

Characterizing Search Behavior in Productivity Software

Horațiu Bota
Adam Fourney
Susan Dumais
Tomasz Religa
Robert Rounthwaite



- From Beginning
- From Current Slide
- Share with people
- Print Notes Pages
- Duplicate
- Get Help on "start pres"
- Smart Lookup on "start pres"

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 Bing

 Cortana

 Tell Me



Informational

Transactional

 Bing

 Cortana

 Tell Me

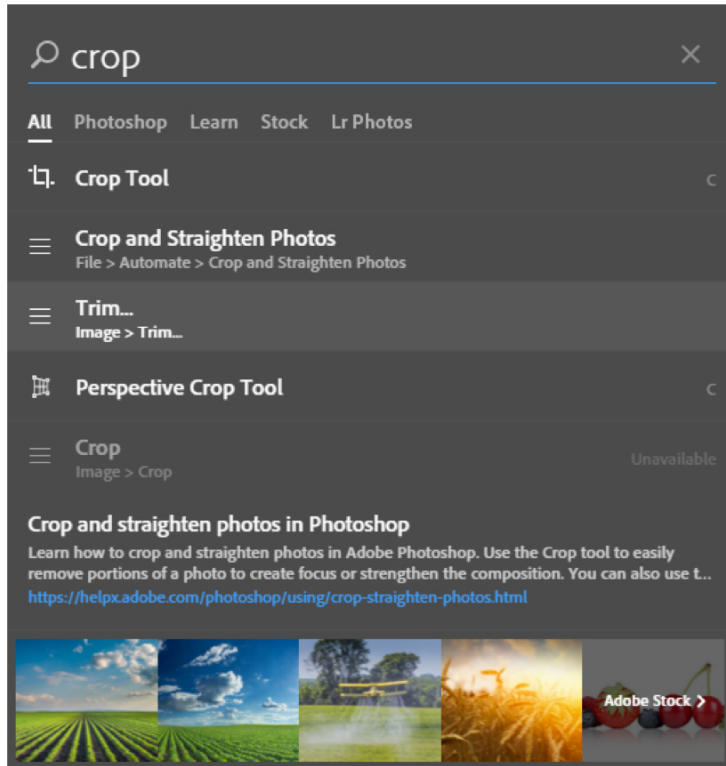


Informational

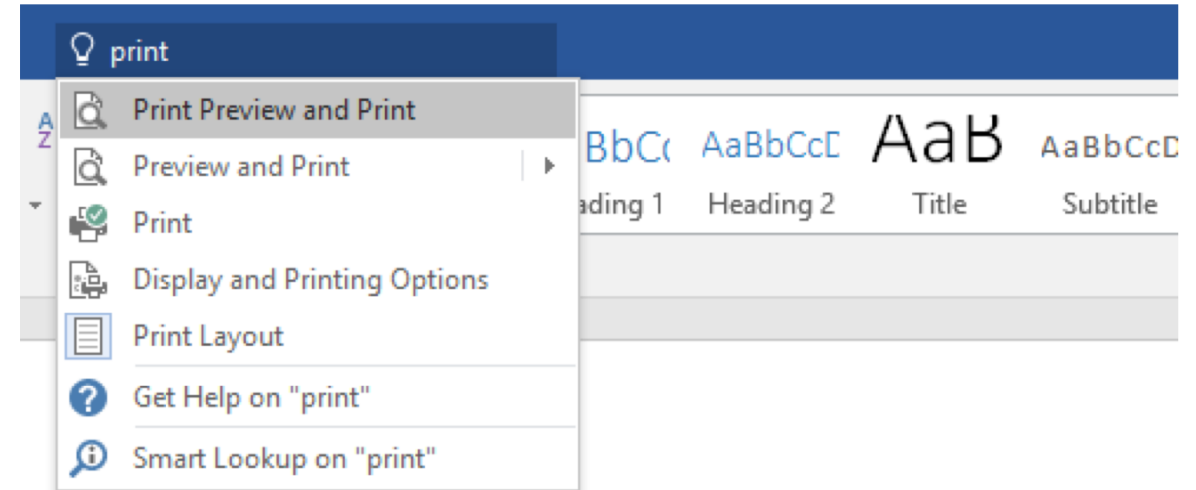
Transactional

Queries people use to "perform a ~~web~~-mediated activity" (Broder, 2002)

Adobe Photoshop



Microsoft Office (TellMe)



As seen at:
<https://helpx.adobe.com/photoshop/using/search.html>

Help search

PowerPoint 2016 Help

Search

What is a slide **master?**
The master slide is the top slide in the thumbnail pane on the left side of the window. The related slide layouts appear just below the slide master:

Change a slide **master**
Every PowerPoint presentation contains a slide master with related slide layouts that control the look.

Video: Change slide **masters**
Training: to add consistency to your colors, fonts, headings, and other styles, and to unify the look of your presentation, use a slide master.

Insert a picture in PowerPoint
Insert a picture in PowerPoint. Applies To: ... If you want a picture to appear as background without affecting all slides in a Master, ...

Add a background picture (or watermark) to

master

- Slide Master View
- View Notes Master
- Handout Master View
- Delete Slide
- Footers
- Get Help on "master"
- Smart Lookup on "master"

Web search

Insights

Explore Define

Explore Wikipedia

Master - Wikipedia
Look up Master, master, masterful, masters, or mastership in Wiktionary, the free dictionary. Master, masters, and the Master may refer to:

The Master (Doctor Who) - Wikipedia
The Master is a recurring character in the British science fiction television series Doctor Who and its associated spin-off works. The character is a ...

Web search

Masters Tournament - Official Site
http://www.masters.com
The Official Site of the Masters Golf Tournament 2016. This major golf tournament is played annually at the Augusta National Golf Club.

Master | Definition of Master by Merriam-Webster
https://www.merriam-webster.com/dictionary/master
As a slave he was required to do his master's bidding without question. The dog was always obedient to its master. the master and mistress of the house

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More

Web search

Masters Tournament - Official Site
<http://www.masters.com>
The Official Site of the Masters Golf Tournament 2016. This major golf tournament is played annually at the Augusta National Golf Club.

Master | Definition of Master by Merriam-Webster
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As a slave he was required to do his master's bidding without question. The dog was always obedient to its master. the master and mistress of the house

More

Powered by bing

1. Describe **search activity** in Office

- 1.1 What **types of search** do people engage in?
- 1.2 How do they **perform** these search activities?

2. Describe **abandonment** in Office command search

- 2.1 Effect of Menu results

3. Evaluate **re-ranking strategies**

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3. Evaluate **re-ranking strategies**

Random sample of 1 million unique users and their millions of searches.

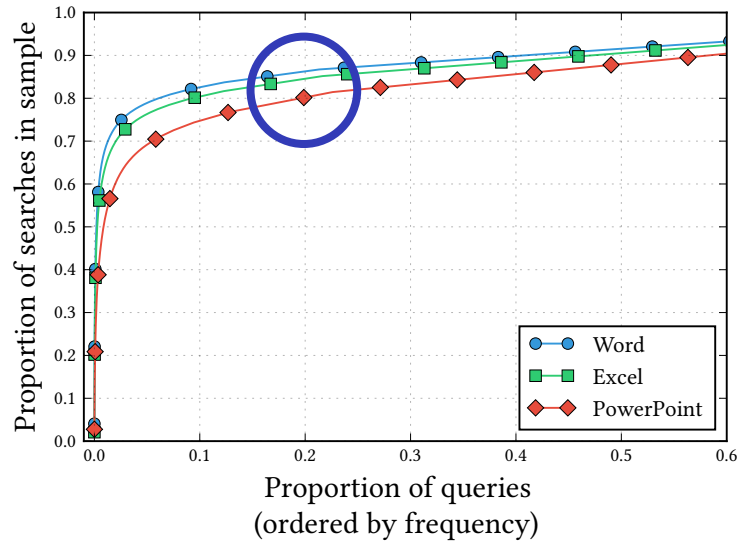
User location: U.S.

User type: Desktop only

App Version: Office 16+

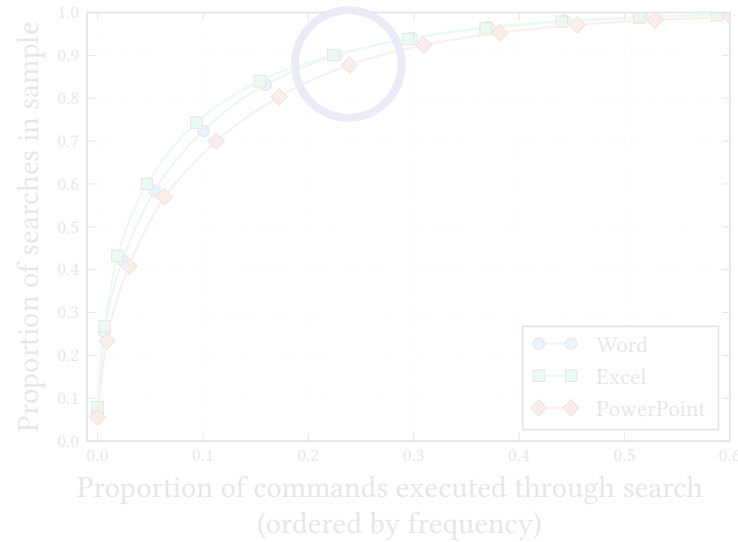
Apps: Word, Excel, PowerPoint

Start/End Date: 29/05 – 02/07/2017 (5 weeks)



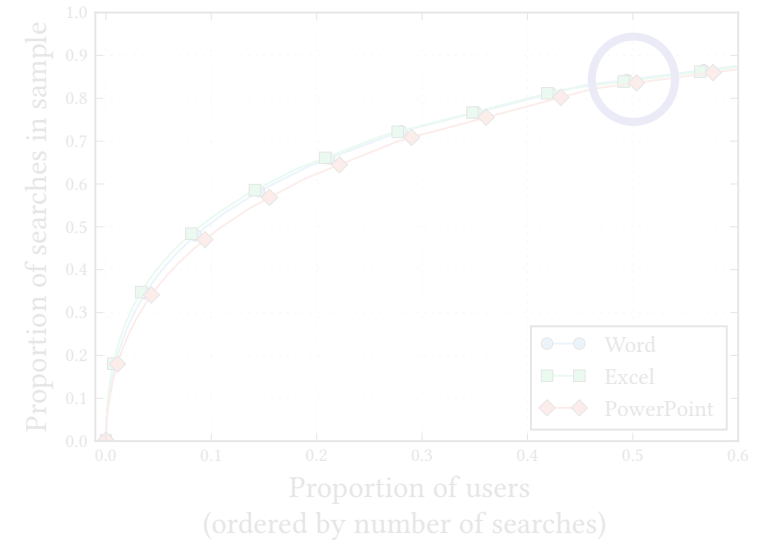
(a) Cumulative distribution of queries

~20% of queries account for ~80% of searches with a typed query.



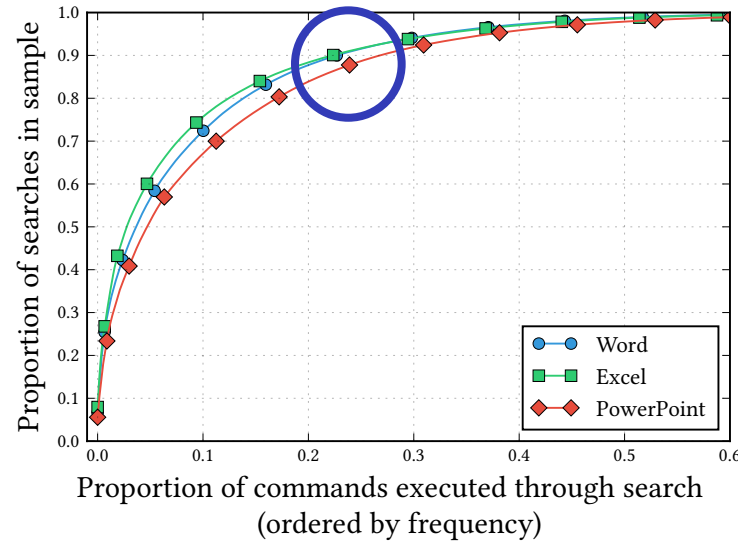
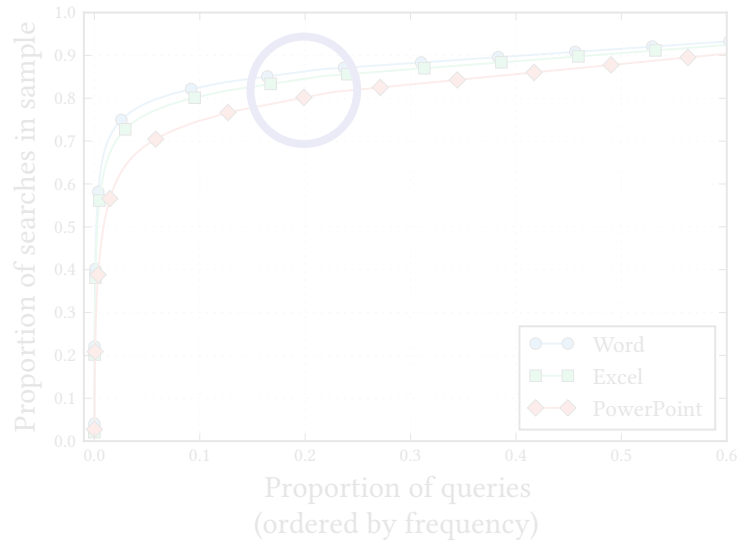
(b) Cumulative distribution of commands

~90% of searches used to access ~25% of commands executed through search.



(c) Cumulative distribution of users

~50% of users account for ~80% of searches with a typed query.



(a) Cumulative distribution of queries

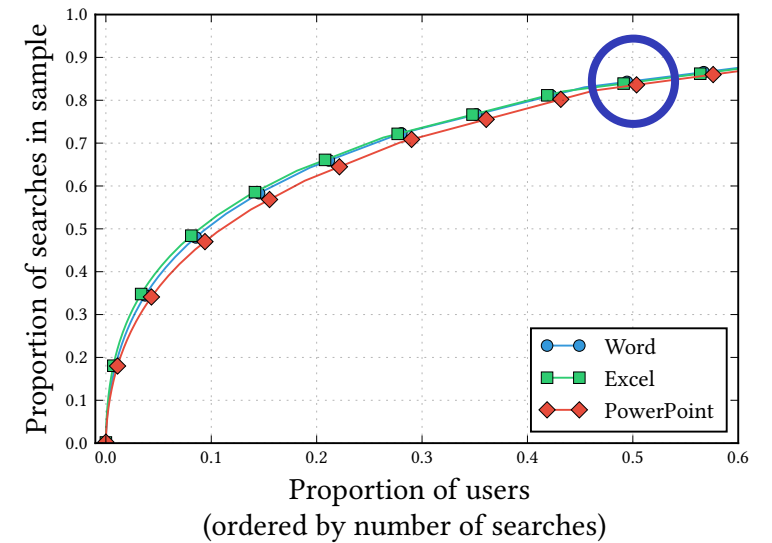
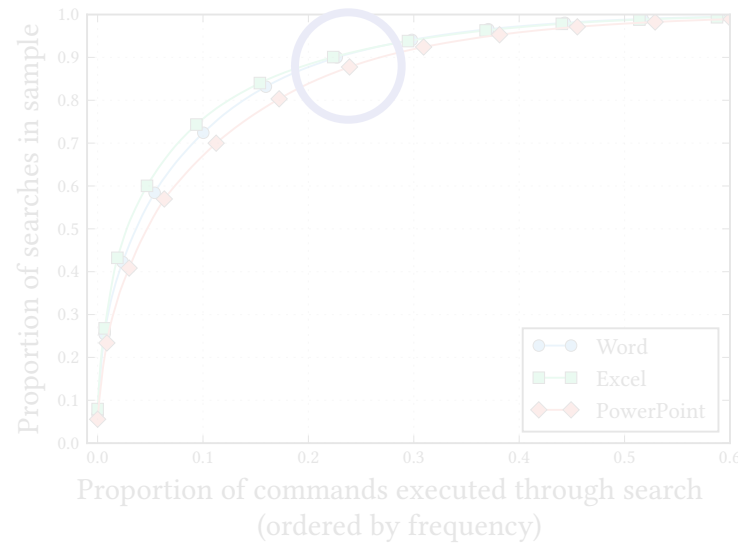
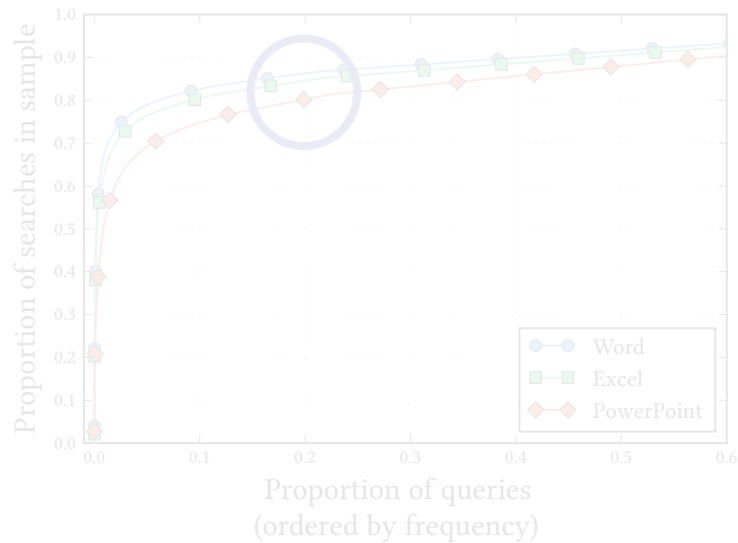
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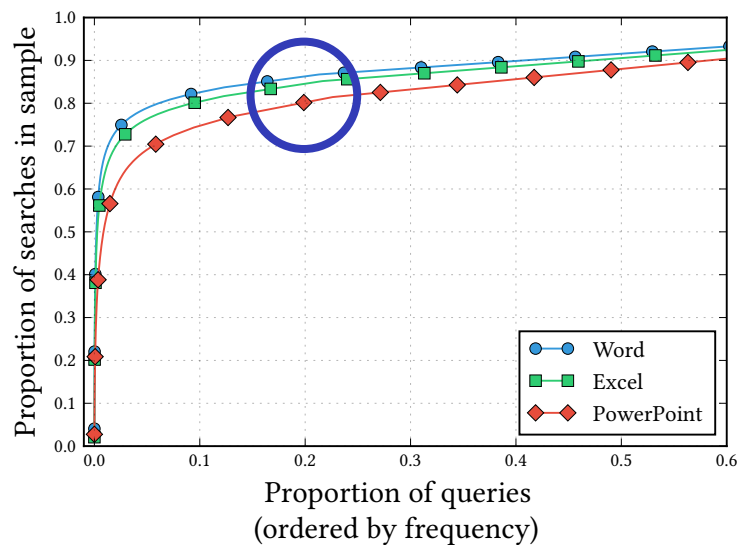
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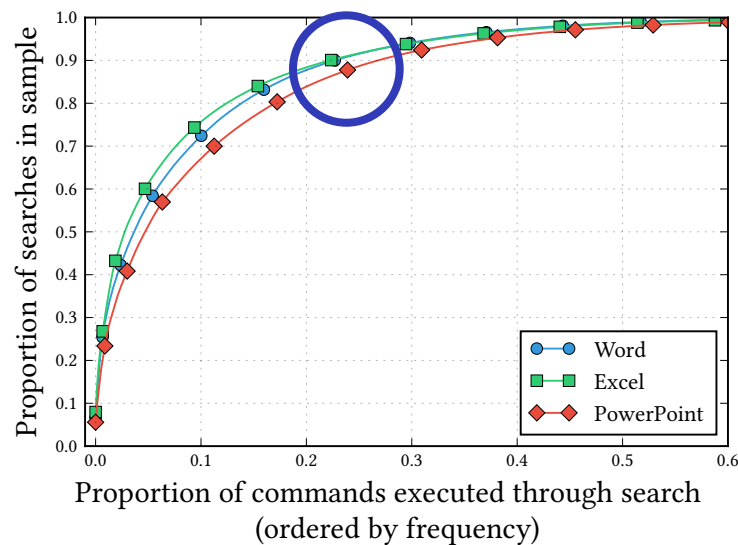
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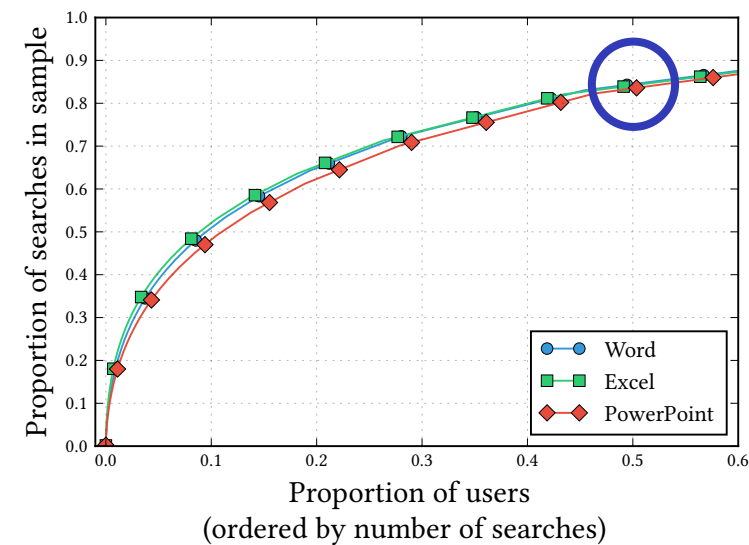
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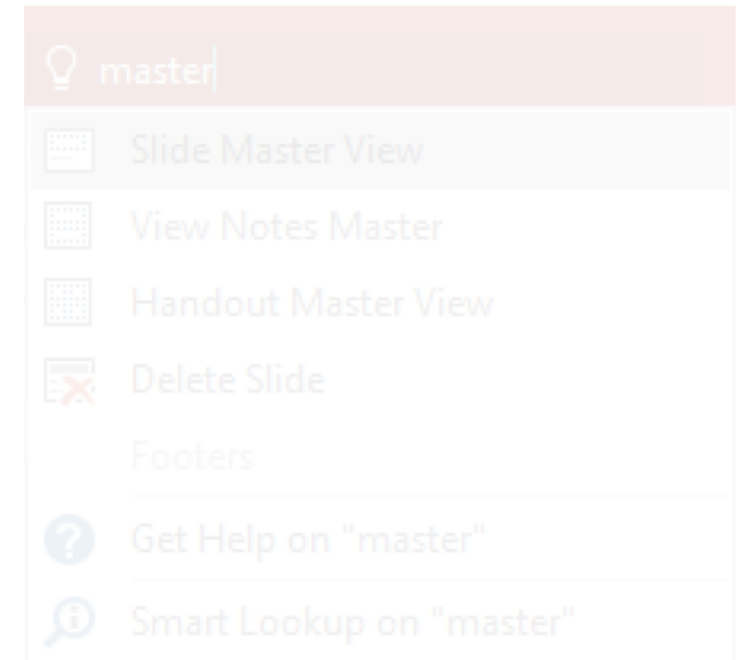
~50% of users account for ~80% of searches with a typed query.

Results

When users issue search queries in Office, the results may include **commands**, a link to **Office help**, or a link to **Web search** results.

Command execution is the most likely outcome.

Command results are clicked 6.4 times as often as help documentation, and 32 times as often as web search.

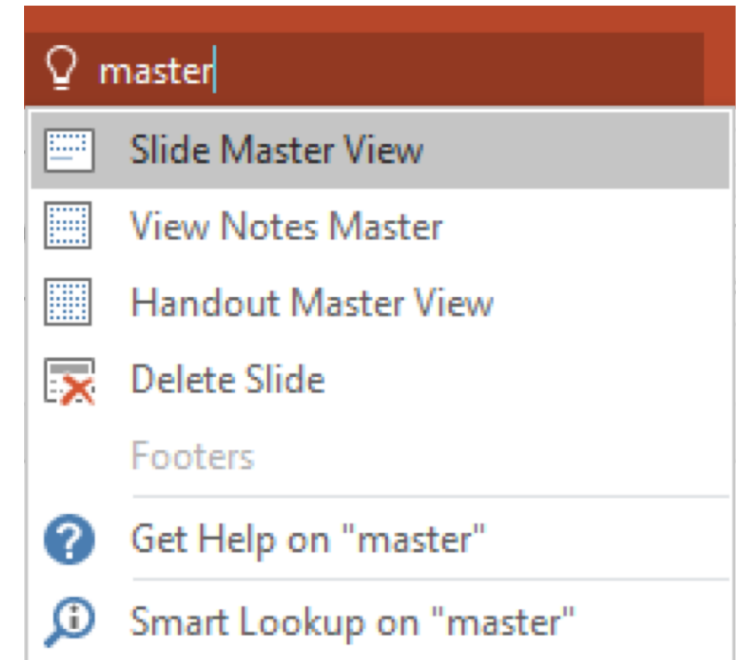


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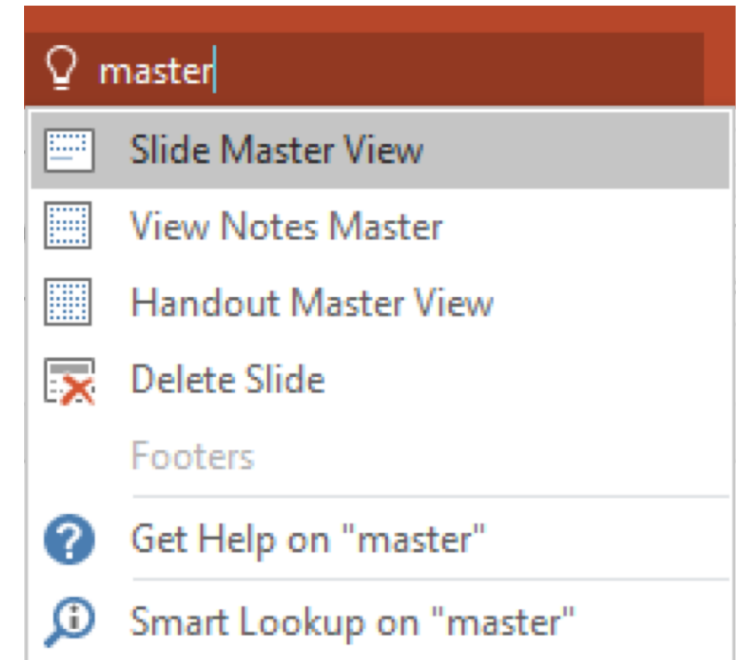


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Query	Most Popular Command	% Search Volume	% App Sessions	% Users	% Abandoned	% Requery	# Query Rank	# App Rank	# Users Rank
header	HeaderAndFooter	2.09%	3.04%	3.32%	6.88%	39.17%	1	1	1
free	FreezePanels	1.70%	1.96%	2.11%	8.25%	52.57%	2	3	3
print	PrintDefault	1.44%	2.19%	2.53%	16.21%	32.90%	3	2	2
sort	Sort	1.18%	1.29%	1.44%	11.85%	53.38%	4	8	7
find	Find	1.07%	1.35%	1.27%	7.35%	54.82%	5	5	9
insert	InsertSheetRows	1.06%	1.14%	1.24%	23.88%	55.58%	6	10	10
freeze the top row†	FreezePanels	0.93%	1.43%	1.92%	99.78%	20.93%	7	4	4
insert row	InsertSheetRows	0.85%	0.93%	1.06%	8.62%	52.43%	8	11	12
freeze	FreezePanels	0.80%	1.16%	1.41%	13.41%	32.94%	9	9	8
insert a table†	InsertList	0.79%	1.34%	1.79%	99.77%	13.77%	10	7	6

Head queries in Excel.

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Low overlap between users.

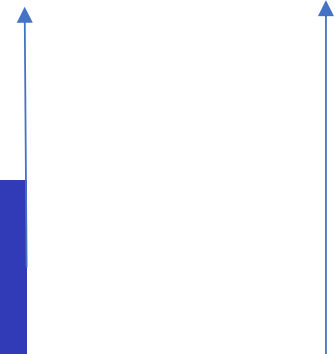
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Frequent re-finding.



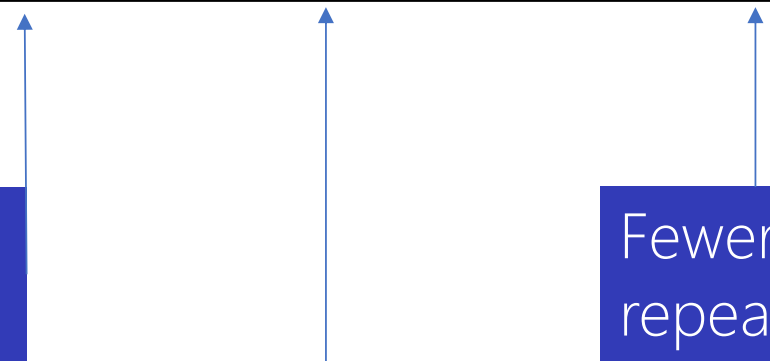
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Low overlap between users.

Fewer users with repeated use.

Head queries in Excel.

Frequent re-finding.



Microsoft Word			Microsoft PowerPoint		
Command Name	Query		Command Name	Query	
Proofing	spell	28.07%	Orientation	portrait	24.38%
	sp	18.51%		orientation	6.65%
	spe	15.27%		landscape	5.02%
	spelling	6.35%		change to portrait	3.94%
	spell check	6.25%		change orientation	3.20%
WordCount	word	42.96%	DesignerPane	des	23.29%
	word count	20.13%		design	19.80%
	wor	12.15%		de	16.39%
	wo	4.86%		desi	8.33%
	character count	4.40%		d	6.10%
LineSpacing	line	14.94%	Crop	crop	81.16%
	spacing	6.80%		cr	12.42%
	single space	6.61%		crop picture	0.60%
	double space	6.19%		finish crop	0.39%
	double	4.78%		crop image	0.34%

Table 2: Most frequently used queries for executing top three most frequent commands executed through search.

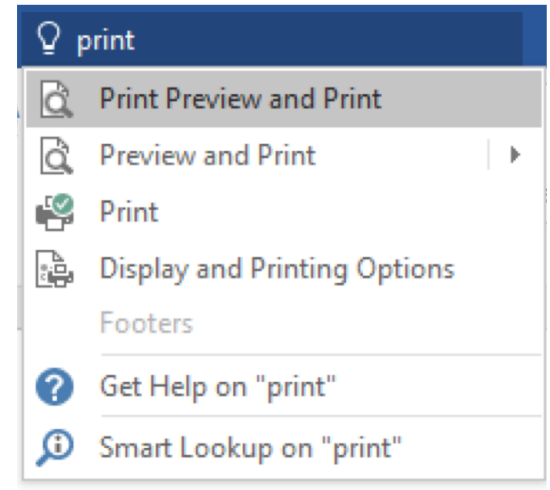
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Table 2: Most frequently used queries

Parameterized commands lead to more variation in queries used to access them.

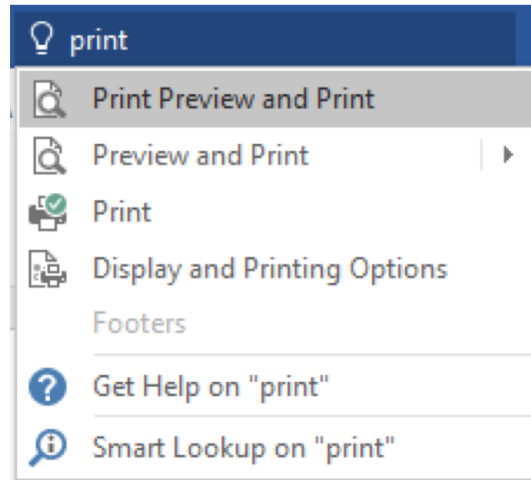


Search Abandonment



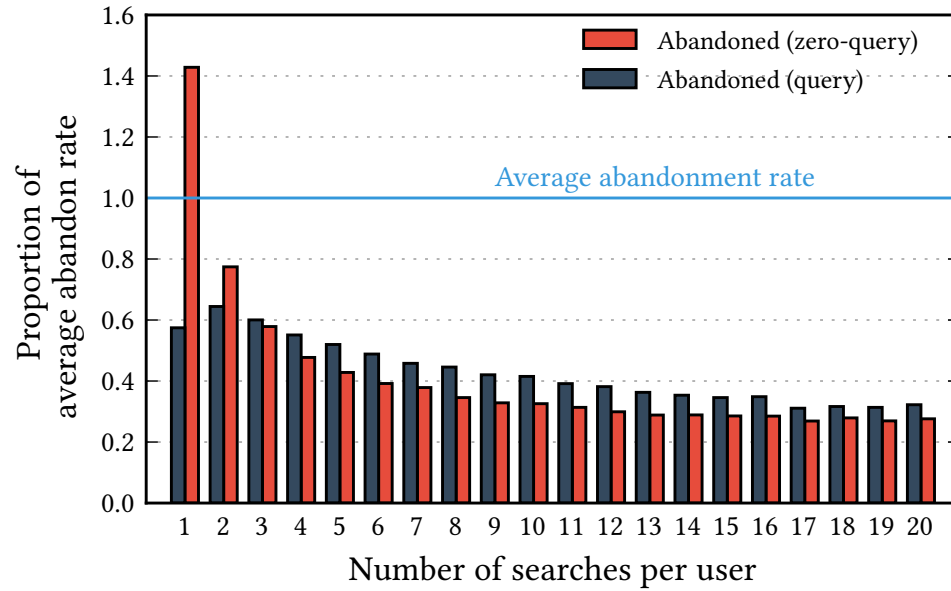


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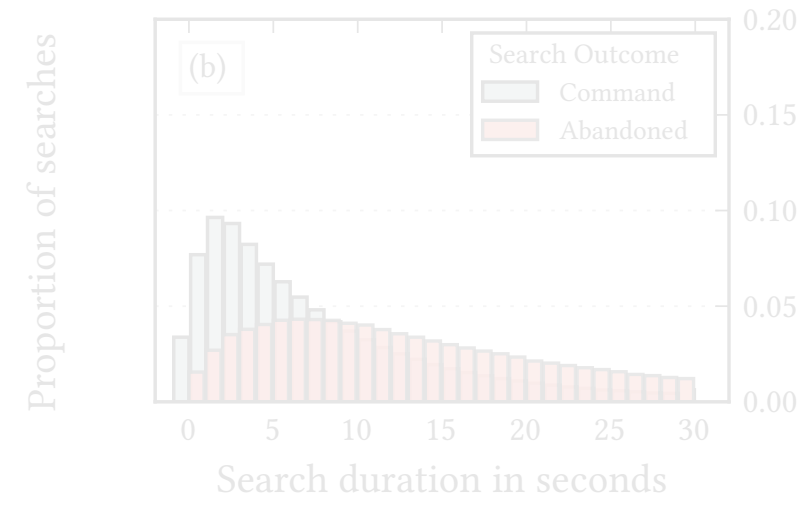
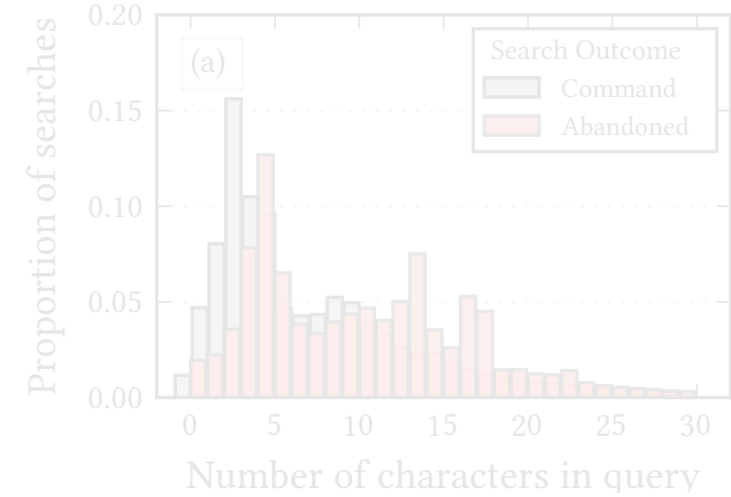


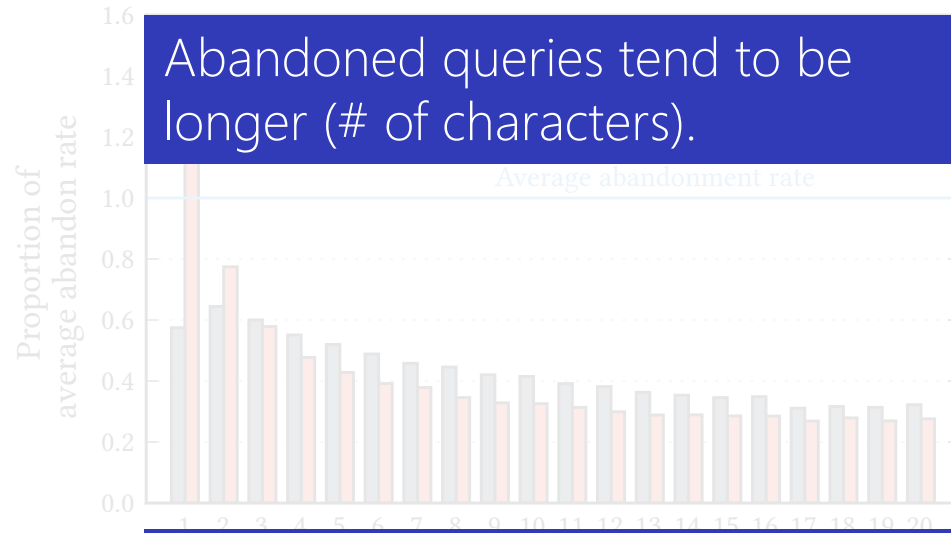
Query	% Abandoned
header	6.88%
free	8.25%
print	16.21%
sort	11.85%
find	7.35%
insert	23.88%
freeze the top row†	99.78%
insert row	8.62%
freeze	13.41%
insert a table†	99.77%

Abandonment for
head queries in
Excel.



Abandonment rates lower for frequent searchers.

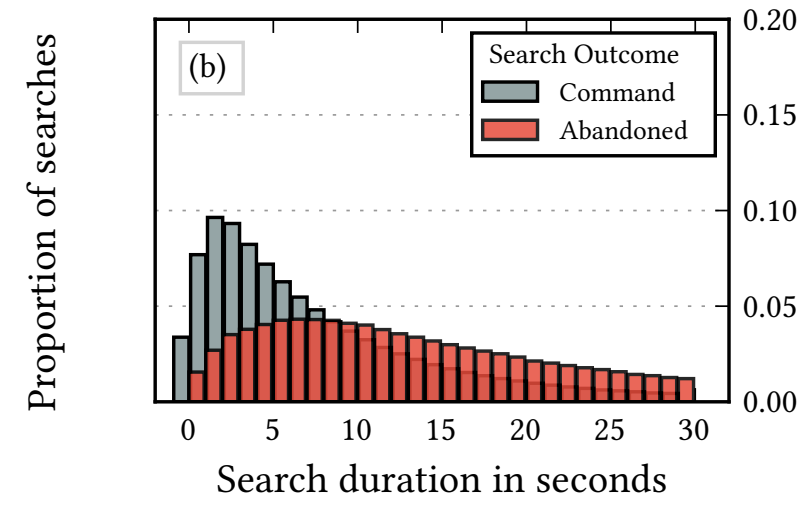
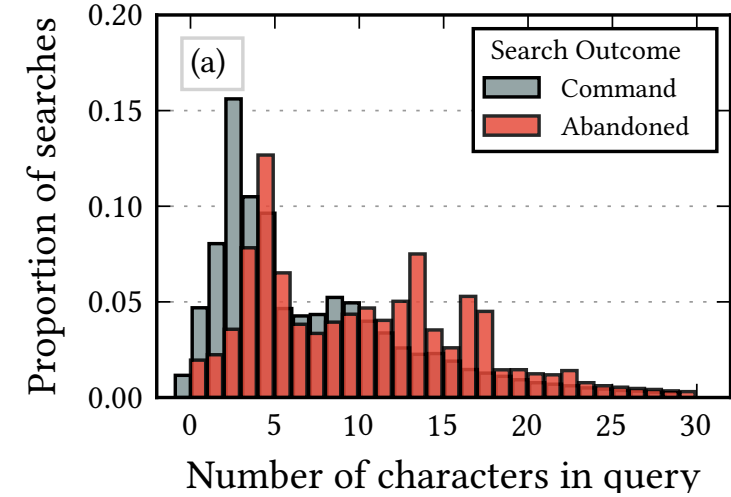


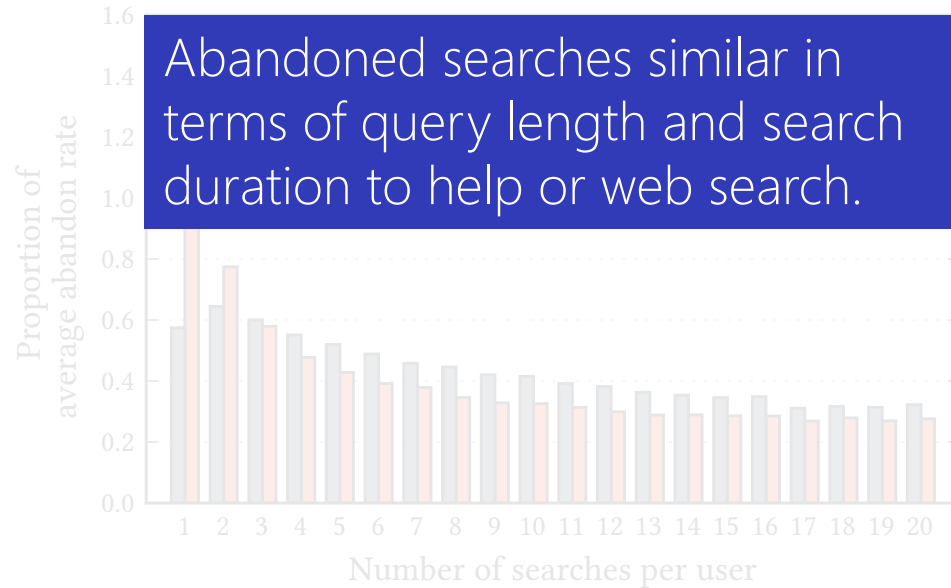


Abandoned queries tend to be longer (# of characters).

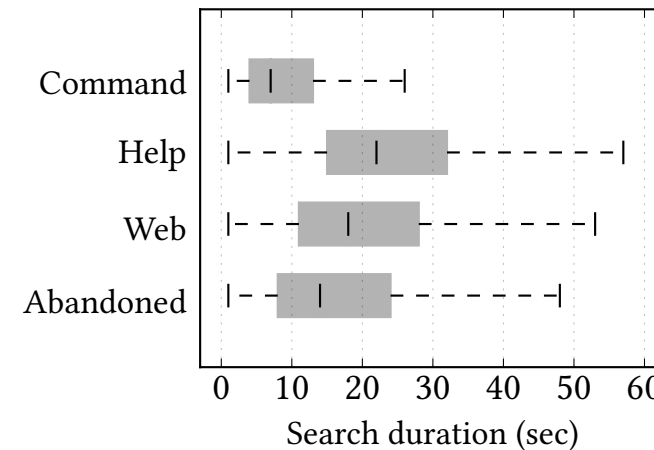
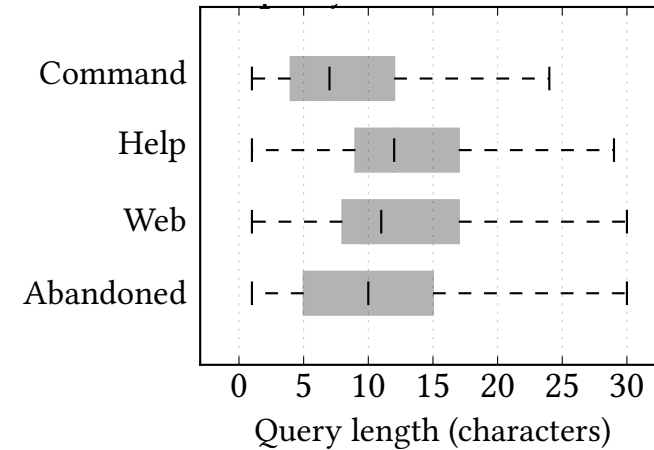
Searchers take longer to abandon than to execute a command.

Abandonment rates lower for frequent searchers.

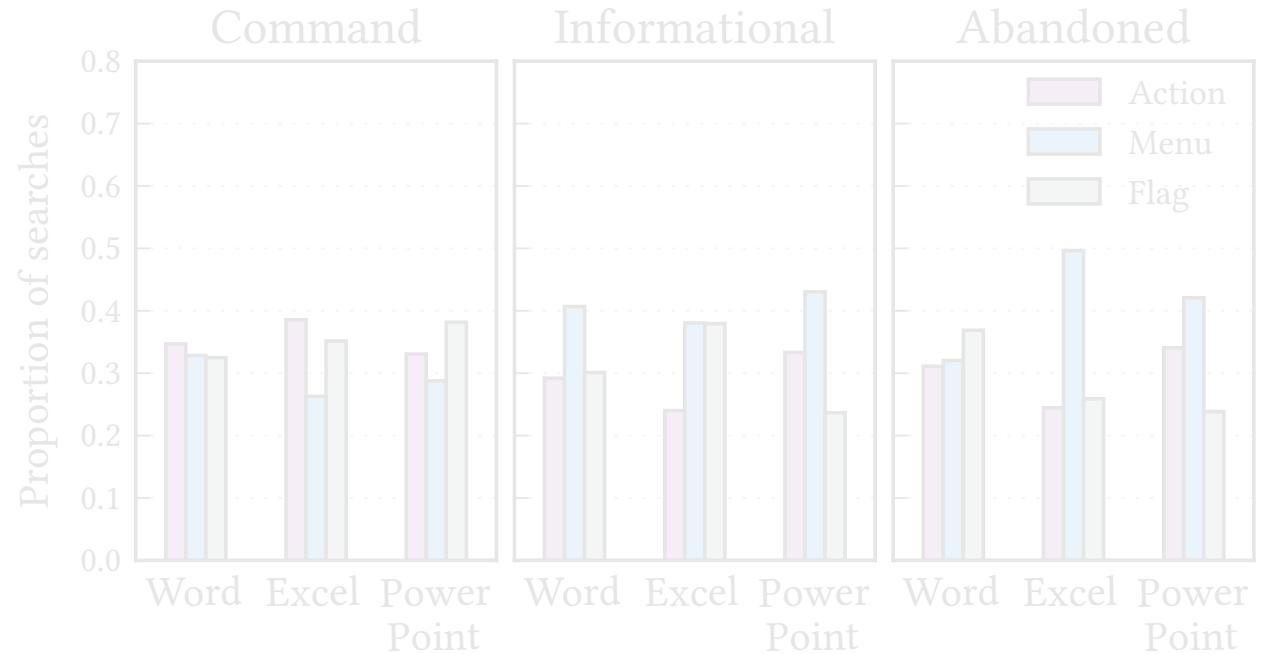
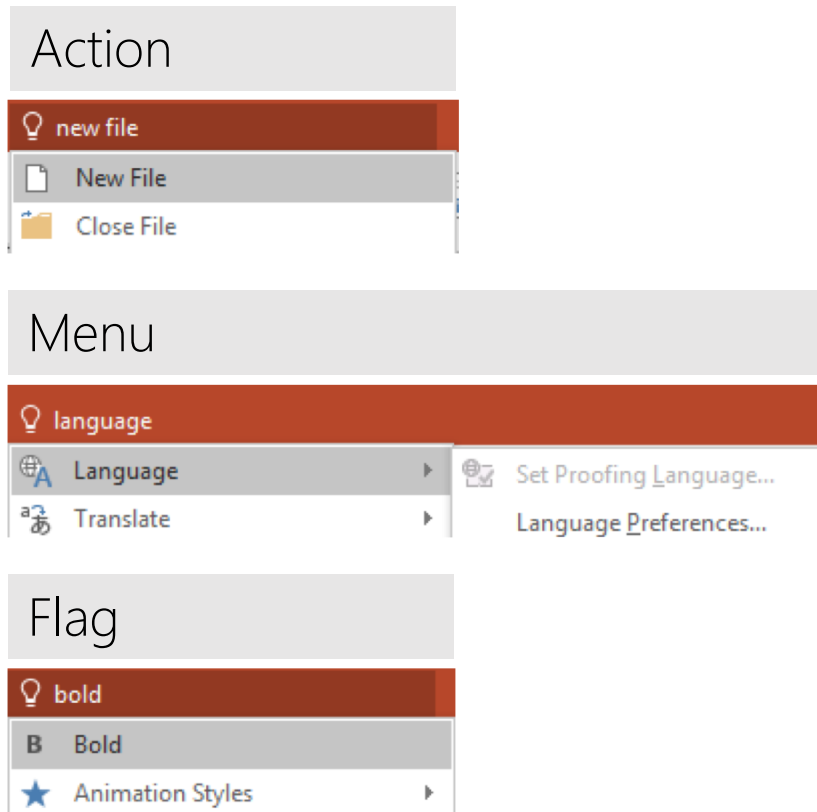




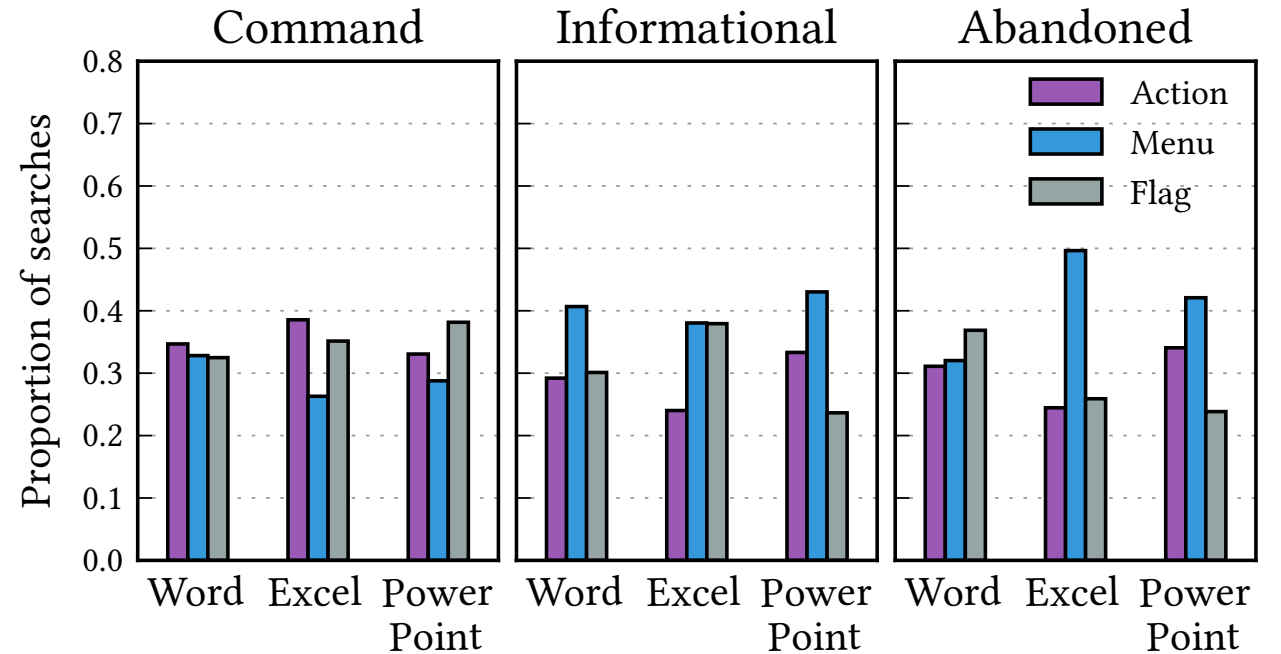
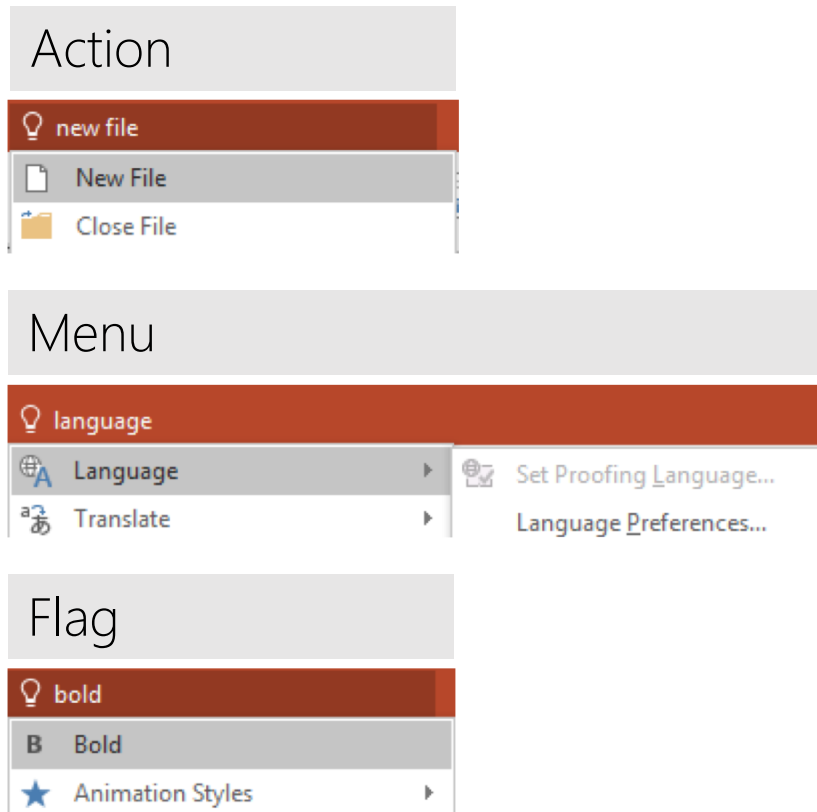
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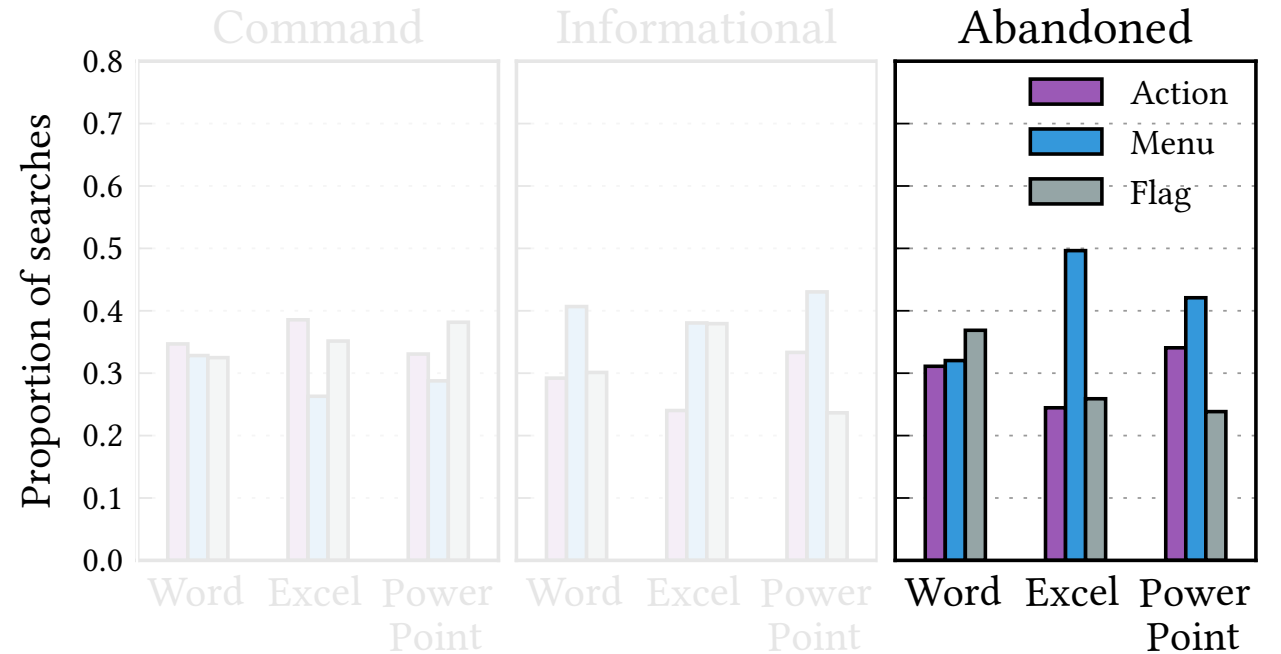
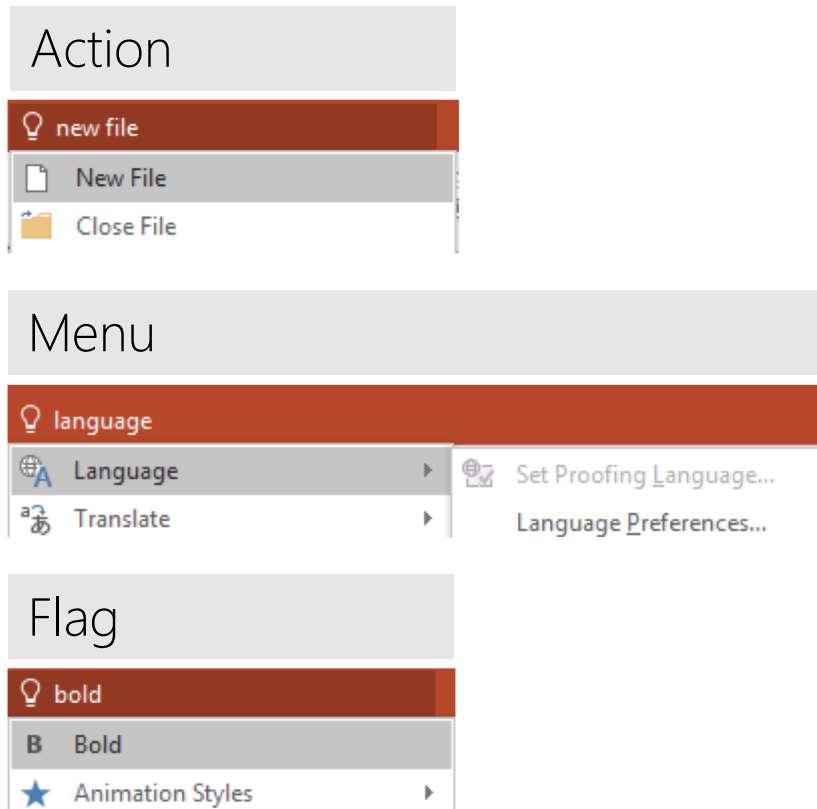
Different types of command results.



Different types of command results.



Different types of command results.



Menu results more frequent at top rank in the case of abandoned / informational search.



Re-ranking Strategies

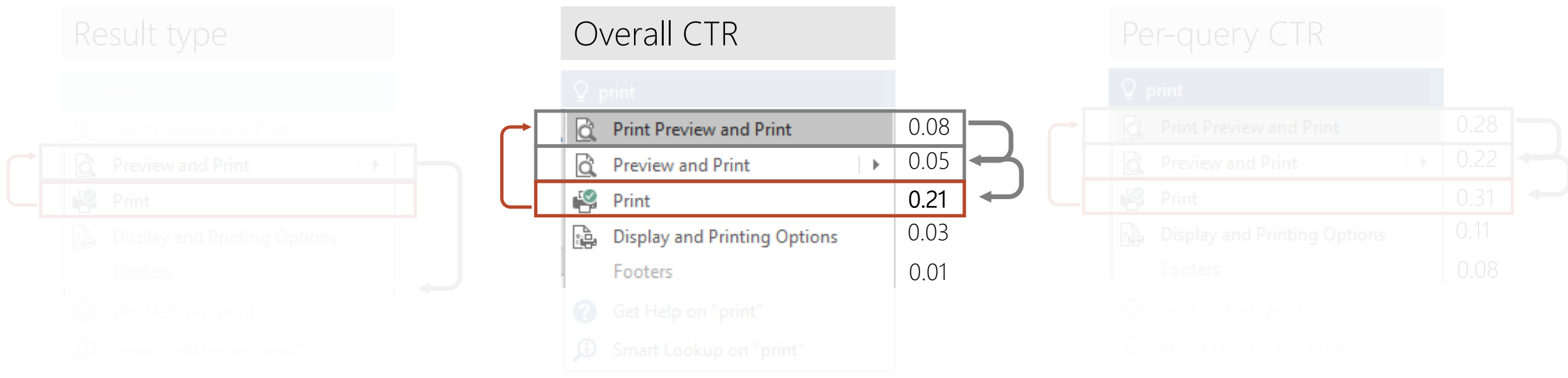


Re-ranking Strategies



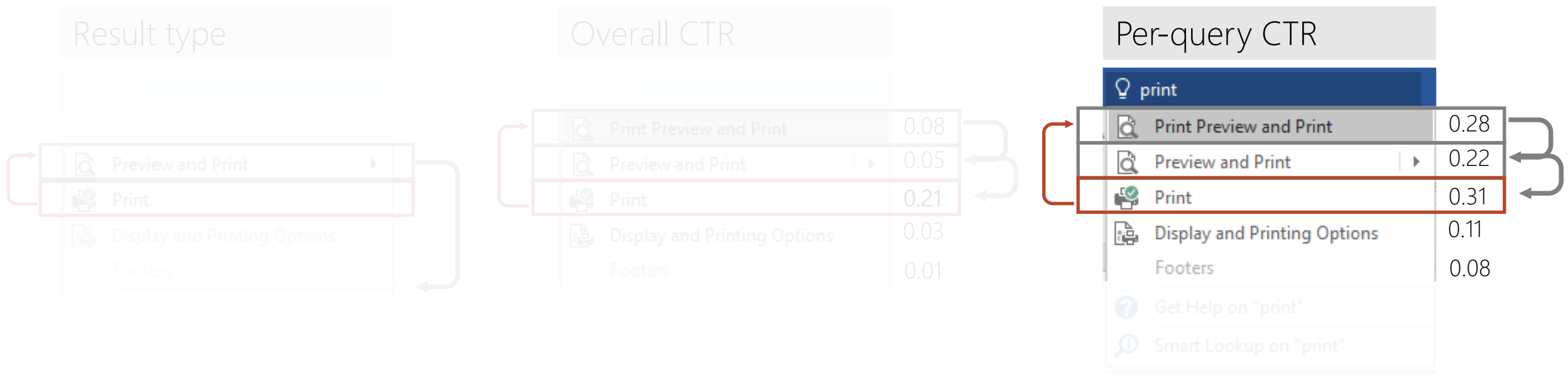


Re-ranking Strategies

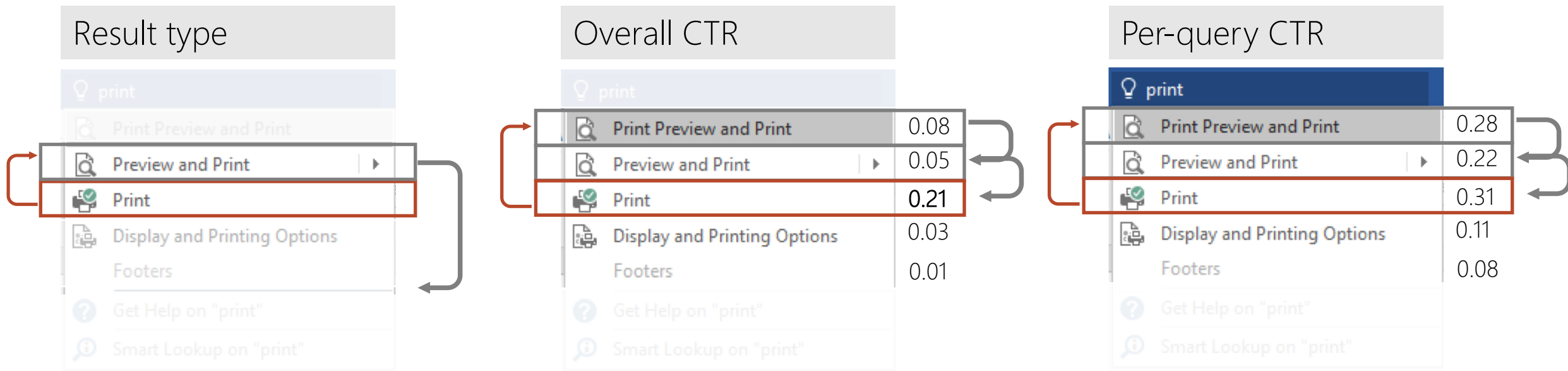




Re-ranking Strategies



Re-ranking Strategies



Selection	Strategy	Clicked result rank				
		1	2	3	4	5
	No re-ranking	70.54%	15.93%	7.18%	3.85%	2.50%
Historical	Result type	71.17%	12.47%	7.21%	5.28%	3.87%
	Overall click-through	74.66%	12.52%	6.47%	3.83%	2.51%
	Per-query click-through	77.93%	12.29%	5.32%	2.68%	1.78%
Oracle	Result type	76.77%	7.48%	5.76%	5.63%	4.36%
	Overall click-through	82.65%	7.25%	5.08%	3.20%	1.82%
	Per-query click-through	83.18%	9.47%	4.24%	1.99%	1.12%

Without re-ranking, most command clicks occur at rank one.

Table 4: Distribution of clicks over ranking positions.

Selection	Strategy	Clicked result rank				
		1	2	3	4	5
	No re-ranking	70.54%	15.93%	7.18%	3.85%	2.50%
Historical	Result type	71.17%	12.47%	7.21%	5.28%	3.87%
	Overall click-through	74.66%	12.52%	6.47%	3.83%	2.51%
	Per-query click-through	77.93%	12.29%	5.32%	2.68%	1.78%
Oracle	Result type	76.77%	7.48%	5.76%	5.63%	4.36%
	Overall click-through	82.65%	7.25%	5.08%	3.20%	1.82%
	Per-query click-through	83.18%	9.47%	4.24%	1.99%	1.12%

Lowering Menu results in the ranking increases clicks on rank one by 6 percentage point.

Table 4: Distribution of clicks over ranking positions.

Selection	Strategy	Clicked result rank				
		1	2	3	4	5
	No re-ranking	70.54%	15.93%	7.18%	3.85%	2.50%
Historical	Result type	71.17%	12.47%	7.21%	5.28%	3.87%
	Overall click-through	74.66%	12.52%	6.47%	3.83%	2.51%
	Per-query click-through	77.93%	12.29%	5.32%	2.68%	1.78%
Oracle	Result type	76.77%	7.48%	5.76%	5.63%	4.36%
	Overall click-through	82.65%	7.25%	5.08%	3.20%	1.82%
	Per-query click-through	83.18%	9.47%	4.24%	1.99%	1.12%

Table 4: Distribution of clicks over ranking positions.

Re-ranking based on per-query CTR increases clicks on rank one by 13 percentage points.

Selection	Strategy	Clicked result rank				
		1	2	3	4	5
	No re-ranking	70.54%	15.93%	7.18%	3.85%	2.50%
Historical	Result type	71.17%	12.47%	7.21%	5.28%	3.87%
	Overall click-through	74.66%	12.52%	6.47%	3.83%	2.51%
	Per-query click-through	77.93%	12.29%	5.32%	2.68%	1.78%
Oracle	Result type	76.77%	7.48%	5.76%	5.63%	4.36%
	Overall click-through	82.65%	7.25%	5.08%	3.20%	1.82%
	Per-query click-through	83.18%	9.47%	4.24%	1.99%	1.12%

Re-ranking based on per-query CTR increases clicks on rank one by 7 percentage points in a train/test split.

Table 4: Distribution of clicks over ranking positions.

Search activity

Command execution is most likely outcome in Office Search.

Frequent command re-finding through search.

Abandonment

Abandonment rates lower for frequent searchers.

Abandoned searches similar (in terms of query length and search duration) to help or web search.

Menu results more frequent at top rank in the case of abandoned / informational search.

Re-ranking

Most command clicks occur at rank one.

Lowering Menu results in the ranking increases clicks on top rank.

Re-ranking based on per-query CTR is most effective strategy investigated.

Search activity

Command execution is most likely outcome in Office Search.

Frequent command re-finding through search.

Abandonment

Abandonment rates lower for frequent searchers.

Abandoned searches similar (in terms of query length and search duration) to help or web search.

Menu results more frequent at top rank in the case of abandoned / informational search.

Re-ranking

Most command clicks occur at rank one.

Lowering Menu results in the ranking increases clicks on top rank.

Re-ranking based on per-query CTR is most effective strategy investigated.

Search activity

Command execution is most likely outcome in Office Search.

Frequent command re-finding through search.

Abandonment

Abandonment rates lower for frequent searchers.

Abandoned searches similar (in terms of query length and search duration) to help or web search.

Menu results more frequent at top rank in the case of abandoned / informational search.

Re-ranking

Most command clicks occur at rank one.

Lowering Menu results in the ranking increases clicks on top rank.

Re-ranking based on per-query CTR is most effective strategy investigated.

Search activity

Command execution is most likely outcome in Office Search.

Frequent command re-finding through search.

Abandonment

Abandonment rates lower for frequent searchers.

Abandoned searches similar (in terms of query length and search duration) to help or web search.

Menu results more frequent at top rank in the case of abandoned / informational search.

Re-ranking

Most command clicks occur at rank one.

Lowering Menu results in the ranking increases clicks on top rank.

Re-ranking based on per-query CTR is most effective strategy investigated.

Thanks 

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