The Practice of Design in the Age of Analytics

Daniel M. Russell, Google
Search quality & User Happiness

My goal…

- … is to make your experience better
- … to make you smarter, more capable, wiser

- How can we get there?
  - Integrate the beauty of analytical data with hardnosed design

- I am not the hardcore hammerheaded Harpy of analytics over design.
- I am a pragmatist.
- I just want to make the experience better.

insights

- Intuitions are terrible.
- In particular, your intuitions are terrible.
- That's why we do studies.
- Fallacy #1: "I do it this way"
- Fallacy #2: "My Mom does it that way"
- Deep truth: you are statistically insignificant
- Deeper truth: you're a couple sigma away from the norm
- … so are your friends

Our intuitions fail us…

- No matter what *Blink* claims, our intuitions about web-app design suck...

- Here's why:
  - Confirmation bias
  - Sampling bias
  - "Natural statistics" errors
  - Sample sizes too small
  - … many other causes…

  - **Invisibility of aggregated end-user behaviors**

Why do all analysis?

- To understand what our searchers are doing…
  - *Trials and tribulations*
  - *Emotional reactions—both positive and negative*
  - *Root factors driving behaviors*
  - *In situ understanding of intent*
  - *Mental models of what they're doing…*
  - *… and whether or not they're happy with what Google does*

Multiple views of data

- **Micro:** ***lowest level details—milliseconds***
- **Meso:** ***mid-level observations—minutes to days***
- **Macro:** ***millions of observations—days to months***

How we approach the problem

❶ Eyetracking studies

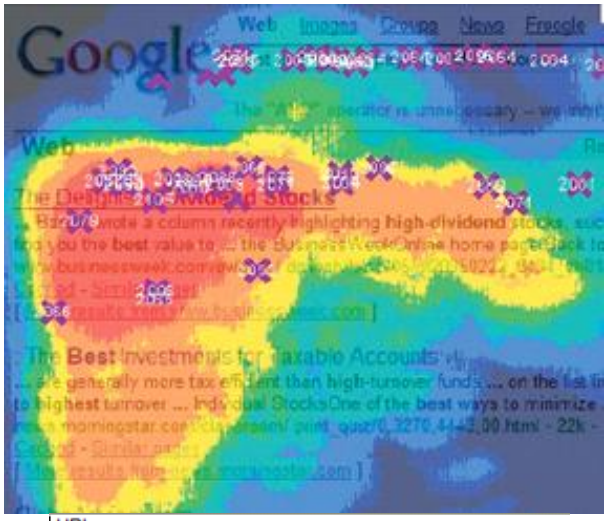
Studies in the microscopic

❷ Field studies

Getting out to see what meso-reality is

❸ Sessions analysis

What are people doing macro in logs, bring outside behavior back to where we can see the signals



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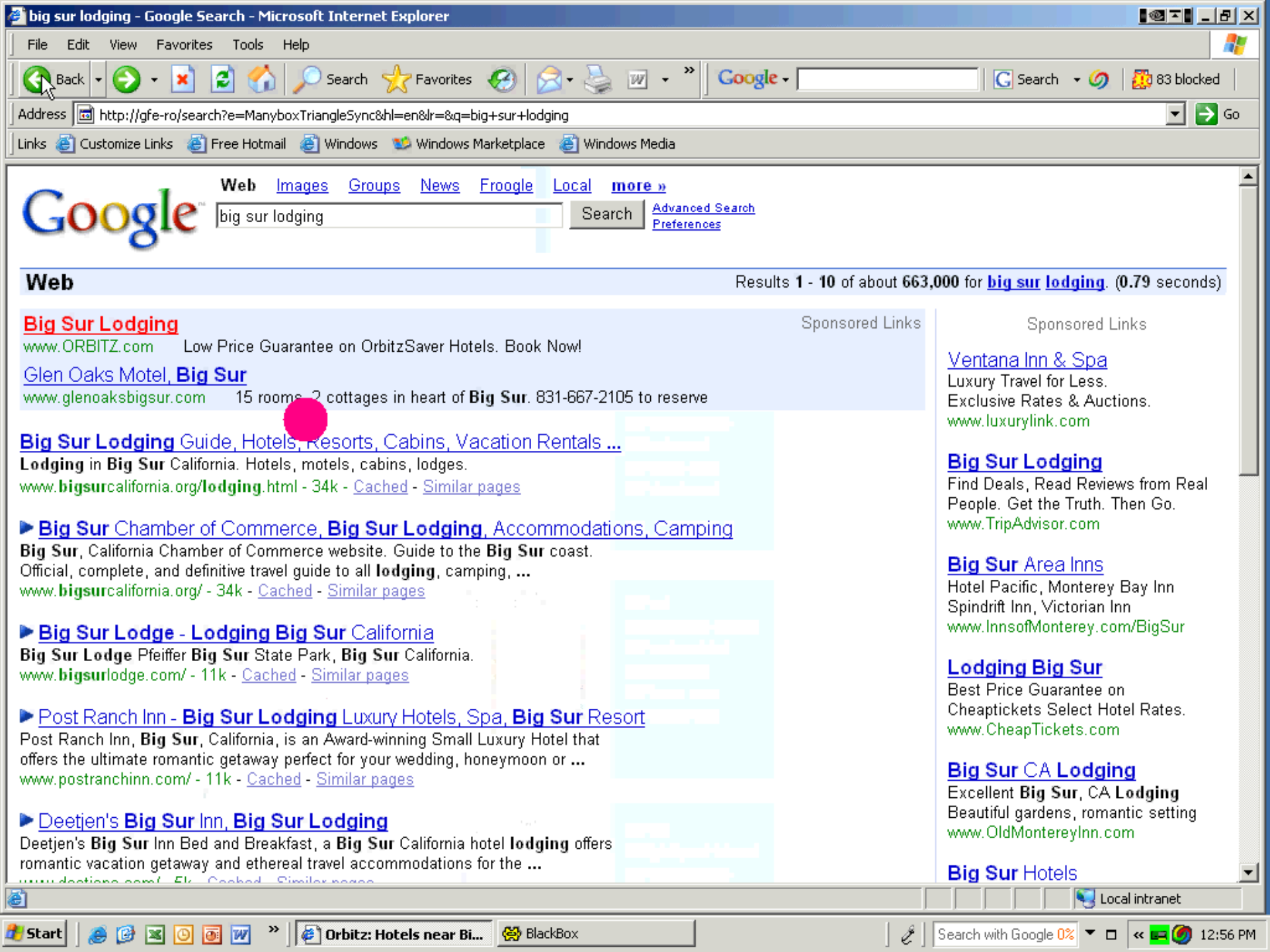
❶ Eyetracking & usability studies at Google

~10-20 / week – typically 3 – 5 observers

- Testing new, specific features of UI

- **Typical studies:**
  - How users perceive a UI change
  - Eyetracking to get at deeper understanding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Big Sur CA Lodging
Excellent Big Sur, CA Lodging
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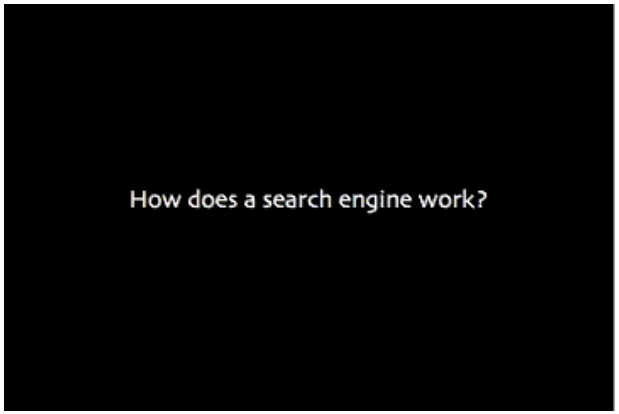
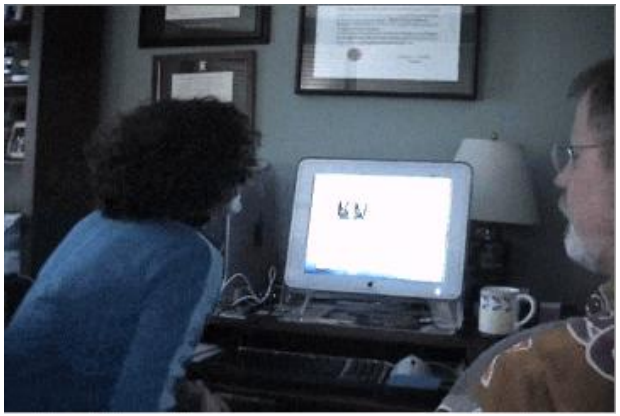
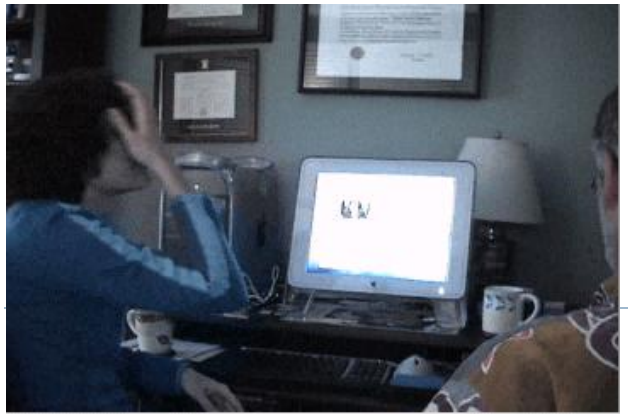
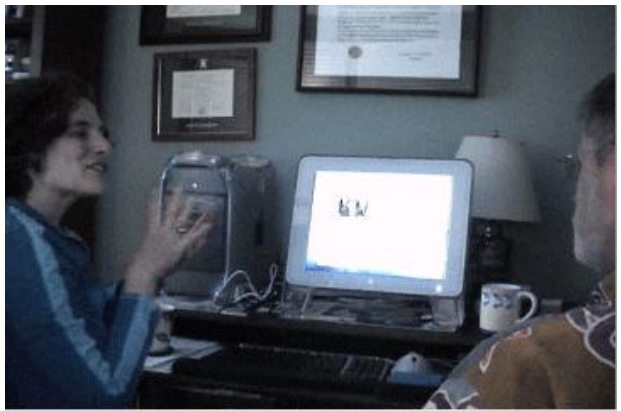
❷ Lies, Truth & Videotape — Field studies

- Interviews held *in situ*…
  - Workplace, home, coffee shop ….any place… must be search-place
  - Place + context cueing effects
  - Interested in natural use phenomena (ads, distractions, multiple tasks…)









00:12 [actor most oscars]

1:15 [actor most oscars Academy]

00:10 So this is celebrity with most Oscars…

00:11 Actor… ah… most…

00:13 I'm just going to try that…most Oscars… don't know…

00:19 (reading) "News results for 'actors most Oscars' … huh..

00:25 Oh, then that would be currently "Brokeback"… "prior voices"… "truth in Oscar's relevance"…

00:32 …now I know…

00:35 … you get a lot of weird things..hold on…

00:38 "Are Filipinos ready for gay flicks?"

00:40 How does that have to do with what I just….did…?

00:43 Ummm…

00:44 So that's where you can get surprised… you're like, where is this… how does this relate…umm…

00:45 Bond…I would think…

00:46 So I don't know, it's interesting…

01:08 **Dan**: Did you realize you were in the News section?

01:09 Oh, no I didn't. How did I get that? . . .

01:10 Oooh… no I didn't.

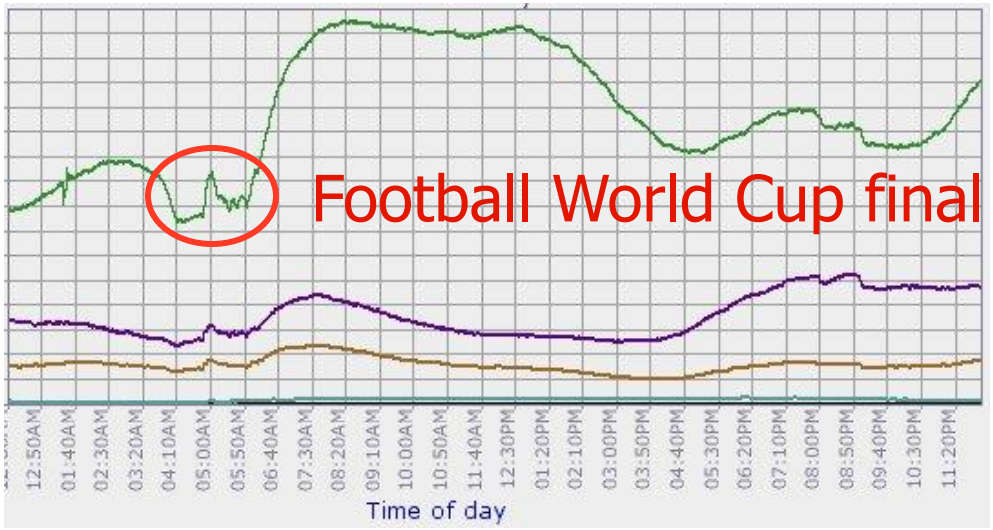
❸ Understanding the behavior of the many

- **We have a lot of data: many TB weekly in logs**
- **How to analyze it?**
- **How does this drive design?**
  - **When we run experiments, what's the effect?**

What is the world thinking today?

A regular Sunday:

A special Sunday:



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What e.g., cafes

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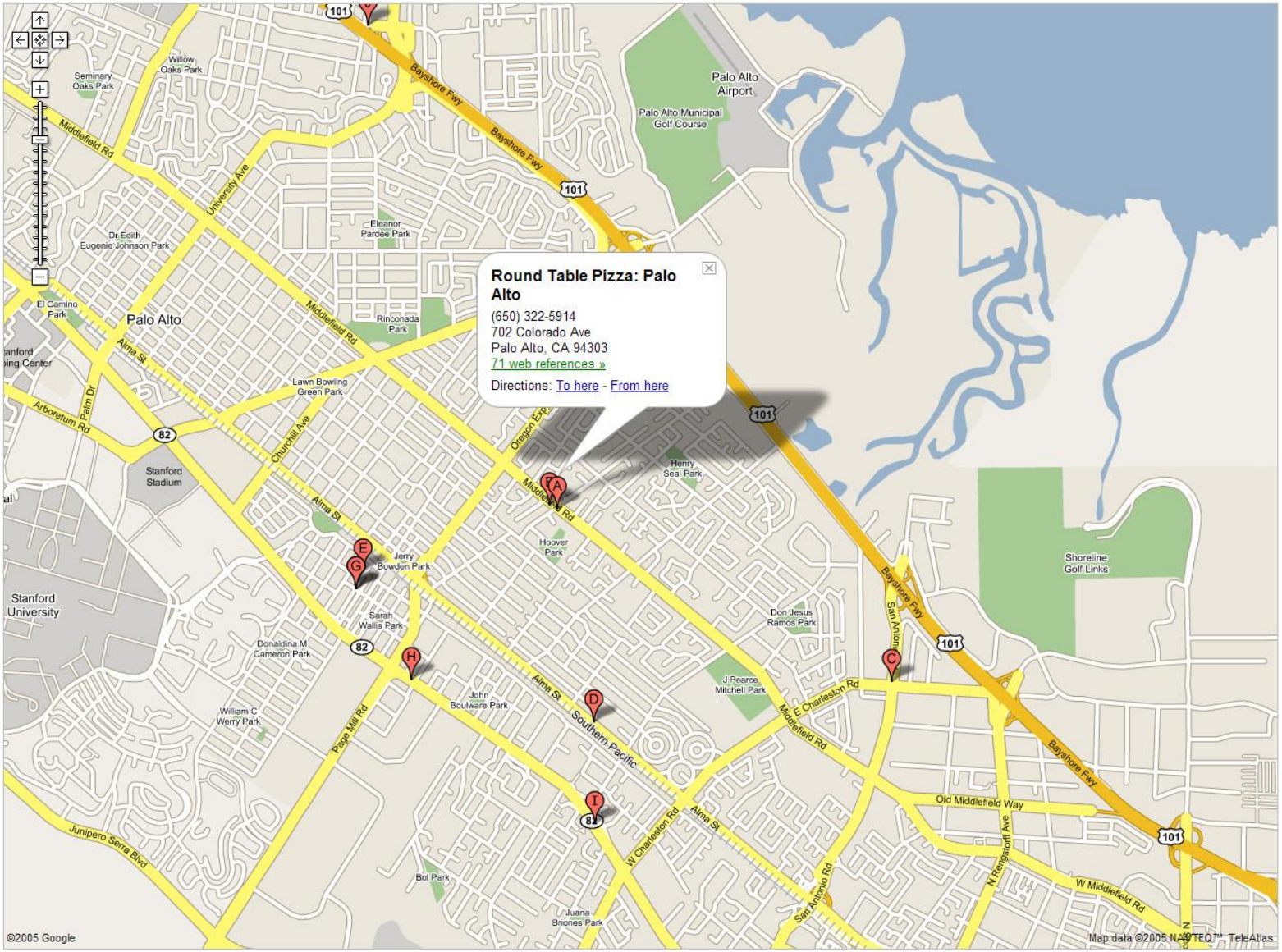

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A Round Table **Pizza**: Palo Alto
(650) 322-5914 - 0.9 mi SW

B Papa Murphy's Take 'n' Bake **Pizza**
(650) 328-5200 - 1.0 mi SW

C **Pizza** Hut-Kfc
(650) 494-7882 - 1.4 mi SE

D Fandango **Pizza**
(650) 494-2928 - 1.5 mi SW

E Domino's **Pizza**
(650) 326-6552 - 1.8 mi SW

F Ramona's **Pizza**
(650) 322-2181 - 1.9 mi SW

G Ramona's Restaurant
(650) 326-2220 - 1.9 mi SW

H **Pizza** Hut
(650) 324-4500 - 1.9 mi SW

I Chicago Pizz'a Pizz'a Chicago
(650) 424-9400 - 1.9 mi S

J Emmanuel **Pizza**
(650) 324-4030 - 2.3 mi NW

Google Local - pizza - Microsoft Internet Explorer

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pizza Search

e.g., "hotels near lax" or "10 market st, san francisco"

Search the map
Find businesses
Get Directions

Local

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Results **1** - **10** of about **44,600** for **pizza**

Categories: Restaurant Pizza, Restaurants

A **Pizz'a Chicago**
4115 El Camino Real, Palo Alto, CA
(650) 424-9400

B **Ramona's Pizza: Delivery & Take Out**
2313 Birch St, Palo Alto, CA
(650) 322-2181

C **Pizza Hut**
1955 W El Camino Real, Mountain View, CA
(650) 960-4000

D **Domino's Pizza**
240 Cambridge Ave # B, Palo Alto, CA
(650) 326-6552

E **Round Pizza Table**
405 N California Ave, Palo Alto, CA
(650) 322-0111

F **Pizza Hut**
851 San Antonio Ave, Palo Alto, CA
(800) 304-4KFC

G **Round Table Pizza: Palo Alto**
702 Colorado Ave, Palo Alto, CA
(650) 322-5914

H **Tony & Alba's Pizza & Pasta**
619 Escuela Ave, Mountain View, CA
(650) 968-5089

I **Papa Murphy's Take 'n' Bake**
2730 Middlefield Rd, Palo Alto, CA
(650) 328-5200

J **Fandango Pizza**
3407 Alma St, Palo Alto, CA
(650) 494-2928

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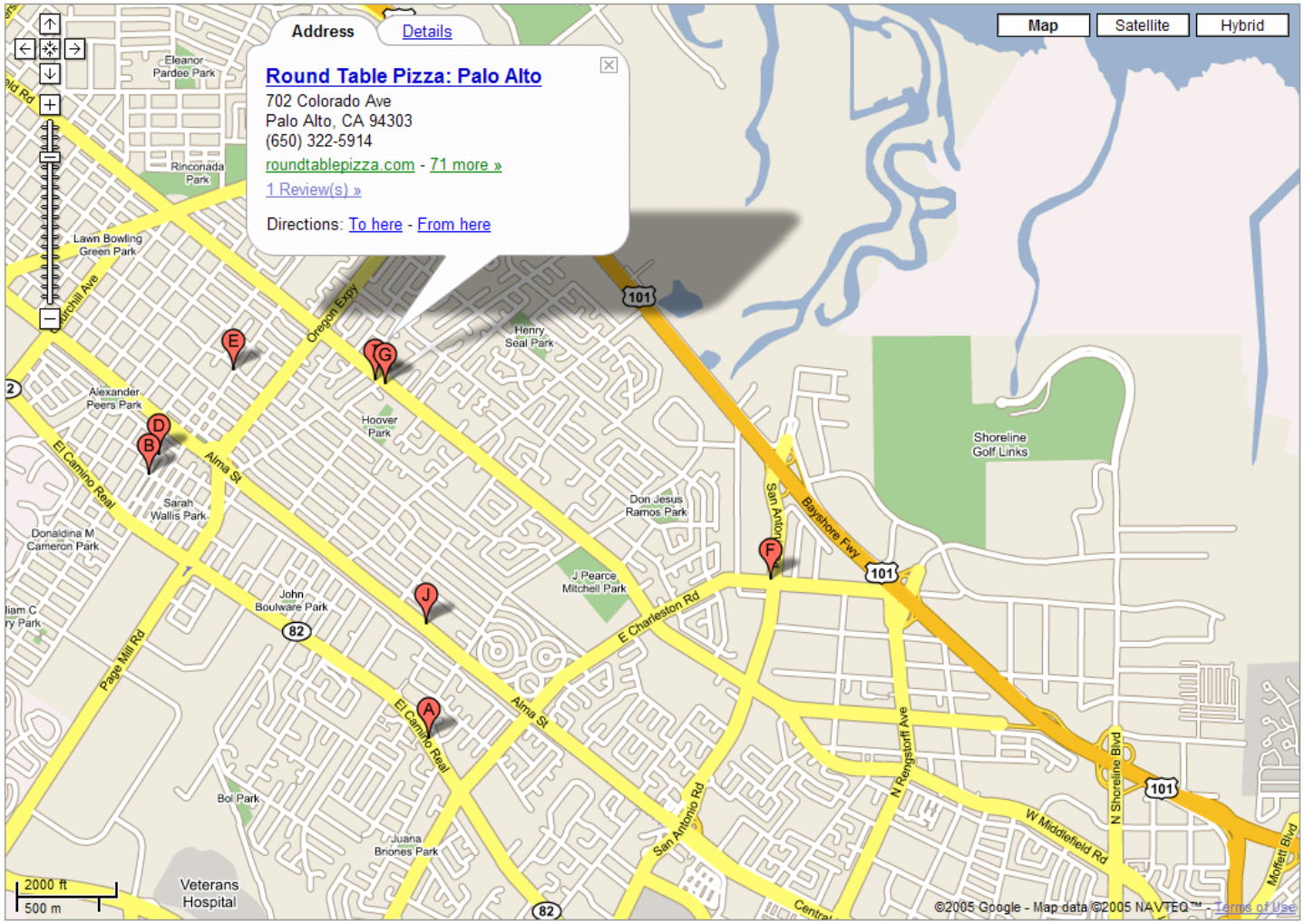
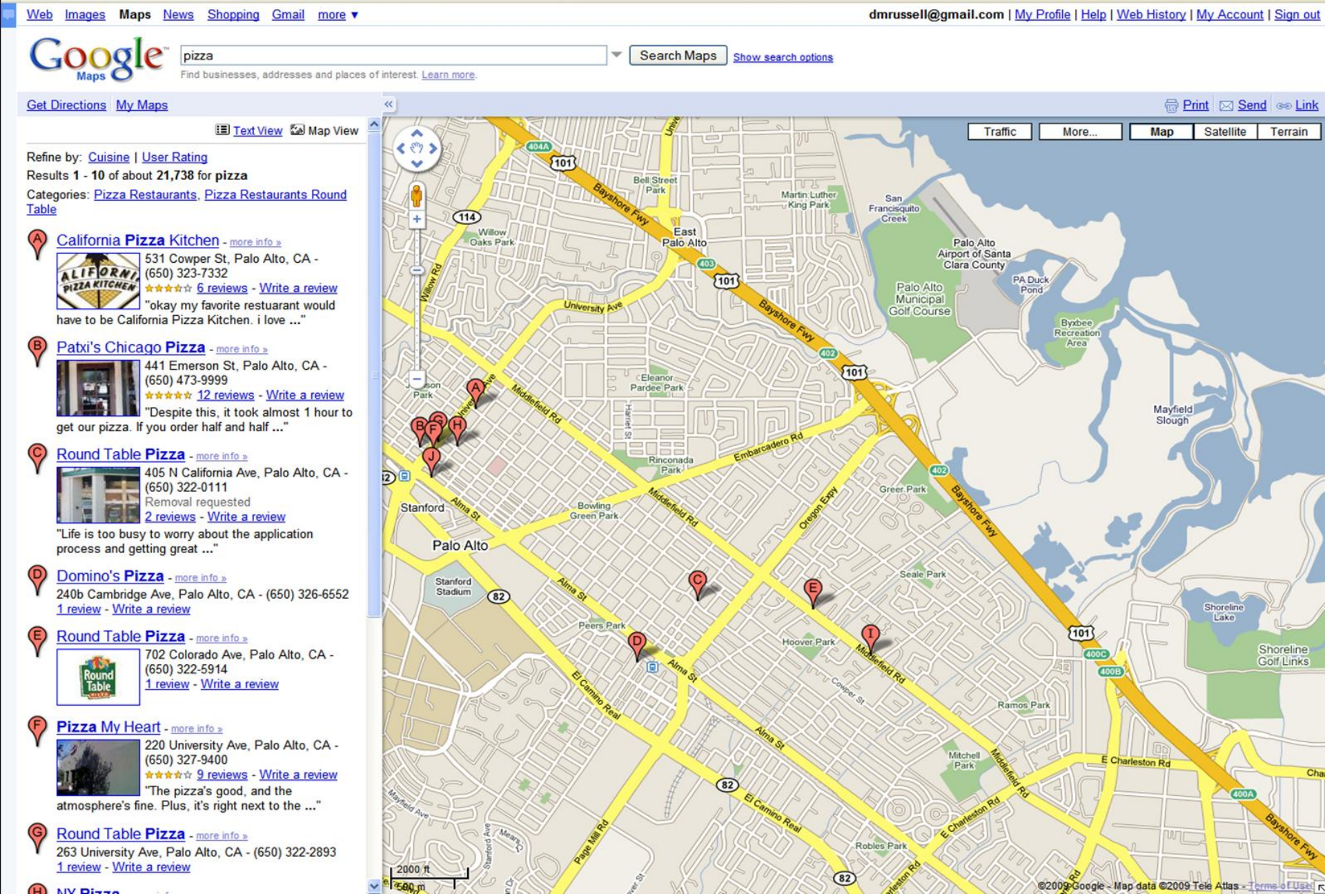


Local intranet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Find businesses, addresses and places of interest. Learn more.
Get Directions My Maps
Print Send Link
Text View Map View
Refine by: Cuisine | User Rating
Results 1 - 10 of about 21,738 for pizza
Categories: Pizza Restaurants, Pizza Restaurants Round Table
A California Pizza Kitchen - more info »
531 Cowper St, Palo Alto, CA - (650) 323-7332
6 reviews - Write a review
"okay my favorite restuarant would have to be California Pizza Kitchen. i love ..."
B Patxi's Chicago Pizza - more info »
441 Emerson St, Palo Alto, CA - (650) 473-9999
12 reviews - Write a review
"Despite this, it took almost 1 hour to get our pizza. If you order half and half ..."
C Round Table Pizza - more info »
405 N California Ave, Palo Alto, CA - (650) 322-0111
Removal requested
2 reviews - Write a review
"Life is too busy to worry about the application process and getting great ..."
D Domino's Pizza - more info »
240b Cambridge Ave, Palo Alto, CA - (650) 326-6552
1 review - Write a review
E Round Table Pizza - more info »
702 Colorado Ave, Palo Alto, CA - (650) 322-5914
1 review - Write a review
F Pizza My Heart - more info »
220 University Ave, Palo Alto, CA - (650) 327-9400
9 reviews - Write a review
"The pizza's good, and the atmosphere's fine. Plus, it's right next to the ..."
G Round Table Pizza - more info »
263 University Ave, Palo Alto, CA - (650) 322-2893
1 review - Write a review
Traffic More... Map Satellite Terrain
Bell Street Park
Martin Luther King Park
San Francisquito Creek
East Palo Alto
Palo Alto Airport of Santa Clara County
PA Duck Pond
Palo Alto Municipal Golf Course
Byxbee Recreation Area
Willow Oaks Park
University Ave
Eleanor Pardee Park
Mayfield Slough
Rinconada Park
Embarcadero Rd
Greer Park
Stanford
Bowling Green Park
Palo Alto
Oregon Expy
Seale Park
Stanford Stadium
Peers Park
Hoover Park
Shoreline Lake
Shoreline Golf Links
Ramos Park
Mitchell Park
Robles Park
Page Mill Rd
El Camino Real
Alma St
Middlefield Rd
Bayshore Fwy
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$10 Papa John's Pizza
Order any Large Specialty **pizza** or
Create your own for just $10!
PapaJohns.com/SpecialtyPizza

A **Round Table Pizza** - more info »
702 Colorado Avenue, Palo Alto, CA - (650) 322-5914
2 reviews
"Rudino's has the best lasagna and the garlic bread that comes with it is ..."

B **Pizz'a Chicago** - more info »

4115 West El Camino Real, Palo Alto, CA - (650) 424-9400
Category: Pizza Restaurant
36 reviews - 1 coupon
"I have never been to Chicago, nor do I intend to anytime soon, so when it ..."

C **Fandango Pizza** - more info »
3163 Middlefield Road, Palo Alto, CA - (650) 494-2928
7 reviews
"We went with my four year old on a Tuesday night. They smiled and talked ..."

D **Domino's Pizza** - more info »

240 Cambridge Avenue, Palo Alto, CA - (650) 326-6552
1 review

E **Ramona's Pizza** - more info »

2313 Birch Street, Palo Alto, CA - (650) 322-2181
6 reviews
"I really like that this restaurant offers whole wheat crusts as an ..."

F **Round Table Pizza** - more info »

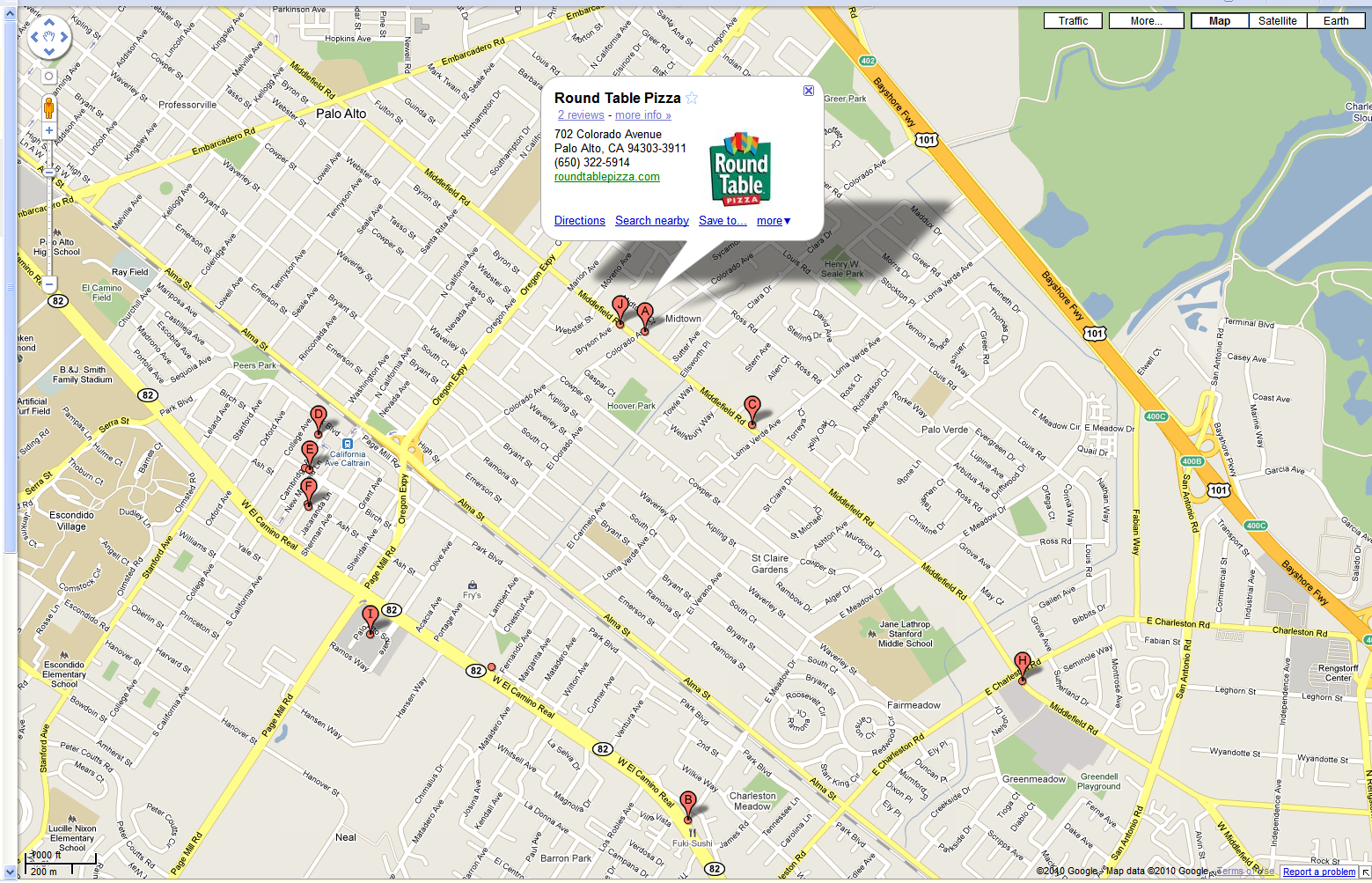
421 S California Ave, Palo Alto, CA - (650) 322-0111
3 reviews
"John and his team at Argonaut Mortgage make getting a home loan or ..."

G **Patxi's Chicago Pizza** - more info »

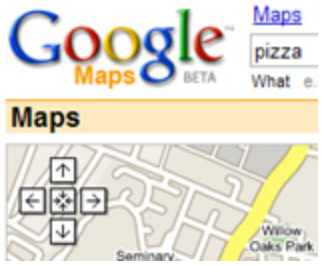
441 Emerson St, Palo Alto, CA - (650) 473-9999
63 reviews
"Arguably a little overdressed but when the dressing's this good it's not ..."

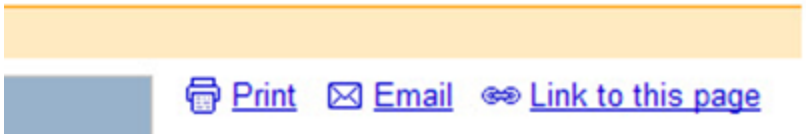
H **Mountain Mike's Pizza** - more info »

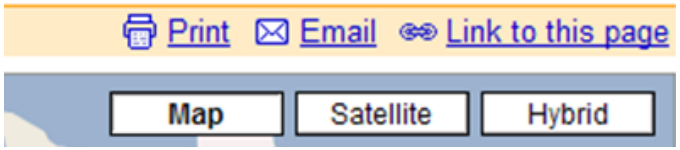
3918-B, Middlefield Road, Palo Alto, CA - (650) 856-7855

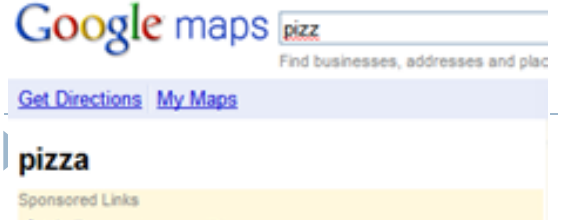


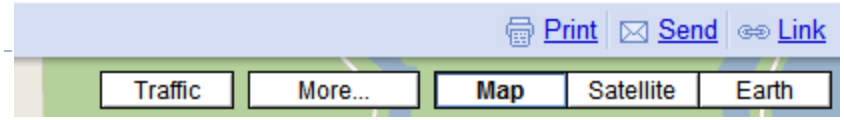
4 years… many changes











In the UX, you live with a lack of knowledge

- Often don't know what caused the effect we see:
  - Was it the UI change?
  - Was it a seasonal effect?
  - Interaction with another experiment?
  - Is it due to content changing? (web content, ads…)
- But with analytics, at least we have a chance!
- But…

Run experiment… then.. .

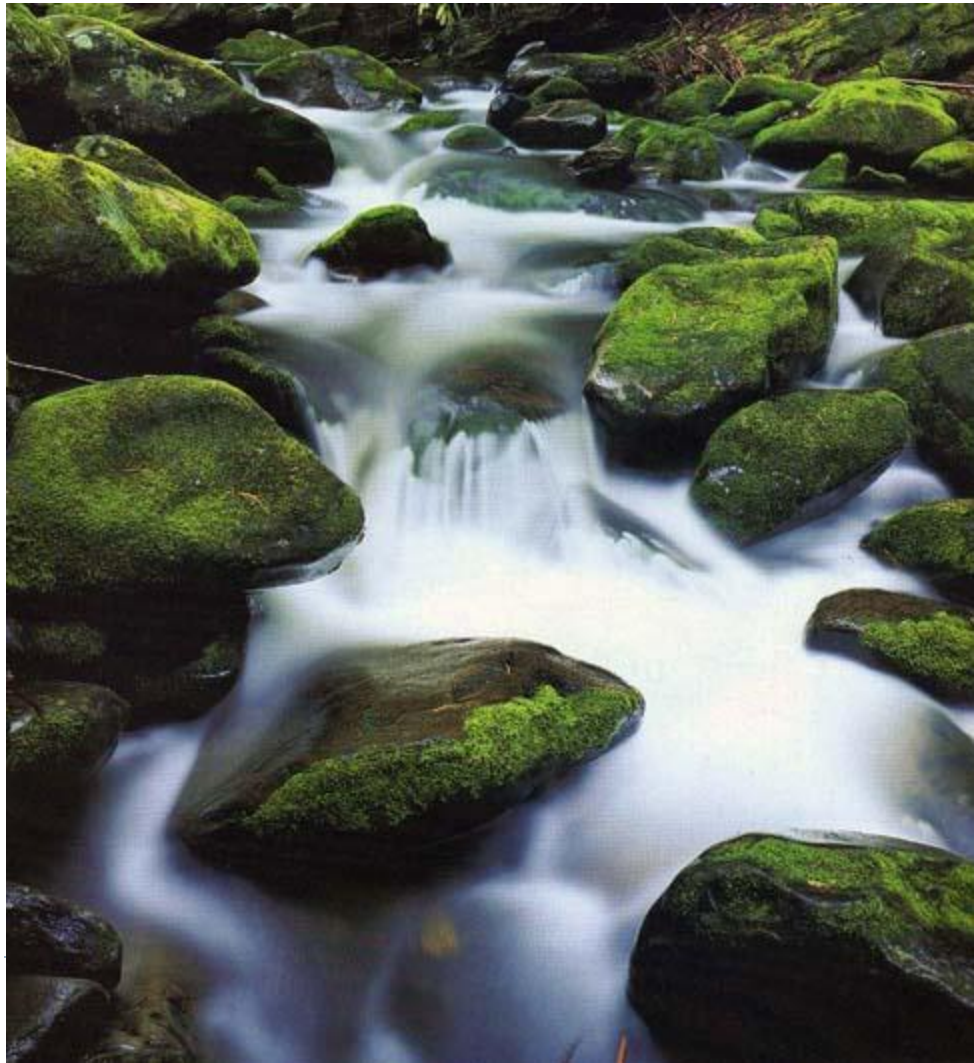
- Some metrics up, some down…
- Things move together, things don't move
- Analytics data interpretation is still far from a science

Sources of lossage

- Cookie churn causes loss of individuals
- Same cookie can represent multiple people
- Each individual can have multiple cookies!
  - How many cookies have you searched with today?
    - (In this crowd, probably 5 or so…)

All the stuff that changes…

- Underlying logging infrastructure changes all the time too
  - Often can't re-run an experiment because the web has changed, the logging has changed, the UI has changed…
  - … so where's your control?



Advanced Search

Advanced Search Tips | About Google

Find results

with **all** of the words
with the **exact phrase**
with **at least one** of the words
without the words

10 results | Google Search

Language	Return pages written in	any language
File Format	Only return results of the file format	any format
Date	Return web pages first seen in the	anytime
Numeric Range	Return web pages containing numbers between and	
Occurrences	Return results where my terms occur	anywhere in the page
Domain	Only return results from the site or domain	e.g. google.com, .org More info
Usage Rights	Return results that are	not filtered by license More info
SafeSearch	No filtering / Filter using SafeSearch	

Page-Specific Search

Similar	Find pages similar to the page	Search e.g. www.google.com/help.html
Links	Find pages that link to the page	Search

Topic-Specific Searches

Google Book Search - Search the full text of books
New! Google Code Search - Search public source code
Google Scholar - Search scholarly papers
Google News archive search - Search historical news

Apple Macintosh - Search for all things Mac
BSD Unix - Search web pages about the BSD operating system
Linux - Search all penguin-friendly pages
Microsoft - Search Microsoft-related pages

U.S. Government - Search all U.S. federal, state and local government sites
Universities - Search a specific school's website

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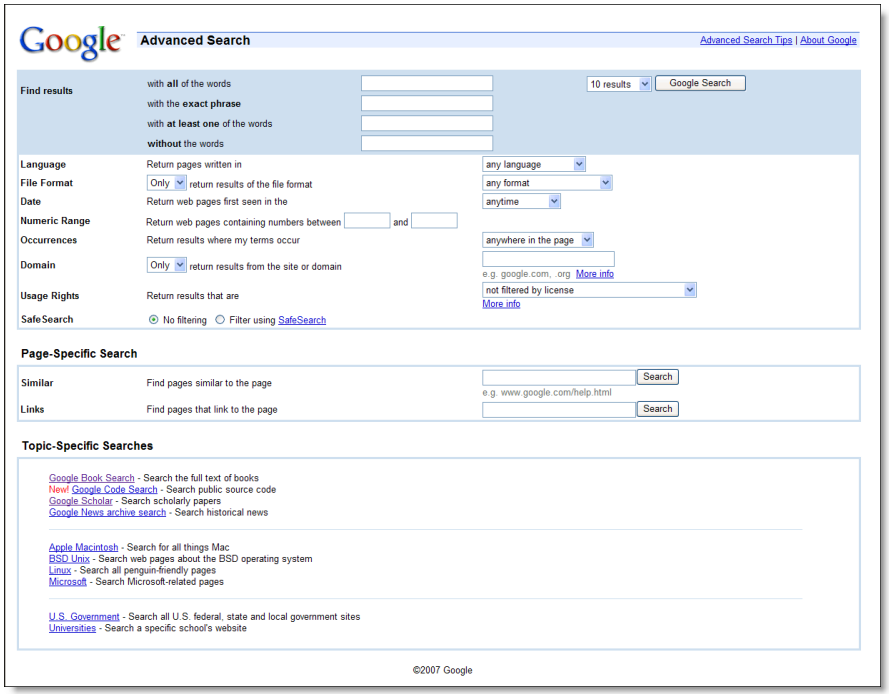
“This scares me…”



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Find results
with **all** of the words — 10 results — Google Search
with the **exact phrase**
with **at least one** of the words
without the words

Language Return pages written in: any language
File Format Only return results of the file format: any format
Date Return web pages first seen in the: anytime
Numeric Range Return web pages containing numbers between ___ and ___
Occurrences Return results where my terms occur: anywhere in the page
Domain Only return results from the site or domain — e.g. google.com, .org More info
Usage Rights Return results that are: not filtered by license — More info
SafeSearch No filtering / Filter using SafeSearch

Page-Specific Search

Similar Find pages similar to the page — Search — e.g. www.google.com/help.html
Links Find pages that link to the page — Search

Topic-Specific Searches

Google Book Search - Search the full text of books
New! Google Code Search - Search public source code
Google Scholar - Search scholarly papers
Google News archive search - Search historical news

Apple Macintosh - Search for all things Mac
BSD Unix - Search web pages about the BSD operating system
Linux - Search all penguin-friendly pages
Microsoft - Search Microsoft-related pages

U.S. Government - Search all U.S. federal, state and local government sites
Universities - Search a specific school's website

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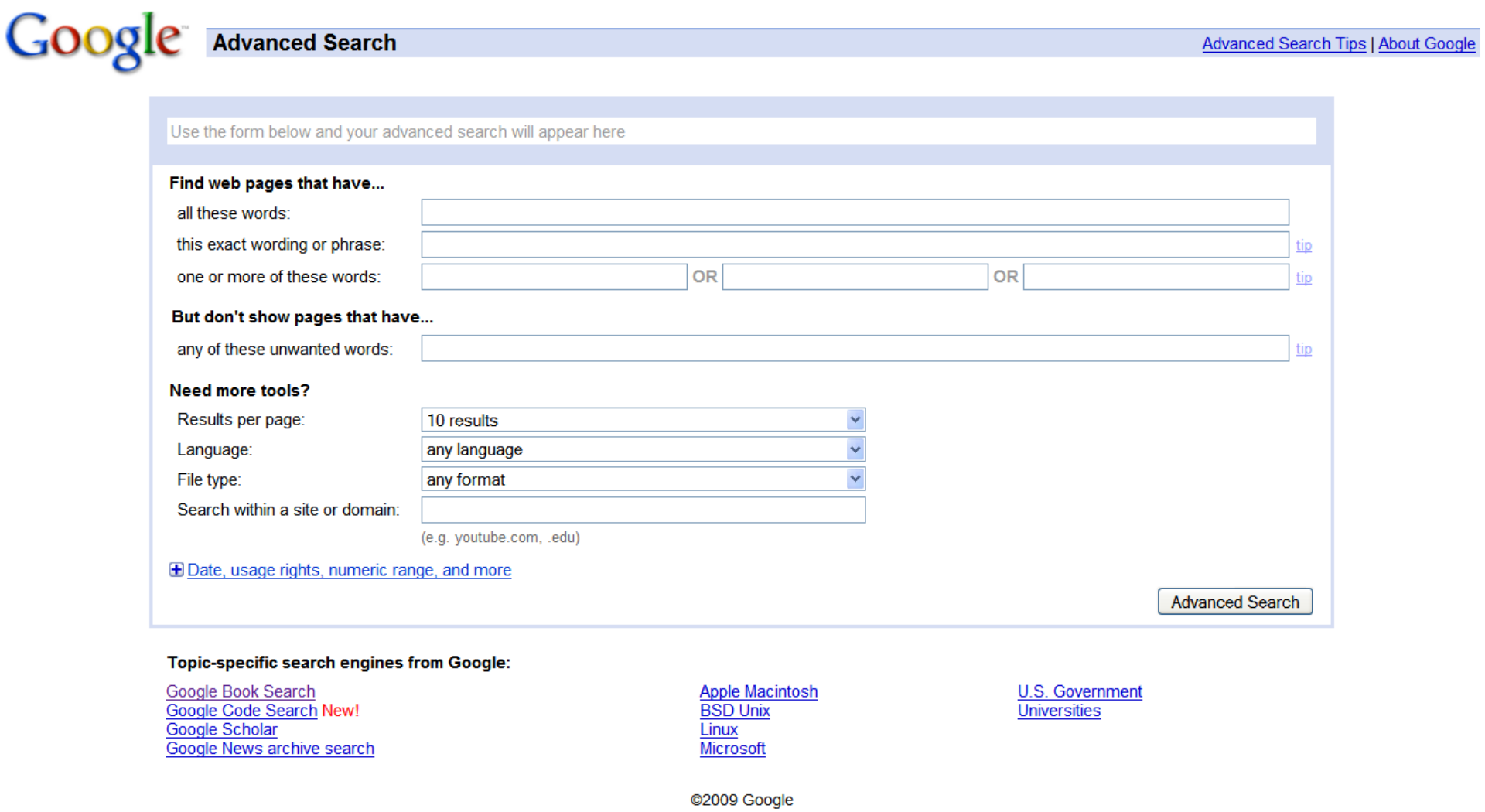


80% → 43% bounce rate

50% page visits > 5 seconds

Successful queries 10X

Testing copy text variations

1. Advertise your business on Google

2. Get new customers with Google

3. Connect with new customers

4. Attract more customers

5. Reach new customers

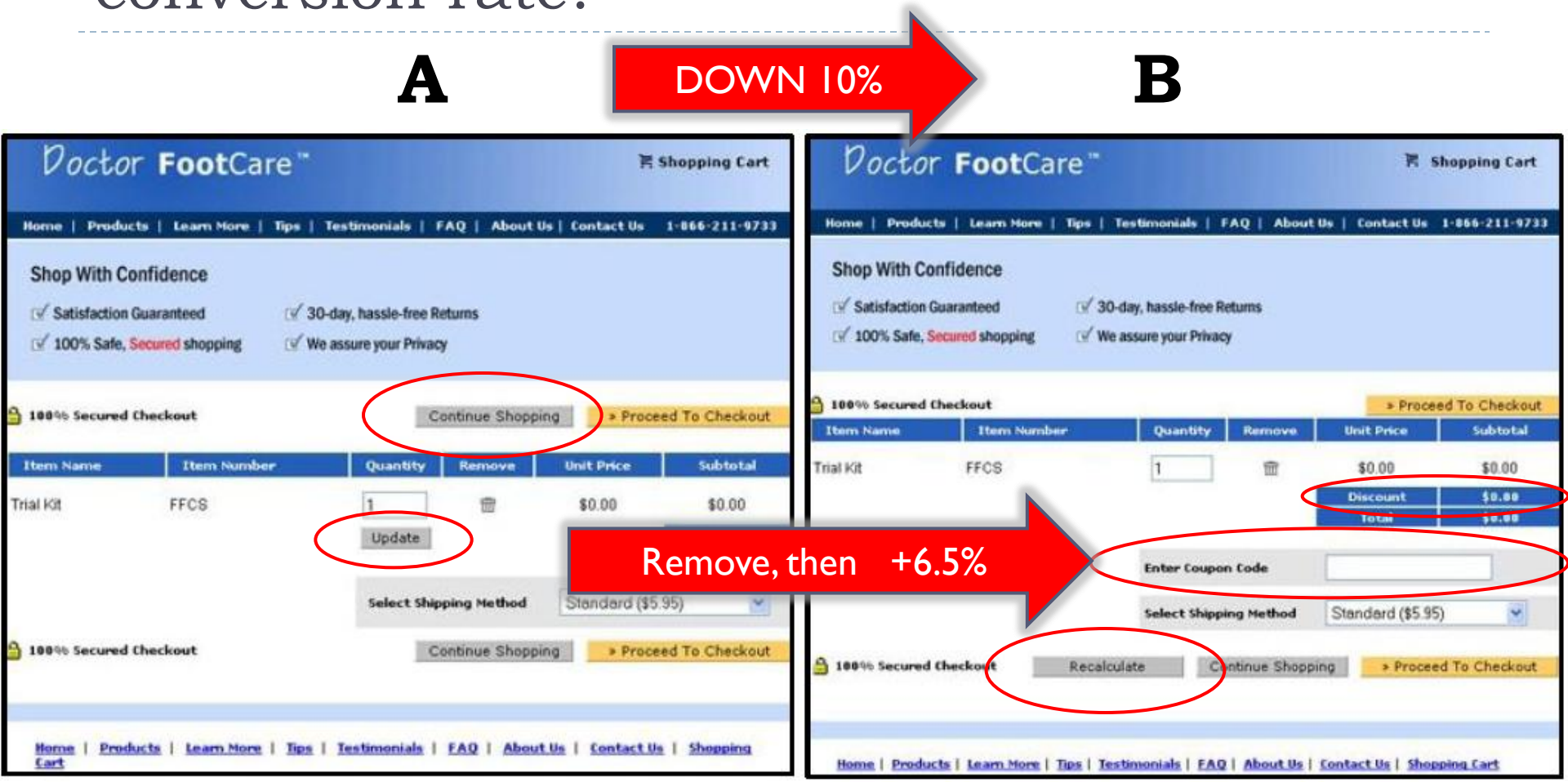
N = 250K trials, period = 2 weeks

Advertise your business on Google	0.0% (original)
Get new customers with Google	**-0.37%**
Connect with new customers	**+0.55%**
Attract more customers	**+0.67%**
Reach new customers on Google	**+0.75%**

Six variations on a text label
(n = 100K trials / variation; t = 1 week)

0.0% (original)
+21.3%
+14.9%
+23.7%
+15.4%
+24.4%

Which UI performs better in terms of conversion rate?

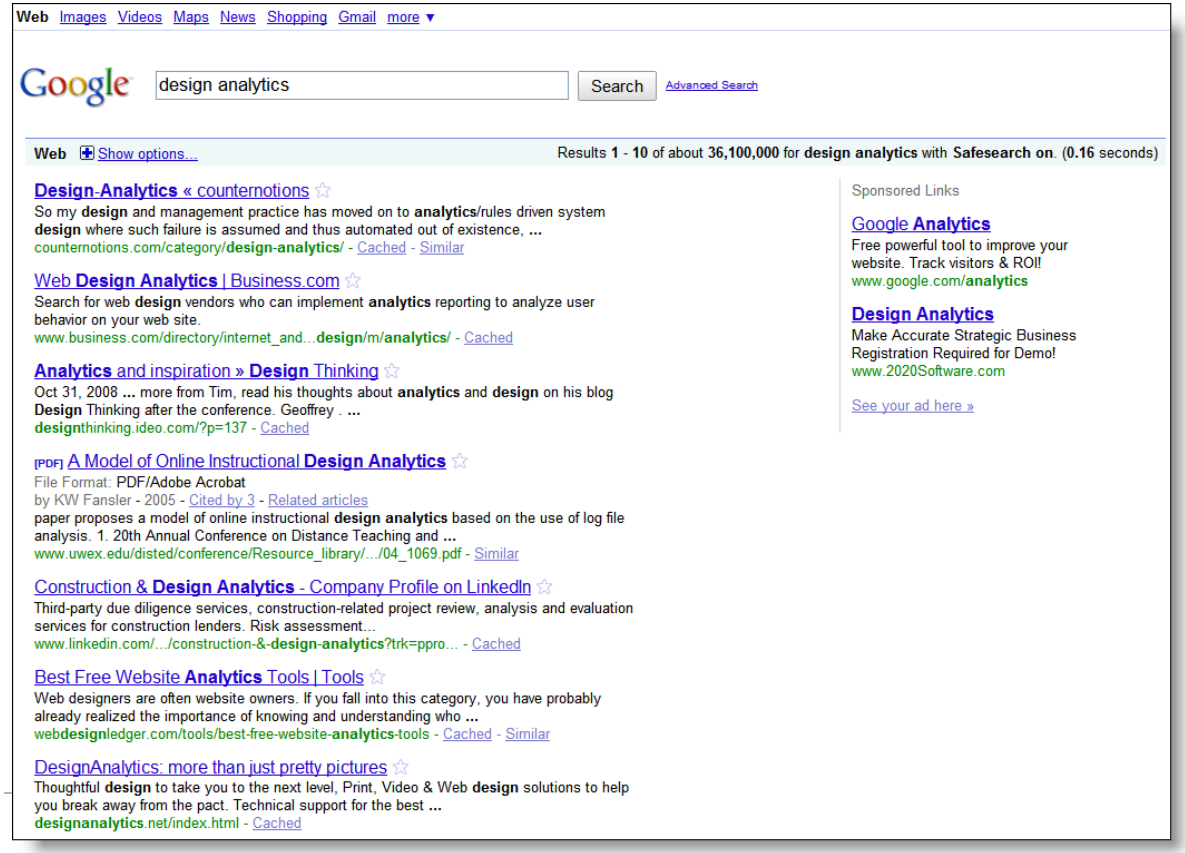


- Example from Bryan Eisenberg, www.clickz.com/showPage.html?1588161

What matters here?

- Big lesson: **EVERYTHING** matters

  - *Color choice*
  - *Visual complexity*
  - *Text choice*
  - *Vertical position*
  - *Horizontal position*
  - *Iconography*
  - *Form, balance…*



Biggest counterintuitive surprise:

Not speed kills, but SLOW kills:

- 500 millisecond delay causes 20% drop in clicks
- 400 ms delay causes 0.6% drop in searches / user / day
- Effect is profound even for 100 ms

Role of design?

- **What it's always been:**
  - *To help guide the design of the user experience*
  - *We can't test everything, so we still need to make choices*
  - *Skill of design is to make choices*

Role of analytics?

- **Newly emerging:**
  - *To help guide the design of the user experience*
  - *Test the variations that we don't understand*
  - *Discover the counterintuitive*
  - *Skill of analytics is to create a deeper understanding about why people act as they do*