



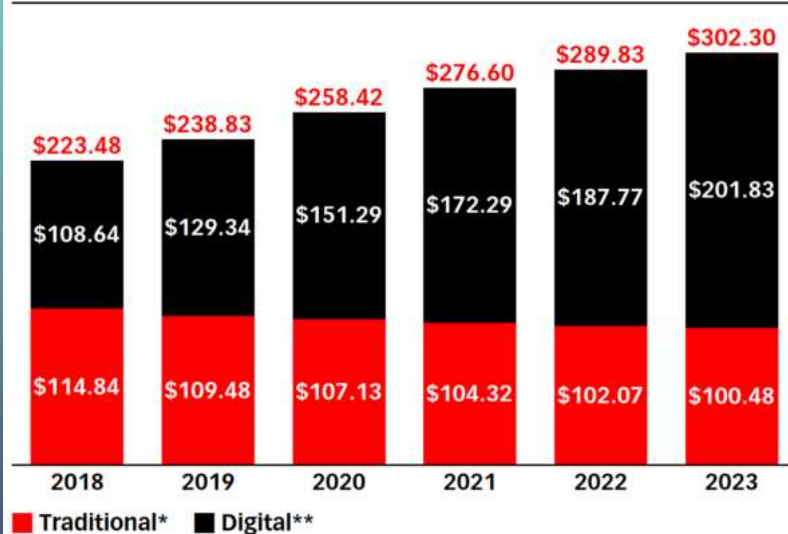
Paid Search

Paying search engines to get traffic

The Growth of Online Ad

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

Paid Search is about 40% of Online AD



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

The background is a teal-to-blue gradient with a white hexagonal grid pattern. The grid consists of interconnected lines forming a series of hexagons, some of which are filled with a lighter shade of teal. The overall aesthetic is clean and modern, typical of a digital marketing or technology presentation.

Paid Search Advertising

About 12,400,000 results (0.68 seconds)

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Paid search

Organic search

Organic Search (SEO)

Less direct control over ranking

Limited control over message

- Message is typically generic / brand driven
- Pulled from code on website

When done well, it can be a very effective method of increasing traffic and leads

High organic rankings have a positive effect on the brand (and vice-versa) 69% of total search clicks are organic

Can be expensive (if outsourced) & time consuming; Not quick process and/or results

Paid Search (PPC)

Can directly influence ranking (based on bid)

Control over message

- Can be more product focused / benefit driven, frequent update

Compensates for inconsistencies in SEO, ensuring consistent placement

High paid rankings have a positive effect on the brand (and vice-versa)

Budgeting opportunity
Immediate results

Example Advertiser

David's Cookies @do

SHOP PRODUCTS ▾ GIFT OCCASIONS ▾ CORPORATE GIFTS

SEARCH THE WEBSITE 🔍

SAVE UP TO 40% ON SELECT ITEMS.

END OF SEASON SALE

SHOP NOW

Holiday Gifts
A sure delight for anyone

Items on Sale!
Shop our holiday sale items

Fresh Baked Cookies
Baked the Day Your Order Ships

Brownies & Crumbcakes
Delicious & Fresh

The screenshot shows the David's Cookies website homepage. At the top is a dark red navigation bar with the David's Cookies logo on the left, three menu items (SHOP PRODUCTS, GIFT OCCASIONS, CORPORATE GIFTS) in the center, and a search bar on the right. Below the navigation bar is a large promotional banner featuring two large chocolate chip cookies on a wooden surface. The banner text reads 'SAVE UP TO 40% ON SELECT ITEMS.' on the left, 'END OF SEASON SALE' in the center, and 'SHOP NOW' in large white letters at the bottom. Below the banner is a grid of eight product category tiles, each with a small image and a title with a brief description. The categories are: Holiday Gifts (A sure delight for anyone), Items on Sale! (Shop our holiday sale items), Fresh Baked Cookies (Baked the Day Your Order Ships), Brownies & Crumbcakes (Delicious & Fresh), and four other categories partially visible at the bottom.

office gift baskets

All Shopping Images News Maps More Settings Tools

About 284,000,000 results (0.93 seconds)

Corporate Gifting Made Easy | Crowd-Pleasing Desserts

Ad www.davidscookies.com/ (800) 500-2800

Custom Logo Stickers & Cards. Choose A Gift & Customization Options. We'll Do the Rest. In a Rush? Provide A Recipient List & We'll Handle Shipping. Arrives in 2 Days or Less.

Cookie of the Month Club

Large Variety of Fresh, Homemade Cookies Delivered to You Monthly.

Cookie Gift Baskets

Unique Collection of Our Delicious Cookies Starting at Only \$39.35!

Olive & Cocoa | Office Gift Baskets | Custom Logo Branding

Ad www.oliveandcocoa.com/ (800) 538-5404

Our Gifts Are Gracefully Packaged Inside Handcrafted Wood Boxes.

Godiva® Corporate Gift Baskets | Chocolates For Self Or Gift

Ad www.godiva.com/Chocolate_Gifts (800) 946-3482

Godiva Corporate Gift Baskets Are The Best Gift Option For Any Office. Order Today! Godiva...

Williams Sonoma® Gift Baskets | Free Shipping On Orders \$49+

Ad www.williams-sonoma.com/Gift-Baskets

Shop Premium Gift Baskets For All Occasions. Exclusively at Williams Sonoma®.



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 auction

Google runs an auction for every search on real time.

Advertisers only pay when a user clicks (not for display ads!)
Paid search auctions are based on a “**Generalized Second Price**”
auction.

Because you pay the next highest, or the second highest bid - get it?



Second-Price Auction

Suppose that we have three bidders for the keyword “office gift basket”, A, B and C.

A bids \$4, B bids \$5, C bids \$3.

B wins the auction because her bid is the highest ($\$5 > \4 and $\$3$).

However, B only pays Google \$4 (the second highest bid, \$5 is the first highest, \$4 is the second highest, \$3 is the third highest bid).

Why not First-Price Auctions?

In first prize auction, people pay the prize they bid.

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

Why not First-Price Auctions?

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A	\$0.50	3	\$0.50
C	\$0.40	4	\$0.40

In this example, D wins the bid and pays \$1 (CPC means “cost per click”).
Advertiser games the system.

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

Second Price Auction

Winner pays $CPC = \text{next highest bid}$

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

In this example, D already 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 will lose the auction.

Second Price Auction



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



Let's guess

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





Let's guess

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

It is *insurance*.





Let's guess

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

It is insurance.

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





Let's guess

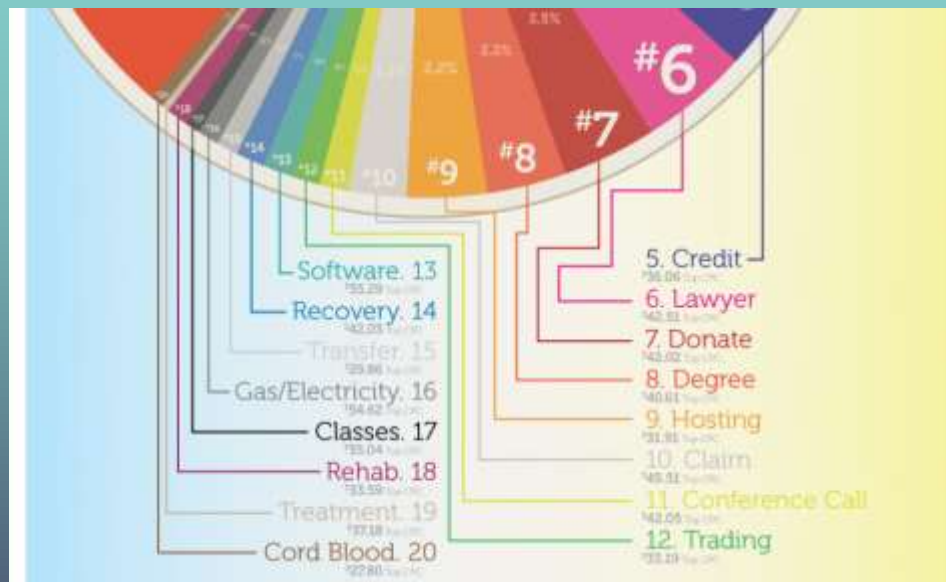
What is the most expensive keyword in Google's search advertising?

It is insurance.

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

It is \$54.91.





Quality Matters!

Quality score affects eligibility to compete in auction, likelihood of winning auction, and the actual amount paid per click. Three main dimensions to improve Quality Score:

Click-through rate

- Identify keywords with low Quality Score, and may be worthwhile pausing or deleting them
- Low scores bring down the overall ad group quality

Ad Relevancy

- Make keyword matches more restrictive
- Build negative keyword list to filter irrelevant search queries

Landing page

- Why does Google care about the landing page quality?

Quality Matters!

Keyword: **internet provider**

Showing ads right now?

Yes

Quality score [Learn more](#)

10/10

Expected clickthrough rate: **Average**

Ad relevance: **Average**

Landing page experience: **Average**

[Ad Preview and Diagnosis](#)

Generalized second-price auction with quality score

Currently used by Google and Bing

Position determined by **ad rank = bids × quality score**

CPC = the next guy's ad rank / own quality score + a bid increment

Advertiser	Bid	Quality Score	Ad Rank	Position	Actual CPC
A	\$0.50	10	5.0	1	$4.5/10 + .01 = \$0.46$
B	\$0.75	6	4.5	2	$3.2/6 + .01 = \$0.54$
C	\$0.40	8	3.2	3	$2.0/8 + .01 = \$0.26$
D	\$1.00	2	2.0	4	$0/2 + .01 = \$0.01$

Why Auctions?

Why a “generalized second price (GSP) auction weighted by quality”?

Auctions are efficient in that they extract more revenue from higher value words

They allow price discrimination without the auctioneer (Google) needing to determine willingness to pay

Auctions are scalable, across words and time

If a word suddenly becomes valuable, the auction can pick that up

Exercise

Example: You won the AdWords auction. Your keyword (e.g., organic pet food) has a max CPC bid of \$0.75 and a Quality Score of 9. The advertiser in second place has an Ad Rank of 6.3. Suppose an expert has offered to improve your website so that your Quality Score goes up to 10. Suppose the number of clicks will be 1,000. How much are you willing to pay the expert?

Exercise

Example: You won the AdWords auction. Your keyword (e.g., organic pet food) has a max CPC bid of \$0.75 and a Quality Score of 9. The advertiser in second place has an Ad Rank of 6.3. Suppose an expert has offered to improve your website so that your Quality Score goes up to 10. Suppose the number of clicks will be 1,000. How much are you willing to pay the expert?

Initial CPC: $6.3/9 + 0.01 = 0.71$

Improved CPC: $6.3/10 + 0.01 = 0.64$

So, you save $0.71 - 0.64 = 0.07$ on each click. Because you have 1,000 clicks, you will save \$70. Therefore, you are willing to pay the expert up to \$70.



Summary

Search engine runs an auction for every search.

Advertisers only pay when a user clicks (pay-per-click).

Paid search auctions are based on a “Generalized Second-Price” auction, because you pay the next highest bid

Many refinements such as “quality score”.

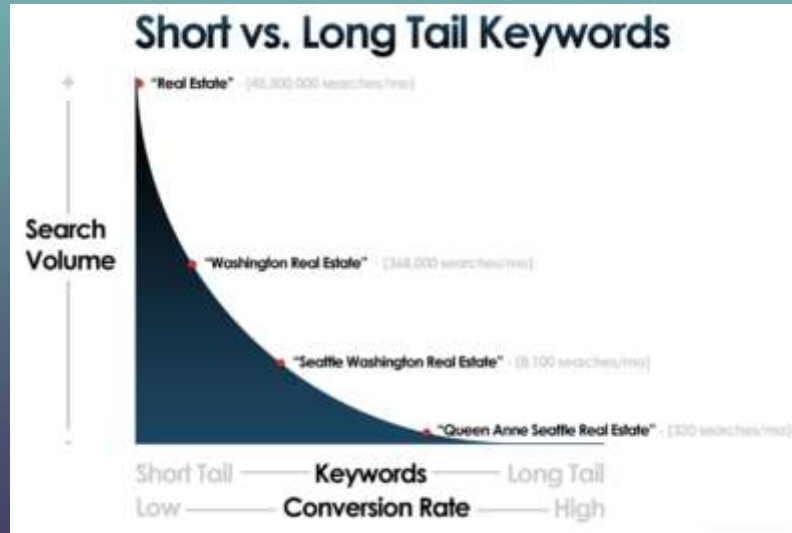




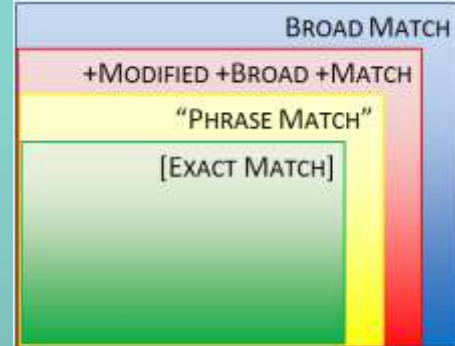
Keywords

Long Tail of Keywords

Most Search Queries Are Unique: you have to bid on lots of keywords



Five Types of Keyword Matches



Match type	Special symbol	Example keyword	Ads may show on searches that	Example searches
Broad match	none	women's hats	include misspellings, synonyms, related searches, and other relevant variations	<i>buy ladies hats</i>
Broad match modifier	+keyword	+women's +hats	contain the modified term (or close variations, but not synonyms), in any order	<i>hats for women</i>
Phrase match	"keyword"	"women's hats"	are a phrase, and close variations of that phrase	<i>buy women's hats</i>
Exact match	[keyword]	[women's hats]	are an exact term and close variations of that exact term	<i>women's hats</i>
Negative match	-keyword	-women	are searches without the term	<i>baseball hats</i>

Broad Match

Default match type.

Display ads if searcher's query matches the keyword exactly, on variations like singular and plural, stemming, misspellings, as well as related words.

For example, custom made shoes can trigger ads on search queries like:

custom made shoes

shoes custom-made

castom made shoes

Broad Match Modifier

Restricts Google's expanded match capabilities

Select some or all of the words in the keyword you'd like to restrict by adding a plus symbol (+) before each selected word

For example, the keyword +University +Hong Kong +jobs can trigger ads on search queries like:

University of Hong Kong jobs

University of HK job

Hong Kong University jobs

HKU jobs

Phrase Match

Can apply to single-word or multi-word keyword by enclosing it in quotes
For example, keyword “silk curtain” could trigger ads on search queries like:

silk curtain

silk curtains

silky curtain

want to buy silk curtains

buy silky curtains for stage

But, keyword “silk curtain” would not trigger ads on search queries like:

silk for curtain

curtain silk

silk kitchen curtain

silk shade

Exact Match

Most restrictive option

Can be applied to single word or phrase by enclosing it in square brackets
For example, keyword [broadway plays] can trigger ads on search queries like:

- broadway play
- braodway play
- braodway plays

But keyword [broadway plays] would not trigger ads on search queries like:

- broadway plays today
- nyc plays
- play broadway



Negative Keywords

A negative keyword is a single word or a phrase prefaced by a single minus symbol.

For example, there are two places called Washington: Washington DC and the Washington State. You can use – DC to filter queries on Washington DC.



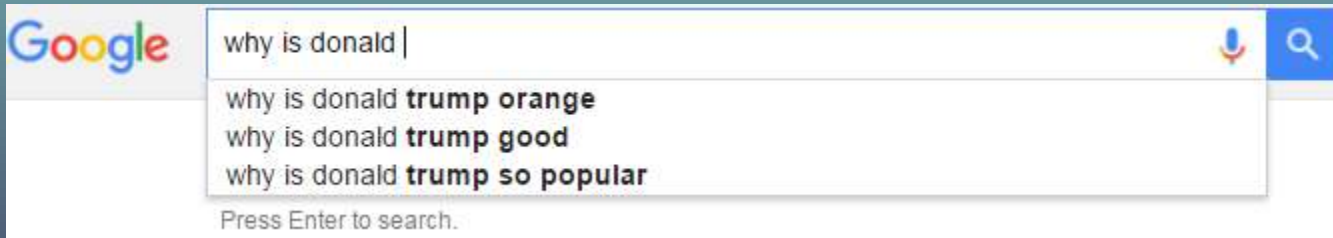


Keyword

Match Types

Developing Your Keyword List

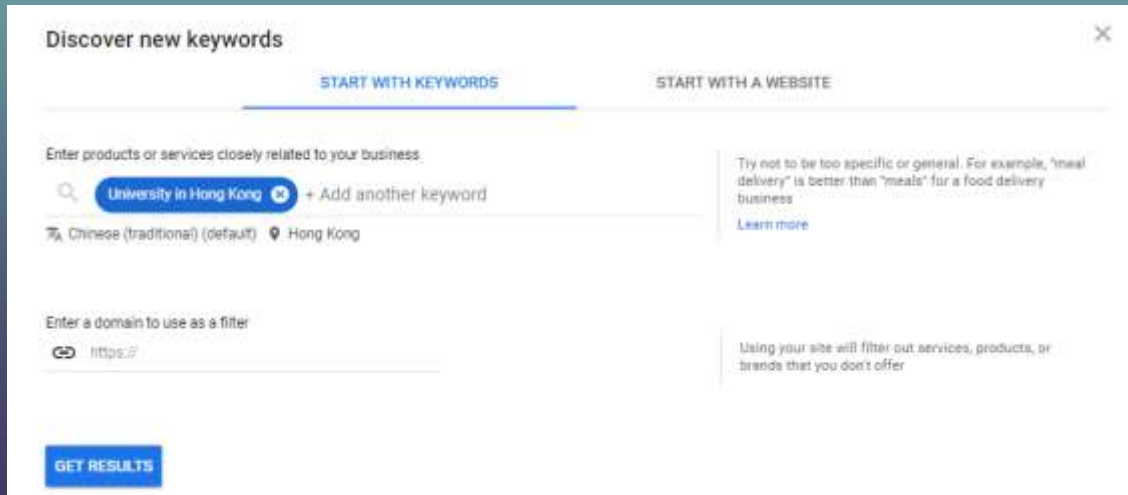
Key is to figure out how potential customers are searching for your product
Play with Google's auto-complete feature



Developing Your Keyword List

Key is to figure out how potential customers are searching for your product
Play with Google's auto-complete feature

Google's Keyword planner tool



The image shows a screenshot of the Google Keyword Planner tool interface. The window title is "Discover new keywords" with a close button (X) in the top right corner. There are two tabs: "START WITH KEYWORDS" (which is active) and "START WITH A WEBSITE".

Under the "START WITH KEYWORDS" tab, there is a text input field with the placeholder "Enter products or services closely related to your business." The input field contains "University in Hong Kong" and a search icon. To the right of the input field is a "+ Add another keyword" button. Below the input field, there are filters for "Chinese (traditional) (default)" and "Hong Kong".

Under the "START WITH A WEBSITE" tab, there is a text input field with the placeholder "Enter a domain to use as a filter." The input field contains "https://".

At the bottom left, there is a blue button labeled "GET RESULTS".

On the right side of the interface, there are two informational boxes:

- The first box says: "Try not to be too specific or general. For example, 'meal delivery' is better than 'meals' for a food delivery business." Below this text is a "Learn more" link.
- The second box says: "Using your site will filter out services, products, or brands that you don't offer."

Developing Your Keyword List

Key is to figure out how potential customers are searching for your product

Play with C

Google's K

Analyzing

Tools:

Top Keywords

Rank	Term	SEO Clicks Per Month
54	finance major reddit	0
40	hk business	0.05
36	execed	0.56
29	www.bm	0.56
9	hong kong university of science and technology	31.1

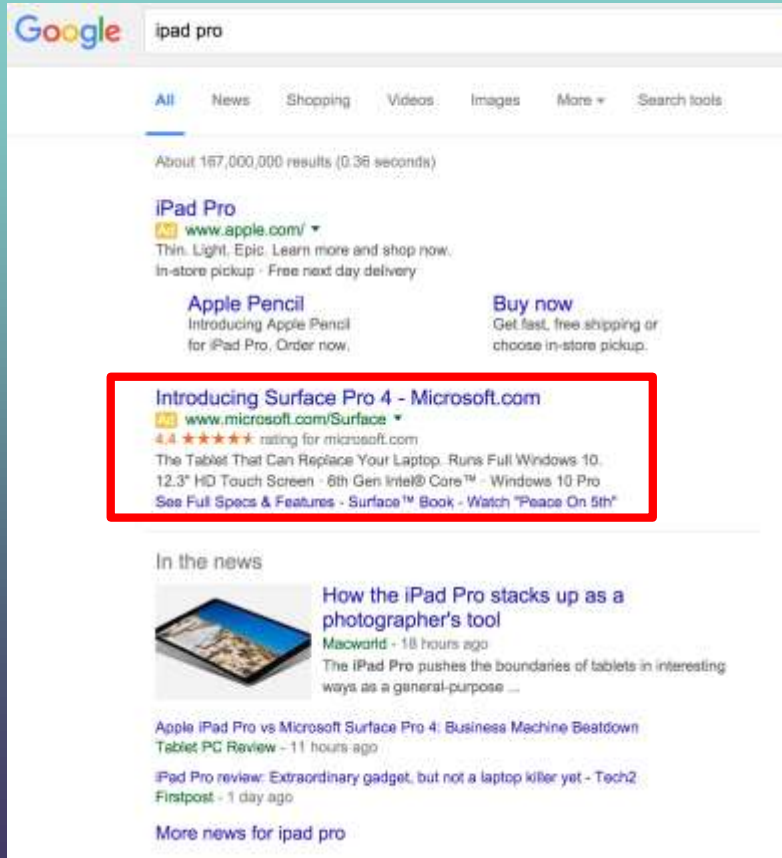
VIEW ALL ORGANIC KEYWORDS >

dSpy.com

Analysis of
<https://www.bm.ust.hk/>

Buy Your Competitor's Keywords

Smaller share brands tend to poach the larger share brands



The image shows a Google search results page for the keyword "ipad pro". The search bar at the top contains "ipad pro" and the Google logo. Below the search bar are navigation tabs for "All", "News", "Shopping", "Videos", "Images", "More", and "Search tools". The search results indicate "About 167,000,000 results (0.38 seconds)".

The top result is for "iPad Pro" from Apple, with a link to "www.apple.com/". Below this are two promotional cards: "Apple Pencil" and "Buy now".

The second result, which is highlighted with a red rectangular box, is "Introducing Surface Pro 4 - Microsoft.com". This result includes a link to "www.microsoft.com/Surface", a 4.4-star rating, and a snippet of text: "The Tablet That Can Replace Your Laptop. Runs Full Windows 10. 12.3\" HD Touch Screen - 5th Gen Intel® Core™ - Windows 10 Pro. See Full Specs & Features - Surface™ Book - Watch 'Peace On 5th'".

Below the search results is a section titled "In the news" with a sub-heading "How the iPad Pro stacks up as a photographer's tool" from Macworld, dated 18 hours ago. Other news items include "Apple iPad Pro vs Microsoft Surface Pro 4: Business Machine Beatdown Tablet PC Review" (11 hours ago) and "iPad Pro review: Extraordinary gadget, but not a laptop killer yet" (1 day ago).

Targeting Options other than Keywords

Language

Locations: Country, City, or Zip code

Device & browser

Timing: using Ad Schedule & Bid Adjustment

Example

You run a dog-sled touring business in Alaska, and you have an existing ad group max CPC bid of \$1.00. You've scheduled your ad to show on Tuesdays between 8 and 11 a.m. You decide to set a bid adjustment of +10% on Tuesdays between 8 and 10 a.m. So, your maximum bid for that time period would be $\$1.00 \times (+10\%) = \1.10 .

Because many of the customers that love your dog-sled tours live in Anchorage, you decide to set an additional +20% adjustment for Anchorage. Your maximum resulting bid for a search that occurs on Tuesdays at 9:30 a.m. for a customer in Anchorage will be \$1.32. Here's how it works:

Starting bid: \$1.00

Tuesdays, 8 to 10 a.m. adjustment: $\$1.00 \times (+10\%) = \1.10

Anchorage adjustment: $\$1.10 \times (+20\%) = \1.32

Maximum bid for Tuesdays, 8 to 10 a.m., in Anchorage: \$1.32



Takeaways

Understand the **buying process** of paid search ads

Different types of **keyword match**

Broad, broad modifier, phrase, exact, negative

Keyword tools are commonly used to gain competitive insights



Measurability

“I know half my advertising is wasted,
I just don't know which half”
--- John Wanamaker





How do we measure the effectiveness of online ads?

How do we measure the effects of online 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



Impression

Impression: A user loads 1 ad on a website

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. $CTR = \text{Clicks} / \text{Impressions}$

Correlation between CTR & ad effectiveness (AdFX) is debatable

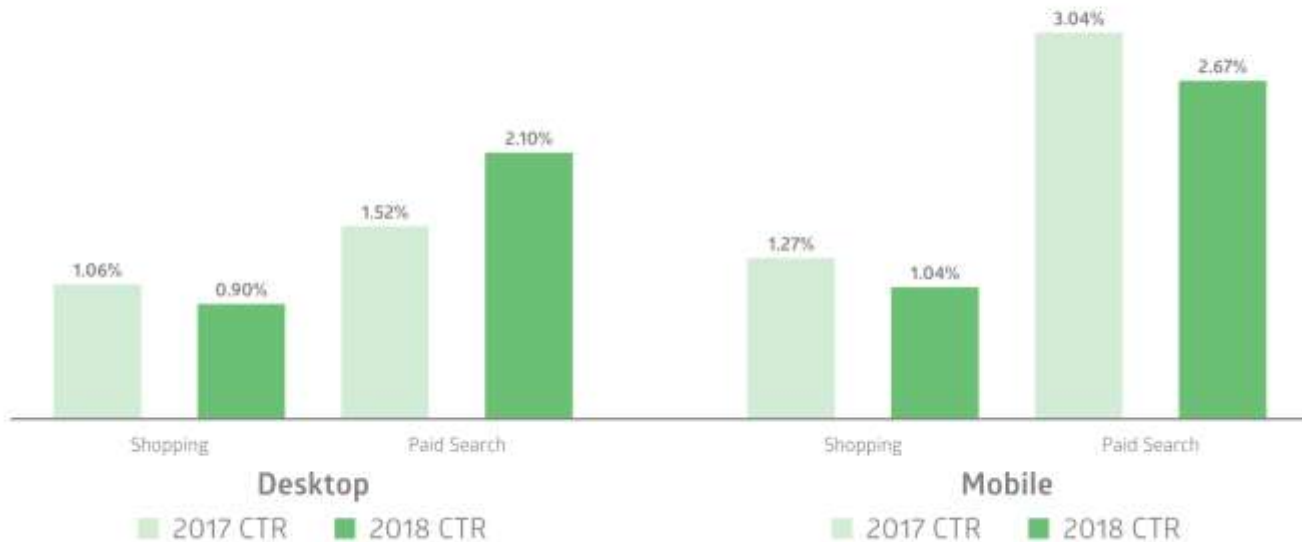
E.g. Does a higher CTR on mobile mean higher mobile AdFX?

Ads are smaller, but fill more of the screen

Up to 50% of clicks on mobile banner ads are accidental (GoldSpot Media)

Clicks

Click-Through Rate in Google Shopping and Google Paid Search
By Device 2017-2018



Source - Sidecar-2019 Benchmarks Report: Google Ads in Retail

**Sometimes clicks are unreliable... Firms might even engage
in click fraud**



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

Twitter: RT, Favorite

Intentional measure showing whether consumer likes ad more than just clicks

Engagement



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. $CR = \text{Conversions} / \text{Clicks}$

Probability of Purchase = CTR x CR, here purchase is broadly defined.




Conversions: Pros and Cons

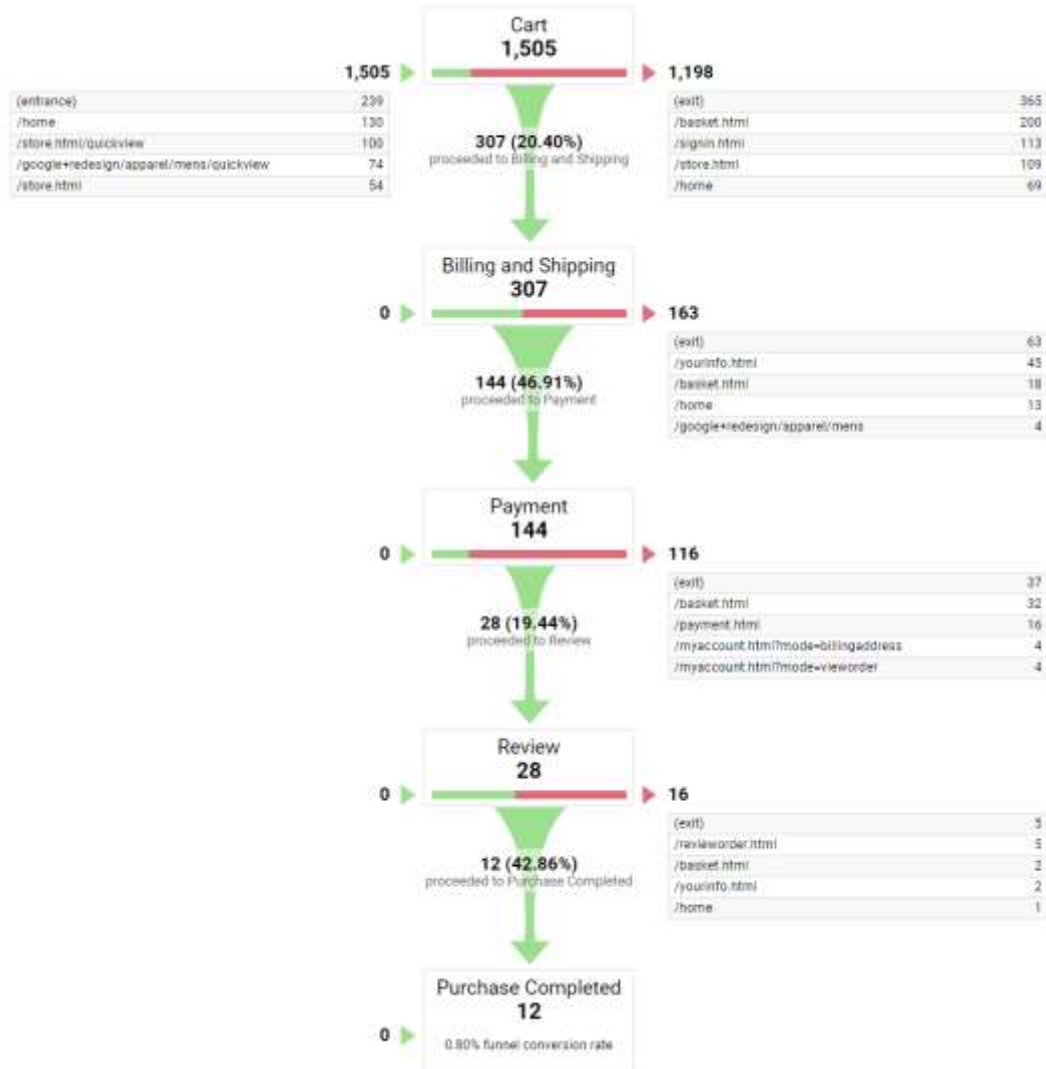
(+) Some direct response advertisers only need conversion info (like app makers & downloads)

(+) 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



- Conversions
- Goals
 - Overview
 - Goal URLs
 - Reverse Goal Path
 - Funnel Visualization**
 - Goal Flow
 - Smart Goals



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 = $CTR \times CR$

Revenue = Prob. of purchase \times Profit margin per purchase \times Impressions

Cost = $\# \text{Clicks} \times \text{CPC}$, where $\# \text{Clicks} = \text{Impression} \times \text{CTR}$

Net Revenue = Revenue – Cost

Return on Investment (ROI) = Net Revenue / Cost



Reminder

In next lecture we will be working on the data project.

Please bring your laptop with you (with R/Tableau installed).

