Online Advertisement Morphing:

Empirical and Strategic Implications

by

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SUBMITTED TO THE MIT SLOAN SCHOOL OF MANAGEMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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ABSTRACT

Today's age of information centric globalization over the Internet requires customer awareness by not only good content communication, but also trust and empathy. Trust and Empathy can be generated only when the sellers understand customers. This is only possible when sellers are aware about how the customers conceive the advertisement presented to them over the web. Fortunately, this knowledge is facilitated by analyzing customer buying behaviour and understanding the cognitive behaviour of the customer using cognitive engines, stochastic measures and analytics. My research will focus towards empirical substantiation of the affects and implications of Morphing.

The study includes methodologies that corporate world can formulate to develop strategic measures to target potential customers based on individual cognitive styles. The study also includes an analysis of the online advertising industry trends, interviews & perspectives of industry thought leaders, and business models of the future.

Thesis Supervisor: Glen L. Urban
Title: David Austin Professor of Marketing

Acknowledgements

First and foremost, I would like to thank Professor Glen L. Urban, my thesis advisor, for giving me an opportunity to write this thesis under his able guidance. It is my ambition to contribute towards data driven strategy building and this thesis allowed me to conduct both empirical analysis from the point of no data at all to business modelling and trend forecasting based on data driven analysis. Professor Glen L. Urban proved to me that even the toughest ambiguity could be resolved if one had an efficient strategy in collecting information and drawing undisputed conclusions. This project allowed me not only to put my management acumen to experiential use, but also prepared me to face ambiguous situations with confidence, informed decisions and cognizance. A project to measure, scale and analyze cognitive behaviours based on advanced analytics and stochastic measures wouldn't have been possible without Professor Glen L. Urban's active support, guidance and genius.

In addition, I would like to thank my team members, Dorothee Bergin and Professor Guilherme Liberali, who provided me with all the necessary project details and spent extra hours with me to resolve my queries and concerns. It was a wonderful experience working with knowledgeable team members and learning in the process of running a project. Special thanks to Professor Guilherme Liberali for his patience, contribution and knowledge sharing in the field of online advertisement morphing. Special thanks to Dorothee Bergin, who apart from being a great company, gave constant encouragement when project timelines were challenged by unforeseen circumstances. Both have been fantastic co-workers. Their ingenuity, diligence, and vitality have made the Online Advertisement Morphing Project a huge success, and also have made these last two semesters the most enjoyable times I have had at MIT Sloan.

I would like to thank all my friends, colleagues and corporate dignitaries who patiently contributed their time for surveys, panel sessions, and interviews; and contributed immensely to the project and thesis.

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Last, but certainly not the least, I would like to thank my family. To my parents, Mrs. Suraiya Rashid and Mr. Mohammad Rashid, for giving me hope and strength during the times I needed them the most. To my younger sister, Dr. Umairah Naaz for showing me unconditional love and support. I would not have achieved this without you.

Thank you all!

Table of Contents

Table of Figures

Table of Tables

Introduction

Thesis Scope and Outline

The contribution of this thesis is to document the trends of the online advertisement industry and the gradual formulation of the industry around evolving needs of the advertisers, publishers and online customers. Further, the thesis attempts to justify the need of advertisement morphing and the basic technique behind morphing that would enhance the online advertisement based revenues. The morphing of advertisements is based on the cognitive styles of individual online customers and how advertisers can adapt their banner advertisements to appeal to the cognitive styles of their customers. The thesis also addresses and documents an empirical analysis of a practical methodology for developing morphed advertisements. The project methodology and techniques are developed by Professor Glen L. Urban, MIT Sloan School of Management in close collaboration with industry partners and sponsors. Further, the thesis explores strategic implications of advertisement morphing in a dynamic industry, and tries to build strategies for future online business advertisements using advertisement morphing to monetize the web. Below is a sectional overview of the five sections of this thesis that determines the thesis scope and outline namely, Background of Online Advertisement Industry, Online Advertisement Morphing, Online Advertisement Morphing Project, Online Advertisement Morphing and its Strategic Implications, Conclusion, and Appendices.

Section 1, presents a background of the online advertisement industry and introduces the industry value chain. This section also describes the current trends, predictions, forecasts and analyses that will be used in formulating the strategic implications and business models for the future of

online advertising. This section also describes the evolution of the online advertising business model based on needs of advertisers, publishers and online customer or website visitors.

Section 2, describes the essence of this thesis and tries to establish the need of advertisement morphing. This section not only presents a unique outlook towards the phenomenon of internet as a duplex communication media, but also presents the technique behind advertisement morphing. The technique used to formulate the advertisement morphing is influenced and referenced from the academic publication "Website Morphing, May 2008", by John R. Hauser, Glen L. Urban, Guilherme Liberali, and Michael Braun. Also, this section draws inferences and basis from the Sloan Management Review Article titled: "Morph the Web to Build Empathy, Trust and Sales, Summer 2009 Vol. 50 No. 4", by Glen L. Urban, John R. Hauser, Guilherme Liberali, Michael Braun and Fareena Sultan.

Section 3, presents the online advertisement morphing project. This section outlines the project details and ecosystem. This section also presents an empirical analysis of the project and describes the methodology including the statistical analysis, regressions and cognitive style determination of the customer base. At each step of the way, this section also presents the reliability of the measures and presents detailed conclusions from the study. This section has constant references to the sectional appendices in order to document the project documentations at various stages of the project.

Section 4, presents the strategic implications and the impact that advertisement morphing can have on the advertiser-publisher business model. This section presents the trends and customer perceptions based on an online survey of a representative sample of over a hundred online customers or website visitors. This survey is an attempt to determine or forecast the future

business models of online advertising industry. Further, this section also presents interviews and perceptions of various advertisers and publishers looking forward to an evolving advertising industry. This section also suggests the business model of the future of online advertising based on the analysis, study and observation of the advertising industry.

Section 5, presents a detailed conclusion of the research, analysis and investigation in order to present a final overview of the online advertisement morphing, empirical analysis and implications, and strategic implications. This section describes the contribution of this thesis, and concludes with a discussion on ideas for future research and analysis.

Sectional Appendices, present a detailed documentation of the supporting materials referenced and elaborated throughout the thesis. These sections have been referenced in the thesis whenever necessary to draw conclusions or present detailed analysis performed by team members working on the Online Advertisement Morphing project under the leadership of Professor Glen L. Urban.

Background

Online Advertising and Its Evolution

Advertising has evolved in various dimensions based on the evolution of the various mediums of communication with customers. Advertising finds its roots in the print media where ads were published on papers and circulated such as, newspapers and magazines. With the advent of broadcast media such as, Radio and Television, advertising evolved into distinctively a visual and verbal art. In today's information age, advertising has taken the form of online presentation that combines the qualities of print and broadcast media, and brings much more to the data-driven advertising world, the world of "Online Advertising".

The online advertising industry is growing at a rapid rate. Since its incepting in 1994, the online advertising has faced various challenges and changes. However, the use of online advertising is increasing in popularity at a fast pace. It is projected that the online advertising industry will grow exponentially compared to advertising in any other medium. (Kridler, 2004)

Supporting statistics about the thriving online advertising industry can be had from the U.S. Ad spending across various mediums from 2007 onwards, even during recession and beyond. Advertising Age reports the following:

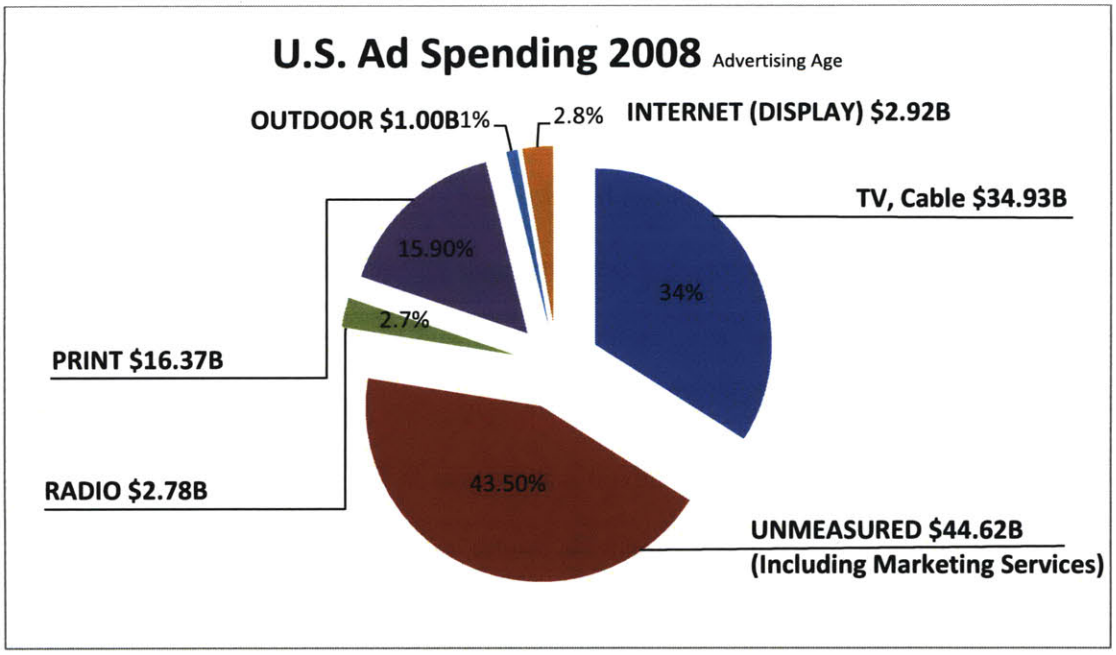


Figure 1: US Ad Spending 2008

Internet display advertising had grown to be a $3 Billion market and a majority of unmeasured advertising (including marketing services) spending seeks an investment area where returns over a $45 Billion can be measured. The fall of traditional print and broadcast media to attract customer base and increasing penetration of internet as a consumer must have suggests an exponential rise in the internet display advertising also known as online advertising investments.

Some expert forecasts, such as ZenithOptimedia's advertising Expenditure Forecasts (December 2009) suggest the following projections for year 2011:

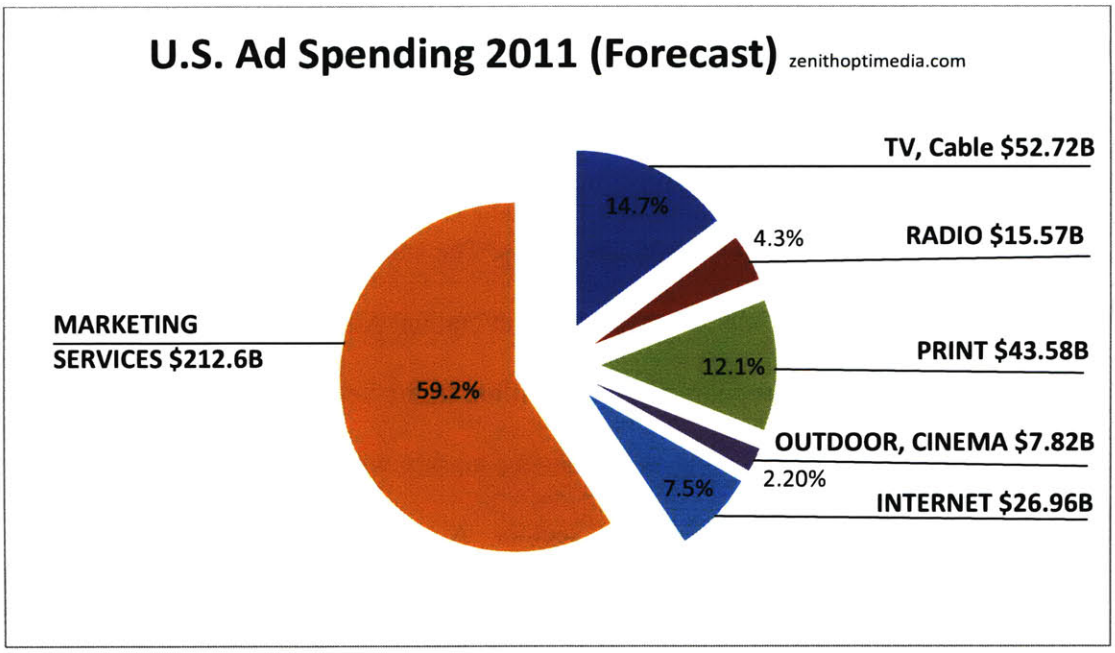


Figure 2: U.S Ad Spending 2011 (Forecast)

The forecast confirms that Ad spending will continue on the trend of moving online and that there will be a rapid decline in the traditional print and broadcast advertising. A tenfold increase in internet ad spending compared to 2008 spending suggests a lot of legitimacy and confidence has been observed between online campaigns and business revenues. This trend suggests that businesses are beginning to evaluate the advantages and disadvantages of advertising online. Businesses are realizing that by advertising online, their message is communicated on a faster medium that not only interacts with customers, but also establishes a one-to-one dialogue (Adams 2003). The marketing services that commands a lion share in US Ad spending 2011 forecast also includes digital components. Apart from various advertising services over diverse media, ZenithOptimedia predicts tremendous growth in digital event sponsorship and digital public relations – two key elements of marketing services. Among other services, marketing

services comprise of services such as, direct marketing, public relations, promotions, and event sponsorships.

Now let's take a close look at who is spending. A latest report from Ad Age attempted to measure the U.S. Ad spending by category of advertisers. The study confirmed that by 2008 U.S. spending from all advertisers on all facets of Internet/Online Advertising was $9.7 Billion, approximately 7% of the total Ad spending of $142 Billion in the year 2008. The study suggests that investment over Internet Advertising is a growing market with the potential to challenge traditional broadcast media advertising across sectors. Also internet's unique capability to present broadcast content in a personalized package has created opportunities for all sectors within an industry and across industries.

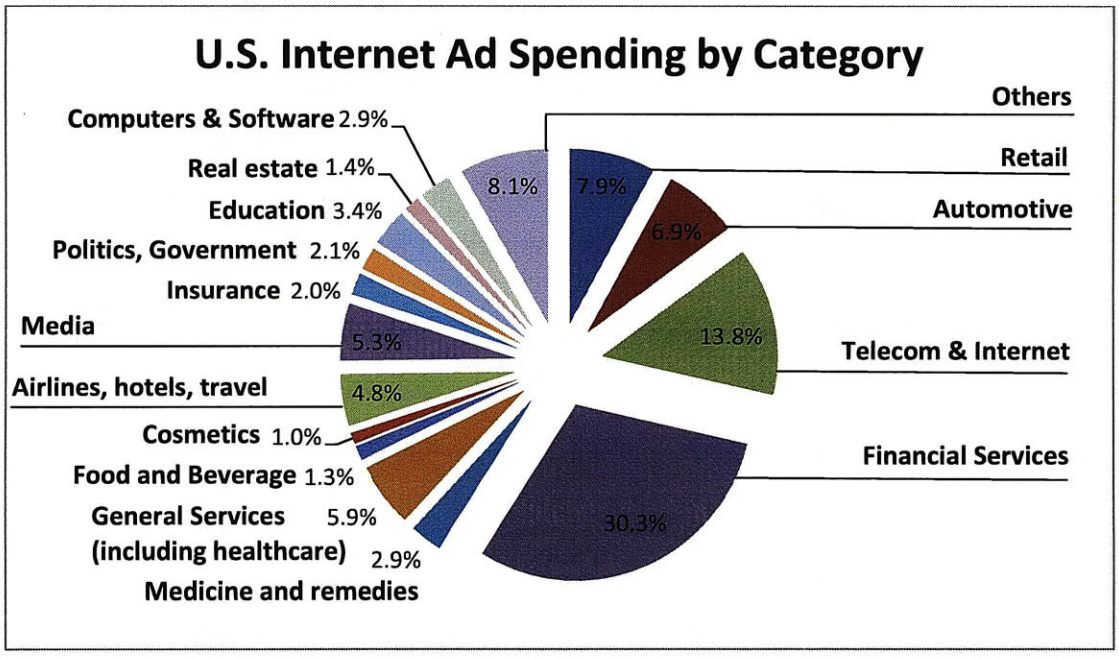


Figure 3: US Internet Ad Spending by Category

In recent years the online advertising has become an essential element in advertising strategies. Three major areas are expected to grow: paid search, display advertisements and internet banners and classifieds are all predicted to be the biggest growth areas in online advertising. A market study by Forrester suggests the following Digital Marketing spend projections for various areas within digital marketing/online advertising:

U.S. Digital Marketing Spend Projections

	2009 (in USD billions)	2010 (in USD billions)	% change, 2009 to 2010
Display Advertising	7.83	8.40	7%
Email Marketing	1.25	1.36	8%
Mobile Marketing	0.39	0.56	44%
Search Marketing	15.39	17.77	15%
Social Media	0.72	0.94	31%
Total	**25.58**	**29.01**	**13%**

Source: Forrester's Interactive Advertising Models. Oct 2008 and April 2009

Table 1: U.S. Digital Marketing Spend Projections

It is evident from Table 1 that search marketing remains the main draw for online advertising spending, and the major reason for this is the media mix that leads to purchases rather than single point of advertising leading to sales. eMarketer's claim in Online Ad Format article states that "when consumer packaged goods companies use paid search, even though their products are rarely sold online, that points to a trend that will also partially offset economic softness. In addition, brand marketers are finding they need to coordinate search ads with other online advertising, such as display or video, and with their offline ad campaigns." Hence, influencing

the market in such a way that advertisers will put more into paid search year-after-year, but the annual growth rate for search will decline year-after-year. So even as paid search decline and the market grows more slowly than the earlier decade, the media mix will give rise to static display ads (banner ads) and classified ads as stalwarts of the online ad industry.

The US online ad spending, by format, from 2007 to 2012 as presented by eMarketer confirmes the claim above:

US Online Advertising Spending, by Format, 2007-2012 (millions)

	2007	2008	2009	2010	2011	2012
Search	$8,440	$10,360	$11,960	$13,860	$15,990	$19,023
Rich media/ Video	$2, 041	$2,654	$3,340	$4,425	$5,991	$9,444
Display Ads	$4,458	$5,465	$6,285	$7,095	$7,893	$9,394
Classified	$3,566	$4,287	$4,875	$5,613	$6,494	$7,575
Lead Generation	$1,667	$2,124	$2,460	$2,853	$3,403	$4,233
E-mail	$422	$492	$555	$613	$677	$765
Sponsorships	$506	$518	$525	$543	$554	$566
Total	**$21,100**	**$25,900**	**$30,000**	**$35,000**	**$41,000**	**$51,000**

Source: eMarketer. March 2008

Table 2: US Online Advertising Spending, by Format, 2007 – 2012

The above trend exemplifies a growing trend towards new media as advertisers continue to spend on advertising on various media formats. The new media comprises of maturing search advertisements, display ads, classified ads and rich media/video ads. The old media such as,

television, radio and print advertisements have increasingly lost advertiser attention (as discussed above). The display ads are popular among advertisers because:

1. Low cost (when compared with search ads or paid keywords).
2. Increasing number of WebPages with increasing available inventory.
3. Ability to create targeted and aggregated groupings across thousands of sites.

Thus, giving advertisers a cost-efficient method to reach large target consumer base, and adding to the popular media mix to advertise their brand.

Classified ads on the other hand steal revenue away from the old media, such as print media. The rich media and video ads can be observed (see Table 2) to have the greatest growth and steals revenue away from the old media, such as television. The reason behind this growth is the trend for more video viewing online, the desire of advertisers to use traditional video as a successful advertising tool from the past, and the pricing structure according to which rich media ads cost more that search, display and classified ads, leading to greater revenues for publishers.

The above trends can be summarized by eMarketer study about US Online Advertising spending growth, by format from 2007 to 2012:

US Online Advertising Spending Growth, by Format, 2007 – 2012 (% change)

	2007	2008	2009	2010	2011	2012
Rich Media/Video	71.2%	30.0%	25.8%	32.5%	35.4%	57.6%
Lead Generation	27.2%	27.4%	15.8%	16.0%	19.3%	24.4%
Display Ads	21.0%	22.6%	15.0%	12.9%	11.2%	19.0%
Search	24.1%	22.7%	15.4%	15.9%	15.4%	19.0%

Classified	16.6%	20.2%	13.7%	15.1%	15.7%	16.6%
E-Mail	24.9%	16.6%	12.8%	10.4%	10.4%	13.1%
Sponsorships	2.1%	2.3%	1.4%	3.3%	2.0%	2.3%
Total	**25.0%**	**22.7%**	**15.8%**	**16.7%**	**17.1%**	**24.4%**

Source: eMarketer. March 2008

Table 3: US Online Advertising Spending Growth, by Format, 2007 – 2012

Graphically, the new media trends can be represented with constant scales. The trends depicted below summarize the high investment and low growth in the search ads, increasing investments and high growth in rich media or video ads, increasing investments and growth maturity in Display and Classified Ads.

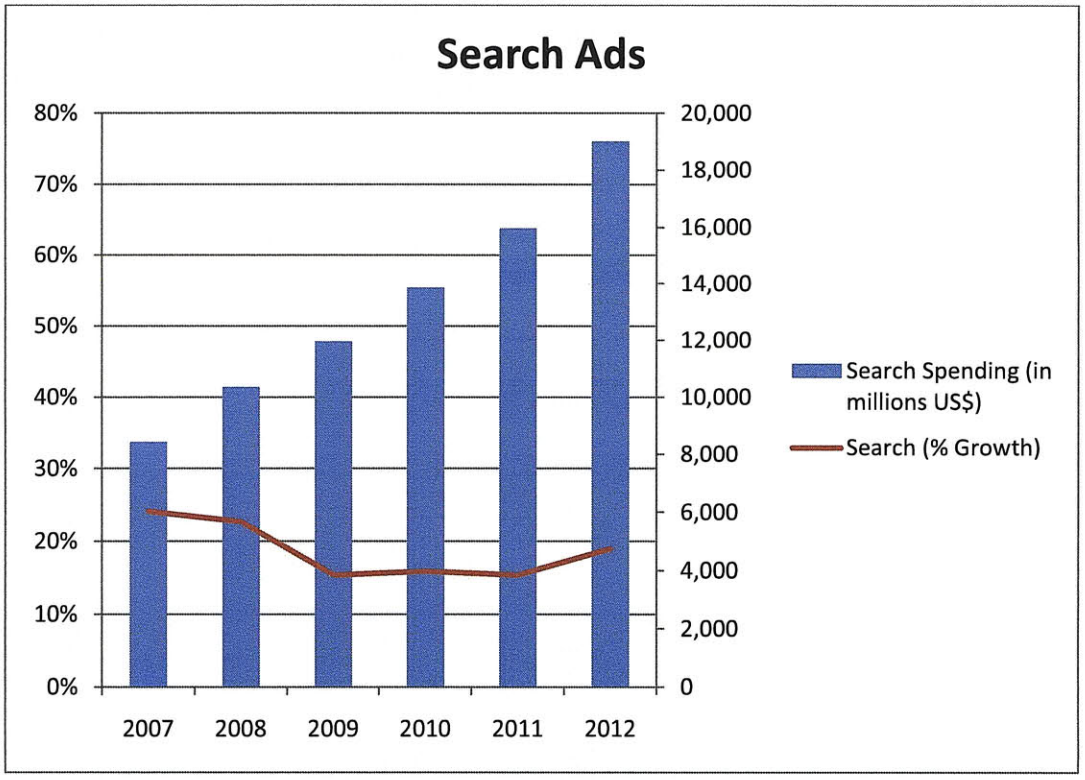


Figure 4: Search Ads growth and spending trends

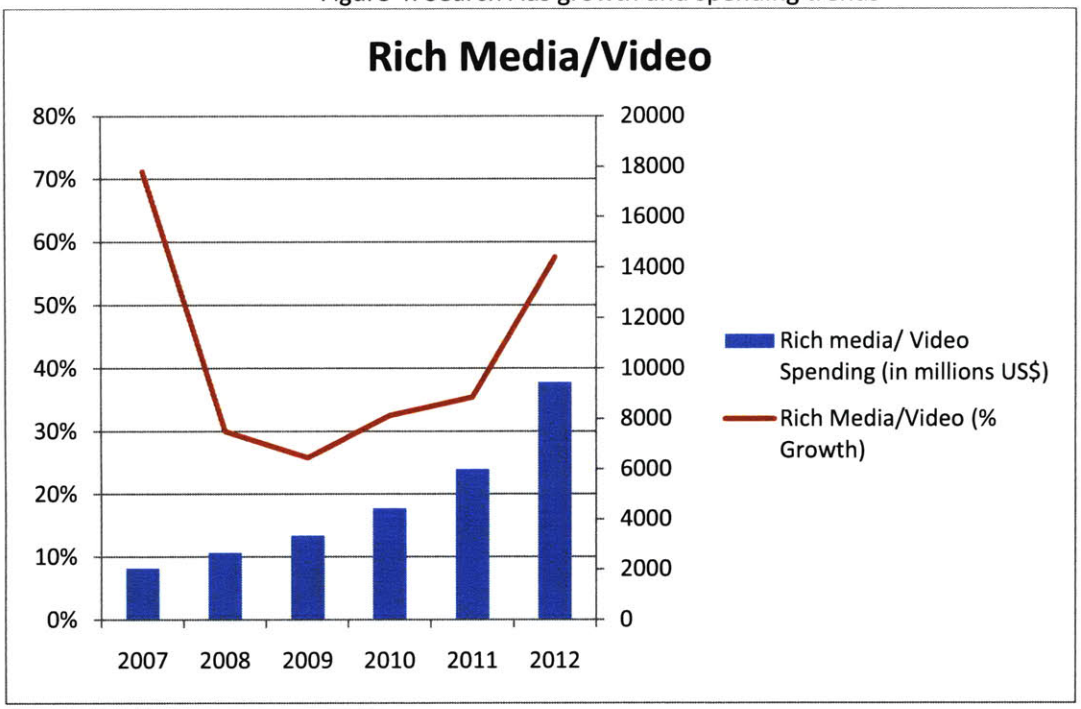


Figure 5: Rich Media/Video Ads growth and spending trends

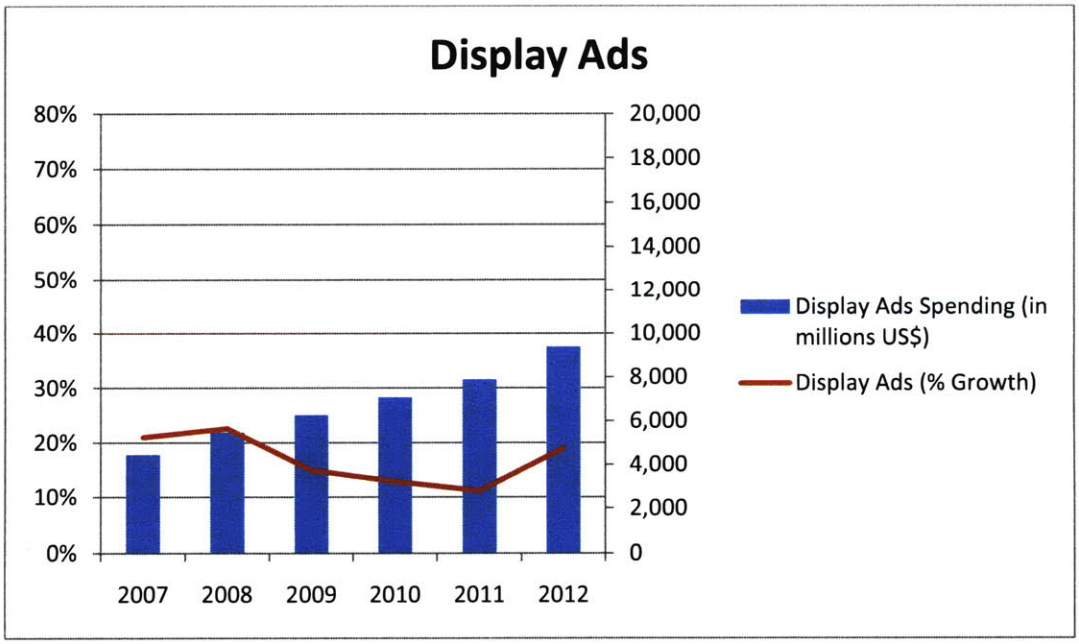


Figure 6: Display Ads growth and spending trends

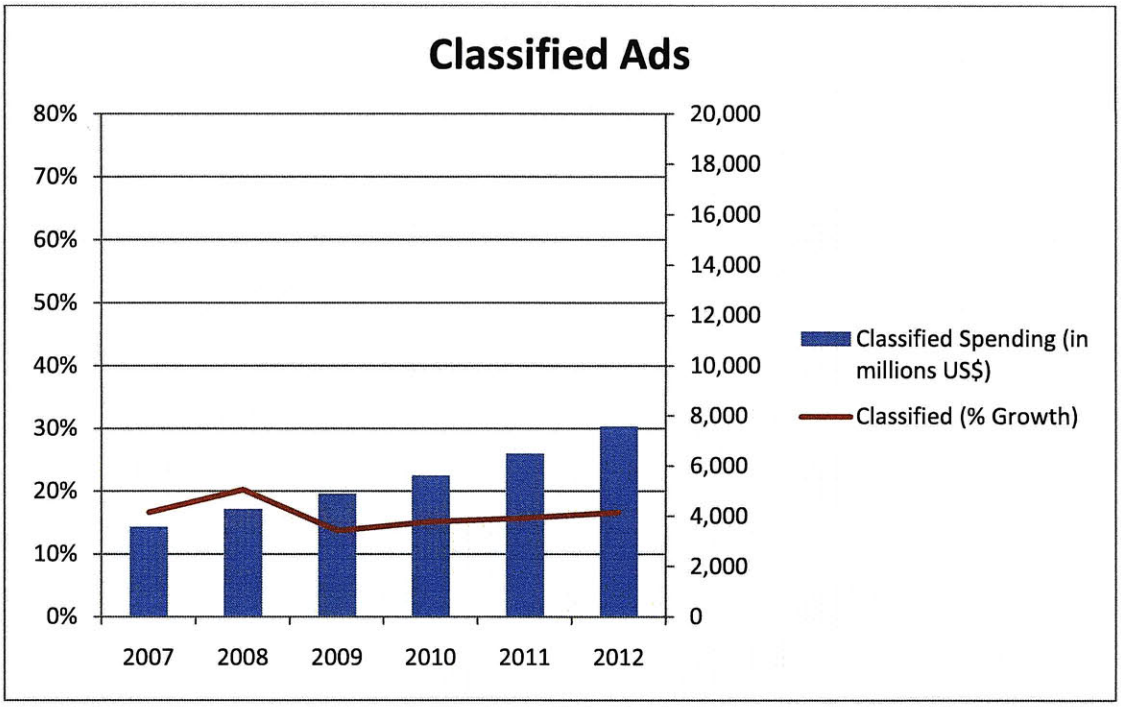


Figure 7: Classified Ads growth and spending trends

The focus of this thesis is Online Display Advertising and presents an empirical analysis about internet banner ads for targeted advertising. However, before exploring the specifics it is important to understand the value chain of display advertising.

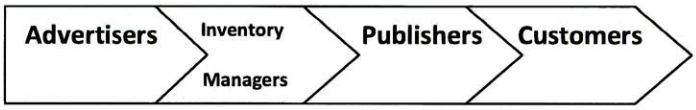


Figure 8: Online Display Advertising Value Chain

The online display advertising value chain comprises broadly of advertisers, ad networks, publishers and customers. The relationships among these components have seen various changes over the years as the online advertising industry in general and display advertising in specific had matured. Before moving on to the evolution of the online advertising model, it is necessary to

understand and define the various components of online display advertising model. Below is a brief analysis on the different components of the model:

The Advertisers: The traditional advertising defines advertisers as organizations or group of people who pay for the production, execution, and placement of an advertisement. However, advertising online has changed the definition of advertisers to be those who bid for a chance to have their ad display when a user searches for a given keyword. Alternatively, an advertiser is someone who pays for the time when his/her advertisement is placed in a particular advertising position or for the time when a portfolio of advertising tools is provided to him/her.

[ref: http://searchenginewatch.com/define]

The Ad Networks: An advertising network or ad network is a company that connects websites that want to host advertisements with advertisers who want to run advertisements/campaigns. Advertising networks provide a way for media buyers to coordinate ad campaigns across dozens, hundreds, or even thousands of sites in an efficient manner. The campaigns often involve running ads over a category (run-of-category) or an entire network (run-of-network). Site-specific buys are not a major emphasis when dealing with advertising networks. In fact, site-specific buys are not even available at some networks, so as not to conflict with in-house sales representatives. Ad networks vary in size and focus. Large ad networks may require premium brands and millions of impressions per month. Small ad networks may accept unbranded sites with thousands of impressions per month.

[ref: http://www.marketingterms.com/dictionary/advertising_network/]

The Publishers: A typical online publisher is one who has a significant number of web-based touch points with the internet browsing population and wants to host advertisements. These

publishers are categorized based on their popularity and the number of eye-balls they catch each going day. Based on their popularity among the browsing population, the publishers sell advertisement space or advertising inventory in the form of banner ads, rich media, text links and emails. Large publishers often sell only their remnant advertising inventory through ad networks. Typical numbers range from 10% to 60% of total inventory being remnant and sold through advertising networks. Smaller publishers often sell their entire advertising inventory through ad networks.

[ref: http://en.wikipedia.org/wiki/Advertising_network]

The Customers: The customer of the online advertising world is the Ad Viewer. In electronic commerce, an ad view (or exposure) occurs each time an advertisement is downloaded from an ad server (a component of ad network) to the viewer's screen. Ad view corresponds to the print impressions of the print media. Hence, ad viewers are essentially the internet browsing population. Since 2008 Google controls an estimated 69% of the online advertising market. Below is a list of top ad network vendors in 2008, also the search engine market share 2009 suggests that Google holds significant Ad Viewer percentage.

Ad Networks	Ad Viewers (in millions)
Google	1,118
DoubleClick (Google)	1,079
Yahoo!	362
MSN (Microsoft)	309
AOL	156
Adbrite	73
Total	**3,087**

Table 4: Ad Networks and corresponding Ad Viewers

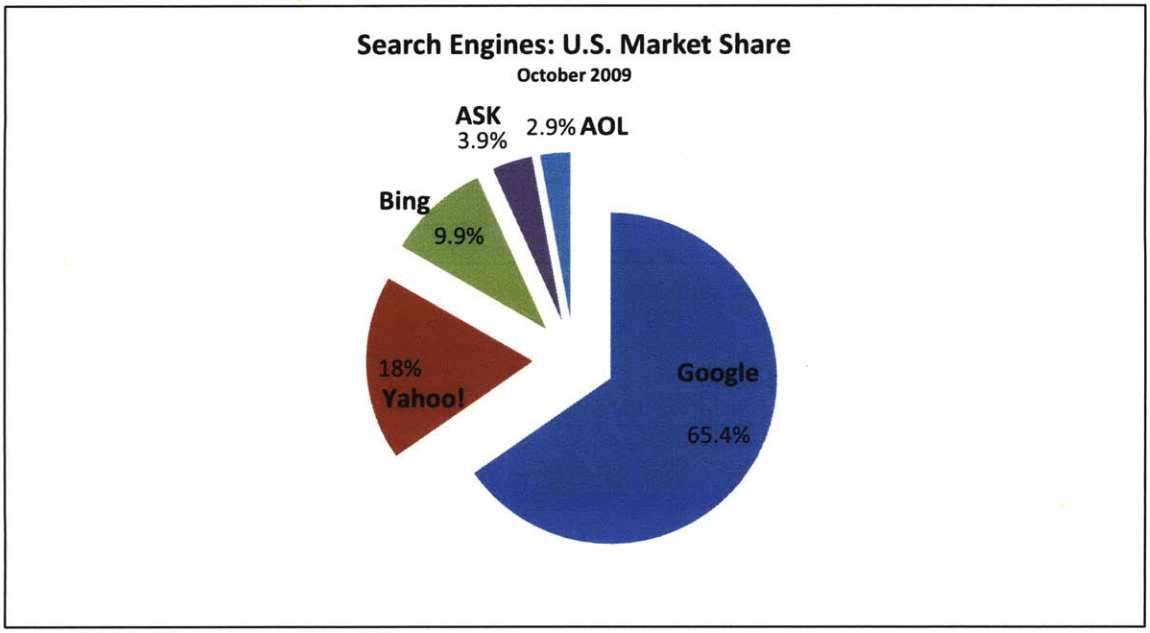


Figure 9: U.S Search engine market share breakdown

Evolution of Online Display Advertising Model

The very first model of advertising over the web evolved with the following structure:

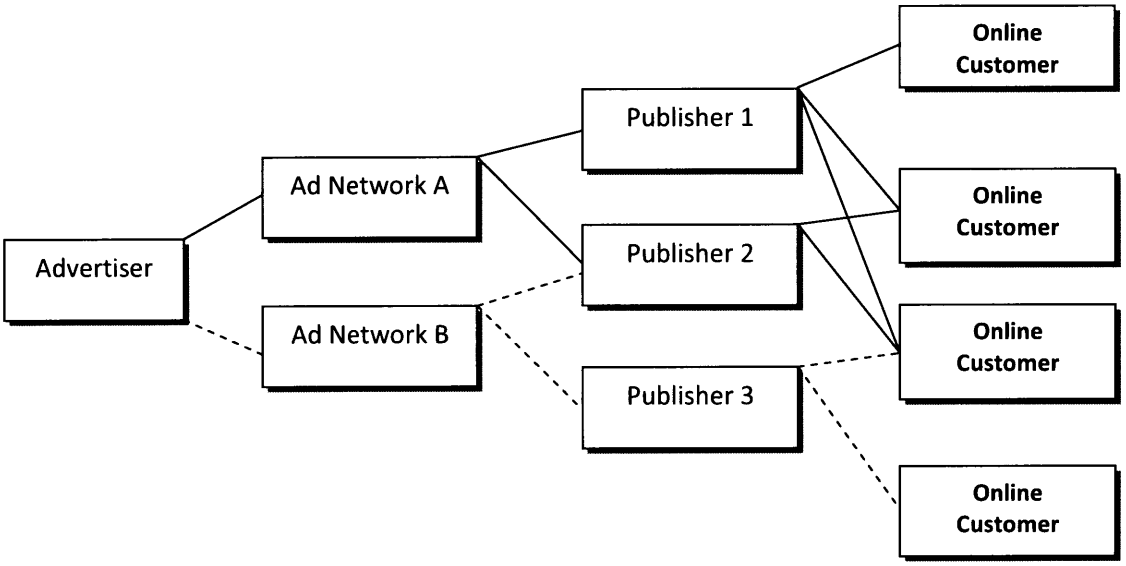


Figure 10: Online Advertising Model 1

In this model the Advertiser contacted Ad Networks, which bought ad space on various publishing sites and boasted of multitudes of online visitors or customers. The advertisers seeking greater visibility contracted with various Ad Networks to achieve a variety of ad spaces on different publishing sites. Such a model existed because the publishers were not large enough to satisfy the advertising needs for a large scale advertising campaign. Hence, there was a need for Ad Networks that bought ad space (a.k.a inventory) at various publishing websites and allowed the advertisers to launch large scale advertising campaigns to reach its product's customers.

Further, the model evolved in order to reach a balance between purchase of ad space or inventory by Ad Networks and Advertisers' contracts, evolving into the following structure:

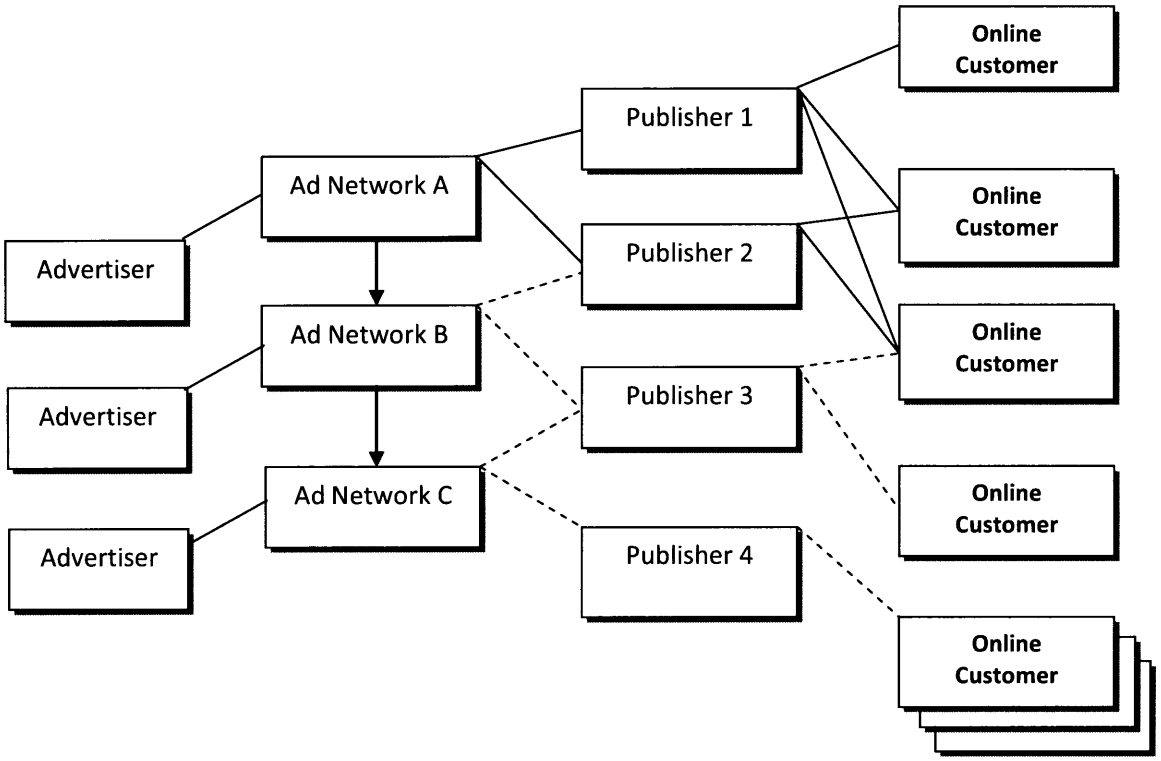


Figure 11: Online Advertising Model 2

This model was efficient because for two reasons:

1. It allowed price differentiation between Advertiser-Ad Network relationship and Ad Network-Ad Network relationship.
2. It allowed reselling and optimal utilization of ad space (inventory) based on advertiser demand.

The earlier model presented the Ad Networks with a risk, the risk of estimating the demand of online advertising space and purchasing it beforehand for Advertisers. This risked allowed the Ad Networks to charge a price premium, in turn leading to higher Advertiser spending, which in turn led to higher product prices or fewer benefits to the customers. The above model allowed excess inventory bought by Ad Network A to be sold or shared with other Ad Networks. This allowed for rapid shifts in demand, lower prices for advertising space and lower Advertising spending by Advertisers.

The very nature of such an online advertising model, with rapid growth in online advertisement investments and with the rise of internet as a media of the future – surpassing television, radio and print broadcast mediums with widespread adoption, created an automatic need for:

1. Ad space (or inventory) cost visibility.
2. Online Advertisement Demand Visibility.
3. Online Advertisement Supply Visibility.

The need became apparent that such a visibility was required for a competitive ad market that was equipped with information at the granular level where the above mentioned needs were satisfied at the time of day and day of week level – giving rise to the advertisement exchanges.

Advertisement Exchange: An Advertisement Exchange, like a forex, index, provides granular level information about the demand, supply and price of ad space at any particular time of day. An Advertisement exchange provides visibility to the Ad space costs, demand and supply in a dynamic advertising market and interfaces the advertisers and publishers (with a few exceptions such as Google, which is both a publisher and ad exchange)

The model below is the advertising model as it has evolved to be today:

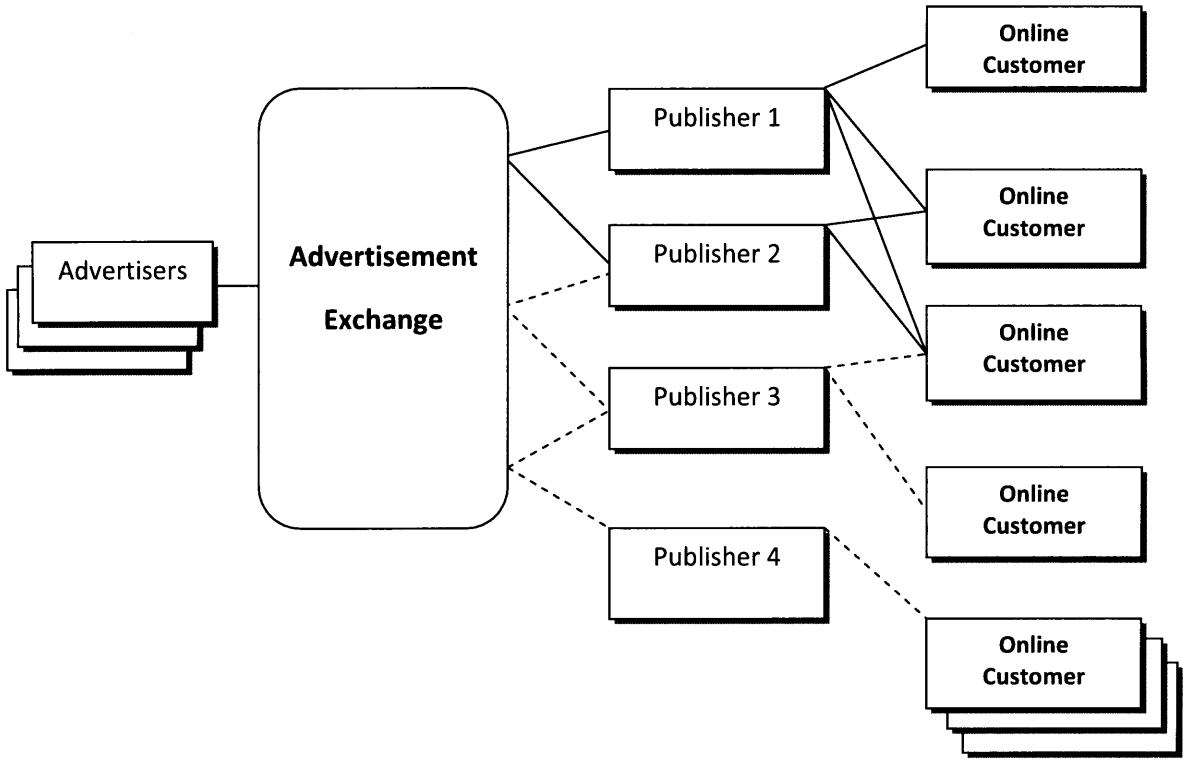


Figure 12: Online Advertising Model 3

However, in essence the Online Advertisement Industry has tried to emulate the traditional broadcast advertisement model on a new media, despite the internet providing an even better opportunity to understand and interact with customers. Essentially, the online advertisement industry has ignored the customers in its haste to keep the traditional advertisement model alive and only modifying it to meet internal demands with respect to inventory and ad space, and ignoring the customers or the last mile leading to the customers.

In telecommunications terminology, owning to my background and experience, this model is a half-duplex model where the communication is one way without any feedback system or a system that would gauge the consumer's ability to grasp the advertisement communication. Diagrammatically, the above discussion can be summarized as:

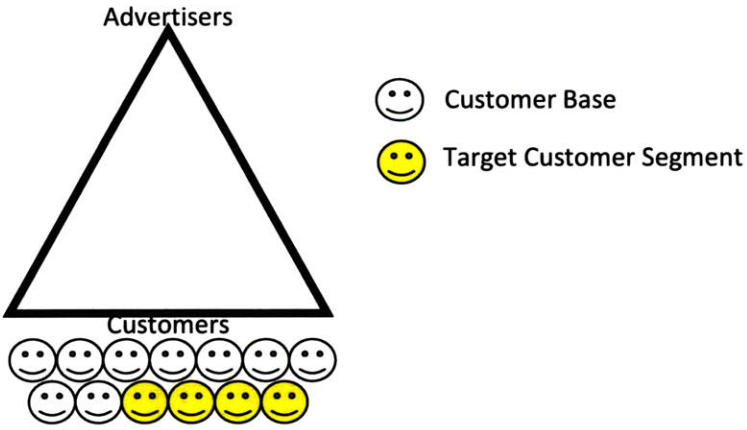


Figure 13: A half-duplex advertising model

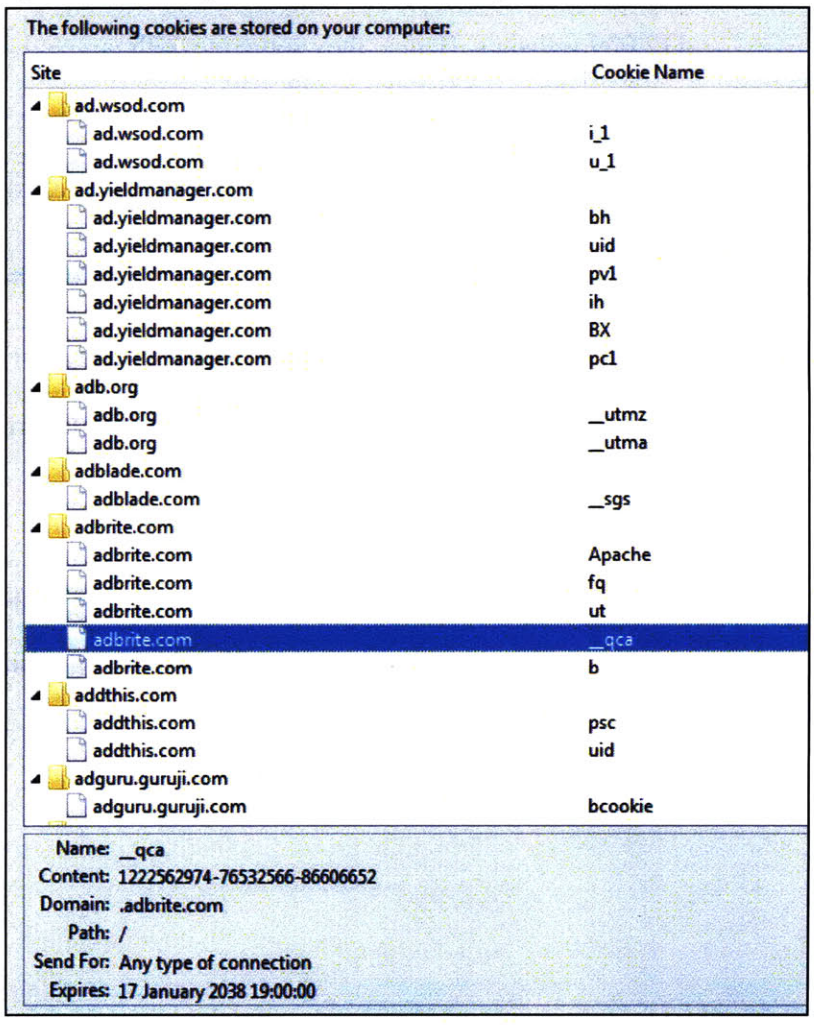
The above figure illustrates the inherent disadvantage of the online advertising industry depicted above. The advertisers spend millions of dollars in advertisement campaigns over the online media without noticing what fraction of the entire customer base is their target customer segment and how is their advertisement perceived by their target customer segments.

To facilitate the above issue, targeted online advertising was employed by the publishers. Inherently, the targeted advertising is comprised of publishers, customers, advertisement content and dynamic advertisement serving. This technique is depends on how data is collected for targeted advertising, how the targeted advertisement is created and what is the mechanism used to serve the advertisement.

There are many ways to collect data for targeted advertising, namely, Online purchase behaviour, Customer entered profile, Customer search, Customer Clickstream, Information from internet service providers, and other demographic information. As the focus of this thesis is Online Advertisement Morphing which utilizes customer clickstream analysis to create morphed ads and dynamically present them as display ads, I will be focusing on collection of data using customer clickstream. Customer clickstream is a behavioural targeting mechanism that relies on cookies.

Cookies are text files saved on customer's computer hard drive using the web browser. The cookies are important in targeted advertising because they record customer actions and are instrumental in track customer actions using clickstreams. Cookies often store settings for a website, such as preferred language or location. When the customer returns to the website, the browser sends back the cookies that belong to the site. This allows the site to present customized information to fit to the customer needs.

Figure 14: Showing cookies from Ad Exchanges & Publishers



Cookies can store a wide range of information, including personally identifiable information (such as your name, home address, e-mail address, or telephone number). However, this information can only be stored if the customer provides it - websites cannot gain access to information you didn't provide to them, and they can't access other files on your computer. By default, the activities of storing and sending cookies are invisible to the customers. However, one can change the web browser settings to allow approval or denial of cookie storage requests, to delete stored cookies automatically when one closes the web browser, and more.

Publishers who have the capability to save cookies on customer's computer hard drives have the capability to uniquely identify customer segments or micro segment customers based on their online profile. This capability allows advertisers to target preferred customer segments using targeted ads based on data collected by cookies.

With the advent of the Ad Exchanges, an increasingly high percentage of the cookie allocation and customer segmentation is handled by the Ad Exchanges. As can be seen in Figure 14, one of the many cookies are from adbrite.com which is an online advertising firm that serves ads on 112,009 websites. Hence, they serve me with targeted ads based on my online clickstream on the websites served by adbrite.com (with cookie expiring on 17th January 2038, adbrite.com should have some long term plans with my online clickstream).

However, as discussed above these cookies can be removed by the customers, leading to loss of important clickstream information. This property of targeted advertising technique leads to ambiguous customer segmentation and probability models for estimation of target customer segments.

Business week discussed the customer view of cookies in an article titled, "Internet cookies leave a bad taste", on June 02, 2005. The study that surveyed 10,000 web users falling in the demographics of over 14years of age in order to understand customer knowledge, perception and deletion reasons and found the following:

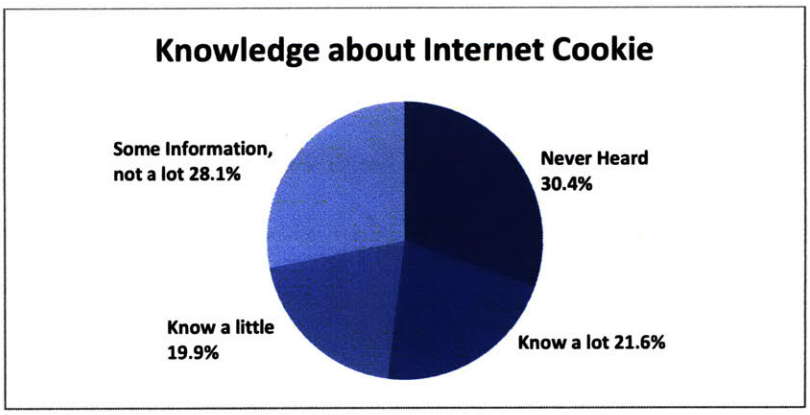


Figure 15: Customer knowledge about internet cookies

A little less than half of the survey respondents (48.1%) said that they have deleted internet cookies in the past and 38.4% of the respondents who deleted Internet Cookies deleted them at-least once a monthly. Some of the popular beliefs that lead to deletion of Internet Cookies include the following:

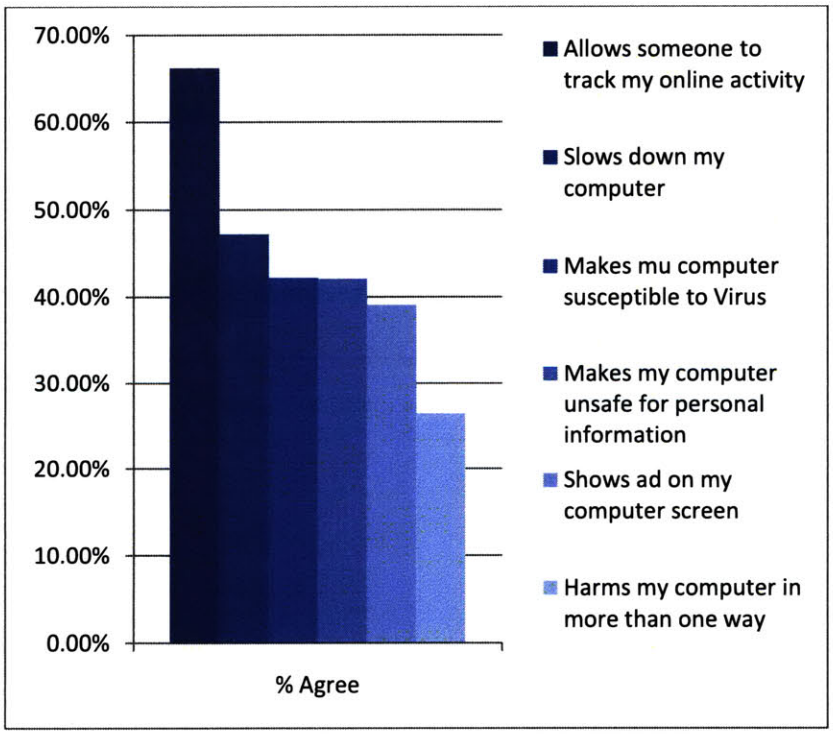


Figure 16: Negative perceptions leading to cookie deletion

The section below illustrates how the online media can facilitate advertisers to understand their customers better and the section on "Strategic Implication" discusses the future evolution of the online advertisement industry based on customer experience and perception and suggests business models for the future. The disadvantage of cookie deletion and the apparent short coming of the targeted online advertising technique are discussed in more detail in the section on "Strategic Implications".

Online Advertisement Morphing Overview

Know Thy Customer and Morph

Targeted online advertising campaigns although designed to monetize the web, have a difficult task of finding and segmenting customers that are interested in their products. Further, they have to deliver a message to those target customers to get a measurable response. According to me this phenomenon of communication is not advertising, but an overall experience for the customers that encourages loyalty, empathy, trust and sales.

As discussed above, this phenomenon of communication involves two fundamental methods: first, knowing who your customers are, and second, knowing how to deliver the message to them using online advertising.

Are businesses only addressing part of the online advertising issue when they acknowledge the status quo coined by John Wanamaker – "I know half of my advertising is wasted, I just don't know which half"?

Traditional broadcast media advertising, such as print, television and radio lacked the ability to target customers by delivering personalized advertisements. With the advent of internet targeting methods that rely on customer generated data to serve advertising has become possible. However, a majority of online advertisement adopter businesses are porting traditional advertising and targeting methods on Internet.

The lead users of online advertisers have understood that internet is unique because it has global reach and customizable. With advertisers and publishers having access to quick data in the form

of: number of people seeing and interacting with their ads, the potential to address first fundamental method of "knowing who your customers are" is relatively easy and powerful.

"The ability to customize and personalize advertising is a very powerful marketing tool that Internet businesses are only beginning to understand and exploit." - Information Rules (1999)

"If you want to personalize your information product, you have to know something about your customer. The hoary injunction "Know Thy Customer" is as important in the information economy as in the industrial economy, if not more so." – Information Rules (1999)

However, knowing how to deliver the message to those customers is the key to address the targeted customer segment. Professor Glen L. Urban et al at the MIT Sloan School of Management asked the question "What are the consequences if the Web can connect with users in the cognitive style they prefer?" the answer to which completes the phenomenon of communication discussed above.

"We've long been able to personalize *what* information the Internet tells us – but now comes "Web morphing", and an Internet that personalizes *how* we like to be told. For companies, it means that communicating – and selling – will never be the same." – Prof. Glen L. Urban, MIT Sloan

In an article titled "Morph the Web to Build Empathy, Trust and Sales" published: summer 2009, MIT Sloan Management Review, Professor Urban and his team discusses that communication is more effective if the communicating entities are "on the same wavelength", or in other words one communicating entity understands the perspective of the other communicating entity. This type of communication leads to empathy and trust. Similar to human communication during one-to-one sales and marketing pitches, the online advertising communication (or campaigns) can

lead to empathy and trust because advertisements (or content messages) are delivered the way customer thinks. These thinking styles are categorized as "cognitive styles", and they broadly define how people process information.

People process information differently; some want to break messages into its component parts and study each component in great detail, a characteristic of an analytical person, where as some look at the message big picture as a whole and make a decision, a characteristic of a holistic person. If a message suitable for analytical person is presented to a person who processes messages in a holistic fashion, the message is not likely to be having the desired effect as it would have had the message been holistic.

Similarly, some people visualize information and form visual patterns or figures when they process information, while others put them in words. Some people are pragmatic thinkers and like to process information (or make a decision) after considering ideas and aspects carefully, a characteristic of a deliberative person, while others are intuitive thinkers and like to process information (or make a decision) based on gut feeling, patterns of past experience or intuition; a characteristic of an impulsive person.

Needless to say, with different methods of processing information and making decision of target customer population, adapting the marketing message to the cognitive styles of individual customer is critical to success and instrumental in encouraging loyalty, empathy, trust and revenue. This establishes the concept that morphing online banner ads to match the cognitive style of individual customers would define market success in the future.

"A recent experimental study at MIT demonstrated that web-originated purchase intensions for a large global telecommunications company's broadband product could increase 20% after morphing the site to match individual cognitive styles." – Prof. Glen L. Urban, MIT Sloan

Essentially, dividing the target customer segment based on basic cognitive styles and presenting information according to the taste of each cognitive style would make customers more likely to click through the banner ads and make a purchase decision. According to the study quoted above – analytics customers were presented with more data and technical details, holistic customers were presented with data after reducing complexity, impulsive customers were presented with succinct recommendations, and deliberative customers were presented with an engaging learning experience about the products and services.

The following sections will describe the methodology used to not only determine the cognitive styles of the target customers, but also provide an empirical and strategic analysis on online advertisement morphing.

Advertisement Morphing Technique

The banner ads morph based on the website's cognizance as visitors use it. Their choice of banner ads and our understanding of their cognitive style dictate a real time process called banner ad morphing. The process can be understood using the following building blocks:

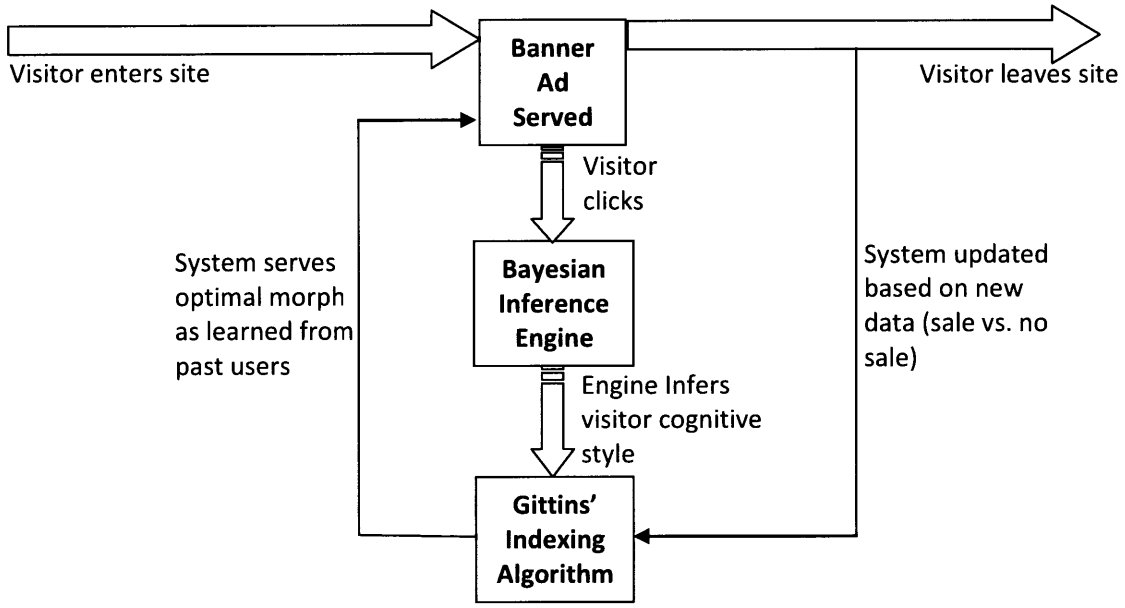


Figure 17: How a banner ad morphs?

The process of morphing banner ads is classified into three steps:

1. Banner Ad Served
2. Bayesian Inference Engine
3. Gittins' Indexing Algorithm

Banner Ad Served:

The Banner Ads are served to the visitors based on preconceived information about the visitor or customer cognitive style. In case of our project, we discover surveyed customers from the CNET.com website on the CBS.com group of websites and present them with the banners that

relate to the cognitive styles of those visitors or customers. In case of customers not surveyed, we present banners at random until a click through is observed, leading us to estimate the cognitive style of the visitor.

Bayesian Inference Engine:

Bayesian Inference is a method of statistically generated inference which has the statistical data or observations prove or disprove the underlying principles or hypotheses of a system. Once enough statistical data is available either for or against a particular systemic hypothesis, one can predict the probability of the hypothesis being either very high or very low. This mechanism that determines from a set of hypotheses and statistical probabilistic model for decision making within a system is termed as Bayesian Inference Engine.

Like the probability theory, the Bayesian Inference relies on subjective information used to formulate inductive reasoning towards an inference. The inference is further refined with the statistical data or observation using the Bayes' theorem.

In the context of online advertisement morphing, the initial hypothesis starts with a null hypothesis for a particular website visitor without any prior cookie information to generate a hypothesis about the cognitive style of the website visitor. On the other hand if the cookie information suggests that the particular website visitor has a cognitive style that is analytical-holistic then the banner ads are morphed to represent the particular cognitive style. This forms the basis of the initial hypothesis.

However, when a click though is observed on a particular banner ad a new statistical data or observation is presented to the inference engine to either confirm the earlier prediction of the

cognitive style as very likely or less likely. The more click through observed on banner ads, the better the inference engine's ability to predict the cognitive style of a particular website visitor.

Empirically the essence of Bayesian Inference Engine based on the Bayes' theorem represented by the probability equation below:

$$P(H|O) = \frac{P(O|H)P(H)}{P(O)}$$

Where,

H represents the initial hypothesis, which could be a null hypothesis or an existing hypothesis based on previous click through on banner ads by a particular user. P (H) is the probability of the initial hypothesis.

O represents the statistical data or observation of a click through (in online advertising terminology). P (O) is the marginal probability of the observation O. By definition marginal probability distribution can also be calculated as a sum of product of all mutually exclusive hypotheses and corresponding conditional probability of the reoccurrence of an observation given that the corresponding hypothesis is true. Hence P (O) can also be calculated as:

$$P(O) = \sum P(E|Hi)P(Hi)$$

P (O|H) is the conditional probability of the reoccurrence of observation O if the hypothesis H is true.

P (H|O) is the conditional probability of the hypothesis getting reinforced has very likely (or very high) if the Observation O is observed.

Hence, the right hand side of the Bayes' theorem, i.e.

$$\frac{P(O|H)P(H)}{P(O)}$$

represents the statistical data or observation's impact on the probability that the initial inference is highly likely or less likely. Similarly, it determines the likelihood of the observation of a click through on a banner ad to prove or change the initial hypothesis about the website visitor's cognitive style.

Gittins' Indexing Algorithm:

The Gittins' Indexing Theorem for the multi-armed bandit problem can be applied to Online Advertising. Here in an attempt to use the Gittins' Indexing Theorem with the Online Advertising terminology to serve optimally morphed banner ads to visitors based on real-time assessment of their cognitive styles according to "A short proof of the Gittins Index Theorem, by John N. Tsitsiklis".

Suppose that there are n cognitive styles and i^{th} such cognitive style is a continuous-time stochastic process with a finite state space σ_i . It is assumed that the state spaces of the different cognitive styles are disjoint and we let $\sigma = \sigma_1 \cup \sigma_2 \cup \ldots \cup \sigma_n$. If the i^{th} cognitive style morph is at some state $x \in \sigma_i$ and is selected to be presented, then a click through C(x) is observed and the cognitive style morph remains active on a cookie over a time period of random length T(x). It is assumed that after T(x) time period either the cookie is deleted or modified to better suit the visitor's cognitive style and the visitor's cookie moves to a new state Y(x).

At this point, we assume that the random vector (T(x), C(x), Y(x)) corresponding to different banner ad presentation for same or different visitors is statistically independent and that the joint

probability distribution of the random vector (T(x), C(x), Y(x)) is known and is the same for every banner ad presented to cognitive style i for which cognitive style i is at the same state x ε σ_i .

It is proven that for a particular mapping of cognitive styles with respective state spaces, the time t_i at which the i^{th} banner presentation starts and the click through C_i observed at that time are well defined random variables depicting the maximization of:

$$E[\sum_0^\infty C_i \ e^{-\beta t_i}]$$

And not the entire probability distribution of C(x) to increase the likelihood of a click through based on the correct cognitive style deduction and banner ad presentation.

Gittins Theorem 2.1 states that "There exists an optimal policy that obeys the following rule: Whenever bandit i* is at state s*, then bandit i* is played." The theorem makes it apparent that the statistics of the random variables T(x) and C(x), as well as the transition probabilities of the reduced cognitive style i* are completely determined by the corresponding statistics and transition probabilities of the original cognitive style i*. This shows that the indices of the various states of a particular cognitive style are completely determined by the statistics associated with that cognitive style. In other words, the index algorithm can be carried out separately for each different cognitive style, still yielding the same index values.

Prof. John N. Tsitsiklis states that "The Gittins Index theorem establishes something more than Theorem 2.1. In particular, not only does it show that there exist a priority policy which is optimal, but also that an optimal priority ordering can be found by ordering the states according to the numerical values of a certain index which can be computed separately for each bandit."

Hence, The Gittins Index Theorem can be applied to the banner ad morphing based on different cognitive styles and index the cognitive styles based on the cognitive state of the visitor by the statistics associated with the visitor's cognitive style.

Online Advertisement Morphing Project

Project Introduction

Our move towards online advertisement morphing extends beyond existing behavioural targeting methods that generally use patterns of clicks but do not make inferences on underlying cognitive states and do not include formal experimental learning based on Gittins' updating strategies. The key project entities are CBS.com websites, the ad server or publisher; AT&T, the advertisers; CNET.com, the click stream tracker, cookie updater and customer surveyor; Atlas, the click through tracker for AT&T morphed banner ads on the CBS.com websites. The Project Ecosystem described below explains the project entities and their respective functionalities in detail.

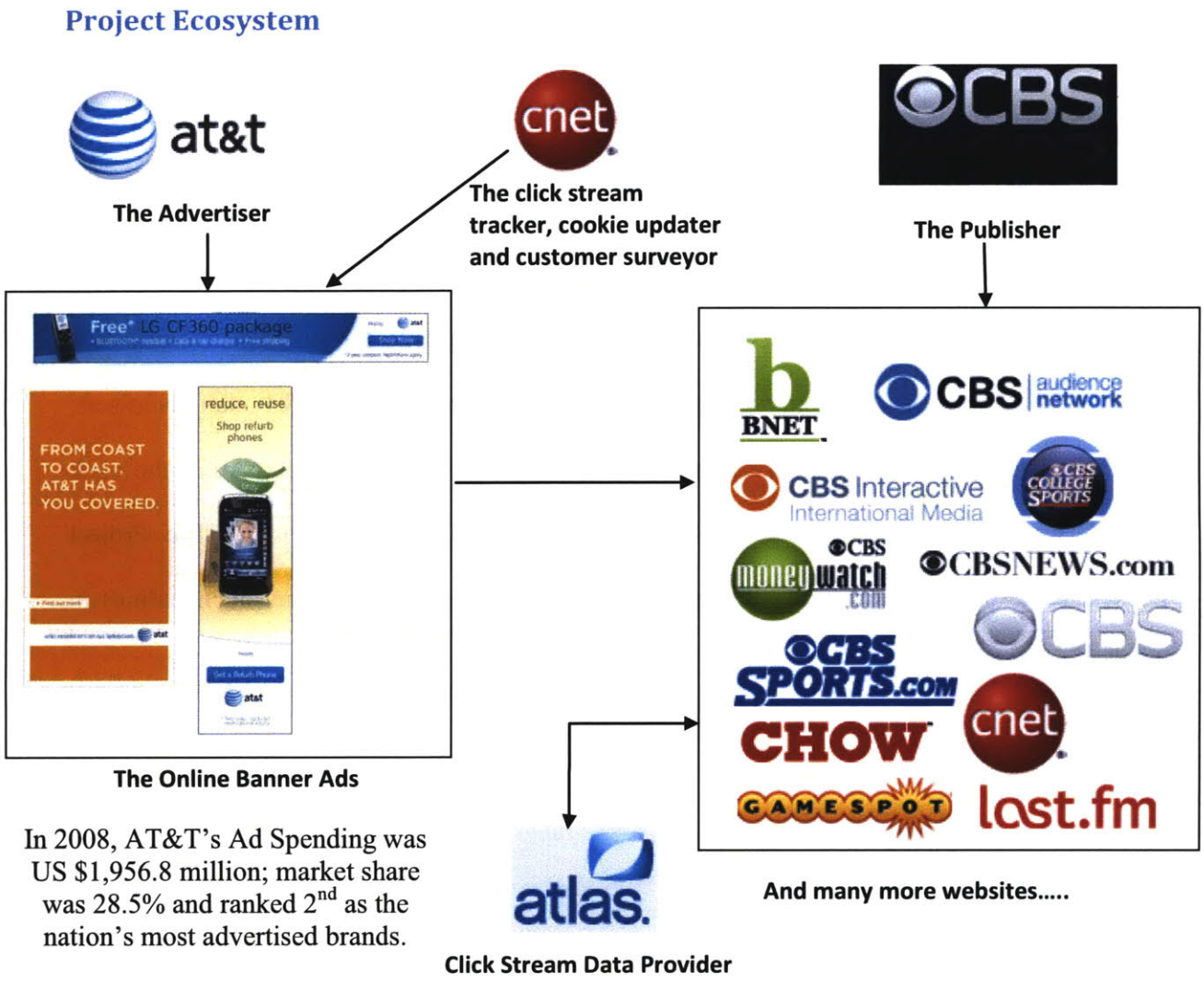


Figure 18: Online Advertisement Morphing project ecosystem

As described above the project ecosystem comprises of the following entities:

1. **AT&T, The Advertiser:**

   AT&T provides the content of the advertisement campaigns that are run on the publisher sites. The AT&T banner ads represent the various promotions and products that AT&T wants

to advertise to its customers. As a matter of fact, gathered from Annual 2010 Edition of Advertisement Age, Telecoms made up three of the five most advertised brands in 2008.

2. **CNET.com, The customer surveyor, Click Stream Tracker, and Cookie Updater:**

   We use CNET customer (or registered user) base that ranges from 50,000 to 100,000 users, and mark their cookies with their cognitive styles. These marked cookies will help us determine the CNET customers on CBS.com group of websites and serve them with morphed advertisements of AT&T banner ads. Further, the project includes observation of the morphed banner ad click through, which will allow us to adjust the customer cognitive style as Analytic, Holistic, Deliberative, Impulsive, Intuitive, Rational, Visual, or Verbal.

3. **Atlas, The Click Stream data provider:**

   We use a third party service provider to measure and retrieve data about the click through on the morphed AT&T banner ads shown to the customers of various CBS.com websites. This data provides us the necessary information to compare the improvement of banner ad click through and subsequent purchase of the advertiser products and services when the target customer is presented with a morphed banner ad when compared to a generic banner ad.

4. **CBS.com, The publisher:**

   CBS builds media experiences based on customer preferences. As leading destinations for the information and entertainment customer segment, CBS hosts a multitude of specific entertainment websites such as, CBS.com, GameSpot, CNET, TV.com, CBSNews.com, last.fm and CBSSports.com, and delivers engaging editorial programming that combines original, independent and user-generated content. We used CBS as the publisher of morphed ads for AT&T.

The following section discusses the project methodology that pulls the project ecosystem together in order to determine the Cognitive Styles of various customer or registered users of CBS/CNET.

Project Methodology

The project methodology comprises of seven distinct steps aimed at understanding and classifying the customer cognitive styles. The steps are broadly classified as:

1. Panel Study
2. Pre-Test Analysis and Study
3. Priming Study – Cognitive Style Priors
4. Cognitive Style Estimation and Cookie Assignment
5. Morph Designing
6. Detecting visitors and morphing ("re-messaging")
7. Field Study and Analysis

The Panel Study and Pre-Test Analysis and Study were performed at MIT Sloan School of Management, below is a brief description of the processes and elaborate description will follow in the subsequent sections regarding empirical analysis of data.

1. **Panel Study:**

   The panel study is performed to measure the cognitive styles, popularly known as the C's, which will be fed to the Bayesian Inference Engine to infer cognitive styles. A panel of 13 (thirteen) judges from MIT Sloan participated in the panel study. The judges were presented with screenshots of a website (CNET.com in this case) and asked to rate each

link and banner according to their cognitive styles. The qualitative information that results from the panel study underwent a reliability test using Rust and Cooil (1994). The reliability results show 86% to 88% qualitative data reliability, which is desirable to proceed to the next step in the process of determining the quality of our cognitive scales, pre-test analysis and study.

2. **Pre-Test Analysis and Study:**

   The pre-test analysis and study is essential to inspect the quality of our cognitive scales. As we know that the quality of morphing is more or less dependent on the quality of the factors that empirically define cognitive scales because factors, by definition, reduce variance in behavioural responses. As these factors are fed to the Bayesian Inference Engine via Ω (estimates of the preference matrix) that aids in inferring cognitive styles based on banner click through, it is essential to perform a pre-test analysis to test our cognitive scales. The pre-test was performed by means of an internet survey of a small group of 40 to 50 (forty to fifty) respondents.

After determining the cognitive scales, and their reliability and quality, the cognitive indices are provided to CNET.com for a more elaborate survey of a selected set of 5000 customers (or registered users). This study is called priming study, below is a brief description of the process and elaborate description will follow in the subsequent sections regarding empirical analysis of data.

3. **Priming Study – Cognitive Style Priors:**

   The priming study uses CNET's customer base to invite selected CNET visitors to complete the priming study online survey to provide data to update Ω. The online survey contains a series of preference and cognitive style questions that are presented to the

CNET visitors after their 6th banner ad click. Based on the daily distribution of visitors per click on CNET it is estimated that within 2 weeks, 5000 visitors will have reached the 6th click and answered the online survey.

Once the customer preferences Ω and cognitive styles have been established the next step is to perform the cognitive style estimation and cookie assignment per surveyed CNET visitor.

4. **Cognitive Style Estimation and Cookie Assignment:**

   Based on the customer preference Ω and cognitive styles r recognized in the priming study, which provides us with the click streams from ~50,000 CNET visitors, we estimate the cognitive styles of each one of the estimated 50,000 CNET visitors who completed our survey. A cookie will be assigned to each of the 50,000 CNET visitors based on their individual cognitive style. This step allows us to enlist the cognitive styles generated as a result of the survey and the best morph for each cognitive style. As a result of the priming study, cognitive style estimation and cookie assignment, the publisher (CBS.com) will be able to produce optimally morphed banner ads.

5. **Morph Design:**

   The morph designing phase utilizes the customer preferences and respective cognitive styles to create banner ads that would be used on publisher sites. The morphed banner ads or "creatives" best serve the purpose if they are created such that one banner add appeals to customers of only one cognitive style. A dominant design that addresses the needs of multiple cognitive styles would defeat the purpose of morphing. Hence, mutually exclusive designs of morphed banner ads will add value to the study as well as the concept of optimal communication with one's customers based on how the customer likes

to see the information or promotional information about advertisers' products and services.

6. **Detecting visitors and morphing ("re-messaging"):**

   As discussed in the project ecosystem, the CNET updated cookies will be re-detected on CBS.com group of websites and will be presented with morphed banner ads of AT&T. The CBS.com group of websites is an ad publisher and will present AT&T ads based on the inventory volume purchased by AT&T's online ad exchange. The visitors to CBS.com websites will be presented with the banner ads based on their cognitive style-morph combination. Completion of this step brings us to the end of the project and to the phase where we analyse the overall impact of morphing on AT&T's revenues using field study.

7. **Field Study and Analysis:**

   This phase is the end of the project analysis wherein Atlas/AT&T will provide us with the performance of the morphed banner ads with respect to the generic advertising banner ads. This data will allow us to calculate the aggregate morphed advertising efficacy and performance.

Project Empirical Analysis

This section discusses the project methodology in detail with empirical analysis at each step to prove procedural sanity and to negate any doubts or uncertainties. The advanced analytics and statistic measures allows for created reliability and consistency in the project's approach.

Panel Study

The Panel study was conducted with 13 judges, who were presented with different areas of website pages on CNET.com and asked to evaluate on the following criteria:

1. Criterion A, whether or not they expect the page pointed to by the link (or collection of links) to have a picture or graph. The criterion had the following rating scale:

The link indicated a graphical page	3
Probably a graphical page	2
Probably not a graphical page	1
Not a graphical page	0
I cannot judge	NA

   For this criterion, the pages presented were CNET.com "Homepage" and part of "Reviews Category – Cell Phones" in order to gauge the visual and verbal cognitive styles of the panel judges. This would allow measuring the cognitive styles, popularly known as the C's, which will be fed to the Bayesian Inference Engine to infer cognitive styles based on the panel's judgement of the click though on links and banners on the website.

   Appendix I: discusses the website links and questions presented to panel judges.

2. Criterion B, whether or not they expect the page pointed to by the link (or collection of links) to have content that is focused on one specific aspect (such as, technical or design question). The criteria had the following rating scale:

The link indicated a focused page	3
Probably a focused page	2
Probably not a focused page	1
Not a focused page	0
I cannot judge	NA

   For this criterion, the pages presented were CNET.com "Reviews Category – Cell Phones" and part of "Reviews Category – Desktops" in order to gauge the analytic and

holistic cognitive styles of the panel judges. This would allow measuring the cognitive styles, popularly known as the C's, which will be fed to the Bayesian Inference Engine to infer cognitive styles based on the panel's judgement of the click though on links and banners on the website.

Appendix I: discusses the website links and questions presented to panel judges.

3. Criterion C, whether or not they expect the page pointed to by the link (or collection of links) to have lots of information or very little information. The criteria had the following rating scale:

The link indicated a page with lots of data	3
Probably lots of data	2
Probably not lots of data	1
Not lots of data	0
I cannot judge	NA

For this criterion, the pages presented were CNET.com "Review Products", "Download Links", "Blogs" and part of "News Links" in order to gauge the deliberative and impulsive cognitive styles of the panel judges. This would allow measuring the cognitive styles, popularly known as the C's, which will be fed to the Bayesian Inference Engine to infer cognitive styles based on the panel's judgement of the click though on links and banners on the website.

Appendix II: discusses the website links and questions presented to panel judges.

The ratings collected as a result of the panel discussion is a form of qualitative information that needs to be verified for reliability. The next subsection helps establish reliability of qualitative data.

Establishing reliability of qualitative panel data

Measures of reliability have been developed separately for both quantitative and qualitative data. However, a lot can be learned from the quantitative data and reused with the qualitative data to establish reliability. The use of Proportional Reduction in Loss (PRL) approach is useful because of the following reasons: (Rust and Cooil, 1994)

1. It provides a solid theoretical basis for constructing qualitative reliability measures.
2. It unifies the qualitative and quantitative cases.
3. It relates reliability to loss from poor decisions.
4. It facilitates determination of acceptable reliability levels.
5. It facilitates determination of minimum number of judges to be observed.
6. It facilitates determination of minimum number of inter-judge agreements.

Roland T. Rust and Bruce Cooil, "Reliability Measures for Qualitative Data" Market Research Journal (1994), define the PRL approach to expect loss of data rather than error in data. "The judges' preferences are used to form an estimate Θ of the true value μ, and this estimate results in a loss L, which is zero when $\Theta = \mu$. The PRL measure is defined as:

$$PRL = \frac{[E_{max}(L) - E(L)]}{E_{max}(L)}$$

Where E (L) is the expected loss (that can be estimated from the sample) and E_{max} (L) is the maximum possible expected loss that occurs when the data is completely unreliable."

Given that we have n judges, the maximum number of inter-judge agreements can be calculated to be n (n – 1)/2. By finding the total number of inter-judge agreements for each of the criteria mentioned above, one can calculate the proportion of inter-judge agreement or the A value.

The study suggests the following statistics for inter-judge agreements with respect to panel criteria:

Criterion A	Maximum Possible Agreements	% of inter-judge agreements	PRL Reliability Measure in %
1223	3432	35.64%	88%

Table 5: Criteria A PRL Reliability Measure

Criterion B	Maximum Possible Agreements	% of inter-judge agreements	PRL Reliability Measure in %
1240	3432	36.13%	88%

Table 6: Criteria B PRL Reliability Measure

Criterion C	Maximum Possible Agreements	% of inter-judge agreements	PRL Reliability Measure in %
1157	3432	33.71%	84%

Table 7: Criteria C PRL Reliability Measure

Overall	Maximum Possible Agreements	% of inter-judge agreements	PRL Reliability Measure in %
3620	10296	35.16%	86%

Table 8: Overall PRL Reliability Measure

Based on the above statistical evidence, it can be concluded that the qualitative information collected using the panel has achieved the PRL Reliability Measurement of 86% overall. Therefore, one can be fairly confident in the panel study and in our judges' classifications. Also

86% level of PRL is directly comparable to a Cronbach's alpha of .86 in terms of expected loss. Hence, one can have the same level of confidence in this panel's judges' classifications and ratings as would have been with Cronbach's alpha of .86. As Cronbach's alpha valuation of .86 is considered fairly good, PRL valuation of being fairly good is appropriate. This leads us to the next step towards inspecting the quality of our cognitive scales using Pre-Test Analysis and Study.

Pre-Test Analysis and Cognitive Style Estimation

Further to the Panel Study, a survey of 199 people was conducted in order to estimate the cognitive scales and help estimate the criteria of distinction among various cognitive styles. The survey was conducted based on the 35 initial cognitive scales, which were further purified to 11 cognitive style scales. The purification of the cognitive scales is discussed in the Appendix titled "Pre-Test Analysis".

Based on the purification results the cognitive scales were available in three distinct dimensions namely,

1. Deliberative / Impulsive
2. Holistic / Analytical
3. Intuitive / Rational

And the purified scales that led to the above dimensions include:

Deliberative / Impulsive Scales:

q20_Given enough time, I would consider every situation from all angles.

q23_When making a decision, I take my time and thoroughly consider all relevant factors.

q1_I reason things out carefully.

q10_I am detail oriented and start with the details in order to build a complete picture.

Holistic / Analytical Scales:

q7_I do not like detailed explanations.

q2_I do not tackle tasks systematically.

q4_I do not approach tasks analytically.

q22_I find that to adopt a careful, analytical approach to making decisions takes too long.

Intuitive / Rational Scales:

q18_I rely on my first impressions.

q16_I go by what feels good to me.

q19_I use my instincts.

After the scales were determined using the Pre-Test Analysis, I used the factor scores of the R-mode Factor Analysis to cluster to individuals (survey participants) into clusters of cognitive styles. This section will perform an empirical analysis on the results observed during the factor analysis and hierarchical clustering of the individual cases (or survey participants).

The communalities, a measure of the percent of variance in a given variable explained by all the factors jointly and can be interpreted as the reliability of the indicator, suggest that the factors selected can explain over 74.3 % of Analytical / Holistic Cognitive Style, over 69.1% of Impulsive / Deliberative Cognitive Style, and over 72.6 % of Intuitive / Rational Cognitive Style.

The reliability of the indicators is close to the Cornbach's Reliability Alpha value and is hence considered as reliable indicators. . The SPSS output below depicts the above explanation:

Communalities

	Initial	Extraction
q20_Given enough time, I would consider every situation from all angles.	**1.000**	**.743**
q23_When making a decision, I take my time and thoroughly consider all relevant factors.	1.000	.699
q1_I reason things out carefully.	1.000	.711
q10_I am detail oriented and start with the details in order to build a complete picture.	1.000	.662
q7_I do not like detailed explanations.	**1.000**	**.691**
q2_I do not tackle tasks systematically.	1.000	.649
q4_I do not approach tasks analytically.	1.000	.638
q22_I find that to adopt a careful, analytical approach to making decisions takes too long.	1.000	.650
q18_I rely on my first impressions.	**1.000**	**.726**
q16_I go by what feels good to me.	1.000	.625
q19_I use my instincts.	1.000	.553

Extraction Method: Principal Component Analysis.

Table 9: SPSS Factor Analysis and Component Communalities

Using the Eigen Values to measure the amount of variation in the total sample of 199 is accounted for by each factor. The Total Variance Explained analysis using SPSS to analyse the cognitive styles of the sample under consideration 11 components (factors) would be needed to explain 100% of the variance in the data, and these 11 factors are the extracted above for optimal reliability. One can observe that the traditional criteria of stopping when the initial eigenvalue drops below 1.0, only 3 of the 11 factors were actually extracted. These 3 would account for 66.79% of the variance in the data. The SPSS output below depicts the above explanation:

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**3.355**	**30.502**	**30.502**	**3.355**	**30.502**	**30.502**	**2.940**	**26.723**	**26.723**
2	**2.954**	**26.851**	**57.353**	**2.954**	**26.851**	**57.353**	**2.666**	**24.232**	**50.955**
3	**1.038**	**9.440**	**66.793**	**1.038**	**9.440**	**66.793**	**1.742**	**15.838**	**66.793**
4	.704	6.398	73.191						
5	.579	5.265	78.456						
6	.548	4.985	83.441						
7	.457	4.154	87.594						
8	.411	3.740	91.334						
9	.353	3.211	94.545						
10	.334	3.035	97.580						
11	**.266**	**2.420**	**100.000**						

Extraction Method: Principal Component Analysis.

Table 10: SPSS Factor Analysis and Total Variance

Continuing the discussion about the interpretation of the eigenvalues, I present the Cattell Scree Test Plot that plots the components on the X Axis and the corresponding eigenvalues on the Y

axis. Intuitively stating that one can stop at the 3rd component when the elbow of the curve levels. The SPSS output below depicts the above explanation:

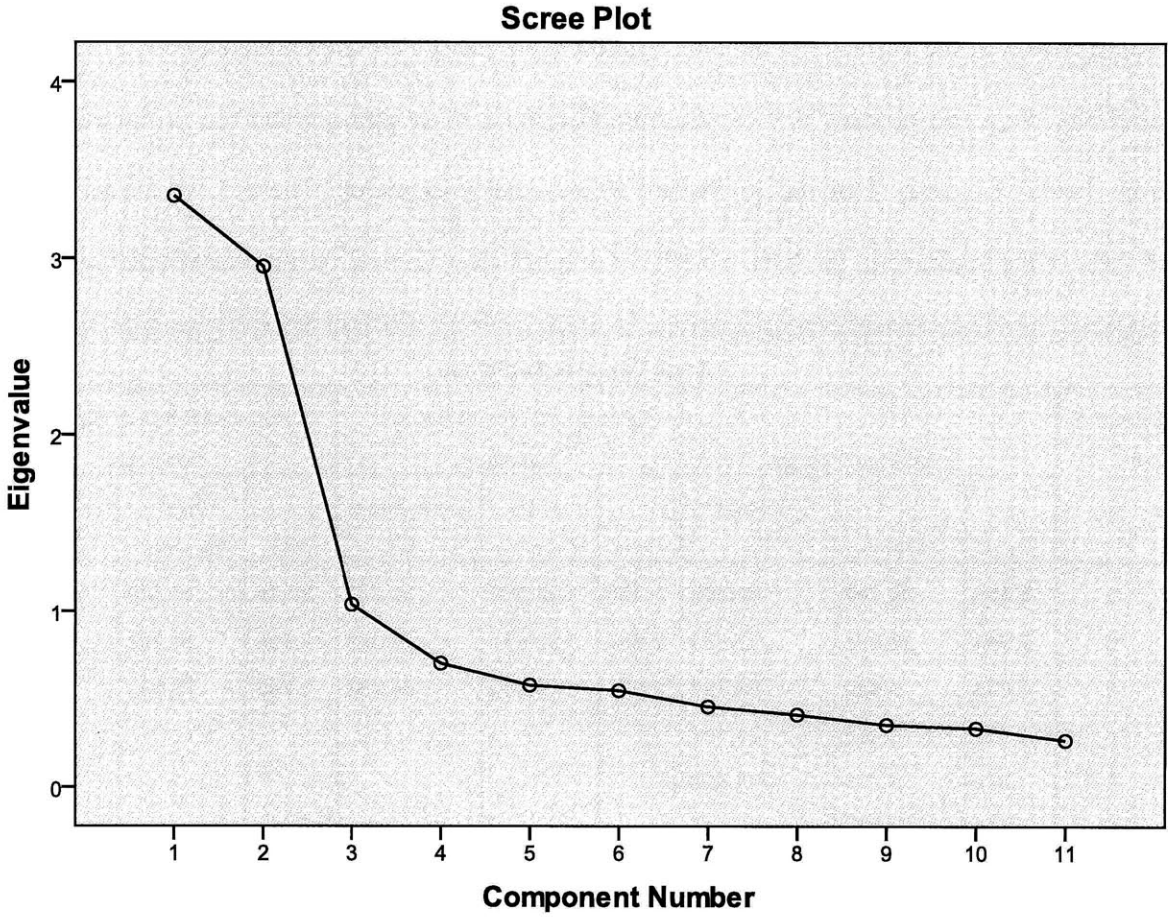


Figure 19: SPSS Factor Analysis and Scree Plot

Now that 3 components were selected to represent the variance of the data, I discuss the Rotated Component Matrix touched upon in the Appendix titled "Pre Test Analysis". The Factor Loadings presented in the Rotated Component Matrix have been chosen to at least be 0.6 or higher. In the study, the individual preferences were coded from ("Strongly Disagree = 0" to "Strongly Agree = 5"), the highlighted cells below show the loadings for the measured row

variables most associated with each of the 3 extracted components (factors). The three components are categorized as Deliberative/Impulsive, Analytical/Holistic, and Intuitive/ Rational respectively.

Rotated Component Matrix[a]

	Component		
	1	2	3
q20_Given enough time, I would consider every situation from all angles.	**.852**	.027	.129
q23_When making a decision, I take my time and thoroughly consider all relevant factors.	**.827**	-.098	.077
q1_I reason things out carefully.	**.827**	-.093	.140
q10_I am detail oriented and start with the details in order to build a complete picture.	**.790**	-.141	.134
q7_I do not like detailed explanations.	-.040	**.829**	.032
q2_I do not tackle tasks systematically.	-.043	**.793**	.134
q4_I do not approach tasks analytically.	-.142	**.784**	.055
q22_I find that to adopt a careful, analytical approach to making decisions takes too long.	-.064	**.776**	.209
q18_I rely on my first impressions.	.086	.103	**.841**
q16_I go by what feels good to me.	.098	.285	**.731**
q19_I use my instincts.	.422	.001	**.612**

A high score on these scales signifies <u>Deliberative</u> Cognitive Style and a low score signifies <u>Impulsive</u> Cognitive Style.

A high score on these scales signifies <u>Holistic</u> Cognitive Style and a low score signifies <u>Analytical</u> Cognitive Style.

A high score on these scales signifies <u>Intuitive</u> Cognitive Style and a low score signifies <u>Rational</u> Cognitive

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Table 11: SPSS Factor Analysis and Rotated Component Matrix

Component 1 loads Deliberative/Impulsive Styles, Component 2 loads Holistic/Analytical Styles, and Component 3 loads Intuitive/Rational Styles.

The component plot in rotated space presents a diagrammatic representation of the factor loadings above with respect to the row variables:

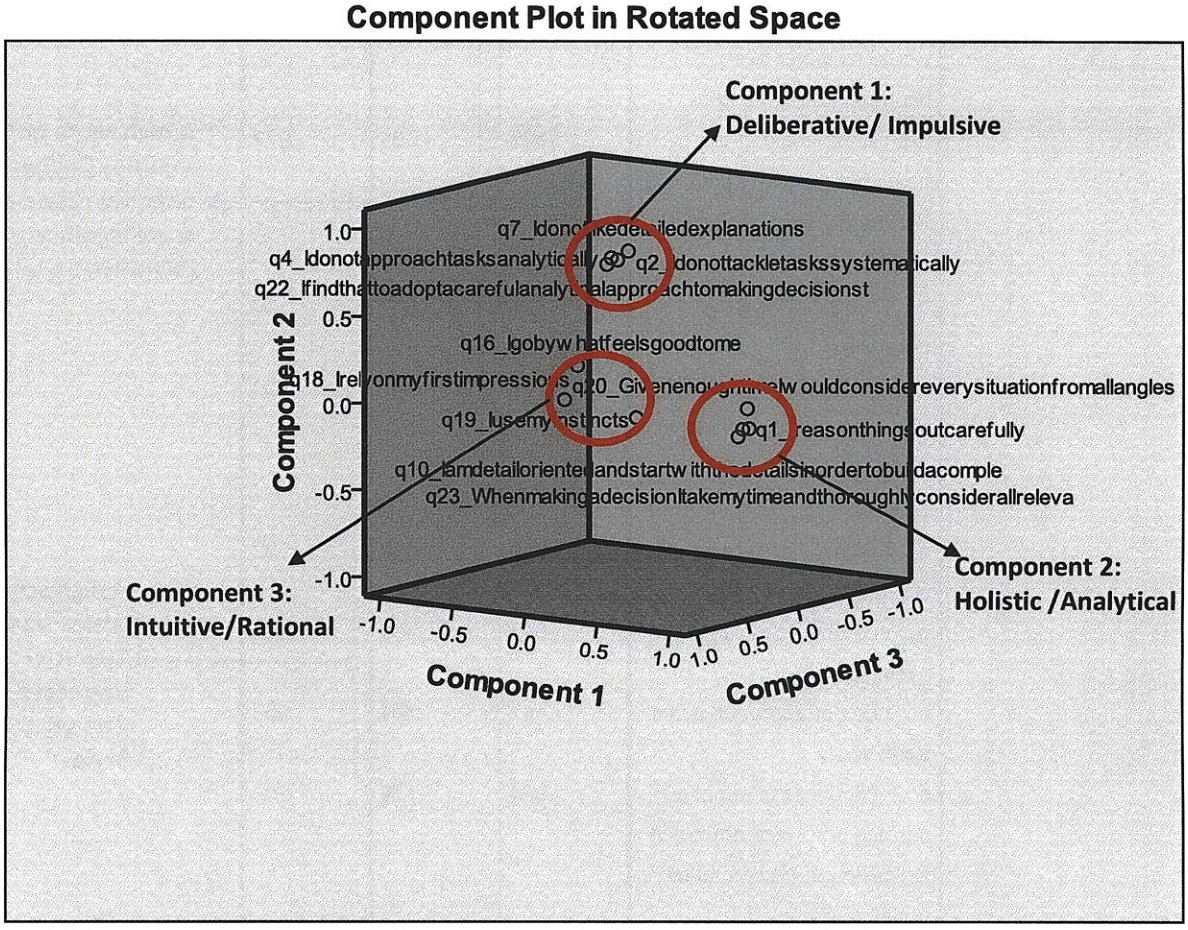


Figure 20: SPSS Factor Analysis and Component Plot in Rotated Space

Further, I used the Factor Scores generated as a result of the Factor Analysis to create and cluster individuals (199, survey participants). The SPSS output below depicts the above explanation:

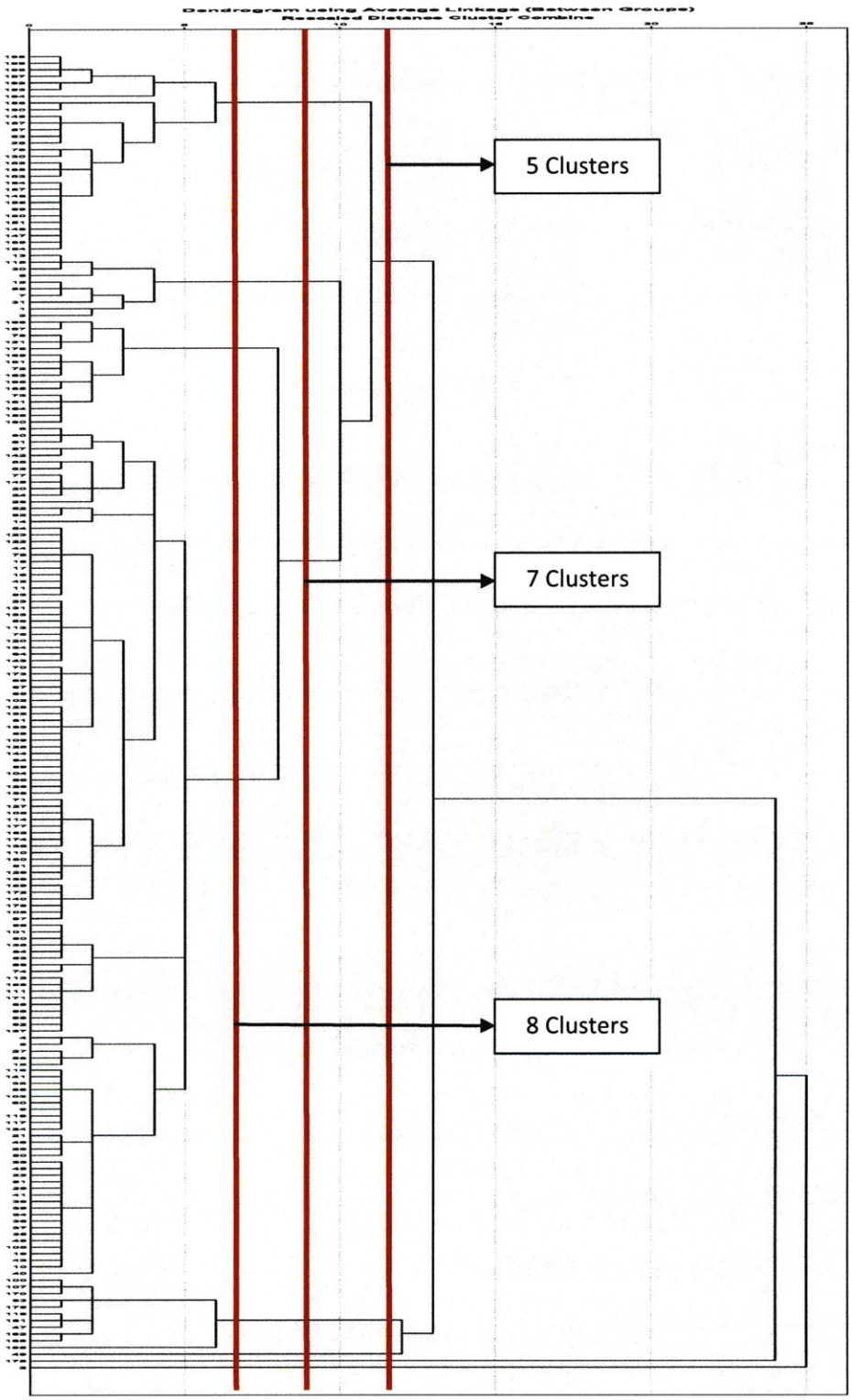


Figure 21: SPSS Cluster Analysis

The Cluster Analysis presented above can be used to cluster individuals into five, seven or eight clusters and determine the best target methodology for morphed ads per cluster of individual cognitive styles.

Using the Factor Score Centroids for each cluster with each component, I determine the characteristic features of the clusters with respect to the cognitive styles. Below is an analysis for five, seven and eight clusters:

5-Cluster Analysis:

As is evident from the cluster analysis, two clusters namely cluster 2 and cluster 5 are outliers comprised on only one individual forming the cluster, hence, these clusters are discarded.

The factor score centroids for the remaining three clusters with components are depicted below:

	Deliberative/Impulsive	Holistic/Analytical	Intuitive/Rational
Cluster 1	0.068769451	-0.166996463	-0.018275827
Cluster 3	0.228620586	-0.362736927	0.110953372
Cluster 4	1.008468957	0.086804936	0.362417327

Table 12: 5 Cluster Factor Score Centroids

A graphical representation of the association below depicts that the clusters are not very representative of the components being analysed as few clusters such as cluster one and three have similar characteristics with respect to the components under study. Hence, it is required to analyse with more clusters, leading to the 7 cluster analysis.

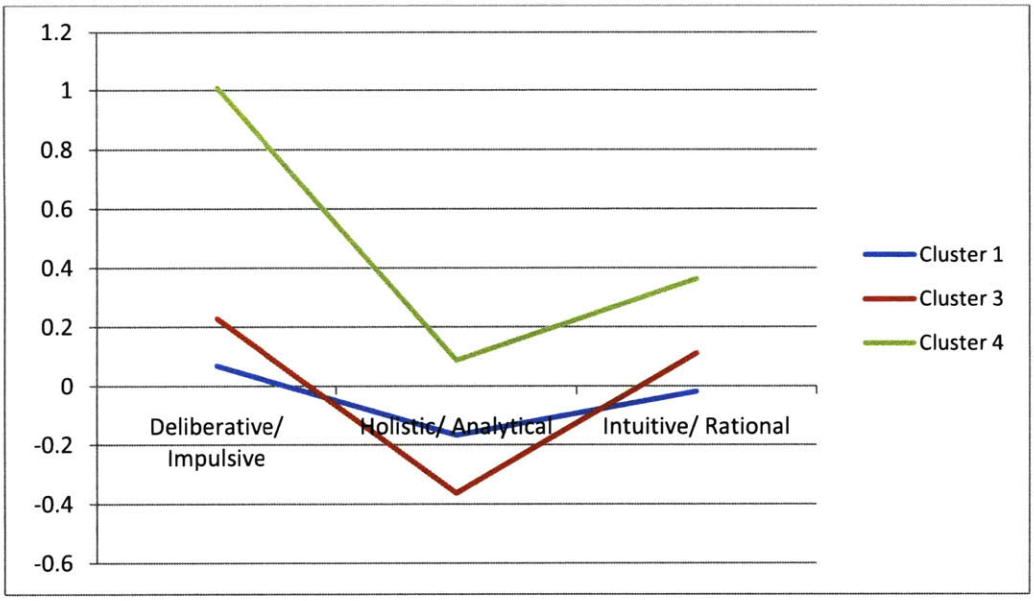


Figure 22: 5 Cluster Factor Score Centroid Analysis

7-Cluster Analysis:

As is evident from the cluster analysis, two clusters namely cluster 2 and cluster 7 are outliers comprised on only one individual forming the cluster, hence, these clusters are discarded.

The factor score centroids for the remaining three clusters with components are depicted below:

	Deliberative/Impulsive	Holistic/Analytical	Intuitive/Rational
Cluster 1	-2.685590909	-0.173562083	-0.752258125
Cluster 3	0.009857429	-0.172817494	-0.017159037
Cluster 4	0.088629569	-0.172817494	-0.023061492
Cluster 5	0.228620586	-0.362736927	0.110953372
Cluster 6	1.008468957	0.086804936	0.362417327

Table 13: 7 Cluster Factor Score Centroids

A graphical representation of the association below depicts that three patterns of clusters emerge from the above analysis:

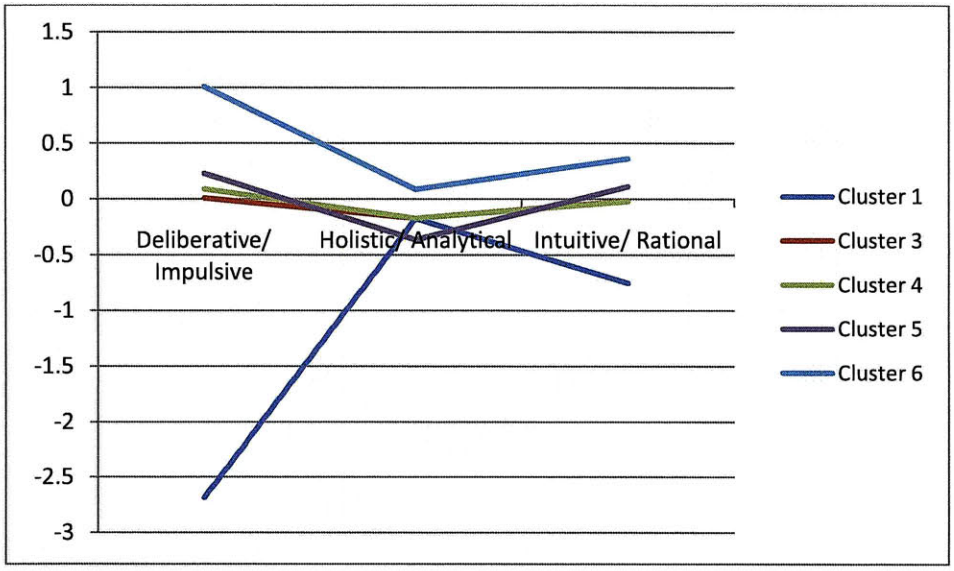


Figure 23: 7 Cluster Factor Score Centroid Analysis

In order to understand the emerging pattern, an 8 Cluster Analysis seems necessary and much more required at this stage of analysis.

8-Cluster Analysis:

As is evident from the cluster analysis, two clusters namely cluster 2 and cluster 8 are outliers comprised on only one individual forming the cluster, hence, these clusters are discarded.

The factor score centroids for the remaining three clusters with components are depicted below:

	Deliberative/Impulsive	Holistic/Analytical	Intuitive/Rational
Cluster 1	-2.685590909	-0.173562083	-0.752258125
Cluster 3	0.009857429	-0.172817494	-0.017159037

Cluster 4	0.08802616	-0.178638525	-0.027847157
Cluster 5	0.130495257	-0.193194475	-0.029166988
Cluster 6	0.228620586	-0.362736927	0.110953372
Cluster 7	1.008468957	0.086804936	0.362417327

Table 14: 8 Cluster Factor Score Centroids

A graphical representation of the association below depicts that three patterns of clusters emerge from the above analysis, as well:

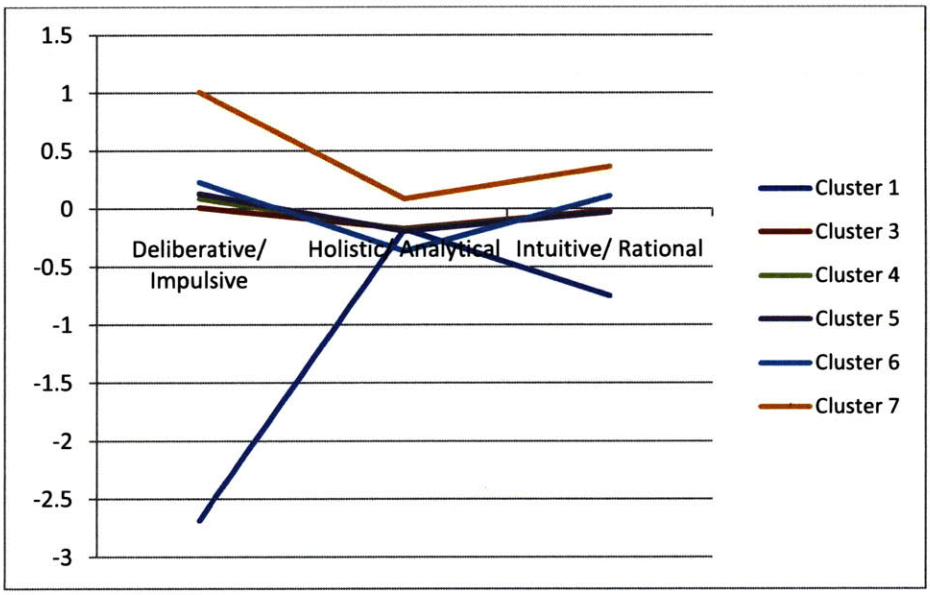


Figure 24: 8 Cluster Factor Score Centroid Analysis

The clusters of individual cognitive styles exhibit the following characteristics, namely:

1. Highly Impulsive, Analytical and Rational approach. (Cluster 1)
2. Highly Deliberative, Relatively Low Analytical and Intuitive Approach. (Cluster 7)
3. Deliberative, Analytical and Intuitive Approach. (Cluster 3, 4, 5 and 6)

However, these clusters are against the popular belief about cognitive style. A cognitive behaviour that is both Analytical and Intuitive or Analytical and Impulsive is contradictory.

Hence, the above analysis is discarded and **K-Mean Cluster Analysis** is used for analysis. A K-Mean Cluster Analysis assigns the survey participants to a given group at the first step based on the initial criteria of Factor Scores determined using the Factor Analysis. The K-Mean Cluster Analysis then calculates the means for each group followed by the next step to reshuffle the survey participants to groups based on their similarity to the current mean of that group. This process continues for each survey participant recursively until no participant changes groups. The K-Mean Cluster Analysis depends on a pre-determined number of clusters and we can use the Hierarchical Cluster Analysis results to implement 3, 5 and 6 clusters of cognitive styles.

K-Mean Cluster Analysis with 3 Clusters:

The K-Mean Cluster Analysis with 3 Clusters performs grouping or clustering using the initial factor scores and presents the initial Cluster Centers as depicted in the SPSS output of K-Mean Clusters titled "Initial Cluster Centers". Further the Final Cluster Centers are calculated after reshuffling the survey participants in the groups based on their similarity to the group, depicted in the SPSS output of K-Mean Clusters titled "Final Cluster Centers".

Initial Cluster Centers				Final Cluster Centers			
	Cluster				Cluster		
	1	2	3		1	2	3
Deliberative/Impulsive	1.43624	-3.56337	.68538	Deliberative/Impulsive	.63938	-.99789	.41221
Holistic/Analytical	-1.05720	2.28206	-2.12460	Holistic/Analytical	-.28265	.26545	-.01156
Intuitive/Rational	-3.35133	.77956	2.19964	Intuitive/Rational	-.84726	-.20687	.93929

Table 15: SPSS Output of K-Mean Cluster Analysis with 3 Clusters

As can be observed from the table above the cognitive styles are high on scale on certain groups/clusters and low on scale of other groups/clusters (highlighted above). The Final Cluster Centers provides a vivid division of survey participant's cognitive styles. For instance, Cluster 1 is distinctively Deliberative, Analytical and Rational; Cluster 2 is distinctively Impulsive, Holistic and Rational; and Cluster 3 is Impulsive, Holistic and Intuitive.

A graphical representation of "Initial Cluster Centers" and "Final Cluster Centers" presents the apparent distinction among survey participants, considered as a representative sample for advertisement morphing.

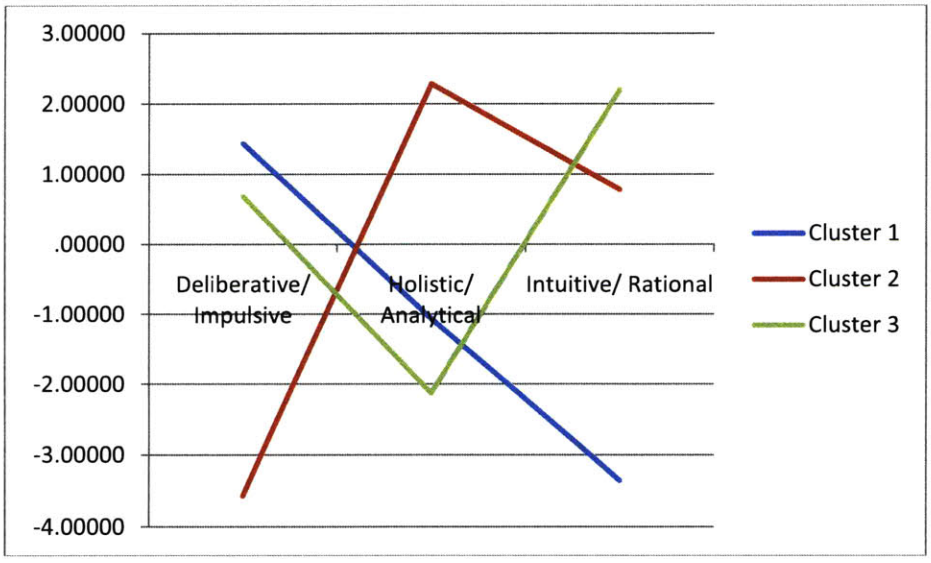


Figure 25: Graphical Representation of K-Mean Cluster Analysis with 3 Clusters, Initial Cluster Centers

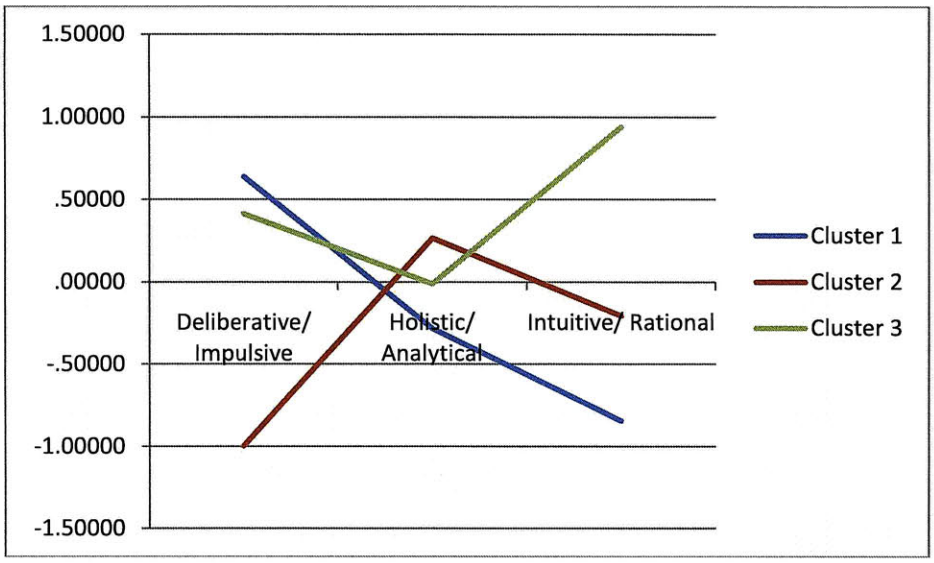


Figure 26: Graphical Representation of K-Mean Cluster Analysis with 3 Clusters, Final Cluster Centers

After final clustering with 3 clusters it is apparent that

1. Cluster 1 will prefer Deliberative, Analytical and Rational ads.
2. Cluster 2 will prefer Impulsive, Holistic and Rational ads.
3. Cluster 3 will prefer Impulsive, Holistic and Intuitive ads.

Examples of these ads and their definitions can be had from "Example Morph Design" Section.

In order to investigate further clusters that would present a more vivid description of the cognitive styles of the representative same of survey participants, I explore K-Mean Cluster Analysis with 5 Clusters. The analysis will be performed only on the Final Cluster Centers for these clusters because final cluster centers are more representative of the cognitive styles.

K-Mean Cluster Analysis with 5 Clusters:

The aim of this analysis is to investigate further clusters that would present a more vivid description of the cognitive styles. Hence, a 5-Cluster Analysis performed using K-Mean Method presents 5 Clusters with the following cognitive styles:

Cluster 1 is distinctively Impulsive, Holistic, and Rational; Cluster 2 is distinctively Impulsive, Holistic and Intuitive; Cluster 3 is distinctively Deliberative, Analytical and Rational; Cluster 4 is Deliberative, Holistic and Rational; and Cluster 5 represents outlier participants.

Final Cluster Centers

	Cluster				
	1	2	3	4	5
Deliberative/Impulsive	-.69232	-1.49172	.76315	.89171	.28642
Holistic/Analytical	.26927	.06553	-.57404	1.65323	-.81618
Intuitive/Rational	-.55538	.84617	-1.10536	.38071	.79653

Table 16: SPSS Output of K-Mean Cluster Analysis with 3 Clusters

A graphical representation confirms that Cluster 5 is an outlier and can be discarded from the analysis.

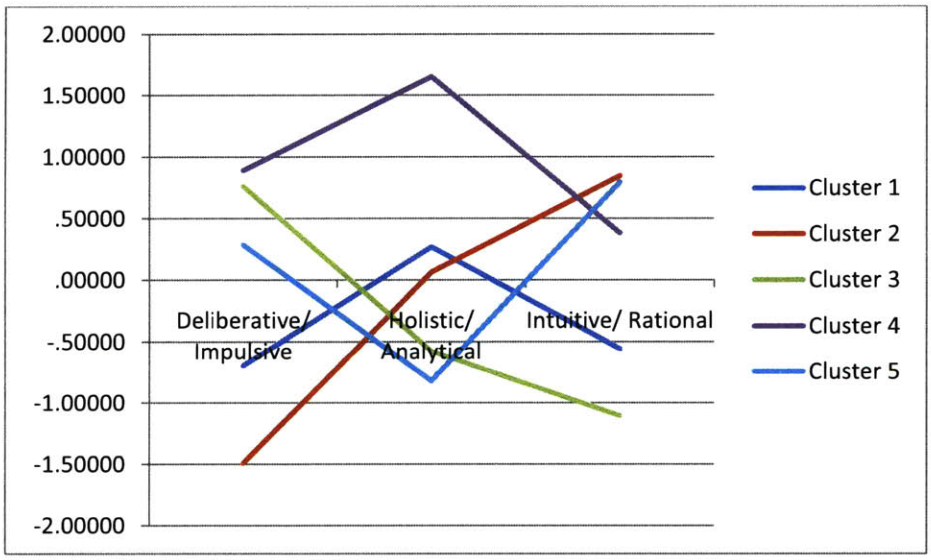


Figure 27: Graphical Representation of K-Mean Cluster Analysis with 5 Clusters

In order to explore and reduce the degree of error with contradicting cognitive styles, I explore K-Mean Cluster Analysis with 6 clusters.

K-Mean Cluster Analysis with 6 Clusters:

The aim of this analysis is to investigate further clusters that would present a more vivid description of the cognitive styles. Hence, a 6 Cluster Analysis performed using K-Mean Method presents 6 Clusters with the following cognitive styles:

Cluster 1 is distinctively Deliberative, Analytical and Rational; Cluster 2 is distinctively Impulsive and Intuitive; Cluster 3 is distinctively Impulsive, Holistic and Rational; Cluster 4 is distinctively Deliberative, Analytical and Rational; Cluster 5 is Distinctively Intuitive, and Cluster 6 is highly Holistic but also Deliberative.

Final Cluster Centers

	Cluster					
	1	2	3	4	5	6
Deliberative/Impulsive	.84771	-1.59637	-.72786	.43693	.13318	.94013
Holistic/Analytical	-.40501	.07483	.32660	-.59630	-.93797	1.73193
Intuitive/Rational	-1.66372	.71217	-.58809	-.07124	1.38559	.38136

Table 17: SPSS Output of K-Mean Cluster Analysis with 3 Clusters

Clearly this cluster analysis provides clusters that are much distinctive in the cognitive style and behaviour. Also, a reduced degree of error with increasing clusters presents well defined clusters and cognitive styles.

A graphical representation of the Final Cluster Centers of 6 clusters confirms the analysis, and is instrumental in creating target morphs for different cognitive styles based on the representative sample.

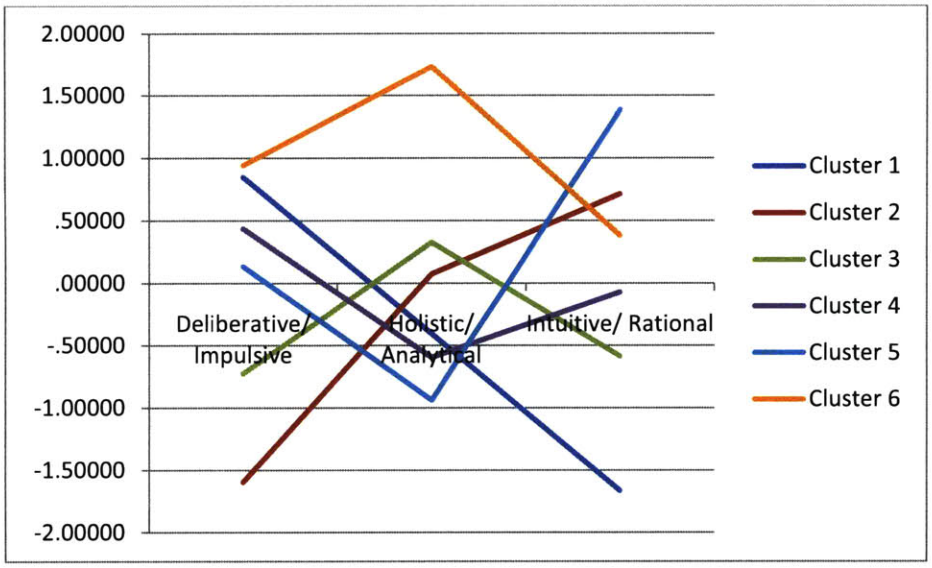


Figure 28: Graphical Representation of K-Mean Cluster Analysis with 6 Clusters

Based on the above description of cluster cognitive styles, target advertisers can morph the advertising creatives based on a mixture of cognitive style attributes rather than creating morphs which are more polarized towards the components namely, Analytical / Holistic, Impulsive / Deliberative or Intuitive / Rational.

A set of creatives drawn from Prof. Glen L. Urban's SMR article titled, "Morph the Web to Build Empathy, Trust and Sales" depicts banner morphs for each cognitive styles. These banner ad morphs can be treated as platforms or basis points for creating hybrid morphs (creatives) which are based on the cognitive styles of the clusters of individuals (market segments) an organization wants to target for optimal advertisement performance and communication.

The section below presents the example morphs discussed above to form a basis or platform for creation of target advertisements based on individual cognitive styles. These examples can act as benchmarks for creation of hybrid morphs targeted to market segments (or clusters).

Example Morph Designs

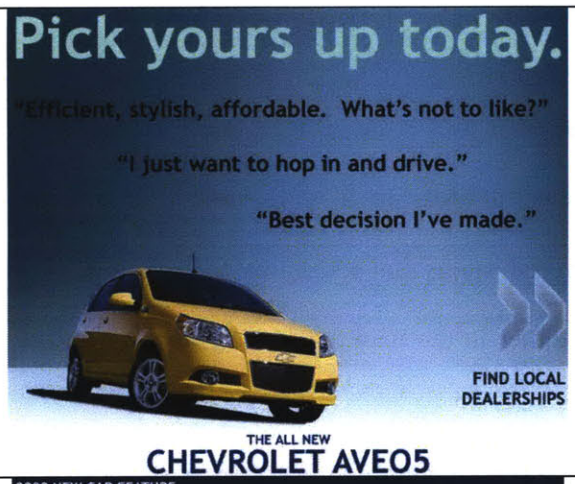
Below are a few examples of the banner ads based on individual cognitive styles and behavioural analysis. These example banner ads can be taken as a basis or platform for creating morphed ads for CNET and CBS customers viewing the AT&T banner ads.

The banner ads below are drawn from the Ad Morphing experiential project for General Motors at MIT Sloan School of Management and are referenced in the Sloan Management Review article titled, "Morph the Web to Build Empathy, Trust and Sales".

<table>
<tr>
<td> 
</td>
<td>Intuitive Ad

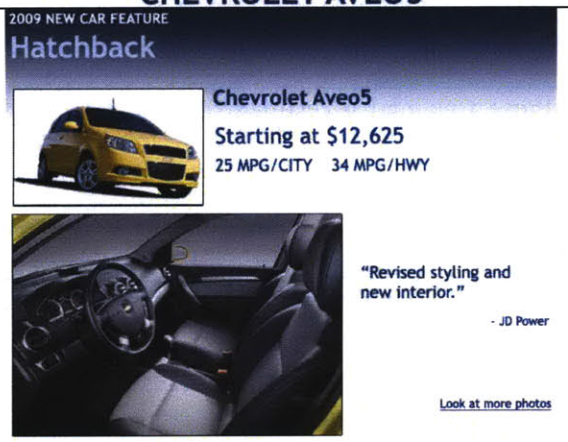
Intuitive (Cognitive Style): a cognitive style behaviour in which an individual processes information based on emotions or gut feeling as against deliberative/conscious thought and analysis.</td>
</tr>
<tr>
<td> 
</td>
<td>Deliberative Ad

Deliberative (Cognitive Style): a cognitive style behaviour in which an individual processes information based on conscious thought and effort as against emotions or instincts.</td>
</tr>
</table>



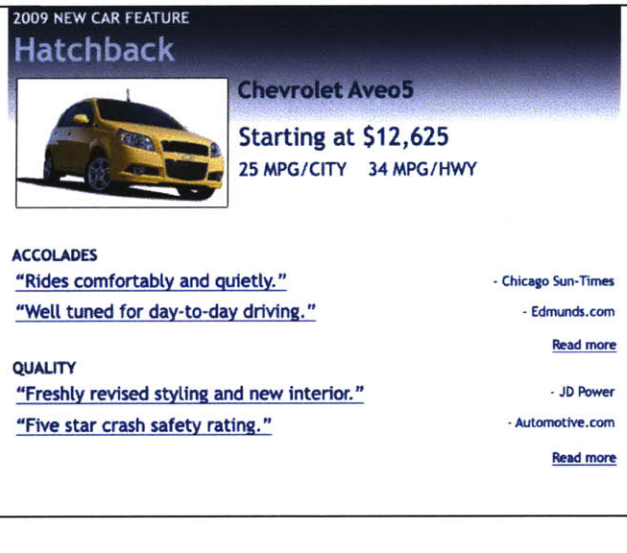
Impulsive Ad

Impulsive (Cognitive Style): a cognitive style behaviour in which an individual processes information inclined on sudden desires or inclinations.



Holistic Ad

Holistic (Cognitive Style): a cognitive style behaviour in which an individual processes information based on the wholes or complete systems rather than analysis of individual parts in making a decision.



Analytical Ad

Analytical (Cognitive Style): a cognitive style behaviour in which an individual processes information using logic and makes a decision after detailed analysis.

Online Advertisement Morphing and Its Strategic Implications

Till now we have dealt with the empirical analysis that proves the efficacy and use of morphing banner ads as an efficient mechanism of presenting ideas to a wide variety of customers, performing customer segmentation based on cognitive styles and adding value to the business by conveying the marketing message out to the customer in the way the message is best perceived and understood using the online media.

In this section, strategic implications of performing advertisement morphing are studied with the perspective of a financial investment, returns on those financial investments, strategic risks and remedies, and business models.

This study is divided into three constituent parts namely, Trend Analysis, Interviews of industry professionals and Impact on existing business models.

The first part, argues a few strategic questions such as:

1. Is Ad Morphing a wise investment? What is the expected ROI?
2. What are the risks and remedies for using morphed ads on the web?
3. How can companies incorporate Ad Morphing in their business model?
4. Is there a better mechanism to achieve the same result?
5. What about personal privacy regulations?

… and many more from the perspective of current media trends and business decisions.

The second part tries to harvest more industry specific trends and their view about the idea of Ad Morphing and its future. This analysis involves interviewing three major entities in the Online Advertising value chain namely, the advertisers, the publishers and the customers. The questions

asked to these entities of the advertising value chain are different keeping in mind the perspective of their industry and will help in analysing the current trends and possibly predicting the future trends.

The third part will bring together the data gathered from the various trend analyses and interviews to suggest business models that can be implemented either along with the traditional media mix of advertising or completely change the way online advertising was perceived to impact the traditional business models.

Industry Trend and Customer Perception Analysis

The introductory section of "Online Advertising" performs an in-depth analysis about the current online advertising industry trends, and brings to notice the following conclusions:

1. The traditional broadcast media such as print, television and radio are losing market share.
2. The advent of broadband technology has given rise to a new communication media for the advertisers.
3. On an average a consumer spends more time on the internet than in front of any other media and this has helped many organizations and advertisers to restructure the methodology they used to address customer demand in the past.
4. Increasingly high number of industrial and business sectors are advertising over the internet and shifting their advertising expenditure from traditional broadcast media to targeted broadcast media i.e. the online advertisement industry.

However, little study has been performed to analyse the consumer experience and perception of the online advertisement industry. In order to draw some conclusions, I surveyed over 100 online

customers or website visitors to analyse consumer concerns and preferences in the following areas:

1. Privacy.
2. Purchase Decisions.
3. Preferences with respect to ad presentation.
4. Preferences with respect to ad content.
5. Preferences with respect to ad location on a website.

The survey questionnaire can be found in the section named "Interview Questions for Customers/Website Visitors".

The study reveals that 58% to 64% of online customers and website visitors have no concerns whether their online buying behaviour or activity provides seed ideas for targeted advertisement presentation. However, the study also reveals that 80% of the online visitors haven't purchased the product or service online after clicking on a banner advertisement, whereas 74% of the online visitors do click on banner ads for an intension of purchase or learning more about the product. Therefore, the percentage of people who click on banner ads and go ahead with a positive purchase decision is only 14 to 15%.

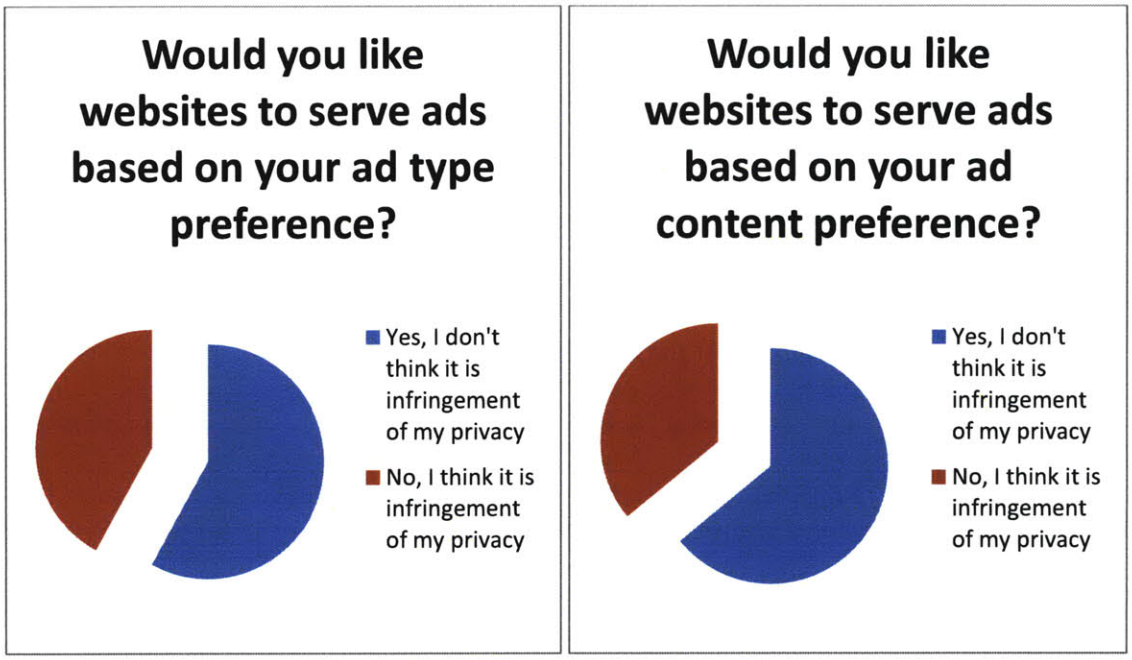


Figure 29: Customer Privacy Perception

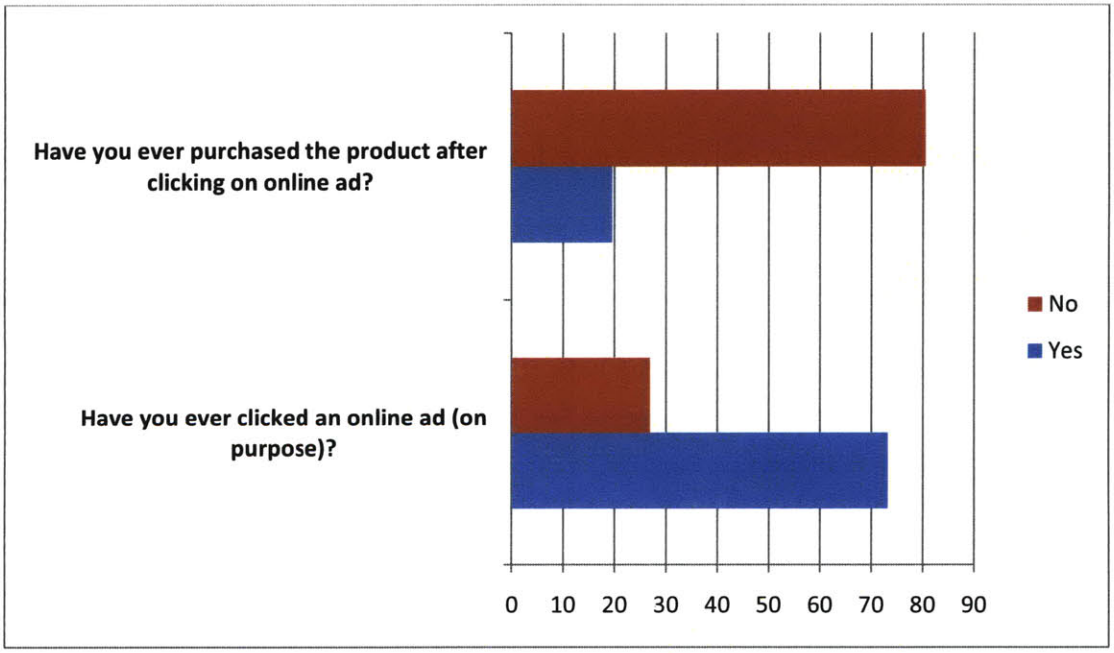


Figure 30: Customer Buying Behaviour

The above data definitely proves that there is something going wrong. The advertisers pay for a click through of about 75% of the website visitors, however the net benefit to the advertiser is only about 15% of website visitors "who click on banner ads" actually making a purchase. This

gives rise to an interesting point. Why is there such a huge gap and uncertainty in the online advertisement and revenue model?

The reason as discussed in earlier sections of the study is that:

1. Advertisers spend on "online ads" for the entire customer base when their product appeals to a certain segment of the customer base.
2. Advertisers do not accurately know how to deliver the message/advertisement communication to different people with different cognitive styles.

These uncertainties drives high ad spending budgets and lower than expected advertiser revenues.

The study with respect to advertisement presentation reveals that only 42% of the website visitors prefer to see advertisements as video clippings, a contrast to the same individuals exposed to television and video advertisements from childhood. This brings to our notice that customer behaviour differ with different media interactions. A customer base of 58% prefers text only, text with pictures and audio advertisements and there is a need to address a customer segment with tastes and preferences divided between different advertisement presentation styles.

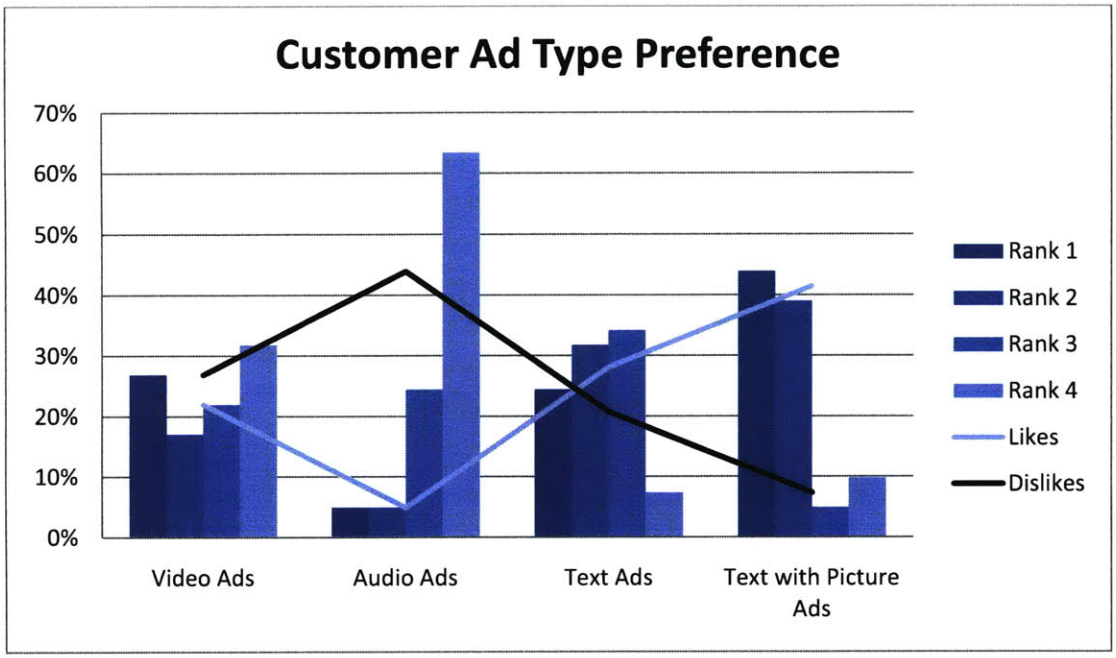


Figure 31: Customer Ad Type Preference

The study with respect to advertisement content reveals that a majority of website visitors (52% of the representative sample) prefer humour and wit as medium of communication from advertisers to themselves. About 94% of the representative sample dislikes flashy and attention seeking ads and about 88% of the representative sample dislikes descriptive ads.

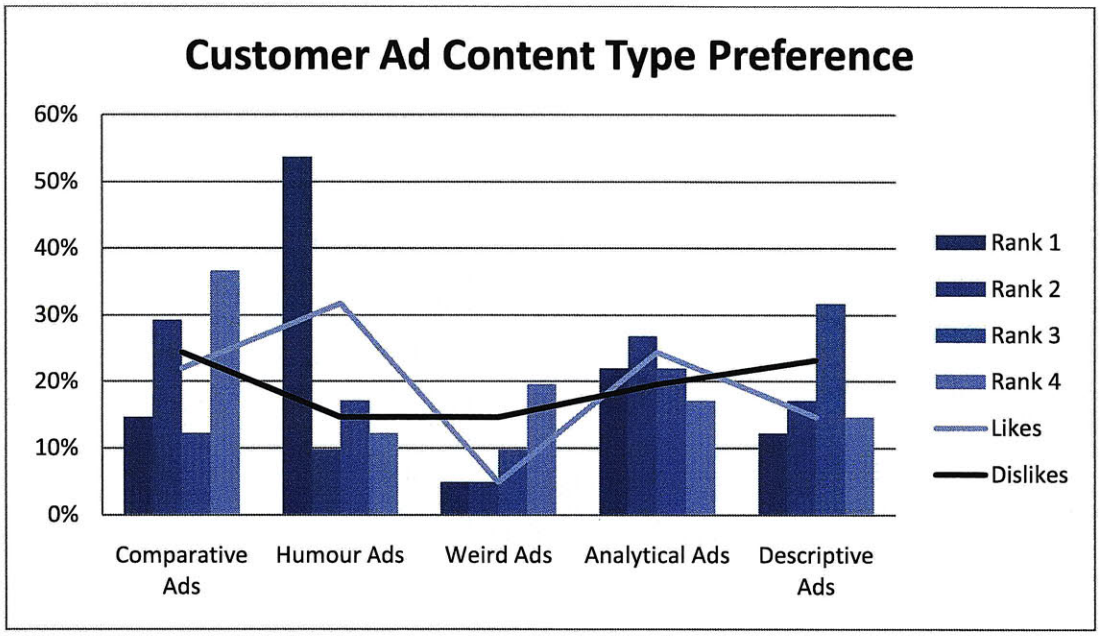


Figure 32: Customer Ad Content Type Preference

The study with respect to advertisement location on a webpage reveals that a majority of the preferences lie among right and bottom areas of the webpage. About 62% of the representative sample prefers online advertisements to the either on the right or at the bottom of the webpage. Hence, from the publisher's perspective their websites becoming increasingly annoying when advertisements are presented at the top, left or middle of their webpage.

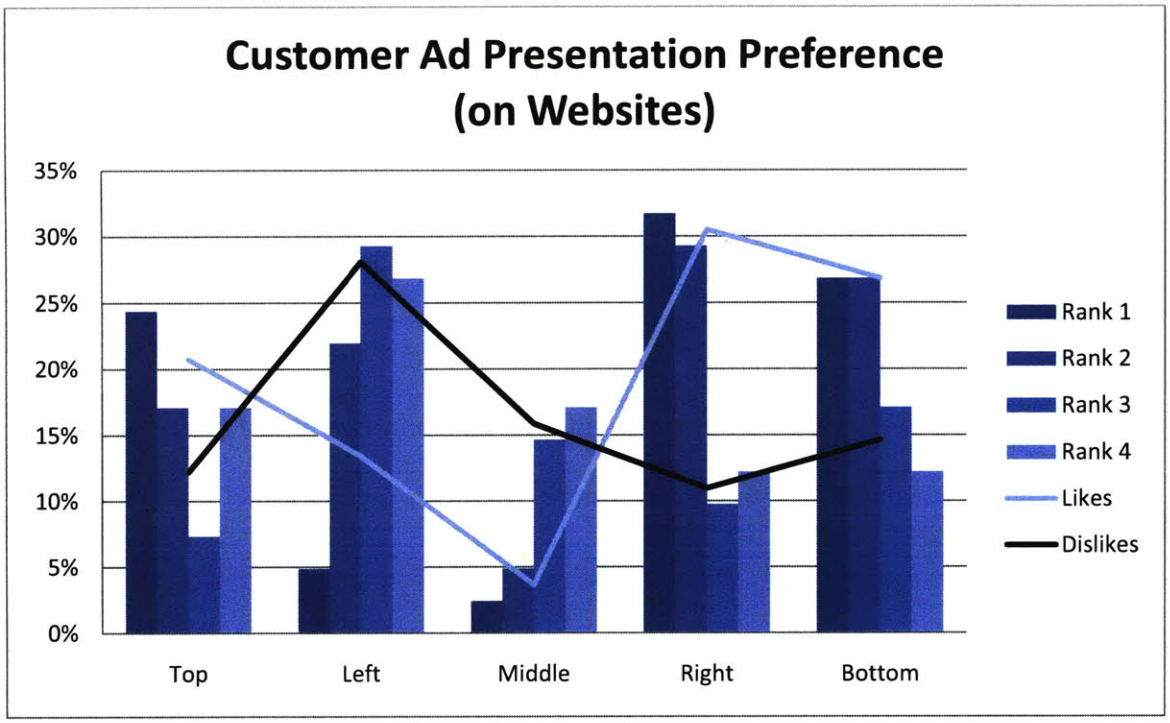


Figure 33: Customer Ad Presentation Preference with respect to Websites

The above study and analysis brings to our notice that just knowing one's customer is not helpful in the online advertising industry. It is important to know how to deliver that information with customers having a wide variety of perspectives about how an advertisement should be presented to them, the advertisement content and the advertisement location.

The present advertisement model doesn't address the customer preference and there is a need to adapt the advertisements to individual preferences or cognitive styles.

Interviews and Perspectives

In order to understand the perspective of advertisers and publishers, I conducted many interviews of professionals working in the field and having affiliation to popular advertisers or publishers. However, the sample of interviewees is not a random sample and readers are advised to take the individual perspectives with further analysis and deliberation.

In a quest to understand the perspectives of advertisers and publishers in the online advertising industry, I have reached the following conclusions based on the interview questions in the Appendix I section labelled "Interview Questions: Advertisers" and "Interview Questions: Publishers". In order to collect diverse perspectives, the interviewees were chosen from a wide variety of backgrounds and range from CEOs to Marketing Managers of Internet, sales, marketing and research firms. The firm sizes ranged from start ups to public limited companies.

Interviewees participating in the study were selected from three sources and were approached for a formal interview over telephone or face-to-face from January 2010 to April 2010:

- Approximately 42% were author's professional and academic network acquaintances from MIT Media Lab associates, MIT Sloan and HEC Paris alumni.
- Approximately 33% were selected from social networking site: LinkedIn and belonged to the groups specializing the Web 2.0 and Social Media.
- Approximately 25% were approachable associates from academia and researchers in the field of Online Advertising.

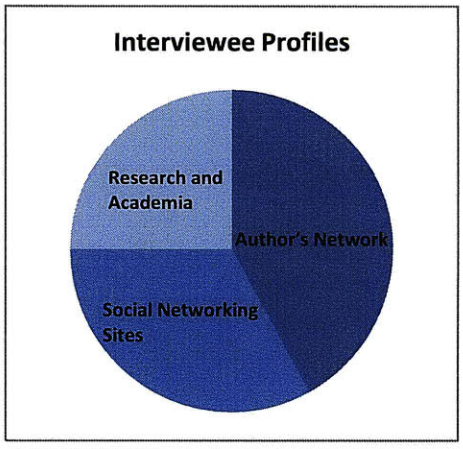


Figure 34: Interviewee Profiles

Advertiser's Perspectives

According to the interviews advertisers seek the following from the online advertising industry:

1. Customer reach, education and preference analysis about their product or brand.
2. Contribution to media mix and customer buying behaviour.
3. Data for forecasting demand, growth, and product success criteria.
4. Data for value chain optimization in a global market place.
5. Return on Advertising Expense and Investment.
6. Quantification of qualitative information collected from customer clickstreams.

I explore the above stated advertiser needs based on the information gathered from interviews and interviewee perspectives. Based on the value chain of the online advertising industry, it is important to understand that advertisers form a critical part of the value chain and act as the financial sustainers of online advertising industry.

Following are some of their expectations in greater details:

Customer reach, education and preference analysis about advertiser product or brand:

According to Dr. Edmund Kelly, Chairman, President, and CEO of Liberty Mutual, advertising can be broadly classified into three modes of communication:

1. **Child to Child Communication:** A communication method in which advertisers advertise products and brands based on prestige, emotional outlook and brand association.
2. **Adult to Child Communication:** A communication method in which advertisers advertise products and brands with a motive of educating the targeted customer segments.

3. **Adult to Adult Communication:** A communication method in which advertisers advertise products and brands with a motive to convince an aware customer that the advertiser's product is indeed efficacious compared to other products or brands in the market.

An advertiser's expectation with internet as a medium of communication is to address the three basic communication methods. Advertisers expect quantitative information about their campaign's customer reach, education and customer preference with respect to their products and brands. Advertisers use this information to improve their products, brand image and to discover new information (or feedback) about the value their products bring to their customers. Online advertising also helps advertisers to reach the customers at a personal level. The ability to personalize ones brand experience provided advertisers the ability to target multiple customer segments in a single or similar set of advertising campaigns.

Advertisement morphing adds value to advertisers need to personalize each customer's experience of their brand by targeting advertisements based of individual cognitive styles.

Contribution to media mix and customer buying behaviour: Many consumer goods companies use advertising over various media as a media mix to indulge customers in buying their products. As the reader might be aware that many consumer goods especially raw materials of food or fast moving consumer goods are not purchased using the online media, however, these products are still advertised online because they add to the media mix and alter customer buying behaviour. Advertisers who seek media mix have never had such a cost effective means to conduct mass advertisements of their products in a relatively low cost method. As discussed in the section about new media that comprises of rich media/video ads, display ads, classified ads

and search ads, an appropriate media mix can be achieved using relatively low cost display ads or search ads.

Advertisement morphing for only media mix is an expensive choice, however it is efficient when applied with the motive to increase customer base and brand awareness about the products or brands.

Data for forecasting demand, growth, and product success criteria, and

Data for value chain optimization in a global market place:

Apart from product or brand success, advertisers seek information to improve for the future. Advertisers need information about the demographics of the customers, customer buying behaviour, and customer preferences. Such information is usually collected using the internet cookies to estimate the geographic demand of the product to better optimize their value chain to meet those demands and improve their revenues.

Customer buying behaviour also influences the method used to sell a particular product at a market for e.g. some products that are purchased of the shelf in the US are purchased online in India, and addressing such a market needs not only optimization of the value chain but also evolution of the value chain to serve customers with varying buying behaviour.

Customer preferences vary from one individual to another and providing a personalized brand experience has been the foremost motto of any product marketing team. Data with respect to customer preferences generated from online activities or customer profiles (created by customers themselves, upon registration to a publishing website) provides advertisers with the opportunity to personalize their brand experience and/or sub-segment customers to address group needs.

Collecting and utilizing data with respect to customer behaviour, preferences and cognitive style can be cumbersome for most advertisers, hence the intent of this thesis is to illustrate a project that collects, evolves, morphs and presents display ads in real-time. This project helps not only to optimize data utilization using advanced analytics tools, but also allows advertisers to know their customers better to serve them better.

Return on Advertising Expense and Investment:

A study involving 44 high-tech companies' expenses found that companies invested the biggest share of their budgets (approx. 39%) in activities that are chiefly brand-building such as advertising, public relations, demos, sales collateral, and research. No other category of spending gets much emphasis; however found that their efforts were only 15% effective. Needless to say a linear return on investment on an increasing advertising expense is a pursuit to be achieved with much deliberation and effort.

As can be seen from the pictorial representation of the scenario, Traditional ROI is a linear function of an increasing advertising expense in many of the successful marketing organizations of the world. However, what advertisers seek is a much disruptive marketing mechanism that could add more predictability to the advertising model, and more effectively break the linearity. Advertisers seek to achieve better ROI (Return of Investments) and look forward to avenues that would facilitate such a quantitative impact.

The difference between Traditional ROI and Expected ROI is the delta ROI that advertisers seek with to fulfil with minimal investments. Online Advertising has already proved to be a tool that adds predictability to the advertising models of various organizations, however targeted

advertising provide the necessary disruption to meet the ROI needs and the necessary quantitative impact.

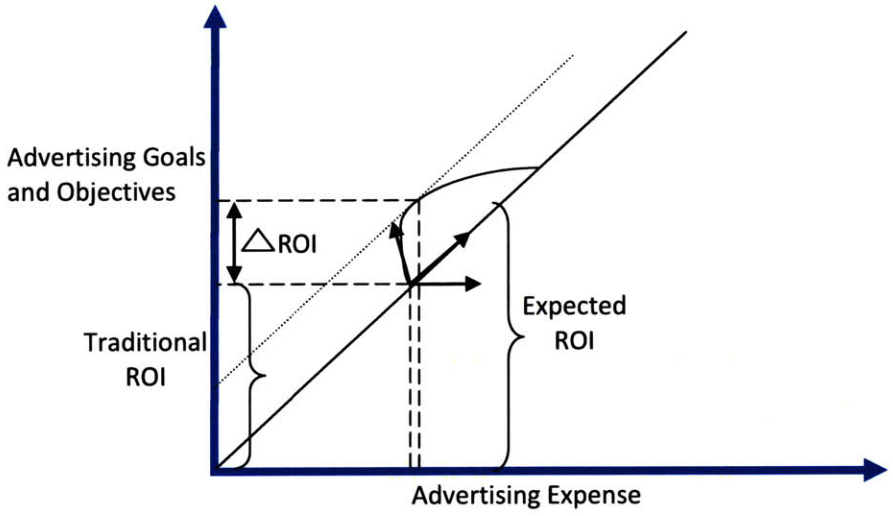


Figure 35: Advertiser's return on investment

With the new media (search ads, display ads, rich media/video ads, and classified ads) replacing the old media (television, print and other broadcast media) for the share of advertising budget in various industrial sectors, the paradigm of return on investment for advertising will undergo a revolutionizing change in both quantification and methodology. An analogy with the operating leverage of an organization defined as the ratio of percent change in operating income to percent change in sales, depicted below:

$$Operating\ Leverage = \Delta\ \%\ Operating\ Income / \Delta\ \%\ Sales$$

Can be applied to advertising return on investment, as advertising leverage:

$$Advertising\ Leverage = \Delta\ \%\ Advertising\ Expense / \Delta\ \%\ Sales$$

An interesting property of operating leverage is that a higher operating leverage will lead to a greater risk for the company. Intuitively, a company that has high fixed cost relative to total costs will have a high operating leverage. Similarly, a company with higher advertising leverage will lead to a greater risk of ineffective allocation of budget to advertising, and a greater upfront advertising expense to total organizational expense will lead to higher advertising leverage.

Hence, apart from expecting greater ROI from advertisement investments, advertisers should consider methods of lowering advertising leverage. A short term goal of lowering advertising leverage will lead to the long term goal of greater returns of advertising expense.

Quantification of qualitative information collected from customer clickstreams: Besides customer reach, customer data and return of investment, advertisers seek advanced analytical services that help them understand the evolving needs of their customer base, new target segments, and future opportunities with respect to their products and brands. One of the means to enable analytic services is internet cookies, one of the focus areas of this thesis and discussed in detail in the section titled: "Online Advertising Industry".

Internet cookies help provide customer online behaviour that can be analyzed and quantified for a target customer segment. Advertisers seek services that can perform these analytical studies on their customer bases and/or target customer segments for market penetration, market creation, product marketing, market research, and product improvements.

Publisher's Perspectives

According to the interviews publishers seek the following from the online advertising industry:

1. High advertising revenues.
2. Minimal risk of loss of customer base.

and, Quality advertising.

I explore the above stated publisher needs based on the information gathered from interviews and interviewee perspectives. Based on the value chain of the online advertising industry, it is important to understand that publishers form the last mile interface to the customers in the value chain and act as the communicators of online advertising industry.

Following are some of their expectations in greater details:

High advertising revenues: In order for the publishers to generate high advertising revenues, the advertisers should be convinced that the mode of communication with customer base is indeed efficacious. Higher advertising revenues will follow the advertisers' satisfaction that their advertising campaigns are reaching the appropriate set of target customers.

Following is the online display advertising metrics and forecast, 2008-2013 (eMarketer.com):

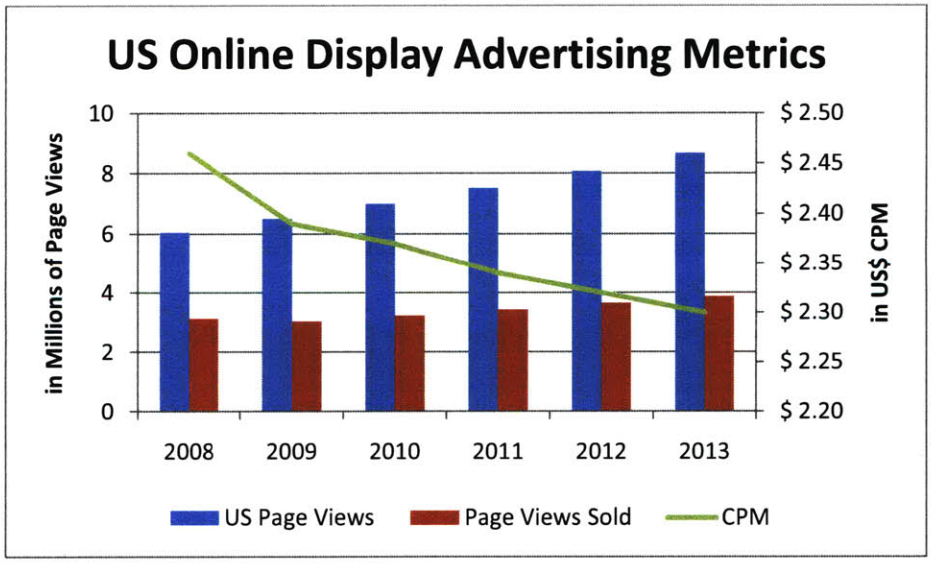


Figure 36: US Online Display Advertising Metrics

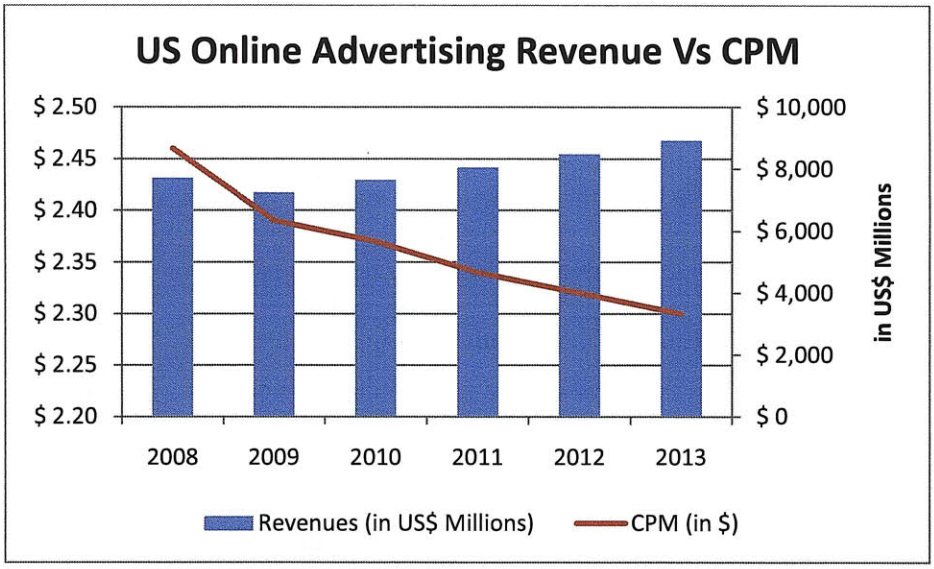


Figure 37: US Online Advertising Revenue Vs CPM

Average US Online Video Advertising CPM, by Format, 2008	
Premium preroll	$35
Preroll	$25
Ad Network Inventory	$13
In-banner video impressions	$11

Table 18: Average US Online Video Advertising CPM, by Format, 2008

As it is evident from the statistics and estimates (2008-2013) above:

1. The US page views are estimated to grow faster than the number of page views sold.
2. The US Online Advertising revenue will continue to grow at a steady pace.
3. The CPM (in US$) will continue on a steady downward trend.

One can infer the following future trends impacting the high revenue expectations of publishers:

1. Increasing market entry of publishing websites and ad networks leading to decreasing CPM and increased number of options for advertisers.
2. As page views increase and page view sold decrease, two trends are visible:
    a. Availability of excess inventory, but lack of quality pages attracting eye-balls and perhaps a consolidation of few highly visited/viewed publishing sites.
    b. Increased focus on high revenue generating ad formats such as rich media/video (see Table 9); confirming the earlier estimation of increasing adoption and growth of rich media/video advertising compared to other online advertising formats.

Hence, publishers will increasingly prefer higher revenue generating ad formats in order to hedge their risk in the context of increased market entry of publishing websites.

Minimal risk of loss of customer base: Apart from higher inventory revenues publishers seek minimal risk of loss of customer base. In most instances publishers ask the exchange, ad network or advertisers the content of their advertisement and seek a proper contract depicting the nature, intent and duration of the campaign advertisement.

Business Models of the Future

The introductory section of "Online Advertising" and the section on "know thy customers and morph" discuss three limitations of the Online Advertising Model in today's world, namely:

1. The Online Advertising Model is essentially emulating the broadcast media advertising and so far hasn't tapped the full potential of the internet media.
2. The Online Advertising Model is not advanced enough to evolve into a phenomenon of communication that involves knowing who the customers are,
3. And knowing how to deliver the message to them using online advertising.

Essentially the need is to move from broadcast or search engine optimized advertising to customer driven advertising.

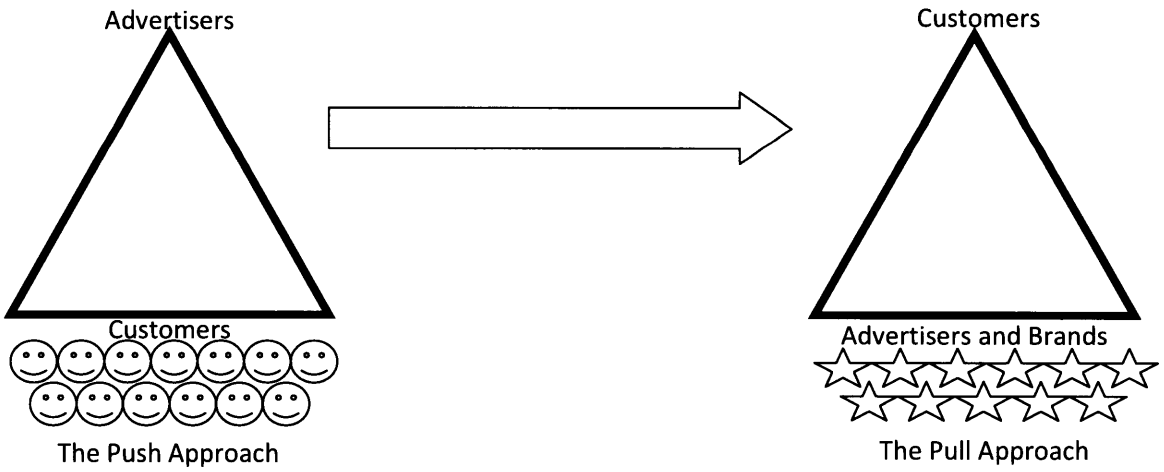


Figure 38: Evolution of Online Advertisement Business Model

The Online Advertising has evolved from untargeted push approach to a targeted push approach; however this approach has inherent discrepancies which an internet media can address

efficiently. The approach of a pull from customers is the business model of the future. The reason such a business model will be successful is because it is important the customer become cognizant about the advertiser's products and services. In the earlier approach the interaction was centred between advertisers and publishers, whereas the optimal approach is that of interaction between advertisers and customers with publishers acting as a medium of communication.

In the pull approach, the customer will be willing to share their needs based on direct interaction with social media networks or hub websites, and the advertisers and brands will be notified about the need of individual customers using the publisher websites. The advertisements will be presented to the customers based on their willingness and need. Further, it will be the customer's choice to decide on which product to purchase. This last mile deals with knowing how to deliver the message to the customers using online advertising. This is when online advertisement morphing adds value to the entire business model. Such a business model not only addresses the limitation of the existing business model in the following way:

1. The Online Advertising Model is essentially emulating the broadcast media advertising and so far hasn't tapped the full potential of the internet media. This business model will move away from the half-duplex advertising model to full-duplex advertising model where customers participate in their purchase decision based on advertisement they wish to be presented with. This will provide far more accurate data regarding individual purchasing decisions and cognitive styles.
2. The Online Advertising Model is not advanced enough to evolve into a phenomenon of communication that involves knowing who the customers are. With a Pull approach the customers will identify themselves to the advertisers, hence re-defining the advertising

world from a broadcast communication medium to individual customer focused advertising model.

3. And knowing how to deliver the message to them using online advertising. A pull approach with online advertisement morphing technique discussed above will bring about enormous visibility to the customers because the advertisements will be presented based on the individual customer's cognitive style in real time.

But also addresses the advertiser's concern and uncertainty about whether their advertising expense is addresses the right customer segments and reaching the right people at the right time.

Conclusions and Future Research

This thesis started with an introduction of the online advertising industry and the related dynamics in its emerging value chain. The study of the online advertising industry presented us with vivid trends, analysis and insights into the future of media, content and delivery of information. Further, the study analyzed the emergence of internet as a media and its impact over the traditional media, and the study presented the distinctive rise of new media and the downfall of the old or traditional media. These studies provided both empirical and strategic implications of various scenarios, components and drivers of the online advertising industry.

Subsequently, the thesis provided an introduction to the concept of morphing of banner ads and the emergence of a trend to understand customer better in order to better fulfil their needs and desires. The study provided with empirical evidence of the methodology used to perform morphing and also suggested methodology of targeted advertising based on individual customer cognitive style. A leap ahead of the present day broadcast and multicast advertising, the morphed banner ads provide a cutting edge mechanism to communicate to various customer segments and defining an overall experience for the customers that encourages loyalty, empathy, trust and sales. This thesis also described this phenomenon of communication as having two fundamental methods: first, knowing who your customers are, and second, knowing how to deliver the message to them using online advertising.

Besides describing the concept, the thesis also included a project that helped determine individual cognitive styles based on a panel study comprising 13 judges and a pre-test survey comprising 199 respondents. The results from the panel and survey were empirically optimized to determine the cognitive scales for morphing. An in-depth analysis of the factors influencing

consumer behaviour helped not only to determine the cognitive styles, but also the clusters of customer segments that processes information differently based on their individual cognitive styles. An essential contribution of this thesis has been facilitating targeted communication in an era of personalized communication over the web.

Finally, this thesis concentrated on customer trends, interviews and business models of the future. The customer trends and perceptions were determined using an online survey attracting over 100 representative respondents. The interviews of many professionals from the advertising and publishing realms provided distinct information about the needs and desires of each of these entities of the advertising value chain. Further, the thesis provided suggestions about the business models of the future.

In summary, this thesis provides empirical and strategic analysis of each component of the advertising value chain and contributes towards the evolution of targeted advertising over the web. This thesis not only presents concepts, but also deals with projects that implement those concepts and provides in-depth analysis of the findings and results. With the use of advanced analytics and data-driven strategy building, the four components of the thesis namely, Online Industry Background Analysis, Morphing Concept and Methodology, Empirical Analysis of Morphing Project, and Strategic Implications in the building of future business models, complement each other and meet the expectation of an experiential analysis of Online Advertisement Morphing.

The immediate future research in this field would include morphing banner ads based on the cluster – to – component matrix discussed while determining the cognitive style scales and conducting the empirical analysis using advanced analytics tools.

Future researches may also include the following:

1. Using the business model described in this thesis for an empirical analysis of the efficacy of the model and further refinement of the business model for generating revenues for the advertisers (brands) and publishers.
2. The emergence of new media in the form of search ads, classified ads, display ads and rich media/video ads has impacted the online advertising with many positive value adds. Can the new media business model be further refined to address advertiser needs and customer preferences? If so, how?
3. The cognitive scales determined as a result of this thesis can be further reused for experiments with other types of products to measure the efficacy of the scales across products and services, and help standardize a basic set of cognitive style scales for morphing ads and media contents of the future.
4. Conducting experiments to determine the optimal media mix, in order to help the advertisers and publishers to invest creatively in various media/content delivery systems for advertising and affecting the company's bottom-line.
5. Empirical and strategic analysis of the morphing smart phone applications for dynamic content delivery based on cognitive styles and online behaviour over the smart phones.

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Appendix I – Interviews and Perspectives

Interview Questions: Advertisers

Q1. What are your major concerns as an online advertiser?

Q2. Do you think ad morphing technique will address all your advertising concerns? Which of your concerns are not addressed and how would you prefer to address them?

Q3. Is online ad morphing the future of targeted advertising? Why or why not?

Q4. What is your Return on Investment expectations with online advertising when compared to traditional advertising?

Q5. What will be your Return on Investment expectations with online advertising with targeted ad morphing technique? Why?

Q6. How do you choose the publishers or Ad Exchanges to publish your ads?

Q7. How do you design your online ads?

Q8. What is the marketing media mix that you as an advertiser expect? How do you think it will evolve in the future?

Interview Questions: Publishers

Q1. What do you think are the strengths and weaknesses of an online ad morphing targeted advertising technique? What are the remedies to the weaknesses of this technique?

Q2. How do you think this technique would enhance the efficiency of advertising for your clients?

Q3. How do you think this technique would enhance the return on investments for your clients?

Q4. How do you think this technique will have the future of advertising business model?

Q5. Is there a better technique that could achieve the same results with less complexity?

Q6. What do you think is the role of social networking sites in targeted advertising and reaching customers?

Q7. What do you think is the future of online targeted advertising in general and ad morphing in particular?

Interview Questions: Customers/Website Visitors

Q1. Have you ever clicked an online ad (on purpose)? *
Clicking with an intention to explore, learn, purchase etc.

- Yes
- No

Q2. Have you ever purchased the product after clicking an online ad? *

- Yes
- No

Q3. Has an online ad changed your opinion about a product/service? *

- Yes
- No

Q4. Does it matter to you if an online advertisement is presented based on your online buying behaviour? *

- Yes
- No

Q5. Do you know that online advertisements can be targeted based on one's online activities? *

- Yes
- No

Q6. Do you come to know when an online advertisement targeted towards your taste/ search/ need? *

- Yes, they are usually about my last search results
- No, I generally tend to ignore online ads
- Yes, they are usually about my last online purchase
- No, are the ads targeted on individual preferences?

Q6. What kind of online ad do you find most interesting? *
Please assign a rank, with 1 to the most preferred and 4 to the least preferred

	Rank 1	Rank 2	Rank 3	Rank 4
Video ads	○	○	○	○
Voice ads	○	○	○	○
Text ads	○	○	○	○
Text ads with Pictures	○	○	○	○

Q7. Would you like websites to serve ads based on your ad type preference? *

○ Yes, I don't think it is infringement of my privacy

○ No, I think it is infringement of my privacy

Q8. What kind on online ad content do you find most interesting? *
Please assign a rank, with 1 to the most preferred and 5 to the least preferred

	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Comparative (Windows Vs Mac) ads	○	○	○	○	○
Humorous/Witty ads	○	○	○	○	○
Creepy/Weird ads	○	○	○	○	○
Analytical (save x%) ads	○	○	○	○	○
Descriptive ads	○	○	○	○	○

Q9. Would you like websites to serve ads based on your ad content preference? *

○ Yes, I don't think it is infringement of my privacy

○ No, I think it is infringement of my privacy

Q10. Where would you like to see online advertisements on a website? *
Please assign a rank, with 1 to the most preferred and 5 to the least preferred

	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Top of the Page	○	○	○	○	○
Left of the Page	○	○	○	○	○
Middle/Center of the Page	○	○	○	○	○
Right of the Page	○	○	○	○	○
Bottom of the Page	○	○	○	○	○

Appendix II - Panel Study

This section documents the Online Advertisement Morphing Project's Panel study and is specifically referenced by the Panel Study subsection. This section contains the following information:

1. Instructions to set up the panel.
2. Instructions to the judges participating in the panel.
3. Sample Panel Questionnaire.
4. Panel Judgement.
5. Panel Reliability Analysis based on PRL method.

Instructions to set up the panel

General Rating Procedures to setup the panel

Judges will be given screenshots of the site and will be asked to rate each link according to its cognitive cues. Each judge will rate each link by answering to three cognitive scales. Before they start they must read carefully the rating guidelines which explain the rating system and the anchors.

They will receive one rating sheet in total, with one line item per module. At the top of each rating sheet the judge will find a number that identifies the judge. Please let us know which name corresponds to which judge number. We will have a total of 7-12 judges.

The judges will not be shown the actual site. They will see a screenshot of the webpage.

Note that:

We want the judges to rate the expected characteristics of the page linked, not the link itself. For example, a link with the word "Graph" indicates that the page linked to it is graphical, despite the link itself being textual.

- All ratings are relative, not absolute
- All links must be rated considering its cognitive distance from the other links within the same page.
- Judges can review and change the ratings within the same webpage as needed
- There is one question per column. Judges simply have to mark their answer: 3, 2, 1, 0 or NA.
- Please ask the judges to finish answering one question for all links before moving to the next question (each page has three questions)

Training and Understanding the Criteria

1. Joint training. Everyone should understand the criteria. They can talk among themselves during training.

   Key messages:

   - You will be helping with the research and pizza lunch as compensation.
   - Describe the entire procedure and check they are ok with it.
   - You will not be graded or evaluated for your performance.
   - Our focus in on the site, not on you

2. Judges can come together after a few ratings to refine on criteria. If they do so, they should re-rate those that they have already rated, but independently.
3. Judges rate all clicks and do so independently.
4. They are allowed to rate a click as "not sure."

5. After rating all other clicks, judges can meet to discuss the not-sure (although they do not agree on the ratings), but then they rate them independently.

List of WebPages to Show to Judges

SLIDE 1: HOMEPAGE
SLIDE 2: HOMEPAGE CONTINUED.
SLIDE 3: REVIEWS CATEGORY DOOR – CELL
SLIDE 4: REVIEWS CATEGORY DOOR - CELL CONTINUED.
SLIDE 5: REVIEWS CATEGORY DOOR - DESKTOPS
SLIDE 6: REVIEWS BEST FIVE
SLIDE 7: REVIEWS PAGE
SLIDE 8: REVIEWS PAGE CONTINUED.
SLIDE 9: EDITOR'S CHOICE
SLIDE 10: DOWNLOADS
SLIDE 11: DOWNLOADS CONTINUED.
SLIDE 12: BLOGS HOME
SLIDE 13: BLOG PAGE
SLIDE 14: CRAVE
SLIDE 15: NEWS

Instructions to the judges participating in the panel

General Instructions

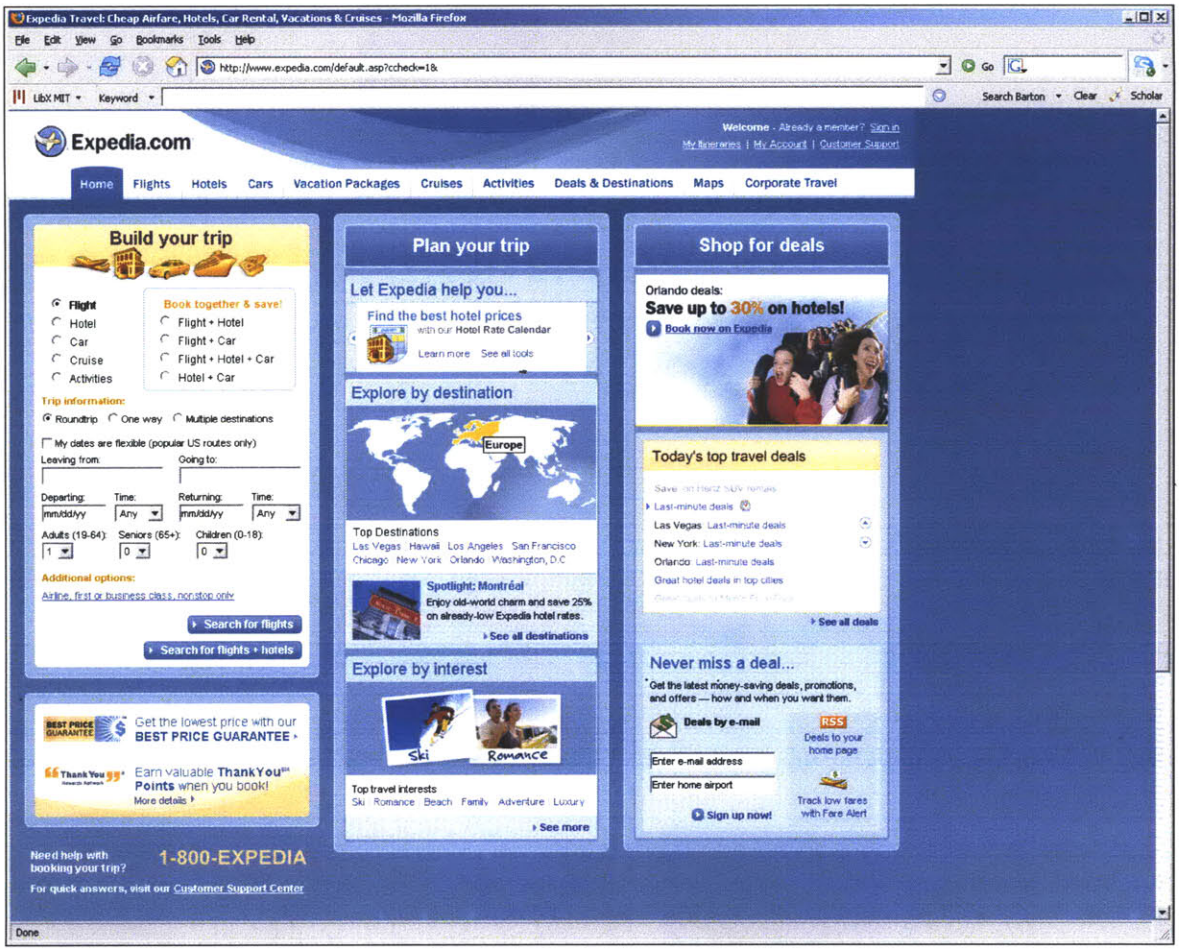
Thank you for agreeing to participate in our research. This research is conducted to help us better understand website characteristics.

Please take a careful look at the WebPages that you will be shown and rate the selected links according to the expectations you have. Please use the rating sheets that you will be given. Even if you are not certain about the exact rate to give, mark the answer that is closest to your opinion and go to the next link. Note that we have one line per module (highlighted boxes in the presentation).

To do the ratings, please take into account the following:

- A link can give you cues about the page that is linked to it. We want you to rate the page you expect to receive if you were to click on that link. For example, a link with the word "Graph" gives you cues about how graphical the page linked is, despite the link itself being textual. We want you to rate the expected page, not the link.
- You will not be able to click on any links.
- All ratings are page-specific and relative. This means that we want to know how you rate each link as compared to how you rate the other links in that same page.

Here is an example. Consider this webpage:



If you expect the link that says "Europe" to lead to a graphical or pictorial page you would rate that link as 3 in the following question:

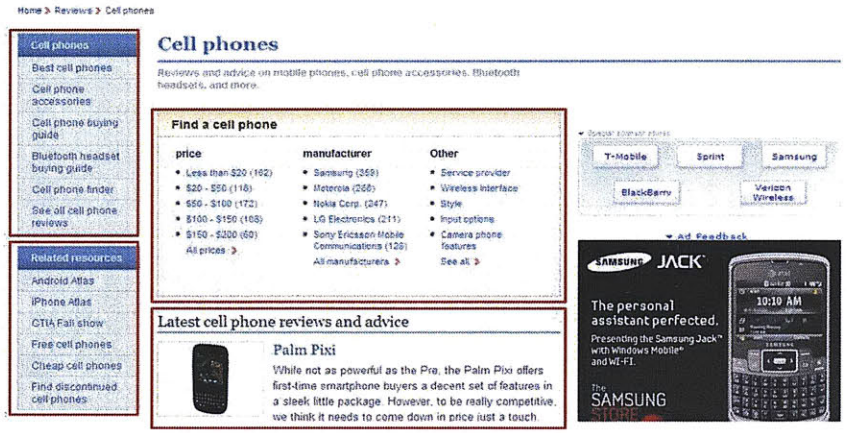
Q1. Do you expect the page pointed by this link to have pictures or graphs?

The link indicated a graphical page	3
Probably a graphical page	2
Probably not a graphical page	1
Not a graphical page	0
I cannot judge	NA

You will now receive a description of all rating scales. Please read them carefully.

Sample Panel Questionnaire

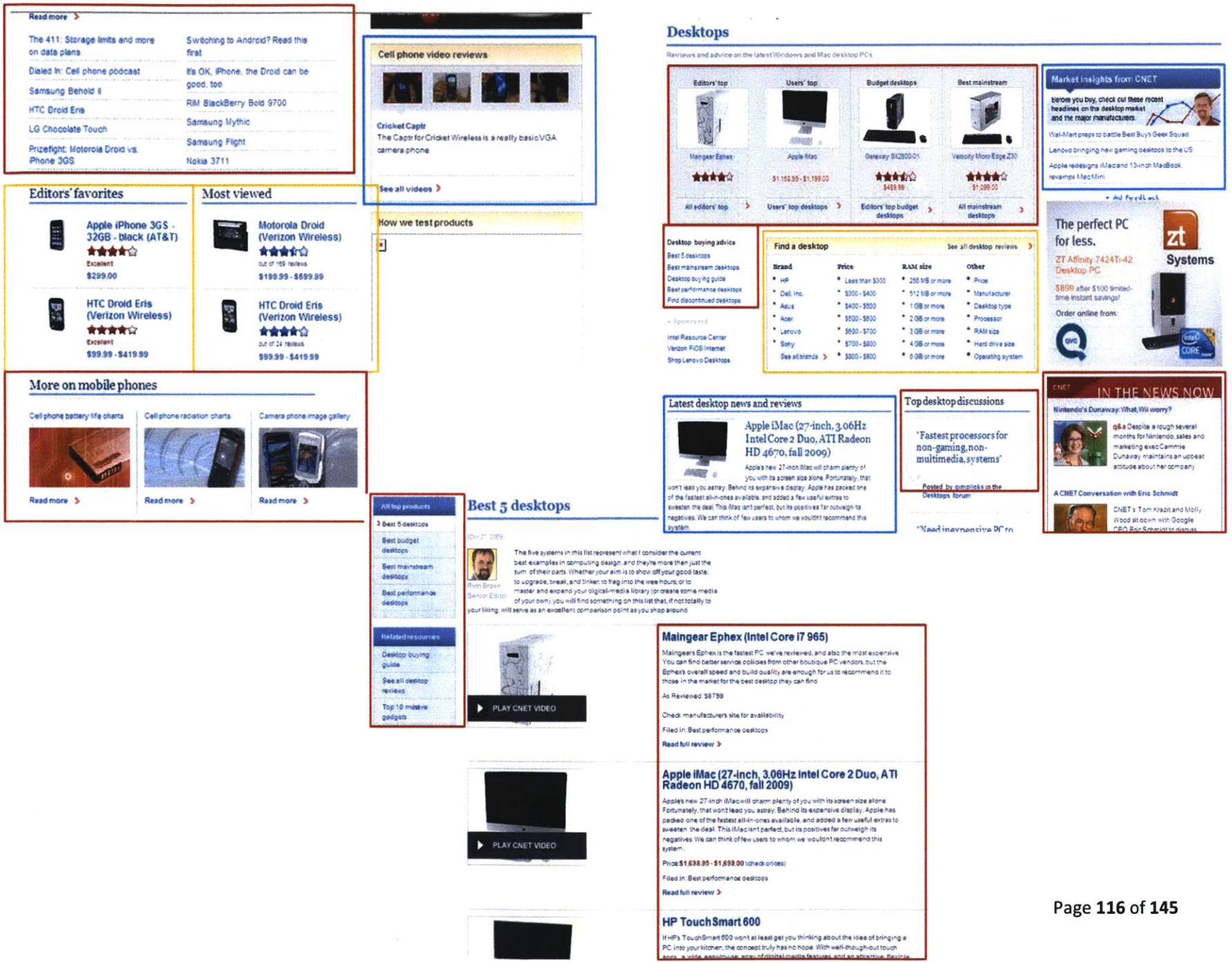
Webpage Presented to Judges



Questions for the Judges

RATER # __
PAGE: 1

Link	**Do you expect the page pointed by this link to have pictures or graphs?** The link indicated a graphical page 3 Probably a graphical page 2 Probably not a graphical page 1 Not a graphical page 0 I cannot judge NA					**Do you expect that the page pointed by this link has information that is focused on one specific aspect (e.g., technical question)?** The link indicated a focused page 3 Probably a focused page 2 Probably not a focused page 1 Not a focused page 0 I cannot judge NA					**Do you expect the page pointed by this link to have lots of data or very little amount of data?** The link indicated a page with lots of data 3 Probably lots of data 2 Probably not lots of data 1 Not lots of data 0 I cannot judge NA				
	3	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**
Left Column															
Center Carousel															
More Stories															
Fall Tech Preview															
Right Column															
Tabbed Content															
Inside CNET															
Footer															
Center Column – Find a Cell															
Center Column - Reviews															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Excellent
$99.99 - $419.99
Most viewed
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HTC Droid Eris (Verizon Wireless)
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Read more
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Reviews and advice on the latest Windows and Mac desktop PCs
Editors' top
Users' top
Budget desktops
Best mainstream
Maingear Ephex
Apple iMac
Gateway SX2800-01
Velocity Micro Edge Z30
$1,169.99 - $1,199.00
$499.99
$1,099.00
All editors' top
Users' top desktops
Editors' top budget desktops
All mainstream desktops
Market insights from CNET
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Lenovo bringing new gaming desktops to the US
Apple redesigns iMac and 13-inch MacBook, revamps Mac Mini
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Best 5 desktops
Best mainstream desktops
Desktop buying guide
Best performance desktops
Find discontinued desktops
Sponsored
Intel Resource Center
Verizon FiOS Internet
Shop Lenovo Desktops
Find a desktop
See all desktop reviews
Brand
Price
RAM size
Other
HP
Dell, Inc.
Asus
Acer
Lenovo
Sony
See all brands
Less than $300
$300 - $400
$400 - $500
$500 - $600
$600 - $700
$700 - $800
$800 - $900
256 MB or more
512 MB or more
1 GB or more
2 GB or more
3 GB or more
4 GB or more
6 GB or more
Price
Manufacturer
Desktop type
Processor
RAM size
Hard drive size
Operating system
The perfect PC for less.
ZT Affinity 7424Ti-42 Desktop PC
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Latest desktop news and reviews
Apple iMac (27-inch, 3.06Hz Intel Core 2 Duo, ATI Radeon HD 4670, fall 2009)
Apple's new 27-inch iMac will charm plenty of you with its screen size alone. Fortunately, that won't lead you astray. Behind its expansive display, Apple has packed one of the fastest all-in-ones available, and added a few useful extras to sweeten the deal. This iMac isn't perfect, but its positives far outweigh its negatives. We can think of few users to whom we wouldn't recommend this system.
Top desktop discussions
"Fastest processors for non-gaming, non-multimedia, systems"
Posted by gumplicks in the Desktops forum
CNET
IN THE NEWS NOW
Nintendo's Dunaway: What, Wii worry?
Q&A Despite a rough several months for Nintendo, sales and marketing exec Cammie Dunaway maintains an upbeat attitude about her company.
A CNET Conversation with Eric Schmidt
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All top products
Best 5 desktops
Best budget desktops
Best mainstream desktops
Best performance desktops
Related resources
Desktop buying guide
See all desktop reviews
Top 10 massive gadgets
Best 5 desktops
(Oct 2nd, 2009)
Rich Brown
Senior Editor
The five systems in this list represent what I consider the current best examples in computing design, and they're more than just the sum of their parts. Whether your aim is to show off your good taste, to upgrade, tweak, and tinker, to frag into the wee hours, or to master and expand your digital-media library (or create some media of your own), you will find something on this list that, if not totally to your liking, will serve as an excellent comparison point as you shop around.
PLAY CNET VIDEO
PLAY CNET VIDEO
Maingear Ephex (Intel Core i7 965)
Maingear's Ephex is the fastest PC we've reviewed, and also the most expensive. You can find better service policies from other boutique PC vendors, but the Ephex's overall speed and build quality are enough for us to recommend it to those in the market for the best desktop they can find.
As Reviewed: $8798
Check manufacturer's site for availability
Filed in: Best performance desktops
Read full review
Apple iMac (27-inch, 3.06Hz Intel Core 2 Duo, ATI Radeon HD 4670, fall 2009)
Apple's new 27-inch iMac will charm plenty of you with its screen size alone. Fortunately, that won't lead you astray. Behind its expansive display, Apple has packed one of the fastest all-in-ones available, and added a few useful extras to sweeten the deal. This iMac isn't perfect, but its positives far outweigh its negatives. We can think of few users to whom we wouldn't recommend this system.
Price: $1,698.85 - $1,699.00 (check prices)
Filed in: Best performance desktops
Read full review
HP TouchSmart 600
If HP's TouchSmart 600 won't at least get you thinking about the idea of bringing a PC into your kitchen, the concept truly has no hope. With well-though-out touch

Questions for the Judges

RATER # __
PAGE: 2

Link	**Do you expect the page pointed by this link to have pictures or graphs?** The link indicated a graphical page 3 Probably a graphical page 2 Probably not a graphical page 1 Not a graphical page 0 I cannot judge NA					**Do you expect that the page pointed by this link has information that is focused on one specific aspect (e.g., technical question)?** The link indicated a focused page 3 Probably a focused page 2 Probably not a focused page 1 Not a focused page 0 I cannot judge NA					**Do you expect the page pointed by this link to have lots of data or very little amount of data?** The link indicated a page with lots of data 3 Probably lots of data 2 Probably not lots of data 1 Not lots of data 0 I cannot judge NA				
	3	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**
Editor's Favorites / Most Viewed															
More on Mobile Phones															
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Home > Reviews > Digital Camcorders > JVC digital camcorders > JVC Picsio GC-FM1 (black)
ultra
as simple as it is fun
now available in HD
Free Shipping
Order Now
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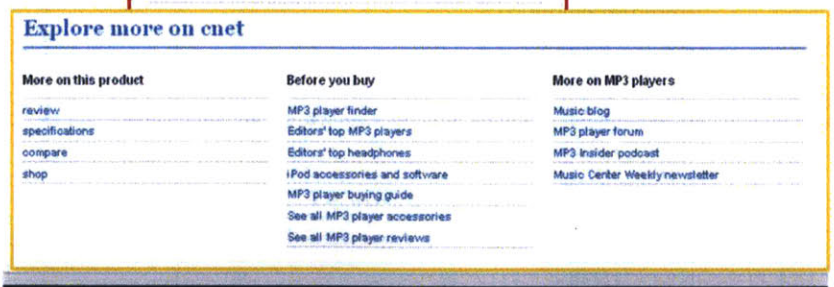
Camcorder finder
Editors' top camcorders
Camcorder buying guide
See all camcorder reviews
JVC Picsio GC-FM1 (black)
Add to my list
Print
E-mail
Share
review | user reviews | specifications | compare | shop
My recently viewed products
COMPARE
clear all | remove selected
Where to buy JVC Picsio GC-FM1 (black)
Price range: $177.99 - $209.99
store
price
in stock
B&H Photo-Video
$199.95
Yes
Amazon.com Marketplace
$177.99
Yes


Similar products
Grado PS1000
Skullcandy Icon 2 headphones (Magenta Print)
Klipsch Image S4 earphones
Sennheiser HD 800
Tritton AX 720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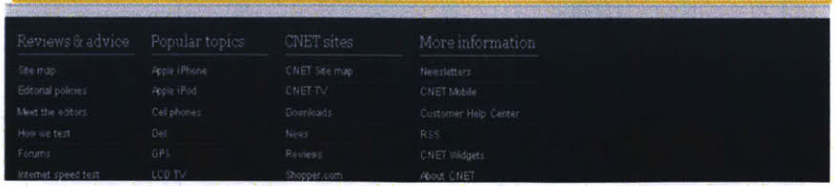
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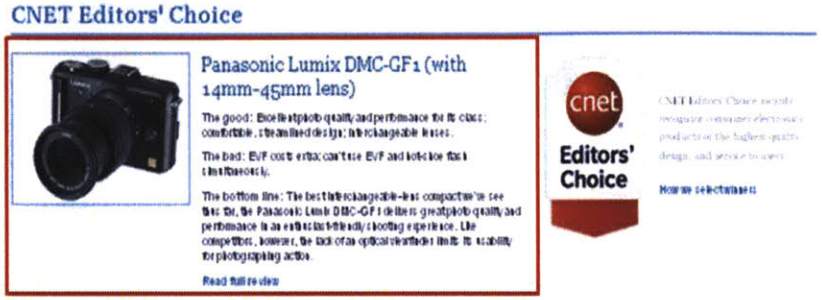
CNET Editors' Choice
Panasonic Lumix DMC-GF1 (with 14mm-45mm lens)
The good: Excellent photo quality and performance for its class; comfortable, streamlined design; interchangeable lenses.
The bad: EVF costs extra; can't use EVF and interior flash simultaneously.
The bottom line: The best interchangeable-lens compact we've seen thus far, the Panasonic Lumix DMC-GF1 delivers great photo quality and performance in an extraordinarily friendly shooting experience. Like competitors, however, the lack of an optical viewfinder limits its usability for photographing action.
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cnet
Editors' Choice
Browse selections


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Check prices
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Apple iMac (27-inch, 3.06Hz Intel Core 2 Duo, ATI Radeon HD 4670, fall 2009)
Read the review
Check prices
See user opinions
Pioneer VSX-1018AH-K
Read the review
Check prices
See user opinions
Pioneer AVIC-Z110BT
Read the review
Check prices
See user opinions


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2009 BMW 760Li - July 2009
2010 Toyota Prius - July 2009
Digital cameras
Panasonic Lumix DMC-GF1 (with 14mm-45mm lens) - October 2009
Panasonic Lumix DMC-GF1 (with 20mm lens) - October 2009
Panasonic Lumix DMC-TS1 (Blue) - August 2009
Panasonic Lumix DMC-TS1 (green) - August 2009
Panasonic Lumix DMC-TS1 (orange) - August 2009
Canon EOS 5D Mark II (with 24-105mm lens) - January
Peripherals
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Samsung SyncMaster XL2370 - September 2009
Logitech Performance Mouse MX - August 2009
Dell S2409W - February 2009
HP LP2275w - December 2008
Microsoft Explorer Mouse - December 2008
Logitech Cordless Desktop Wave Pro - October 2008

Questions for the Judges

RATER # __
PAGE: 3

Link	**Do you expect the page pointed by this link to have pictures or graphs?** The link indicated a graphical page 3 Probably a graphical page 2 Probably not a graphical page 1 Not a graphical page 0 I cannot judge NA					**Do you expect that the page pointed by this link has information that is focused on one specific aspect (e.g., technical question)?** The link indicated a focused page 3 Probably a focused page 2 Probably not a focused page 1 Not a focused page 0 I cannot judge NA					**Do you expect the page pointed by this link to have lots of data or very little amount of data?** The link indicated a page with lots of data 3 Probably lots of data 2 Probably not lots of data 1 Not lots of data 0 I cannot judge NA				
	3	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**
Top Discussions															
In the News Now															
Main Content															
Header															
Header Navigation															
Recently Viewed															
Similar Products															
Explore More															
Editor's Choice															

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Software advice, news, and wisdom from the editors of Download.com

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Opera releases its most recent mobile browser--complete with Speed Dial and a new tabbed browsing design--for Windows Mobile phones.

Posted By: Jessica Dolcourt on Nov 17, 2009

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Posted By: Jessica Dolcourt on Nov 17, 2009

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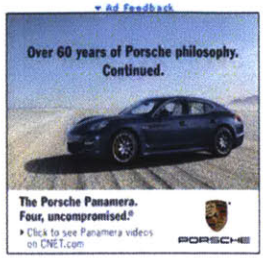

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1 hour, 26 minutes ago

AT&T is following Verizon Wireless by offering a prepaid wireless broadband service for laptop users.

(Posted in Signal Strength by Marguerite Reardon)

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4 hours, 18 minutes ago

Some power users are none too pleased, though, and are requesting refunds for seller fees if their auctions were disrupted as a result.

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3 hours, 2 minutes ago

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include disturbing content, even from innocuous queries. We assure you that the views expressed by such sites are not in any way endorsed by Google." Google said its policy in matters like this is to only remove content from its site if that content is illegal, violates Google's Webmaster guidelines in some way, or if the site owner requests the content be removed.

What's not clear, however, is what triggers the company to take out an ad explaining the search results: after all, there's no shortage of things on the Internet that would offend the average person. Google did not immediately respond to a request for more information about how those decisions are made.

Search Engine Land notes Google has also taken out explanation ads against search queries such as **"jew"** and "miserable failure," the search query that introduced much of the world to **the concept of the Google bomb** when searches for those keywords were orchestrated to point to the official Web site of former President George W. Bush by taking advantage of Google's PageRank formula.

Tom Krazit writes about the ever-expanding world of Internet search, including Google, Yahoo, online advertising, and portals, as well as the evolution of mobile computing. He has written about traditional PC companies, chip manufacturers, and mobile computers, spending the last three years covering Apple. E-mail Tom.

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About Relevant Results

Relevant Results focuses on the big Internet companies of our time, tracking the evolution of search, communication, and business on the Web. Tom Krazit examines how a shift to mobile computing and the growing demand for online content affect our understanding of how to deliver information in the 21st century, in between

Questions for the Judges

RATER # __
PAGE: 4

Link	**Do you expect the page pointed by this link to have pictures or graphs?** The link indicated a graphical page 3 Probably a graphical page 2 Probably not a graphical page 1 Not a graphical page 0 I cannot judge NA					**Do you expect that the page pointed by this link has information that is focused on one specific aspect (e.g., technical question)?** The link indicated a focused page 3 Probably a focused page 2 Probably not a focused page 1 Not a focused page 0 I cannot judge NA					**Do you expect the page pointed by this link to have lots of data or very little amount of data?** The link indicated a page with lots of data 3 Probably lots of data 2 Probably not lots of data 1 Not lots of data 0 I cannot judge NA				
	3	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**
Recent Winners															
More Recent Winners															
Spice it Up															
Main Content Links															
Most Popular Downloads															
The Daily Download															
More From Download															
From the CNET Staff															
Most recent															
Relevant, Related Results															

Questions for the Judges

RATER # __
PAGE: 4

Link	**Do you expect the page pointed by this link to have pictures or graphs?** The link indicated a graphical page 3 Probably a graphical page 2 Probably not a graphical page 1 Not a graphical page 0 I cannot judge NA					**Do you expect that the page pointed by this link has information that is focused on one specific aspect (e.g., technical question)?** The link indicated a focused page 3 Probably a focused page 2 Probably not a focused page 1 Not a focused page 0 I cannot judge NA					**Do you expect the page pointed by this link to have lots of data or very little amount of data?** The link indicated a page with lots of data 3 Probably lots of data 2 Probably not lots of data 1 Not lots of data 0 I cannot judge NA				
	3	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**	**3**	**2**	**1**	**0**	**NA**
Most Popular															
In the News Now															
Crave Topics															
Lead Stories															
Editor's Picks															
Latest Headlines															
Featured Blogs															
Multimedia															

Panel Judgement Data and PRL Reliability Calculations

Summary

Question 1

Number of Judges	13	
Total Agreements	1223	
Total Cases	3432	
Proportion of interjudge agreement (A)	0.36	
PRL Reliability Measure (*100)	88	pre-elimination of NA
PRL Reliability Measure (*100)	88	post-elimination of NA

Question 2

Number of Judges	13	
Total Agreements	1240	
Total Cases	3432	
Proportion of interjudge agreement (A)	0.36	
PRL Reliability Measure (*100)	88	pre-elimination of NA
PRL Reliability Measure (*100)	88	post-elimination of NA

Question 3

Number of Judges	13	
Total Agreements	1157	
Total Cases	3432	
Proportion of interjudge agreement (A)	0.34	
PRL Reliability Measure (*100)	84	pre-elimination of NA
PRL Reliability Measure (*100)	86	post-elimination of NA

Grand Total

Grand Total of Agreements	3620	
Grand Total of Cases	10296	
Proportion of interjudge agreement (A)	0.35	
PRL Reliability Measure (*100)	86	pre-elimination of NA
PRL Reliability Measure (*100)	88	post-elimination of NA

Question 1: Do you expect the page pointed by this link to have pictures or graphs?

Judgement Data													PRL Reliability Calculations					
13	12	11	10	9	8	7	1	2	3	4	5	6	# of 0s	# of 1s	# of 2s	# of 3s	Total Agreements	Total Cases
0	3	1	0	2	1	2	0	2	1	1	1	2	3	5	4	1	19	78
0	3	3	2	3	2	3	2	3	2	3	3	2	1	0	5	7	31	78
0	2	2	0	0	0	1	1	3	1	2	1	0	5	4	3	1	19	78
3	2	2	3	2	1	2	NA	3	2	3	3	2	0	1	6	5	25	78
2	2	1	1	1	0	2	2	1	0	1	2	2	2	5	6	0	26	78
0	2	2	2	1	0	0	1	1	1	1	1	1	3	7	3	0	27	78
2	3	2	3	2	1	2	2	3	3	2	3	2	0	1	7	5	31	78
1	2	1	1	2	2	0	1	1	0	0	2	3	3	5	4	1	19	78
3	3	2	0	2	0	0	0	1	1	2	1	2	4	3	4	2	16	78
0	3	0	1	1	3	2	2	3	1	1	2	1	2	5	3	3	17	78
2	3	2	1	2	2	2	3	3	1	1	3	2	0	3	6	4	24	78
2	2	3	2	3	2	3	3	2	2	3	3	2	0	0	7	6	36	78
3	3	3	3	3	3	2	3	3	3	3	3	3	0	0	1	12	66	78
2	2	2	2	3	2	1	2	3	1	1	3	2	0	3	7	3	27	78
0	2	1	2	1	1	1	1	3	1	2	0	2	2	6	4	1	22	78
1	1	1	0	2	1	0	1	1	2	2	2	2	2	6	5	0	26	78
0	1	2	2	2	2	2	2	3	2	0	3	2	2	1	8	2	30	78
1	1	0	0	0	0	1	0	1	0	0	NA	1	7	5	0	0	31	78
0	1	2	3	2	2	1	1	1	2	1	1	3	1	6	4	2	22	78
0	2	0	2	2	2	1	1	3	2	0	0	2	4	2	6	1	22	78
2	2	2	2	2	1	3	1	3	0	1	0	3	2	3	5	3	17	78
2	2	1	2	2	2	3	2	3	2	1	2	3	0	2	8	3	32	78
2	2	2	3	2	3	1	2	3	2	2	3	3	0	1	7	5	31	78
3	1	2	2	2	3	2	2	3	2	2	3	3	0	1	7	5	31	78
1	2	1	1	1	1	0	1	2	0	1	0	1	3	8	2	0	32	78
1	2	2	2	2	3	2	2	3	2	1	3	2	0	2	8	3	32	78
3	2	2	2	3	3	2	3	3	3	2	3	2	0	0	6	7	36	78
3	2	2	1	2	2	2	3	3	3	3	1	1	0	3	5	5	23	78
3	3	3	1	3	3	1	3	2	2	2	2	3	0	2	4	7	28	78
2	1	1	1	2	2	1	3	2	0	1	1	1	1	7	4	1	27	78
1	1	2	2	1	1	0	1	2	0	0	0	2	4	5	4	0	22	78

	1	2	2	3	2	2	2	1	2	2	0	1	3	1	3	7	2	25	78
	2	2	2	3	2	2	2	1	2	2	2	1	3	0	2	9	2	38	78
	0	1	1	2	1	1	1	1	0	0	1	1	2	3	8	2	0	32	78
	0	1	1	1	2	1	0	1	0	0	1	1	1	4	8	1	0	34	78
	0	1	2	1	1	1	0	1	0	0	0	1	0	6	6	1	0	30	78
	1	2	1	1	2	1	0	1	0	0	0	2	1	4	6	3	0	24	78
	1	2	2	3	2	2	1	2	0	1	0	3	2	2	3	6	2	20	78
	1	1	2	2	2	2	1	2	2	2	0	2	1	1	4	8	0	34	78
	1	1	2	2	2	2	2	1	2	2	0	3	1	1	4	7	1	27	78
	0	1	1	1	2	2	0	1	2	2	0	2	1	3	5	5	0	23	78
	1	1	0	1	2	2	1	1	2	2	0	2	1	2	6	5	0	26	78
	1	1	1	1	1	1	0	1	2	0	0	2	1	3	8	2	0	32	78
	2	2	3	2	2	3	3	1	3	3	3	3	2	0	1	5	7	31	78
														81	**166**	**214**	**109**	**1223**	**3432**

Proportion of Inter-judge Agreement (A)	**0.36**
PRL Measure Pre-Elimination	**88**
PRL Measure Post-Elimination	**88**

Question 2: Do you expect that the page pointed by this link has information that is focused on one specific aspect (e.g., technical question)?

Judgement Data													PRL Reliability Calculations					
13	12	11	10	9	8	7	1	2	3	4	5	6	0s	1s	2s	3s	Total Agreements	Total Cases
0	3	1	2	3	2	1	0	2	2	2	2	3	2	2	6	3	20	78
3	2	1	NA	3	1	3	3	3	3	1	1	3	0	4	1	7	27	78
3	2	2	1	3	0	1	3	3	1	3	1	3	1	4	2	6	22	78
3	1	2	2	2	2	3	3	3	3	3	2	2	0	1	6	6	30	78
1	1	1	3	3	0	3	1	1	3	1	3	2	1	6	1	5	25	78
3	1	1	2	1	2	1	3	3	2	3	2	3	0	4	4	5	22	78
3	1	1	2	2	2	2	3	3	3	1	2	3	0	3	5	5	23	78
3	2	2	2	2	2	0	0	1	3	1	2	3	2	2	6	3	20	78
3	3	3	3	2	3	0	3	1	3	1	2	3	1	2	2	8	30	78
3	3	2	3	3	3	3	3	3	3	3	2	2	0	0	3	10	48	78
3	3	2	3	2	3	3	3	3	3	3	2	3	0	0	3	10	48	78
2	3	2	3	3	2	2	3	2	0	1	1	2	1	2	6	4	22	78
3	3	2	3	3	3	1	3	3	2	3	2	1	0	2	3	8	32	78
3	3	3	3	2	2	2	3	3	3	3	3	2	0	0	4	9	42	78
3	2	2	3	2	3	1	1	2	1	1	2	3	0	4	5	4	22	78
3	2	2	1	2	3	1	1	1	3	1	1	2	0	6	4	3	24	78
3	3	1	2	3	3	3	3	3	3	3	2	3	0	1	2	10	46	78
3	2	2	1	2	1	1	3	2	2	3	1	2	0	4	6	3	24	78
3	2	2	1	2	2	1	2	2	2	3	2	1	0	3	8	2	32	78
3	3	2	2	3	2	3	3	3	3	3	1	2	0	1	4	8	34	78
1	2	2	3	2	1	0	0	1	0	0	0	1	5	4	3	1	19	78
3	2	2	3	2	2	0	0	2	1	1	2	1	2	3	6	2	20	78
1	3	2	3	3	3	3	3	3	3	2	1	1	0	3	2	8	32	78
1	1	2	2	2	2	1	3	3	3	2	1	1	0	5	5	3	23	78
2	1	2	1	2	1	1	1	2	1	1	0	1	1	8	4	0	34	78
3	3	3	3	3	3	3	3	3	3	3	3	1	0	1	0	12	66	78
3	2	2	3	2	3	3	3	3	3	3	3	2	0	0	4	9	42	78
3	2	2	3	1	3	2	3	3	3	1	1	3	0	3	3	7	27	78
3	3	1	2	2	1	3	3	2	1	3	1	1	0	5	3	5	23	78
3	3	1	3	1	0	2	3	2	3	3	2	0	2	2	3	6	20	78

	3	3	2	1	2	2	3	3	3	3	0	2	1	1	4	7	27	78
	3	3	2	1	3	1	2	3	3	3	3	1	1	0	4	2	7	28	78
	1	3	2	1	1	1	2	3	3	3	1	1	1	0	7	2	4	28	78
	3	2	3	2	2	1	1	3	2	1	0	0	0	3	3	4	3	15	78
	3	2	2	3	2	1	2	3	2	1	1	3	1	0	4	5	4	22	78
	2	1	2	1	2	1	1	3	2	1	1	2	1	0	7	5	1	31	78
	3	2	2	3	2	1	1	3	2	1	3	3	1	0	4	4	5	22	78
	0	2	2	3	1	2	2	3	2	1	3	3	0	2	2	5	4	18	78
	1	2	0	2	1	2	1	1	2	2	0	2	1	2	5	6	0	26	78
	3	2	2	3	2	2	2	3	2	1	3	3	1	0	2	6	5	26	78
	3	2	2	3	3	2	2	3	2	1	3	3	1	0	2	5	6	26	78
	3	2	2	3	2	2	2	3	2	1	3	2	1	0	2	7	4	28	78
	3	2	1	2	1	1	3	3	2	1	3	1	1	0	6	3	4	24	78
	0	2	2	3	2	0	2	1	3	1	3	2	2	2	2	6	3	20	78
														28	**136**	**178**	**229**	**1240**	**3432**

Proportion of Inter-judge Agreement (A)	**0.36**
PRL Measure Pre-Elimination	**88**
PRL Measure Post-Elimination	**88**

Question 3: Do you expect the page pointed by this link to have lots of data or very little amount of data?

Judgement Data													PRL Reliability Calculations					
13	12	11	10	9	8	7	1	2	3	4	5	6	0s	1s	2s	3s	Total Agreements	Total Cases
0	1	2	2	1	3	0	NA	3	2	1	2	0	3	3	4	2	13	78
3	1	2	1	1	1	3	1	2	1	0	1	3	1	7	2	3	25	78
3	1	2	2	2	1	0	1	2	1	0	3	3	2	4	4	3	16	78
0	1	1	1	1	1	1	1	1	1	2	1	1	1	11	1	0	55	78
1	1	1	2	2	0	1	NA	1	2	1	3	2	1	6	4	1	21	78
1	1	1	3	1	1	1	1	3	2	1	3	1	0	9	1	3	39	78
0	2	1	2	2	1	1	2	2	3	2	3	2	1	3	7	2	25	78
2	2	2	2	2	1	2	0	1	2	2	3	2	1	2	9	1	37	78
3	3	3	3	1	3	3	2	2	3	2	2	3	0	1	4	8	34	78
3	2	1	2	3	2	3	3	3	3	1	3	1	0	3	3	7	27	78
2	3	2	2	2	2	3	2	3	2	2	2	2	0	0	10	3	48	78
1	3	1	2	2	1	0	0	2	1	3	3	2	2	4	4	3	16	78
2	2	1	2	2	0	1	2	3	2	1	2	1	1	4	7	1	27	78
2	2	2	2	1	2	3	2	3	3	2	2	2	0	1	9	3	39	78
1	2	1	2	1	2	1	NA	2	2	3	3	3	0	4	5	3	19	78
1	3	2	2	1	3	1	2	2	3	2	2	2	0	3	7	3	27	78
2	3	2	2	3	2	3	3	3	3	1	2	2	0	1	6	6	30	78
1	1	1	3	1	0	1	0	3	2	0	NA	1	3	6	1	2	19	78
1	1	1	2	1	1	0	2	3	0	0	1	1	3	7	2	1	25	78
3	2	2	2	2	3	2	3	3	3	1	2	3	0	1	6	6	30	78
1	0	2	3	1	1	0	0	1	1	1	0	1	4	7	1	1	27	78
1	0	1	3	1	2	0	0	2	2	NA	2	3	3	3	4	2	13	78
0	2	2	2	2	2	3	1	3	2	1	1	1	1	4	6	2	22	78
1	0	2	2	2	2	1	1	3	2	1	1	1	1	6	5	1	25	78
2	0	2	3	2	1	1	1	2	0	1	2	2	2	4	6	1	22	78
3	2	3	2	3	3	2	3	3	3	2	2	2	0	0	6	7	36	78
1	2	2	2	1	2	2	1	3	2	2	2	1	0	4	8	1	34	78
3	2	2	2	1	2	2	1	3	2	2	1	2	0	3	8	2	32	78
1	0	0	3	1	0	1	2	2	1	1	1	1	3	7	2	1	25	78
0	3	1	3	1	1	1	2	2	0	1	1	1	2	7	2	2	24	78

	0	2	2	0	2	1	1	0	3	3	0	0	2	5	2	4	2	18	78
	0	2	1	1	2	1	1	0	3	2	0	1	1	3	6	3	1	21	78
	0	2	1	1	1	1	0	0	3	2	1	1	1	3	7	2	1	25	78
	1	1	3	3	2	1	0	2	3	1	1	0	2	2	5	3	3	17	78
	1	1	1	2	1	1	1	2	3	1	1	3	1	0	9	2	2	38	78
	1	1	1	3	1	1	0	2	3	1	0	1	2	2	7	2	2	24	78
	1	1	1	1	1	1	0	2	3	1	0	2	1	2	8	2	1	30	78
	0	1	1	1	1	1	0	2	3	1	0	2	1	3	7	2	1	25	78
	1	1	2	2	1	1	0	1	2	2	2	2	3	1	5	6	1	25	78
	1	1	2	3	2	1	0	3	3	1	0	2	1	2	5	3	3	17	78
	0	1	1	2	2	1	0	3	3	1	0	3	1	3	5	2	3	17	78
	1	1	1	2	1	1	0	3	3	1	0	3	1	2	7	1	3	25	78
	1	1	2	1	1	1	0	2	3	1	0	0	1	3	7	2	1	25	78
NA		1	1	3	2	0	1	1	3	0	2	1	1	2	6	2	2	18	78
														68	**211**	**180**	**107**	**1157**	**3432**

Proportion of Inter-judge Agreement (A)	**0.34**
PRL Measure Pre-Elimination	**84**
PRL Measure Post-Elimination	**86**

Appendix III – Pre-Test Analysis

This section documents the Online Advertisement Morphing Project's Pre-Test Analysis and is specifically referenced by the Pre-Test Analysis subsection. This section contains details regarding the Cognitive Scale Purification.

Pre-Test Stage Online Survey Questionnaire

Welcome

This is a research on digital marketing and morphing methods that is focused on-line customization. Your participation is voluntary. You may decline to answer any or all questions. You may decline further participation, at any time, without adverse consequences. Data collected will be reported in such a way that the identity of individuals is protected, and anonymity is assured.

Thank you for agreeing to participate in our survey. Please answer these questions as honestly as you can - there are no right or wrong answers. This survey will take approximately 10-14 minutes to complete.

You will be presented a list of questions in one page, and three open-ended questions in another page.

Please read each question carefully before answering it. Even if you are not certain about the exact answer to a question, mark the answer that is closest to your opinion and go to the next question. Your responses will be kept in the strictest of confidence.

Please select a rating for each statement.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
In my experience, rational thought is the only realistic basis for making decisions.	○	○	○	○	○
I rely on my first impressions.	○	○	○	○	○
I am very aware of my thinking process.	○	○	○	○	○
I am constantly on the lookout for new experiences.	○	○	○	○	○
I do not use my gut feeling.	○	○	○	○	○
The kind of work I like best is that which requires a logical, step-by-step approach.	○	○	○	○	○
I am more at home with ideas rather than facts and figures.	○	○	○	○	○
I'm usually more interested in the whole than in parts and details.	○	○	○	○	○

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am the kind of person who casts caution to the wind.	○	○	○	○	○
I figure things out logically.	○	○	○	○	○
I see what I read in mental pictures.	○	○	○	○	○
I enjoy deciphering graphs, charts, and diagrams.	○	○	○	○	○
I do not tackle tasks systematically.	○	○	○	○	○
My philosophy is that it is better to be safe than risk being sorry.	○	○	○	○	○
I avoid taking a course of action if the odds are against its success.	○	○	○	○	○
I reason things out carefully.	○	○	○	○	○
I do not rely on my sense of intuition.	○	○	○	○	○
I go by what feels good to me.	○	○	○	○	○
I tend to see problems in their entirety.	○	○	○	○	○
I am detail oriented and start with the details in order to build a complete picture.	○	○	○	○	○
I do not like detailed explanations.	○	○	○	○	○
I find that to adopt a careful, analytical approach to making decisions takes too long.	○	○	○	○	○
When making a decision, I take my time and thoroughly consider all relevant factors.	○	○	○	○	○
I do not approach tasks analytically.	○	○	○	○	○
Given enough time, I would consider every situation from all angles.	○	○	○	○	○
I am inclined to scan through reports rather than read them in detail.	○	○	○	○	○

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My understanding of a problem tends to come more from thorough analysis than flashes of insight.	○	○	○	○	○
I prefer planning before acting.	○	○	○	○	○
I will read an explanation of a graph/chart before I try to understand the graph/chart on my own.	○	○	○	○	○
I prefer to listen to a lecture rather than to read text.	○	○	○	○	○
I like to make purchases without thinking too much about the consequences.	○	○	○	○	○
I prefer chaotic action to orderly inaction.	○	○	○	○	○
I make most progress when I take calculated risks.	○	○	○	○	○
I use my instincts.	○	○	○	○	○
I find that 'too much analysis results in paralyses'.	○	○	○	○	○

Pre-Test Stage Scale Purification

Cognitive scales are crucial to morphing, as the Bayesian inference engine will use them (via Ω) to infer cognitive styles. This short note summarizes the results of a purification study we ran previous to the CNET/CBS priming study.

These scales were drawn from previous projects (BT1, Suruga) and additional literature (Donna Hoffman's work as well as CSI scales).

In the purification study we had a pool of 267 respondents, 199 of which are from Greenfield.com. Results shown here refer to these 199 respondents. These respondents received monetary incentive to participate in our survey. The rest of the sample (68 respondents) is not

used here because such respondents did not receive incentives, and were not individually identified (a person could have answered twice, and others could have answered effortlessly).

Our original scales were:

1. I reason things out carefully
2. I do not tackle tasks systematically
3. I figure things out logically
4. I do not approach tasks analytically
5. I tend to see problems in their entirety
6. I am very aware of my thinking process
7. I do not like detailed explanations
8. I prefer planning before acting
9. I'm usually more interested in the whole than in parts and details
10. I am detail oriented and start with the details in order to build a complete picture
11. I prefer to listen to a lecture rather than to read text
12. I enjoy deciphering graphs, charts, and diagrams.
13. I will read an explanation of a graph/chart before I try to understand the graph/chart on my own.
14. I see what I read in mental pictures.
15. I do not use my gut feeling
16. I go by what feels good to me
17. I do not rely on my sense of intuition
18. I rely on my first impressions
19. I use my instincts

20. Given enough time, I would consider every situation from all angles.
21. I like to make purchases without thinking too much about the consequences
22. I find that to adopt a careful, analytical approach to making decisions takes too long.
23. When making a decision, I take my time and thoroughly consider all relevant factors.
24. I find that 'too much analysis results in paralysis'.
25. I am more at home with ideas rather than facts and figures.
26. I am the kind of person who casts caution to the wind.
27. I avoid taking a course of action if the odds are against its success
28. I make most progress when I take calculated risks.
29. My philosophy is that it is better to be safe than risk being sorry
30. In my experience, rational thought is the only realistic basis for making decisions
31. I prefer chaotic action to orderly inaction.
32. The kind of work I like best is that which requires a logical, step-by-step approach
33. I am inclined to scan through reports rather than read them in detail.
34. My understanding of a problem tends to come more from thorough analysis than flashes of insight.
35. I am constantly on the lookout for new experiences.

We purified these scales using factorial analysis (threshold of 0.6). We found that five reasonably consistent factors can recover 55.89% of variance. They are: analytical-holistic (α=0.907), impulsive-deliberative (α =0.853), intuitive aspects of decision-making (α =0.846), feeling/sensing/emotional aspects of decision-making (α =0.637), and risk aversion aspects of decision-making (α =0.565). The scale grouping is:

A. Analytical-holistic (α =0.907)

1. I reason things out carefully
3. I figure things out logically
5. I tend to see problems in their entirety
6. I am very aware of my thinking process
8. I prefer planning before acting
10. I am detail oriented and start with the details in order to build a complete picture
20. Given enough time, I would consider every situation from all angles
23. When making a decision, I take my time and thoroughly consider all relevant factors
32. The kind of work I like best is that which requires a logical, step-by-step approach

B. Impulsive-deliberative (α =0.853)

2. I do not tackle tasks systematically
4. I do not approach tasks analytically
7. I do not like detailed explanations
22.I find that to adopt a careful, analytical approach to making decisions takes too long
24. I find that 'too much analysis results in paralysis'
25. I am more at home with ideas rather than facts and figures
31. I prefer chaotic action to orderly inaction
33. I am inclined to scan through reports rather than read them in detail.

C. Intuitive aspects of decision-making (α =0.846)

15. I do not use my gut feeling
17. I do not rely on my sense of intuition

D. Feeling/sensing/emotional aspects of decision-making (α =0.637)

16. I go by what feels good to me
18. I rely on my first impressions

E. Risk aversion (α =0.565)

27. I avoid taking a course of action if the odds are against its success

29. My philosophy is that it is better to be safe than risk being sorry

Additionally, the following two items had loadings close to the threshold for factor C. Intuitive aspects of decision-making. If we include #11, reliability goes down to $\alpha = 0.727$.

11. I prefer to listen to a lecture rather than to read text (0.536)

12. I enjoy deciphering graphs, charts, and diagrams (0.555)

We also ran a factorial analysis using all 267 respondents. Results were similar to the ones described here, but not as clear.

If necessary, we still can reduce even more the number of scales items in the first two dimensions without substantial reduction in reliability. SPSS output suggests items we can remove with little impact on Cronbach's a.

It is interesting to note that the above solution means that we will only be able to recover 55.89% of variance, not 100%. While this is typical in marketing, I wonder if that can hurt Bayesian inference and morphing performance. Thus, my next step, after scale purification, is to write out the MLE likelihood to update Ω our as users go through the system.

Reduced Set of Scales

After a second set of reliability analysis and scale removal iterations, we ended up being able to reduce scales analytical-holistic (A) and impulsive-deliberative (B) to four items each. Reliabilities are still reasonable (see scales below).

Next, to pick one dimension out of factors C, D, and E, the choice was factor Emotion/Feelings (D) because it is reasonable to expect this dimension to be useful in online banner design, i.e.

morph design. More specifically, we hope an ad that is well-liked by people who are driven by "first impressions" and "what feels good to me" might be disliked by people who "like to reason things carefully" and are "detailed oriented".

These scales are listed below.

I. Analytical-holistic (α =0.859)

1. I reason things out carefully
10. I am detail oriented and start with the details in order to build a complete picture
20. Given enough time, I would consider every situation from all angles
23. When making a decision, I take my time and thoroughly consider all relevant factors

II. Impulsive-deliberative (α =0.823)

2. I do not tackle tasks systematically
4. I do not approach tasks analytically
7. I do not like detailed explanations
22.I find that to adopt a careful, analytical approach to making decisions takes too long

III. Feeling/sensing/emotional aspects of decision-making (α =0.658)

16. I go by what feels good to me
18. I rely on my first impressions
19. I use my instincts

As a final check, the factorial analysis with this reduced set of scales seems to behave well: all scales items group nicely in the three factors.

Rotated Component Matrix[a]

	Component		
	1 - Deliberative/ Impulsive	2 - Holistic/ Analytical	3 – Intuitive/ Rational
q20_Given enough time, I would consider every situation from all angles.	.852		.129
q23_When making a decision, I take my time and thoroughly consider all relevant factors.	.827		
q1_I reason things out carefully.	.827		.140
q10_I am detail oriented and start with the details in order to build a complete picture.	.790	-.141	.134
q7_I do not like detailed explanations.		.829	
q2_I do not tackle tasks systematically.		.793	.134
q4_I do not approach tasks analytically.	-.142	.784	
q22_I find that to adopt a careful, analytical approach to making decisions takes too long.		.776	.209
q18_I rely on my first impressions.		.103	.841
q16_I go by what feels good to me.		.285	.731
q19_I use my instincts.	.422		.612

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Appendix IV – Glossary

This section is intended to clarify and define terminology used in the thesis or necessary for a basic understanding of the thesis topic. This section elucidates usage of author perceived synonymous terms.

A

Ad Exchange: *see section on Online Advertising Industry for detailed definition.*

Ad Network: *see section on Online Advertising Industry for detailed definition.*

Advertiser: *see section on Online Advertising Industry for detailed definition.*

Advertisement (or Ad): a brand communication methodology aimed at broadcasting or multicasting product offers, plans, rebates, features and various other promotions using various means of broadcast and multicast communication.

Advertising Leverage: also called Advertising Elasticity, is the relationship between a change in advertising expense (or budget) and the resulting change in product sales.

Advertising Space (or Ad Space): *See Inventory definition.*

Ad Views: *See Impressions definition.*

Analytical (Cognitive Style): a cognitive style behaviour in which an individual processes information using logic and makes a decision after detailed analysis. *(See also Cognitive Style)*

B

Banner Ad: is a graphical web advertising unit, typically a large headline or title extending across the full page width often measuring 468 pixels wide and 60 pixels tall.

Bayesian Inference Engine: *see section on Advertisement Morphing Technique for detailed definition.*

Broadcast Ad: is an Ad type that used broadcast communication medium of communication, such as, television, radio or print media.

C

Campaign: is the process of planning, creating, publishing and tracking an advertisement project.

CPA (Cost Per Action) or (Cost Per Acquisition): advertising is performance based payment methodology. In this payment methodology, the publisher takes all the risk of running the ad, and the advertiser pays only for the amount of users who complete a transaction, such as a purchase or sign-up.

CPC (Cost Per Click): is also known as Pay per click (PPC). Advertisers pay each time a user clicks on their listing and is redirected to their website. They do not actually pay for the listing, but only when the listing is clicked on. This system allows advertising specialists to refine searches and gain information about their market. Under the Pay per click pricing method, advertisers pay for the right to be listed under a series of target rich words that direct relevant traffic to their website, and pay only when someone clicks on their listing which links directly to their website. CPC differs from CPV in that each click is paid for regardless of whether the user makes it to the target site.

Cost Per Conversion: describes the cost of acquiring a customer, typically calculated by dividing the total cost of an ad campaign by the number of conversions. The definition of "Conversion" varies depending whether it is considered to be a lead, a sale, or a transaction.

CPE (Cost Per Engagement): is a form of Cost Per Action pricing first introduced in March 2008. Differing from cost-per-impression or cost-per-click models, a CPE model means advertising impressions are free and advertisers pay only when a user engages with their specific ad unit. Engagement is defined as a user interacting with an ad in any number of ways.

CPL (Cost Per Lead): is identical to CPA advertising and is based on the user completing a form, registering for a newsletter or some other action that the merchant feels will lead to a sale.

CPM (Cost Per Mille): also called "Cost Per Thousand (CPT)", is a mechanism where advertisers pay for exposure of their message to a specific audience. "Per mille" means per thousand impressions, or loads of an advertisement.

CPV (Cost Per Visitor): is a mechanism where advertisers pay for the delivery of a Website Visitor to the advertisers' website.

Classified Ad: is a web or print advertising that is limited to certain classes of goods and services, and usually limited in size and content.

Clickstream: is a form of raw data that represents the path a website visitor takes from page to page or from website to website when navigating on the web. The clickstream information is important for publishers and advertisers for optimal placement of advertisements.

Cluster Analysis: seeks to identify homogeneous subgroups of entities under analysis.

Cognitive Style: an individual characteristic style of processing information for decision making

Cookies: *See Internet Cookies definition.*

Consumer (or Customer): is a group of individuals who collectively, are intended recipients of an advertiser's message.

Creatives: is a general marketing term used for the material used to generate leads and sell advertising developed and designed by art directors and/or copywriters in an ad agency.

D

Data Analytics: is a process of analysing and modelling data with the intent of inferring useful insights, deriving conclusions, and facilitating decision making.

Deliberative (Cognitive Style): a cognitive style behaviour in which an individual processes information based on conscious thought and effort as against emotions or instincts. *(See also Cognitive Style)*

Demographics: are the basic objective descriptive classifications of consumers, such as their age, sex, income, education, size of household, ownership of home, etc. This does not include classification by subjective attitudes or opinions of consumers.

Display Ad: *See Banner Ad definition.*

F

Factor Analysis: also called R-mode factor analysis, is an analysis that seeks to cluster variables on a set of entities such as, sample market representatives.

G

Gittins' Indices: *see section on Advertisement Morphing Technique for detailed definition.*

H

Holistic (Cognitive Style): a cognitive style behaviour in which an individual processes information based on the wholes or complete systems rather than analysis of individual parts in making a decision. *(See also Cognitive Style)*

I

Impressions: is the number of times a banner ad is clicked or presumably seen by visitors. It is a metrics a website uses for measuring inventory. *(See also Inventory definition)*

Impulsive (Cognitive Style): a cognitive style behaviour in which an individual processes information inclined on sudden desires or inclinations. *(See also Cognitive Style)*

Internet Cookies: are text files saved on customer's computer hard drive using the web browser. The cookies are important in targeted advertising because they record customer actions and are instrumental in track customer actions using clickstreams. *(See also Clickstream definition)*

Intuitive (Cognitive Style): a cognitive style behaviour in which an individual processes information based on emotions or gut feeling as against deliberative/conscious thought and analysis. *(See also Cognitive Style)*

Inventory: is the number of ad spaces available for sale on a Website. A typical budgeting of Ad Space on a website is conducted using the number of ad spaces per pages, number of pages per website and the number of page requests.

M

Media: is a means of communication, such as the web, television, radio, print, that reach or influence people or masses.

Morphing: a process of dynamic change with respect to particular condition; in the context of this thesis, Online Advertisement Morphing is a process of dynamic presentation of banner ads morphed with respect to a registered website visitor's cognitive style.

N

New Media: comprise of stalwarts of online advertising media i.e. search ads, rich media/video ads, display ads and classified ads.

O

Old Media: comprise of traditional communication media i.e. television, radio and print media.

Operating Leverage: is the variability of earnings to corresponding changes in revenues.

P

Print Media: The print media include all newspapers, newsletters, booklets, pamphlets, magazines, and other printed publications, especially those that sell advertising space as a means of raising revenue.

Publisher: *see section on Online Advertising Industry for detailed definition.*

Q

Q-Factor Analysis: also called inverse factor analysis, is factor analysis which seeks to cluster the observations (sample market representatives) rather than the variables.

R

Rich Media Ad: A type of advertisement communication methodology that often includes richer graphics, audio or video within the advertisement. Such rich media ads are created with Flash, Shockwave and similar technologies.

S

SPSS: (Statistical **P**ackage for **S**ocial **S**ciences) is software program used for statistical analysis.

Search Ad: is advertisement based on the website visitor search text on a search engine.

T

Targeted Ad: is advertisement targeted to a particular market segment or demographic.

Traditional Media Ad: Advertisements broadcasted over the television, radio or print media communication channel.

V

Value Chain: describes the high-level interrelationship between a business' key operations or activities that are involved in delivering value to that business' customers. (Michael Porter, 1985)

Video Ad: *See Rich Media Ad definition.*

W

Website Visitor: *See Consumer (or Customer) definition.*