

# ADVERTISING MEDIA AND WEB METRICS

---

## Introduction

### Metrics covered in this chapter:

Advertising: Impressions,  
Gross Rating Points, and  
Opportunities-to-See

Cost per Thousand Impressions  
(CPM) Rates

Reach/Net Reach and  
Frequency

Frequency Response Functions

Effective Reach and Effective Frequency

Share of Voice

Impressions, Pageviews, and Hits

Clickthrough Rates

Cost per Impression, Cost per Click,  
and Cost of Acquisition

Visits, Visitors, and Abandonment

Advertising is the cornerstone of many marketing strategies. The positioning and communications conveyed by advertising often set the tone and timing for many other sales and promotion efforts. Advertising is not only the defining element of the marketing mix, but it is also expensive and notoriously difficult to evaluate. This is because it is not easy to track the incremental sales associated with advertising decisions. For many marketers, media metrics are particularly confusing. A command of the vocabulary involved in this field is needed to work with media planners, buyers, and agencies. A strong understanding of media metrics can help marketers ensure that advertising budgets are spent efficiently and directed toward a specific aim.

In the first part of this chapter, we discuss media metrics that reveal how many people may be exposed to an advertising campaign, how often those people have an

opportunity to see the ads, and the cost of each potential impression. Toward that end, we introduce the vocabulary of advertising metrics, including such terms as impressions, exposures, OTS, rating points, GRPs, net reach, effective frequency, and CPMs.

In the second part of this chapter, we focus on metrics used in Web-based marketing efforts. The Internet increasingly provides valuable opportunities to augment traditional “broadcast” advertising with interactive media. In fact, many of the same advertising media terms, such as impressions, are used to describe and evaluate Web-based advertising. Other terms, such as clickthrough, are unique to the Web. Certain Web-specific metrics are needed because the Internet, like direct mail, serves not only as a communications medium, but also as a direct sales channel that can provide real-time feedback on the effectiveness of advertising in generating customer interest and sales.

	Metric	Construction	Considerations	Purpose
9.1	Impressions	An impression is generated each time an advertisement is viewed. The number of impressions achieved is a function of an ad’s reach (the number of people seeing it), multiplied by its frequency (number of times they see it).	As a metric, impressions do not account for quality of viewings. In this regard, a glimpse will have less effect than a detailed study. Impressions are also called exposures and opportunities-to-see (OTS).	To understand how many times an advertisement is viewed.
9.1	Gross Rating Points (GRPs)	Impressions divided by the number of people in the audience for an advertisement.	Impressions expressed in relation to population. GRPs are cumulative across media vehicles, making it possible to achieve GRPs of more than 100%. Target Rating Points (TRPs) are measured in relation to defined target populations.	To measure impressions in relation to the number of people in the audience for an advertising campaign.

	<b>Metric</b>	<b>Construction</b>	<b>Considerations</b>	<b>Purpose</b>
9.2	Cost per Thousand Impressions (CPM)	Cost of advertising divided by impressions generated (in thousands).	CPM is a measure of cost per advertising impression, reckoning impressions in thousands. This makes it easier to work with the resulting dollar figures than would be possible on the basis of cost per single impression.	To measure the cost-effectiveness of the generation of impressions.
9.3	Net Reach	The number of people who receive an advertisement.	Equivalent to reach. Measures unique viewers of an advertisement. Often best mapped on a Venn diagram.	To measure the breadth of an advertisement's spread across a population.
9.3	Average Frequency	The average number of times that an individual receives an advertisement, given that he or she is indeed exposed to the ad.	Frequency is measured only among people who have in fact seen the advertisement under study.	To measure how strongly an advertisement is concentrated on a given population.
9.4	Frequency Response Functions	Linear: All advertising impressions are equally impactful. Threshold: A certain number of impressions are needed before an advertising message will sink in.	Linear model is often unrealistic, especially for complex products. Threshold model is often used, as it is simple and intuitive.	Learning curve model may suggest spurious accuracy in an imprecise process. Should be tested for accuracy.

*Continues*

Metric	Construction	Considerations	Purpose	
9.4 (Continued)	Learning curve: An advertisement has little impact at first but gains force with repetition and then tails off as saturation is achieved.		To model the reaction of a population to exposure to an advertisement.	
9.5	Effective Reach	Reach achieved among individuals who are exposed to an advertisement with a frequency greater than or equal to the effective frequency.	The effective frequency rate constitutes a crucial assumption in the calculation of this metric.	To measure the portion of an audience that is exposed to an advertisement enough times to be influenced.
9.5	Effective Frequency	The number of times an individual must see an advertisement in order to register its message.	As a rule of thumb in planning, marketers often use an effective frequency of 3. To the extent that it promises to have a significant impact on campaign results, this assumption should be tested.	To determine optimal exposure levels for an advertisement or campaign, trading the risk of overspending against the risk of failing to achieve the desired impact.
9.6	Share of Voice	Quantifies the advertising “presence” of a brand, campaign, or firm in relation to total advertising in a market.	Market definition is central to meaningful results. Impressions or ratings represent a conceptually strong basis for share of voice calculations. Often, however, such data are unavailable. Consequently, marketers use spending, an input, as a proxy for output.	To evaluate the relative strength of advertising program within its market.

	Metric	Construction	Considerations	Purpose
9.7	Pageviews	The number of times a Web page is served.	Represents the number of Web pages served. Hits, by contrast, represent pageviews multiplied by the number of files on a page, making it as much a metric of page design as of traffic.	To provide a top-level measure of the popularity of a Web site.
9.8	Clickthrough Rate	Number of click-throughs as a fraction of the number of impressions.	An interactive measure of Web advertising. Has great strengths, but clicks represent only a step toward conversion and are thus an intermediate advertising goal.	To measure the effectiveness of a Web advertisement by counting those customers who are sufficiently intrigued to click through it.
9.9	Cost per Click	Advertising cost, divided by number of clicks generated.	Often used as a billing mechanism.	To measure or establish the cost-effectiveness of advertising.
9.9	Cost per Order	Advertising cost, divided by number of orders generated.	More directly related to profit than cost per click, but less effective in measuring pure marketing. An advertisement may generate strong click-through but yield weak conversion due to a disappointing product.	To measure or establish the cost-effectiveness of advertising.

*Continues*

	Metric	Construction	Considerations	Purpose
9.9	Cost per Customer Acquired	Advertising cost, divided by number of customers acquired.	Useful for purposes of comparison to customer lifetime value. Helps marketers determine whether customers are worth the cost of their acquisition.	To measure the cost-effectiveness of advertising.
9.10	Visits	The number of unique viewings of a Web site.	By measuring visits relative to pageviews, marketers can determine whether viewers are investigating multiple pages on a Web site.	To measure audience traffic on a Web site.
9.10	Visitors	The number of unique Web site viewers in a given period.	Useful in determining the type of traffic generated by a Web site—a few loyal adherents, or many occasional visitors. The period over which this metric is measured can be an important consideration.	To measure the reach of a Web site.
9.10	Abandonment Rate	The rate of purchases started but not completed.	Can warn of weak design in an e-commerce site by measuring the number of potential customers who lose patience with a transaction process or are surprised and put off by “hidden” costs revealed toward its conclusion.	To measure one element of the close rate of Internet business.

## 9.1 Advertising: Impressions, Exposures, Opportunities-To-See (OTS), Gross Rating Points (GRPs), and Target Rating Points (TRPs)

Advertising impressions, exposures, and opportunities-to-see (OTS) all refer to the same metric: an estimate of the audience for a media “insertion” (one ad) or campaign.

**Impressions = OTS = Exposures.** In this chapter, we will use all these terms. It is important to distinguish between “reach” (number of unique individuals exposed to certain advertising) and “frequency” (the average number of times each such individual is exposed).

**Rating Point = Reach** of a media vehicle as a percentage of a defined population (for example, a television show with a rating of 2 reaches 2% of the population).

**Gross Rating Points (GRPs) = Total Ratings** achieved by multiple media vehicles expressed in rating points (for example, advertisements on five television shows with an average rating of 30% would achieve 150 GRPs).

Gross rating points are impressions expressed as a percentage of a defined population, and often total more than 100%. This metric refers to the defined population reached rather than an absolute number of people. Although GRPs are used with a broader audience, the term target rating points (TRPs) denotes a narrower definition of the target audience. For example, TRPs might consider a specific segment such as youths aged 15 to 19, whereas GRPs might be based on the total TV viewing population.

*Purpose: To measure the audience for an advertisement.*

Impressions, exposures, and opportunities-to-see (OTS) are the “atoms” of media planning. Every advertisement released into the world has a fixed number of planned exposures, depending on the number of individuals in its audience. For example, an advertisement that appears on a billboard on the Champs-Élysées in central Paris will have an estimated number of impressions, based on the flow of traffic from visitors and locals. An advertisement is said to “reach” a certain number of people on a number of occasions, or to provide a certain number of “impressions” or “opportunities-to-see.” These impressions or opportunities-to-see are thus a function of the number of people reached and the number of times each such person has an opportunity to see the advertisement.

Methodologies for estimating opportunities-to-see vary by type of media. In magazines, for example, opportunities-to-see will not equal circulation because each copy of the magazine may be read by more than one person. In broadcast media, it is assumed that the quantified audience comprises those individuals available to hear or see an advertisement. In print and outdoor media, an opportunity-to-see might range from a brief glance to a careful consideration. To illustrate this range, imagine you're walking down a busy street. How many billboard advertisements catch your eye? You may not realize it, but you're contributing to the impressions of several advertisements, regardless of whether you ignore them or study them with great interest.

When a campaign involves several types of media, marketers may need to adjust their measures of opportunities-to-see in order to maintain consistency and allow for comparability among the different media.

Gross rating points (GRPs) are related to impressions and opportunities-to-see. They quantify impressions as a percentage of the population reached rather than in absolute numbers of people reached. Target rating points (TRPs) express the same concept but with regard to a more narrowly defined target audience.

## Construction

**Impressions, Opportunities-to-See (OTS), and Exposures:** *The number of times a specific advertisement is delivered to a potential customer. This is an estimate of the audience for a media “insertion” (one ad) or a campaign.*  
*Impressions = OTS = Exposures.*

**Impressions:** The process of estimating reach and frequency begins with data that sum all of the impressions from different advertisements to arrive at total “gross” impressions.

$$\text{Impressions (\#)} = \text{Reach (\#)} * \text{Average Frequency (\#)}$$

The same formula can be rearranged as follows to convey the average number of times that an audience was given the opportunity to see an advertisement. Average frequency is defined as the average number of impressions per individual “reached” by an advertisement or campaign.

$$\text{Average Frequency (\#)} = \frac{\text{Impressions (\#)}}{\text{Reach (\#)}}$$

Similarly, the reach of an advertisement—that is, the number of people with an opportunity to see the ad—can be calculated as follows:

$$\text{Reach (\#)} = \frac{\text{Impressions (\#)}}{\text{Average Frequency (\#)}}$$

Although reach can thus be quantified as the number of individuals exposed to an advertisement or campaign, it can also be calculated as a percentage of the population. In this text, we will distinguish between the two conceptualizations of this metric as reach (#) and reach (%).

The reach of a specific media vehicle, which may deliver an advertisement, is often expressed in rating points. Rating points are calculated as individuals reached by that vehicle, divided by the total number of individuals in a defined population, and expressed in “points” that represent the resulting percentage. Thus, a television program with a rating of 2 would reach 2% of the population.

The rating points of all the media vehicles that deliver an advertisement or campaign can be summed, yielding a measure of the aggregate reach of the campaign, known as gross rating points (GRPs).

**Gross Rating Points (GRPs):** *The sum of all rating points delivered by the media vehicles carrying an advertisement or campaign.*

---

**EXAMPLE:** A campaign that delivers 150 GRPs might expose 30% of the population to an advertisement at an average frequency of 5 impressions per individual ( $150 = 30 * 5$ ). If 15 separate “insertions” of the advertisement were used, a few individuals might be exposed as many as 15 times, and many more of the 30% reached would only have 1 or 2 opportunities-to-see (OTS).

---

**Gross Rating Points (GRPs) (%) = Reach (%) \* Average Frequency (#)**

$$\text{Gross Rating Points (GRPs) (\%)} = \frac{\text{Impressions (\#)}}{\text{Defined Population (\#)}}$$

**Target Rating Points (TRPs):** *The gross rating points delivered by a media vehicle to a specific target audience.*

---

**EXAMPLE:** A firm places 10 advertising insertions in a market with a population of 5 people. The resulting impressions are outlined in the following table, in which “1” represents an opportunity-to-see, and “0” signifies that an individual did not have an opportunity to see a particular insertion.

Insertion	Individual					Impressions	Rating Points (Impressions/ Population)
	A	B	C	D	E		
1	1	1	0	0	1	3	60
2	1	1	0	0	1	3	60
3	1	1	0	1	0	3	60
4	1	1	0	1	0	3	60
5	1	1	0	1	0	3	60
6	1	0	0	1	0	2	40
7	1	0	0	1	0	2	40
8	1	0	0	0	0	1	20
9	1	0	0	0	0	1	20
10	1	0	0	0	0	1	20
<b>Totals</b>	<b>10</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>2</b>	<b>22</b>	<b>440</b>

In this campaign, the total impressions across the entire population = 22.

As insertion 1 generates impressions upon three of the five members of the population, it reaches 60% of that population, for 60 rating points. As insertion 6 generates impressions upon two of the five members of the population, it reaches 40% of the population, for 40 rating points. Gross rating points for the campaign can be calculated by adding the rating points of each insertion.

$$\text{Gross Rating Points (GRPs)} = \text{Rating Points of Insertion 1} + \text{Rating Points of Insertion 2} + \text{etc.} \\ = 440$$

Alternatively, gross rating points can be calculated by dividing total impressions by the size of the population and expressing the result in percentage terms.

$$\text{Gross Rating Points (GRPs)} = \frac{\text{Impressions}}{\text{Population} * 100\%} * 100\% = \frac{22}{5} * 100\% = 440$$

Target rating points (TRPs), by contrast, quantify the gross rating points achieved by an advertisement or campaign among targeted individuals within a larger population.

For purposes of this example, let's assume that individuals A, B, and C comprise the targeted group. Individual A has received 10 exposures to the campaign; individual B, 5 exposures; and individual C, 0 exposures. Thus, the campaign has reached two out of three, or 66.67% of targeted individuals. Among those reached, its average frequency has been 15/2, or 7.5. On this basis, we can calculate target rating points by either of the following methods.

$$\begin{aligned} \text{Target Rating Points (TRPs)} &= \text{Reach (\%)} * \text{Average Frequency} \\ &= 66.67\% * \frac{15}{2} \\ &= 500 \\ \text{Target Rating Points (TRPs)} &= \frac{\text{Impressions (\#)}}{\text{Targets (\#)}} = \frac{15}{3} = 500 \end{aligned}$$

### *Data Sources, Complications, and Cautions*

Data on the estimated audience size (reach) of a media vehicle are typically made available by media sellers. Standard methods also exist for combining data from different media to estimate “net reach” and frequency. An explanation of these procedures is beyond the scope of this book, but interested readers might want to consult a company dedicated to tracking rating points, such as Nielsen ([www.nielsen.com](http://www.nielsen.com)), for further detail.

Two different media plans can yield comparable results in terms of costs and total exposures but differ in reach and frequency measures. In other words, one plan can expose a larger audience to an advertising message less often, while the other delivers more exposures to each member of a smaller audience. For an example, please see Table 9.1.

**Table 9.1** Illustration of Reach and Frequency

	Reach	Average Frequency*	Total Exposures (Impressions, OTS)
Plan A	250,000	4	1,000,000
Plan B	333,333	3	1,000,000

\*Average frequency is the average number of exposures made to each individual who has received at least one exposure to a given advertisement or campaign. To compare impressions across media, or even within classes of media, one must make a broad assumption: that there is some equivalency between the different types of impressions generated by each media classification. Nonetheless, marketers must still compare the “quality” of impressions delivered by different media.

Consider the following examples: A billboard along a busy freeway and a subway advertisement can both yield the same number of impressions. Whereas the subway advertisement has a captive audience, however, members of the billboard audience are generally driving and concentrating on the road. As this example demonstrates, there may be differences in the quality of impressions. To account for these differences, media optimizers apply weightings to different media vehicles. When direct response data are available, they can be used to evaluate the relative effectiveness and efficiency of impression purchases in different media. Otherwise, this weighting might be a matter of judgment. A manager might believe, for example, that an impression generated by a TV commercial is twice as effective as one made by a magazine print advertisement.

Similarly, marketers often find it useful to define audience sub-groups and generate separate reach and frequency statistics for each. Marketers might weight sub-groups differently in the same way that they weight impressions delivered through different media.<sup>1</sup> This helps in evaluating whether an advertisement reaches its defined customer groups.

When calculating impressions, marketers often encounter an overlap of people who see an advertisement in more than one medium. Later in this text, we will discuss how to account for such overlap and estimate the percentage of people who are exposed to an advertisement multiple times.

## 9.2 Cost per Thousand Impressions (CPM) Rates

Cost per thousand impressions (CPM) is the cost per thousand advertising impressions. This metric is calculated by dividing the cost of an advertising placement by the number of impressions (expressed in thousands) that it generates.

$$\text{Cost per Thousand Impressions (CPM)} = \frac{\text{Cost of Advertising (\$)}}{\text{Impressions Generated (\# in thousands)}}$$

CPM is useful in comparing the relative efficiency of different advertising opportunities or media and in evaluating the costs of overall campaigns.

*Purpose: To compare the costs of advertising campaigns within and across different media.*

A typical advertising campaign might try to reach potential consumers in multiple locations and through various media. The cost per thousand impressions (CPM) metric enables marketers to make cost comparisons between these media, both at the planning stage and during reviews of past campaigns.

Marketers calculate CPM by dividing advertising campaign costs by the number of impressions (or opportunities-to-see) that are delivered by each part of the campaign. As the impression counts are generally sizable, marketers customarily work with the CPM impressions. Dividing by 1,000 is an industry standard.

**Cost per Thousand Impressions (CPM):** *The cost of a media campaign, relative to its success in generating impressions or opportunities-to-see.*

### Construction

To calculate CPM, marketers first state the results of a media campaign (gross impressions) in thousands. Second, they divide that result into the relevant media cost:

$$\text{Cost per Thousand Impressions (CPM) (\$)} = \frac{\text{Advertising Cost (\$)}}{\text{Impressions Generated (\# in Thousands)}}$$

---

**EXAMPLE:** An advertising campaign costs \$4,000 and generates 120,000 impressions. On this basis, CPM can be calculated as follows:

$$\begin{aligned} \text{Cost per Thousand Impressions} &= \frac{\text{Advertising Cost}}{\text{Impressions Generated (thousands)}} \\ &= \frac{\$4,000}{(120,000/1,000)} \\ &= \frac{\$4,000}{120} = \$33.33 \end{aligned}$$

---

### Data Sources, Complications, and Cautions

In an advertising campaign, the full cost of the media purchased can include agency fees and production of creative materials, in addition to the cost of media space or time. Marketers also must have an estimate of the number of impressions expected or delivered in the campaign at an appropriate level of detail. Internet marketers (see Section 9.7) often can easily access these data.

CPM is only a starting point for analysis. Not all impressions are equally valuable. Consequently, it can make good business sense to pay more for impressions from some sources than from others.

In calculating CPM, marketers should also be concerned with their ability to capture the full cost of advertising activity. Cost items typically include the amount paid to a

creative agency to develop advertising materials, amounts paid to an organization that sells media, and internal salaries and expenses related to overseeing the advertisement.

### *Related Metrics and Concepts*

**Cost per Point (CPP):** *The cost of an advertising campaign, relative to the rating points delivered. In a manner similar to CPM, cost per point measures the cost per rating point for an advertising campaign by dividing the cost of the advertising by the rating points delivered.*

## 9.3 Reach, Net Reach, and Frequency

Reach is the same as net reach; both of these metrics quantify the number or percentage of individuals in a defined population who receive at least one exposure to an advertisement. Frequency measures the average number of times that each such individual sees the advertisement.

$$\text{Impressions (\#)} = \text{Reach (\#)} * \text{Frequency (\#)}$$

Net reach and frequency are important concepts in describing an advertising campaign. A campaign with a high net reach and low frequency runs the danger of being lost in a noisy advertising environment. A campaign with low net reach but high frequency can over-expose some audiences and miss others entirely. Reach and frequency metrics help managers adjust their advertising media plans to fit their marketing strategies.

*Purpose: To separate total impressions into the number of people reached and the average frequency with which those individuals are exposed to advertising.*

To clarify the difference between reach and frequency, let's review what we learned in Section 9.1. When impressions from multiple insertions are combined, the results are often called "gross impressions" or "total exposures." When total impressions are expressed as a percentage of the population, this measure is referred to as gross rating points (GRPs). For example, suppose a media vehicle reaches 12% of the population. That vehicle will have a single-insertion reach of 12 rating points. If a firm advertised in 10 such vehicles, it would achieve 120 GRPs.

Now, let's look at the composition of these 120 GRPs. Suppose we know that the 10 advertisements had a combined net reach of 40% and an average frequency of 3. Then their gross rating points might be calculated as  $40 * 3 = 120$  GRPs.

**EXAMPLE:** A commercial is shown once in each of three time slots. Nielsen keeps track of which households have an opportunity to see the advertisement. The commercial airs in a market with only five households: A, B, C, D, and E. Time slots 1 and 2 both have a rating of 60 because 60% of the households view them. Time slot 3 has a rating of 20.

Time Slot	Households with Opportunity-to-See	Households with no Opportunity-to-See	Rating Points of Time Slot
1	A B E	C D	60
2	A B C	D E	60
3	A	B C D E	20
		GRP	140

$$\text{GRP} = \frac{\text{Impressions}}{\text{Population}} = \frac{7}{5} = 140 (\%)$$

The commercial is seen by households A, B, C, and E, but not D. Thus, it generates impressions in four out of five households, for a reach (%) of 80%. In the four households reached, the commercial is seen a total of seven times. Thus, its average frequency can be calculated as 7/4, or 1.75. On this basis, we can calculate the campaign’s gross rating points as follows:

$$\text{GRP} = \text{Reach} (\%) * \text{Average Frequency} = \frac{4}{5} * \frac{7}{4} = 80\% * 1.75 = 140 (\%)$$

Unless otherwise specified, simple measures of overall audience size (such as GRPs or impressions) do not differentiate between campaigns that expose larger audiences fewer times and those that expose smaller audiences more often. In other words, these metrics do not distinguish between reach and frequency.

Reach, whether described as “net reach” or simply “reach,” refers to the unduplicated audience of individuals who have been exposed at least once to the advertising in question. Reach can be expressed as either the number of individuals or the percentage of the population that has seen the advertisement.

**Reach:** *The number of people or percent of population exposed to an advertisement.*

Frequency is calculated by dividing gross impressions by reach. Frequency is equal to the average number of exposures received by individuals who have been exposed to at least one impression of the advertising in question. Frequency is calculated *only* among individuals who have been exposed to this advertising. On this basis: Total Impressions = Reach \* Average Frequency.

**Average Frequency:** *The average number of impressions per reached individual.*

Media plans can differ in reach and frequency but still generate the same number of total impressions.

**Net Reach:** *This term is used to emphasize the fact that the reach of multiple advertising placements is not calculated through the gross addition of all individuals reached by each of those placements. Occasionally, the word “net” is eliminated, and the metric is called simply reach.*

**EXAMPLE:** Returning to our prior example of a 10-insertion media plan in a market with a population of five people, we can calculate the reach and frequency of the plan by analyzing the following data. As previously noted, in the following table, “1” represents an opportunity-to-see, and “0” signifies that an individual did not have an opportunity to see a particular insertion.

Insertion	Individual					Impressions	Rating Points (Impressions/ Population)
	A	B	C	D	E		
1	1	1	0	0	1	3	60
2	1	1	0	0	1	3	60
3	1	1	0	1	0	3	60
4	1	1	0	1	0	3	60
5	1	1	0	1	0	3	60
6	1	0	0	1	0	2	40
7	1	0	0	1	0	2	40
8	1	0	0	0	0	1	20
9	1	0	0	0	0	1	20
10	1	0	0	0	0	1	20
<b>Totals</b>	<b>10</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>2</b>	<b>22</b>	<b>440</b>

Reach is equal to the number of people who saw at least one advertisement. Four of the five people in the population (A, B, D, and E) saw at least one advertisement. Consequently, reach (#) = 4.

$$\text{Average Frequency} = \frac{\text{Impressions}}{\text{Reach}} = \frac{22}{4} = 5.5$$

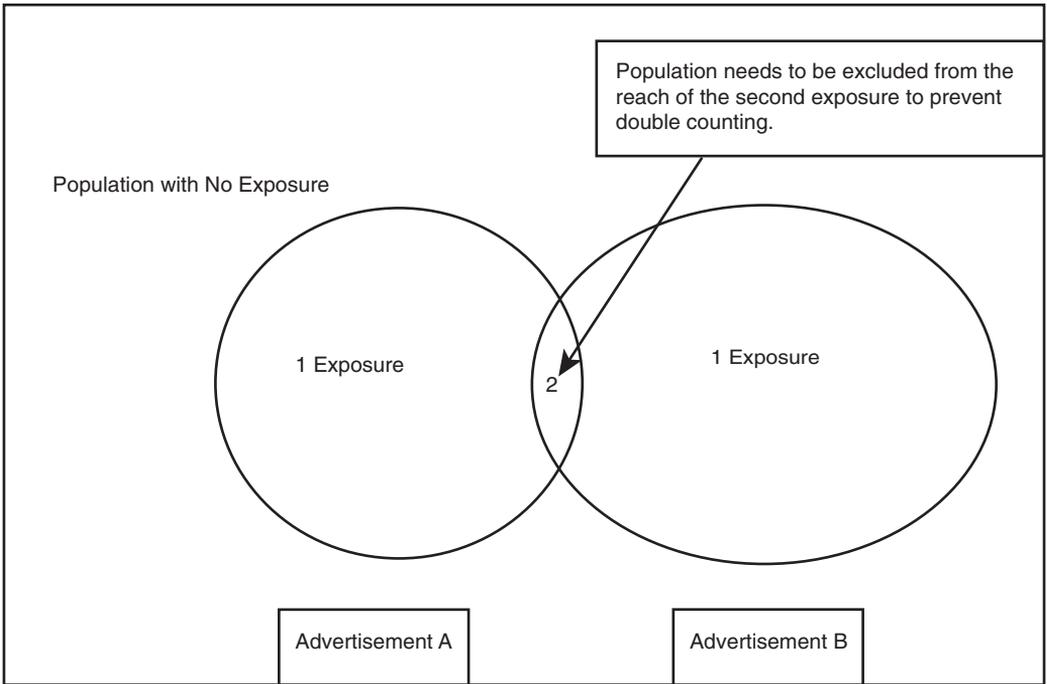


Figure 9.1 Venn Diagram Illustration of Net Reach

When multiple vehicles are involved in an advertising campaign, marketers need information about the overlap among these vehicles as well as sophisticated mathematical procedures in order to estimate reach and frequency. To illustrate this concept, the following two-vehicle example can be useful. Overlap can be represented by a graphic known as a Venn diagram (see Figure 9.1).

**EXAMPLE:** As an illustration of overlap effects, let's look at two examples. *Aircraft International* magazine offers 850,000 impressions for one advertisement. A second magazine, *Commercial Flying Monthly*, offers 1 million impressions for one advertisement.

Example 1: Marketers who place advertisements in both magazines should not expect to reach 1.85 million readers. Suppose that 10% of *Aircraft International* readers also read *Commercial Flying Monthly*. On this basis, net reach =  $(850,000 \times .9) + 1,000,000 = 1,765,000$  unique individuals. Of these, 85,000 (10% of *Aircraft International* readers) have received two exposures. The remaining 90% of *Aircraft International* readers have received only one exposure. The overlap between two different media types is referred to as external overlap.

Example 2: Marketers often use multiple insertions in the same media vehicle (such as the July and August issues of the same magazine) to achieve frequency. Even if the estimated audience size is the same for both months, not all of the same people will read the

magazine each month. For purposes of this example, let's assume that marketers place insertions in two different issues of *Aircraft International*, and that only 70% of readers of the July issue also read the August issue. On this basis, net reach is not merely 850,000 (the circulation of each issue of *Aircraft International*) because the groups viewing the two insertions are not precisely the same. Likewise, net reach is not  $2 \times 850,000$ , or 1.7 million, because the groups viewing the two insertions are also not completely disparate. Rather, net reach =  $850,000 + (850,000 \times 30\%) = 1,105,000$ .

The reason: Thirty percent of readers of the August issue did not read the July issue and so did not have the opportunity to see the July insertion of the advertisement. These readers—and only these readers—represent incremental viewers of the advertisement in August, and so they must be added to net reach. The remaining 70% of August readers were exposed to the advertisement twice. Their total represents internal overlap or duplication.

---

### *Data Sources, Complications, and Cautions*

Although we've emphasized the importance of reach and frequency, the impressions metric is typically the easiest of these numbers to establish. Impressions can be aggregated on the basis data originating from the media vehicles involved in a campaign. To determine net reach and frequency, marketers must know or estimate the overlap between audiences for different media, or for the same medium at different times. It is beyond the capability of most marketers to make accurate estimates of reach and frequency without access to proprietary databases and algorithms. Full-service advertising agencies and media buying companies typically offer these services.

Assessing overlap is a major challenge. Although overlap can be estimated by performing customer surveys, it is difficult to do this with precision. Estimates based on managers' judgment occasionally must suffice.

## 9.4 Frequency Response Functions

Frequency response functions help marketers to model the effectiveness of multiple exposures to advertising. We discuss three typical assumptions about how people respond to advertisements: linear response, learning curve response, and threshold response.

In a linear response model, people are assumed to react equally to every exposure to an advertisement. The learning curve response model assumes that people are initially slow to respond to an advertisement and then respond more quickly for a time, until ultimately they reach a point at which their response to the message tails off. In a threshold response function, people are assumed to show little response until a critical frequency level is reached. At that point, their response immediately rises to maximum capacity.

Frequency response functions are not technically considered metrics. Understanding how people respond to the frequency of their exposure to advertising, however, is a vital part of media planning. Response models directly determine calculations of effective frequency and effective reach, metrics discussed in Section 9.5.

*Purpose: To establish assumptions about the effects of advertising frequency.*

Let's assume that a company has developed a message for an advertising campaign, and that its managers feel confident that appropriate media for the campaign have been selected. Now they must decide: How many times should the advertisement be placed? The company wants to buy enough advertising space to ensure that its message is effectively conveyed, but it also wants to ensure that it doesn't waste money on unnecessary impressions.

To make this decision, a marketer will have to make an assumption about the value of frequency. This is a major consideration: What is the assumed value of repetition in advertising? Frequency response functions help us to think through the value of frequency.

**Frequency Response Function:** *The expected relationship between advertising outcomes (usually in unit sales or dollar revenues) and advertising frequency.*

There are a number of possible models for the frequency response functions used in media plans. A selection among these for a particular campaign will depend on the product advertised, the media used, and the judgment of the marketer. Three of the most common models are described next.

**Linear Response:** *The assumption behind a linear response function is that each advertising exposure is equally valuable, regardless of how many other exposures to the same advertising have preceded it.*

**Learning Curve Response:** *The learning or S curve model rests on the assumption that a consumer's response to advertising follows a progression: The first few times an advertisement is shown, it does not register with its intended audience. As repetition occurs, the message permeates its audience and becomes more effective as people absorb it. Ultimately, however, this effectiveness declines, and diminishing returns set in. At this stage, marketers believe that individuals who want the information already have it and can't be influenced further; others simply are not interested.*

**Threshold Response:** *The assumption behind this model is that advertising has no effect until its exposure reaches a certain level. At that point, its message becomes fully effective. Beyond that point, further advertising is unnecessary and would be wasted.*

These are three common ways to value advertising frequency. Any function that accurately describes the effect of a campaign can be used. Typically, however, only one function will apply to a given situation.

### Construction

Frequency response functions are most useful if they can be used to quantify the effects of incremental frequency. To illustrate the construction of the three functions described in this section, we have tabulated several examples.

Tables 9.2 and 9.3 show the assumed incremental effects of each exposure to a certain advertising campaign. Suppose that the advertisement will achieve maximum effect (100%) at eight exposures. By analyzing this effect in the context of various response functions, we can determine when and how quickly it takes hold.

Under a linear response model, each exposure below the saturation point generates one-eighth, or 12.5%, of the overall effect.

The learning curve model is more complex. In this function, the incremental effectiveness of each exposure increases until the fourth exposure and declines thereafter.

Under the threshold response model, there is no effect until the fourth exposure. At that point, however, 100% of the benefit of advertising is immediately realized. Beyond that point, there is no further value to be obtained through incremental advertising. Subsequent exposures are wasted.

The effects of these advertising exposures are tabulated cumulatively in Table 9.3. In this display, maximum attainable effectiveness is achieved when the response to advertising reaches 100%.

Table 9.2 Example of the Effectiveness of Advertising

Exposure Frequency	Linear	Learning or S Curve	Threshold Value
1	0.125	0.05	0
2	0.125	0.1	0
3	0.125	0.2	0
4	0.125	0.25	1
5	0.125	0.2	0
6	0.125	0.1	0
7	0.125	0.05	0
8	0.125	0.05	0

Table 9.3 Assumptions: Cumulative Advertising Effectiveness

Exposure Frequency	Linear	Learning or S Curve	Threshold Value
1	12.5%	5%	0%
2	25.0%	15%	0%
3	37.5%	35%	0%
4	50.0%	60%	100%
5	62.5%	80%	100%
6	75.0%	90%	100%
7	87.5%	95%	100%
8	100.0%	100%	100%

We can plot cumulative effectiveness against frequency under each model (see Figure 9.2). The linear function is represented by a simple straight line. The Threshold assumption rises steeply at four exposures to reach 100%. The cumulative effects of the learning curve model trace an S-shaped curve.

**Frequency Response Function; Linear:** *Under this function, the cumulative effect of advertising (up to the saturation point) can be viewed as a product of the frequency of exposures and effectiveness per exposure.*

Frequency Response Function; Linear (I) = Frequency (#) \* Effectiveness per Exposure (I)

**Frequency Response Function; Learning Curve:** *The learning curve function can be charted as a non-linear curve. Its form depends on the circumstances of a particular campaign, including selection of advertising media, target audience, and frequency of exposures.*

**Frequency Response Function; Threshold:** *The threshold function can be expressed as a Boolean “if” statement, as follows:*

Frequency Response Function; Threshold Value (I) = If (Frequency (#)  $\geq$  Threshold (#), 1, 0)

Stated another way: In a threshold response function, if frequency is greater than or equal to the threshold level of effectiveness, then the advertising campaign is 100% effective. If frequency is less than the threshold, there is no effect.

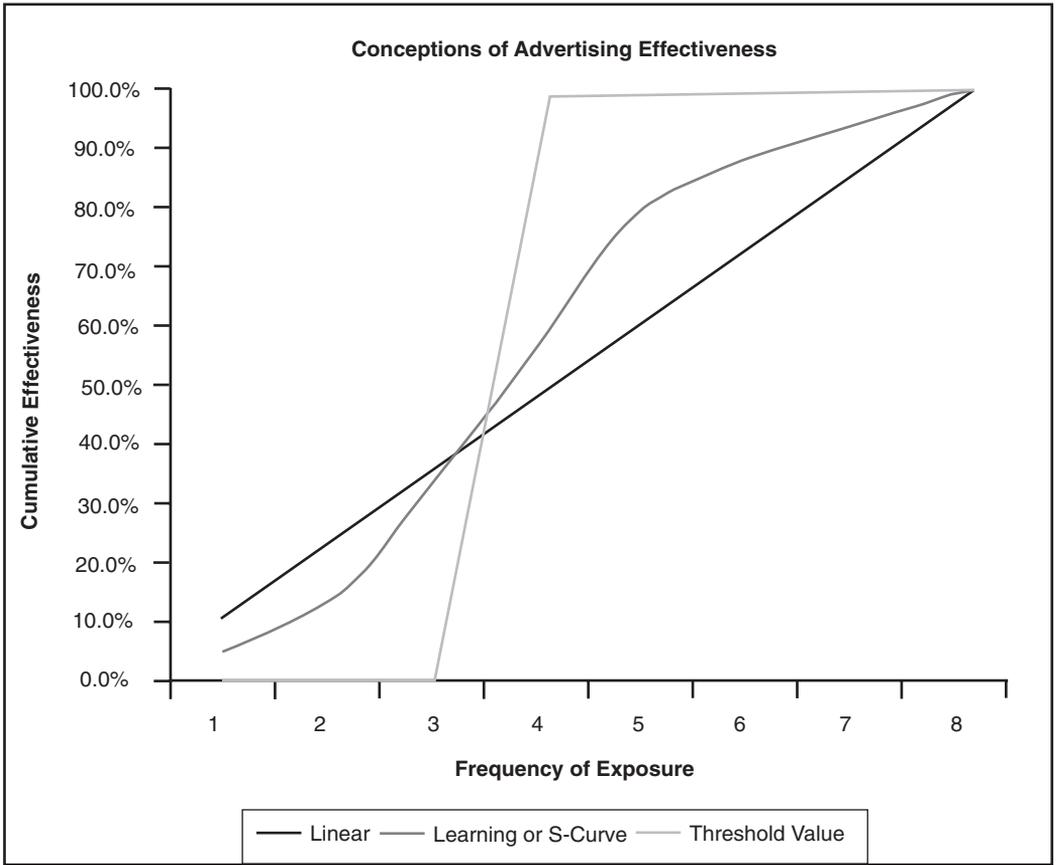


Figure 9.2 Illustration of Cumulative Advertising Effectiveness

### *Data Sources, Complications, and Cautions*

A frequency response function can be viewed as the structure of assumptions made by marketers in planning for the effects of an advertising campaign. In making these assumptions, a marketer's most useful information can be derived from an analysis of the effects of prior ad campaigns. Functions validated with past data, however, are most likely to be accurate if the relevant circumstances (such as media, creative, price, and product) have not significantly changed.

In comparing the three models discussed in this section, the linear response function has the benefit of resting on a simple assumption. It can be unrealistic, however, because it is hard to imagine that every advertising exposure in a campaign will have the same effect.

The learning curve has intuitive appeal. It seems to capture the complexity of life better than a linear model. Under this model, however, challenges arise in defining and

predicting an advertisement's effectiveness. Three questions emerge: At what point does the curve begin to ramp up? How steep is the function? When does it tail off? With considerable research, marketers can make these estimates. Without it, however, there will always be the concern that the learning curve function provides a spurious level of accuracy.

Any implementation of the threshold response function will hinge on a firm's estimate of where the threshold lies. This will have important ramifications. If the firm makes a conservative estimate, setting the tipping point at a high number of exposures, it may pay for ineffective and unneeded advertising. If it sets the tipping point too low, however, it may not buy enough advertising media, and its campaign may fail to achieve the desired effect. In implementation, marketers may find that there is little practical difference between using the threshold model and the more complicated learning curve.

### *Related Metrics and Concepts*

**Wear-in:** *The frequency required before a given advertisement or campaign achieves a minimum level of effectiveness.*

**Wear-out:** *The frequency at which a given advertisement or campaign begins to lose effectiveness or even yield a negative effect.*

## 9.5 Effective Reach and Effective Frequency

The concept of effective frequency rests on the assumption that for an advertisement or campaign to achieve an appreciable effect, it must attain a certain number of exposures to an individual within a specified time period.

Effective reach is defined as the number of people or the percentage of the audience that receives an advertising message with a frequency equal to or greater than the effective frequency. That is, effective reach is the population receiving the “minimum” effective exposure to an advertisement or campaign.

*Purpose: To assess the extent to which advertising audiences are being reached with sufficient frequency.*

Many marketers believe their messages require repetition to “sink in.” Advertisers, like parents and politicians, therefore repeat themselves. But this repetition must be monitored for effectiveness. Toward that end, marketers apply the concepts of effective frequency and effective reach. The assumptions behind these concepts run as follows: The first few times people are exposed to an ad, it may have little effect. It is only when more exposures are achieved that the message begins to influence its audience.

With this in mind, in planning and executing a campaign, an advertiser must determine the number of times that a message must be repeated in order to be useful. This number is the effective frequency. In concept, this is identical to the threshold frequency in the threshold response function discussed in Section 9.4. A campaign's effective frequency will depend on many factors, including market circumstances, media used, type of ad, and campaign. As a rule of thumb, however, an estimate of three exposures per purchase cycle is used surprisingly often.

**Effective Frequency:** *The number of times a certain advertisement must be exposed to a particular individual in a given period to produce a desired response.*

**Effective Reach:** *The number of people or the percentage of the audience that receives an advertising message with a frequency equal to or greater than the effective frequency.*

### Construction

Effective reach can be expressed as the number of people who have seen a particular advertisement or the percentage of the population that has been exposed to that advertisement at a frequency greater than or equal to the effective frequency.

$$\text{Effective Reach (\#, \%)} = \text{Individuals Reached with Frequency Equal to or Greater Than Effective Frequency}$$

---

**EXAMPLE:** An advertisement on the Internet was believed to need three viewings before its message would sink in. Population data showed the distribution in Table 9.4.

Table 9.4 Number of Views of Advertisement

Number of Views	Population
0	140,000
1	102,000
2	64,000
3	23,000
4 or more	11,000
<b>Total</b>	<b>340,000</b>

Because the effective frequency is 3, only those who have seen the advertisement three or more times have been effectively reached. The effective reach is thus  $23,000 + 11,000 = 34,000$ .

In percentage terms, the effective reach of this advertisement is  $34,000/340,000 = 10\%$  of the population.

---

### *Data Sources, Complications, and Cautions*

The Internet has provided a significant boost to data gathering in this area. Although even Internet campaigns can't be totally accurate with regard to the number of advertisements served to each customer, data on this question in Web campaigns are far superior to those available in most other media.

Where data can't be tracked electronically, it's difficult to know how many times a customer has been in a position to see an advertisement. Under these circumstances, marketers make estimates on the basis of known audience habits and publicly available resources, such as TV ratings.

Although test markets and split-cable experiments can shed light on the effects of advertising frequency, marketers often lack comprehensive, reliable data on this question. In these cases, they must make—and defend—assumptions about the frequency needed for an effective campaign. Even where good historical data are available, media planning should not rely solely on past results because every campaign is different.

Marketers must also bear in mind that effective frequency attempts to quantify the *average* customer's response to advertising. In practice, some customers will need more information and exposure than others.

## 9.6 Share of Voice

Share of voice quantifies the advertising “presence” that a specific product or brand enjoys. It is calculated by dividing the brand's advertising by total market advertising, and it is expressed as a percentage.

$$\text{Share of Voice (\%)} = \frac{\text{Brand Advertising (\$, \#)}}{\text{Total Market Advertising (\$, \#)}}$$

For purposes of share of voice, there are at least two ways to measure “advertising”: in terms of dollar spending; or in unit terms, through impressions or gross rating points (GRPs). By any of these measures, share of voice represents an estimate of a company's advertising, as compared to that of its competitors.

*Purpose: To evaluate the comparative level of advertising committed to a specific product or brand.*

Advertisers want to know whether their messages are breaking through the “noise” in the commercial environment. Toward that end, share of voice offers one indication of a brand’s advertising strength, relative to the overall market.

There are at least two ways to calculate share of voice. The classic approach is to divide a brand’s advertising dollar spend by the total advertising spend in the marketplace.

Alternatively, share of voice can be based on the brand’s share of GRPs, impressions, effective reach, or similar measures (see earlier sections in this chapter for more details on basic advertising metrics).

### *Construction*

**Share of Voice:** *The percentage of advertising in a given market that a specific product or brand enjoys.*

$$\text{Share of Voice (\%)} = \frac{\text{Brand Advertising (\$, \#)}}{\text{Total Market Advertising (\$, \#)}}$$

### *Data Sources, Complications, and Cautions*

When calculating share of voice, a marketer’s central decision revolves around defining the boundaries of the market. One must ensure that these are meaningful to the intended customer. If a firm’s objective is to influence savvy Web users, for example, it would not be appropriate to define advertising presence solely in terms of print media. Share of voice can be computed at a company level, but brand- and product-level calculations are also common.

In executing this calculation, a company should be able to measure its total advertising spend fairly easily. Determining the ad spending for the market as a whole can be fraught with difficulty, however. Complete accuracy will probably not be attainable. It is important, however, that marketers take account of the major players in their market. External sources such as annual reports and press clippings can shed light on competitors’ ad spending. Services such as leading national advertisers (LNA) can also provide useful data. These services sell estimates of competitive purchases of media space and time. They generally do not report actual payments for media, however. Instead, costs are estimated on the basis of the time and space purchased and on published “rate cards” that list advertised prices. In using these estimates, marketers must bear in mind that rate cards rarely cite the discounts available in buying media. Without accounting

for these discounts, published media spending estimates can be inflated. Marketers are advised to deflate them by the discount rates they themselves receive on advertising.

A final caution: Some marketers might assume that the price of advertising is equal to the value of that advertising. This is not necessarily the case. With this in mind, it can be useful to augment a dollar-based calculation of share of voice with one based on impressions.

## 9.7 Impressions, Pageviews, and Hits

As noted in Section 9.1, impressions represent the number of opportunities that have been presented to people to see an advertisement. The best available measures of this figure use technology in an effort to judge whether a given advertisement was actually seen. But this is never perfect. Many recorded impressions are not actually perceived by the intended viewer. Consequently, some marketers refer to this metric as opportunities-to-see.

In applying this concept to Internet advertising and publishing, pageviews represent the number of opportunities-to-see for a given Web page. Every Web page is composed of a variety of individual objects and files, which can contain text, images, audio, and video. The total number of these files requested in a given period is the number of hits a Web site or Web server receives. Because pages composed of many small files generate numerous hits per pageview, one must take care not to be overly impressed by large hit counts.

*Purpose: To assess Web site traffic and activity.*

To quantify the traffic a Web site generates, marketers monitor pageviews—the number of times a page on a Web site is accessed.

In the early days of e-commerce, managers paid attention to the number of hits a Web site received. Hits measure file requests. Because Web pages are composed of numerous text, graphic, and multimedia files, the hits they receive are a function not only of pageviews, but also of the way those pages were composed by their Web designer.

As marketing on the Internet has become more sophisticated, better measures of Web activity and traffic have evolved. Currently, it is more common to use pageviews as the measure of traffic at a Web location. Pageviews aim to measure the number of times a page has been displayed to a user. It thus should be measured as close to the end user as possible. The best technology counts pixels returned to a server, confirming that a page was properly displayed. This pixel<sup>2</sup> count technique yields numbers closer to the end user than would a tabulation of requests to the server, or of pages sent from the server

in response to a request. Good measurement can mitigate the problems of inflated counts due to servers not acting on requests, files failing to serve on a user's machine, or users terminating the serving of ads.

**Hits:** *A count of the number of files served to visitors on the Web. Because Web pages often contain multiple files, hits is a function not only of pages visited, but also of the number of files on each page.*

**Pageviews:** *The number of times a specific page has been displayed to users. This should be recorded as late in the page-delivery process as possible in order to get as close as possible to the user's opportunity to see. A page can be composed of multiple files.*

For marketing purposes, a further distinction needs to be made as to how many times an advertisement was viewed by unique visitors. For example, two individuals entering a Web page from two different countries might receive the page in their respective languages and might not receive the same ad. One example of an advertisement that changes with different visitors is an embedded link with a banner ad. Recognizing this potential for variation, advertisers want to know the number of times that their specific advertisement was displayed to visitors, rather than a site's number of pageviews.

With this in mind, Internet advertisers often perform their analyses in terms of impressions—sometimes called ad impressions or ad views. These represent the number of times an advertisement is served to visitors, giving them opportunities to see it. (Many of the concepts in this section are in line with the terms covered in the advertising section, Section 9.1.)

For a single advertisement served to all visitors on a site, impressions are equal to the number of pageviews. If a page carries multiple advertisements, the total number of all ad impressions will exceed the number of pageviews.

### *Construction*

**Hits:** The number of hits on a Web site is a function of the number of pageviews multiplied by the number of files comprising each page. Hit counts are likely to be more relevant to technicians responsible for planning server capacity than to marketers interested in measuring visitor activity.

$$\text{Hits (\#)} = \text{Pageviews (\#)} * \text{Files on the Page (\#)}$$

**Pageviews:** The number of pageviews can be easily calculated by dividing the number of hits by the number of files on the page.

$$\text{Pageviews (\#)} = \frac{\text{Hits (\#)}}{\text{Files on the Page (\#)}}$$

---

**EXAMPLE:** There are 250,000 hits on a Web site that serves five files each time a page is accessed. Pageviews =  $250,000/5 = 50,000$ .

If the Web site served three files per page and generated 300,000 pageviews, then hits would total  $3 * 300,000 = 900,000$ .

---

### *Data Sources, Complications, and Cautions*

Pageviews, page impressions, and ad impressions are measures of the responses of a Web server to page and ad requests from users' browsers, filtered to remove robotic activity and error codes prior to reporting. These measures are recorded at a point as close as possible to the user's opportunity to see the page or ad.<sup>3</sup>

A count of ad impressions can be derived from pageviews if the percentage of pageviews that contain the ad in question is known. For example, if 10% of pageviews receive the advertisement for a luxury car, then the impressions for that car ad will equal 10% of pageviews. Web sites that serve the same advertisement to all Web users are much easier to monitor because only one count is required.

These metrics quantify opportunities-to-see without taking into account the number of ads actually seen or the quality of what is shown. In particular, these metrics do not account for the following:

- Whether the message appeared to a specific, relevant, defined audience.
- Whether the people to whom the pages appeared actually looked at them.
- Whether those who looked at the pages had any recall of their content, or of the advertising messages they contained, after the event.

Despite the use of the term impression, these measures do not tell a business manager about the effect that an advertisement has on potential customers. Marketers can't be sure of the effect that pageviews have on visitors. Often, pageview results will consist of data that include duplicate showings to the same visitor. For this reason, the term gross impressions might be used to suggest a key assumption—that opportunities-to-see can be delivered to the same viewer on multiple occasions.

## 9.8 Clickthrough Rates

Clickthrough rate is the percentage of impressions that lead a user to click on an ad. It describes the fraction of impressions that motivate users to click on a link, causing a redirect to another Web location.

$$\text{Clickthrough Rate (\%)} = \frac{\text{Clickthroughs (\#)}}{\text{Impressions (\#)}}$$

Most Internet-based businesses use clickthrough metrics. Although these metrics are useful, they should not dominate all marketing analysis. Unless a user clicks on a “Buy Now” button, clickthroughs measure only one step along the path toward a final sale.

*Purpose: To capture customers’ initial response to Web sites.*

Most commercial Web sites are designed to elicit some sort of action, whether it be to buy a book, read a news article, watch a music video, or search for a flight. People generally don’t visit a Web site with the intention of viewing advertisements, just as people rarely watch TV with the purpose of consuming commercials. As marketers, we want to know the reaction of the Web visitor. Under current technology, it is nearly impossible to fully quantify the emotional reaction to the site and the effect of that site on the firm’s brand. One piece of information that is easy to acquire, however, is the clickthrough rate. The clickthrough rate measures the proportion of visitors who initiated action with respect to an advertisement that redirected them to another page where they might purchase an item or learn more about a product or service. Here we have used “clicked their mouse” on the advertisement (or link) because this is the generally used term, although other interactions are possible.

### *Construction*

**Clickthrough Rate:** *The clickthrough rate is the number of times a click is made on the advertisement divided by the total impressions (the times an advertisement was served).*

$$\text{Clickthrough Rate (\%)} = \frac{\text{Clickthroughs (\#)}}{\text{Impressions (\#)}}$$

**Clickthroughs:** *If you have the clickthrough rate and the number of impressions, you can calculate the absolute number of clickthroughs by multiplying the clickthrough rate by the impressions.*

$$\text{Clickthroughs (\#)} = \text{Clickthrough Rate (\%)} * \text{Impressions (\#)}$$

---

**EXAMPLE:** There are 1,000 clicks (the more commonly used shorthand for clickthroughs) on a Web site that serves up 100,000 impressions. The clickthrough rate is 1%.

$$\text{Clickthrough Rate} = \frac{1,000}{100,000} = 1\%$$

If the same Web site had a clickthrough rate of 0.5%, then there would have been 500 clickthroughs:

$$\text{Clickthrough Rate} = 100,000 * 0.5\% = 500$$

If a different Web site had a 1% clickthrough rate and served up 200,000 impressions, there would have been 2,000 clicks:

$$\# \text{ of Clicks} = 1\% * 200,000 = 2,000$$

---

### *Data Sources, Complications, and Cautions*

The number of impressions is a necessary input for the calculation. On simpler Web sites, this is likely to be the same as pageviews; every time the page is accessed, it shows the same details. On more sophisticated sites, different advertisements can be shown to different viewers. In these cases, impressions are likely to be some fraction of total pageviews. The server can easily record the number of times the link was clicked (see Figure 9.3).

First, remember that clickthrough rate is expressed as a percentage. Although high clickthrough rates might in themselves be desirable and help validate your ad's appeal, companies will also be interested in the total number of people who clicked through. Imagine a Web site with a clickthrough rate of 80%. It may seem like a highly successful Web site until management uncovers that only a total number of 20 people visited the site with 16 clicking through compared with an objective of 500 visitors.

Also remember that a click is a very weak signal of interest. Individuals who click on an ad might move on to something else before the new page is loaded. This could be because the person clicked on the advertisement by accident or because the page took too long to load. This is a problem that is of greater significance with the increase in richer media advertisements. Marketers should understand their customers. Using large video files is likely to increase the number of people abandoning the process before the ad is served, especially if the customers have slower connections.

As with impressions, try to ensure that you understand the measures. If the measure is of clicks (the requests received from client machines to the server to send a file), then there may be a number of breakage points between the clickthrough rate and the impressions of the ad generated from a returned pixel count. Large discrepancies should be understood—is it technical (the size/design of the advertisement) or weak interest from clickers?

Clicks are the number of times the advertisement was interacted with, not the number of customers who clicked. An individual visitor can click on an ad several times—either in a single session or across multiple sessions. Only the most sophisticated Web sites control the number of times they show a specific advertisement to the same customer. This means that most Web sites can only count the number of times the ad was clicked, not the number of visitors who clicked on an ad. Finally, the clickthrough rate must be

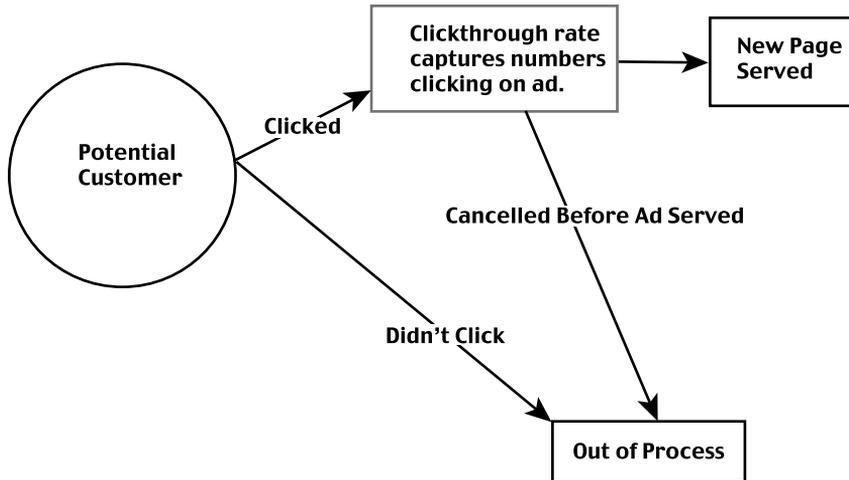


Figure 9.3 Clickthrough Process

interpreted relative to an appropriate baseline. Clickthrough rates for banner ads are very low and continue to fall. In contrast, clickthrough rates for buttons that simply take visitors to the next page on a site should be much higher. An analysis of how clickthrough rates change as visitors navigate through various pages can help identify “dead end” pages that visitors rarely move beyond.

## 9.9 Cost per Impression, Cost per Click, and Cost per Order

These three metrics measure the average cost of impressions, clicks, and customers. All three are calculated in the same way—as the ratio of cost to the number of resulting impressions, clicks, or customers.

$$\text{Cost per Impression} = \frac{\text{Advertising Cost (\$)}}{\text{Number of Impressions (\#)}}$$

$$\text{Cost per Click (\$)} = \frac{\text{Advertising Cost (\$)}}{\text{Number of Clicks (\#)}}$$

$$\text{Cost per Order (\$)} = \frac{\text{Advertising Cost (\$)}}{\text{Orders (\#)}}$$

These metrics are the starting point for assessing the effectiveness of a company’s Internet advertising and can be used for comparison across advertising media and vehicles and as an indicator of the profitability of a firm’s Internet marketing.

*Purpose: To assess the cost effectiveness of Internet marketing.*

In this section, we present three common ways of measuring the cost effectiveness of Internet advertising. Each has benefits depending upon the perspective and end goal of the advertising activity.

**Cost per Impression:** *The cost to offer potential customers one opportunity to see an advertisement.*

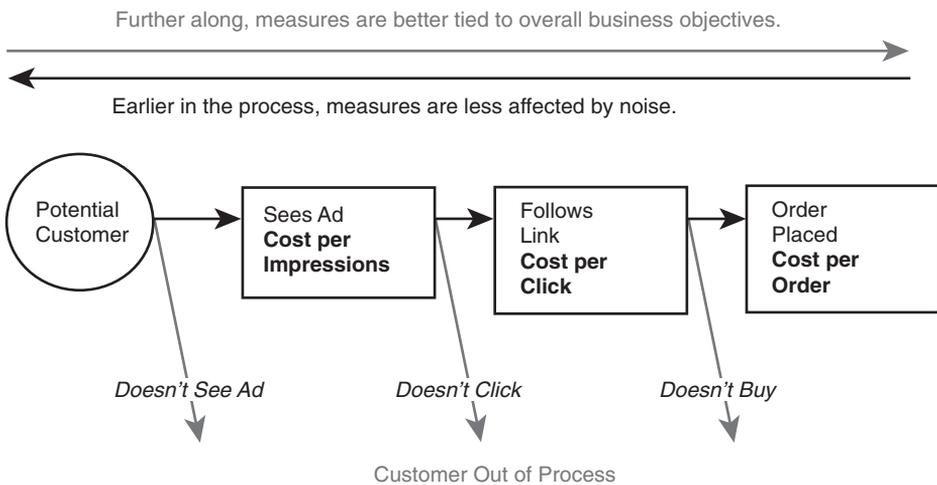
**Cost per Click:** *The amount spent to get an advertisement clicked.*

Cost per click has a big advantage over cost per impression in that it tells us something about how effective the advertising was. Clicks are a way to measure attention and interest. Inexpensive ads that few people click on will have a low cost per impression and a high cost per click. If the main purpose of an ad is to generate a click, then cost per click is the preferred metric.

**Cost per Order:** *The cost to acquire an order.*

If the main purpose of the ad is to generate sales, then cost per order is the preferred metric.

Once a certain number of Web impressions are achieved, the quality and placement of the advertisement will affect clickthrough rates and the resulting cost per click (see Figure 9.4).



**Figure 9.4** The Order Acquisition Process

## Construction

The formulas are essentially the same for the alternatives; just divide the cost by the appropriate number, for example, impressions, clicks, or orders.

**Cost per Impression:** This is derived from advertising cost and the number of impressions.

$$\text{Cost per Impression (\$)} = \frac{\text{Advertising Cost (\$)}}{\text{Number of Impressions (\#)}}$$

Remember that cost per impression is often expressed as cost per thousand impressions (CPM) in order to make the numbers easier to manage (for more on CPM, refer to Section 9.2).

**Cost per Click:** This is calculated by dividing the advertising cost by the number of clicks generated by the advertisement.

$$\text{Cost per Click (\$)} = \frac{\text{Advertising Cost (\$)}}{\text{Clicks (\#)}}$$

**Cost per Order:** This is the cost to generate an order. The precise form of this cost depends on the industry and is complicated by product returns and multiple sales channels. The basic formula is

$$\text{Cost per Order (\$)} = \frac{\text{Advertising Cost (\$)}}{\text{Orders Placed (\#)}}$$

---

**EXAMPLE:** An Internet retailer spent \$24,000 on online advertising and generated 1.2 million impressions, which led to 20,000 clicks, with 1 in 10 clicks resulting in a purchase.

$$\text{Cost per Impression} = \frac{\$24,000}{1,200,000} = \$0.02$$

$$\text{Cost per Click} = \frac{\$24,000}{20,000} = \$1.20$$

If 1 in 10 of the clicks resulted in a purchase

$$\text{Cost per Order} = \frac{\$24,000}{2,000} = \$12.00$$

This last calculation is also called “cost per purchase.”

---

## *Data Sources, Complications, and Cautions*

The Internet has provided greater availability of advertising data. Consequently, Internet advertising metrics are likely to rely on data that is more readily obtainable than data from conventional channels. The Internet can provide more information about how customers move through the system and how individual customers behave at the purchase stage of the process.

For advertisers using a mix of online and “offline” media, it will be difficult to categorize the cause and effect relationships between advertising and sales from both online and offline sources. Banner ads might receive too much credit for an order if the customer has also been influenced by the firm’s billboard advertisement. Conversely, banner ads might receive too little credit for offline sales.

The calculations and data we have discussed in this section are often used in contracts compensating advertisers. Companies may prefer to compensate media and ad agencies on the basis of new customers acquired instead of orders.

### *SEARCH ENGINES*

Search engine payments help determine the placement of links on search engines. The most important search engine metric is the cost per click, and it is generally the basis for establishing the search engine placement fee. Search engines can provide plenty of data to analyze the effectiveness of a campaign. In order to reap the benefits of a great Web site, the firm needs to get people to visit it. In the previous section, we discussed how firms *measure* traffic. Search engines help firms *create* that traffic.

Although a strong brand helps drive traffic to a firm’s site, including the firm’s Web address in all of its offline advertising might not increase traffic count. In order to generate additional traffic, firms often turn to search engines. It was estimated that over \$2.5 billion was spent on paid search marketing, which made up approximately 36% of total online spending of \$7.3 billion in 2003.<sup>4</sup> Other online spending was composed of the following categories: 50% as impressions, 12% as banner ads, and 2% as email advertising.

Paid search marketing is essentially paying for the placement of ads on search engines and content sites across the Internet. The ads are typically small portions of text (much like newspaper want ads) made to look like the results of an unpaid or organic search. Payment is usually made only when someone clicks on the ad. It is sometimes possible to pay more per click in return for better placement on the search results page. One important subset of paid search is keyword search in which advertisers can bid to be displayed whenever someone searches for the keyword(s). In this case, companies bid on the basis of cost per click. Bidding a higher amount per click gets you placed higher. However, there is an added complexity, which is if the ad fails to generate several clicks, its placement will be lowered in comparison to competing ads.

The measures for testing search engine effectiveness are largely the same as those used in assessing other Internet advertising.

**Cost per Click:** The most important concept in search engine marketing is cost per click. Cost per click is widely quoted and used by search engine companies in charging for their services. Marketers use cost per click to build their budgets for search engine payments.

Search engines ask for a “maximum cost per click,” which is a ceiling whereby the marketer imposes the maximum amount they are willing to pay for an individual click. A search engine will typically auction the placement of links and only charge for a click at a rate just above the next highest bid. This means the maximum cost per click that a company would be willing to pay can be considerably higher than the average cost per click they end up paying.

Marketers often talk about the concept of daily spend on search engines—just as it sounds, this is the total spent on paid search engine advertising during one day. In order to control spending, search engines allow marketers to specify maximum daily spends. When the maximum is reached, the advertisement receives no preferential treatment.

The formula is the multiple of average cost per click and the number of clicks:

$$\text{Daily Spend (\$)} = \text{Average Cost per Click (\$)} * \text{Number of Clicks (\#)}$$

---

**EXAMPLE:** Andrei, the Internet marketing manager of an online music retailer, decides to set a maximum price of \$0.10 a click. At the end of the week he finds that the search engine provider has charged him a total of \$350.00 for 1,000 clicks per day.

His average cost per click is thus the cost of the advertising divided by the number of clicks generated:

$$\begin{aligned} \text{Cost per Click} &= \frac{\text{Cost per Week}}{\text{Clicks per Week}} \\ &= \frac{\$350}{7,000} \\ &= \$0.05 \text{ a Click} \end{aligned}$$

Daily spend is also calculated as average cost per click times the number of clicks:

$$\begin{aligned} \text{Daily Spend} &= \$0.05 * 1,000 \\ &= \$50.00 \end{aligned}$$

Search engines typically use auctions to establish a price for the search terms they sell. Search engines have the great advantage of having a relatively efficient market; all users have access to the information and can be in the same virtual location. They tend to adopt a variant on the second price auction. Buyers only pay the amount needed for their requested placement.

**Cost per Customer Acquired:** *Similar to cost per order when the order came from a new customer. Refer to Chapter 5, “Customer Profitability,” for a discussion on defining customer and acquisition costs.*

## 9.10 Visits, Visitors, and Abandonment

Visits measures the number of sessions on the Web site. Visitors measures the number of people making those visits. When an individual goes to a Web site on Tuesday and then again on Wednesday, this should be recorded as two visits from one visitor. Visitors are sometimes referred to as “unique visitors.” Visitors and unique visitors are the same metric.

Abandonment usually refers to shopping carts. The total number of shopping carts used in a specified period is the sum of the number abandoned and the number that resulted in complete purchases. The abandonment rate is the ratio of the number of abandoned shopping carts to the total.

*Purpose: To understand Web site user behavior.*

Web sites can easily track the number of pages requested. As we saw earlier in Section 9.7, the pageviews metric is useful but far from complete. In addition to counting the number of pageviews a Web site delivers, firms will also want to count the number of times someone visits the Web site and the number of people requesting those pages.

**Visits:** *The number of times individuals request a page on the firm’s server for the first time. Also known as sessions.*

The first request counts as a visit. Subsequent requests from the same individual do not count as visits unless they occur after a specified timeout period (usually set at 30 minutes).

**Visitors:** *The number of individuals requesting pages from the firm’s server during a given period. Also known as unique visitors.*

To get a better understanding of traffic on a Web site, companies attempt to track the number of visits. A visit can consist of a single pageview or multiple pageviews, and one

individual can make multiple visits to a Web site. The exact specification of what constitutes a visit requires an accepted standard for a timeout period, which is the number of minutes of inactivity from the time of entering the page to the time of requesting a new page.

In addition to visits, firms also attempt to track the number of individual visitors to their Web site. Because a visitor can make multiple visits in a specified period, the number of visits will be greater than the number of visitors. A visitor is sometimes referred to as a unique visitor or unique user to clearly convey the idea that each visitor is only counted once.

The measurement of users or visitors requires a standard time period and can be distorted by automatic activity (such as “bots”) that classify Web content. Estimation of visitors, visits, and other traffic statistics are usually filtered to remove this activity by eliminating known IP addresses for “bots,” by requiring registration or cookies, or by using panel data.

Pageviews and visits are related. By definition, a visit is a series of pageviews grouped together in a single session, so the number of pageviews will exceed the number of visits.

Consider the metrics as a series of concentric ovals as shown in Figure 9.5. In this view, the number of visitors must be less than or equal to the number of visits, which must be less than or equal to the number of pageviews, which must be equal to or less than the number of hits. (Refer to Section 9.7 for details of the relationship between hits and pageviews.)

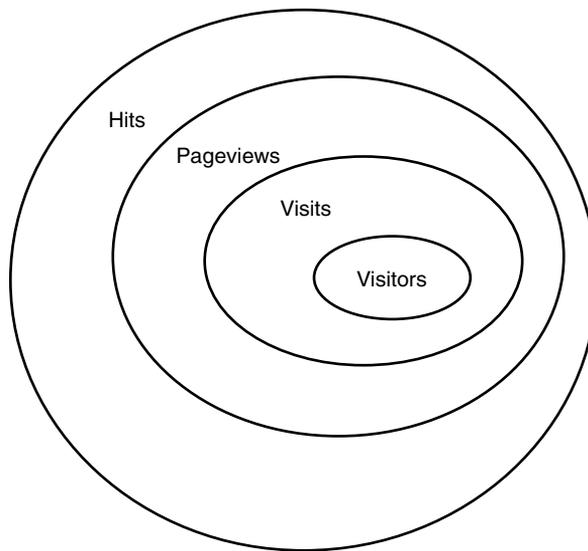


Figure 9.5 Relationship of Hits to Pageviews to Visits to Visitors

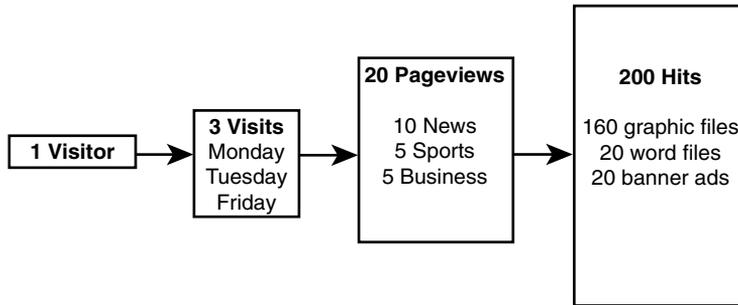


Figure 9.6 Example of Online Newspaper Visitor

Another way to consider the relationship between visitors, visits, pageviews, and hits is to consider the following example of one visitor entering a Web site of an online newspaper (see Figure 9.6). Suppose that the visitor enters the site on Monday, Tuesday, and Friday. In her visit she looks at a total of 20 pageviews. Those pages are made up of a number of different graphic files, word files, and banner ads.

The ratio of pageviews to visitors is sometimes referred to as the average pages per visit. Marketers track this average to monitor how the average visit length is changing over time.

It is possible to dig even deeper and track the paths visitors take within a visit. This path is called the clickstream.

**Clickstream:** *The path of a user through the Internet.*

The clickstream refers to the sequence of clicked links while visiting multiple sites. Tracking at this level can help the firm identify the most and least appealing pages (see Figure 9.7).

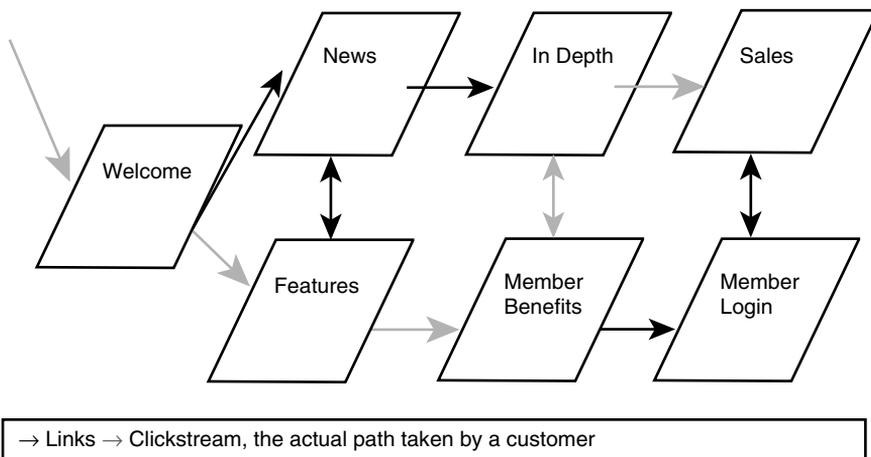


Figure 9.7 A Clickstream Documented

The analysis of clickstream data often yields significant customer insights. What path is a customer most likely to take prior to purchase? Is there a way to make the most popular paths even easier to navigate? Should the unpopular paths be changed or even eliminated? Do purchases come at the end of lengthy or short sessions? At what pages do sessions end?

A portion of the clickstream that deserves considerable attention is the subset of clicks associated with the use of shopping carts. A shopping cart is a piece of software on the server that allows visitors to select items for eventual purchase. Although shoppers in brick and mortar stores rarely abandon their carts, abandonment of virtual shopping carts is quite common. Savvy marketers count how many of the shopping carts used in a specified period result in a completed sale versus how many are abandoned. The ratio of the number of abandoned shopping carts to the total is the abandonment rate.

**Abandonment Rate:** *The percentage of shopping carts that are abandoned.*

To decide whether a visitor is a returning visitor or a new user, companies often employ cookies. A cookie is a file downloaded onto the computer of a person surfing the Web that contains identifying information. When the person returns, the Web server reads the cookie and recognizes the visitor as someone who has been to the Web site previously. More advanced sites use cookies to offer customized content, and shopping carts make use of cookies to distinguish one shopping cart from another. For example, Amazon, eBay, and EasyJet all make extensive use of cookies to personalize the Web views to each customer.

**Cookie:** *A small file that a Web site puts on the hard drive of visitors for the purpose of future identification.*

## Construction

**Visitors:** Cookies can help servers track unique visitors, but this data is never 100% accurate (see the next section).

**Abandoned Purchases:** *The number of purchases that were not completed.*

---

**EXAMPLE:** An online comics retailer found that of the 25,000 customers who loaded items into their electronic baskets, only 20,000 actually purchased:

$$\text{Purchases Not Completed} = \text{Purchases Initiated} - \text{Purchases Completed}$$

$$= 25,000 - 20,000 = 5,000$$

$$\text{Abandonment Rate} = \frac{\text{Not Completed}}{\text{Customer Initiation}} = \frac{5,000}{25,000}$$

$$= 20\% \text{ Abandonment Rate}$$

---

## *Data Sources, Complications, and Cautions*

Visits can be estimated from log file data. Visitors are much more difficult to measure. If visitors register and/or accept cookies, then at least the computer that was used for the visit can be identified.

Meaningful results are difficult to get for smaller or more narrowly focused Web sites.

It is possible to bring in professionals in competitive research and user behavior. Nielsen, among other services, runs a panel in the U.S. and a number of major economies.<sup>5</sup>

## *References and Suggested Further Reading*

Farris, Paul W., David Reibstein, and Ervin Shames. (1998). "Advertising Budgeting: A Report from the Field," monograph, New York: American Association of Advertising Agencies.

Forrester, J.W. (1959). "ADVERTISING: A Problem in Industrial Dynamics," *Harvard Business Review*, 37(2), 100.

Interactive Advertising Bureau. (2004). Interactive Audience Measurement and Advertising Campaign Reporting and Audit Guidelines. United States Version 6.0b.

Lodish, L.M. (1997). "Point of View: J.P. Jones and M.H. Blair on Measuring Ad Effects: Another P.O.V.," *Journal of Advertising Research*, 37(5), 75.

Net Genesis Corp. (2000). E-metrics Business Metrics for the New Economy. Net Genesis and Target Marketing of Santa Barbara.

Tellis, G.J., and D.L. Weiss. (1995). "Does TV Advertising Really Affect Sales? The Role of Measures, Models, and Data Aggregation," *Journal of Advertising*, 24(3), 1.