Google the Gatekeeper: How Search Components Affect Clicks and Attention

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Background: Evolution of Google Search

1998: 10 Blue Links

Background: Evolution of Google Search

1998: 10 Blue Links

2007: Universal Search

Image Credits: *wellspringdigital.com*

Background: Evolution of Google Search

1998: 10 Blue Links

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2012: Knowledge Graph

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2012: Knowledge Graph

2014: Featured Snippets

5

Background: Evolution of Google Search

1998: 10 Blue Links

2007: Universal Search

2012: Knowledge Graph

2014: Featured Snippets

2023: Generative AI

Motivation 1: Good Abandonment

- **Definition:** A user's information need is successfully addressed by the results page with no need to click on a result [1]

[1] Li, J.; Huffman, S.; and Tokuda, A. 2009. Good abandonment in mobile and PC internet search. In *Proceedings of the 32nd international ACM SIGIR conference on Research and development in information retrieval*.

Motivation 1: Good Abandonment

- **Definition:** A user's information need is successfully addressed by the results page with no need to click on a result [1]

- Wikipedia visitation rate increases from 11.1% to 20.5% when Wikipedia knowledge components removed [2]
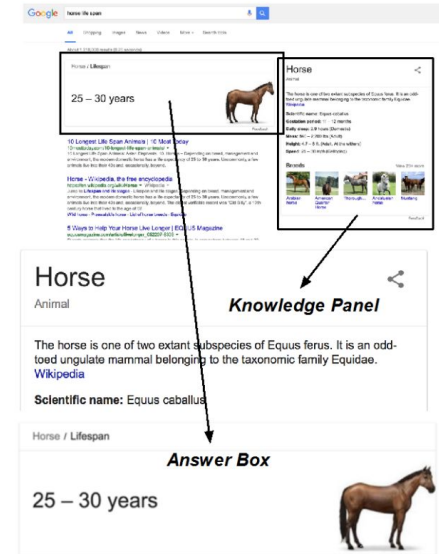
Figure 1: A "Knowledge Panel" and "Rich Answer"

[2] McMahon, C.; Johnson, I.; and Hecht, B. 2017. The Substantial Interdependence of Wikipedia and Google: A Case Study on the Relationship Between Peer Production Communities and Information Technologies. In *Proceedings of the International AAAI Conference on Web and Social Media.*

Research Question 1

What effect do **extracted results** have on **behavior**, measured through (1) click-through rate (CTR) and (2) time on the results page?

Direct-Answer

Featured-Snippet

Knowledge-Panel

Motivation 2: Self-Preferencing

- **Definition:** A gatekeeper treats their own product or service more favorably than similar products or services offered by third-parties [3]

[3] European Commission. 2022. The Digital Markets Act: ensuring fair and open digital markets. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital- markets-act-ensuring-fair-and-open-digital-markets_en. Accessed: 2023-04-18.

Motivation 2: Self-Preferencing

- **Definition:** A gatekeeper treats their own product or service more favorably than similar products or services offered by third-parties [3]

- Users prefer Local-Results that include reviews from competitors (e.g. Yelp, TripAdvisor) [4]
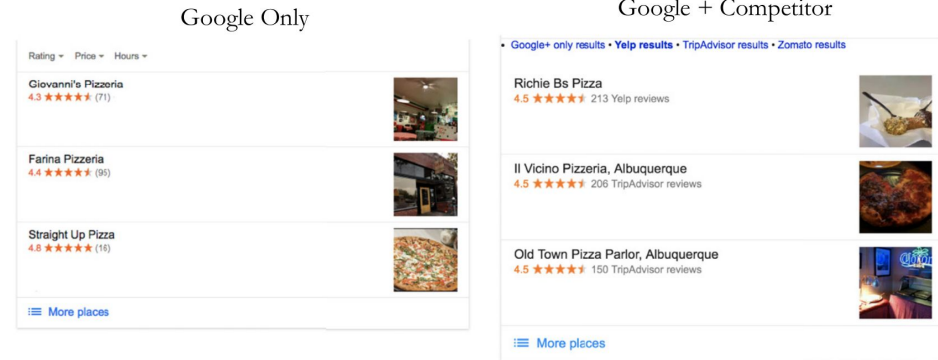
Google Only

Google + Competitor

[4] Kim, H.; and Luca, M. 2019. Product quality and entering through tying: Experimental evidence. *Management Science*, 65(2).

Motivation 2: Self-Preferencing

- **Definition:** A gatekeeper treats their own product or service more favorably than similar products or services offered by third-parties [3]

- Google Flights decreases organic clicks to competitors by 55% and increases paid clicks by 65% [4]

[4] Edelman, B.; and Lai, Z. 2016. Design of search engine services: Channel interdependence in search engine results. *Journal of Marketing Research*, 53(6)

Research Question 2

What effect do **Google Services** have on **traffic**, measured through
(1) organic CTR to 1st-parties and (2) organic CTR to 3rd-parties?
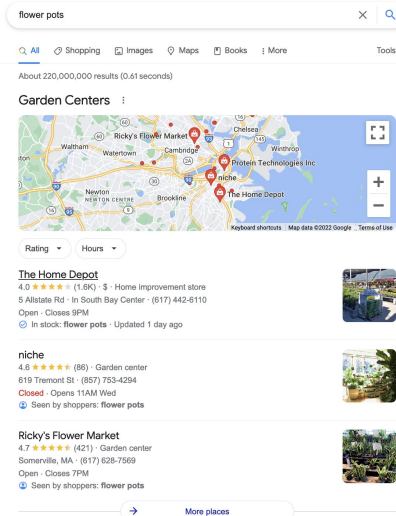
Local-Results
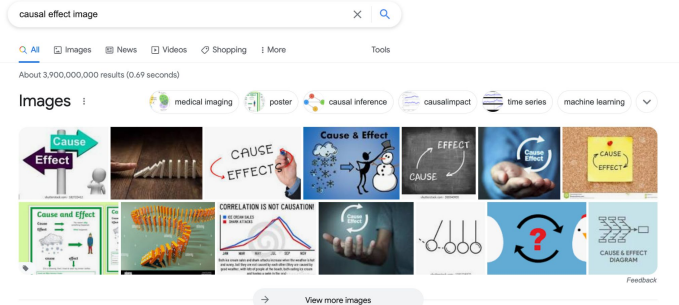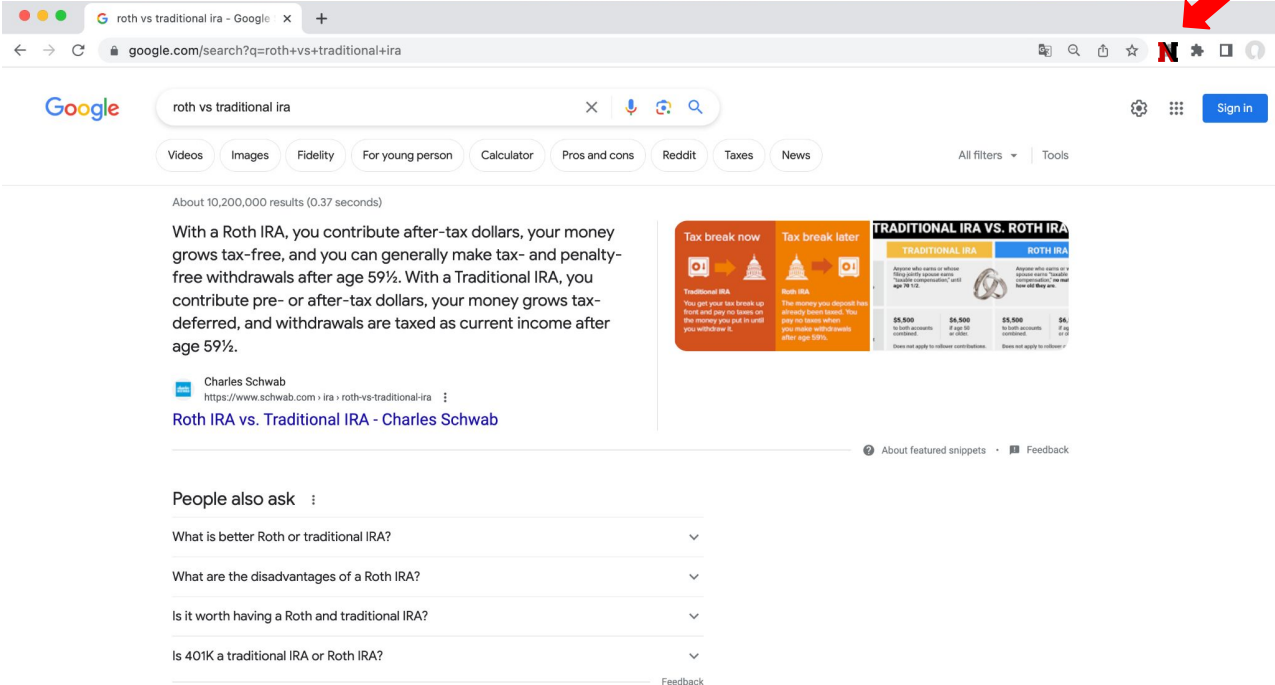
Images
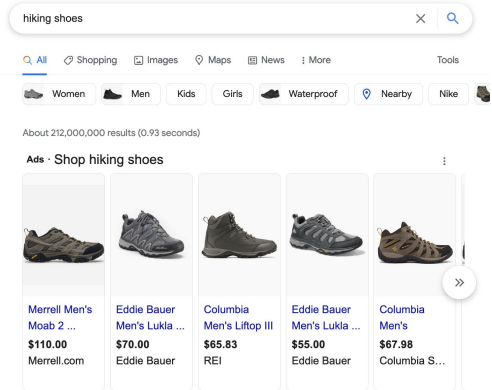
Shopping-Ads

# Data Collection

Data Collection

Data Collection

Data Collection

From Aug to Dec 2020 we collected 850,000+ results pages from 1,900+ participants 17

Method: Treatment Definition

Treatment

Method: Outcome Definition (RQ1)

Treatment

Outcomes: Behavior (RQ1)

1. **Click-through rate (CTR)**
2. **Time on the results page**

Method: Outcome Definition (RQ2)

Treatment

Outcomes: Behavior (RQ1)

1. **Click-through rate (CTR)**
2. **Time on the results page**

Outcomes: Traffic (RQ2)

1. **Organic CTR to 1st-parties**
2. **Organic CTR to 3rd-parties**

Method: Matching

Search Results Page A

Search Results Page B

Method: Matching

Search Results Page A

Search Results Page B

Method: Matching

Search Results Page A

Search Results Page B

[5] Roberts, M. E.; Stewart, B. M.; and Nielsen, R. A. 2020. Adjusting for confounding with text matching. *American Journal of Political Science*, 64(4).
[6] Keith, K. A.; Jensen, D.; and O'Connor, B. 2020. Text and causal inference: A review of using text to remove confounding from causal estimates. *arXiv preprint arXiv:2005.00649*.
[7] Mozer, R.; Miratrix, L.; Kaufman, A. R.; and Anastasopoulos, L. J. 2020. Matching with text data: An experimental evaluation of methods for matching documents and of measuring match quality. *Political Analysis*, 28(4).
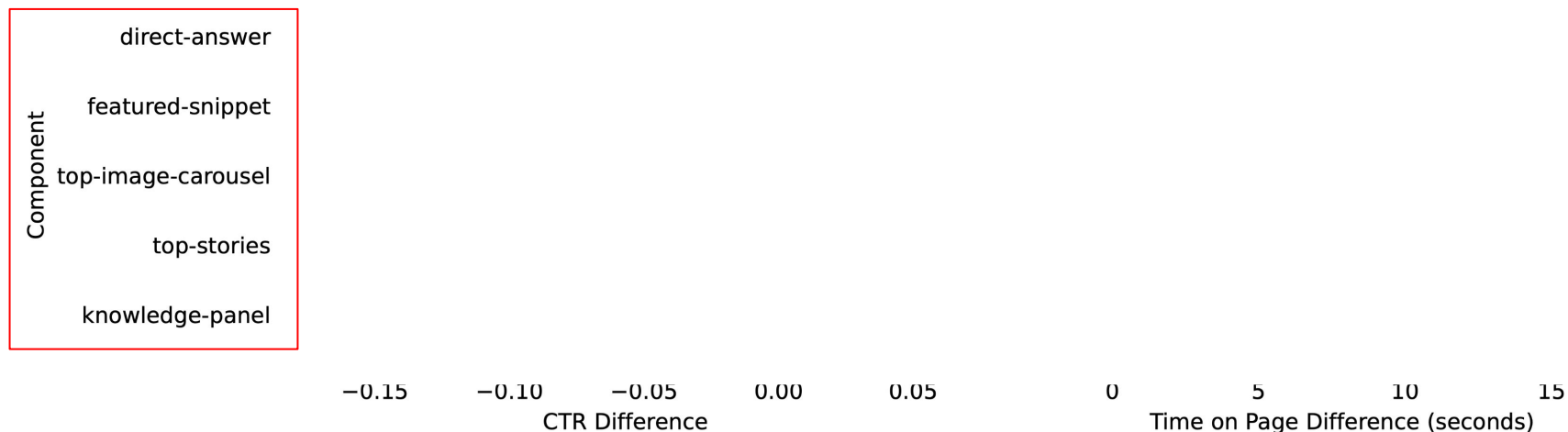
Results: Effects of *Extracted Results* (RQ1)

Component

- direct-answer
- featured-snippet
- top-image-carousel
- top-stories
- knowledge-panel

−0.15   −0.10   −0.05   0.00   0.05

CTR Difference

0   5   10   15

Time on Page Difference (seconds)

Results: Effects of *Extracted Results* (RQ1)

Component

- direct-answer
- featured-snippet
- top-image-carousel
- top-stories
- knowledge-panel

CTR Difference: −0.15, −0.10, −0.05, 0.00, 0.05

Time on Page Difference (seconds): 0, 5, 10, 15

Results: Effects of *Extracted Results* (RQ1)

Component

direct-answer

featured-snippet

top-image-carousel

top-stories

knowledge-panel

−0.15   −0.10   −0.05   0.00   0.05

CTR Difference

0   5   10   15

Time on Page Difference (seconds)
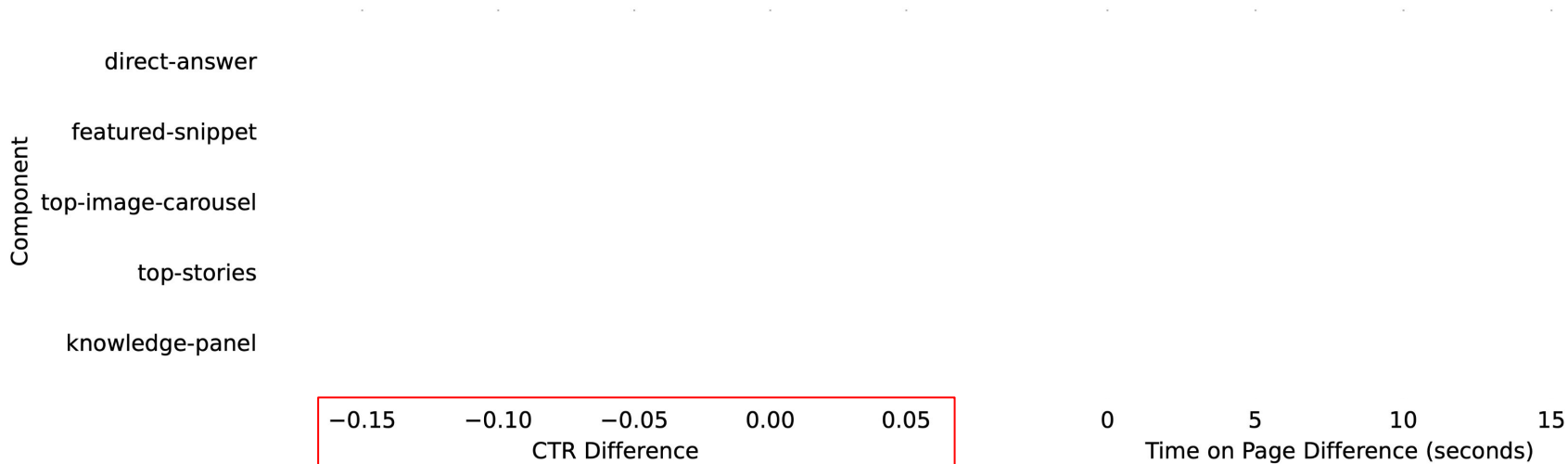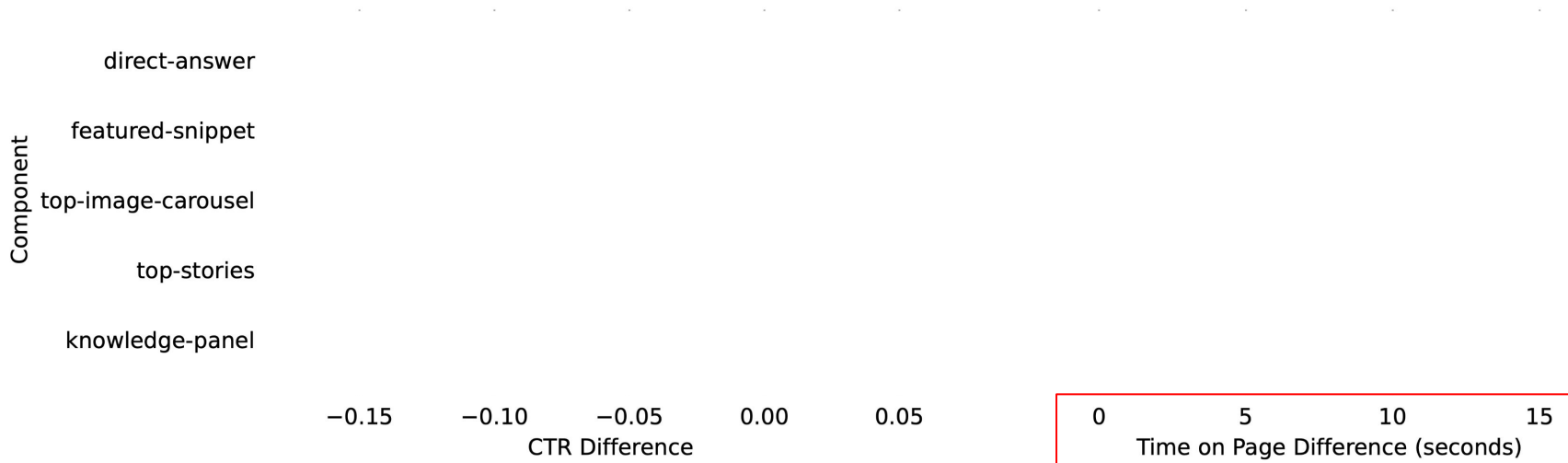
Results: Effects of *Extracted Results* (RQ1)

Featured-snippets decrease CTR by -6.5 pp.
Featured-snippets increase time on the page by 3.7s.
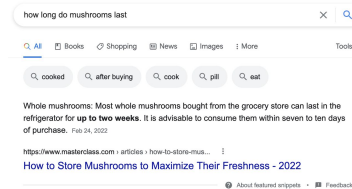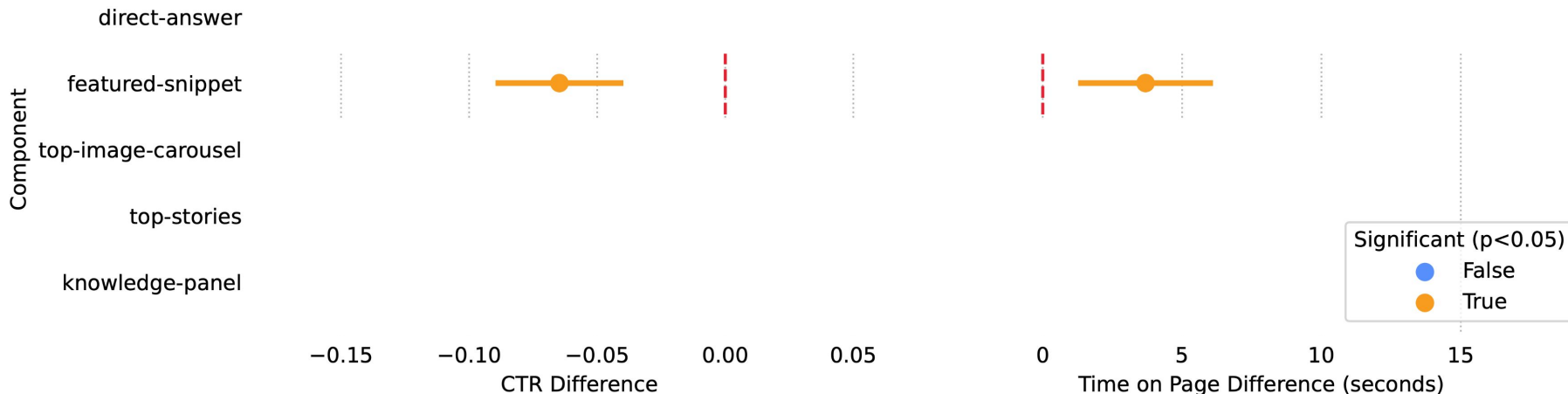
Results: Effects of *Extracted Results* (RQ1)

Direct-answers decrease CTR by -12.1 pp.
Direct-answers increase time on the page by 10.9s.
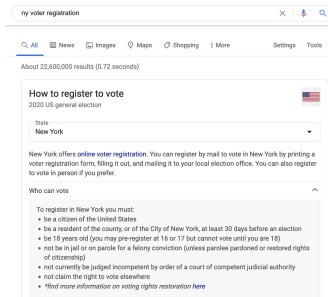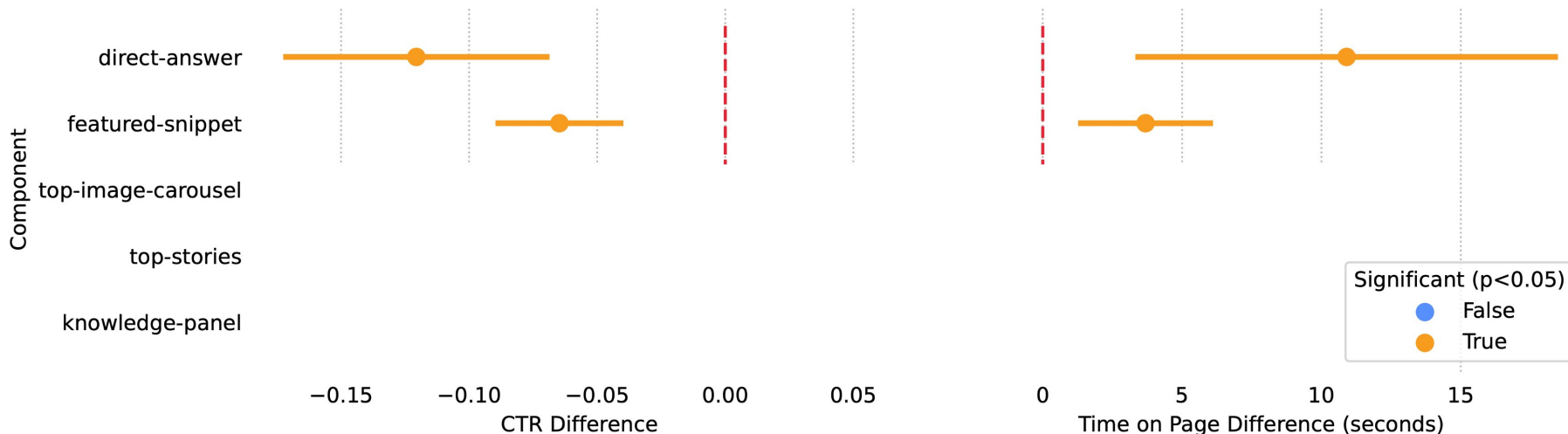
Results: Effects of *Extracted Results* (RQ1)
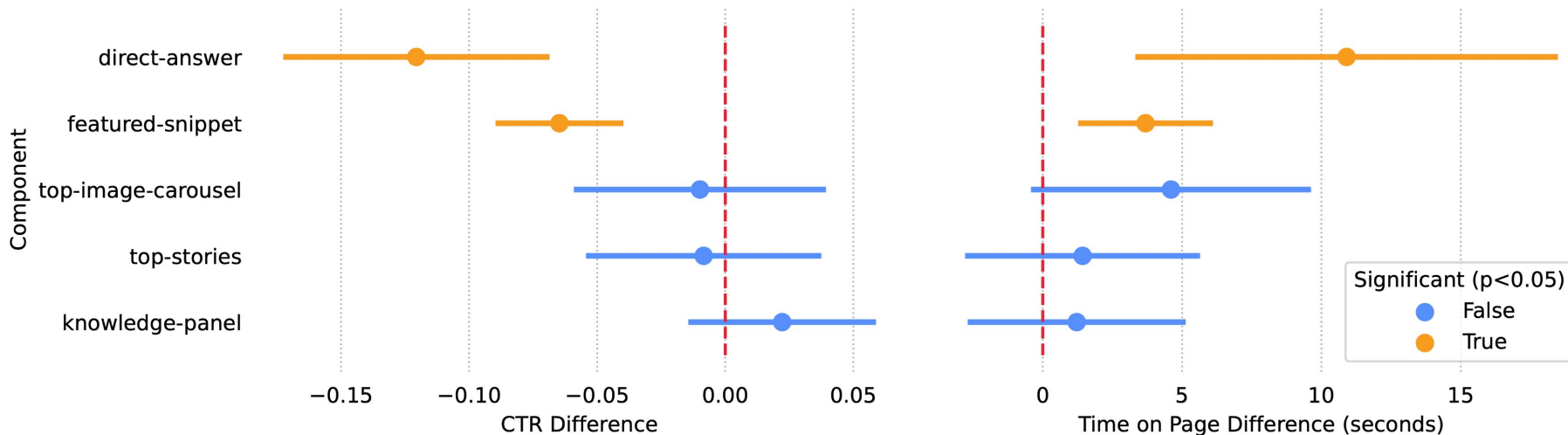
Discussion: *Extracted Results* (RQ1)

- Highlight work on the credibility and quality of knowledge components [8]

[8] Lurie, E.; and Mustafaraj, E. 2018. Investigating the Effects of Google's Search Engine Result Page in Evaluating the Credibility of Online News Sources. In *Proceedings of the 10th ACM Conference on Web Science.*

Discussion: *Extracted Results* (RQ1)

- Highlight work on the credibility and quality of knowledge components [8]
- Conversational search intensifies concerns about [9]:
  - Good abandonment
  - Misappropriation of content
  - Information quality
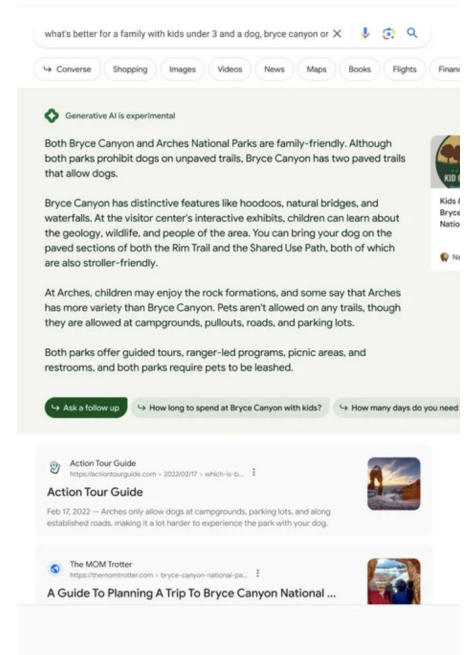
[9] Robertson, K. 2023. Publishers Worry A.I. Chatbots Will Cut Readership.
https://www.nytimes.com/2023/03/30/business/media/publishers-chatbots-search-engines.html. Accessed: 2023-04-18.

Results: Effects of *Google Services* (RQ2)

Component

local-results

images

map-results

scholarly-articles

shopping-ads

ad

videos

−0.05 0.00 0.05 0.10 0.15 0.20 0.25 0.30
Organic CTR to 1st-Party Domains Difference

−0.25 −0.20 −0.15 −0.10 −0.05 0.00 0.05 0.10
Organic CTR to 3rd-Party Domains Difference

Results: Effects of *Google Services* (RQ2)

local-results

images

map-results

scholarly-articles

shopping-ads

ad

videos

Component

−0.05   0.00   0.05   0.10   0.15   0.20   0.25   0.30
Organic CTR to 1st-Party Domains Difference

−0.25 −0.20 −0.15 −0.10 −0.05   0.00   0.05   0.10
Organic CTR to 3rd-Party Domains Difference

Results: Effects of *Google Services* (RQ2)


Component

local-results

images

map-results

scholarly-articles

shopping-ads

ad

videos

−0.05 0.00 0.05 0.10 0.15 0.20 0.25 0.30
Organic CTR to 1st-Party Domains Difference

−0.25 −0.20 −0.15 −0.10 −0.05 0.00 0.05 0.10
Organic CTR to 3rd-Party Domains Difference

Results: Effects of *Google Services* (RQ2)

Local-results increase organic CTR to Google by 22.5 pp.
Local-results decrease organic CTR to 3rd-parties by -13.9 pp.
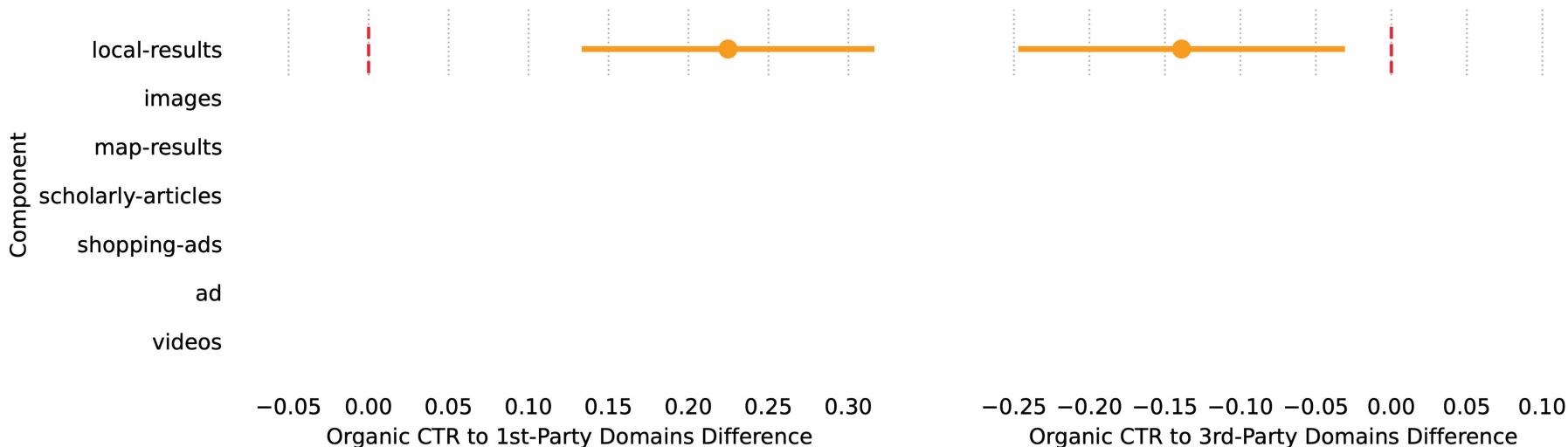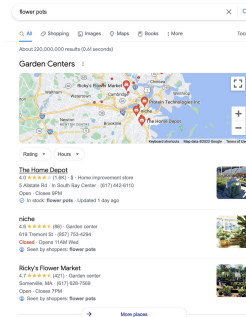
# Results: Effects of *Google Services* (RQ2)
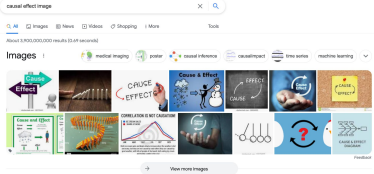
Images increase organic CTR to Google by 19.9 pp.
Images decrease organic CTR to 3rd-parties by -17.7 pp.
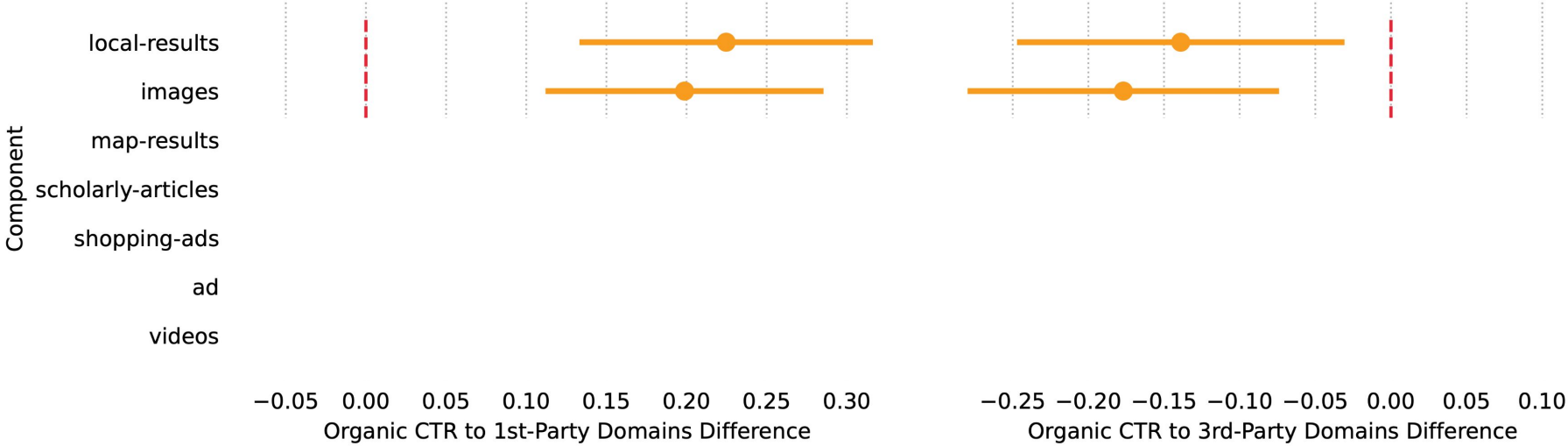
# Results: Effects of *Google Services* (RQ2)
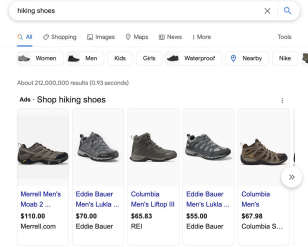
Shopping-ads decrease organic CTR to 3rd-parties by -12.0 pp.
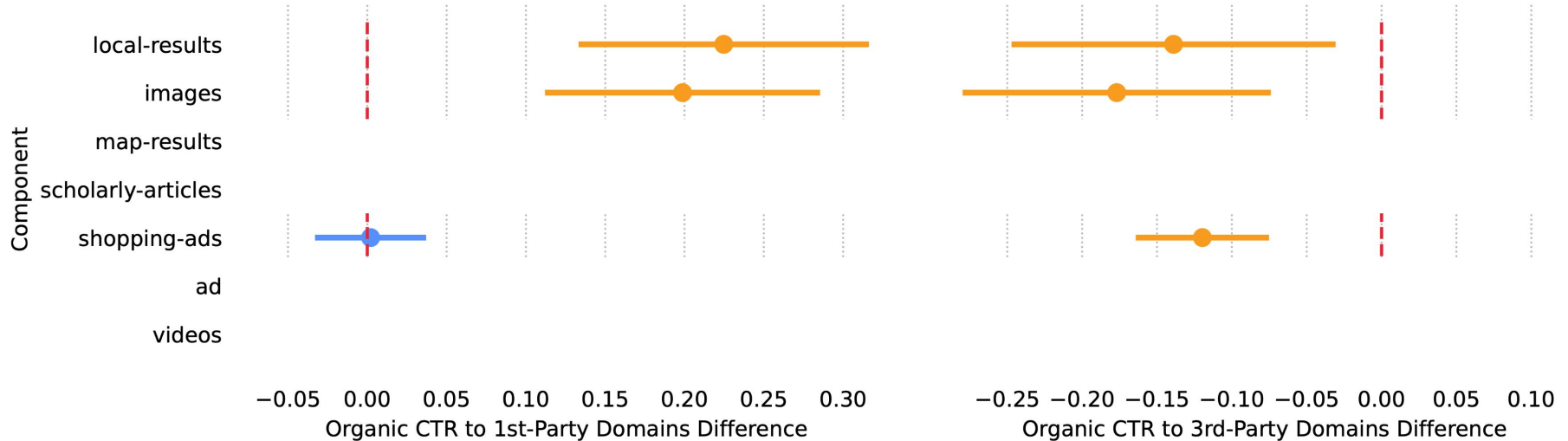
Results: Effects of *Google Services* (RQ2)
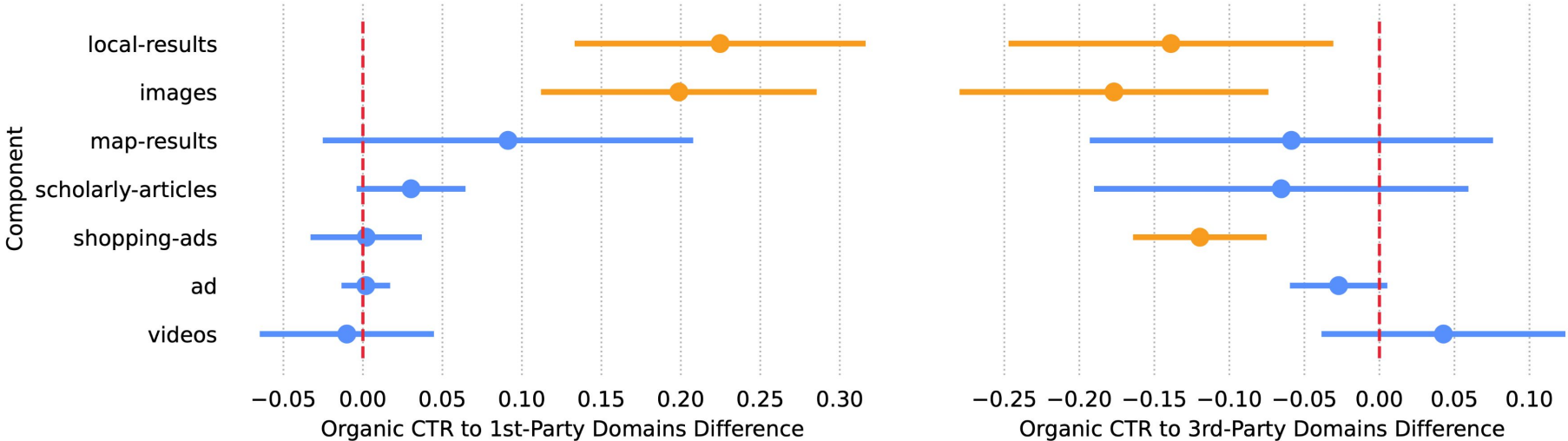
Discussion: *Google Services* (RQ2)

- *Digital Markets Act* makes self-preferencing illegal in the EU

Discussion: *Google Services* (RQ2)

- *Digital Markets Act* makes self-preferencing illegal in the EU
- Proposed US legislation: *American Innovation and Choice Online Act*

Thank you!

Questions: gleason.je@northeastern.edu

Paper and Code: https://jlgleason.github.io

Method: Causal DAG
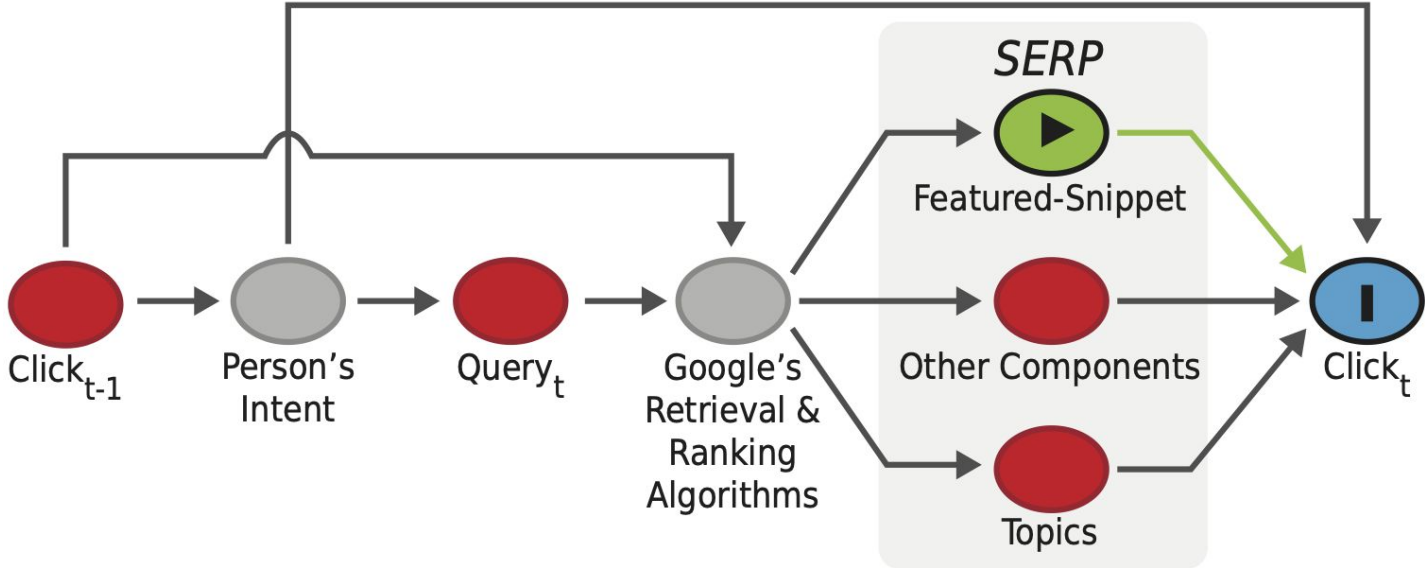
Method: Matching Evaluation

	Component	Mean Cosine Similarity	Matches Retained
Extracted Results	featured-snippet	0.92	3330 (.04)
	knowledge-panel	0.92	1557 (.03)
	top-stories	0.94	1057 (.06)
	top-image-carousel	0.96	915 (.09)
	direct-answer	0.92	345 (.01)
Google Services	ad	0.95	2223 (.06)
	shopping-ads	0.93	1090 (.03)
	local-results	0.90	306 (.05)
	videos	0.93	300 (.02)
	images	0.91	170 (.02)
	map-results	0.90	127 (.03)
	scholarly-articles	0.91	126 (.05)

Method: Additional Confounders
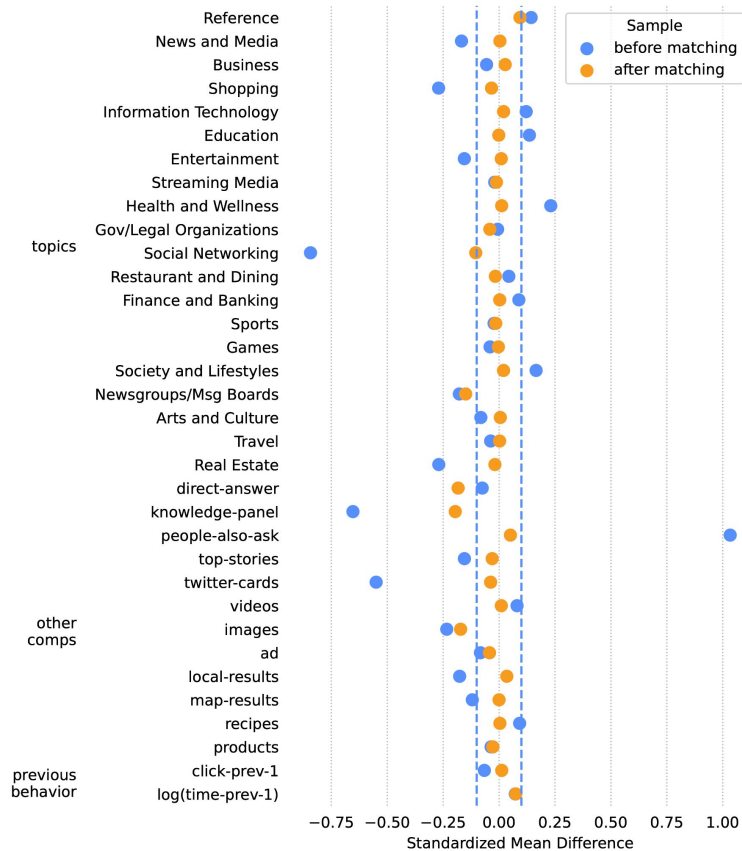
Results: Sensitivity Analysis
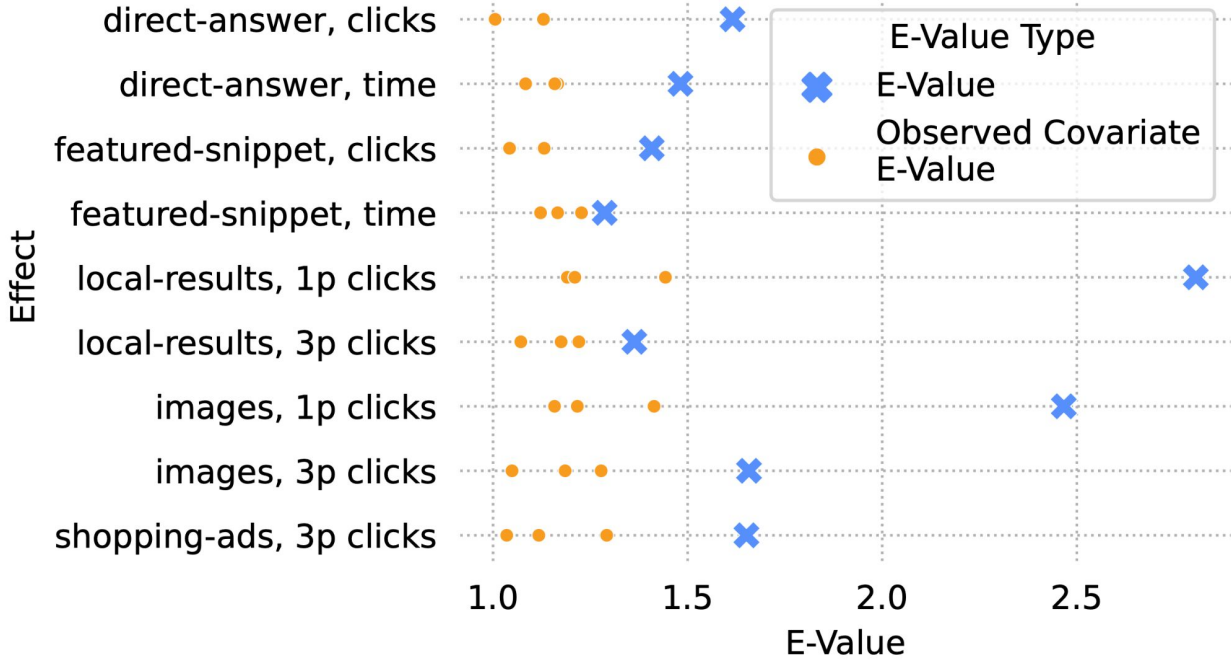
Demographic Variable		Frequency
Age	18 - 24	13.6
	25 - 44	42.2
	45 - 64	30.3
	65+	13.9
Gender	Male	51.5
	Female	48.5
Race/Ethnicity	White	74.1
	Black	8.4
	Asian	6.8
	Latino	6.8
Education	Four-year degree or higher	54.6
	Less than a four-year degree	45.4
Income	Under $50,000	47.3
	$50,000 - $99,999	30.9
	$100,000 - $149,999	12.5
	$150,000 - $199,999	4.8
	$200,000 and over	4.4
Political Party	Democrat	54.8
	Independent/Other	30.8
	Republican	14.4

Table 1: Participant Demographics