



# Manipulating Time Perception of Web Search Users



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## ❖ Background & Motivations

- Time plays an essential role in multiple areas of Information Retrieval (IR) researches
  - The **time** factor in search evaluation
    - Time-biased gain (TBG) & Time Well Spent (TWS)
    - An indicator of *user efforts* in Benefit/Cost framework
  - The **time** factor in user behavior analysis
    - Dwell time in identify satisfied clicks
  - The **time** factor in intent understanding
    - Time sensitive queries: “*today’s weather*”
    - Time critical search: “*baby choked by food*”
- Time in previous works is the **objective time** measured by timing devices
- Psychological studies show that time perception could be influenced by many subjective factors

## ❖ Temporal Relevance (TR)

- In this work, we focus on the impact of TR
  - **Temporal Relevance** is one of the main determinants of the level of temporal awareness
  - **Definition:** level of relevancy and importance of time dimension in a specific state required for the optimal adaptation to the external environment
  - It remains uninvestigated **whether TR will affect the time perception of Web search users** and further have influence on the perception of system effectiveness
- **RQ1:** What is the **impact of TR** on time perception in Web search scenario?
- **RQ2:** Are the results consistent across **different tasks** and **different search users**?

## ❖ Experiment Setup

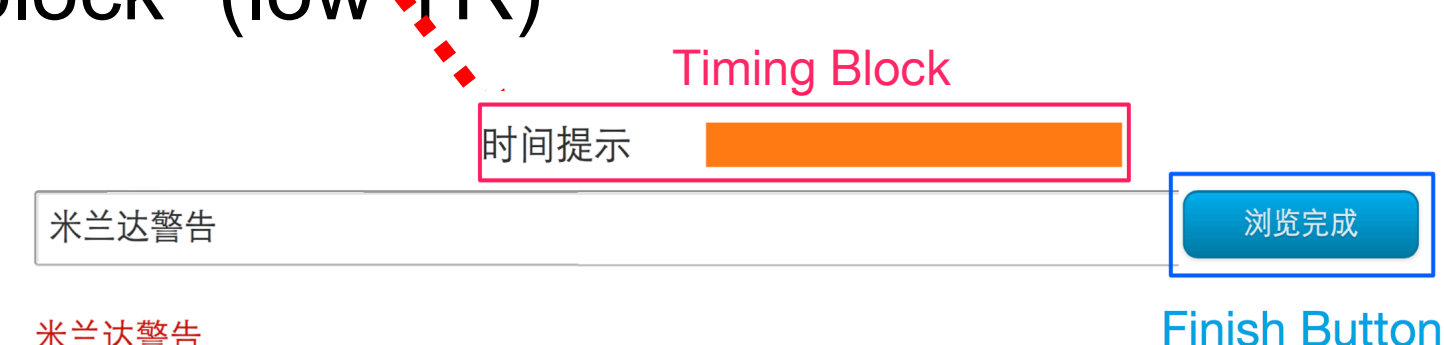
- **Manipulating Temporal Relevance (TR):**
  - Treatment group: “**timing block**”, a flashing colored block (visually informing the user about elapsed time — high TR)
  - Control group: no “timing block” (low TR)

### ➤ Search tasks:

- 16 informational search tasks created based on queries from search logs
- Backstories spoken directly to the participants

### ➤ Settings:

- Participants are **not allowed to acquire time** from devices in external environment
- Participants are required to **estimate the time** spent during the task in seconds, e.g., the duration of the whole search session



米兰达警告

米兰达警告 “你有权保持沉默！”——米兰达警告的由来 熟悉美国警匪片的网友们，对警察向犯罪嫌疑人说出的第一句话都耳熟能详：“你有权保持沉默。如果你不保持沉默，那么你所说的——”

顺德教育信息网 - jms.sdedu.net/wap... - 2014-6-16 - 快照 - 预览

米兰达警告四十年（下）\_新闻中心\_新浪网

2006年9月4日，在伦敦法院做出的一些司法判决应予推翻，其中首当其冲的就是1966年的米兰达案和1963年的吉迪案。如果说米兰达警告背运，那么“米兰达警告”的问世，堪...

新浪新闻 - news.sina.com.cn/w... - 2006-9-4 - 快照 - 预览

米兰达警告 - 维基百科，自由的百科全书

米兰达警告（英语：Miranda Warning、Miranda rights），又译米兰达忠告、米兰达告诫、米兰达公约，或米兰达宣言，是指美国警察（包括检察官）根据美国联邦最高法院...

维基百科 - zh.wikipedia.org/wiki... - 2005-7-2 - 快照 - 预览

Time	Color	Flash Frequency
0~3 min	<div></div>	0.3
3~5 min	<div></div>	1.2
After 5 min	<div></div>	5

(a)

### Search Time Estimation

Please estimate the time you spent during the search session.

We provide a timeline to help you estimate the time. The further the bar is moved to the right, the longer time you have spent.

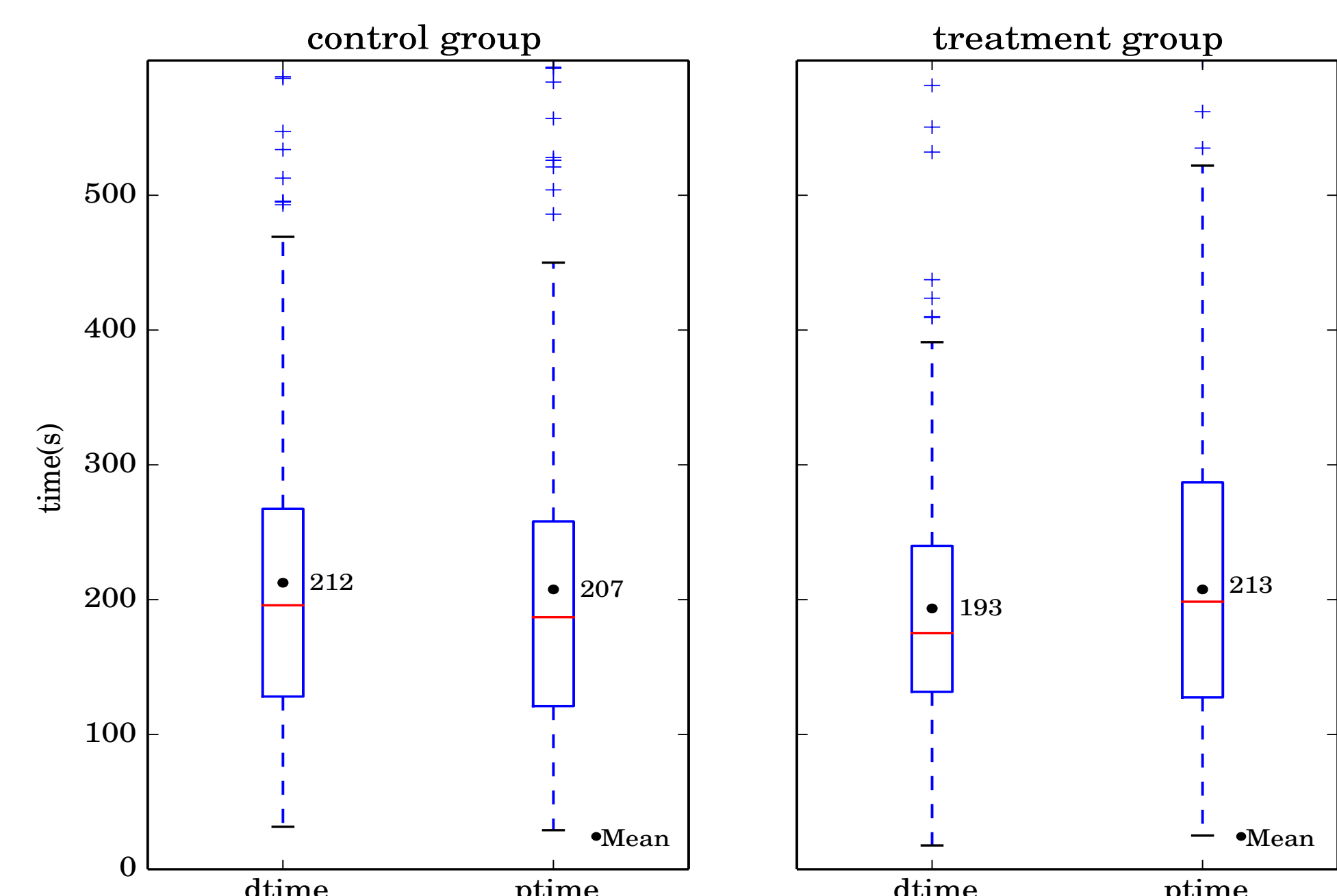


Time: 2 mins 5 seconds

(b)

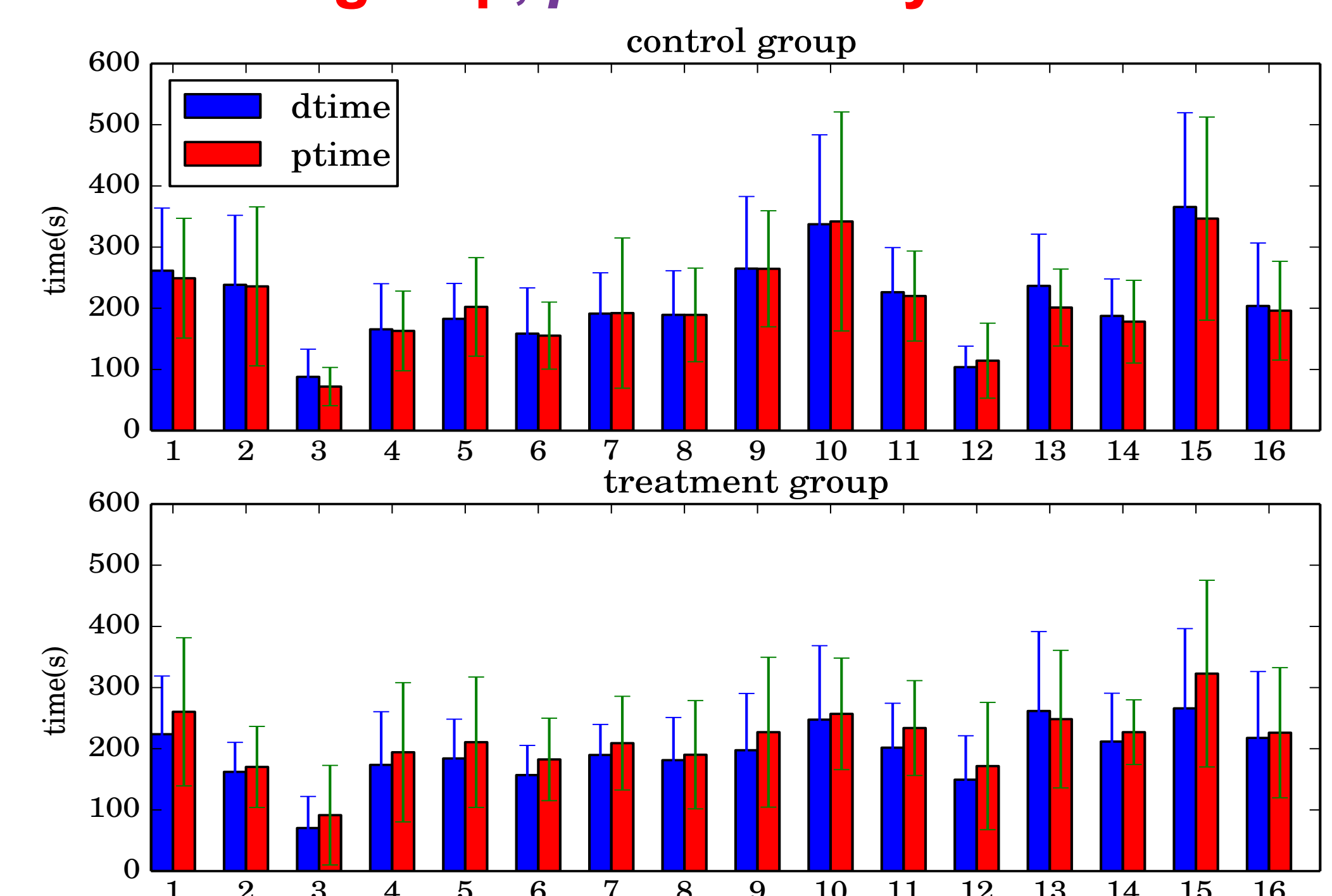
## ❖ The Impact of TR on Time Perception

- Treatment (high TR): the perceived time (*ptime*) in the treatment group is **significantly longer** (10.36% with p-value < 0.01) than the dwell time (*dtime*)
- Control (low TR): **No significant difference** between dwell time and perceived time.



## ❖ The Impacts of Tasks and Users

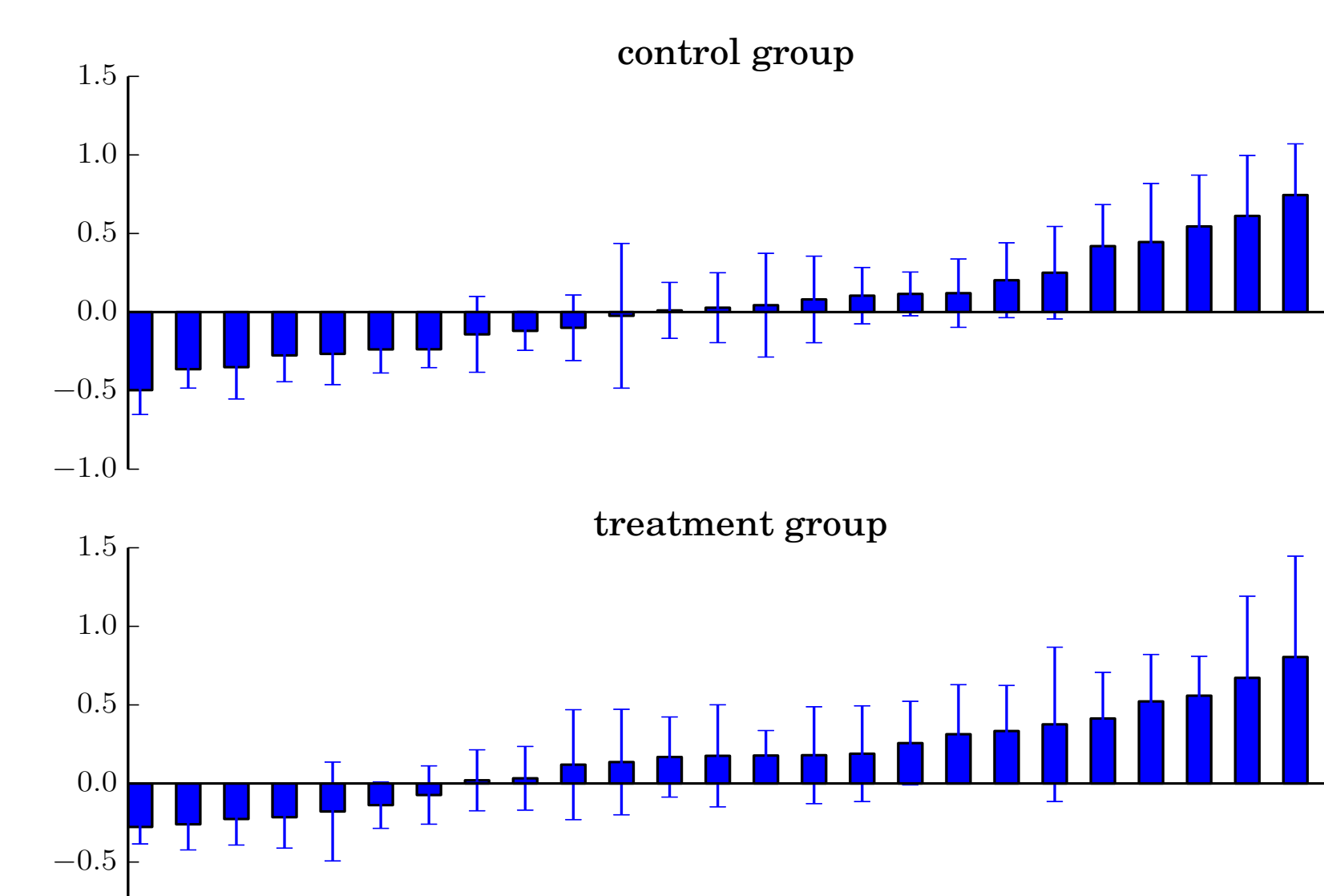
- For 15 of the 16 tasks, the average *ptime* in the **treatment group is longer** than the average *dtime*
- In the **control group**, *ptime* is **very close to dtime**



### ➤ Average Estimation Offset (AEO)

$$AEO = \frac{1}{\#tasks} \sum_{t \in tasks} \frac{ptime_t - dtime_t}{dtime_t}$$

- More participants are with **positive AEOs** in the **treatment group**



## ❖ Conclusion & Future work

- Users tend to perceive longer duration in high TR settings, for example, in some time critical situations.
- We would further explore other factors' impacts in perceived time (e.g. relevance, satisfaction, etc.)