

What are they thinking?

Searching for the mind of the searcher

Daniel M. Russell

September 17, 2007



[jaguar]

[iraq]

[latest release Thinkpad drivers touchpad]

[ebay]

[first]

[google]

[britttteny spirs]

- How can we figure out what you're trying to do?
- The information signal is sometimes weak...

- ~60% users have an average of less 1 query/day
- Average query length is ~3 words / query
- Average visit length is very short (~3 mins)

Confidence among Searchers

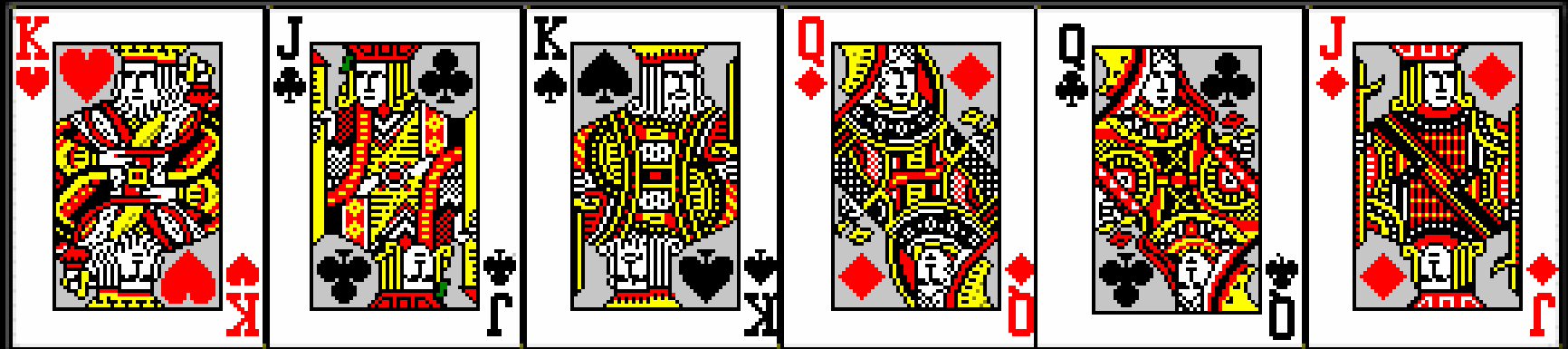
The more confident the searcher, the more engaged he is with searching.

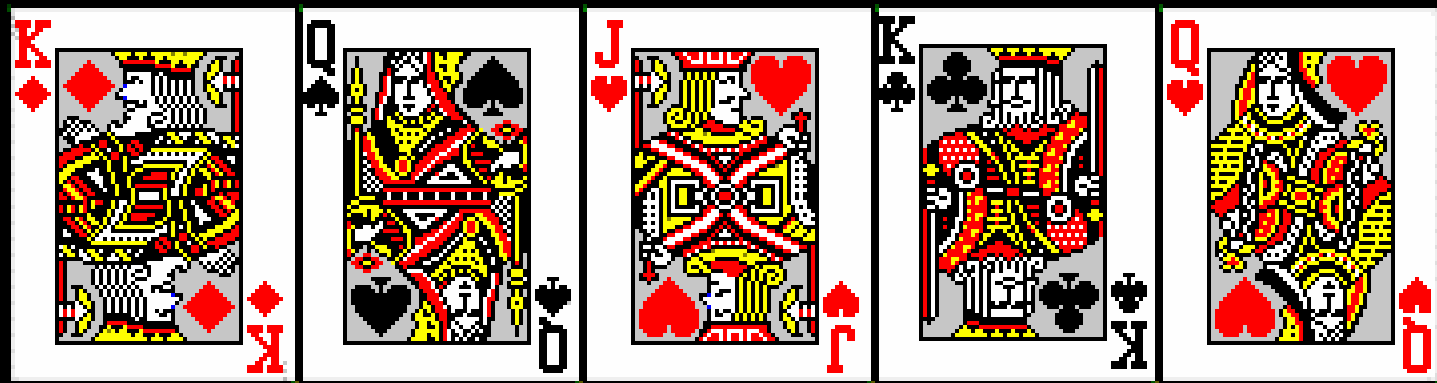
	Very Confident	Somewhat Confident	Not Confident
Frequency of searching	%	%	%
92% say they're confident in their searching ability	34	While 66% search less than 1 time per day	
	15		
	35		
	16		
Successful Searching			
Always	27	7	6
Usually	68	78	41
Sometimes	4	13	43
Rarely	-	1	7
Importance of most searches			
Important	34	24	9
Unimportant	15	19	22
Mixed	51	57	69

Pew Internet & American Life Project
(2005) ±3%

What are they doing?

Quantum ESP experiment





00:12 [actor most oscars]

VIDEO OF USER HERE

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.

How to be literate user of a UI?

- How does one make sense of a user interface?
- What do you pay attention to?
 - What's interactive? What's live?
 - What do various actions do?
 - What model does user have of UI?
 - Groups / Functions / Overall operation / Gestalt

What do you notice?

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[dmrussell@gmail.com](#) | [Saved Locations](#) | [Help](#) | [Web History](#) | [My Account](#) | [Sign out](#)



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

9500 Gilman Drive, La Jolla, CA 92093-0404

Search Maps

Search the map

Find businesses

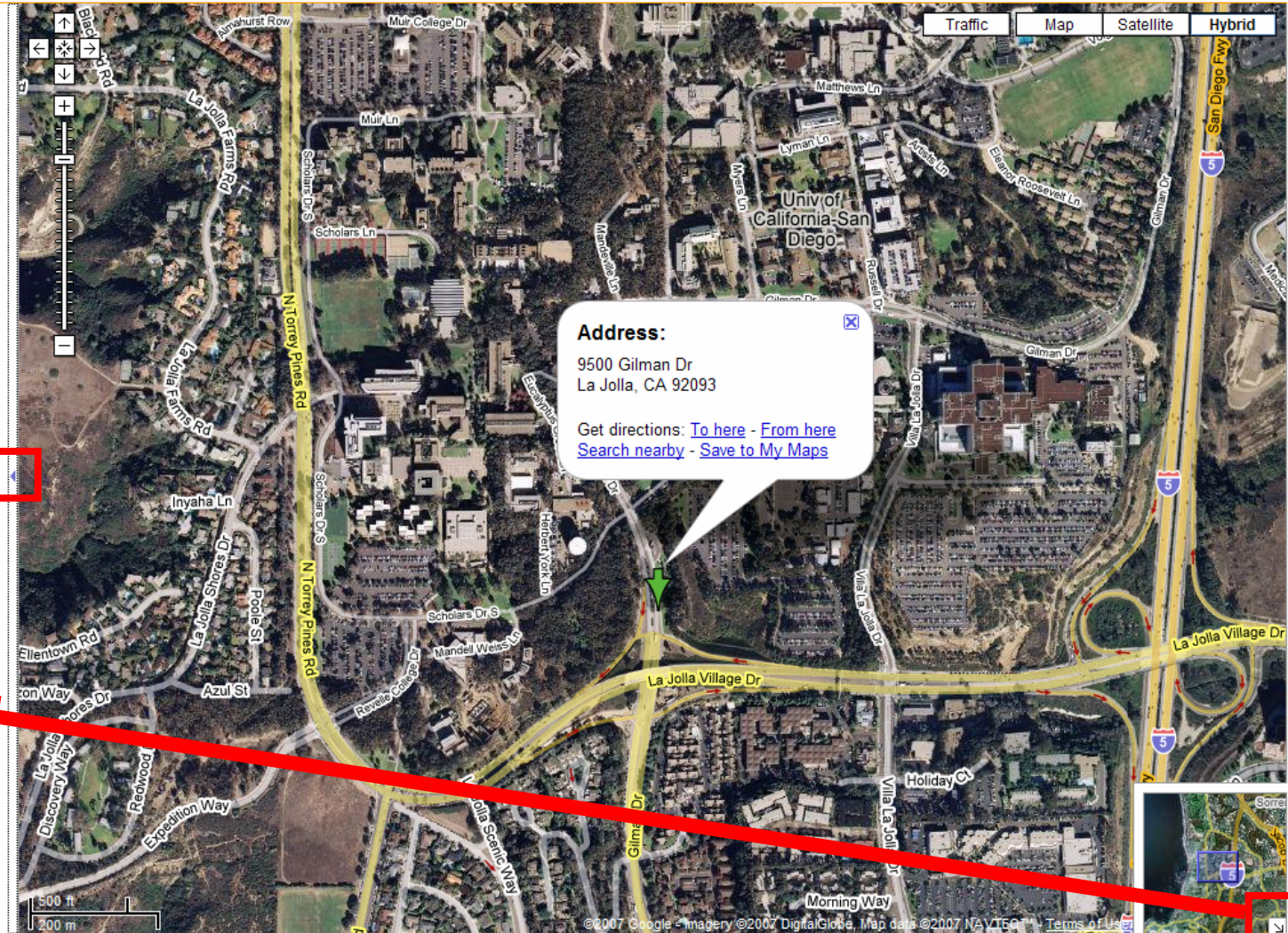
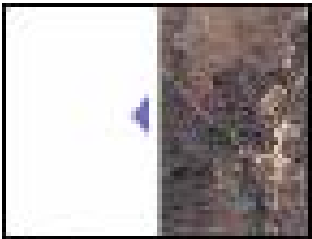
Get directions

Search Results

My Maps **New!**

[Print](#) [Email](#) [Link to this page](#)

9500 Gilman Dr
La Jolla, CA 92093
[Make this my default location](#)



Address:

9500 Gilman Dr
La Jolla, CA 92093

Get directions: [To here](#) - [From here](#)
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How many **brands** can we fit under our **new Apparel Tab? Over 450 to start!**

► **Introducing Apparel & Accessories at Amazon.com**

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Inattention Blindness (Cognitive Psychology)
by [Arien Mack](#), [Irv Rock](#), [Irvin Rock](#)

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[Look inside this book](#)

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- [The Attentive Brain](#) by Raja Parasuraman (Editor) (Hardcover)



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Your default shipping address and other settings are shown below. Use the buttons to make any changes; when you're done, click the "Place your order" button. By placing your order, you agree to Amazon.com's privacy notice and conditions of use.

Important Message

Want free shipping? Make sure you select FREE Super Saver Shipping as your shipping speed under "Shipping Options" below. (Note: Orders will take an additional 3 to 5 days to ship. Other restrictions apply.)

Click the "Place your order" button to complete your purchase.

[Place your order](#)

Shipping Details

Shipping to: [Change](#)

Daniel M. Russell
3419 Ramona St
Palo Alto CA 94306
USA

Sending items to more than one address? [Ship to multiple addresses](#)

Shipping Options: [Learn more about shipping prices and policies](#)

Choose a shipping speed:

- ☐ FREE Super Saver Shipping (5-9 business days)
- ☒ Standard Shipping (3-7 business days)
- ☐ Two Day Shipping (2 business days)
- ☐ One Day Shipping (1 business day)

The following items will arrive in 1 shipment:

Need to [Change quantities or delete](#) ?

Estimated ship date for this item: January 18, 2003 - January 20, 2003

Order Summary

Items:	\$60.00
Shipping & Handling:	\$3.99
Total Before Tax:	\$63.99
Estimated Tax:	\$0.00

Order Total: \$63.99

[Why didn't I qualify for free shipping on my entire order?](#)

Have a gift certificate, promotional code or gift card?

Enter them here (one at a time):

[Apply](#)

Payment Method:

[Change](#)

Mastercard: ***-12347

Search on:	Search for:	Directory:
Name	soders*, c	ALL



Name	Tie Line	Email Address	Job Responsibility
------	----------	---------------	--------------------

No matches found.

Please check the [Help](#) page to make sure you entered the search string properly.

Search on:	Search for:	Directory:
Name	soders*, c	ALL

Go!

Name	Tie Line	Email Address	Job Responsibility
------	----------	---------------	--------------------

No matches found.

Please check the [Help](#) page to make sure you entered the search string properly.

Inattention & Invisible UI elements



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library database ui

Search

[Advanced Scholar Search](#)

[Scholar Preferences](#)

[Scholar Help](#)

Scholar All articles - [Recent articles](#)

All Results

[H Korth](#)

[A Silberschatz](#)

[V Basili](#)

[I Bruno](#)

[V Ogle](#)

[User interface modeling in UMLi](#) - [all 10 versions »](#)

PP da Silva, NW Paton - Software, IEEE, 2003 - [ieeexplore.ieee.org](#)

... This article examines some of UML's **user interface** modeling facilities. ... can provide a combination of a book's properties for querying a **library database**. ...

[Cited by 43](#) - [Related Articles](#) - [Web Search](#) - [BL Direct](#)

[book] **Database** Design - [all 2 versions »](#)

GC Wiederhold - 1977 - McGraw-Hill, Inc. New York, NY, USA

[Cited by 163](#) - [Related Articles](#) - [Web Search](#) - [Library Search](#)

[book] **Database** system concepts - [all 2 versions »](#)

HF Korth, A Silberschatz - 1986 - McGraw-Hill, Inc. New York, NY, USA

[Cited by 461](#) - [Related Articles](#) - [Web Search](#) - [Library Search](#)

[A digital library for geographically referenced materials](#) - [all 6 versions »](#)

TR Smith - Computer, 1996 - [ieeexplore.ieee.org](#)

... **library** services; and the ingest facility, for storing and processing data from new holdings. CUI means graphical **user interface**. ODBC means Open **DataBase** ...

[Cited by 97](#) - [Related Articles](#) - [Web Search](#) - [BL Direct](#)

Why is chron sort so hard? Compare...

```
@article{gross96dec,  
  title={{Demonstrating the Electronic Cocktail Napkin}},  
  author={Gross, M.D. and Do, E.Y.L.},  
  journal={ACM Human Factors in Computing-CHI},  
  volume={96},  
  pages={5--6} }
```

```
@article{mueller2005hod,  
  title={{Hug over a distance}},  
  author={Mueller, F. and Vetere, F. and Gibbs, MR and Kjeldskov,  
    J. and Pedell, S. and Howard, S.},  
  journal={Proc. CHI},  
  volume={5},  
  pages={1673--1676},  
  year={2005} }
```

So... what do we do?

- How do we understand what people are doing?
- Between inattention and low-signal density...

- **3M points-of-view:**

Micro: *lowest level details—milliseconds*

Meso: *mid-level observations—minutes to days*

Macro: *millions of observations—days to months*

WHAT are people doing?

① Field studies (meso)

Getting out to see what reality is

② Eyetracking studies (micro)

Studies in the microscopic

③ Sessions analysis (macro)

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

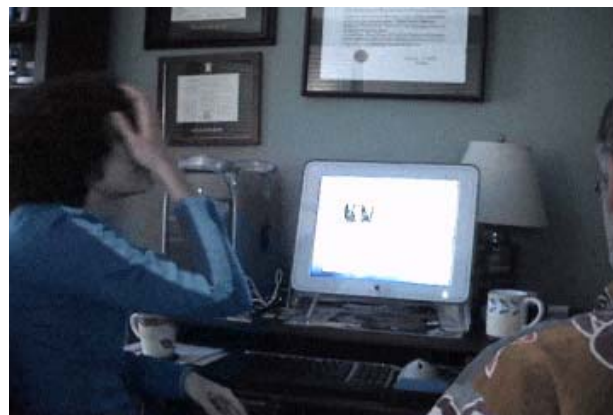
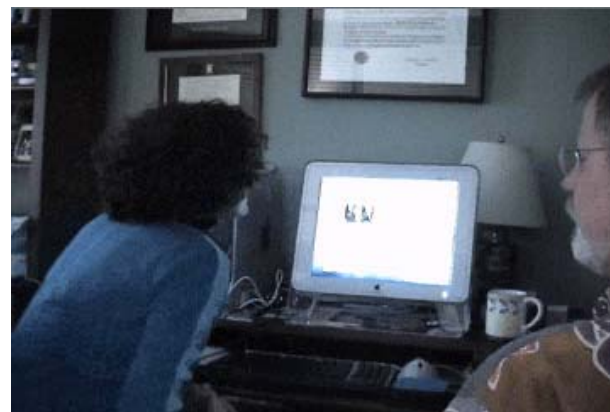
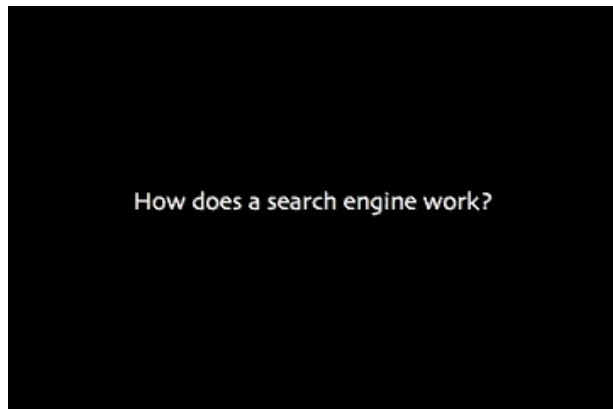


'URL
<http://www.google.com/ig?hl=en>
<http://127.0.0.1:4664/search?q=wardrobe+in+NBC&num=2&sz=po>
<http://www.google.com/search?hl=en&q=wardrobe+in+NBC>
<http://ad.doubleclick.net/adi/N339.cbshealthwatch/B1809262>
<http://adopt.specificclick.net/adopt.sm?i=1013290775&sz=po>
<http://www.cbsnews.com/stories/2004/07/01/entertainment/m>
<http://127.0.0.1:4664/search?q=wardrobe+in+NBC&num=2&sz=po>
<http://www.google.com/search?hl=en&q=wardrobe+in+NBC>
http://www.nbc.com/nbc/Will_&_Grace/wardrobe/frames/sear
http://www.nbc.com/nbc/Will_&_Grace/wardrobe/frames/si
http://www.nbc.com/nbc/Will_&_Grace/wardrobe/index.shtml
<http://127.0.0.1:4664/search?q=wardrobe+in+NBC&num=2&sz=po>
<http://www.google.com/search?hl=en&q=wardrobe+in+NBC>
<http://127.0.0.1:4664/search?q=will+and+grace+wardrobe+in+NBC>
<http://www.google.com/search?hl=en&lr=&safe=off&q=will+ar>
<http://www.nbc.com/nbc/footer/FAQ.shtml>
<http://nbc.resultspage.com/display.php?w=wardrobe>
http://www.nbc.com/nbc/Will_&_Grace/wardrobe/frames/sear
http://www.nbc.com/nbc/Will_&_Grace/wardrobe/frames/si
http://www.nbc.com/nbc/Will_&_Grace/wardrobe/

1 Lies, Truth & Videotape — Field studies (meso)

- **Interviews held *in situ*...**

- Workplace, home, coffee shopany place... must be search-place
- Place + context cueing effects
- Interested in natural use phenomena (ads, distractions, multiple tasks...)



Field notes from interviewing a Google user at their home

Yahoo → Robt Fay → NBC → [Search] → return.

2. Recent searches

2.1. Show me the last search you did. Talk about it. Walk me through what you did.

q26 - Carverbury - go to site directly.

Already have profile.

Yahoo toolbar.

[word robe in NBC]

click on 1

he for - [response will and Grace word robe in NBC]

goal: Look for images of father
→ NBC.com
Search inside NBC website
[word robe]

2.2. Now show me a similar search and talk me through it.

[Buzz Year Toy] - ^{Light} gone: Best Price.

- not eBay.

- go to Amazon. check price.

→ panasonic.com

people to look for toys or w.

check authenticity.

went to 8.

[Toy R Us ...]

skip the box

A9 Search []

spell correction

q34
Kern to
Kern to
check for
new music.

2.3. Can you show me the most difficult search you've done? Talk me through it.

(See above as example)

q38 - "AG"

Don't know what
★ minute realized

scroll ~~end~~ to end.

2.10.2006 7:10 AM

2.2.2006 (Kern)

Client-side logs: Very detailed recording of behavior keyed to video

URL	URL_NAME	FILE_SIZE	TIME_TO_LOAD	TIME_AT_LOCATION
http://www.google.com/ig?hl=en	Google	49195	0.95	31.681
http://127.0.0.1:4664/search?q=wardrobe+in+NBC&num=2&...	wardrobe in NBC - Google Search	28542	1.007	0.057
http://www.google.com/search?hl=en&q=wardrobe+in+NBC	wardrobe in NBC - Google Search	28542	1.404	12.233
http://ad.doubleclick.net/adi/N339.cbshealthwatch/B1809262.3	CBS News CBS Dealt Record Fine Over Janet	57879	1.276	4.742
http://adopt.specificclick.net/adopt.sm?l=1013290775&sz=pop	CBS News CBS Dealt Record Fine Over Janet	57879	1.544	0.268
http://www.cbsnews.com/stories/2004/07/01/entertainment/me	CBS News CBS Dealt Record Fine Over Janet	57879	0.053	3.925
http://127.0.0.1:4664/search?q=wardrobe+in+NBC&num=2&...	wardrobe in NBC - Google Search	28542	0.071	0.018
http://www.google.com/search?hl=en&q=wardrobe+in+NBC	wardrobe in NBC - Google Search	28542	1.594	8.237
http://www.nbc.com/nbc/Will_&Grace/wardrobe/frames/sear	NBC.com > Will & Grace > Wardrobe	39299	1.601	0.007
http://www.nbc.com/nbc/Will_%26_Grace/wardrobe/frames/se	NBC.com > Will & Grace > Wardrobe	39299	1.652	0.051
http://www.nbc.com/nbc/Will_&Grace/wardrobe/index.shtml	NBC.com > Will & Grace > Wardrobe	39299	0.08	6.695
http://127.0.0.1:4664/search?q=wardrobe+in+NBC&num=2&...	wardrobe in NBC - Google Search	28542	0.251	0.171
http://www.google.com/search?hl=en&q=wardrobe+in+NBC	wardrobe in NBC - Google Search	28542	0.228	15.026
http://127.0.0.1:4664/search?q=will+and+grace+wardrobe+in+	will and grace wardrobe in NBC - Google Search	28372	0.242	0.014
http://www.google.com/search?hl=en&lr=&safe=off&q=will+an	will and grace wardrobe in NBC - Google Search	28372	2.424	9.52
http://www.nbc.com/nbc/footer/FAQ.shtml	NBC.com > Frequently Asked Questions	26666	2.211	14.35
http://nbc.resultspage.com/display.php?w=wardrobe	NBC.com > Search Results	39229	0.104	5.22
http://www.nbc.com/nbc/Will_&Grace/wardrobe/frames/sear	NBC.com > Will & Grace > Wardrobe	39299	0.118	0.014
http://www.nbc.com/nbc/Will_%26_Grace/wardrobe/frames/se	NBC.com > Will & Grace > Wardrobe	39299	0.219	0.101
http://www.nbc.com/nbc/Will_&Grace/wardrobe/	NBC.com > Will & Grace > Wardrobe	39299	0.711	4.985
http://nbc.resultspage.com/display.php?w=wardrobe	NBC.com > Search Results	39229	1.175	4.432
http://www.nbc.com/nbc/Las_Vegas/wardrobe/frames/search/r	NBC.com > Las Vegas > Wardrobe	28386	1.18	0.005
http://www.nbc.com/nbc/Las_Vegas/wardrobe/frames/search/r	NBC.com > Las Vegas > Wardrobe	28386	1.196	0.016
http://www.nbc.com/nbc/Las_Vegas/wardrobe/	NBC.com > Las Vegas > Wardrobe	28386	0.64	18.488
http://nbc.resultspage.com/display.php?w=wardrobe	NBC.com > Search Results	39229	1.13	9.216
http://www.nbc.com/nbc/Passions/wardrobe/frames/search/na	NBC.com > Passions > Wardrobe	35183	1.136	0.006
http://www.nbc.com/nbc/Passions/wardrobe/frames/search/res	NBC.com > Passions > Wardrobe	35183	1.185	0.049
http://www.nbc.com/nbc/Passions/wardrobe/	NBC.com > Passions > Wardrobe	35183	1.185	0.049
TotalTime:			26.567	149.576

Sample findings

- **Very uneven level of search skill**
 - Many show at least 1 “deep” skill
(advanced search, operator use, URL completion)
 - Nobody was consistently broadly expert at search
 - > 50% said they “wished they knew better how to search”
- **Comfort level is *VERY* important**
 - Users choose familiar over scary
(obviously not all, but many—how many?)
- **Education is accidental**
 - Google users have no good way to learn about Google

What we learn from field studies...

- How people think...
- Mental models
- Qualitative approaches
- Emotional reactions
- Expectations (and violations)
- WHY we're getting certain behaviors:
 - Example: why are 50% of clicks to Advanced Search page short?



Find results	<div>with all of the words</div> <div>with the exact phrase</div> <div>with at least one of the words</div> <div>without the words</div>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	10 results <input type="button" value="Google Search"/>
Language	Return pages written in	<input type="text" value="any language"/>	
File Format	<input type="button" value="Only"/> return results of the file format	<input type="text" value="any format"/>	
Date	Return web pages first seen in the	<input type="text" value="anytime"/>	
Numeric Range	Return web pages containing numbers between <input type="text"/> and <input type="text"/>		
Occurrences	Return results where my terms occur	<input type="text" value="anywhere in the page"/>	
Domain	<input type="button" value="Only"/> return results from the site or domain	<input type="text"/> e.g. google.com .org More info	
Usage Rights	Return results that are	<input type="text" value="not filtered by license"/> More info	
SafeSearch	<input checked="" type="radio"/> No filtering <input type="radio"/> Filter using SafeSearch		

Page-Specific Search

Similar	Find pages similar to the page	<input type="text"/> e.g. www.google.com/help.html	<input type="button" value="Search"/>
Links	Find pages that link to the page	<input type="text"/>	<input type="button" value="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

② 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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tallest active player NBA

Search

[Advanced Search](#)[Preferences](#)

Web

Results **1 - 10** of about **50,600** for **[tallest active player NBA](#)**. (0.09 seconds)[SportingNews.com - NBA Trivia!!!](#)

3. Who is the shortest **active player** today ? (what height) 4. Who is the **tallest player** ever in the **NBA** ?(what height) 5. Who is the shortest **player** ever in ...

forums-beta.sportingnews.com/topic.php?p=725271 - 139k - [Cached](#) - [Similar pages](#)

[Dirk Nowitzki - Wikipedia, the free encyclopedia](#)

(Kevin Garnett leads all **active players**, having played 11 seasons for ... He is the **tallest NBA player** to win the 3-point shootout at 7 ft 0 in (2.13 m). ...

en.wikipedia.org/wiki/Dirk_Nowitzki - 50k - Jul 15, 2006 - [Cached](#) - [Similar pages](#)

[List of famous tall men - Wikipedia, the free encyclopedia](#)

Manute Bol — **tallest NBA** basketball **player** till Muresan (below) ... Mu Tiezhu — Chinese basketball **player**, Yao Ming — **tallest active player** in the **NBA** ...

en.wikipedia.org/wiki/List_of_famous_tall_men - 85k - [Cached](#) - [Similar pages](#)

[[More results from en.wikipedia.org](#)]

[Players NBA Players Official Sites Player News Player Videos ...](#)

NBA.com provides a link to every **active NBA player's** file. Included in each file: biography ...

So just who are the **tallest** basketball **players** in the world? ...

probasketball.about.com/od/**player**1/ - 36k - [Cached](#) - [Similar pages](#)

[AsianSportsNet.com - Tallest Players in the NBA](#)

Here is a comparison of Yao Ming to the **tallest players** in **NBA** history, ... Yao Ming and Shawn Bradley are presently **active** in the 2004-2005 **NBA** season. ...

www.asiansportsnet.com/articles/**tallest_nba**.html - 8k - [Cached](#) - [Similar pages](#)

[List of famous tall men: Information From Answers.com](#)

Matthew McGrory — actor; Yao Ming — **tallest active player** in the **NBA**; Mu Tiezhu — Chinese basketball **player**; Giant Gonzales — Professional Wrestler ...

www.answers.com/topic/list-of-famous-tall-men - 125k - [Cached](#) - [Similar pages](#)

[NBA Basketball - Answerbag](#)

How many **active players** in the **NBA** have won a championship ring through the 2005-2006 ... Who was the **tallest** African-American basketball **player** ever? ...

www.answerbag.com/c_view.php/1092 - 40k - [Cached](#) - [Similar pages](#)



So.. Did you notice the FTD official site?

To be honest, I didn't even look at that.

At first I saw "from \$20" and \$20 is what I was looking for.

To be honest, 1800-flowers is what I'm familiar with and why I went there next even though I kind of assumed they wouldn't have \$20 flowers

And you knew they were expensive?

I knew they were expensive but I thought "hey, maybe they've got some flowers for under \$20 here..."

But you didn't notice the FTD?

No I didn't, actually... that's really funny.



Rapidly scanning the results

Note scan pattern:

Page 3:

Result 1
Result 2
Result 3
Result 4
Result 3
Result 2
Result 4
Result 5
Result 6 <click>

Q: Why do this?

A: What's learned later influences judgment of earlier content.

The screenshot shows the Google search results for the query "children's unicycle". A red line with numbered circles (1-6) indicates a scanning path that starts at the top of the first result, moves down to the second, then to the third, then to the fourth, then back up to the second, then to the fifth, and finally to the sixth. This illustrates how later results can influence the judgment of earlier ones.

Google Web Images Video News Maps more »
children's unicycle Search Advanced Search Preferences

Web

- 1** [Unicycle UK.com - F.A.Q. - What size?](#)
12" wheel **unicycle**: this is a small **children's unicycle** size. It's good for **children** who are too small to ride a 16" **unicycle**, but it needs smooth ground ...
[www.unicycle.uk.com/FAQ.asp?iCategory=53](#) - 23k - [Cached](#) - [Similar pages](#)
- 2** [Selecting a unicycle: Unicycle.com NZ : buy a unicycle or learn ...](#)
16" wheel **unicycle**: this is a **children's unicycle**, the small wheel makes it only suitable for smooth areas. Best used indoors or on smooth ground; ...
[www.unicycle.co.nz/View.php?action=Page&Name=Selecting_a_unicycle](#) - 22k - [Cached](#) - [Similar pages](#)
- 3** [100 Miles for Kids - The Goal](#)
"The Afghan Mobile Mini Circus for **Children** is an established ... attempt to break the GUINNESS WORLD RECORD for the ONE HOUR **UNICYCLE** DISTANCE RECORD. ...
[www.unicycle4kids.org/](#) - 9k - [Cached](#) - [Similar pages](#)
- 4** [Unicycles page at Juggling World](#)
This is a **children's unicycle**, the small wheel makes it only suitable for very smooth areas. Best used indoors or on smooth ground; not so good outdoors ...
[www.jugglingworld.biz/shop/products_unicycles.html](#) - 100k - [Cached](#) - [Similar pages](#)
- 5** [Buy a Unicycle: Unicycle.com AU : buy a unicycle or learn unicycling](#)
Check out a **Unicycle** Learners Pack for an easy and economical way to take your first steps into the One Wheeled World ... Suitable as a **Children's Unicycle**. ...
[www.unicycle.au.com/View.php?action=Page&Name=Unicycles](#) - 10k - [Cached](#) - [Similar pages](#)
- 6** [Article - News - A unicycle ride for children](#)
Adam Brody, 21, of San Juan Capistrano, led a charity event Saturday that benefits the Orangewood **Children's** Foundation. The **Unicycle** Club of Southern ...
[www.ocregister.com/ocregister/news/homepage/article_1293785.php](#) - 31k - [Cached](#) - [Similar pages](#)

Skill of reading a SERP (search engine results page)

- How many results are viewed before clicking?
- Do users select the first relevant-looking result they see?
- How much time is spent viewing results page?



How do users behave in search?

- Experiment conducted at Cornell [Gay, Granka, et al., 2004]

- *Users:*

- Searched freely with any queries
- Script removed all ad content
- 5 info & 5 nav tasks given to participants

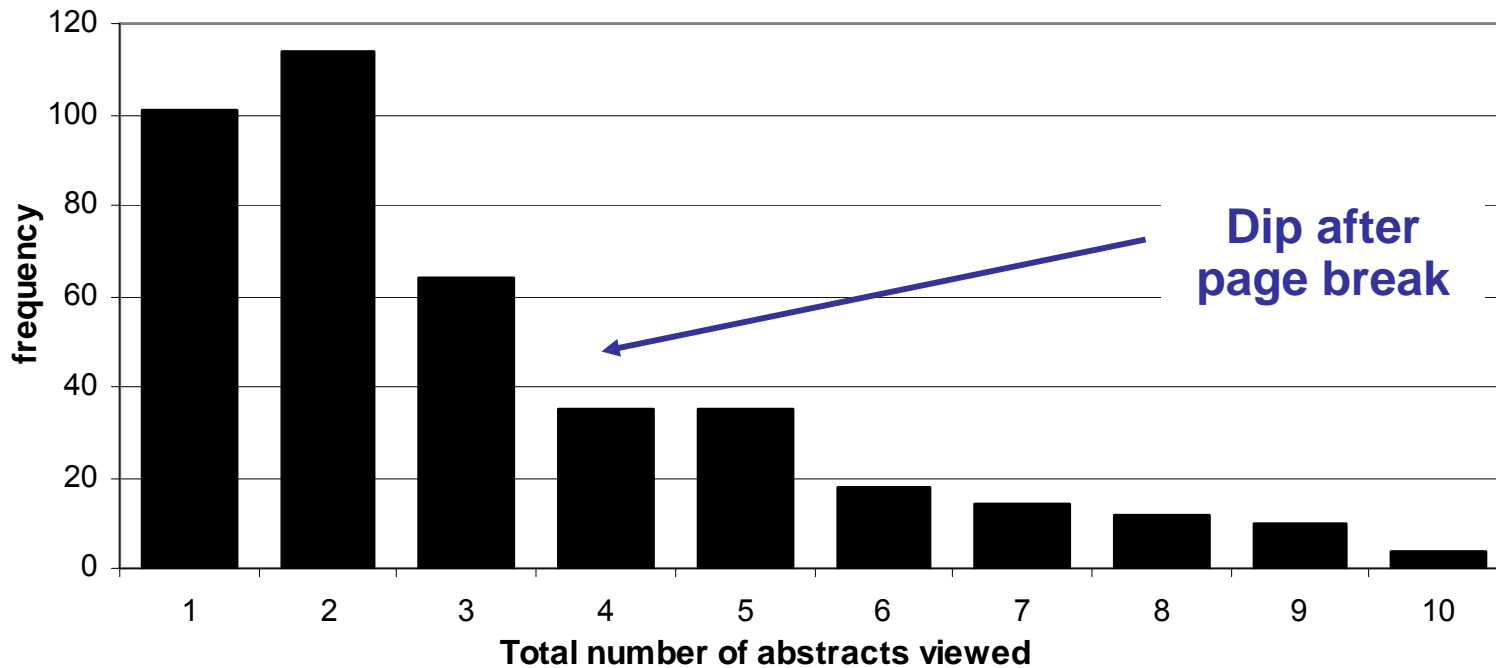
- *Subjects (Phase I)*

- 36 undergraduate students
- Familiar with Google



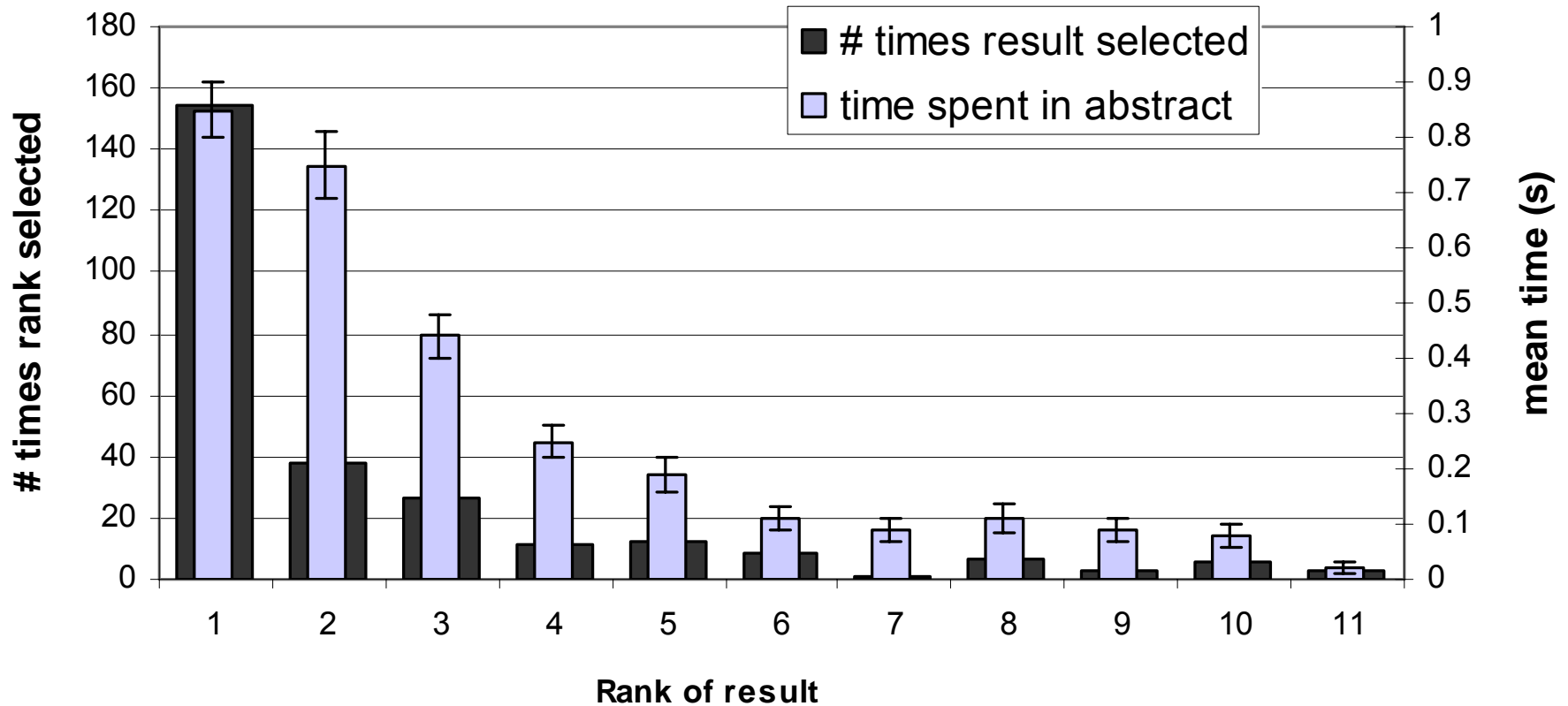
How many links do users view?

Total number of abstracts viewed per page



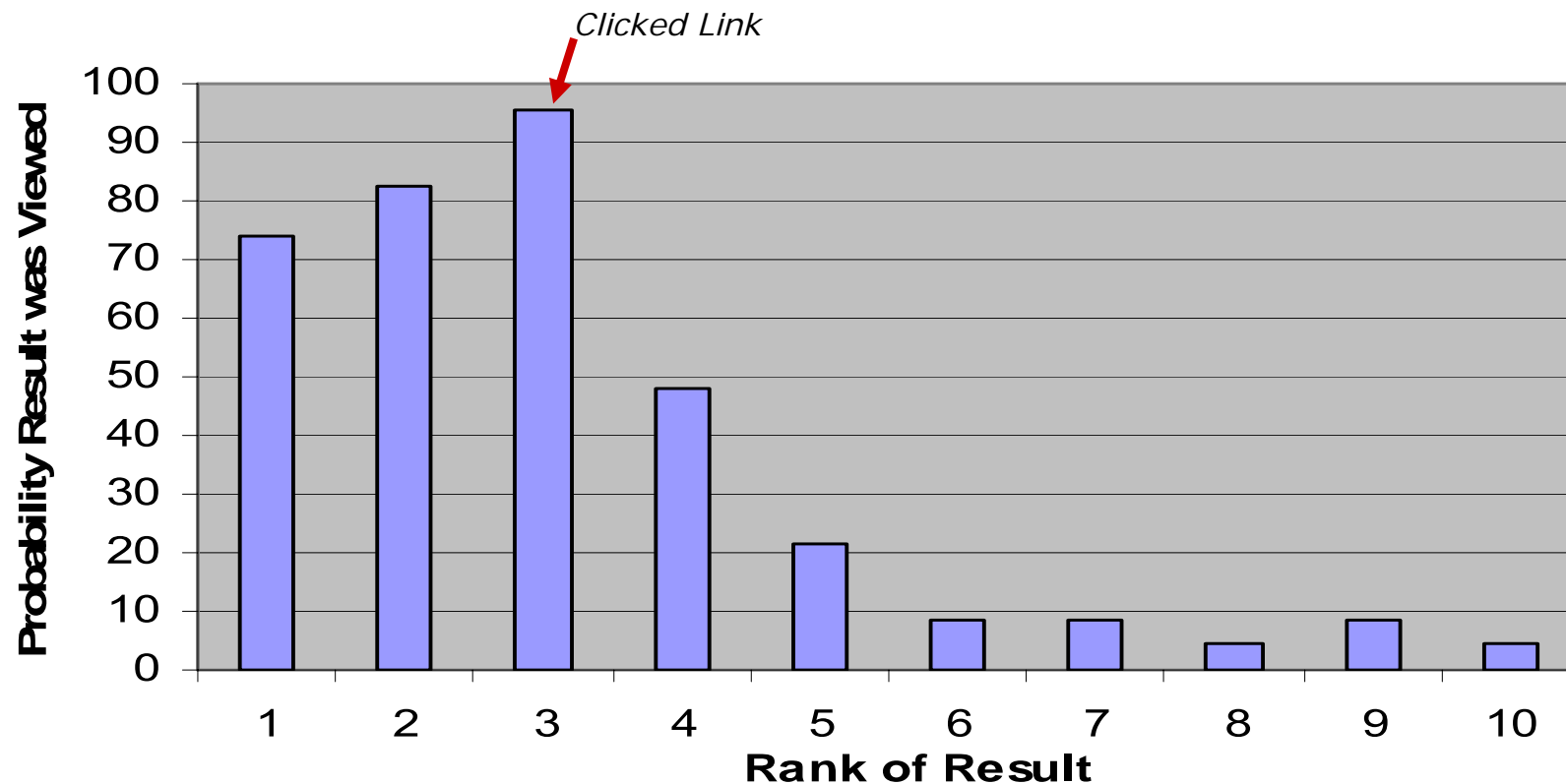
Mean: 3.07 Median/Mode: 2.00

Looking vs. Clicking



- Users view results one and two more often / thoroughly
- Users click most frequently on result one

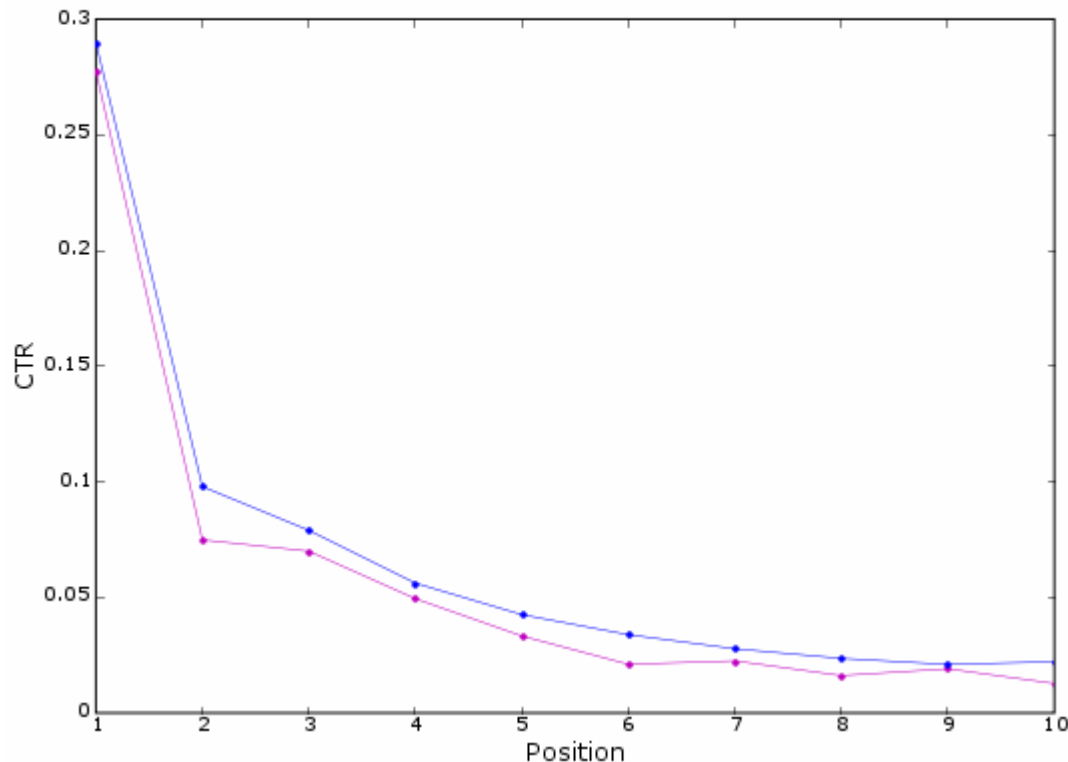
Which results are viewed before clicking?



- Users typically do not look at lower results before they click (except maybe the next result)

Strong implicit behavior...

- Users **strongly** believe that the search engine rank order matters... and that we have the order right!



③ Macro: Understanding the behavior of the many

- **We have a lot of data: many GB weekly in logs**
- **How to analyze it?**

A typical (long) session

- 31: Google Search [irish lotto] (4s)
- 33: Google Result 1 www.lotto.ie/ (7s)
- 34: Google Result 1 www.lotto.ie/ (4s) (DUPE) (p=31)
- 36: Nav (back/fwd) www.google.com/search (1s)
- 37: Google Result 2 www.irishlotto.net/ (2s) (p=31)
- 39: Nav (back/fwd) www.google.com/search (1s)
- 40: Google Result 3 www.irishlotto.net/main-results/2005.htm (1s) (p=31)
- 42: Nav (back/fwd) www.google.com/search (0s)
- 43: Google Result 4 www.irish-lottery.net/ (4s) (p=31)
- 44: Google Result 4 www.irish-lottery.net/ (5s) (DUPE) (p=31)
- 45: Google Result 4 www.irish-lottery.net/ (3s) (DUPE) (p=31)
- 48: Nav (back/fwd) www.google.com/search (6s)
- 49: Google Result 8 www.interlotto.com/irish/ (6s) (p=31)
- 51: Nav (back/fwd) www.google.com/search (1s)
- 52: Google Result 9 lottery.loquax.co.uk/irish-lottery.htm (21s) (p=31)
- 54: Nav casino.loquax.co.uk/ (29s)
- 55: Nav casino.loquax.co.uk/offers/173/Virgin-Casino.htm (4s)
- 56: Nav (new window) casino.loquax.co.uk/offers/173/Virgin-Casino.htm (0s)
- 57: Nav (new window) clkuk.tradedoubler.com/click (7s)
- 58: Nav (back/fwd) casino.loquax.co.uk/ (10s) (p=56)
- 59: Nav casino.virgingames.com/game/menu.do (15s) (p=57)
- 60: Nav (back/fwd) lottery.loquax.co.uk/irish-lottery.htm (0s) (p=58)
- 61: Google Search [irish lotto] (3s) (DUPE) (p=31)
- 63: Google Result 10 online.casinocity.com/lotteries/irish-lotto/ (11s)

Non-Google actions: “work” from the user’s pov

31: Google Search [irish lotto] (4s)

33: Google Result 1 www.lotto.ie/ (7s)

34: Google Result 1 www.lotto.ie/ (4s) (DUPE) (p=31)

37: Google Result 2 www.irishlotto.net/ (2s) (p=31)

40: Google Result 3 www.irishlotto.net/main-results/2005.htm (1s) (p=31)

43: Google Result 4 www.irish-lottery.net/ (4s) (p=31)

44: Google Result 4 www.irish-lottery.net/ (5s) (DUPE) (p=31)

45: Google Result 4 www.irish-lottery.net/ (3s) (DUPE) (p=31)

49: Google Result 8 www.interlotto.com/irish/ (6s) (p=31)

52: Google Result 9 lottery.loquax.co.uk/irish-lottery.htm (21s) (p=31)

61: Google Search [irish lotto] (3s) (DUPE) (p=31)

63: Google Result 10 online.casinocity.com/lotteries/irish-lotto/ (11s)

Evidence of multitasking

100: Google Search [free roulette] (4s) (DUPE) (p=78)

102: Google Result 7 www.getlyrical.com/general/free_casino_games/free_online_roulette.html (3s)

103: Google Result 7 www.getlyrical.com/general/free_casino_games/free_online_roulette.html (19s) (DUPE) (p=100)

106: Google Result 8 www.saliu.com/Roulette.htm (56s) (p=100)

112: Google Search [shockwave] (4s)

114: Google Result 3 www.shockwave.com/sw/home/ (10s)

117: Google Result 5 sdc.shockwave.com/shockwave/download/download.cgi (16s) (p=112)

120: Google Search [free roulette] (3s) (DUPE) (p=78)

122: Google Result 1 www.ildado.com/free_roulette.html (15s) (DUPE)

124: Google Search [free professional roulette] (2s)

126: Google Search (spell correct) [free professional roulette] (10s)

128: Google Result 3 imagesculptor.com/Roulette/free-roulette-professional-system.php (5s)

129: Google Result 3 imagesculptor.com/Roulette/free-roulette-professional-system.php (8s) (DUPE) (p=126)

133: Google Result 7 www.amazon.com/exec/obidos/tg/detail/-/B0007XRSQ4?v=glance (2s) (p=126)

User: 16925

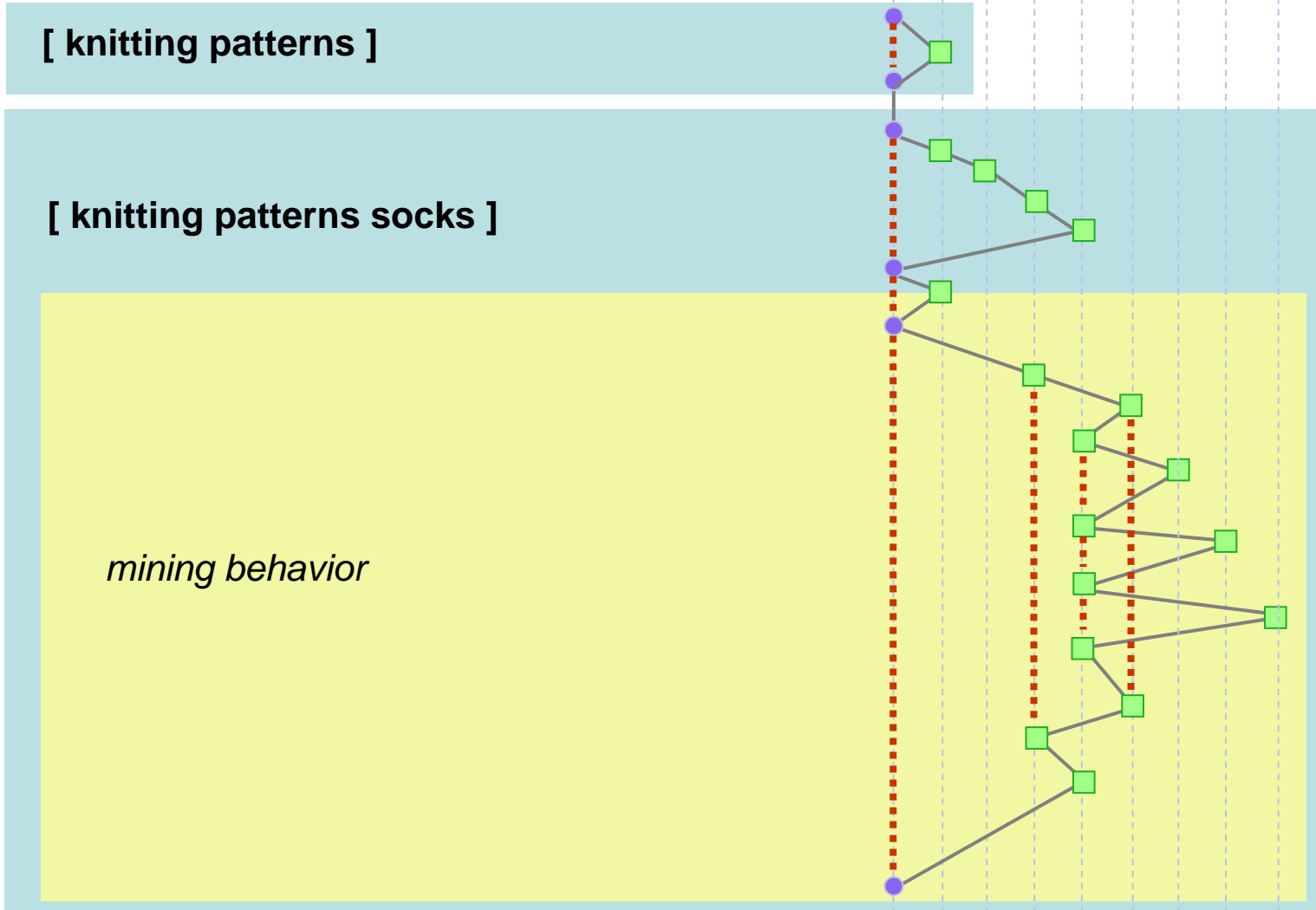
[knitting patterns]

[knitting patterns socks]

mining behavior

Time

- site page
- SERP
- same page



Kinds of behaviors

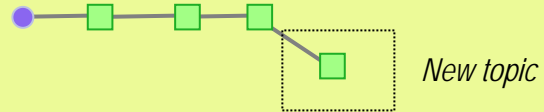
Short / Nav



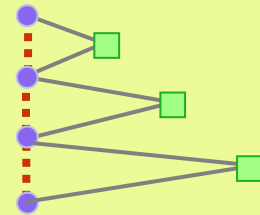
Topic exploration



Topic switch



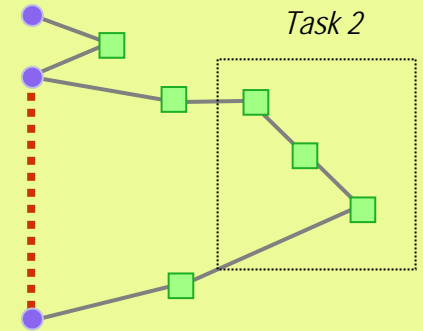
Methodical results exploration



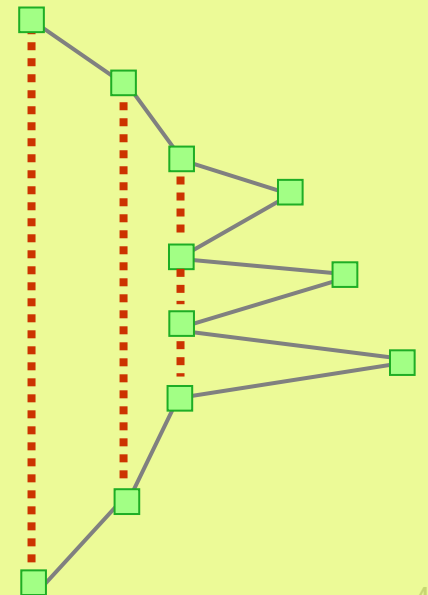
Query reform



Multitasking



Stacking behavior



- **Search is often a multi-step process:**

1. find or navigate to a good site (“orienteering”)
2. browse for the answer there

[actor most oscars] vs. [oscars]

- **Teleporting**

- “I wouldn’t use Google for this, I would just go to...”

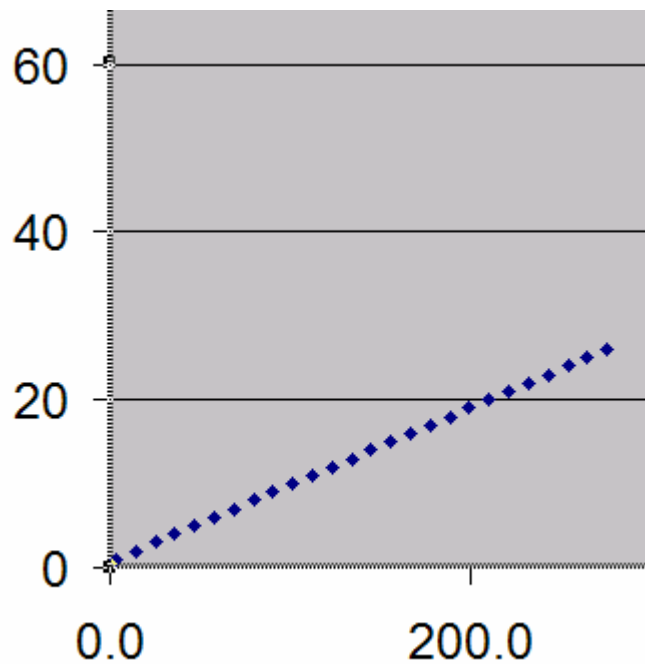
- **Triangulation**

- draw information from multiple sources and interpolate

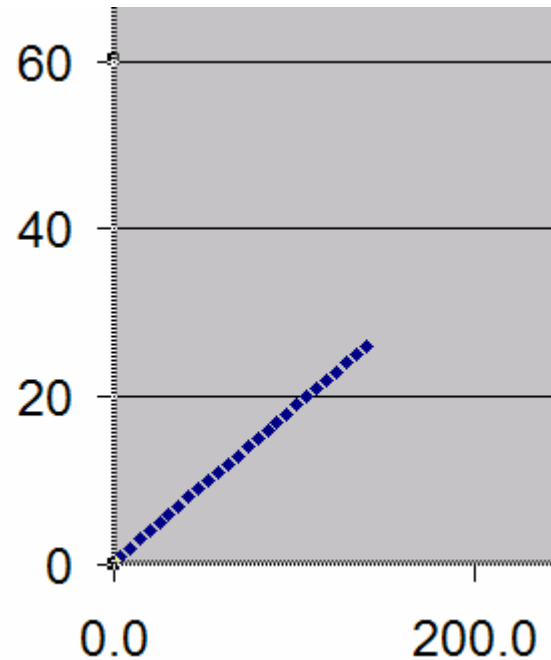
Example: “how long can you last without food?”

Sequence chart

- X over time; event sequence number on Y



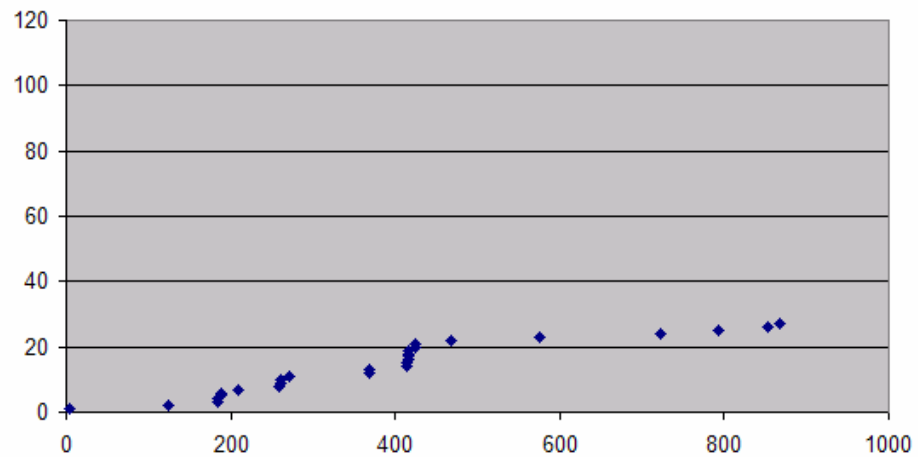
1 query every 24 hrs



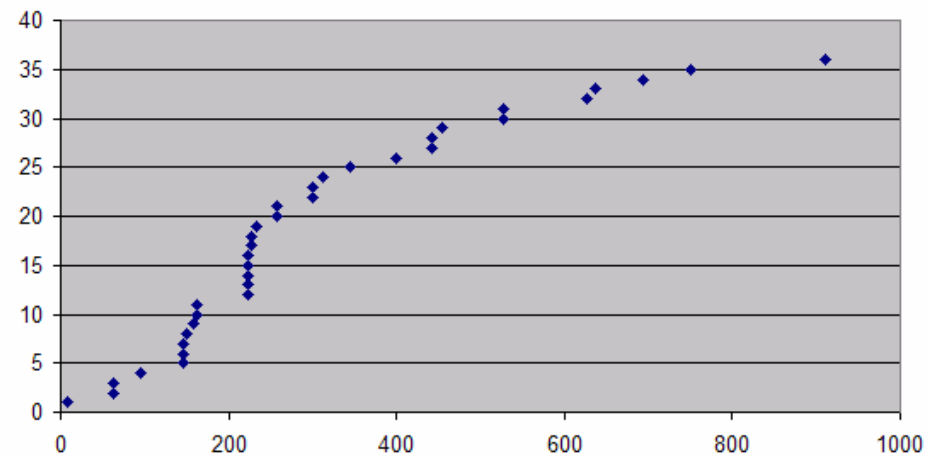
1 query every 12 hrs

Light users (over 41 days)

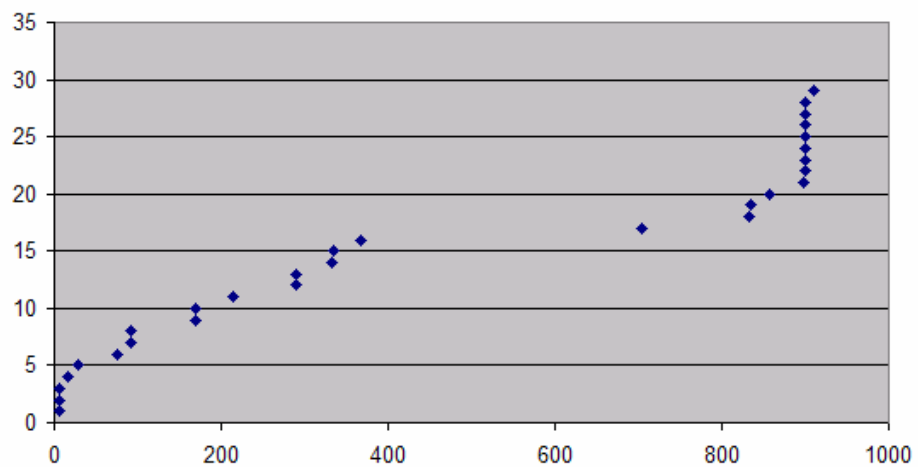
ID:142



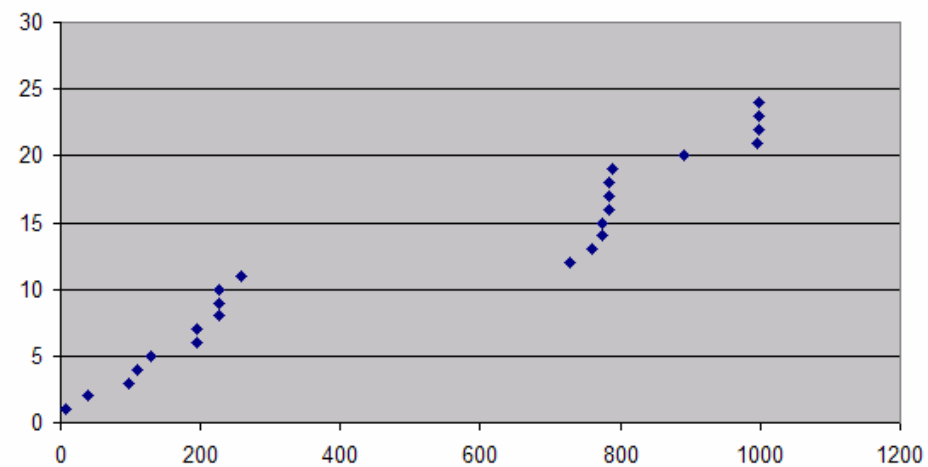
ID:1326



ID:217



ID:1268



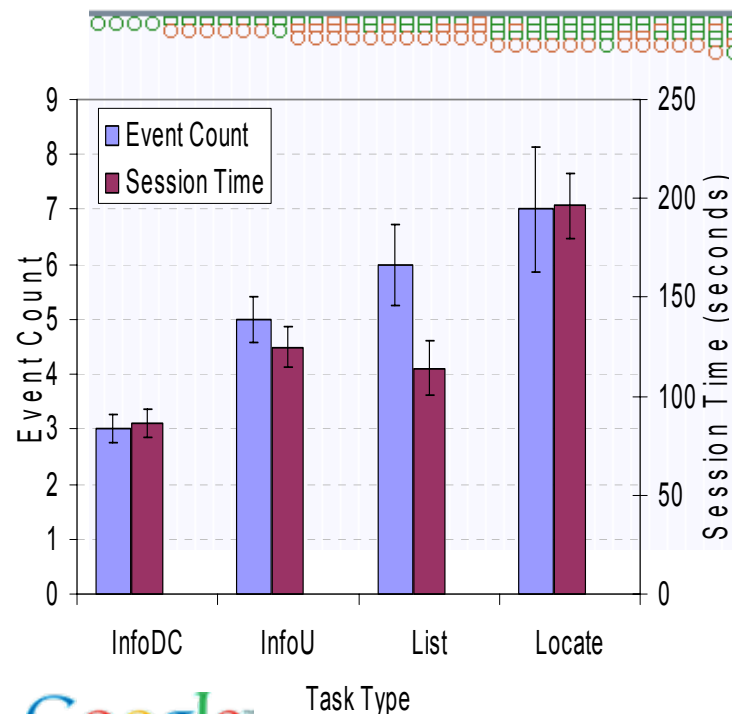
Measurable differences between different task types?

Informational/Directed/Closed

"Find a painting by Georges Seurat called 'La Grande Jatte'"

Informational/Locate

"Search for a man's watch that is water resistant to 100 meters and under \$100"



Main effect of task type on:

- **Event count**
(Kruskal-Wallis: $\chi^2(3)=368.3$; $p<.001$) and
- **Session time**
(Kruskal-Wallis: $\chi^2(3)=368.7$; $p<.001$)

Info Direct-Closed < Info Undirected <= List < Locate

To be a strong user...

...you need to have fairly deep knowledge...

- What sites are possible
- What's in a given site (what's likely to be there)
- Authority of source / site
- Index structure (time, place, person, ...)
 - ➔ what kinds of searches?
- ***How to read a SERP critically***

► Mental models

- How **DO** people think about what a search engine does?
 - Completely keyword search?
 - Full-text indexing?
 - Partial-text indexing?
 - Link anchors?
- What **DOES** one need to know to use search effectively?
 - Relevance?
 - Keyword term frequency?
 - Layered index?
 - Spider / crawling?

kidney stone

Search

More

Results 1 - 10 about 1,000,000 (0.23 seconds)

Fast Kidney Stone Relief

www.kidneysite.com All Natural, Safe & Effective Disintegrates

Fast Kidney Stone Relief

Uriflow.com Works Immediately To Disintegrate And Flush Out

Kidney Stones in Adults

Discusses the causes, symptoms, and diagnosis of **kidney stones**, treatment strategies and treatment options, as well as information on current

<http://www.niddk.nih.gov/health/kidney/pubs/stonadol/stonadol.htm>

I want to try one last thing

Kidney Stones - UrologyChannel

Mental models 1 (a folksonomy)

1. How does Google look it up? **(how can I say what I want?)**
2. Predictable behavior **(when I do X, it does Y)**
3. What content is indexed? **(what can I search for?)**
4. How are the results ranked? **(why do they come out in this order?)**
5. What's in the index? **(what are the different kinds of things to find)**

Looking for an image

Google Web Images Groups News Froogle Maps

La Grande Jatte by Georges Seurat

Web

Product search results for **La Grande Jatte by Georges Seurat**

 Sunday Afternoon on the Island of La Grande Jatte by ... - \$419.99 - Ta
Sunday Afternoon on la Grande Jatte by Georges Seurat - \$23.83 - Po
La Grande Jatte by Georges Seurat Poster/Print - \$12.80 - eBay

WebMuseum: **Seurat, Georges**

Georges-Pierre Seurat was born on Dec. 2, 1859, in Paris. He studied at the E
More details Un dimanche après-midi à l'Île de la Grande Jatte ...
www.ibiblio.org/wm/paint/auth/seurat/ - 7k - [Cached](#) - [Similar pages](#)

Froogle?

Scholar?

Google Web Images Groups News Froogle Maps Scholar more »

La Grande Jatte by Georges Seurat painting

Search [Advanced Search](#) [Preferences](#)

Web

Scholarly articles for La Grande Jatte by Georges Seurat painting

 On Concurrent Programming - Schneider - Cited by 55
Chapter 13 Selfobject Theory and the Artistic Process - Rotenberg - Cited by 8

The Art Institute of Chicago: Art Access

The artist visited **La Grande Jatte** many times, making drawings and more than ... With his
precise method and technique, **Seurat** conceived of his painting as ...
www.artic.edu/artaccess/AA_Impressionist/pages/IMP_7.shtml - 14k - [Cached](#) - [Similar pages](#)

	URL	Title	Search Word(s)
4	525	http://www.google.com/search?hl=en&q=La+Gran...	La Grande Jatte by Georges Seurat - Go... La Grande Jatte by Georges Seurat
5	530	http://froogle.google.com/froogle?q=La+Grande+J...	Froogle Search: La Grande Jatte by Geor...
6	542	http://froogle.google.com/froogle_url?q=http://ww...	A Sunday on La Grande Jatte, 1884 Post...
7	553	http://froogle.google.com/froogle?q=La+Grande+J...	Froogle Search: La Grande Jatte by Geor...
8	555	http://www.google.com/search?hl=en&q=La+Gran...	La Grande Jatte by Georges Seurat - Go... La Grande Jatte by Georges Seurat
9	560	http://www.google.com/search?hl=en&lr=&q=La+...	La Grande Jatte by Georges Seurat paint... La Grande Jatte by Georges Seurat p...
10	573	http://scholar.google.com/scholar?hl=en&lr=&sa=...	La Grande Jatte by Georges Seurat paint...
11	576	http://www.google.com/search?hl=en&lr=&q=La+...	La Grande Jatte by Georges Seurat paint... La Grande Jatte by Georges Seurat p...
		WebMuseum: Seurat, Georges	
		/gran...	WebMuseum: Seurat, Georges: Un dima...
		/	WebMuseum: Seurat, Georges
		=La+...	La Grande Jatte by Georges Seurat paint... La Grande Jatte by Georges Seurat p...
		atte.jp...	Seurat, A Sunday Afternoon on the Island...
		.ml	Georges Seurat
		=0&in...	Special Discounts and Offers
		atte.jp...	Special Discounts and Offers
		=0&in...	Special Discounts and Offers
		=0&in...	Special Discounts and Offers
		atte.jp...	Seurat, A Sunday Afternoon on the Island...

for an image here...

Many ways to ask about a painting... many ways to respond...

Query Terms	OneBox	First Google search result
georges seurat "la grande jatte"	None	The Art Institute of Chicago: Art Access
georges seurat la grande jatte	None	The Art Institute of Chicago: Art Access
"la grande jatte"	None	Seurat, A Sunday Afternoon on the Island of La Grande Jatte
la grand jatte	None	The Art Institute of Chicago: Art Access
george seurat, la grande jatte	None	WebMuseum: Seurat, Georges
george seurat "la grande jatte"	None	The Art Institute of Chicago: Art Access
painting la grand jatte	None	The Art Institute of Chicago: Art Access
"la grande jatte by georges seurat"	None	Sunday Afternoon on the Island of La Grande Jatte Posters by
...		
george seurat la grande jatte	None	Webmuseum: Seurat, Georges
georges seurat painting	None	Webmuseum: Seurat, Georges
la grande jatte	Image	The Art Institute of Chicago: Art Access
la grande jatte georges	Product	The art institute of Chicago
la grande jatte by georges seurat	Product	Webmuseum: Seurat, Georges
georges seurat painting grande jatte	Product	The Art Institute of Chicago: Art Access
la grande jatte painting	Product	Seurat, A Sunday after noon on the island
painting la grand jatte seurat	Product	The Art Institute of Chicago: Art Access
seurat la grande jatte pic	Book	FlickrBlog
la grande jatte by george seurat	Book	Webmuseum: Seurat, Georges
seurat la grande jatte image	Book	Webmuseum: Seurat, Georges
La Grande Jatte by Georges Seurat painting	Scholar	The Art Institute of Chicago: Art Access

...with many OneBoxes...



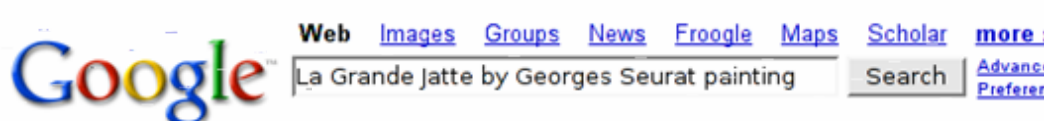
Web

Book results for [la grande jatte by george seurat](#)

-  [Enchanted Evenings](#) - by [Geoffrey Block](#) - 410 pages
[Painting and Sculpture in Europe 1880-1940](#) - by [George Heard Hamilton](#)

WebMuseum: [Seurat, Georges](#)

His famous canvas Sunday Afternoon on the Island of the **Grande Jatte** was the of an exhibition in 1886. By then **Seurat** was spending his winters ...
[www.ibiblio.org/wm/paint/auth/seurat/](#) - 7k - [Cached](#) - [Similar pages](#)



Web

Scholarly articles for [La Grande Jatte by Georges Seurat painting](#)

-  [On Concurrent Programming](#) - [Schneider](#) - Cited by 55
[Chapter 13 Selfobject Theory and the Artistic Process](#) - [Rotenberg](#) - Cited by 8

The Art Institute of Chicago: Art Access

The artist visited **La Grande Jatte** many times, making drawings and more than ... With his precise method and technique, **Seurat** conceived of his painting as ...
[www.artic.edu/artaccess/AA_Impressionist/pages/IMP_7.shtml](#) - 14k - [Cached](#) - [Similar pages](#)



Web

Image results for [la grande jatte](#)



The Art Institute of Chicago: Art Access

A Sunday on **La Grande Jatte**—1884, 1884-86. Oil on canvas. 207.5 x 308 cm ... The artist visited **La Grande Jatte** many times, making drawings and more than 30 ...
[www.artic.edu/artaccess/AA_Impressionist/pages/IMP_7.shtml](#) - 14k - [Cached](#) - [Similar pages](#)



Web

Product search results for [la grande jatte georges](#)

-  [Georges Seurat Sunday Afternoon Island La Grande Jatte](#) - \$2.99 - [eBay](#)
["Sunday Afternoon on la Grande Jatte." Georges Seurat ...](#) - \$1.99 - [EaselWeasel.com](#)
[Sunday Afternoon on the Island of La Grande Jatte by ...](#) - \$419.99 - [Target](#)

The Art Institute of Chicago: Art Access

Georges Seurat. French, 1859-1891 ... The artist visited **La Grande Jatte** many times, making drawings and more than 30 oil sketches to prepare for the final ...
[www.artic.edu/artaccess/AA_Impressionist/pages/IMP_7.shtml](#) - 14k - [Cached](#) - [Similar pages](#)

What's the mental model of oneboxen?

- It's magic:

"... I don't know how to make it come back..."

*"... why does this... **thing**... keep being at the top?"*



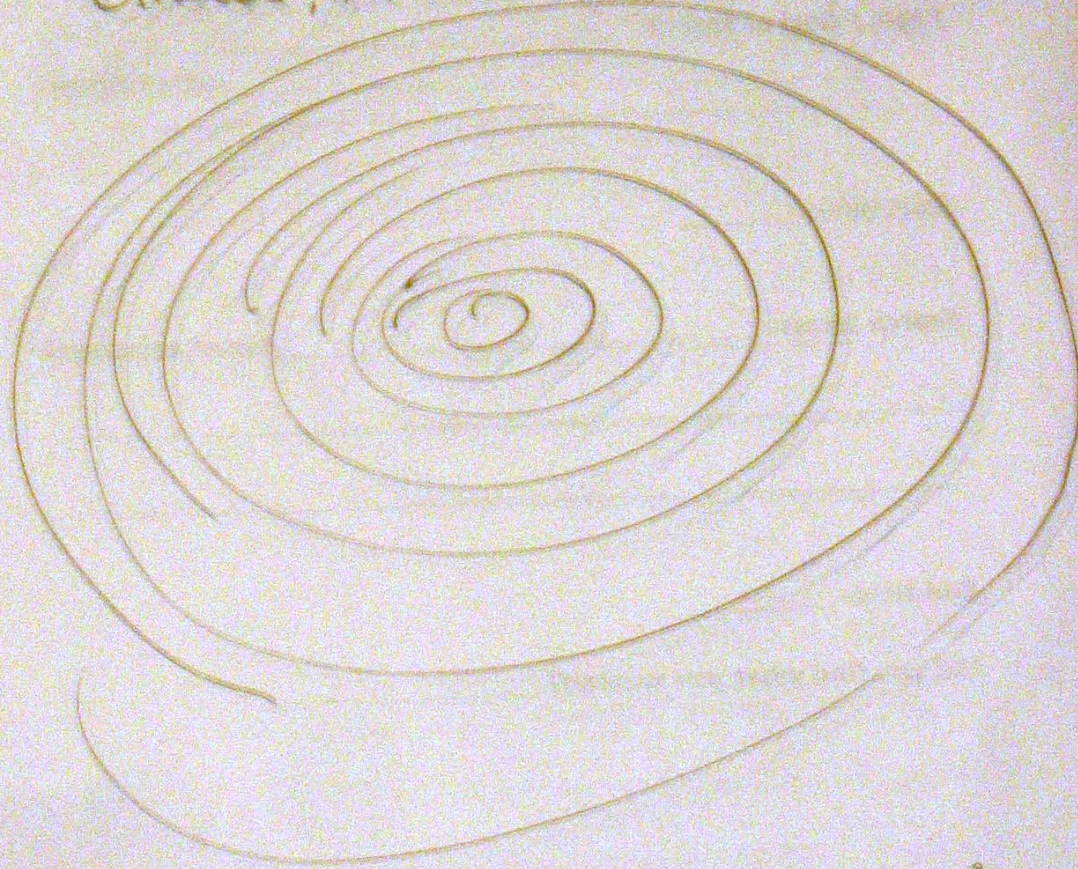
- The un-nameable & inconceivable is magical



A model of Google

4. Can you draw a diagram that illustrates how a Google search works? After you enter your keywords, what happens?

Several overlapping concentric
Circles, Not Linear, Boolean Targets.



Mental model 2



Mental model 3: How can we portray these?

1. Predictable behavior *Can I predict what will happen when I do X?*
2. How is content indexed? *Is it full-text? How are images indexed?.....*
3. How does Google look it up? *Which keywords should I pick?*
4. How are the results ranked? *What does the order mean?*
5. What's in the index? *What kinds of documents can I search?*

► Culture of search 1

- What does it mean to Google something?
"...let me google this on Yahoo..."
- How does always available search change your conversations?



Culture of search 2

- Has ubiquitous search changed expectations about knowledge?

Type 1: **Eternal verities** ($F = ma$; Antarctica is a continent)

Type 2: **Mid-term** (Sacramento is the capital of California; there are 117 elements)

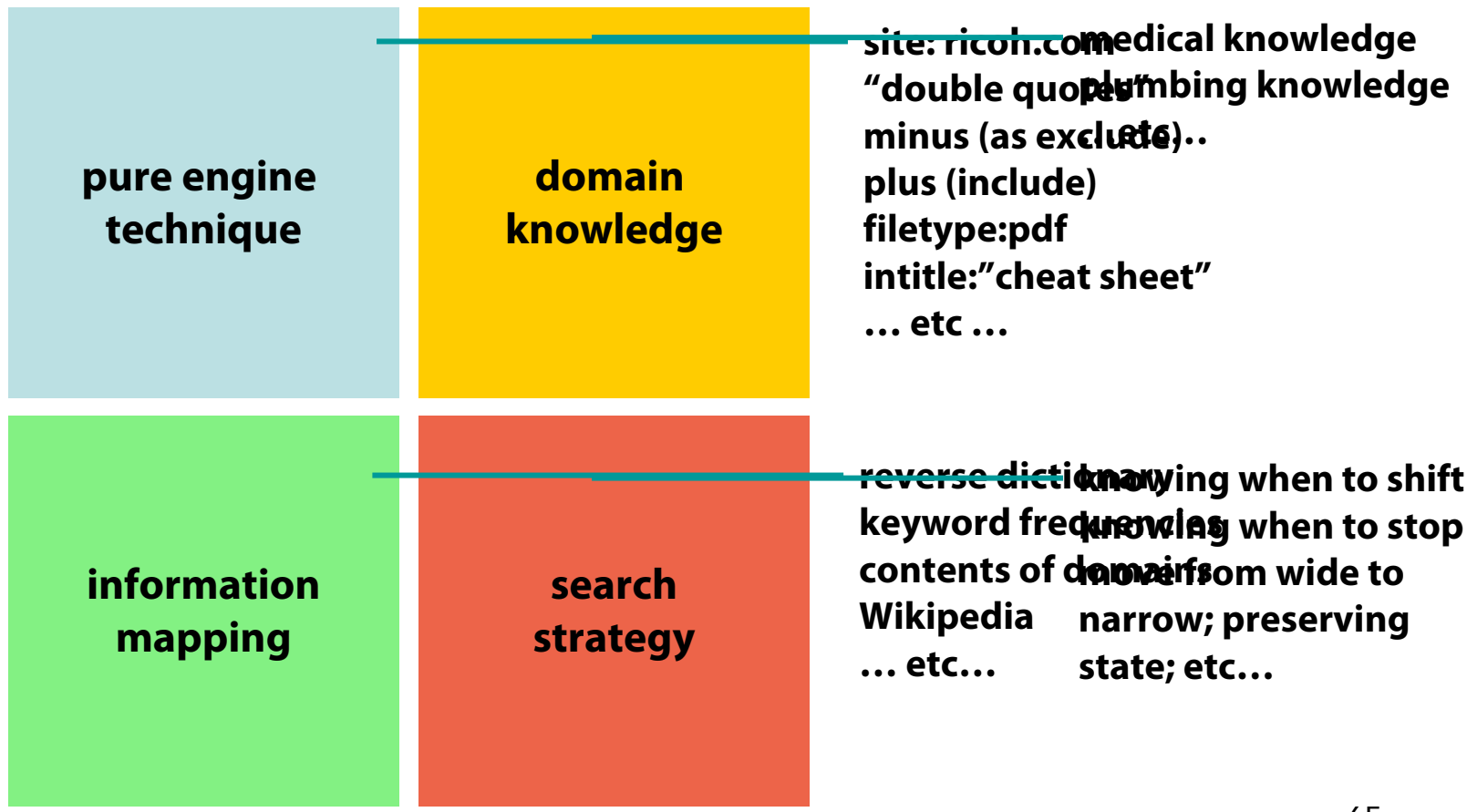
Type 3: **Ephemera** (my IP address is 9.1.2.142; use Muggle.google.com for your proxy)

Culture of search 3

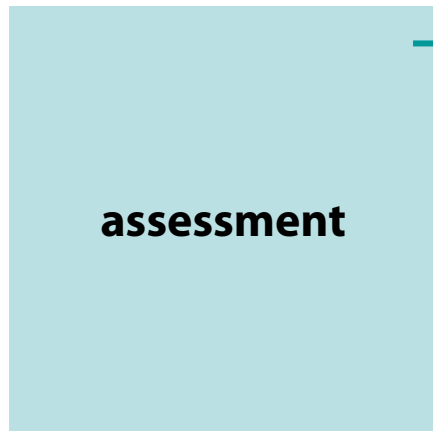
- Key question: What do you *really* need to know?
 - recognition knowledge?
 - contextual knowledge?
 - search skill?
- When the cost of discovery and access is low...
does that change your expectation
of others?

► A research literacy

- Five kinds of knowledge & skills needed to search:



- A fifth kind of knowledge... assessment / evaluation



Is this believable?

**How does this link to
other information I
already know?**

**What is the
relationship of this
information to
authoritative sources?**

- **Search engines will continue to change**
 - change is constant...
new document types, new searches, new possibilities
 - that's the point of all our studies / testing
 - things will continue to change rapidly
- **Search engines need to match capabilities with user expectations and understandable user mental models**
 - need to continually refine understanding of user population's mental models
 - need to detect when a particular model is in play

- **For search engines:**
 - To create a system that behaves predictably
 - To understand expectations of entire breadth of users
- **For our users:**
 - To learn the basics of how search engines work
 - To have a functional mental model

END