Beyond the Commons

Investigating the Value of Personalizing Web Search

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Outline

- Value of personalizing web search
- Study of personal relevancy
  - Rank and rating
  - Same query, different ratings
- Search engines are for the masses
  - Much room for improvement
- Implications for personalized search

What is the Value of Personalization?

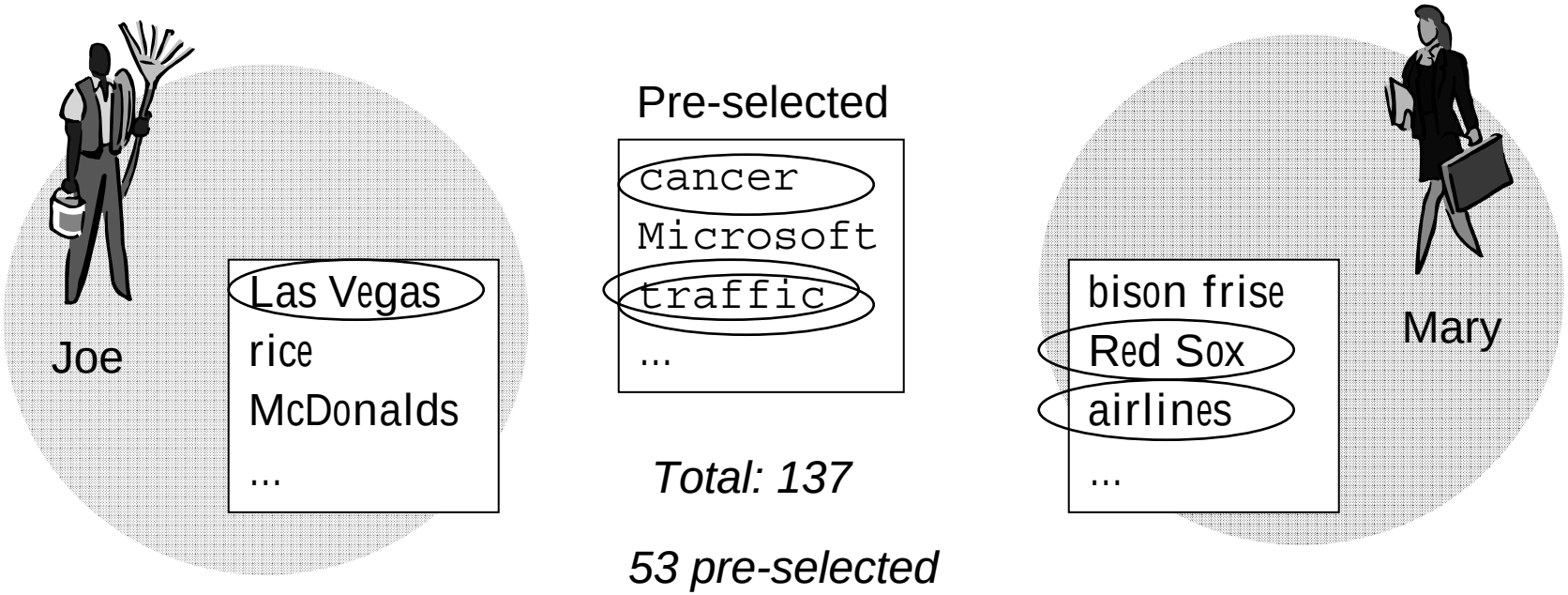
- Do people want different results for the same query?
- How much improvement can be gained by making a generic search engine better?
- How much will personalization help?

Study of Personal Relevancy

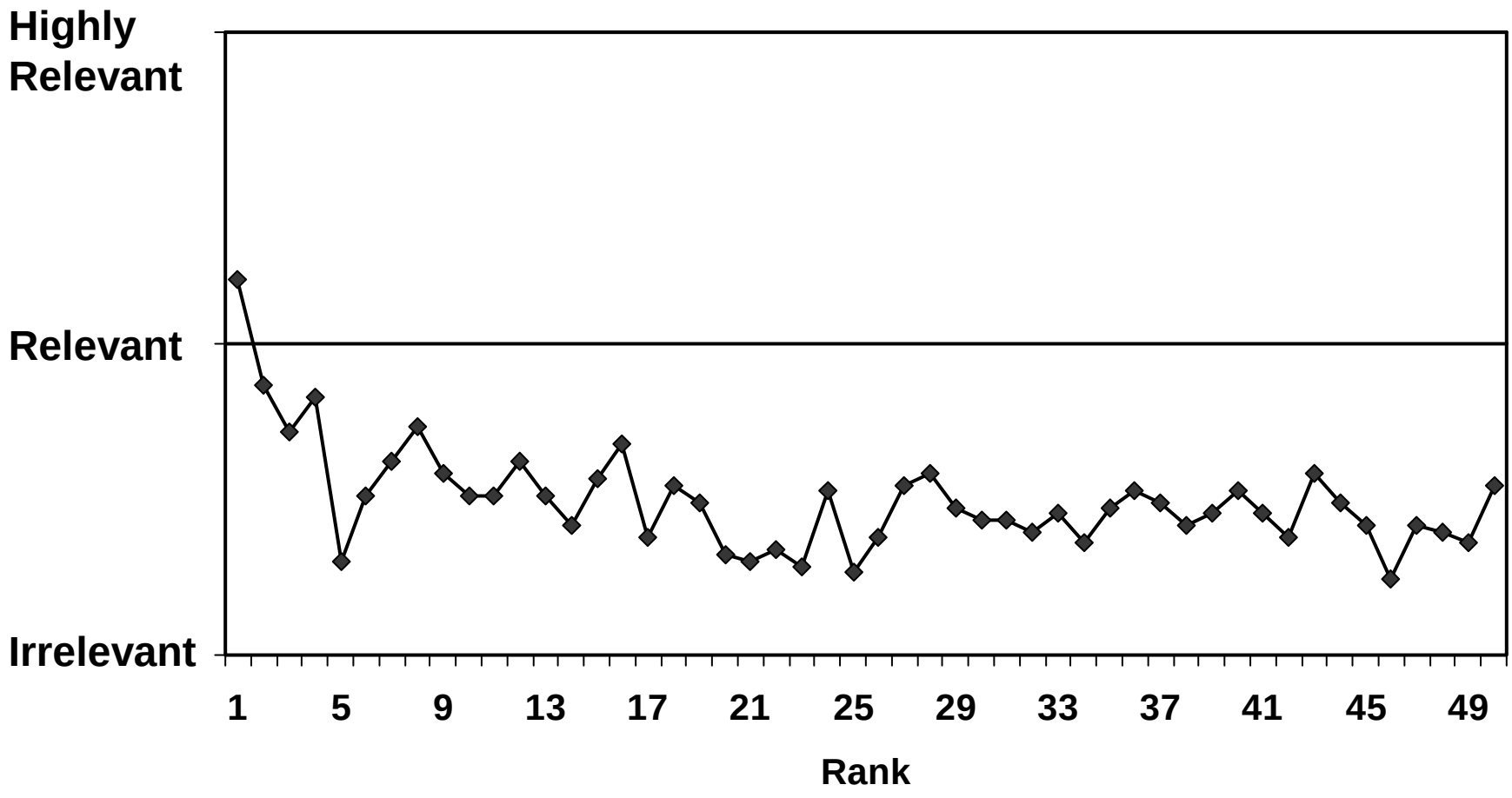
- 15 participants
  - Microsoft employees
  - Managers, support staff, programmers, etc.
- Evaluate 50 results for a query
  - “Highly relevant”
  - “Relevant”
  - “Irrelevant”
- Based on personal preference
- Longer description of information goal
- ~10 queries per person

Study of Personal Relevancy

- Query selection
  - Previously issued query (based on diary)
  - Chose from 10 pre-selected queries

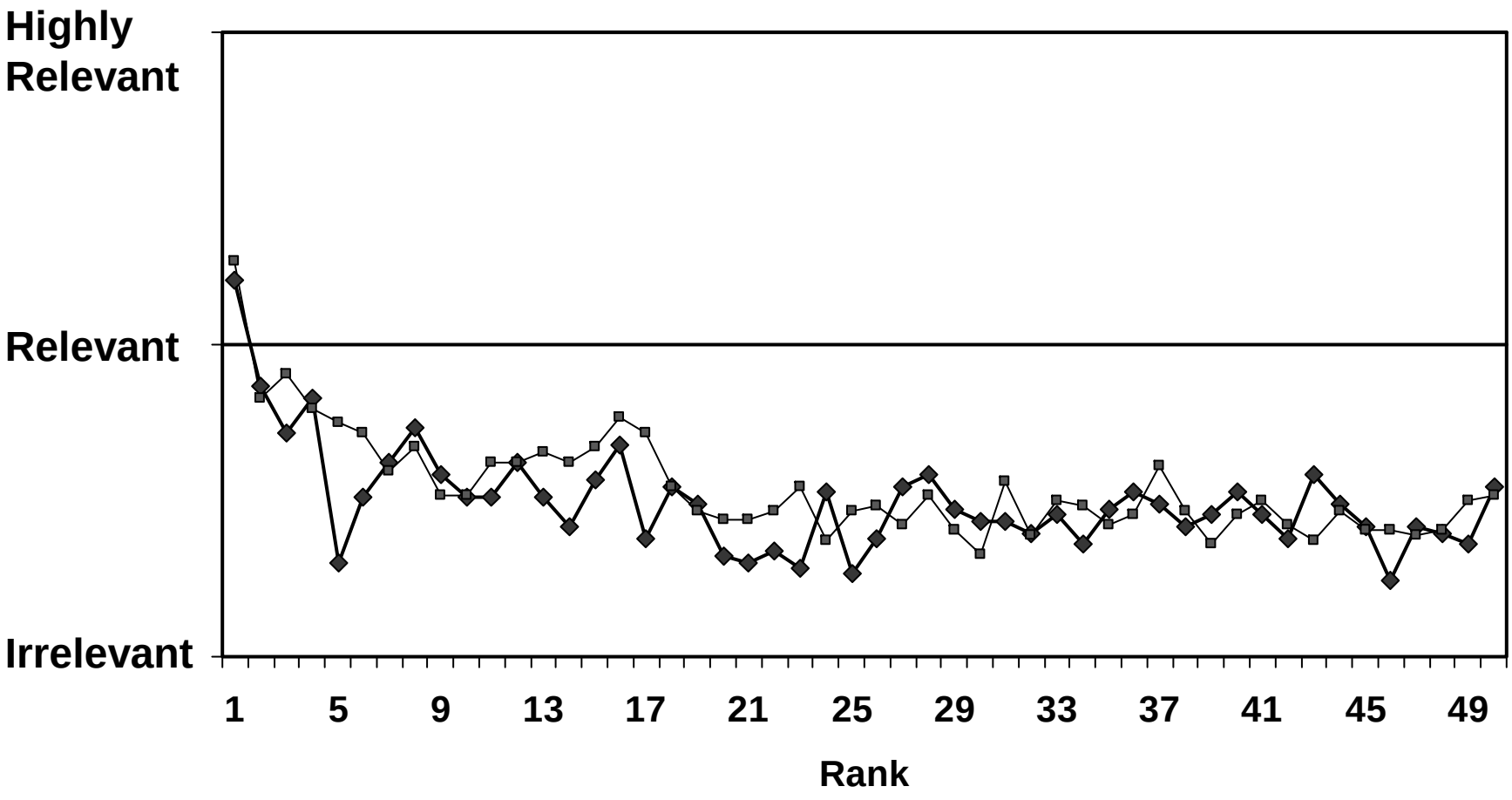


Relevant Results Have Low Rank
(Pre-selected queries)



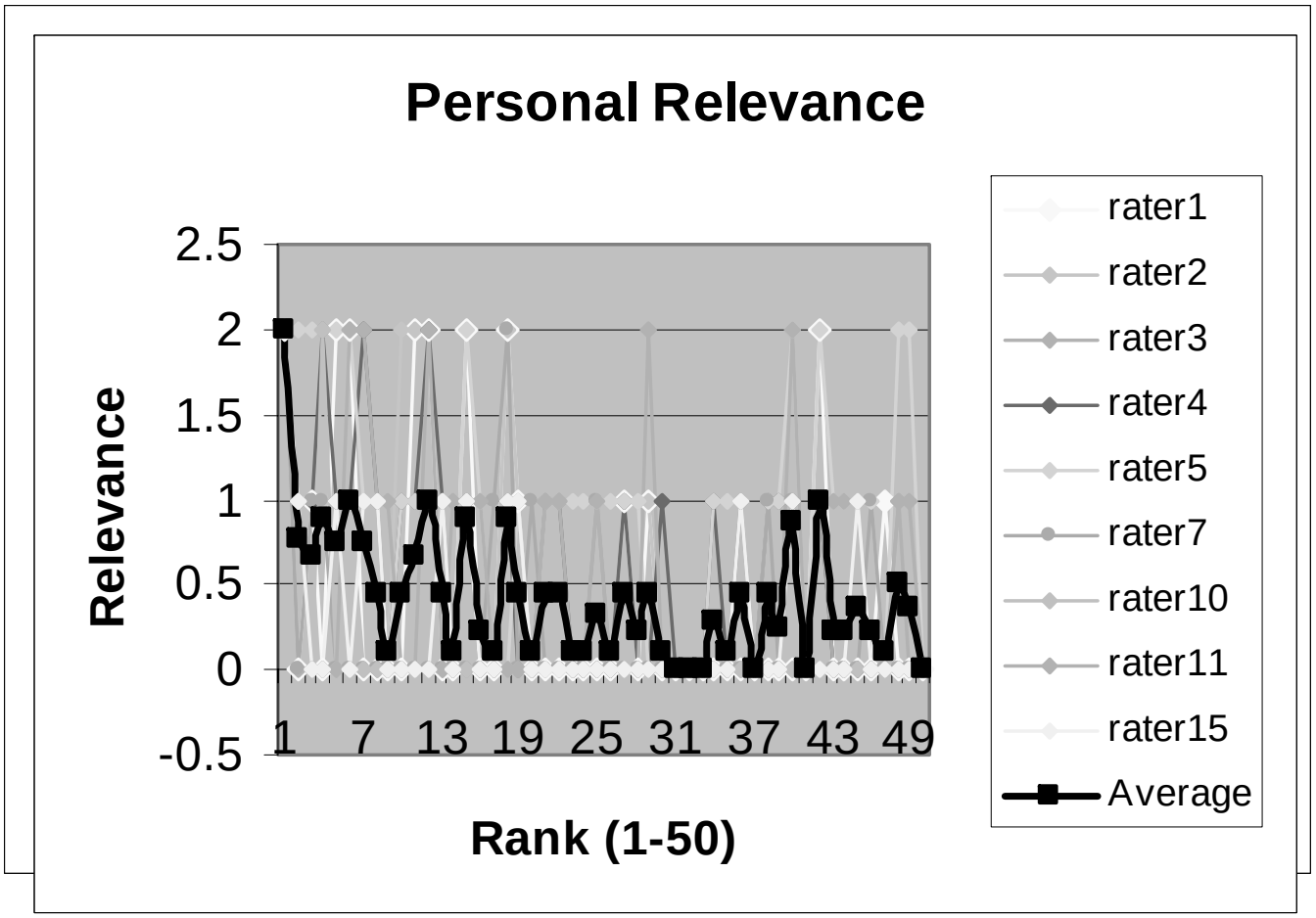
Relevant Results Have Low Rank

(+ Self-selected queries)



Relevant Results Have Low Rank

(Some low ranks highly rated; Raters disagree)



Same Results Rated Differently

- Average inter-rater reliability: 56%
- Different from previous research
  - Belkin: 94% IRR in TREC
  - Eastman: 85% IRR on the Web
- Asked for *personal* relevance judgments, rather than general topical relevance

- Some queries more correlated than others

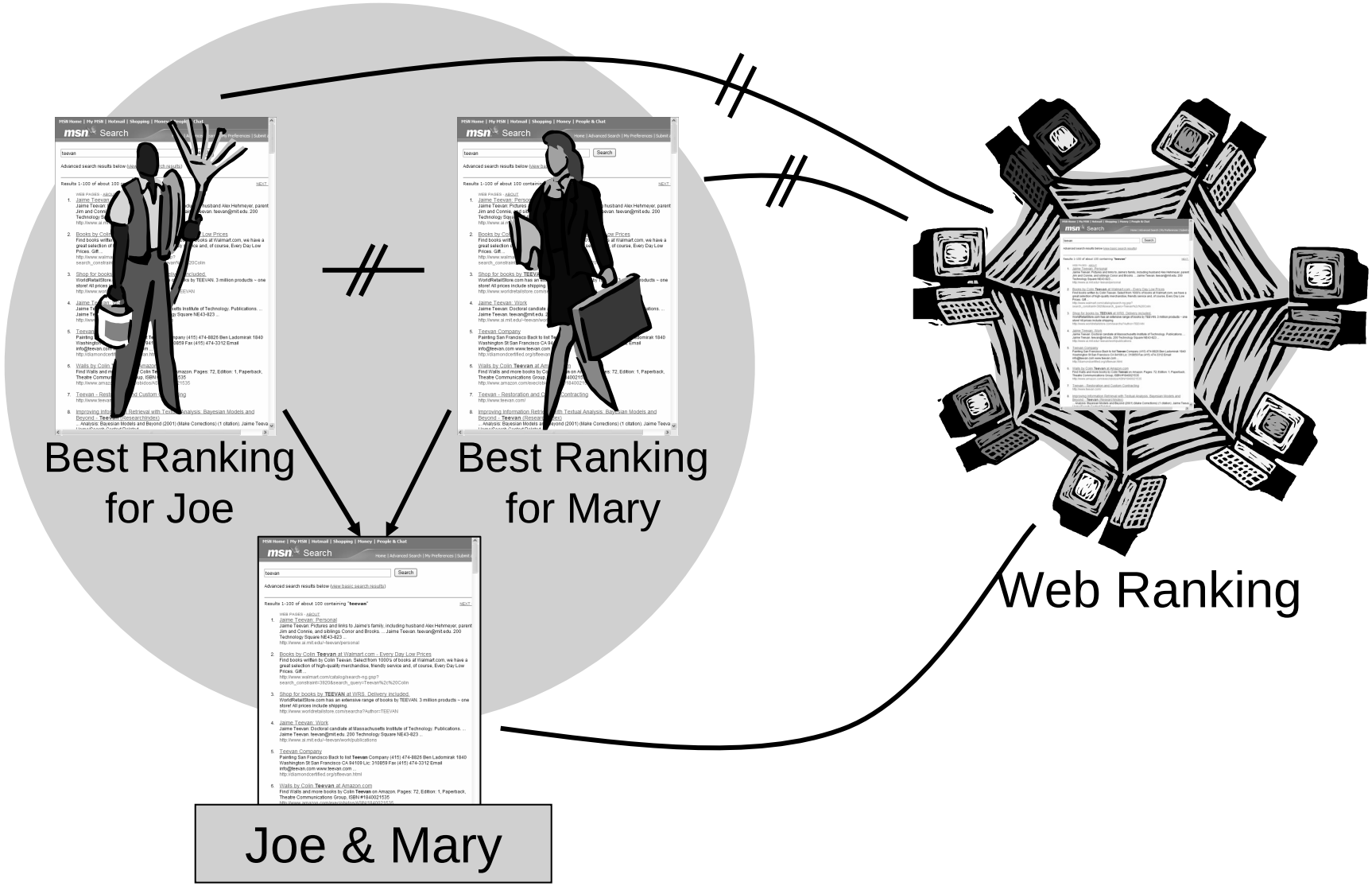
Same Query, Different Meaning/Intent

- Query: *cancer*
- Different meanings
  - “Information about the astronomical/astrological sign of cancer”
  - “information about cancer treatments”
- Different intents
  - “is there any new tests for cancer?”
  - “information about cancer treatments”

Same Intent, Different Evaluation

- Query: *Microsoft*
- Same intents
  - "information about microsoft, the company"
  - "Things related to the Microsoft corporation"
  - "Information on Microsoft Corp"
- 31/50 rated as *relevant* or *highly relevant*
  - All three agree only for www.microsoft.com
  - Only 6/31 do more than one agree
  - Inter-rater reliability: 62%

Search Engines are for the Masses

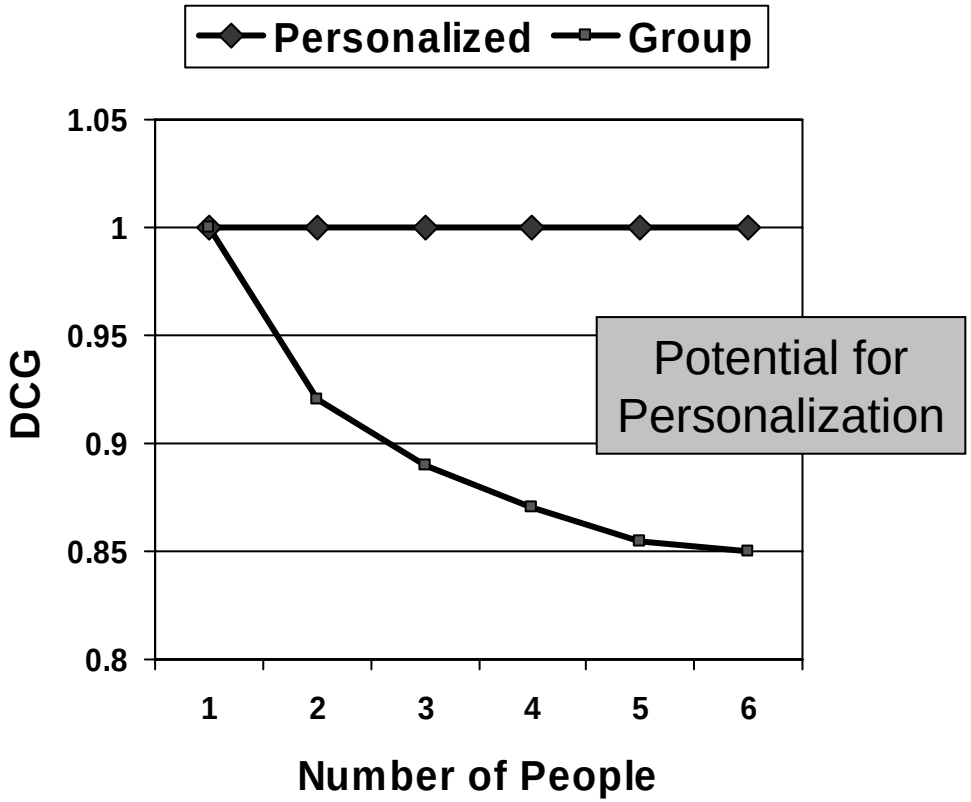


Search Engines are for the Masses

- Best common ranking for a query
  - $\mathrm{DCG}(i) = \begin{cases} \mathrm{Gain}(i), & \text{if } i = 1 \\ \mathrm{DCG}(i-1) + \mathrm{Gain}(i)/\log(i), & \text{otherwise} \end{cases}$
  - Sort results by number marked *highly relevant*, then by *relevant*
- Compare best possible ranking with Web ranking
  - Measure distance with *Kendall-Tau*
  - Number of pair-wise disagreements
  - 0 = same; 1 = reverse order
- Web ranking more similar to common
  - KT(Web, Individual) = 0.47
  - KT(Web, Common) = 0.44

Much Room for Improvement

- Group ranking
  - Best improves on Web by 23%
  - More people → Less improvement
- Personal ranking
  - Best improves on Web by 38%
  - Remains constant



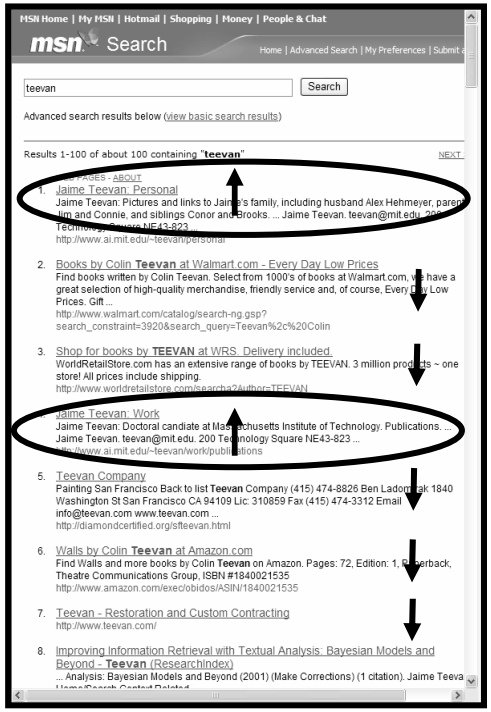
How to Close the Gap

- Aid user to better specify search goal
  - Longer queries; Explicit profile
- Interaction with user
  - Query suggestion; Relevance feedback; Meta-data
- Infer search goal automatically
  - Previous query
  - Richer model (content, usage)
  - And … Re-rank results -> PS Prototype

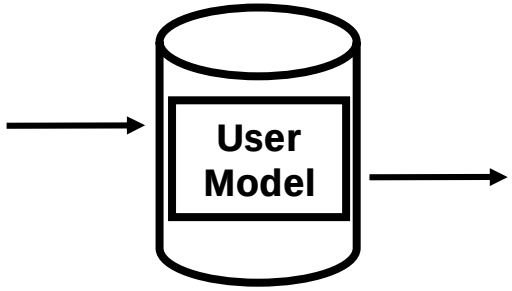
- *Minimize* upfront *work* by user (e.g., no explicit profile); *Maximize* user *control*

Personalized Search (PS): Overview

Step 1:
Retrieve web search results, n>>10



Step 2:
Compute similarity (result, user)



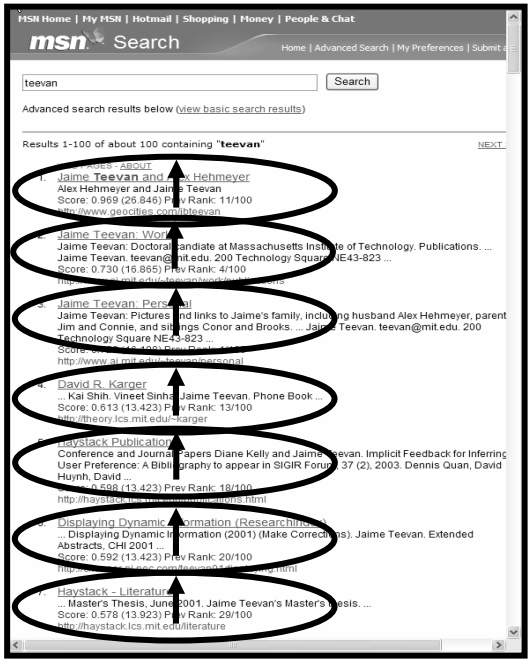
User Model:

* Content + Activity
* Rich and unstructured

Client-Side:

* All storage and processing

Step 3:
Re-rank search results



Summary

- Personal relevance study
- Different ratings even with similar goals
- Making everyone happy means making the individual less happy
- Implications for improving search
  - PS paper to appear at SIGIR 2005

Thank you!
Questions / Comments ???

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http://research.microsoft.com