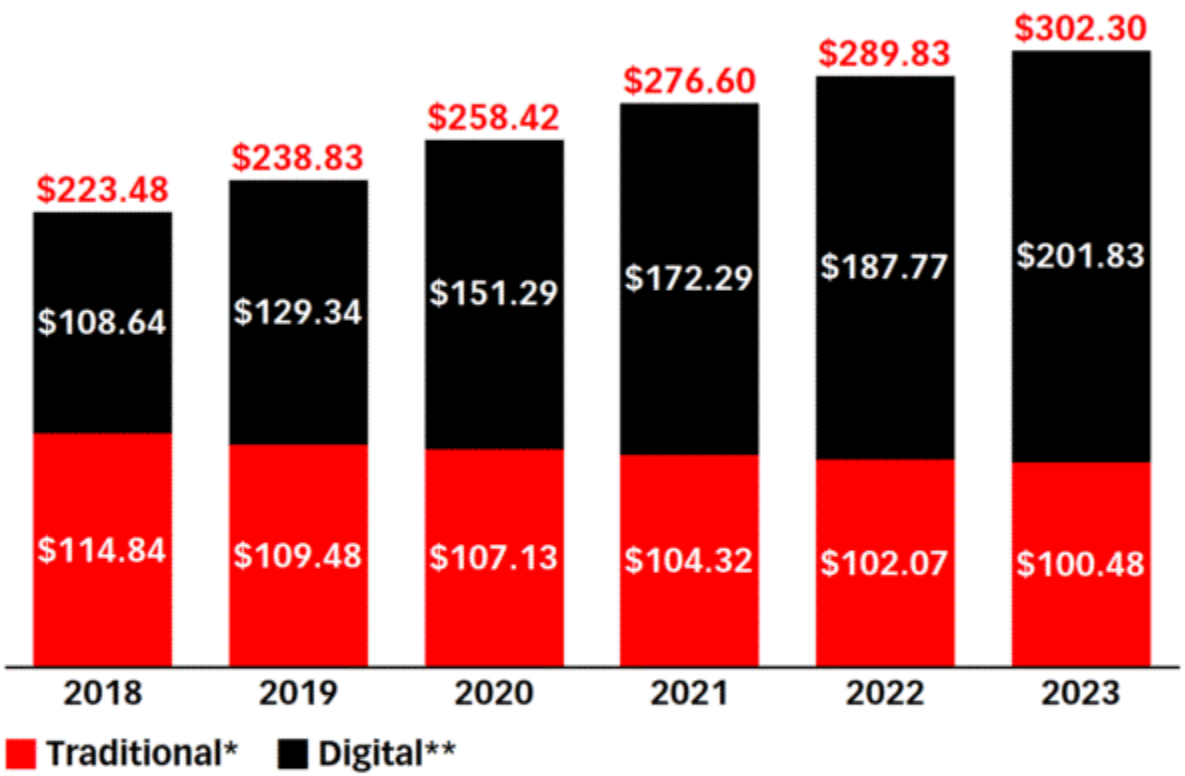
Digital Ads

Total Media Ad Spending in the US, Traditional vs. Digital, 2018-2023

billions



*Note: *includes directories, magazines, newspapers, out-of-home, radio and TV; **includes advertising that appears on desktop and laptop computers as well as mobile phones, tablets and other internet-connected devices, and includes all the various formats of advertising on those platforms; includes SMS, MMS and P2P messaging-based advertising*

Source: eMarketer, February 2019

T10045 www.eMarketer.com

What are the major types of digital ads?

Digital Ad Spending in the US, by Format, 2019-2023

billions

	2019	2020	2021	2022	2023
Display	**$70.06**	**$81.38**	**$92.53**	**$100.71**	**$107.91**
—Video	$36.01	$42.58	$49.02	$53.99	$58.39
—Banners and other*	$25.94	$30.20	$34.23	$37.12	$39.70
—Rich media	$5.28	$5.44	$5.85	$6.00	$6.10
—Sponsorships	$2.84	$3.16	$3.44	$3.60	$3.72
Search	**$53.73**	**$63.90**	**$73.31**	**$80.43**	**$87.15**
Lead generation	**$2.59**	**$2.84**	**$3.05**	**$3.15**	**$3.24**
Classifieds and directories	**$2.19**	**$2.34**	**$2.49**	**$2.53**	**$2.56**
Email	**$0.49**	**$0.55**	**$0.61**	**$0.65**	**$0.68**
Mobile messaging	**$0.28**	**$0.28**	**$0.29**	**$0.29**	**$0.29**
Total	**$129.34**	**$151.29**	**$172.29**	**$187.77**	**$201.83**

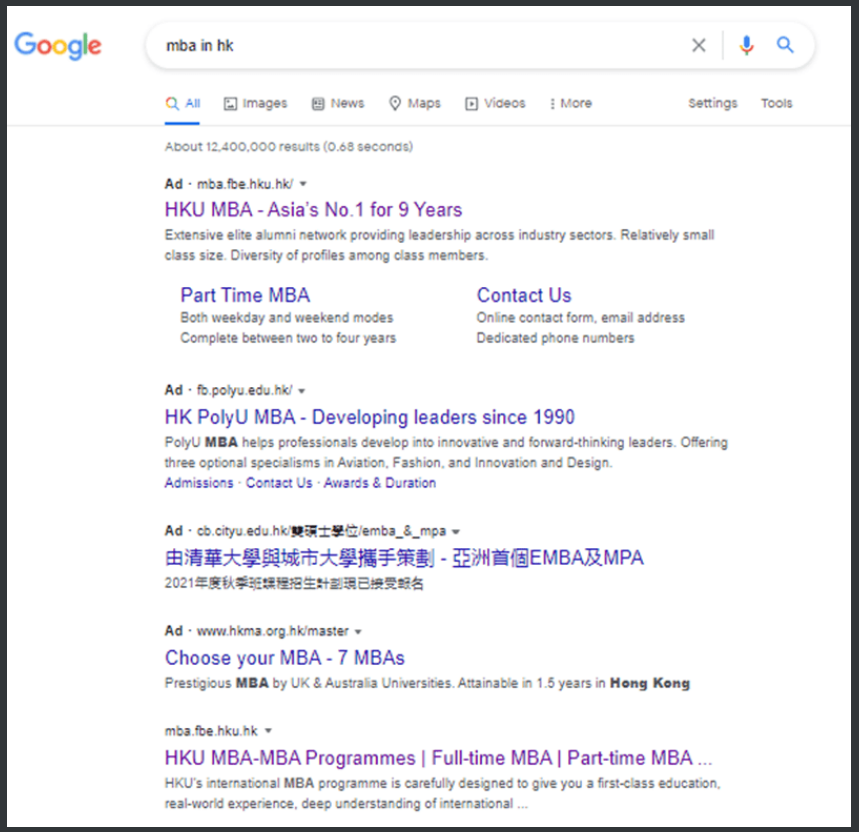
*Note: includes advertising that appears on desktop and laptop computers as well as mobile phones, tablets and other internet-connected devices on all formats mentioned; *includes ads such as Facebook's News Feed Ads and Twitter's Promoted Tweets*

Source: eMarketer, February 2019

T10056 www.eMarketer.com

Display Ads and Paid Search!

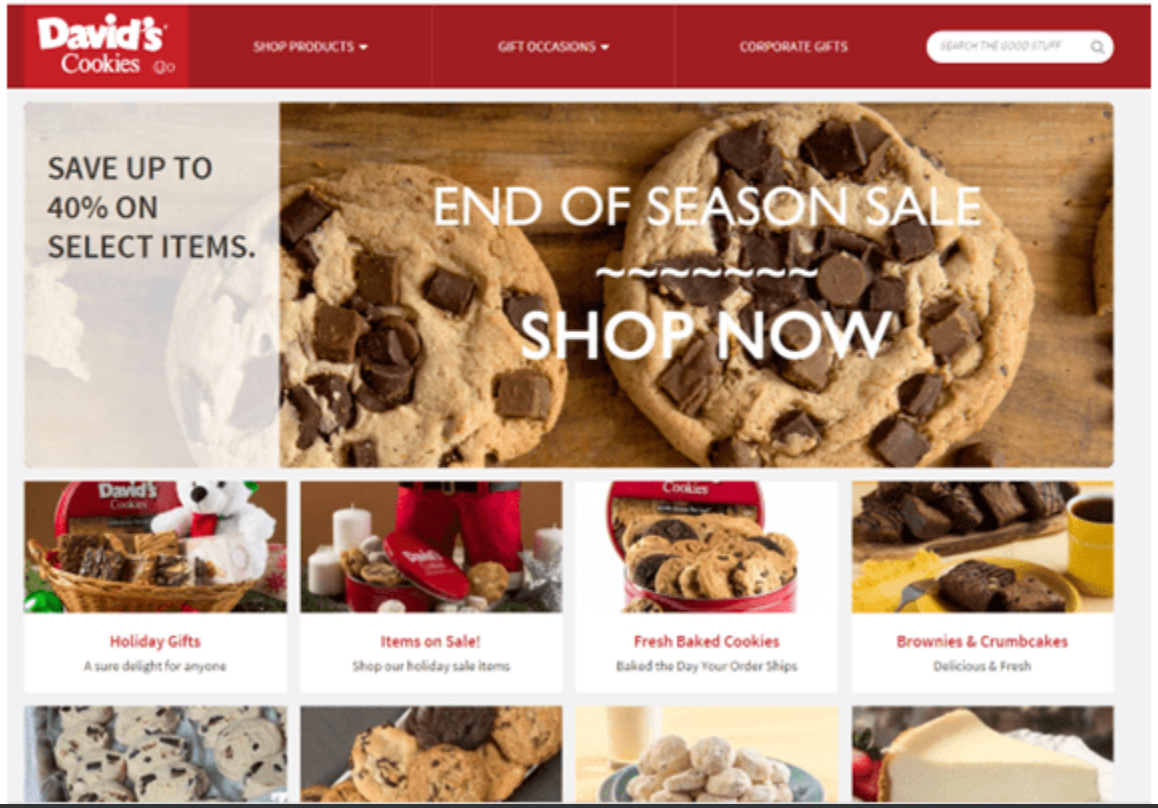
Paid Search

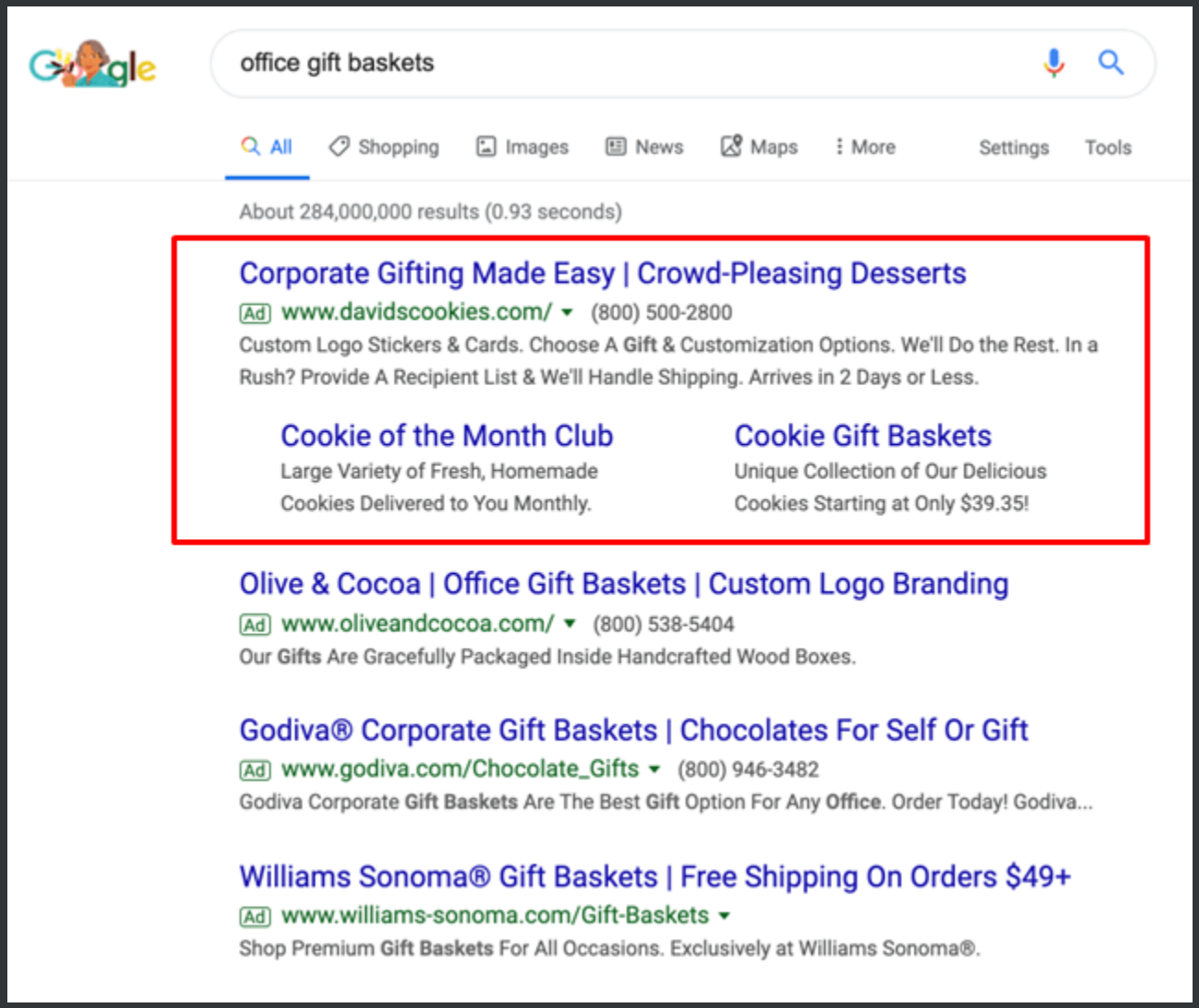


Paid Search

Organic Search

Example Advertiser





How did we end up in position #1?

How much did we pay for this?

Are we paying more than the ad in slot #2?

Paid search ads are sold by auctions

There are two types of auctions: first-price and second-price auctions. Both are used in digital advertising. Google used to adopt second-price auction but switched to first-price auction in 2023.

First-Price Auction

In a first price auction, the winner pays how much he/she bids.
CPC = cost per click

Advertiser	Bid	Position	CPC
D	$1.00	1	$1.00
B	$0.75	2	$0.75
A	$0.50	3	$0.50
C	$0.40	4	$0.40

Second-Price Auction

In a second price auction, the winner pays how much the next bidder bids. CPC = cost per click

Advertiser	Bid	Position	CPC
D	$1.00	1	$0.75
B	$0.75	2	$0.50
A	$0.50	3	$0.40
C	$0.40	4	$0

Second-Price Auction

Why do some search engines use the second-price auction instead of the first-price auction?

First-Price Auction

In a first-price auction, players game the system by bidding less.

Will D have incentives to decrease bid? How about bidding $0.76?

Advertiser	Bid	Position	CPC
D	$1.00	1	$1.00
B	$0.75	2	$0.75
A	$0.50	3	$0.50
C	$0.40	4	$0.40

Second-Price Auction

In this example, D pays $0.75, and she has no incentive to decrease her bid. If she decreases the bid to any number greater than $0.75, she still pays $0.75. If she bids <0.75, she loses the auction.

Advertiser	Bid	Position	CPC
D	$1.00	1	$0.75
B	$0.75	2	$0.50
A	$0.50	3	$0.40
C	$0.40	4	$0

Second-Price Auction

The designer of second-price auction, William Vickrey, won the Nobel Prize in Economics in 1996.

Auctions

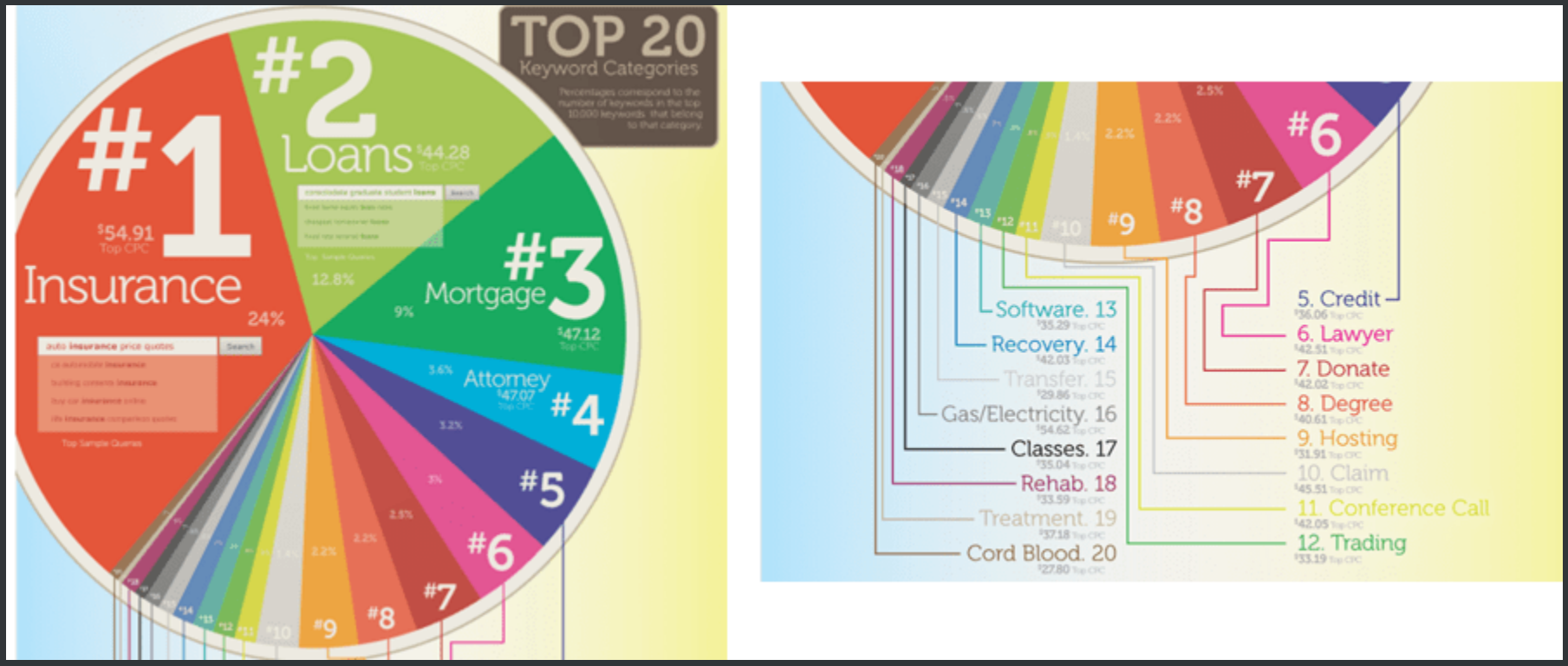
Nonetheless, Google switched back to first-price auction in 2023 because of its simplicity and transparency.

Guess

What is the most expensive keyword in Google's search advertising?

Insurance.

How much do you need to pay Google to get a click on “insurance”?


TOP 20
Keyword Categories
Percentages correspond to the number of keywords in the top 10,000 keywords that belong to that category.
#1
$54.91
Top CPC
Insurance
24%
#2
Loans
$44.28
Top CPC
12.8%
#3
Mortgage
9%
$47.12
Top CPC
#4
Attorney
$47.07
Top CPC
3.6%
#5
3.2%
#6
3%
#7
2.5%
#8
2.2%
#9
2.2%
#10
#11
#12
#13
#14
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#19
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#6
#7
#8
#9
#10
#11
#12
#13
#14
#15
#16
#17
#18
#19
#20
2.2%
2.2%
2.5%
Software. 13
$35.29 Top CPC
Recovery. 14
$42.03 Top CPC
Transfer. 15
$29.86 Top CPC
Gas/Electricity. 16
$54.62 Top CPC
Classes. 17
$35.04 Top CPC
Rehab. 18
$33.59 Top CPC
Treatment. 19
$37.18 Top CPC
Cord Blood. 20
$27.80 Top CPC
5. Credit
$36.06 Top CPC
6. Lawyer
$42.51 Top CPC
7. Donate
$42.02 Top CPC
8. Degree
$40.61 Top CPC
9. Hosting
$31.91 Top CPC
10. Claim
$45.51 Top CPC
11. Conference Call
$42.05 Top CPC
12. Trading
$33.19 Top CPC

Measuring the effectiveness of online ads

How do we measure ads?

- Impressions
  - Frequency & Reach
- Clicks
  - Click-through rate
- Ad Engagement
  - Mouse-over, Interaction
  - FB: Like, Share
  - Twitter: RT, Favorite
- Conversions
  - Sign-ups, Downloads, Place in cart, Purchase

Impressions

Impression: A user loads 1 ad on a website

Impression = Frequency $\times$ Reach
Frequency: Number of ads per person
Reach: Number of people who see at least one ad

Clicks

- Instantaneous feedback on individual ads – revolutionary!
  - Clicks can be used as a measure of intent to buy.
  - Click-Through Rate (CTR) = the number of times a link was clicked divided by the number of times it was seen. CTR=$Clicks / Impressions$
- Correlation between CTR & ad effectiveness (AdFX) is debatable
  - E.g. Does a higher CTR on mobile mean higher mobile AdFX?
  - Ads are smaller, but fill more of the screen
  - Up to 50% of clicks on mobile banner ads are accidental (GoldSpot Media)

Sometimes clicks are unreliable…

https://www.youtube.com/embed/N1ltwg2nTK4?enablejsapi=1

Engagement

- Engagement: A catch-all for user interactions with the ad beyond clicking including mouse-over, interacting with interactive ads, rollover, start or skip video
- Social engagement/conversion include
  - FB: Like, Share
  - X (Twitter): RT, Favorite
- Intentional measure showing whether consumer likes ad more than just clicks

Engagement Ad

Conversions

- Conversions: A catch-all for user interactions with advertiser including sign-ups (newsletter, membership, etc.), downloads, shopping on-site, placing items in cart, purchasing.
- Conversion Rate (CR) = the number of conversions divided by the number of times the ad was clicked. CR=$Conversions/Clicks$
- Probability of Purchase = CTR $\times$ CR, here purchase is broadly defined.

Conversions: Pros and Cons

(+) Some direct response advertisers only need conversion info (like app makers & downloads)

(+) For brand advertisers (like Coca-Cola), conversions (& engagement) are often all they can measure!

(−) Conversion rates are typically very low
Decisions require much more impression data

Some Metrics

Impression = number of instances ad is seen by user
Cost-per-Click (CPC) = cost paid to search engines
Click-Through Rate (CTR) = efficiency of generating clicks from delivered impression
Conversion Rate (CR) = efficiency of generating sales from click
Probability of Purchase = CTR $\times$ CR

Display Advertising

Historical Note: Banners

Banners seem to be the oldest standard format in use.

The first “banner ad” was launched by AT&T on Oct 27, 1994 on Hotwired, the web version of Wired.

Part of the AT&T “you will” ad campaign.

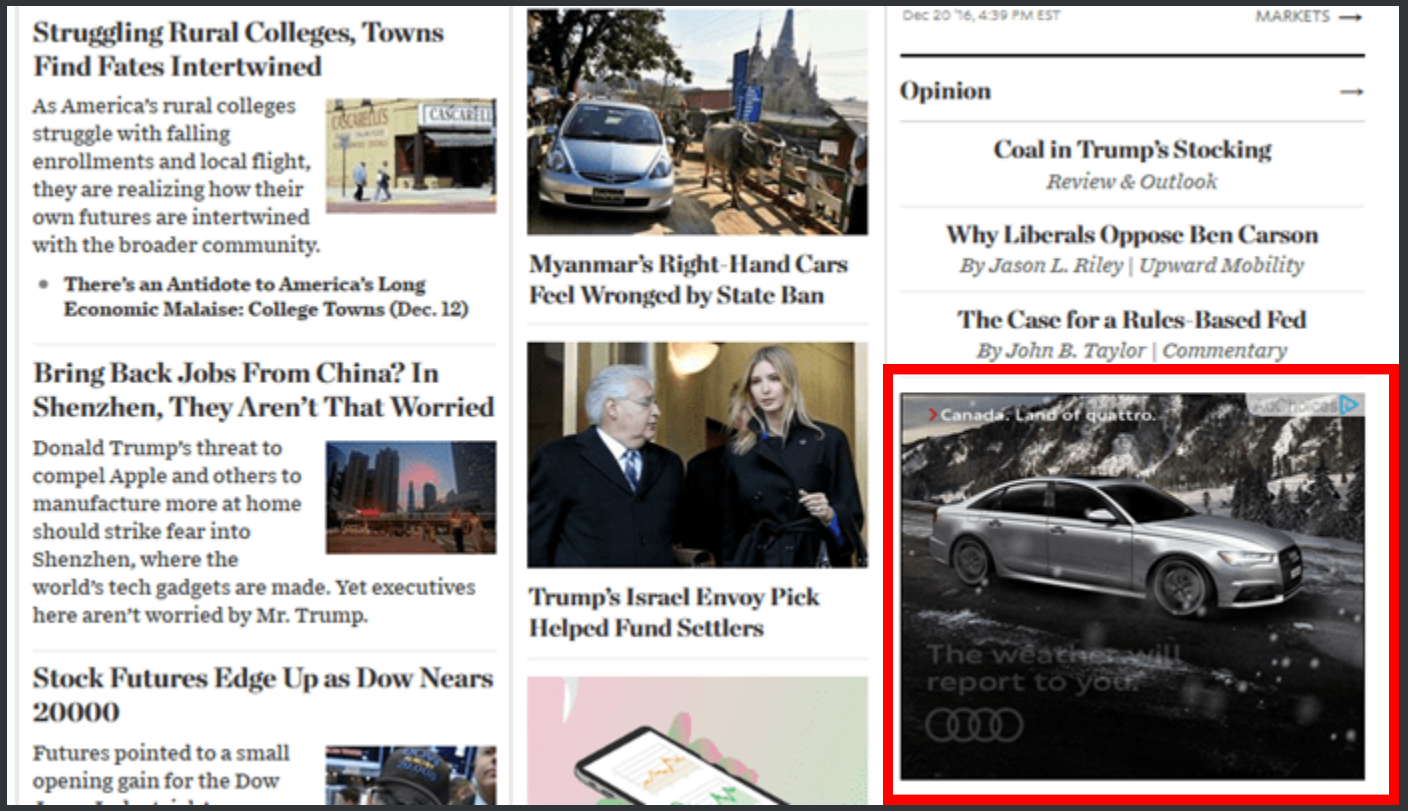
The AT&T You Will Campaign

Each ad presented a futuristic scenario beginning with "Have you ever…" and ending with "…you will. And the company that will bring it to you: AT&T."

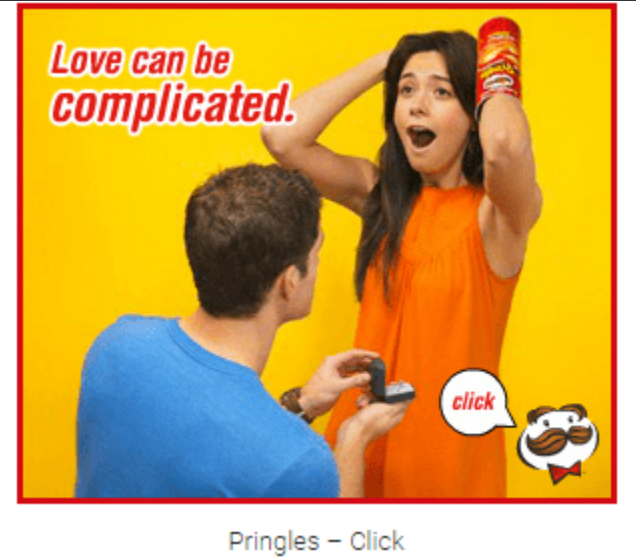
At that time, there were about 30 million people on the Internet.

The ad predicted a number of innovations including GPS navigation, Wi-Fi, tablet computing, smartwatches, distance learning etc.

Display Advertising

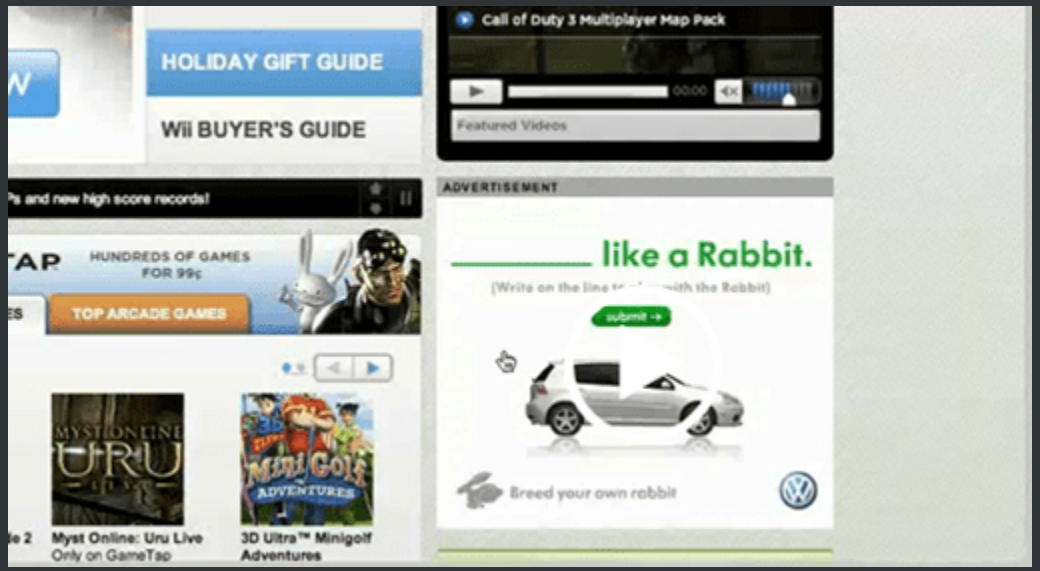


Examples of Interactive Ads

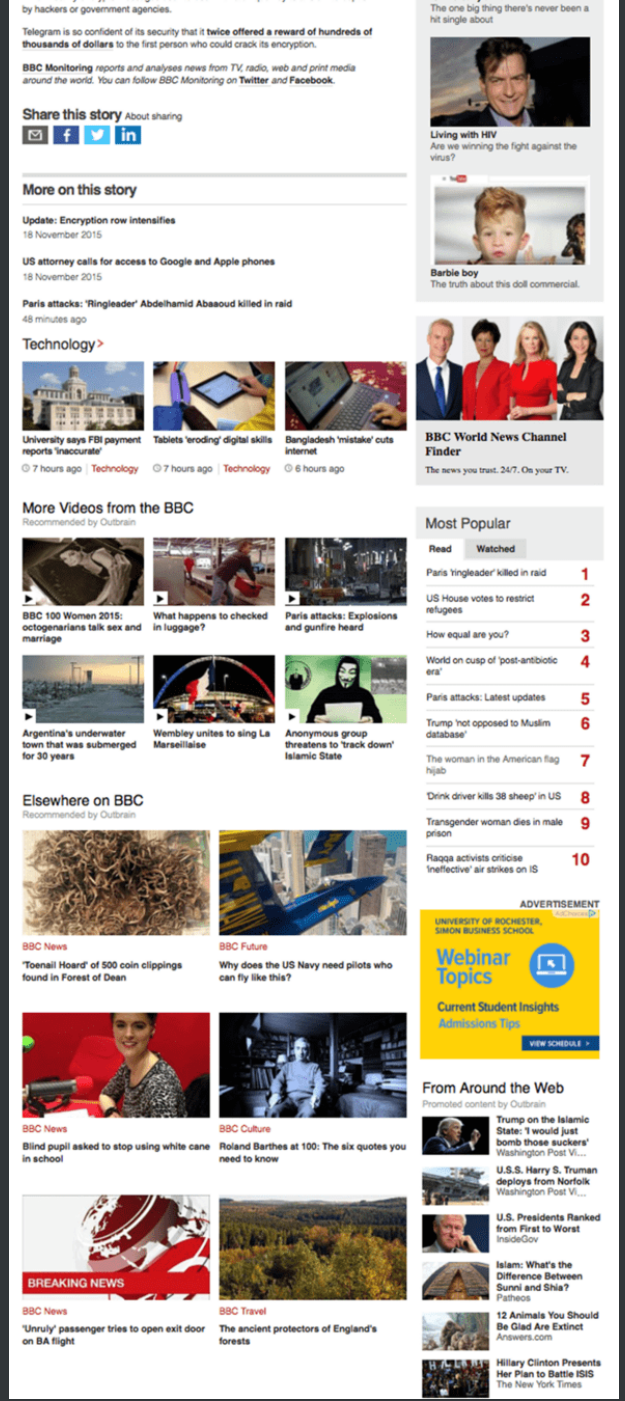


Pringles – Click

link

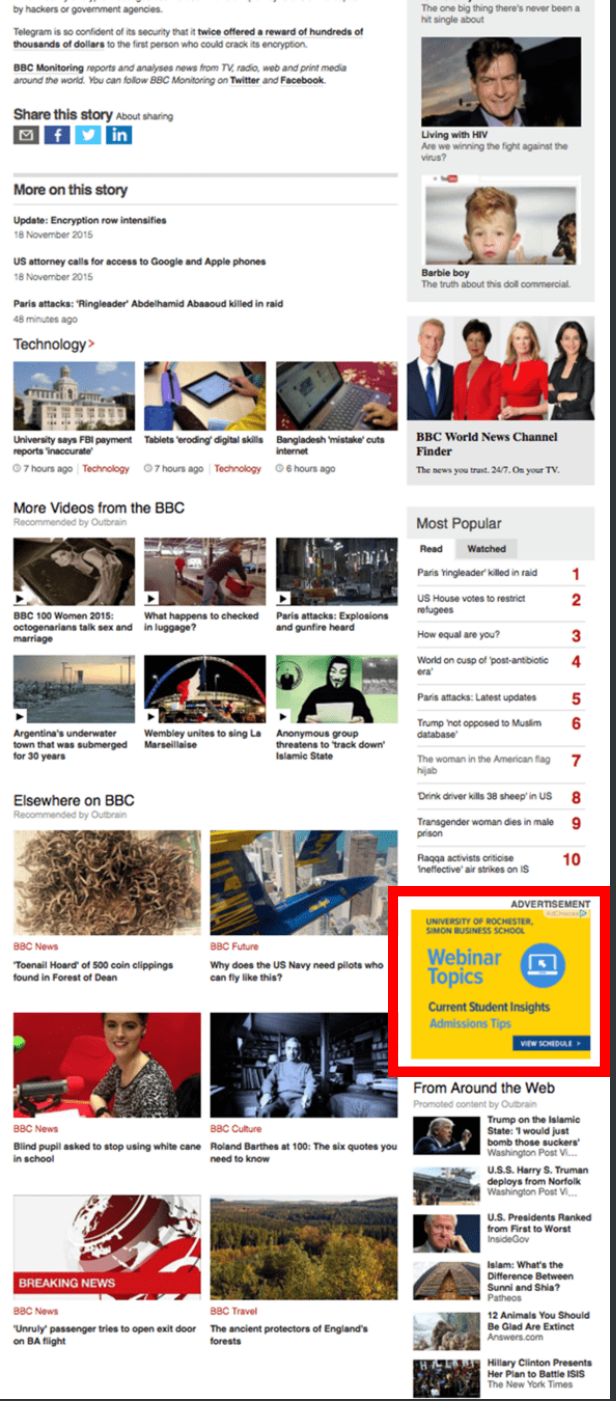


link

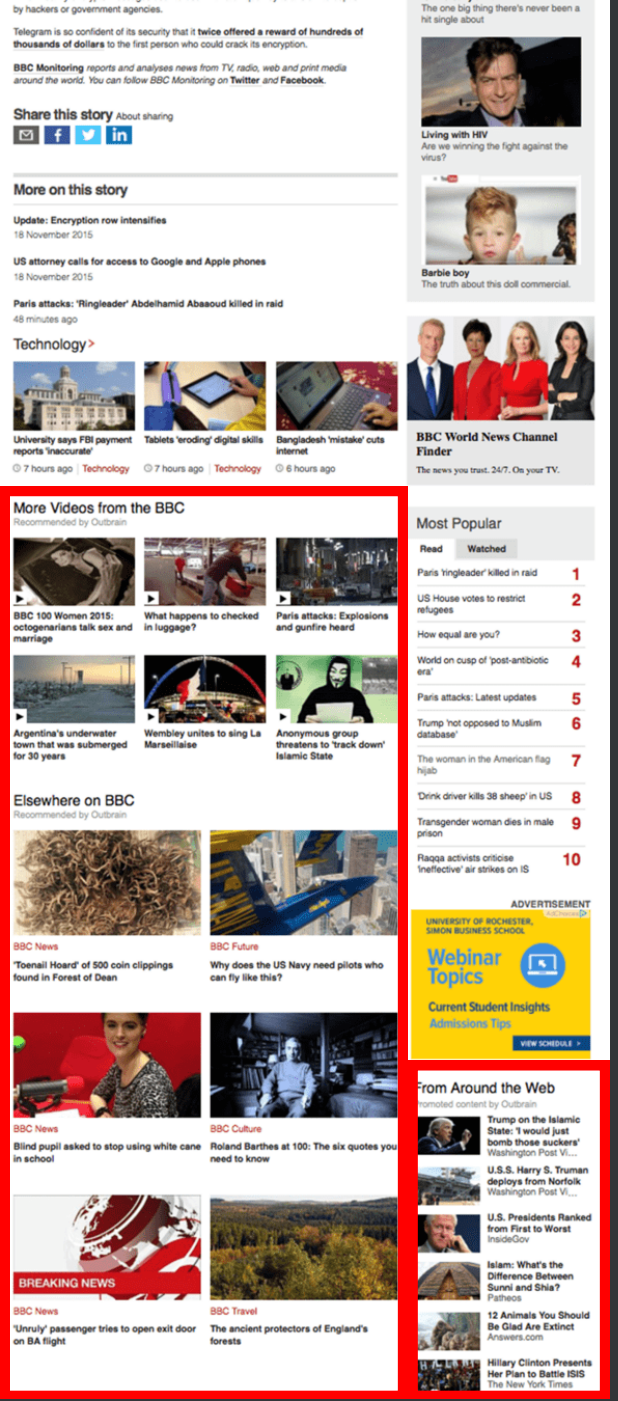


This is an example of the BBC website. How many ads do you find on this webpage?

Both ads from SAS. This is a behavioral targeting ad. It is becoming popular to have two ads on the same page.



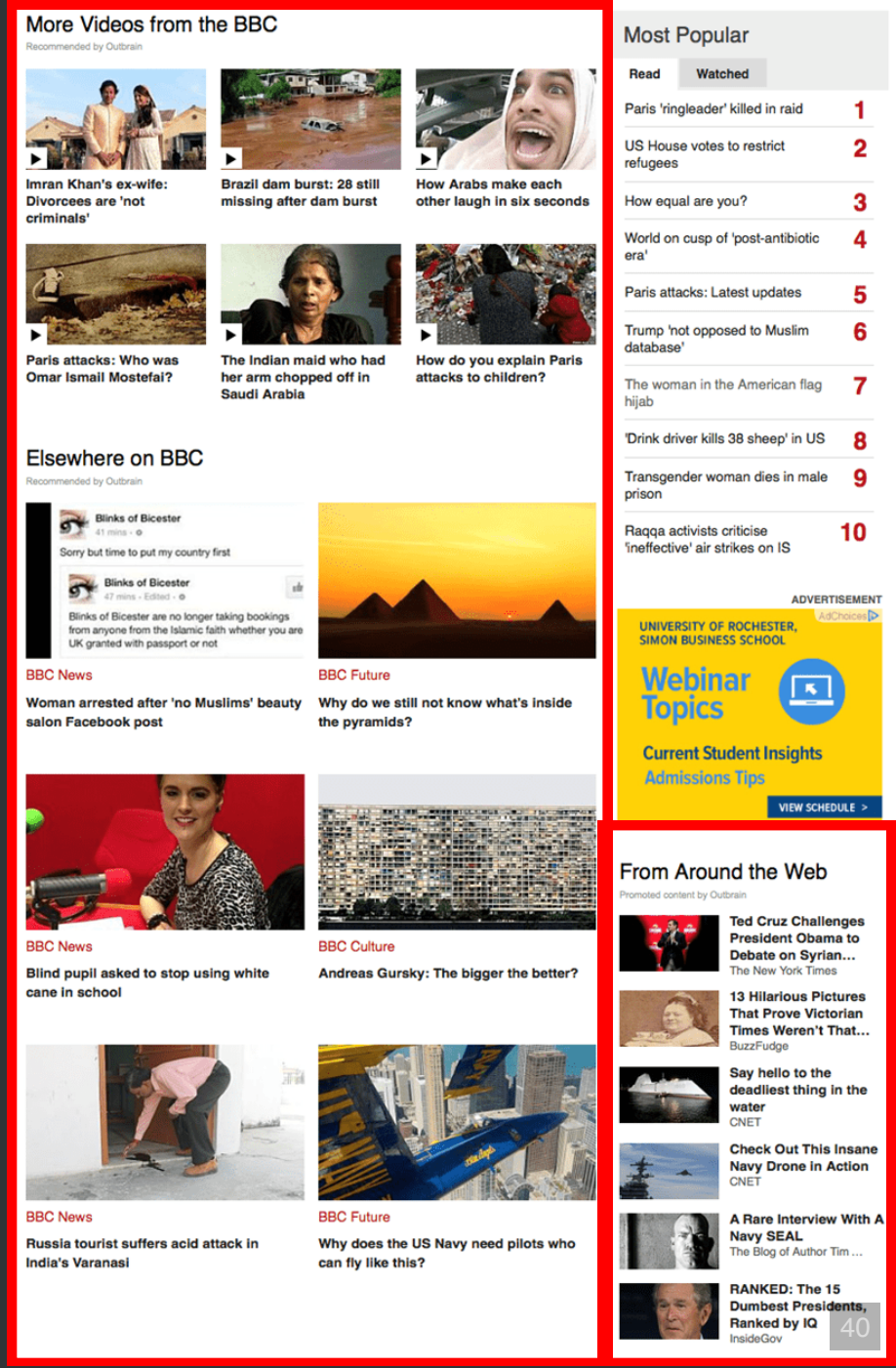
This is an ad from University of Rochester Business School. It is a retargeting ad.



They are also ads, even though they look like real content. This is called native ad.

Native advertising is a type of advertising that matches the form and function of the platform upon which it appears.

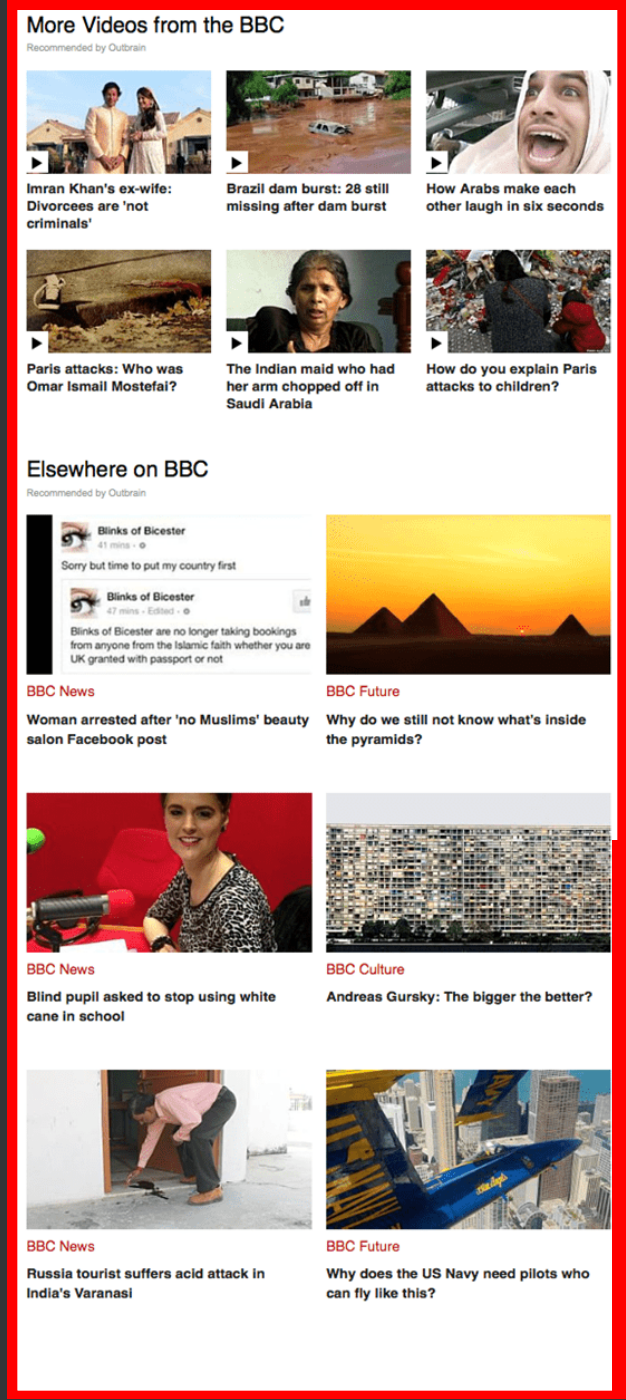
It is hard for consumers to distinguish between content and native ads.



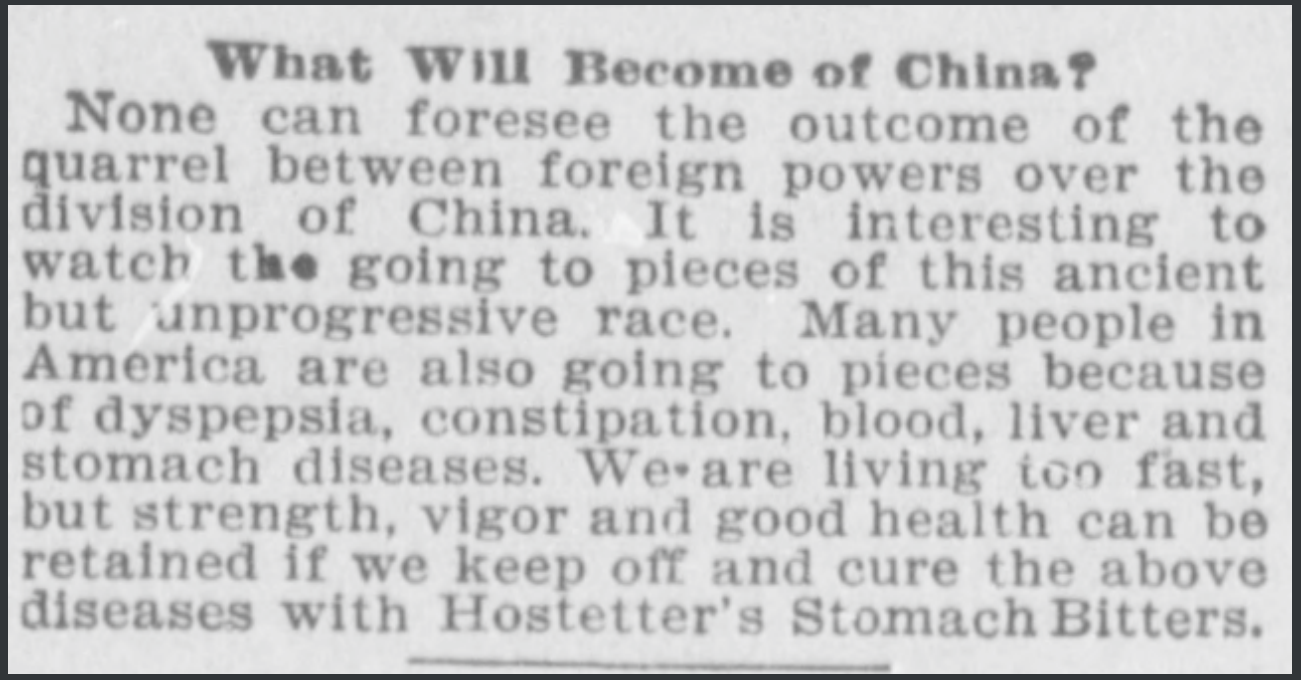
Advertisers face a trade-off between ad clicks and brand recognition.

Publishers need to strike a balance between ad clicks and the platform's trustworthiness.

For policy makers, concerns that native advertising confuses customers prompted the U.S. Federal Trade Commission to issue guidelines for disclosing native ads.



The first native ad



What Will Become of China?

None can foresee the outcome of the quarrel between foreign powers over the division of China. It is interesting to watch the going to pieces of this ancient but unprogressive race. Many people in America are also going to pieces because of dyspepsia, constipation, blood, liver and stomach diseases. We are living too fast, but strength, vigor and good health can be retained if we keep off and cure the above diseases with Hostetter's Stomach Bitters.

Targeting based on simple rules

- Geo-targeting
  - Target by country, state, city, IP address
- OS / Browser / Devices
  - Segment based on technology
- Day and time
  - Specify display times to the minute

In addition to these simple targeting rules (geo-targeting, OS / browser / devices, day and time), which other targeting rules can you think of?

Targeting via sophisticated matching

Contextual targeting

Ads displayed based on content of web site

Photos | Opinion | Local News | Odd News | Comics | Weather | Full Coverage | Video/Audio | Kevin Sites

Search: All News Search Advanced

Over 250 sick after eating at Indiana Olive Garden

REUTERS

Reuters Photo: A plate of pasta from the Olive Garden is seen in an undated file photo....

58 minutes ago

LOS ANGELES (Reuters) - More than 250 people have reported becoming sick after eating at an Olive Garden restaurant in Indianapolis, Indiana, a county health official said on Friday, a day after an outbreak of E.coli at Taco Bell restaurants was declared over.

The news makes Olive Garden at least the third U.S. restaurant chain this month to be linked to widespread customer illnesses.

Some customers who ate at the Olive Garden restaurant in northeast Indianapolis between December 9 and December 13 have reported nausea, vomiting, diarrhea, and in some cases fever, said John Althardt, a spokesman for the Marion County Health Department.

Three of those people have been hospitalized.

Tests of the sick peoples' stool and leftovers they took home from the restaurant will be conducted later today or Monday, Althardt said. He added that the tests would take about 48

ADVERTISEMENT

FREE*
Dinner for Two at Olive Garden*

Click Here!

*Just complete 1 offer ©2006 GiftCardFreebies.com

ELSEWHERE ON THE WEB

CNN.COM

11-year-old charged with driving drunk

REUTERS

NEWS ALERTS

Get an alert when there are new stories about:

- Orange Beach, Alabama
- Perdido Key, Florida
- Chevrolet Monte Carlo

Add Selected Alerts

» More Alerts

ELSEWHERE ON THE WEB

CNN.COM
Explosion rocks besieged mosque in Pakistani capital

ABC NEWS
'Out of the Blue': Do Aliens Exist?

THE CHRISTIAN SCIENCE MONITOR
William Bratton: Lauded chief of troubled LAPD

Fri Jul 6, 3:23 PM ET

MIAMI (Reuters) - An 11-year-old girl was charged with drunken driving after leading police on a chase at speeds of up to 100 mph that ended when she flipped the car in an Alabama beach town.

A video camera in the police car captured the look of surprise on the officer's face when he approached the wrecked car and got a look at the motorist.

The Mobile Press-Register newspaper said the patrolman saw the Chevrolet Monte Carlo speeding and flashed his lights to signal the driver to stop. Instead, the car sped faster, traveling at up to 100 mph (160 kph) before sideswiping another vehicle and flipping over in the Gulf Coast town of Orange Beach, Alabama, on Tuesday night.

The young driver, who lived nearby in Perdido Key, Florida, was treated at a hospital for scrapes and bruises and released to relatives. Police also charged her with speeding, leaving the scene of an accident and reckless endangerment.

The car belonged to a relative and police were still trying to find out where she got the alcohol. There was none in the vehicle but her blood alcohol level was over the limit for adult motorists, police told the newspaper.

ADVERTISEMENT

Email Story | IM Story | Printable View

Targeting via sophisticated matching

Google display network offer two options for contextual targeting

- Keyword targeting: Choose words or phrases related to your product or service so Google can automatically target your ads to relevant websites on the Google Display Network that your customers visit.
- Topic targeting: Target your ad to multiple pages about specific topics at once. Topic targeting lets you reach a broad range of pages on the Display Network.

Targeting via sophisticated matching

Contextual targeting

Ads displayed based on content of web site

Behavioral targeting

Delivering relevant messages to audiences based on interests defined by recency and frequency of site navigation behaviors (web sites visited, search queries made, etc).

Targeting via sophisticated matching

Contextual targeting

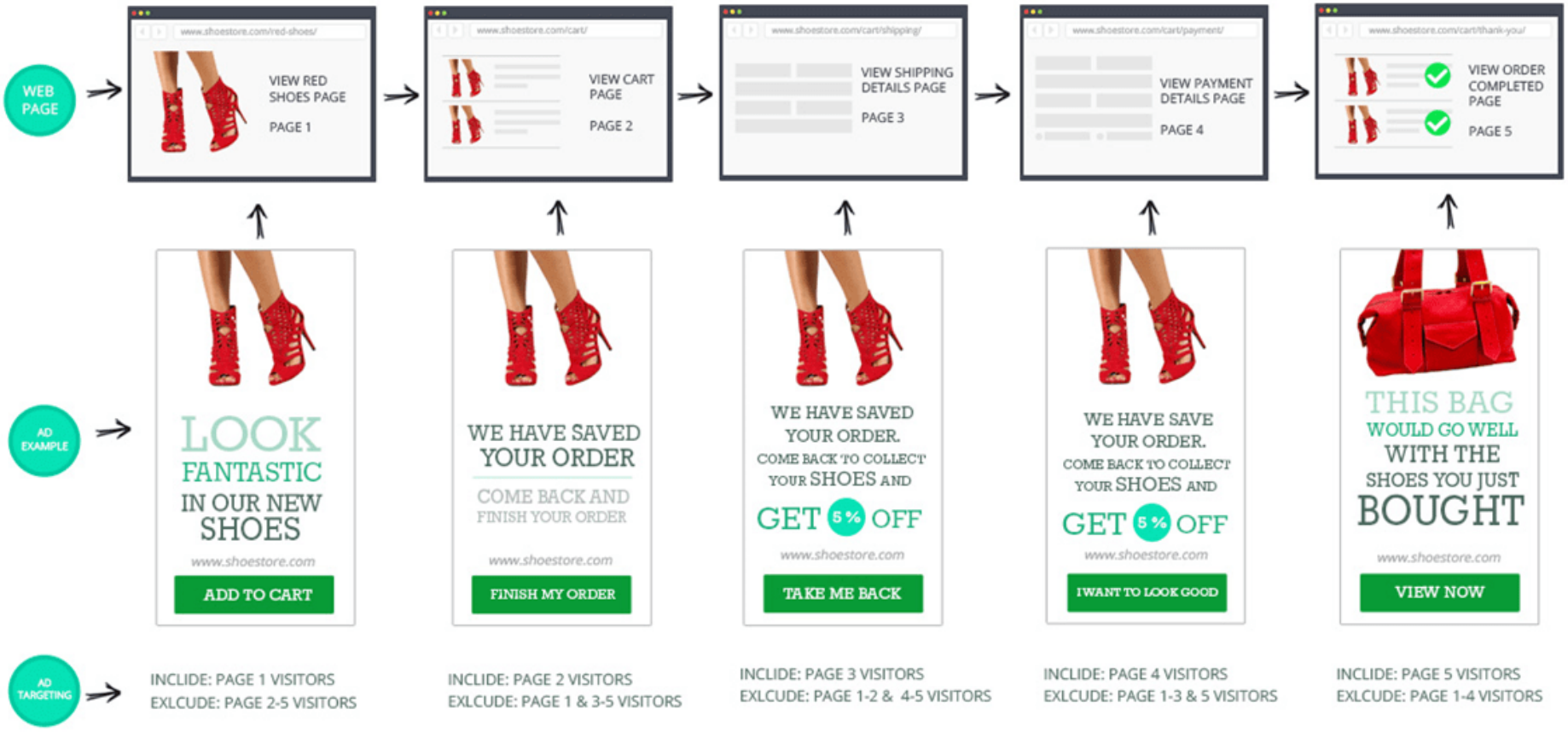
Ads displayed based on content of web site

Behavioral targeting

Delivering relevant messages to audiences based on interests defined by recency and frequency of site navigation behaviors (web sites visited, search queries made, etc).

Retargeting/Remarketing

Online ad is shown to a user who searched for (or saw) a particular kind of content. Based on past sites a user has visited.


WEB PAGE
www.shoestore.com/red-shoes/
VIEW RED SHOES PAGE
PAGE 1
www.shoestore.com/cart/
VIEW CART PAGE
PAGE 2
www.shoestore.com/cart/shipping/
VIEW SHIPPING DETAILS PAGE
PAGE 3
www.shoestore.com/cart/payment/
VIEW PAYMENT DETAILS PAGE
PAGE 4
www.shoestore.com/cart/thank-you/
VIEW ORDER COMPLETED PAGE
PAGE 5
AD EXAMPLE
LOOK FANTASTIC IN OUR NEW SHOES
www.shoestore.com
ADD TO CART
WE HAVE SAVED YOUR ORDER
COME BACK AND FINISH YOUR ORDER
www.shoestore.com
FINISH MY ORDER
WE HAVE SAVED YOUR ORDER.
COME BACK TO COLLECT YOUR SHOES AND
GET 5% OFF
www.shoestore.com
TAKE ME BACK
WE HAVE SAVE YOUR ORDER.
COME BACK TO COLLECT YOUR SHOES AND
GET 5% OFF
www.shoestore.com
I WANT TO LOOK GOOD
THIS BAG WOULD GO WELL WITH THE SHOES YOU JUST BOUGHT
www.shoestore.com
VIEW NOW
AD TARGETING
INCLIDE: PAGE 1 VISITORS
EXLCUDE: PAGE 2-5 VISITORS
INCLIDE: PAGE 2 VISITORS
EXLCUDE: PAGE 1 & 3-5 VISITORS
INCLIDE: PAGE 3 VISITORS
EXLCUDE: PAGE 1-2 & 4-5 VISITORS
INCLIDE: PAGE 4 VISITORS
EXLCUDE: PAGE 1-3 & 5 VISITORS
INCLIDE: PAGE 5 VISITORS
EXLCUDE: PAGE 1-4 VISITORS

Price can also be targeted

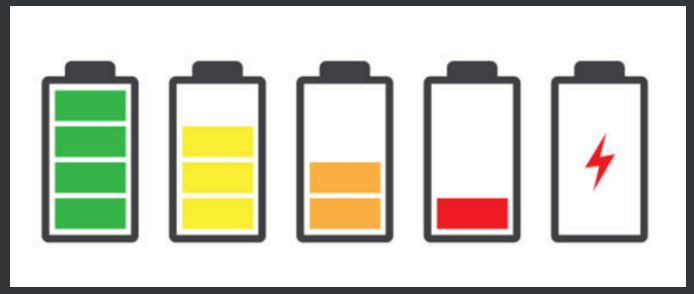
Firms offer different consumers different prices based on their personal situations (e.g., geolocation, search history, purchase history).

Do you use a MacBook or a PC?

Mac vs. PC

The Wall Street Journal investigated claims that Orbitz, a popular online travel agency, was showing higher prices for hotel rooms to Mac users compared to those who used a Windows PC.

Uber charges you higher prices when your battery is low, because it knows you cannot afford to wait!



How are Display Ads Bought & Sold?

Display ads are mainly sold in one of two ways

1. Direct buying from publishers
2. Real-time bidding (RTB) through Ad Exchange

Direct Buying from Publishers

"200,000 impressions to US users on the New York Time's finance related pages in July"

"All impressions on the EPSN homepage on Sept 21"

"300,000 impressions on Yahoo! to a retailer's existing customers in April"

Ad Networks and Ad Exchange

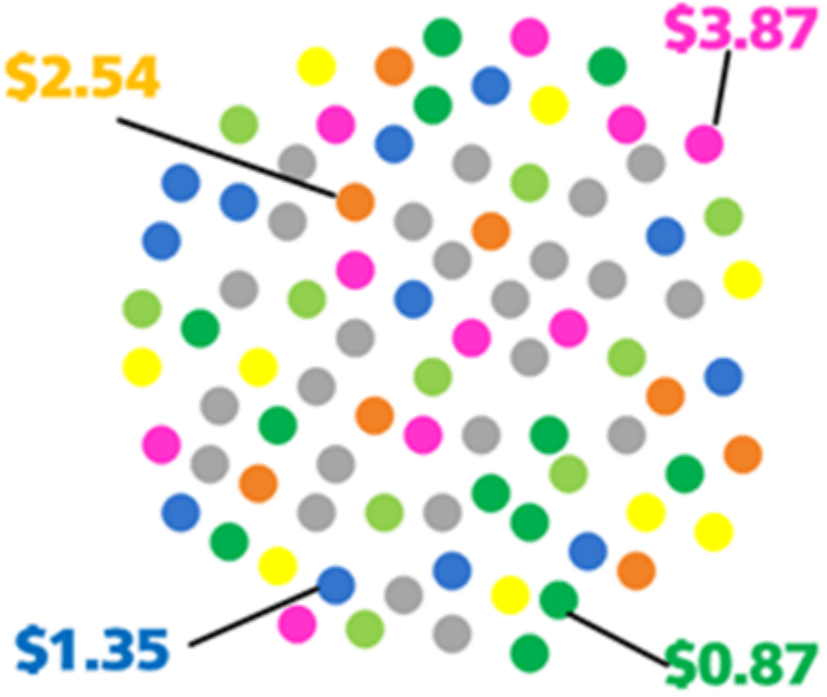
Ad networks/ad exchanges purchase remnant inventory across many publishers and resell to advertisers at a premium.

An essential vehicle for monetizing the Long Tail of the Internet. Provide small and mid-sized online publishers with more advertising revenues.

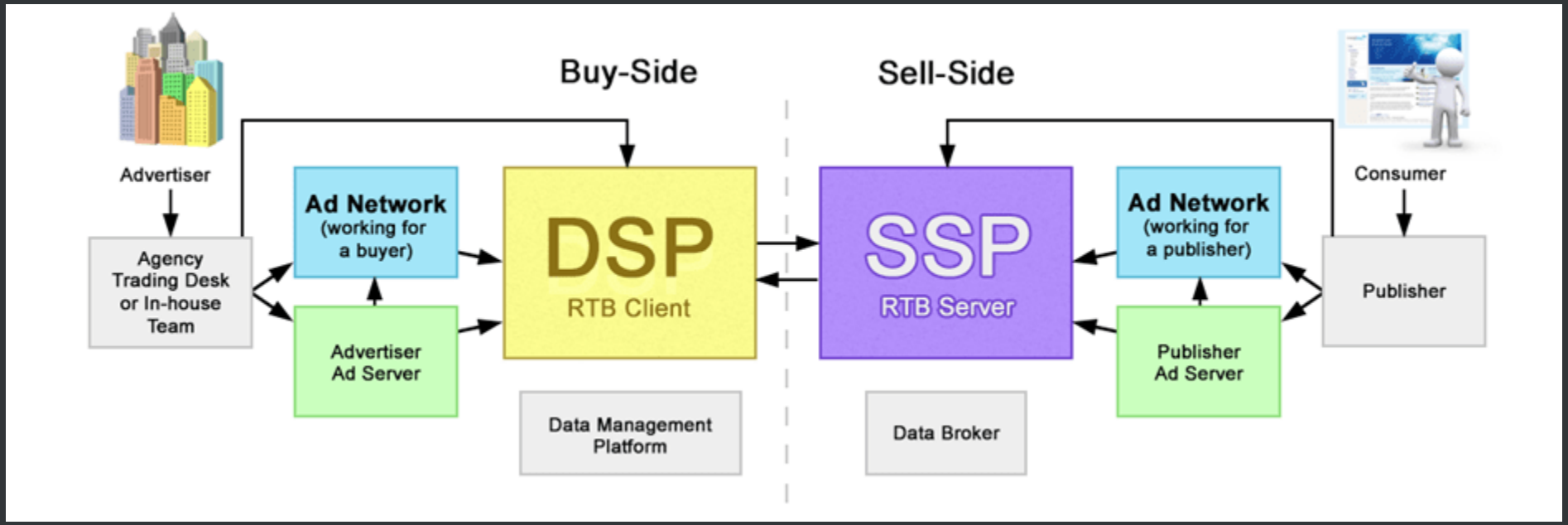
Direct Buy

1 price for all impressions
$10 CPM

Real-time Bidding

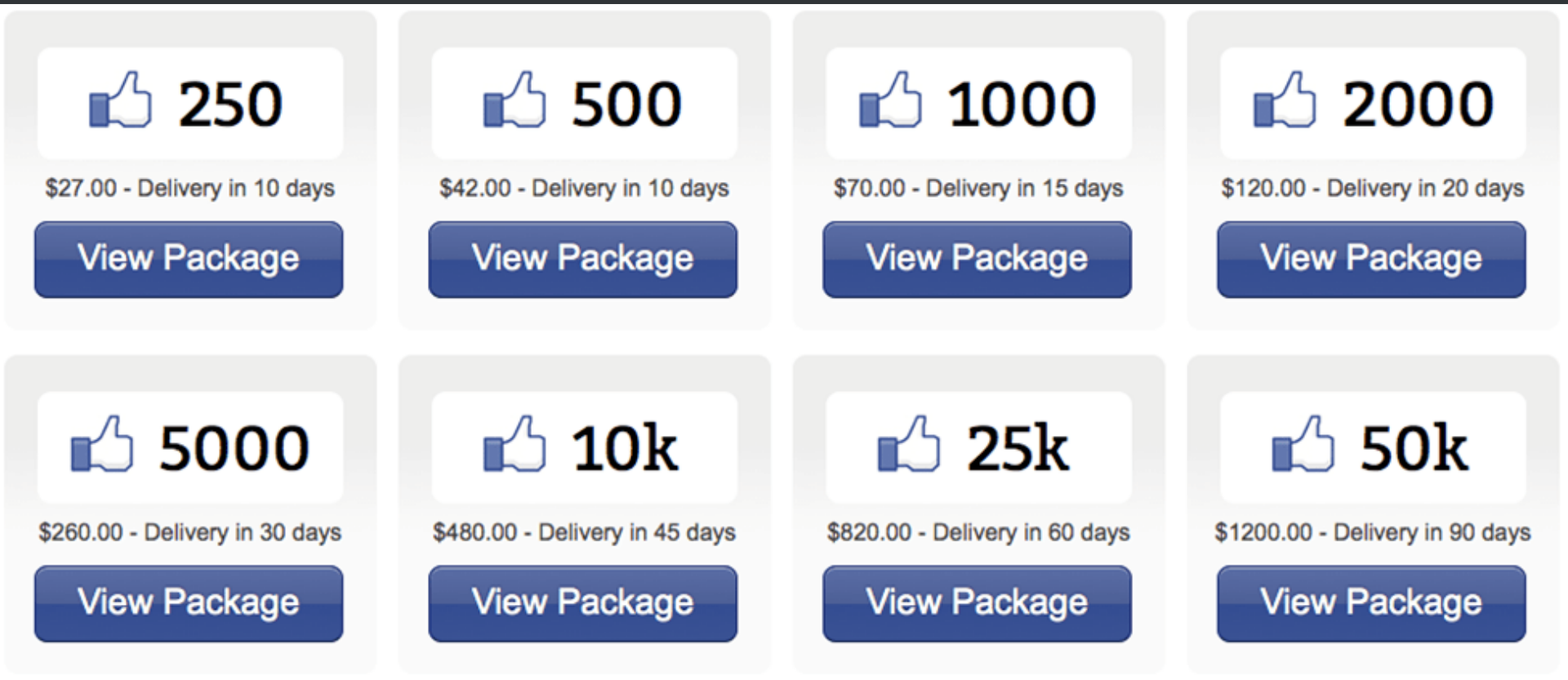


Each ad priced individually
$3 eCPM


Buy-Side
Sell-Side
Advertiser
Agency Trading Desk or In-house Team
Ad Network (working for a buyer)
Advertiser Ad Server
DSP
RTB Client
Data Management Platform
SSP
RTB Server
Data Broker
Ad Network (working for a publisher)
Publisher Ad Server
Consumer
Publisher

https://www.youtube.com/embed/Cd8DYHx2E9E?enablejsapi=1

Click and Like Fraud


250
$27.00 - Delivery in 10 days
View Package
500
$42.00 - Delivery in 10 days
View Package
1000
$70.00 - Delivery in 15 days
View Package
2000
$120.00 - Delivery in 20 days
View Package
5000
$260.00 - Delivery in 30 days
View Package
10k
$480.00 - Delivery in 45 days
View Package
25k
$820.00 - Delivery in 60 days
View Package
50k
$1200.00 - Delivery in 90 days
View Package

Why do people buy fake clicks/likes?

Click and Like Fraud

Publishers profit from clicks and likes, and they have incentive to engage in click and like fraud.

Your competitor may create fake clicks and likes on your ad to waste your advertising budget.

The competitor of your publisher may create fake clicks and likes so that you may terminate the relationship with your publisher.

Click and Like Fraud

Like farmers pay people in developing world
Remember: Fraud is everywhere (click, view, etc.)

But, Like fraud creates a lasting distortion (until the offending user is caught)

- Worse, to avoid detection, like farm users will 'like' pages that are not buying fake likes
- Like farm users hard to detect & removing real users destroys their user experience

Course Project

Course Project

Choose a company and analyze its digital marketing strategy, including:

- Its website
- Online sentiment (How users talk about the brand online? E.g., user reviews on platforms such as TripAdvisor/Amazon; online discussions on platforms such as Twitter/FB)
- Is the company's official social media accounts (e.g., Twitter/IG/FB/YouTube) well managed?
- Competitor Analysis and Consumer Analysis

Course Project

More details can be found here.

You are going to present in the last lecture (Nov 25 for Class A and Nov 29 for Class B); order of presentation will be drawn randomly.

The report is due one week later (Dec 2 for Class A and Dec 6 for Class B).

Companies Chosen by Students in the Past:

Daniel Wellington
Steelseries
Shein
Foodpanda
Nintendo
KKDay
Ocean Park
...

Data Project

The next class will be the lecture for data project.

You will start working on the project in the next class and submit the findings one week later (i.e., each group has one week to complete the data project).