

Better Search, Better Health?

Search Engines, their Evaluation and the Impact on Health Decisions

Guido Zuccon

g.zuccon@uq.edu.au – ielab.io/guido

The University of Queensland

Work presented here is in collaboration with: Anton van der Vegt, Jimmy, Bevan Koopman (AEHRC/CSIRO), Gianluca Demartini, Leif Azzopardi (Strathclyde)

Foundations and Trends® in
Information Retrieval
4:4 (2010)

Test Collection Based Evaluation of Information Retrieval Systems

Mark Sanderson

TREC
Experiment and Evaluation
in Information Retrieval



Foundations and Trends® in
Information Retrieval
10:1

Online Evaluation for Information Retrieval

Katja Hofmann, Lihong Li and Filip Radlinski

Evaluation is key for Advancing Search Engines Technology

edited by Ellen M. Voorhees and Donna K. Harman

now

the essence of knowledge

now

the essence of knowledge

IR evaluation focuses on how
much relevant material the system
retrieves*,**

Is this all we care about?

* In some user studies, user satisfaction and perceived task completion are also probed

** In online evaluation, clicks are used as an indicator of relevance/engagement

Why do we search?

- Broder 2002's taxonomy of search intents: **navigational** (20% - reach a known site), **informational** (~50% - acquire information), **transactional** (30% - perform activity)
- We often do this for **completing a task**
- Emergent research on supporting users in **completing tasks**
- **Task completion support technology**, e.g.
 - Mehrotra & Yilmaz, "Task embeddings: Learning query embeddings using task context" CIKM 2017.
 - Koopman, Zuccon, Russell. "A Task-oriented Search Engine for Evidence-based Medicine" SIGIR 2017.
- **Task-based evaluation**, e.g.
 - Verma et al. "Overview of the TREC Tasks Track 2016" TREC 2016.
 - Lipani, Carterette, Yilmaz. "From a User Model for Query Sessions to Session Rank Biased Precision (sRBP)" SIGIR 2019.

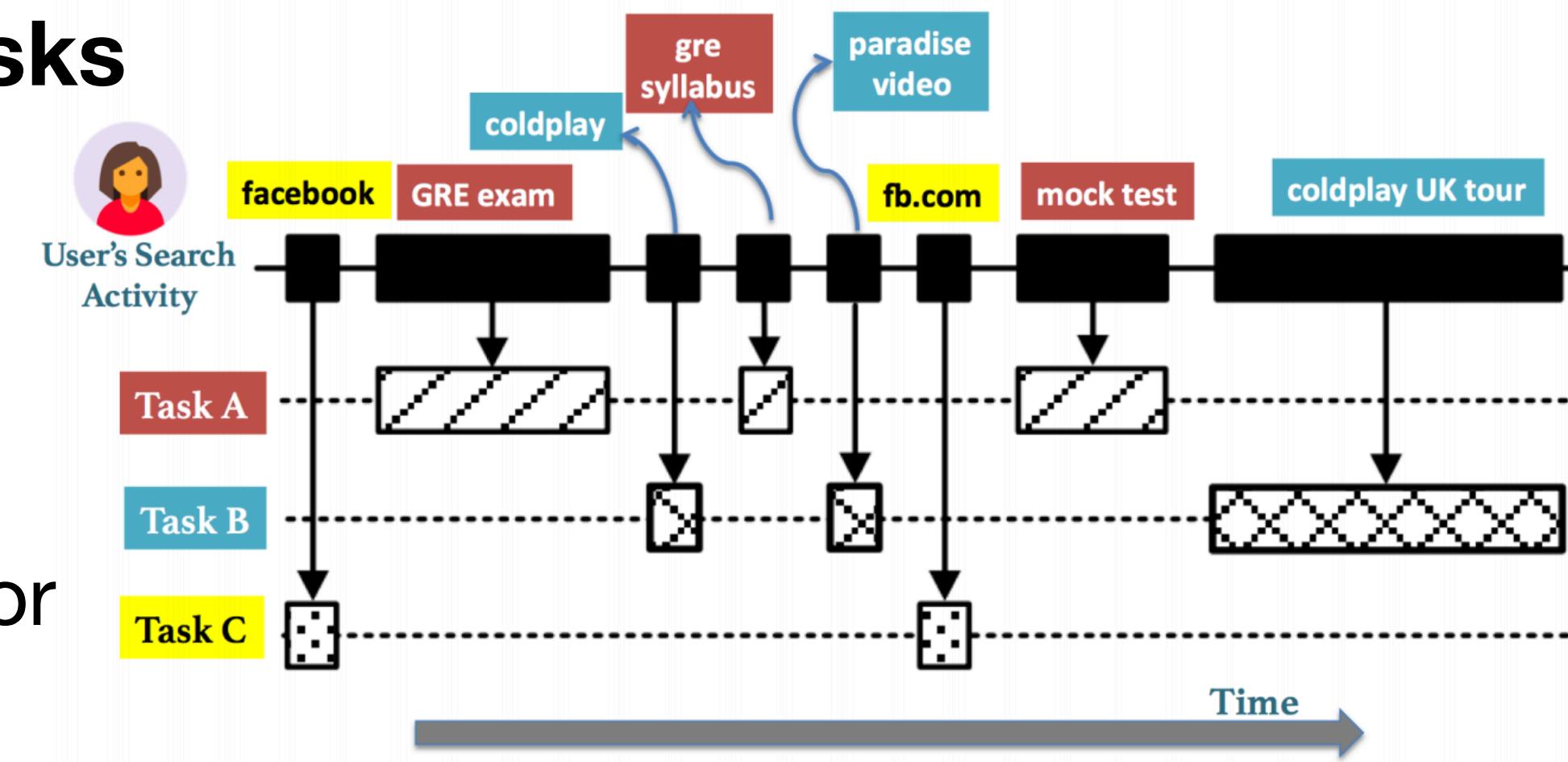


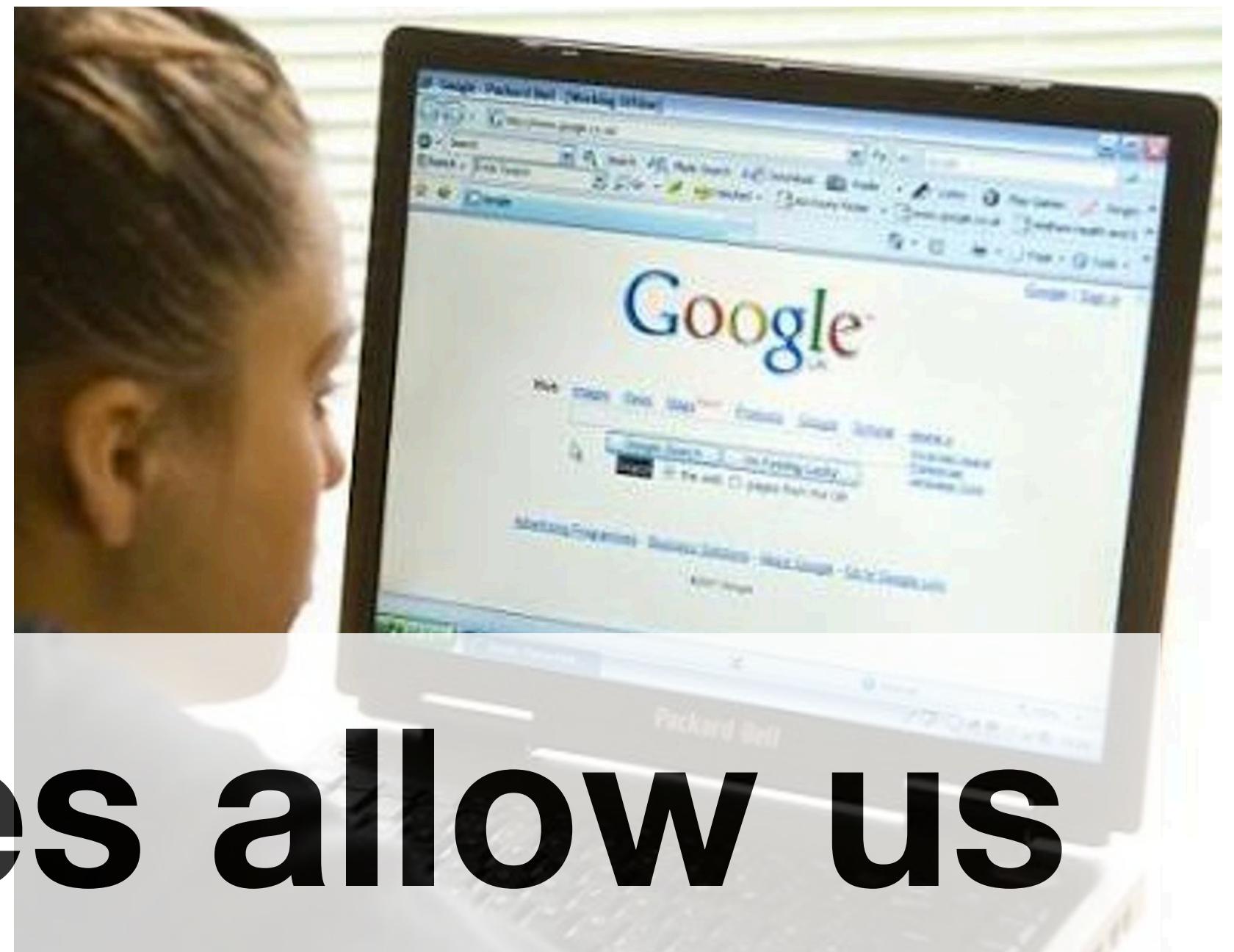
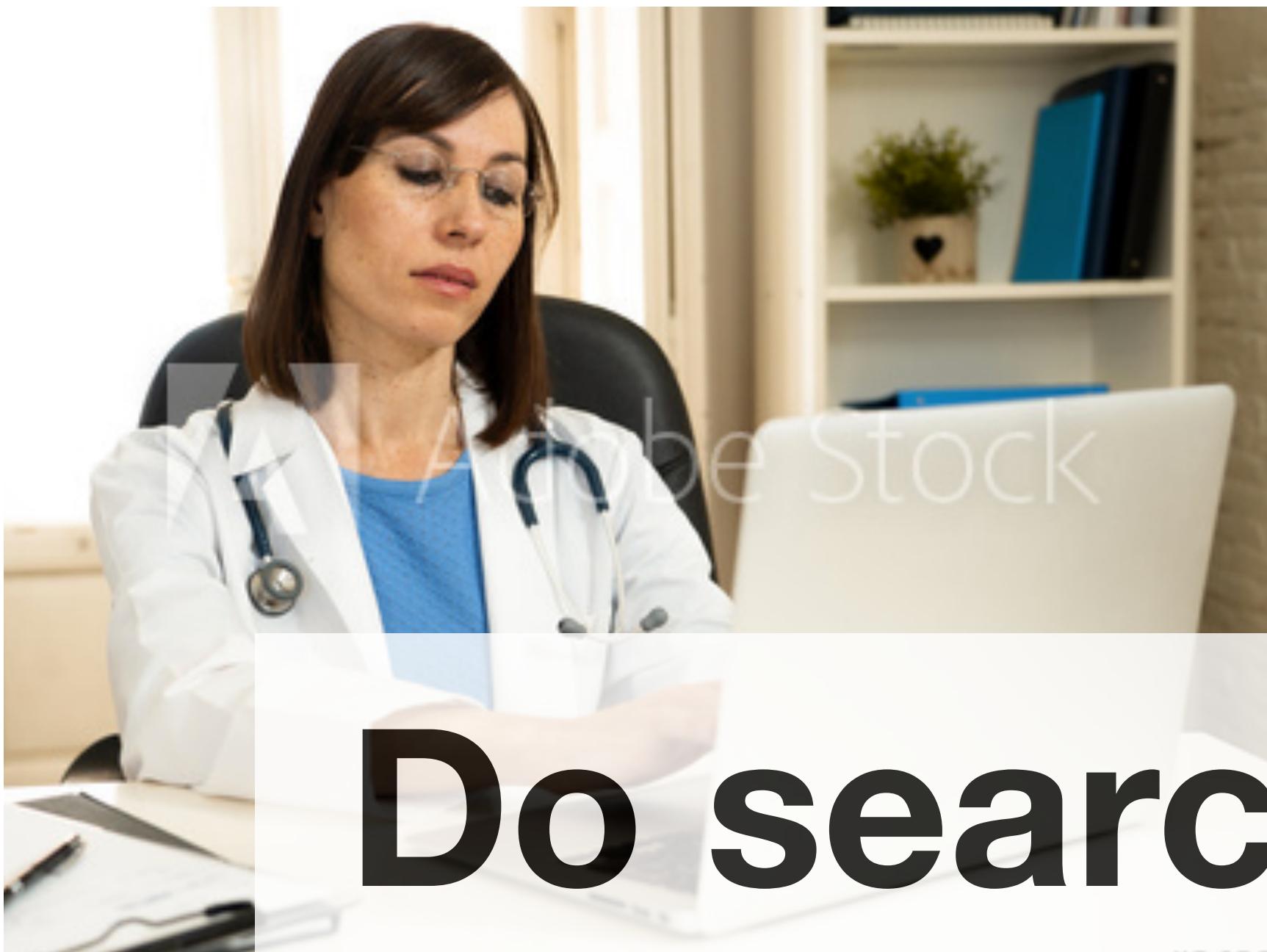
Image from Mehrotra & Yilmaz, CIKM2017

Searching to make decisions



We go one step forward: investigate situations where we **search to make a (critical) decision**

In this talk:



**Do search engines allow us
to make better decisions?**

- I will reflect on the **implications** of our empirical results and observations with respect to:
 - How we **evaluate** search systems in Information Retrieval
 - What **future research** may need to address

1st Study: Clinical Decision Support

Clinical Questions: An information need that arises as a result of a patient encounter directly pertaining to the diagnosis and/or treatments for a patient condition

- What is the **diagnosis**?
- What **medical tests** to order?
- What **treatments** to suggest?
- 1 question every 2 patient visits
- More than half (53%) of clinical questions don't get answered



Does it matter if clinical questions are answered?

- **answering clinical questions** leads to significant changes to care
- relevant information provided to clinicians -> **changes to clinical decisions are observed** for:
 - Patient **advice** (72%)
 - **Treatment** decision (59%)
 - Choice of diagnostic **test** (45%)
 - Choice of drug (**treatment**) (45%)
 - **Diagnosis** decision (29%)
- Thus **avoiding**: additional **tests and procedures** (49%), additional **surgery** (21%), patient **mortality** (19%)
- **Correctly answering** clinical questions **impacts** patient **outcomes** and the **efficiency** and **effectiveness** of the healthcare system

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- Marshall JG. The impact of the hospital library on clinical decision making: the Rochester study. Bull Med Libr Assoc. 1992;80(2):169.
- Marshall JG, et al. The value of library and information services in patient care: results of a multisite study. J Med Libr Assoc JMLA. 2013;101(1):38.

Search Engines often used by clinicians for answering their clinical questions

- PubMed
- UpToDate

Does search engine lead to better clinical decisions?

- User study with 106 clinicians; 16 questions, 1,653 samples
- Clinicians asked to consider **real-life clinical scenarios** with patient complain description:
 - *A 48 year old man presents with severe right sided loin pain and is diagnosed with a 4mm distal ureteric calculus.*
- Clinician asked **focused question** on diagnosis/test/treatment
 - *Has Tamsulosin been shown to increase the chances of the calculus passing?*
- Answer = Yes, No, Conflicting
- Ask question **pre-search** – Ask again **post-search**

Based on: (1) van der Vegt A, Zucccon G, Koopman B, Deacon A. Impact of a Search Engine on Clinical Decisions Under Time and System Effectiveness Constraints: Research Protocol. JMIR Res Protoc 2019;8(5):e12803
(2) van der Vegt A, Zucccon G, Koopman B, Deacon A. The Impact of time pressure on clinical decision making. [under review]
(3) van der Vegt A, Zucccon G, Koopman B. Does better retrieval effectiveness equate to better clinical decisions? If not, why not? [under review]

Does search engine lead to better clinical decisions?

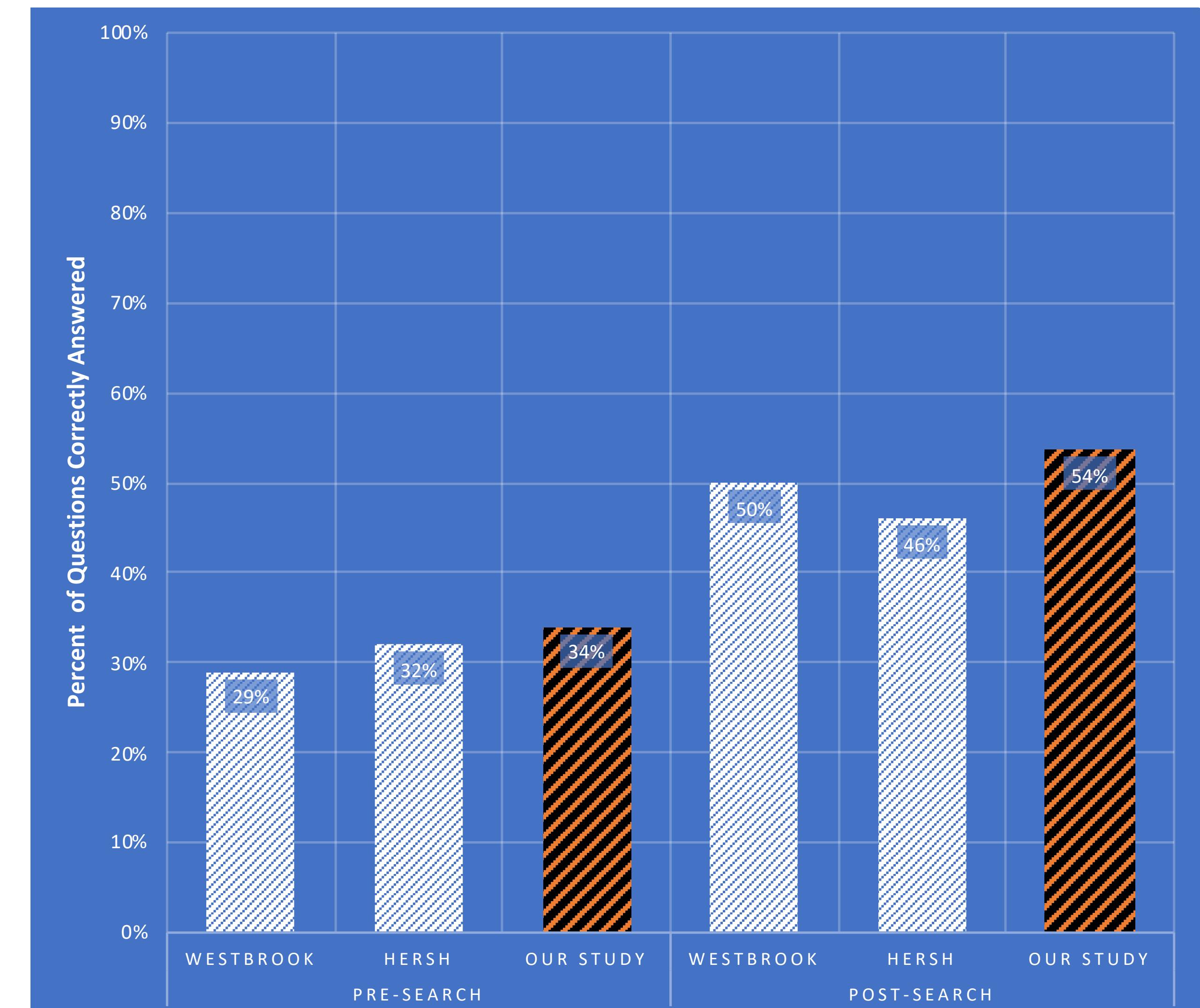
Similar Prior Studies:

- [Westbrook et al, 2005]:
75 clinicians, 8 clinical questions
- [Hersh et al, 2002]:
45 medical students, 21 nursing students, total 324 questions

Our results:

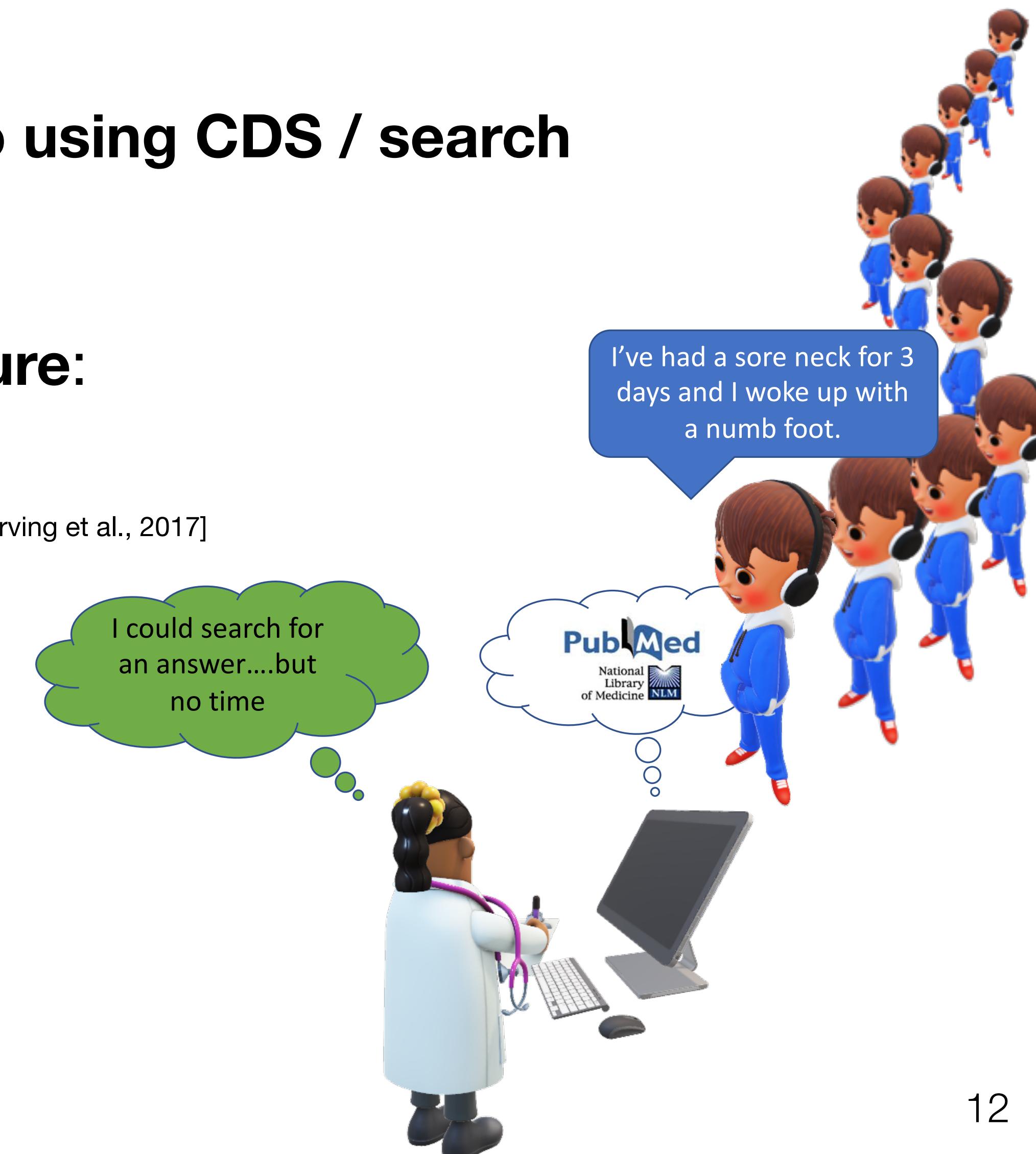
- Slightly higher pre-search & post-search correct answer rate
- Similar **significant benefit** from using a medical **search** engine

Note: All differences between pre-search and post-search answers are significant (McNemar's Chi-squared Test for symmetry)



How does time pressure impact clinical decision making, when using a search engine?

- Clinicians report **lack of time** as the primary **barrier to using CDS / search systems** [Cook et al., 2013]
- In fact, clinicians frequently operate under **time pressure**:
 - Average consultation time is less than 5 minutes [Irving et al., 2017]
 - Over one-third of all primary care physicians are dissatisfied with the time available per patient [Osborn et al., 2015]

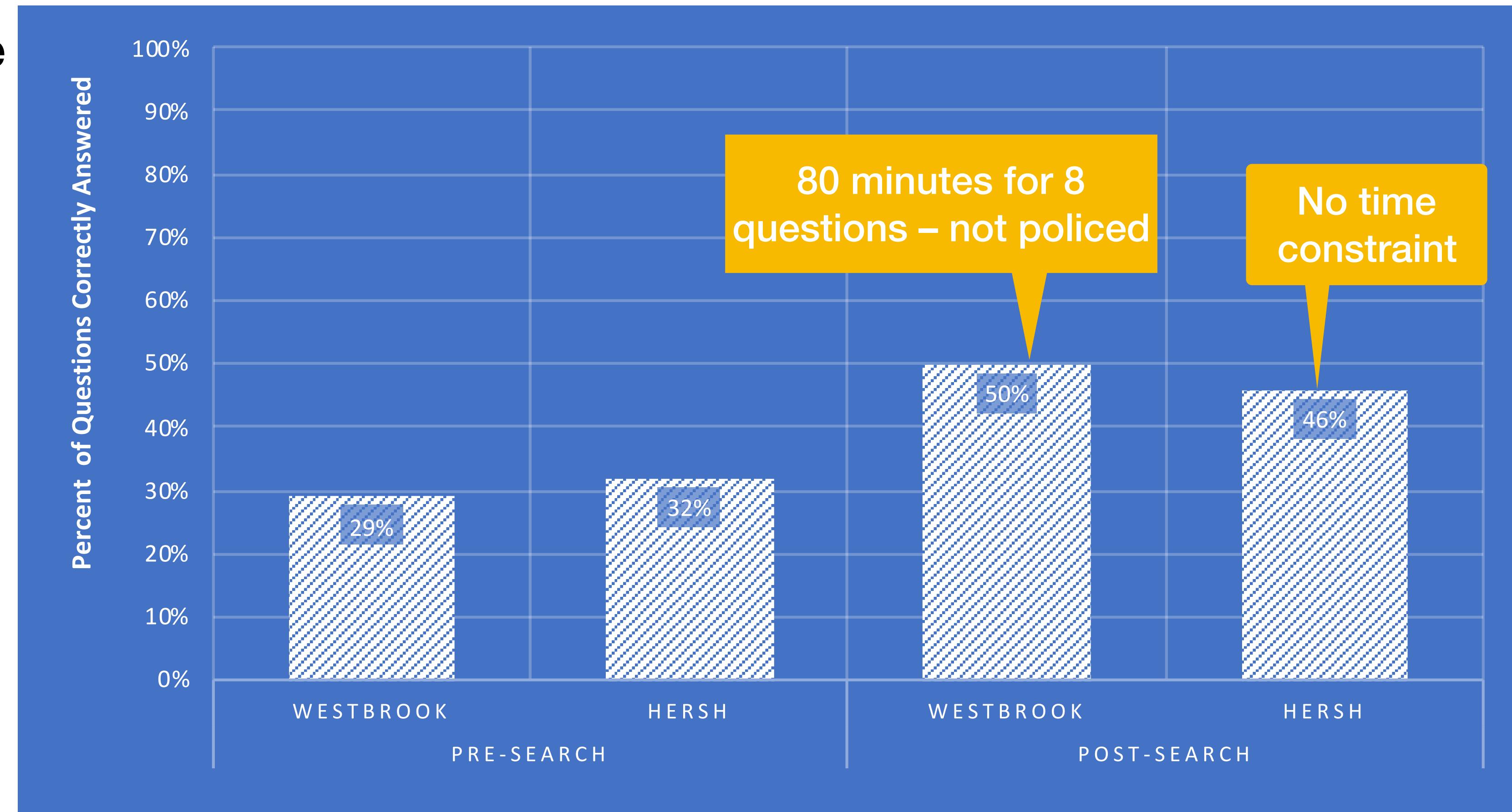


How does time pressure impact clinical decision making, when using a search engine?

Similar Prior Studies: time pressure not controlled for, or measured

[Crescenzi et al, 2016]: Impact of time constraints on user during information search. Users report:

- Greater time pressure
- Higher perceived task difficulty
- Less satisfaction with their performance



Study Design: Imposing Time Pressure



Search time constraints applied to induce time pressure



Based on [Westbrook et al, 2005]: mean search time = 6.1mins, std. dev = 3 mins. Therefore, 3 Time constraints applied to search:
3 minute, 6 minute and 9 minute

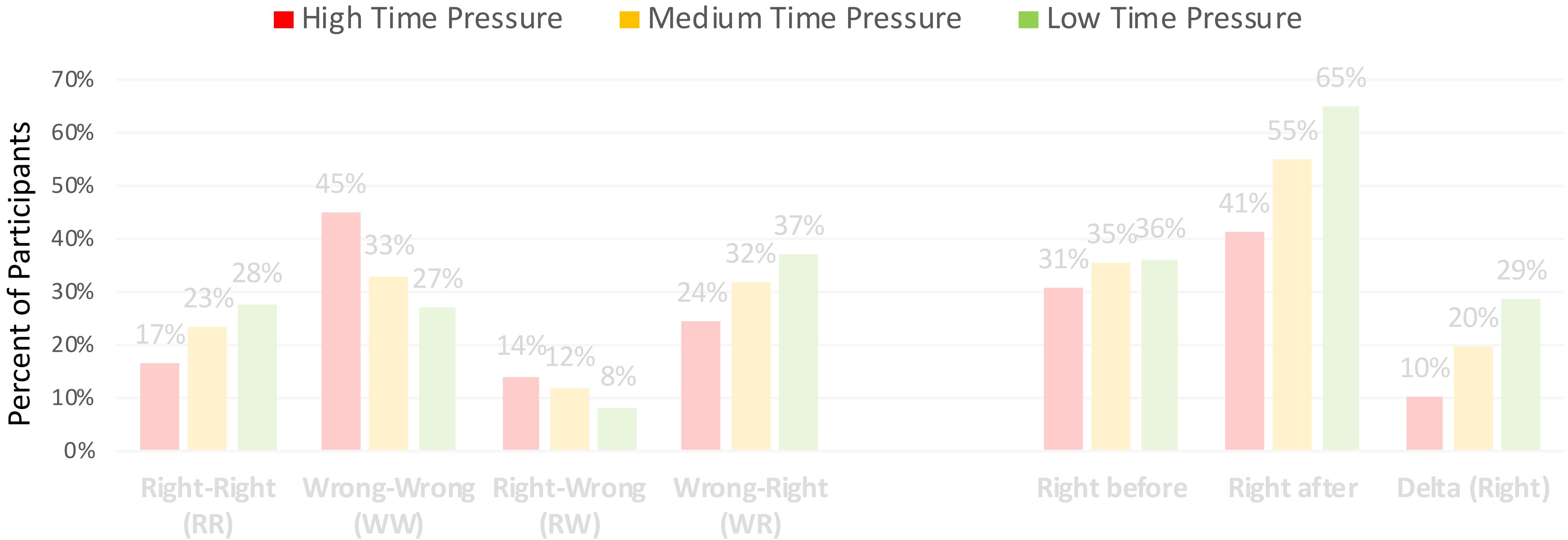


Within-subject, time constraint changes each question

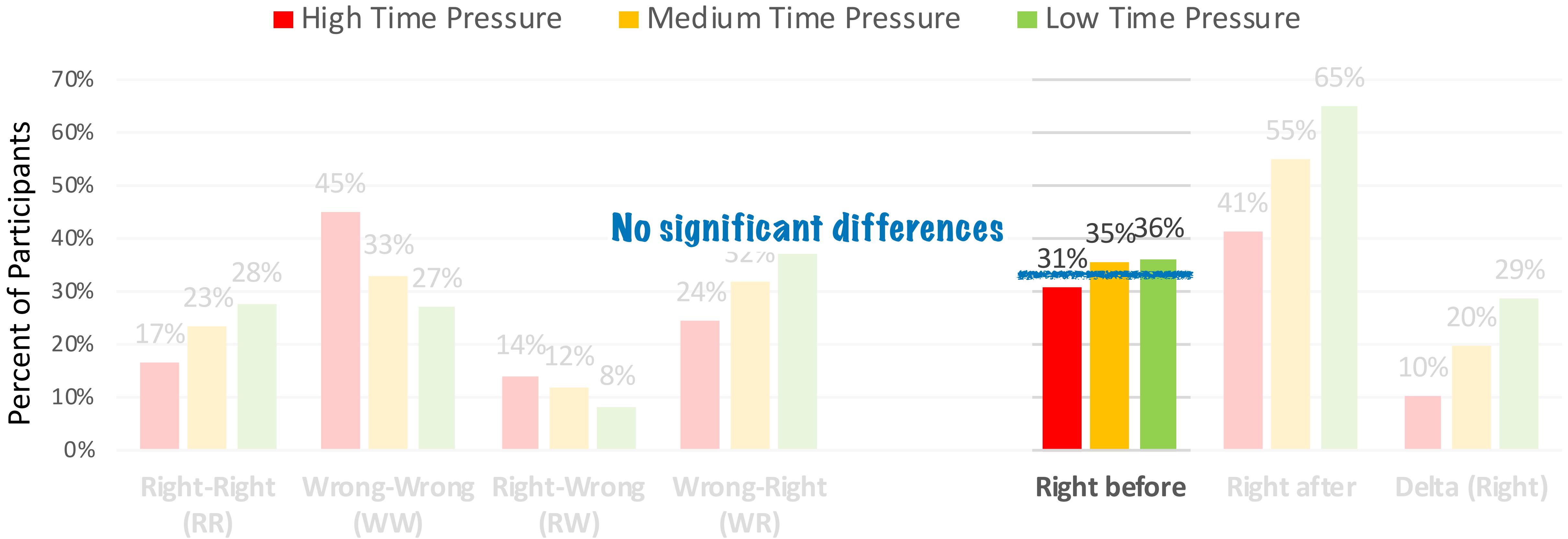


Participant notified of time at start of each question, then given a minute-by-minute countdown timer, then warning at 30 seconds to go, then forced to stop and answer question when time is up

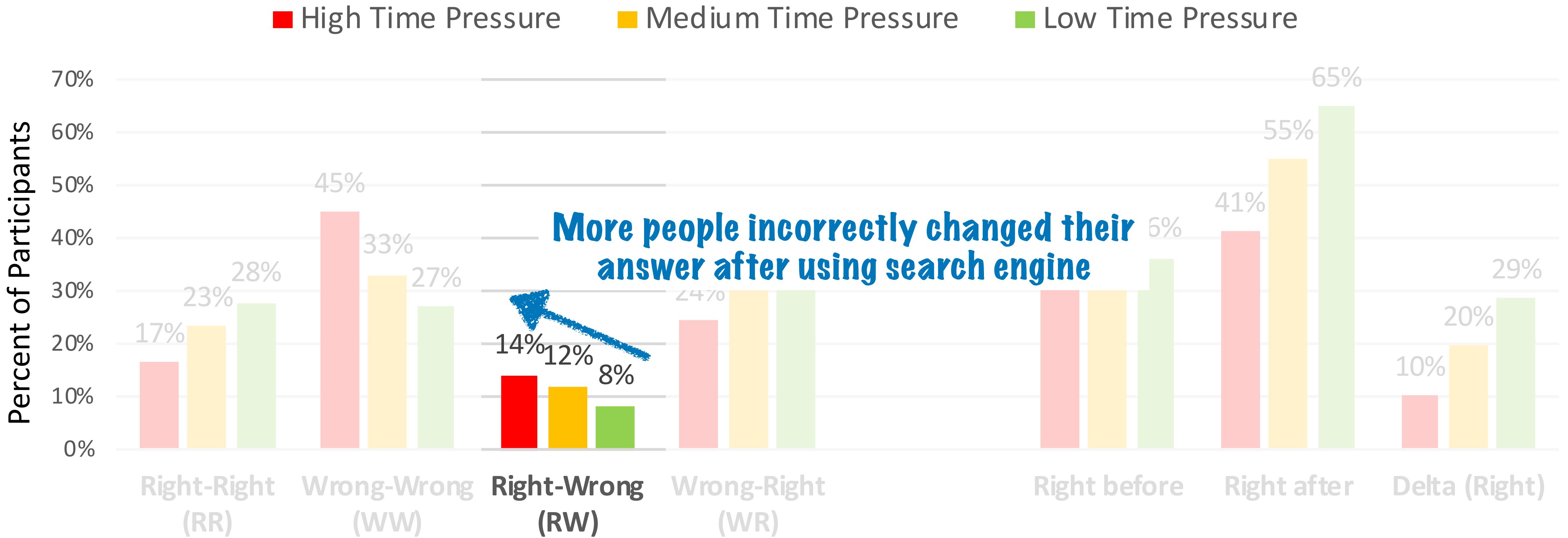
Impact of Time Pressure of Decisions



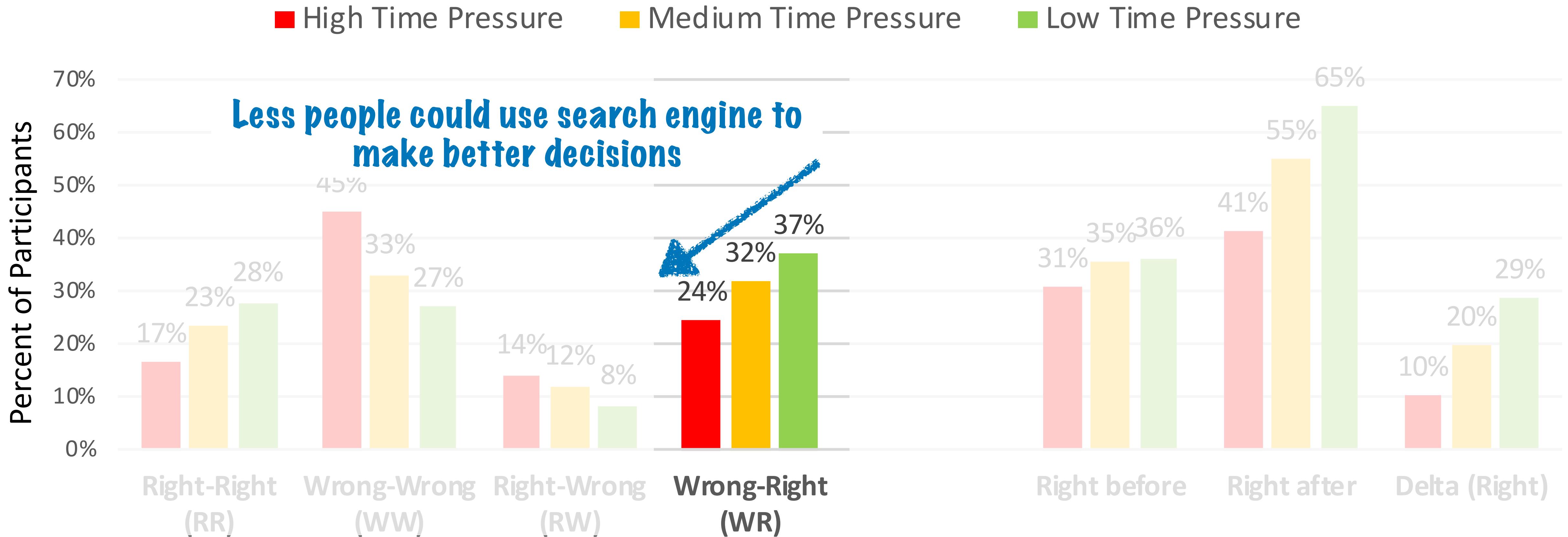
Correctness Before Search



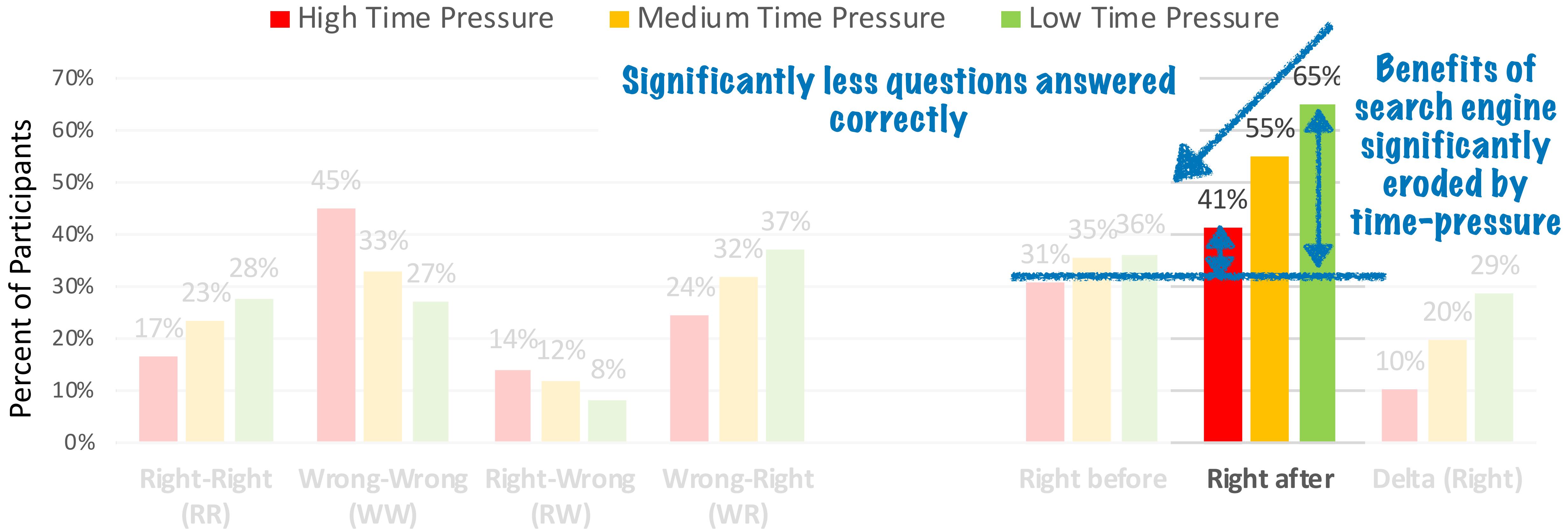
Right before search, then wrong after



Wrong before search then right



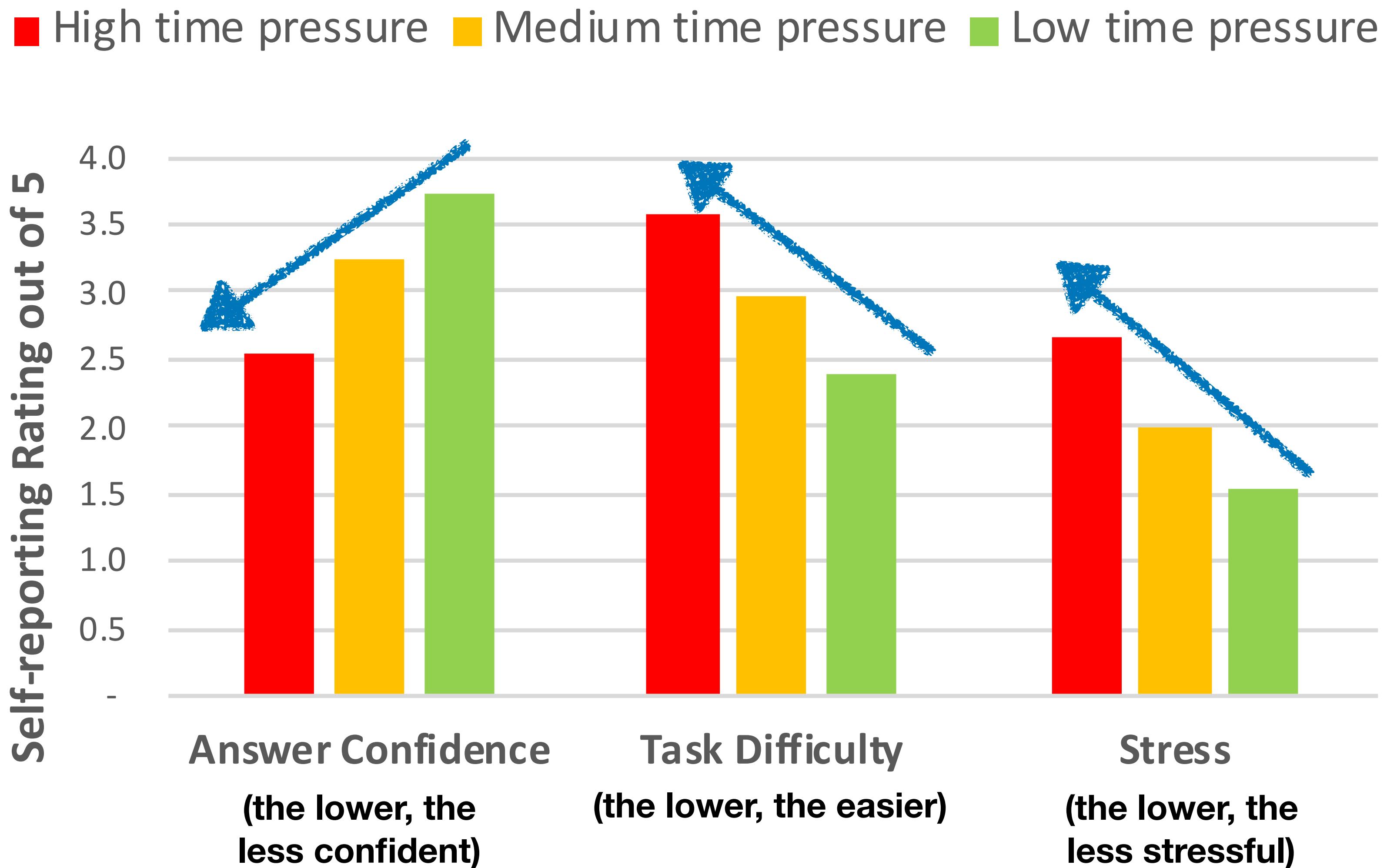
Right after using search system



Impact of time pressure on participants

- Decreased answer confidence
- Increased task difficulty
- Increased stress

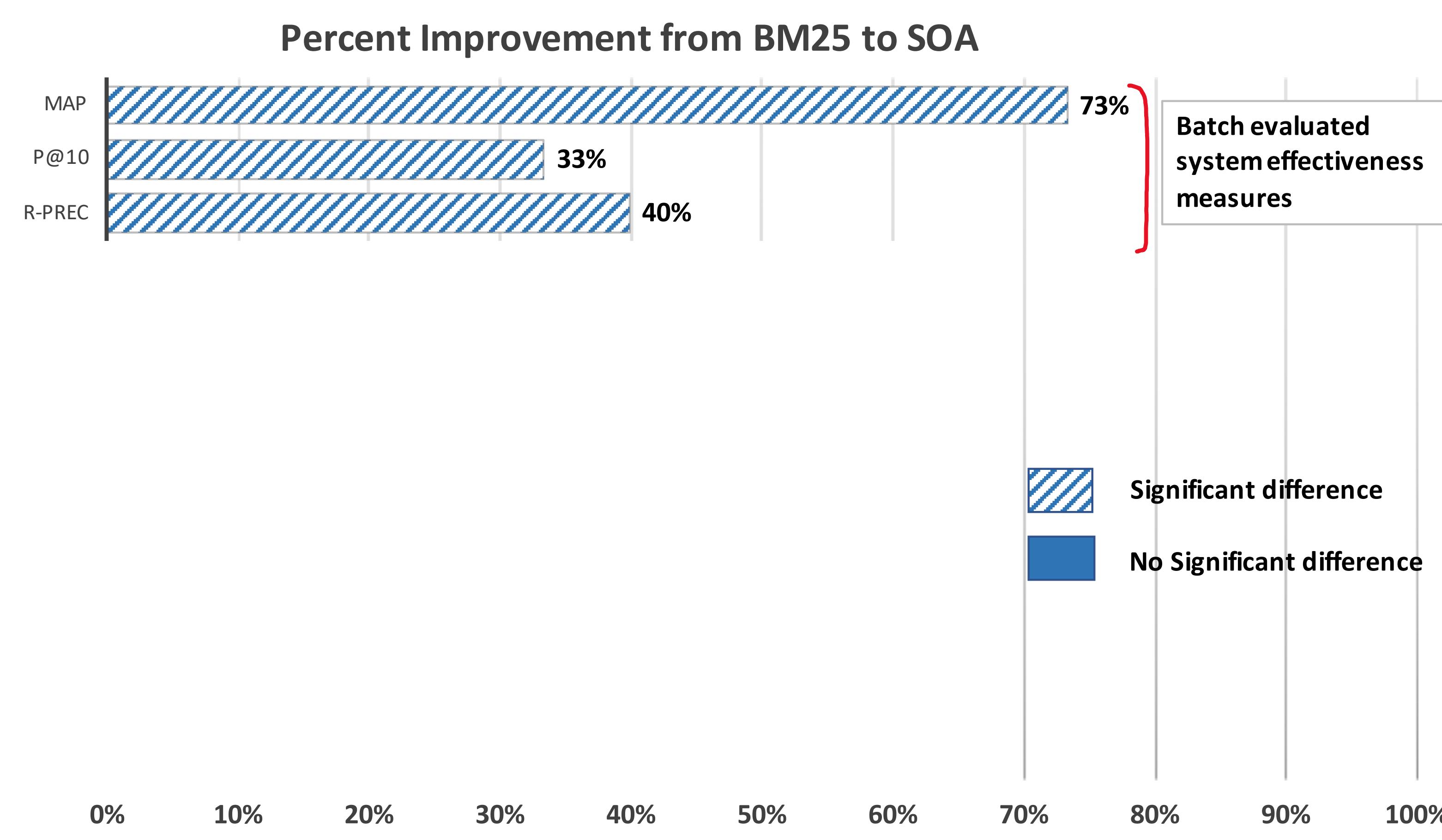
Note: All differences between time pressure levels are significant
(TukeyHSD p<.05)



Does a significantly better search engine translate to better and faster clinical decisions?

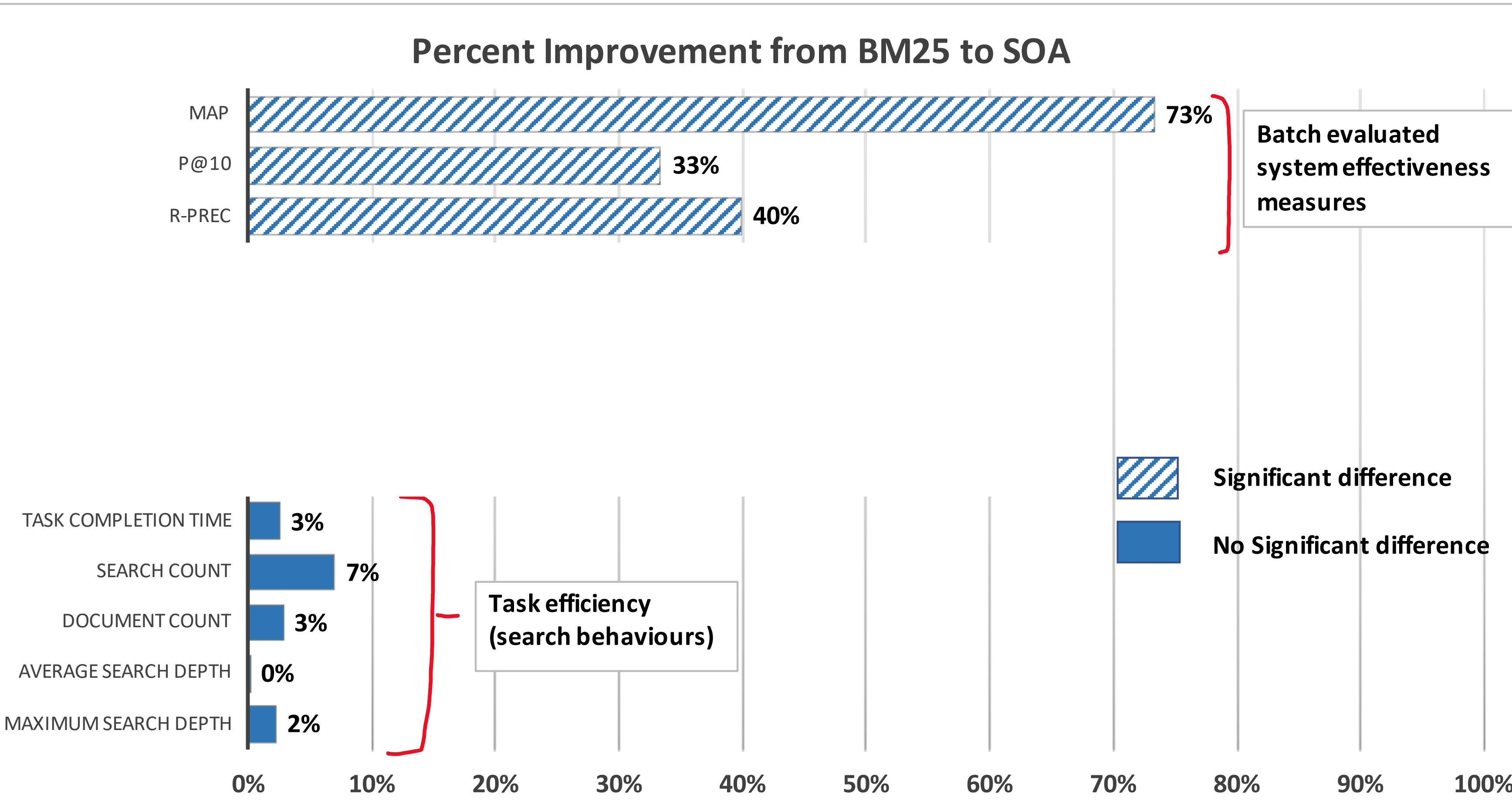
- After all, the IR community spends so much time and \$\$ **building better and better search engines** – in terms of good they are in **retrieving relevant documents**
 - e.g. for this task 7 TREC tracks (3x CDS, 4 x PM)
- In the user study we employed **two systems**
 1. Vanilla **BM25** (baseline)
 2. The state of the art (**SOA**) on the TREC CDS task: best system in 2015, further improvements in follow up SIGIR publications
 - Further tuned & improved RF pipeline, removed negated UMLS terms in query
- All systems tuned and validated on TREC CDS data

Does a significantly better search engine translate to better and faster clinical decisions?



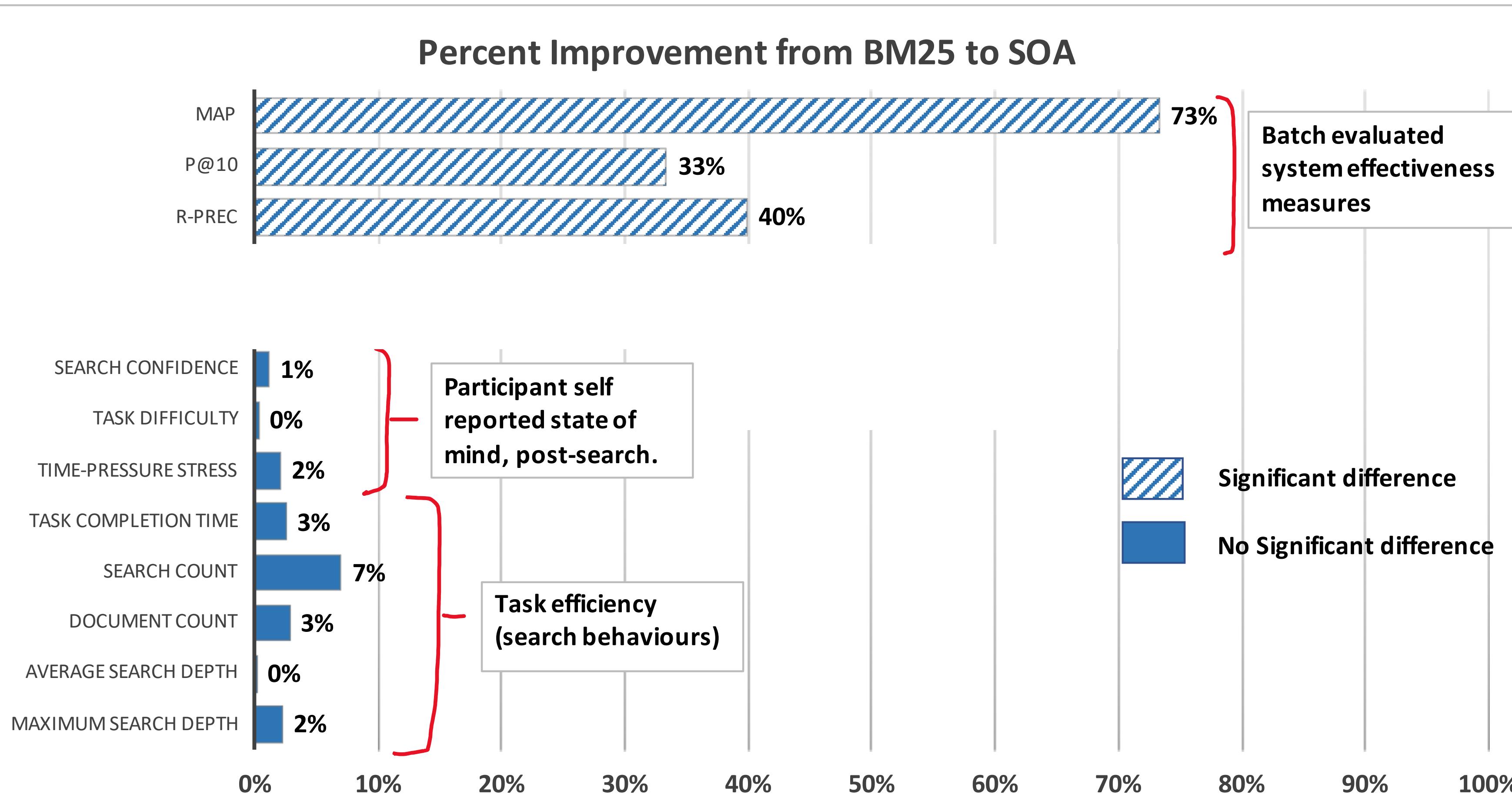
- Significant difference in off-line traditional IR performance
 - e.g., +73% MAP, +84% infAP, +46% infnDCG

Does a significantly better search engine translate to better and faster clinical decisions?



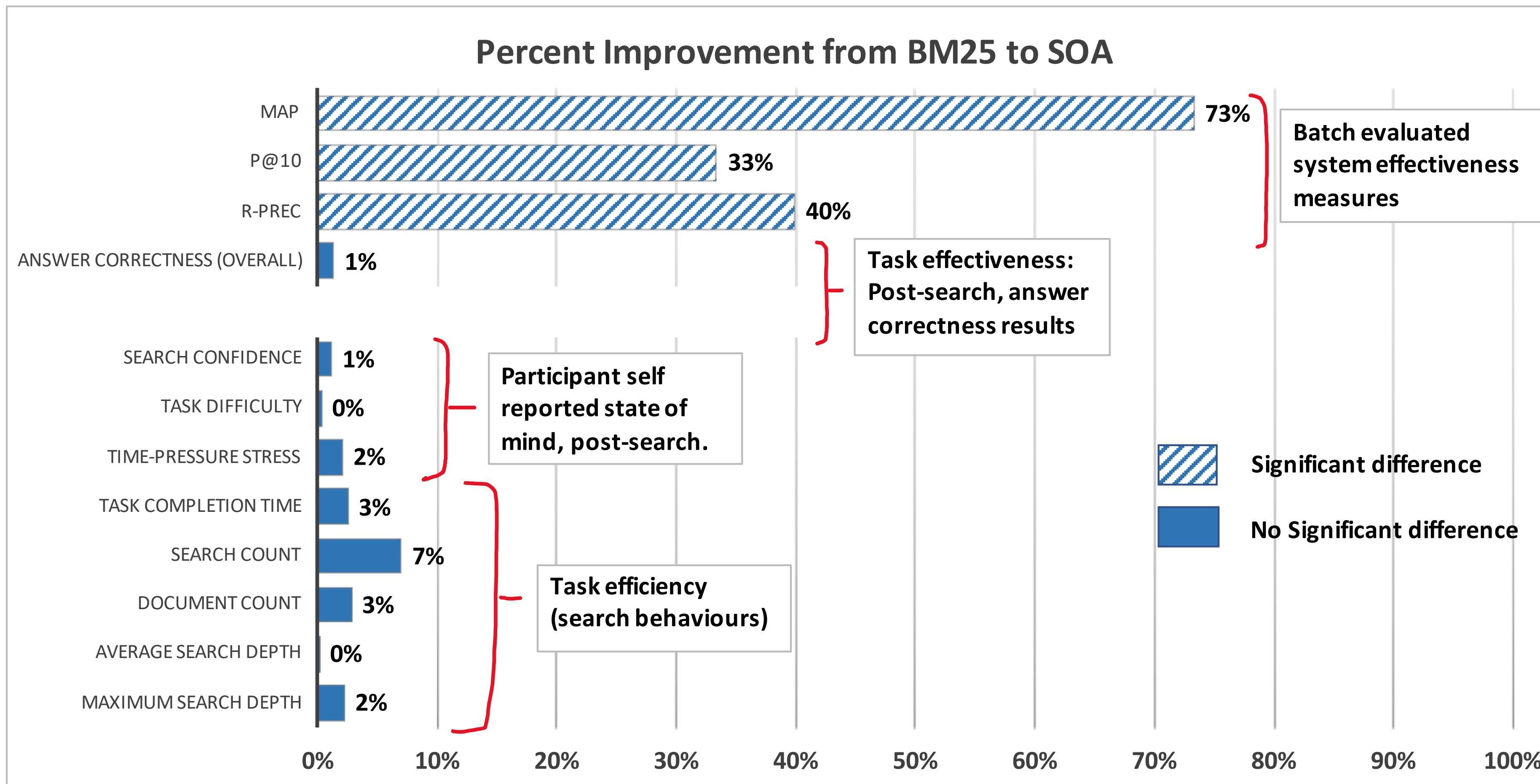
- Significant difference in off-line traditional IR performance
- **No/Minimal Impact on user search behaviour**

Does a significantly better search engine translate to better and faster clinical decisions?



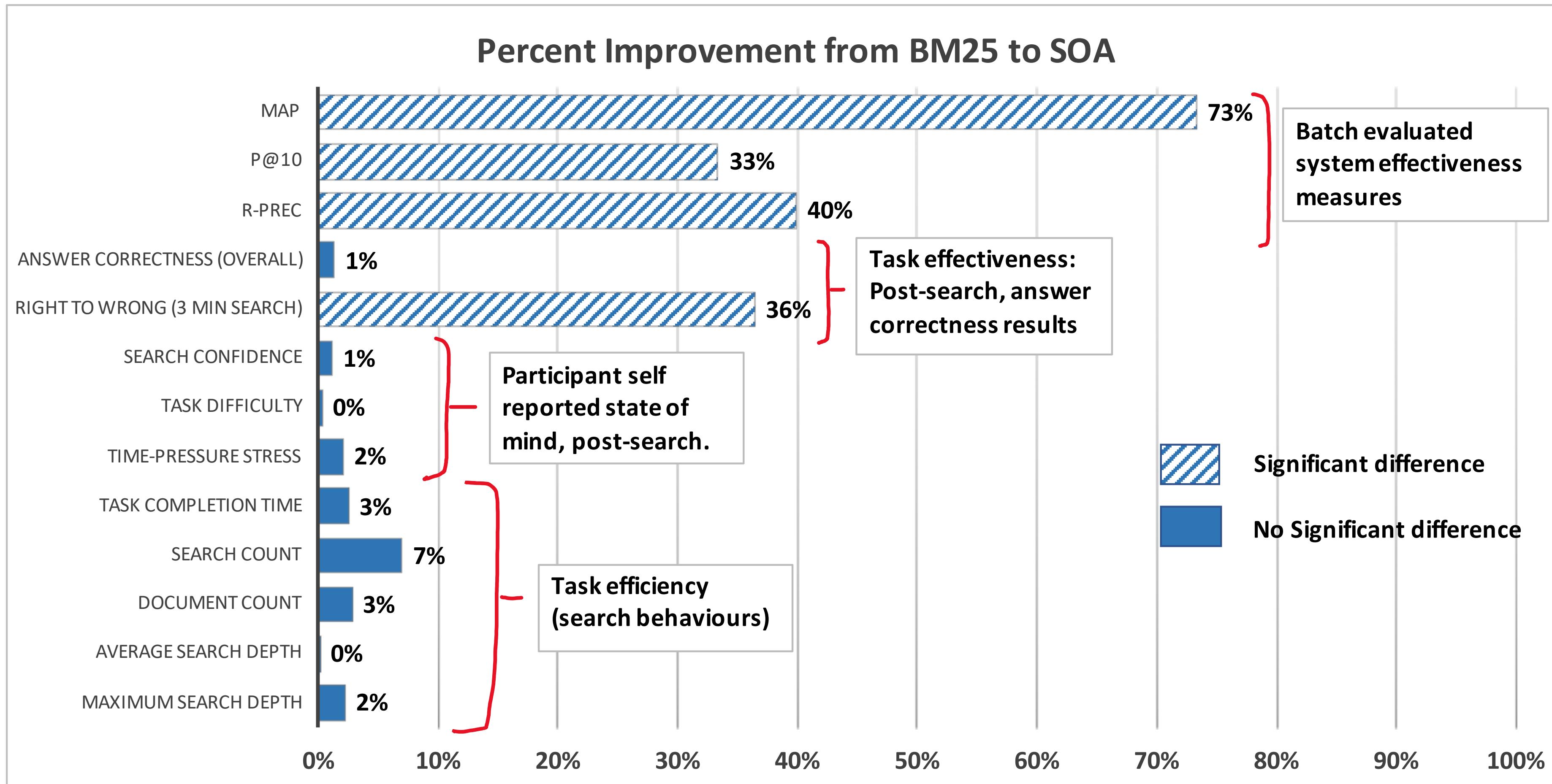
- Significant difference in off-line traditional IR performance
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- **No/Minimal Impact on self-reported state of mind**

Does a significantly better search engine translate to better and faster clinical decisions?



- Significant difference in off-line traditional IR performance
- No/Minimal Impact on user search behaviour!
- No/Minimal Impact on self-reported state of mind
- **No/Minimal Impact on decisions**

Does a significantly better search engine translate to better and faster clinical decisions?

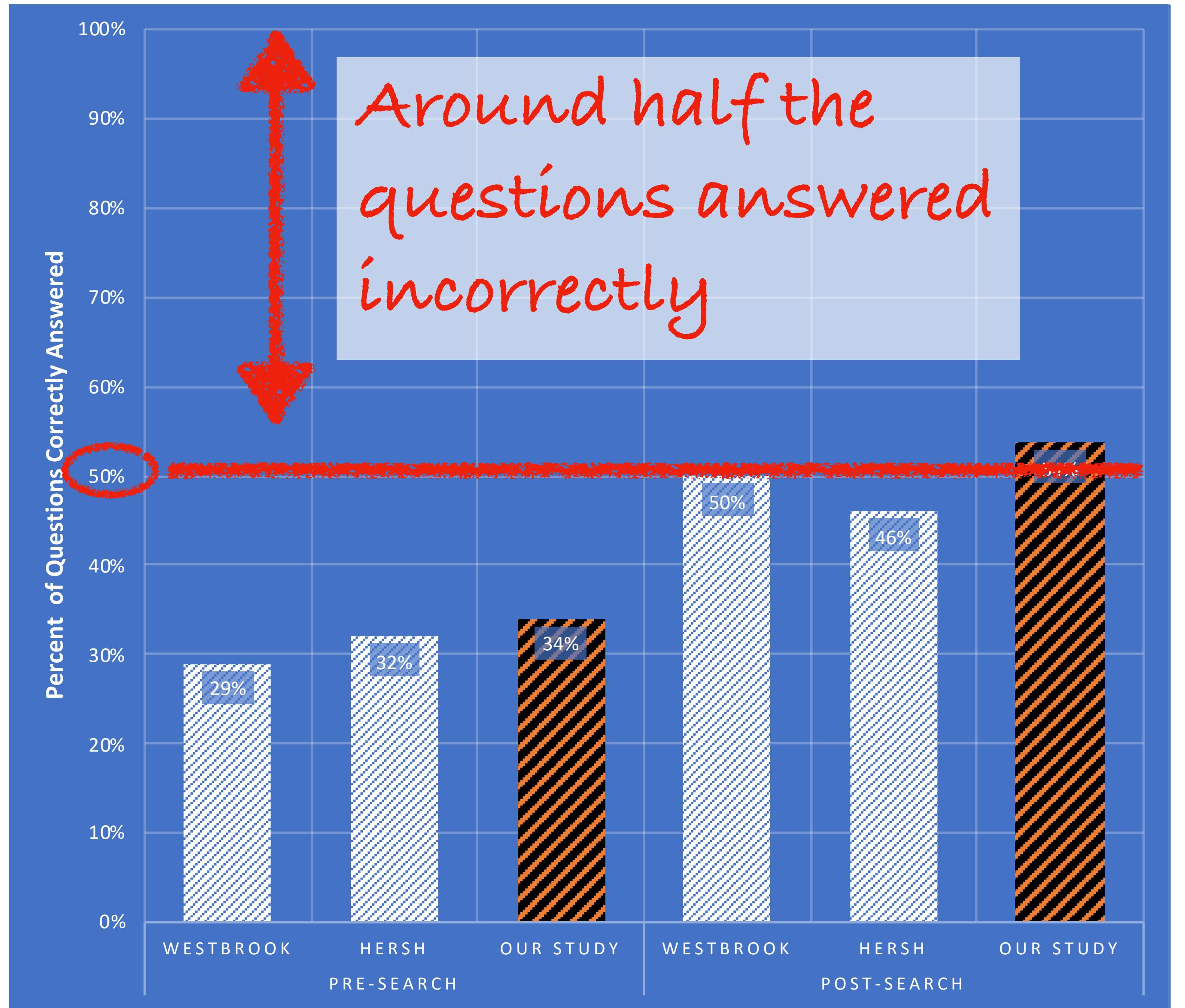


- Significant difference in off-line traditional IR performance
- No/Minimal Impact on user search behaviour!
- No/Minimal Impact on self-reported state of mind
- **No/Minimal Impact on decisions!**
 - Under the tightest, time-constrained search conditions, a better performing search engine **prevents more clinicians from incorrectly changing their clinical decisions**

Broader Implications for IR Evaluation

- Traditionally, **search engine evaluation** has measured a **function** of the presence of **relevant documents** in the ranking, e.g. precision, recall, nDCG, ~~MAP*~~, RBP*, INST*
- BUT — users do not search to find relevant documents
- They **search to fulfil tasks**, and often to **make decisions**
- Our results show that producing **good rankings** in terms of relevance does **NOT** mean helping people making **correct decisions**
- In cases such the one seen here, **evaluation should be more holistic**: it should consider the root cause for using the search engine, i.e. making decisions
- (see next for what may actually impact decisions)

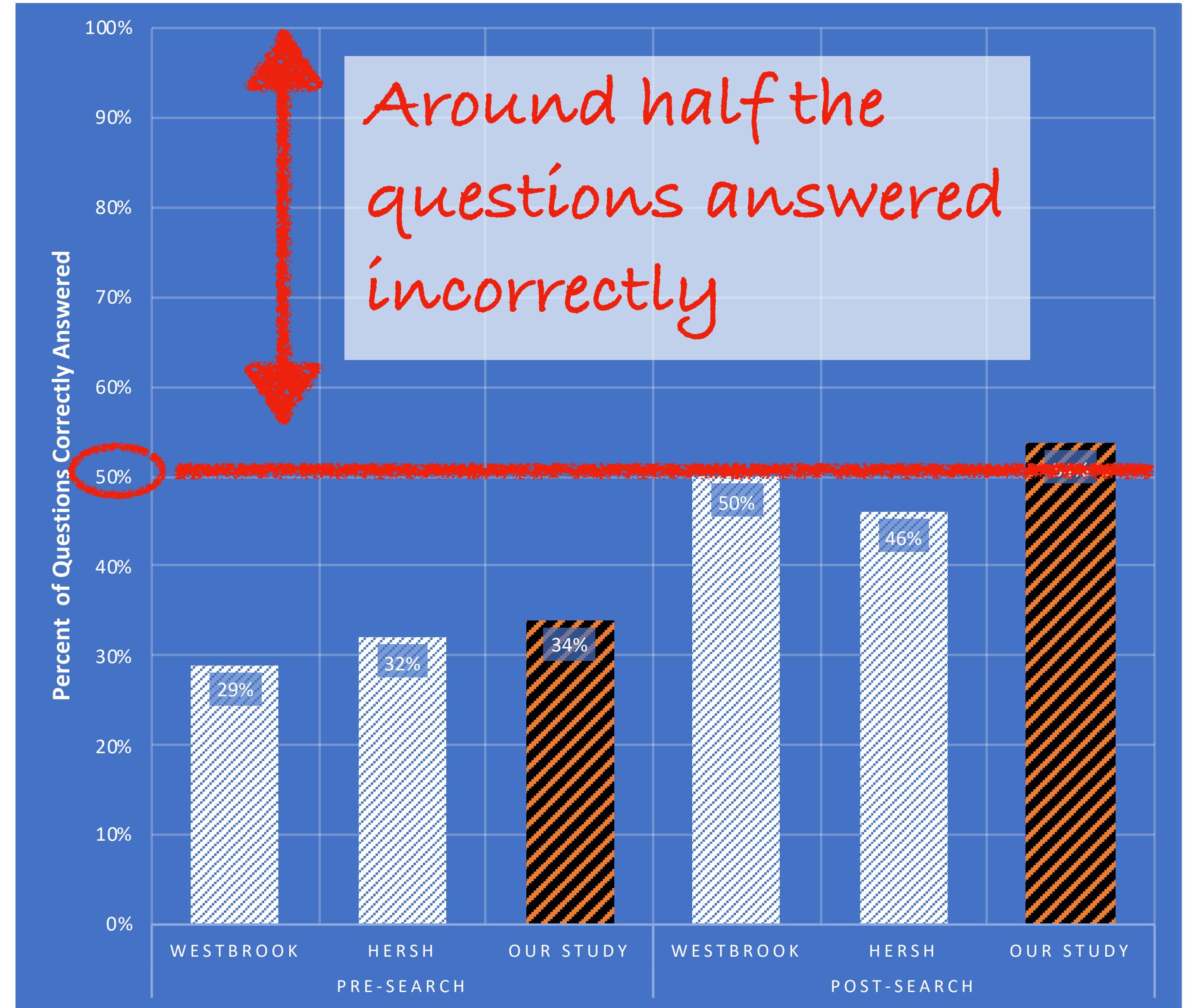
* Inserted just for Alistair to check if he is paying attention



So, why do clinicians fail to correctly answer around half the questions?

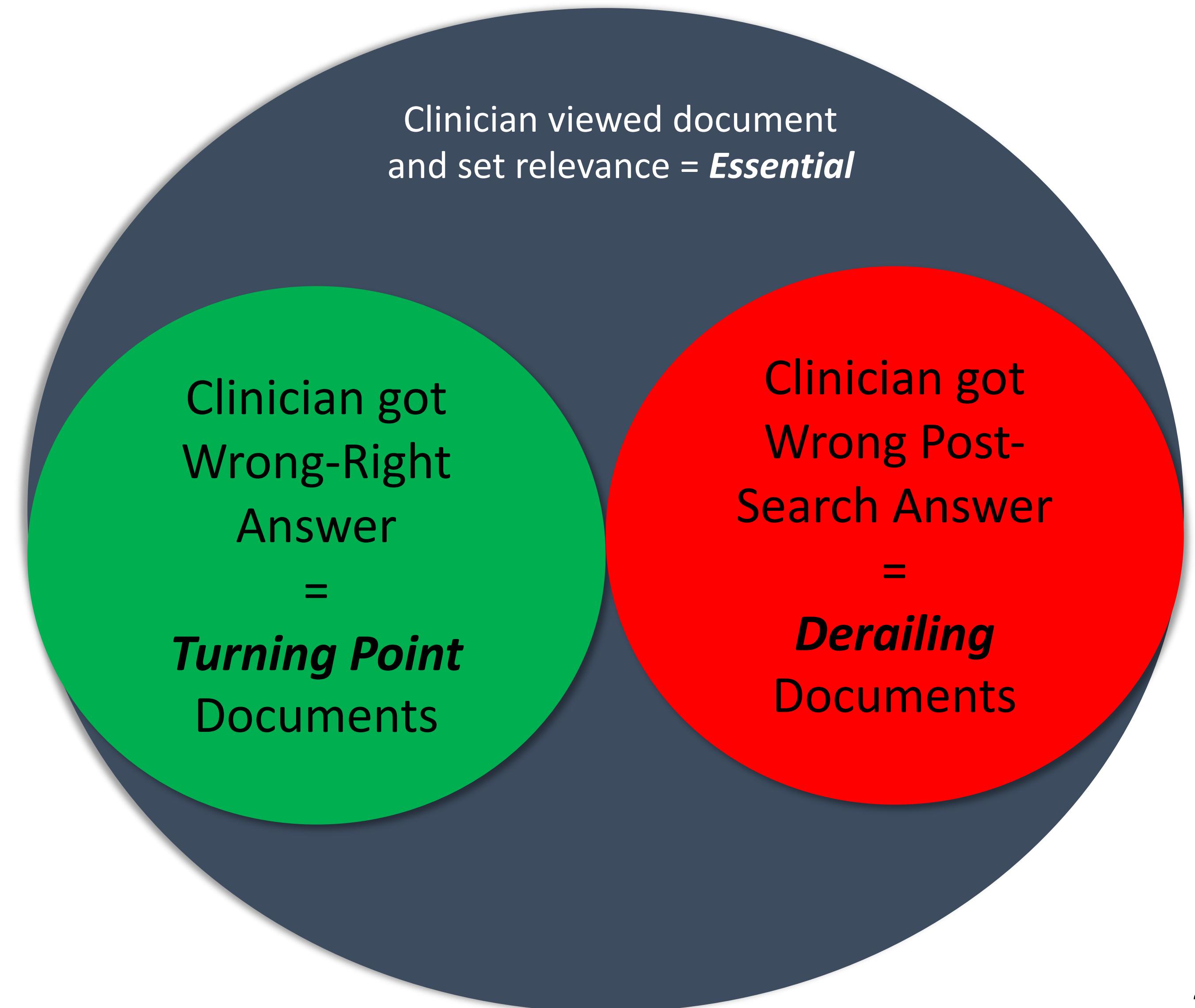
Is it because of:

- the corpus?
- the search engine?
- the participant?

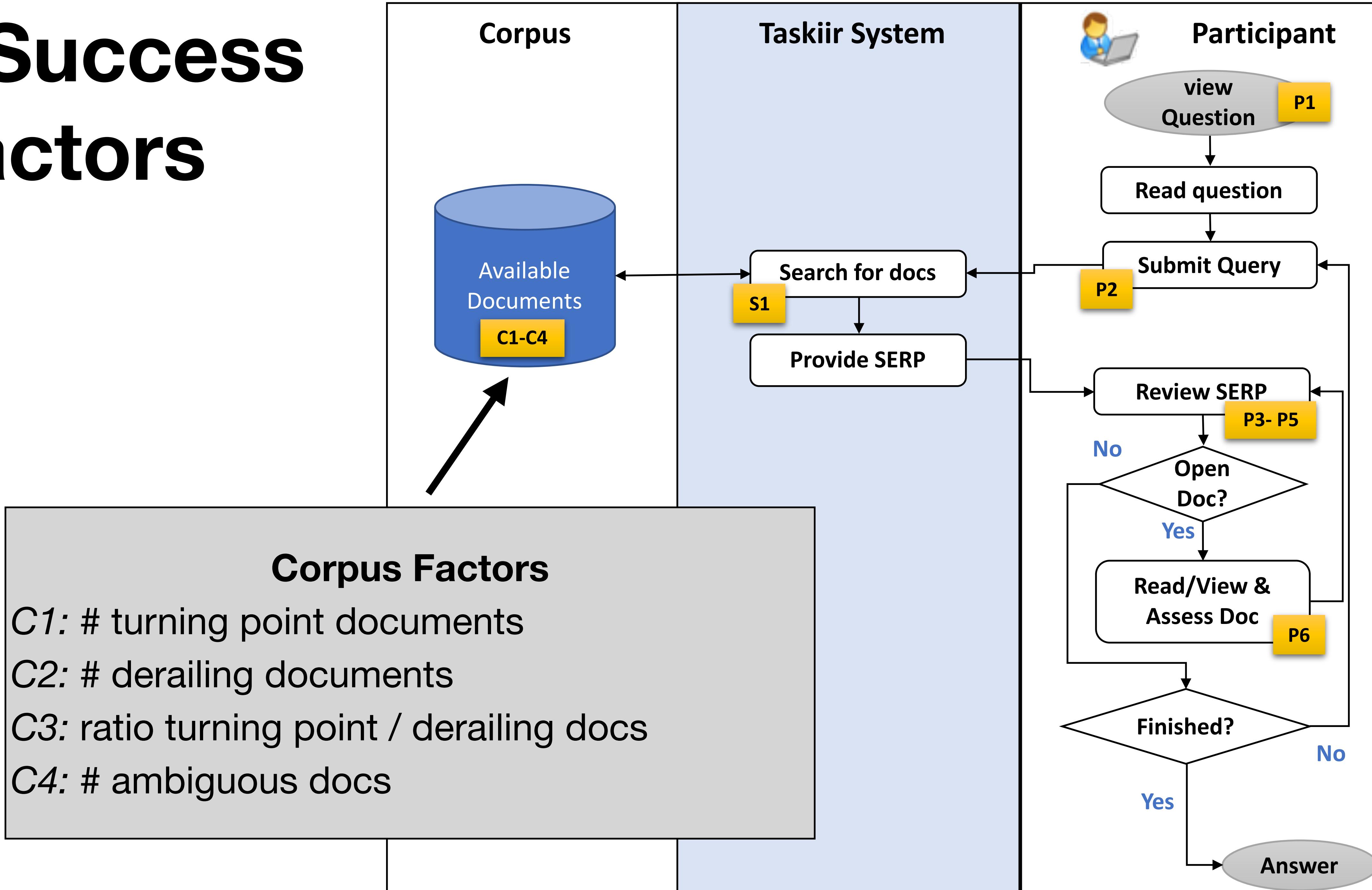


Analysis: Success Factor Model

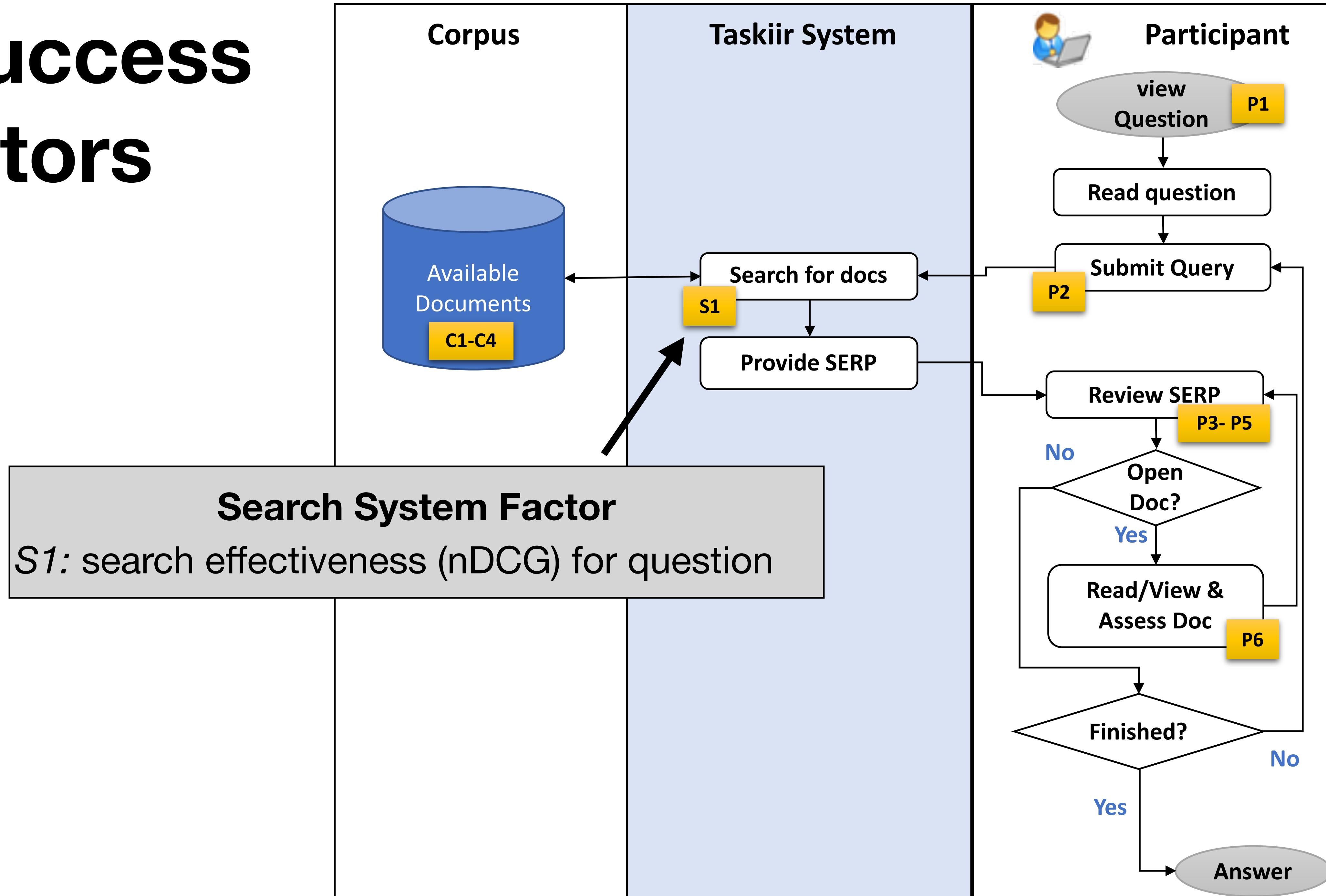
- Three types of documents:
 - **Turning Point:** those identified essential and that lead to change answer from wrong to right
 - **Derailing:** those identified essential but that lead to wrong answer
 - **Ambiguous:** those identified as both turning point and derailing



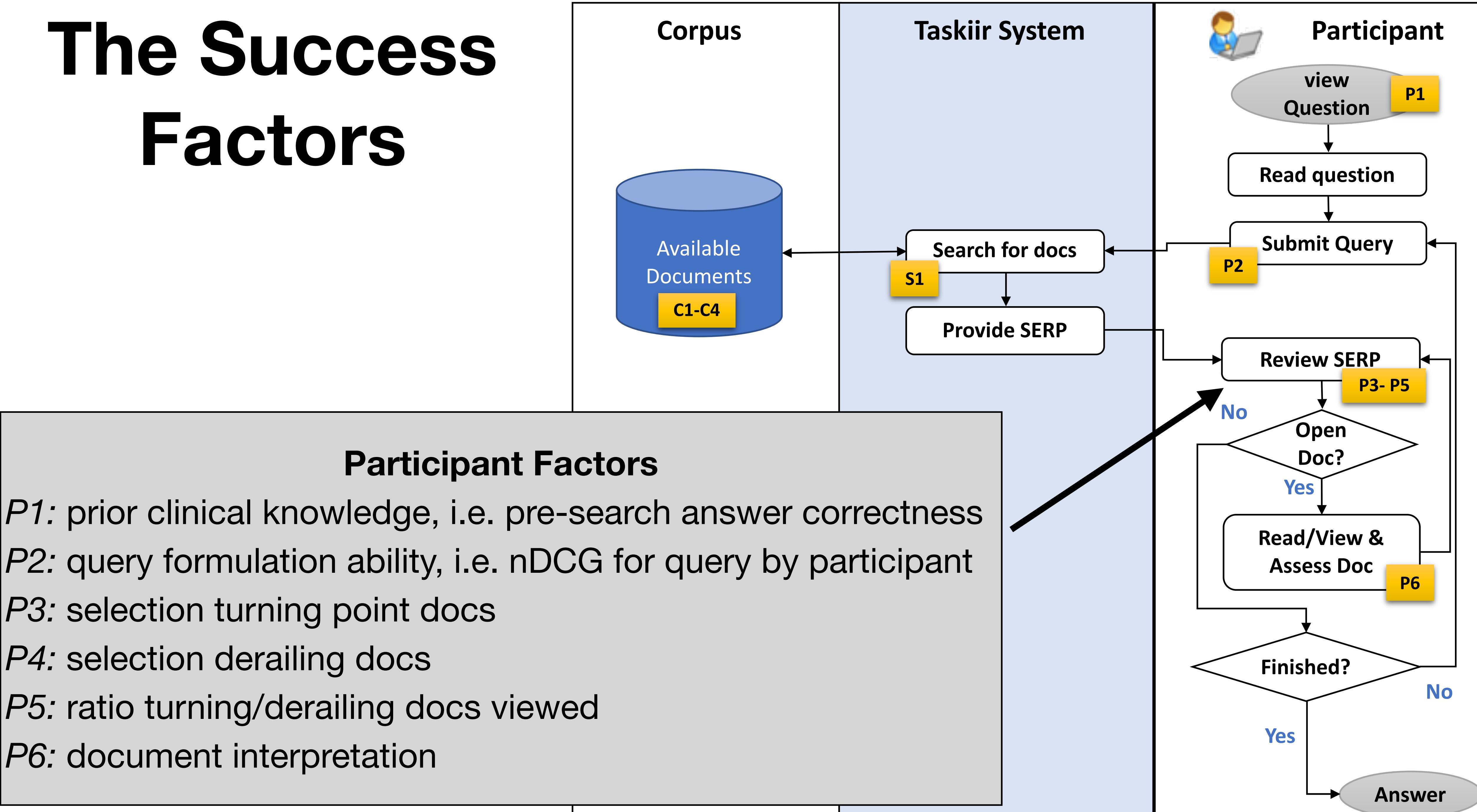
The Success Factors



The Success Factors



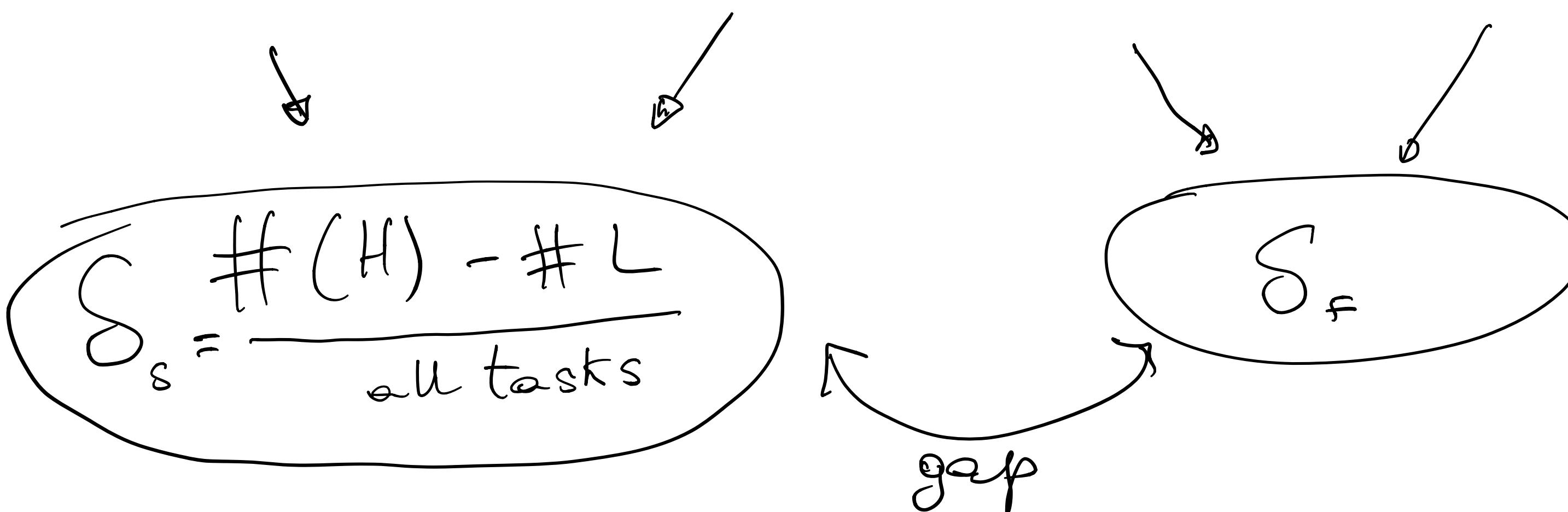
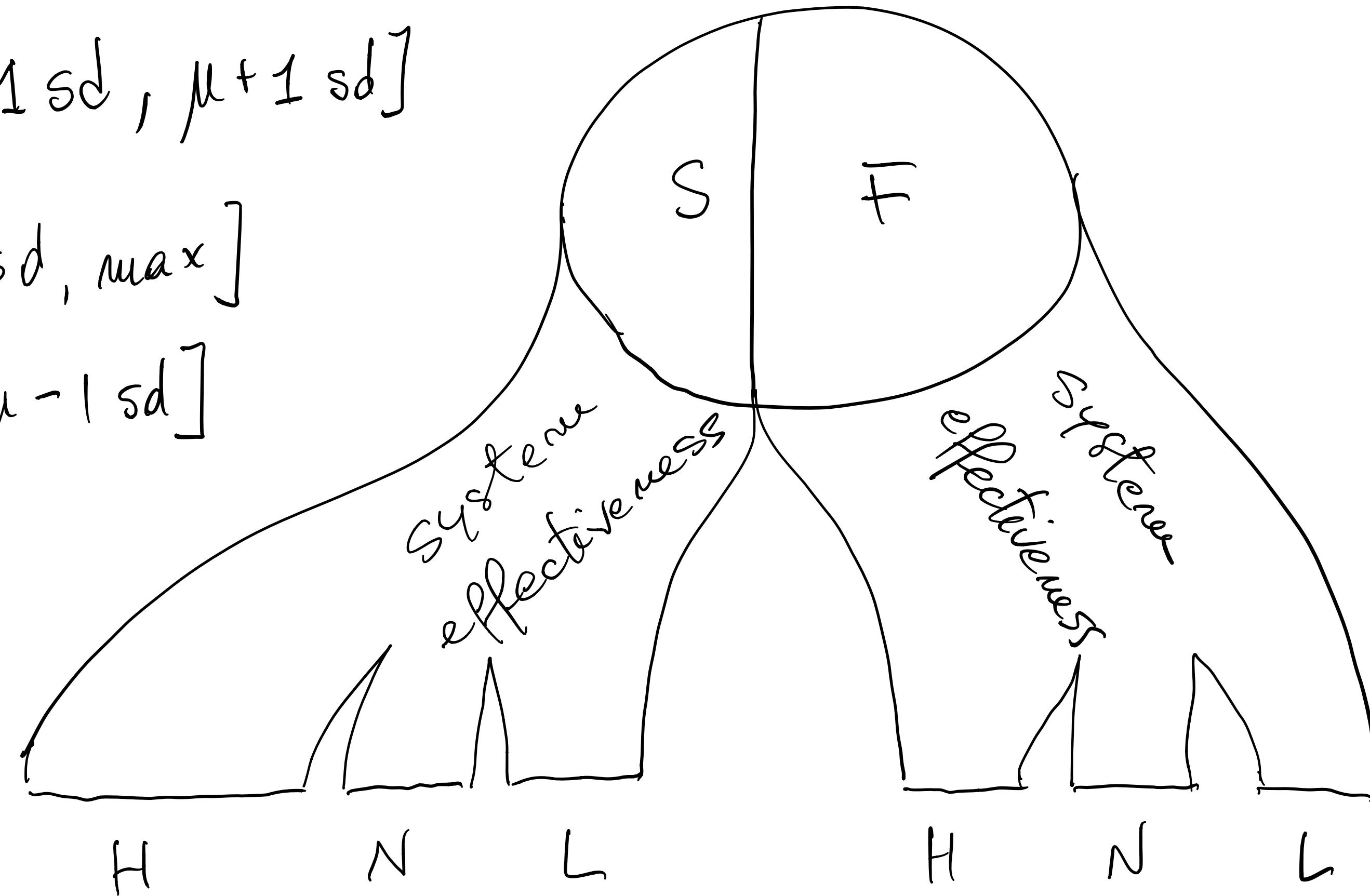
The Success Factors



$$N = [\mu - 1 \text{sd}, \mu + 1 \text{sd}]$$

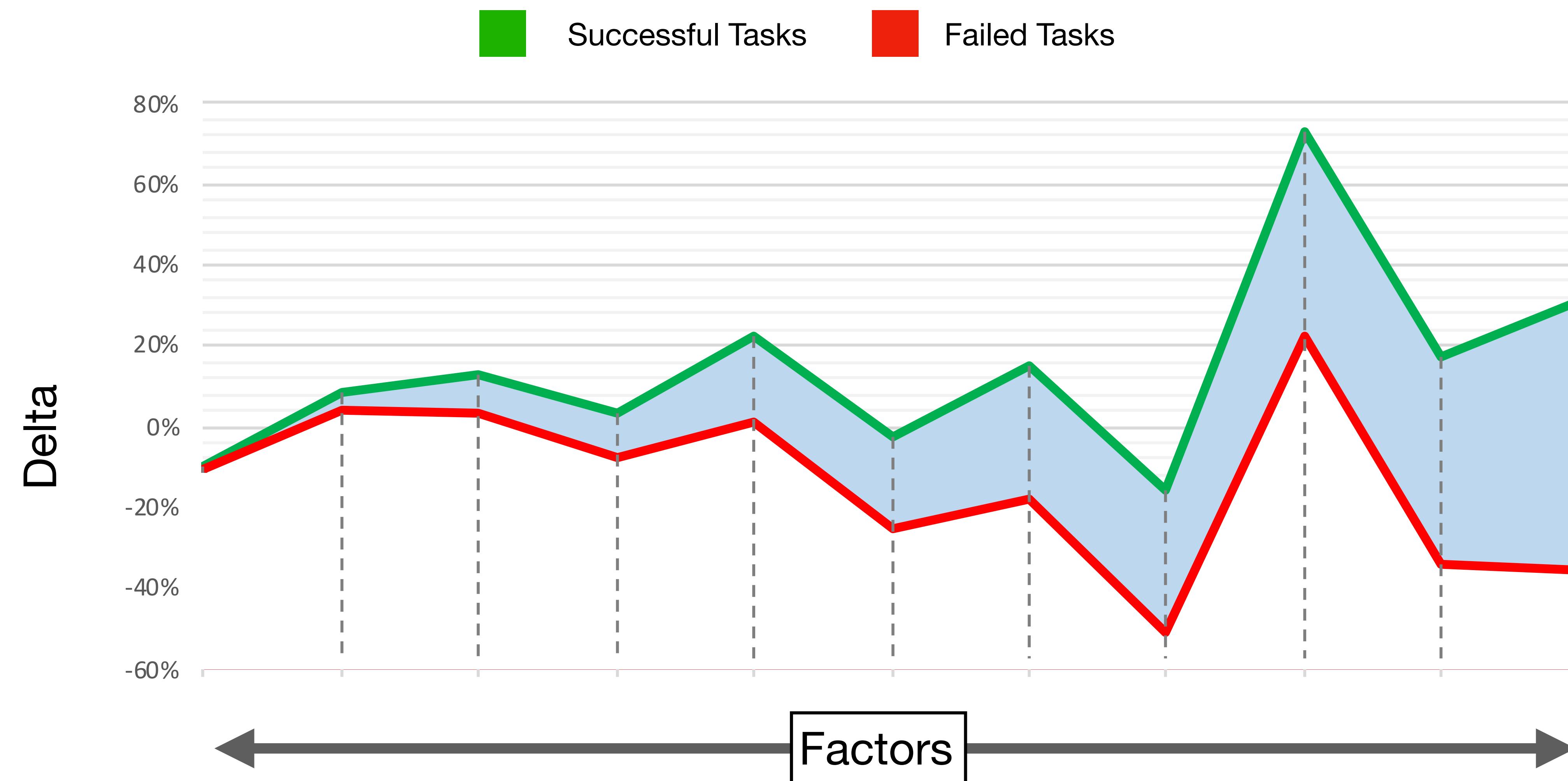
$$H = [\mu + 1 \text{sd}, \max]$$

$$L = [\min, \mu - 1 \text{sd}]$$

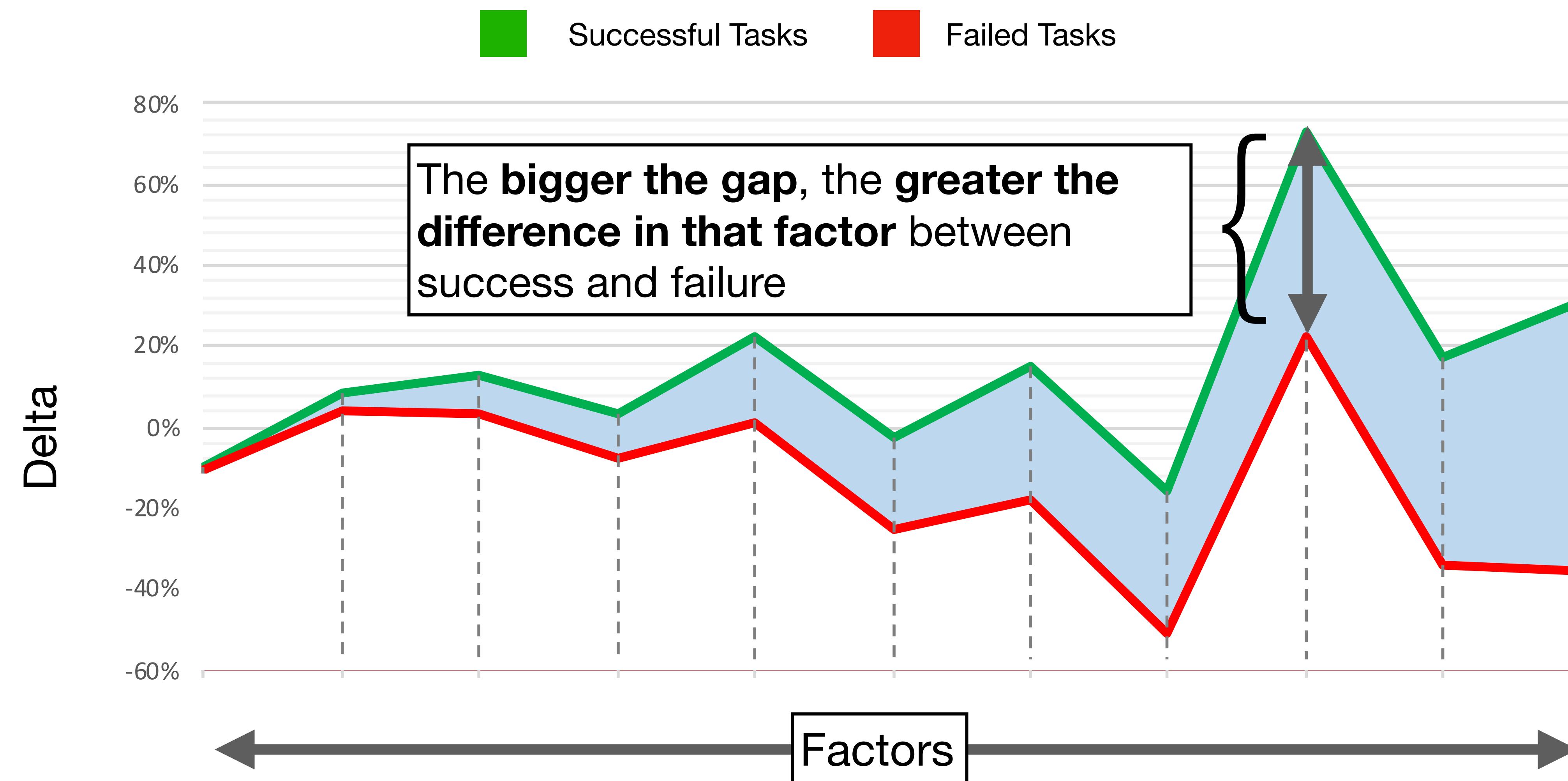


This has been drawn live
during the talk

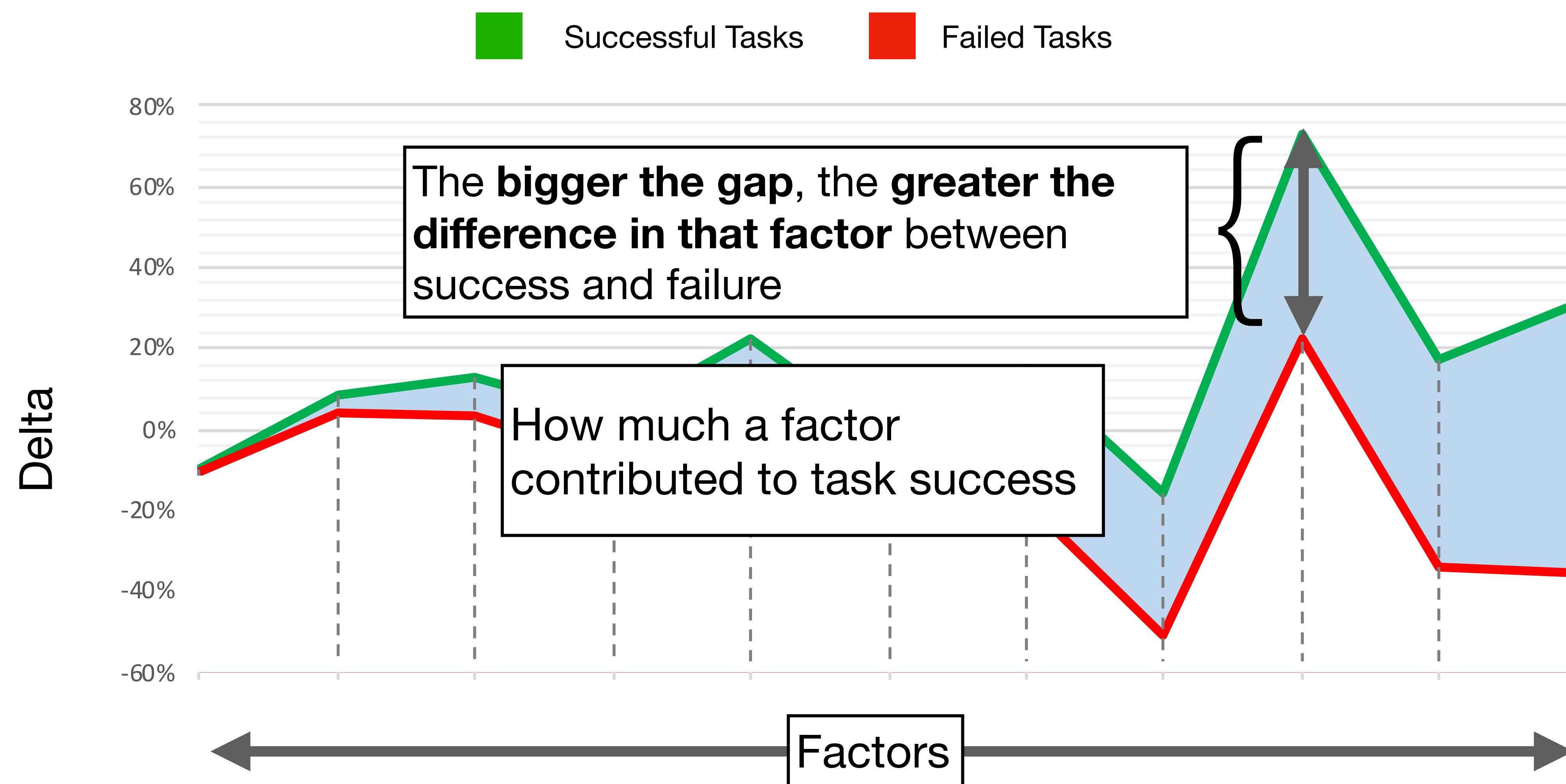
Which Factors are most important?



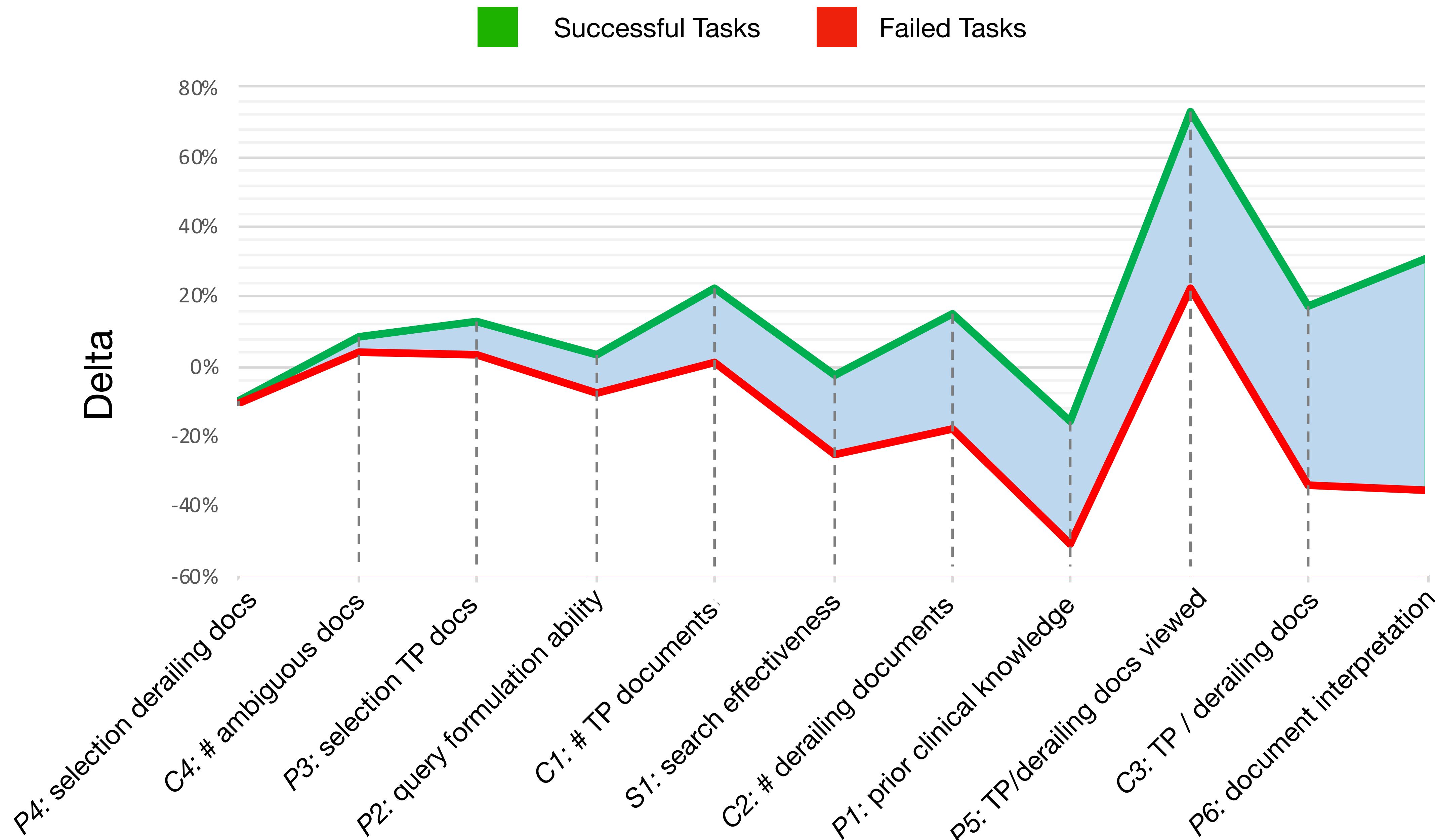
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Which Factors are most important?



Which Factors are most important?



Which Factors are most important?



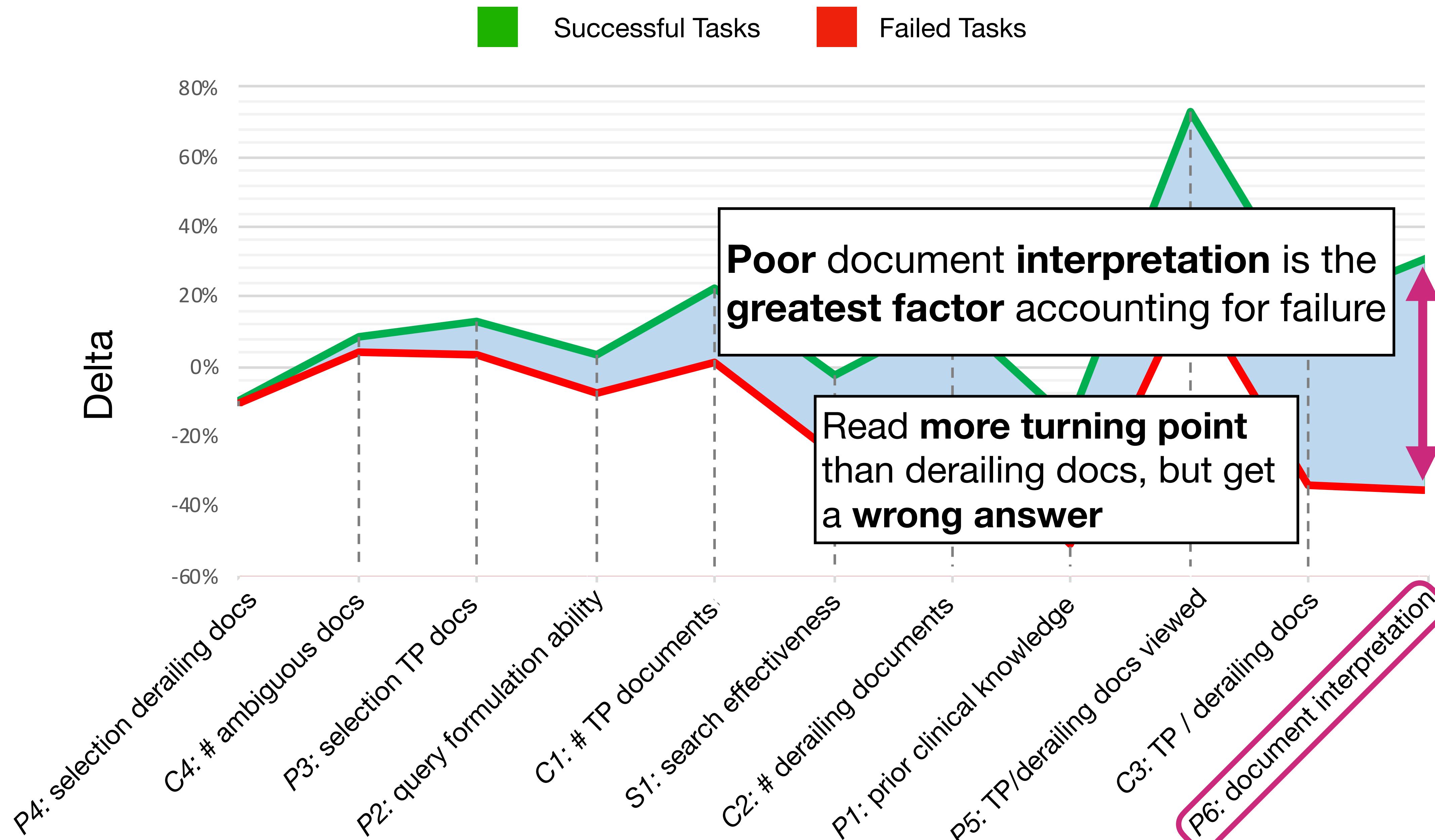
Which Factors are most important?



Which Factors are most important?



Which Factors are most important?



Broader Implications for IR Research

From the results of this study, we have learnt that:

- **System effectiveness is not the only factor** affecting users decisions
 - actually, it is a weak factor
- Document **misinterpretation, biases far more pressing factor** that influence users decisions
- Where would I put my money?
 - **results interpretation, resolve document ambiguity**, reduce cognitive biases (anchoring, confirmation)
[in other domains, also measure correctness, quality of information]
 - How do we **identify derailing documents?**
 - How do we **improve presentation?**
 - How do we help people tie the information to the decision they are trying to make?
- Next study: example of **aiding result interpretation**, in a different, but related task

2nd Study: Consumer Health Search (CHS)

- People search for **health advice** online
 - 59% of U.S. adults has searched online for health information [Fox & Duggan, 2013]
 - 7% of Google searches are health related: ~ 70,000 health queries/minute [Murphy, 2019]
- 59% of self-diagnosers decide **NOT to confirm their condition with a health professional** [Fox & Duggan, 2013]
- Search results strongly **bias people's health decisions** [White, 2009; Dumais et al., 2010; Pogacar, 2017]
- People **struggle to understand** health search results and **fail to make correct health decisions** [Alpay, 2009; Kobayashi & Ishizaki, 2019]
- Search results from **different sources**, with **varying quality**, many web pages **difficult to understand** [D'Alessandro et al., 2001; Becker, 2004]. They may be derailing – or even a blocker (dead end)

Assist People Appraising Search Results

- Entity cards used to present **coherent, easy to understand and trustworthy** information (Radlinski, 2015)
- Currently, health cards triggered by queries that contain **health condition name or its aliases**
- We investigate the benefits of **health cards for broader search tasks** - beyond just find out more information about a specific health condition (e.g. symptom-based query)

child stomach ache vomiting diarrhea temperature

About 1,750,000 results

[Why Is My Child Throwing Up With No Fever? Nausea and ...](https://www.webmd.com/children/guide/child-throw-up-no-fever)
<https://www.webmd.com/children/guide/child-throw-up-no-fever>

Usually, your child will also have nausea, watery diarrhea, and stomach pain. It's possible for food poisoning to cause fever, but it's common for it to cause throwing up with no fever, too.

[Diarrhea, Fever, Nausea or vomiting and Stomach cramps ...](https://symptomchecker.webmd.com/multiple-symptoms?symptoms=diarrhea%7Cfever%7Cnausea-or-vomiting%7C...)
<https://symptomchecker.webmd.com/multiple-symptoms?symptoms=diarrhea%7Cfever%7Cnausea-or-vomiting%7C...>

Diarrhea, Fever, Nausea or vomiting and Stomach cramps. WebMD Symptom Checker helps you find the most common medical conditions indicated by the symptoms diarrhea, fever, nausea or vomiting and stomach cramps including Gastroenteritis, Food poisoning, and Irritable bowel syndrome.

[What are the Causes of Stomach Ache and Fever?](https://www.wisegEEK.com/what-are-the-causes-of-stomach-ache-and-fever.htm)
<https://www.wisegEEK.com/what-are-the-causes-of-stomach-ache-and-fever.htm>

When a person has a stomach ache and fever, one of the most likely causes of his symptoms is a stomach flu. Despite the misleading name, this condition is not related to influenza, but is caused by a virus that leads to such symptoms as pain, fever, diarrhea, nausea, and vomiting.

[Viral Gastroenteritis \(Stomach Flu\): Symptoms and Treatment](https://www.healthline.com/health/viral-gastroenteritis)
<https://www.healthline.com/health/viral-gastroenteritis>

Symptoms can last from 1 to 10 days, including diarrhea, vomiting, and fever. Here are some self-care tips and home remedies for relief. Viral gastroenteritis, also known as the stomach flu, is an ...

[Norovirus | Symptoms | CDC](https://www.cdc.gov/norovirus/about/symptoms.html)
<https://www.cdc.gov/norovirus/about/symptoms.html>

It's probably norovirus, a common virus that is not related to the flu. Norovirus is the most common cause of foodborne diarrhea and vomiting. Norovirus causes inflammation of the stomach or intestines. This is called acute gastroenteritis. A person usually develops symptoms 12 to 48 hours after ...

[Child Vomiting | Ask Dr Sears](https://www.askdrsears.com/topics/health-concerns/childhood-illnesses/vomiting)
<https://www.askdrsears.com/topics/health-concerns/childhood-illnesses/vomiting>

This is a virus that causes sudden onset of vomiting, high fever and stomach pain. Diarrhea usually begins during the first or second day. The length of vomiting varies from the "12 hour flu" to the dreaded "72 hour flu." There is no blood or stool test to diagnose this.

[Diarrhea, Fever and Stomach cramps: Common Related ... - WebMD](https://symptomchecker.webmd.com/multiple-symptoms?symptoms=diarrhea%7Cfever%7Cstomach-cramps&sympto...)
<https://symptomchecker.webmd.com/multiple-symptoms?symptoms=diarrhea%7Cfever%7Cstomach-cramps&sympto...>

Food poisoning can cause abdominal pain, diarrhea, nausea, vomiting, fever, chills, and weakness. Traveler's diarrhea. Traveler's diarrhea causes watery diarrhea and cramps, sometimes with a low-grade fever. Diverticulosis. Diverticulosis is a condition of the colon and causes pain, cramping, infection, bleeding, and other symptoms. Drug overdose

Appendicitis



A condition in which the appendix becomes inflamed and filled with pus, causing pain.

- Requires a medical diagnosis
 - Lab tests or imaging often required
 - Treatable by a medical professional
 - Short-term: resolves within days to weeks
- Appendicitis begins with pain near the belly button and then moves to the right side. This is often accompanied by nausea, vomiting, poor appetite, fever and chills.
- Critical: Consult a doctor for medical advice
Sources: Mayo Clinic

Based on: (1) Jimmy, G Zuccon, B Koopman, G Demartini, Health Cards for Consumer Health Search, SIGIR 2019
(2) Jimmy, G Zuccon, G Demartini, B Koopman, Health Cards to Assist Decision Making in Consumer Health Search, AMIA 2019
(3) Jimmy, G Zuccon, B Koopman, G Demartini, Health Card Retrieval for Consumer Health Search, CIKM 2019

Do Health Cards Help People Making Effective Health Decisions?

- In SIGIR 2019 we compared search engine with health cards VS no health cards:
 - For a broad range of queries
 - Health cards **reduce effort spent, increase good abandonment rate, and user's satisfaction**
 - Health cards **benefit particularly the not knowledgeable searchers** to identify the correct health information

But, do they make better decisions?

- Next is a study where we focus on **Health Decisions** with respect to **self-diagnosis** (what condition and what to do)

For a health scenario, make the following two decisions:

1. What is the most possible condition for the scenario?
2. What to do / level of urgency ?
 - A. Use emergency service
 - B. Contact a health professional
 - C. Self treat

Sample scenario:

Scenario: Your 12-year-old daughter had a sudden severe abdominal pain with nausea, vomiting, and diarrhea. Her body temperature is 40C.

Correct Diagnosis: Appendicitis

Correct Urgency Level: Emergency

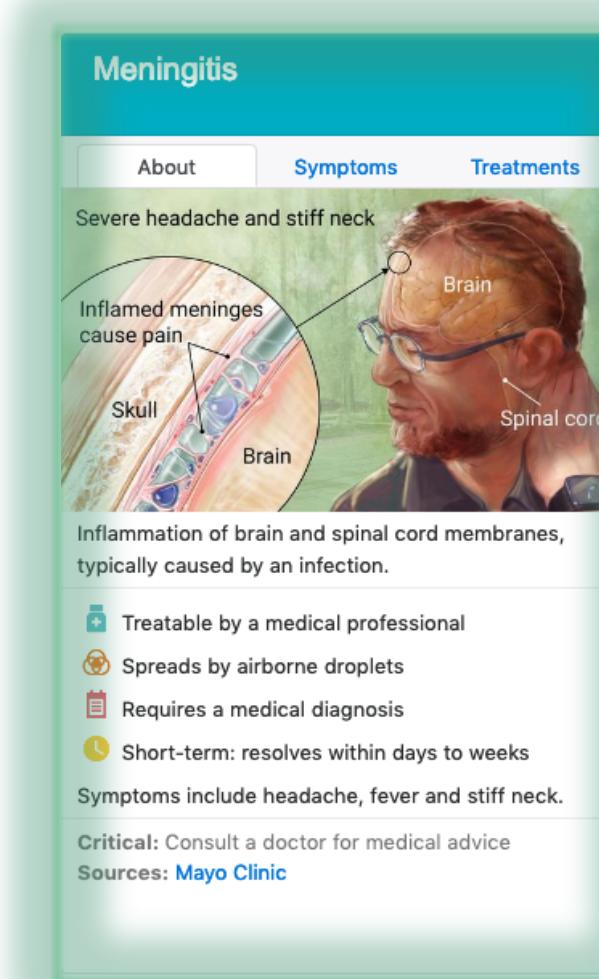
[Semigran et al., 2015]

The Four Search Interfaces

Single-Card

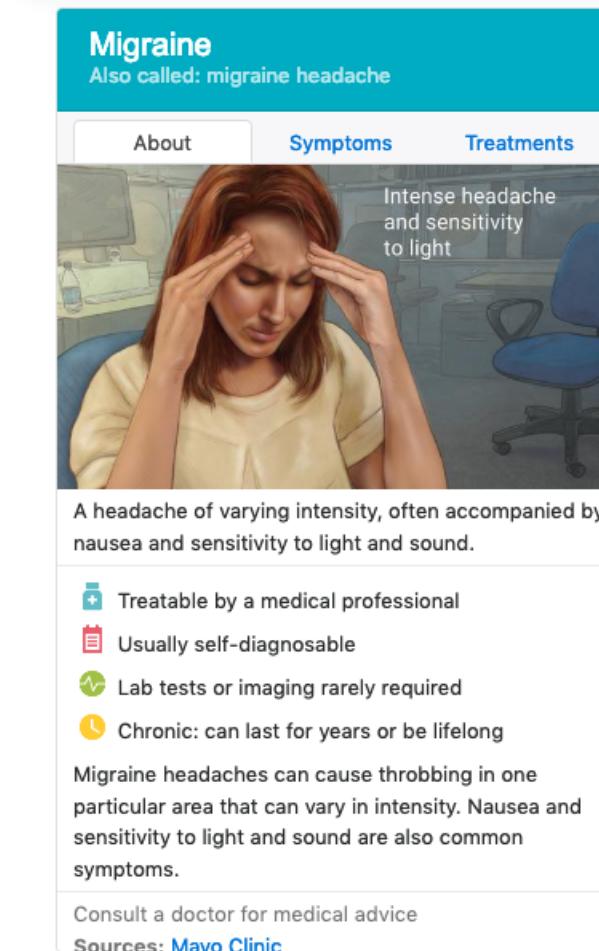
Multi-Cards

With a Correct Card



Migraine Also called: migraine headache	Meningitis	Encephalitis Also called: inflammation of the brain	High blood pressure Also called: HBP, hypertension
Intense headache and sensitivity to light	Severe headache and stiff neck, Inflamed meninges cause pain, Brain, Spinal cord.	Inflamed brain, Can cause severe headache and confusion	Measuring blood pressure
A headache of varying intensity, often accompanied by nausea and sensitivity to light and sound.	Inflammation of brain and spinal cord membranes, typically caused by an infection.	Inflammation of the brain, often due to infection.	A condition in which the force of the blood against the artery walls is too high.
Treatments: Treatable by a medical professional, Usually self-diagnosable, Lab tests or imaging rarely required, Chronic: can last for years or be lifelong.	Treatments: Treatable by a medical professional, Spreads by airborne droplets, Requires a medical diagnosis, Short-term: resolves within days to weeks. Symptoms include headache, fever and stiff neck. Critical: Consult a doctor for medical advice. Sources: Mayo Clinic.	Treatments: Treatable by a medical professional, Spreads by animals or insects, Requires a medical diagnosis, Short-term: resolves within days to weeks. May cause no symptoms or mild flu-like symptoms. Severe cases can be life-threatening. Immediate medical attention is needed for symptoms such as confusion, hallucinations, seizures, weakness and loss of sensation. Critical: Consult a doctor for medical advice. Sources: Mayo Clinic.	Treatments: Treatable by a medical professional, Requires a medical diagnosis, Lab tests or imaging not required, Chronic: can last for years or be lifelong. High blood pressure often has no symptoms. Over time, if untreated, it can cause health conditions, such as heart disease and stroke. Critical: Consult a doctor for medical advice. Sources: Mayo Clinic.

No Correct Card



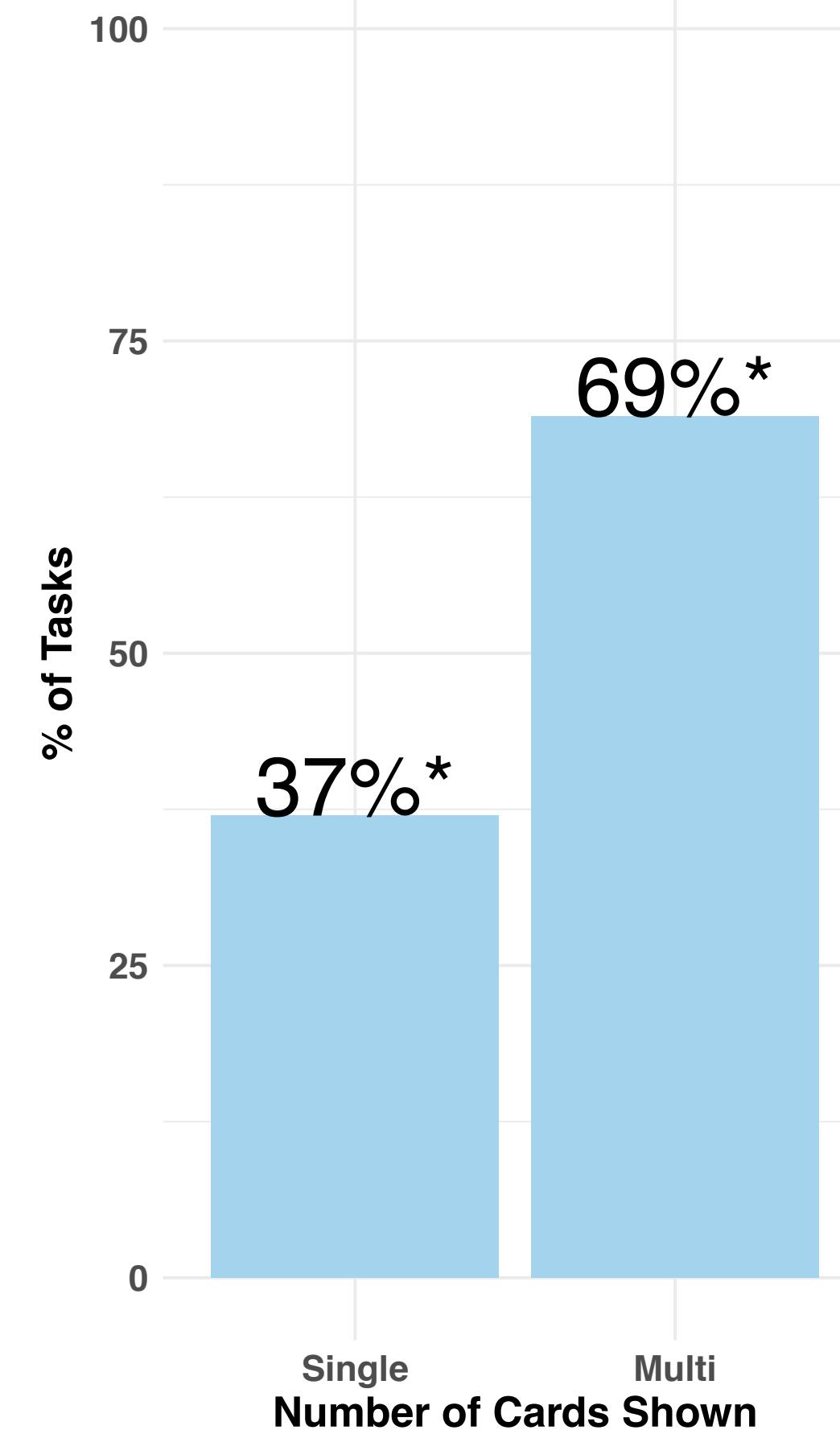
Migraine Also called: migraine headache	Encephalitis Also called: inflammation of the brain	High blood pressure Also called: HBP, hypertension	Pink eye Also called: conjunctivitis
Intense headache and sensitivity to light	Inflamed brain, Can cause severe headache and confusion	Measuring blood pressure	Eye with conjunctivitis, Lining of eye (conjunctiva)
A headache of varying intensity, often accompanied by nausea and sensitivity to light and sound.	Inflammation of the brain, often due to infection.	A condition in which the force of the blood against the artery walls is too high.	Inflammation or infection of the outer membrane of the eyeball and the inner eyelid.
Treatments: Treatable by a medical professional, Usually self-diagnosable, Lab tests or imaging rarely required, Chronic: can last for years or be lifelong. Migraine headaches can cause throbbing in one particular area that can vary in intensity. Nausea and sensitivity to light and sound are also common symptoms. Consult a doctor for medical advice. Sources: Mayo Clinic.	Treatments: Treatable by a medical professional, Spreads by animals or insects, Requires a medical diagnosis, Short-term: resolves within days to weeks. May cause no symptoms or mild flu-like symptoms. Severe cases can be life-threatening. Immediate medical attention is needed for symptoms such as confusion, hallucinations, seizures, weakness and loss of sensation. Critical: Consult a doctor for medical advice. Sources: Mayo Clinic.	Treatments: Treatable by a medical professional, Requires a medical diagnosis, Lab tests or imaging not required, Chronic: can last for years or be lifelong. High blood pressure often has no symptoms. Over time, if untreated, it can cause health conditions, such as heart disease and stroke. Critical: Consult a doctor for medical advice. Sources: Mayo Clinic.	Treatments: Treatable by a medical professional, Spreads easily, Treatable by a medical professional, Usually self-diagnosable, Short-term: resolves within days to weeks. Symptoms include redness, itching and tearing of the eyes. It can also lead to discharge or crusting around the eyes. Consult a doctor for medical advice. Sources: Mayo Clinic.

Why Multi-Cards? Presenting possible health conditions side-by-side may enable people to perform differential diagnosis + increases chances to present a correct health card

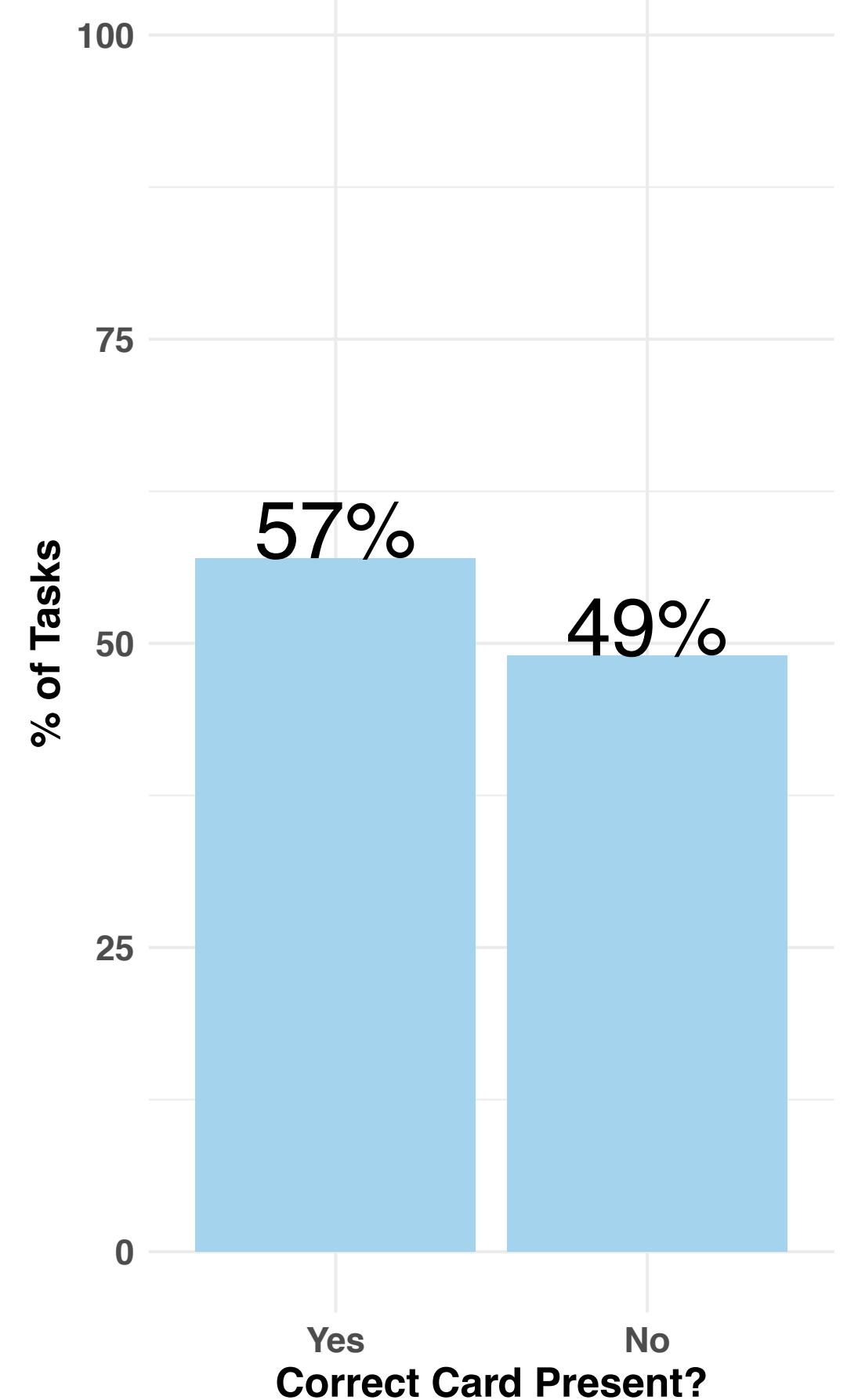
Impact of single and multi-cards?

(1) Health cards selected as a source of information

Information from **multi-cards** selected **significantly more frequently** than from single-card



Information from health cards selected **regardless of the correctness** of health card

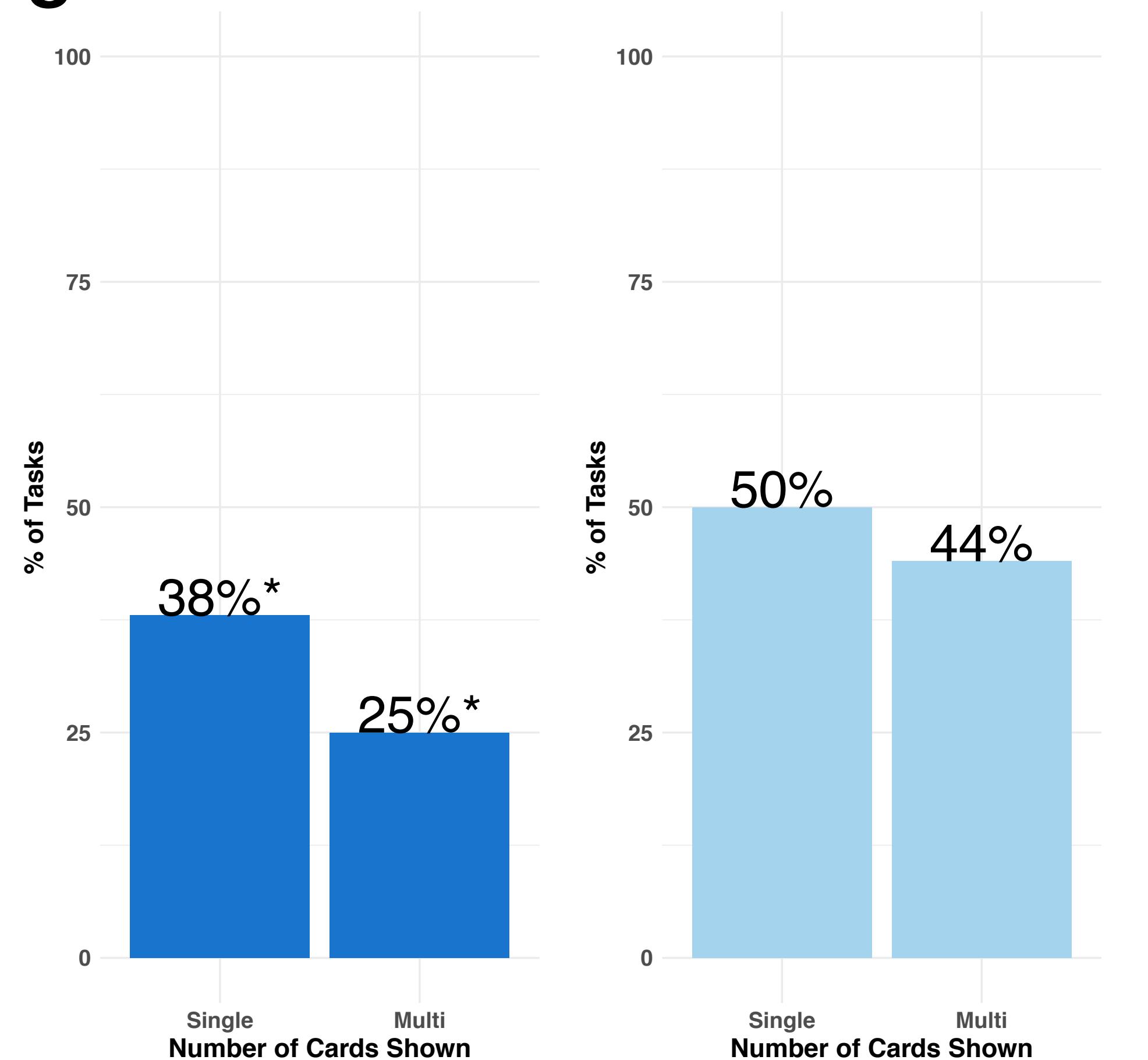




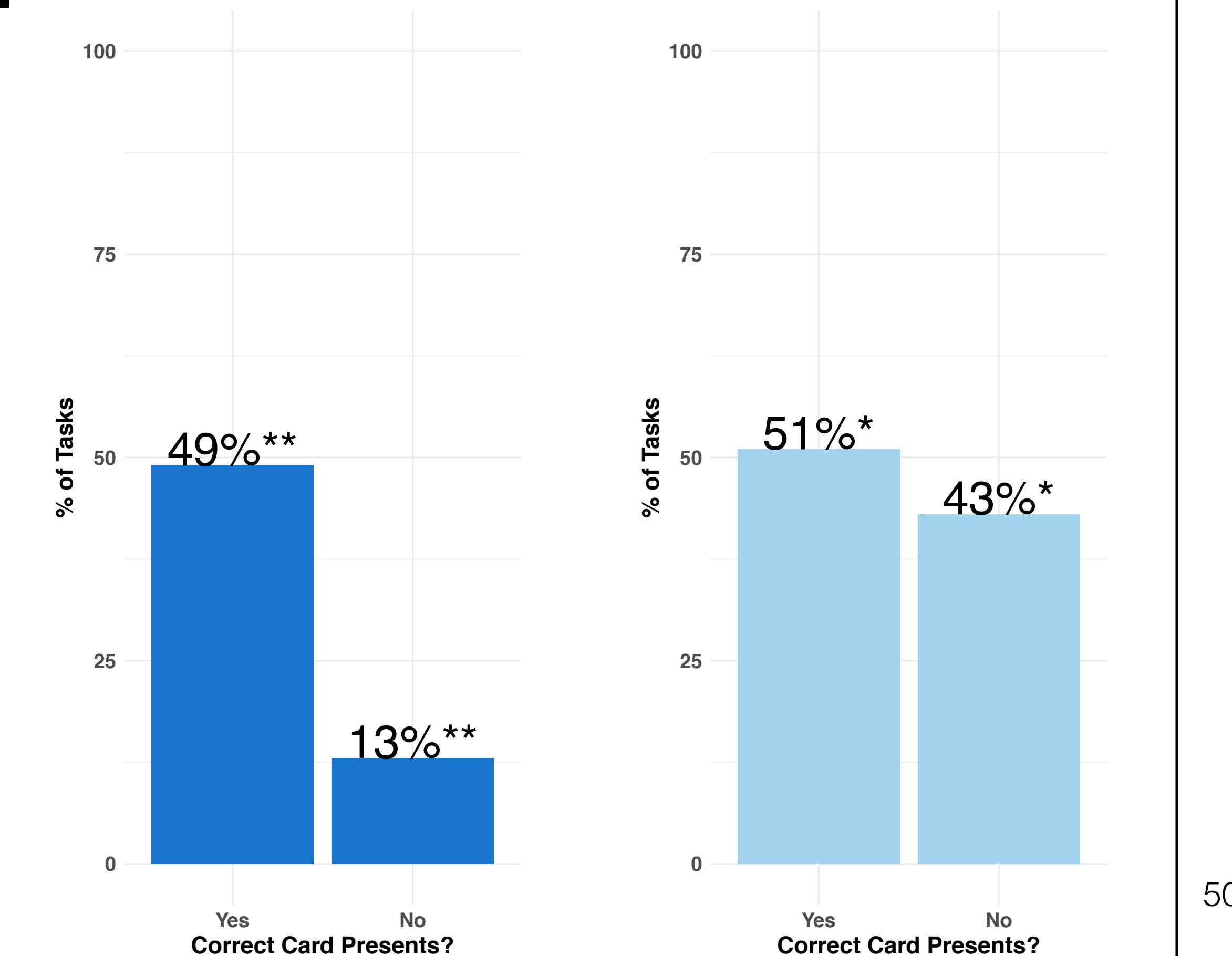
Impact of single and multi-cards?

(2) Correctness of diagnosis and level of urgency

Single card lead to significantly **higher number of correct diagnosis** than multi-cards



Correctness of **decisions** is **dependent** on correctness of presented health card





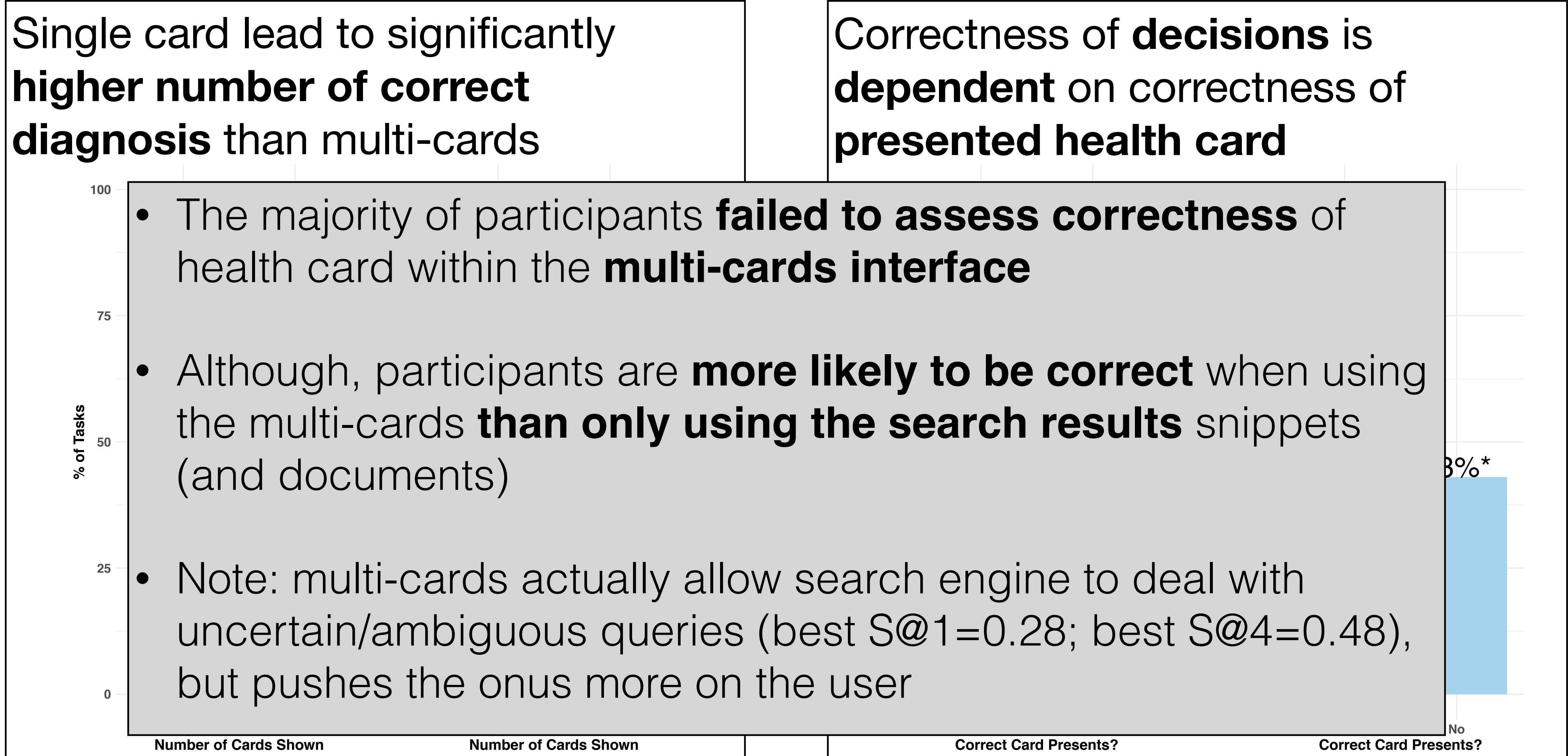
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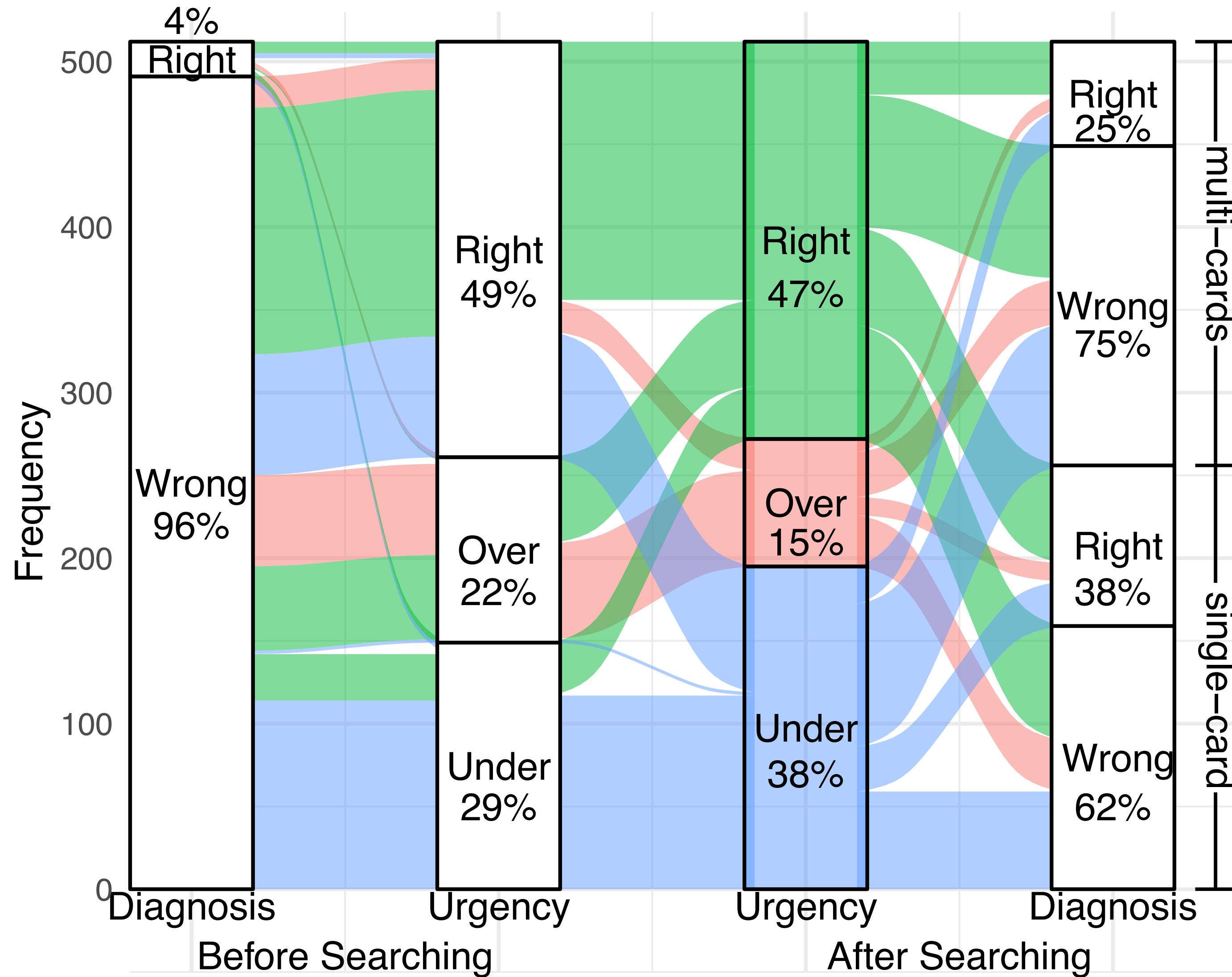
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Correctness of **decisions** is
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- The majority of participants **failed to assess correctness** of health card within the **multi-cards interface**
- Although, participants are **more likely to be correct** when using the multi-cards **than only using the search results** snippets (and documents)
- Note: multi-cards actually allow search engine to deal with uncertain/ambiguous queries (best S@1=0.28; best S@4=0.48), but pushes the onus more on the user



How does Search Impact Health Decision Making?



- Search activities (with health cards) lead to **significant increase of correct diagnosis**
- Search activities did **NOT** lead to **better level of urgency** correctness
- **43%** of correct diagnosis had an **incorrect level of urgency** (73% of them were **underestimated**)

What have we learnt from this study?

- **Health cards help people to make more correct diagnosis**
- **Struggle to infer the level of urgency** – people tend to **underestimate** urgency across search interfaces.
- This is a problem as making the correct diagnosis is not as important as identifying the correct level of urgency

Diagnosis	Urgency Level	Risk
Correct	Under-estimated	Harm well-being + additional health system costs
Correct	Over-estimated	Waste medical resources
Incorrect	Correct	None to minimum

- **Future work needs to specifically better assist people in deciding the urgency level (what to do)**

Example of an attempt to address these findings

Google Cards Before Our Study

Appendicitis

About

Symptoms

Treatments

The image shows a man lying on a couch in pain, with a callout box containing text about appendicitis symptoms. To the right is a circular diagram of the human abdomen showing the large intestine and inflamed appendix.

Causes severe abdominal pain

Large intestine

Inflamed appendix

A condition in which the appendix becomes inflamed and filled with pus, causing pain.

- 📅 Requires a medical diagnosis
- ⌚ Lab tests or imaging often required
- 💊 Treatable by a medical professional
- 🕒 Short-term: resolves within days to weeks

Appendicitis begins with pain near the belly button and then moves to the right side. This is often accompanied by nausea, vomiting, poor appetite, fever and chills.

Critical: Consult a doctor for medical advice

Sources: Mayo Clinic

Google Cards Now

Current Ver. A

Appendicitis

ABOUT

SYMPTOMS

TREATMENTS

The illustration shows a person lying on a couch, clutching their abdomen in pain. A callout box contains the text: "Causes severe abdominal pain". To the right is a circular diagram of the human abdomen. Inside the diagram, the "Large intestine" is labeled with an arrow pointing to its coiled shape. The "Inflamed appendix" is labeled with an arrow pointing to a small, swollen, reddened sac-like structure extending from the colon.

A condition in which the appendix becomes inflamed and filled with pus, causing pain.

- 📅 Requires a medical diagnosis
- ⌚ Lab tests or imaging often required
- 💊 Treatable by a medical professional
- 🕒 Short-term: resolves within days to weeks
- ⚠️ Critical: needs emergency care

The appendix is a pouch on the colon that has no known purpose.

Appendicitis begins with pain near the belly button and then moves to the right side. This is often accompanied by nausea, vomiting, poor appetite, fever and chills.

Appendicitis is usually treated with surgery and antibiotics. If untreated, the appendix can rupture and cause an abscess or systemic infection (sepsis).

Consult a doctor for medical advice

Sources: Mayo Clinic and others. Learn more

Current Ver. B

Appendicitis

OVERVIEW

SYMPTOMS

TREATMENTS

SPECIALISTS

A condition in which the appendix becomes inflamed and filled with pus, causing pain.

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RELATED CONDITIONS

Kidney stone

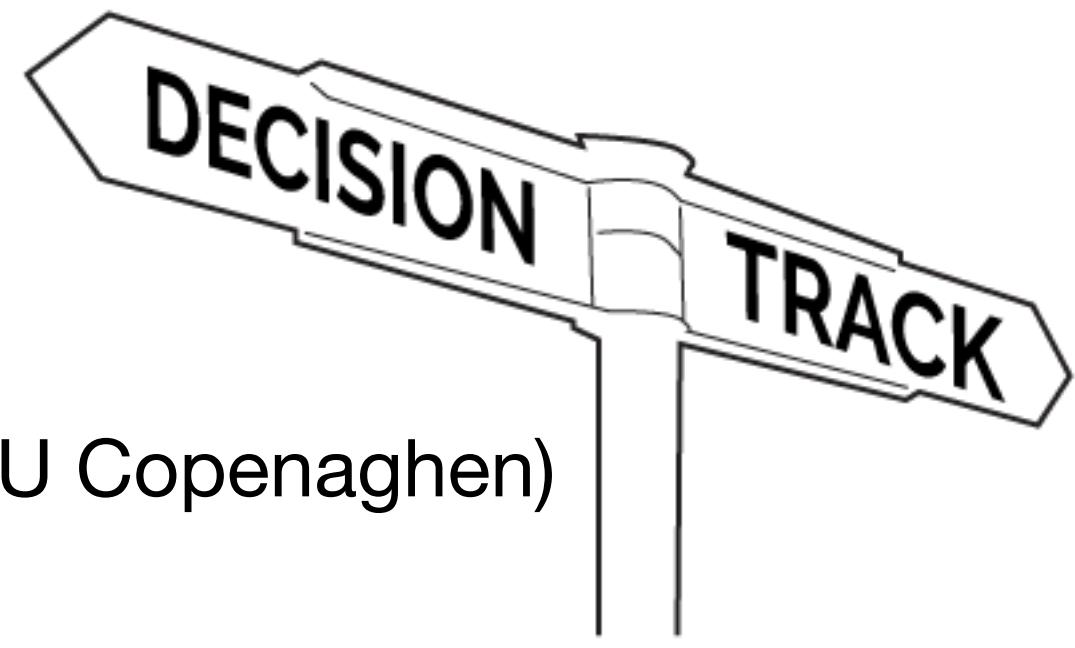
A small, hard deposit that forms in the kidneys and is often painful when passed.

Peritonitis

Inflammation of the membrane lining the abdominal wall and covering the abdominal organs.

The TREC Decision Track

Organised with Mark Smucker (U Waterloo), Christina Lioma, Maria Maistro (U Copenhagen)



- Goals of the track:
 - **Foster research** on retrieval methods that **promote better decision making with search engines**
 - Develop **new online and offline evaluation** methods to predict decision quality induced by search results
- It ran first time in 2019 with an ad hoc search task. In 2020:
 - Task 1: (Offline, ad hoc) devise search technologies that **promote correct information** over incorrect information, with the assumption that correct information can better lead people to make correct decisions
 - Task 2: (Online) Given a query, a document ranking (results list) and interaction/behavioural data, **predict the decisions** users will take at the end of the search process
 - Task 3: (Offline) Given a query, a document ranking (results list), and assessments (for relevance and correctness), **predict the decisions** users will take at the end of the search process
- The task provides assessments of relevance, credibility, correctness + decisions and interactions

Take Aways

- Evaluation drives improvement of search technology. But are we measuring the right thing?
 - **relevance VS decisions**
 - It's not what you think it is relevant, it's how it is being interpreted
 - What do we need?
 - develop a better **understanding of derailing / turning point** documents
 - what are the **blockers** to better decisions?
 - when people have reached a **dead end?**
 - **technology** to support people making **better decisions**

Questions?

g.zuccon@uq.edu.au – ielab.io/guido



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OF QUEENSLAND
AUSTRALIA

CREATE CHANGE

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