



# To Hint Or Not: Exploring the Effectiveness of Search Hints for Complex Informational Tasks

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## Motivation

- Search users vary in experience and skills
- Current methods of user assistance (e.g. query suggestion) work well for popular search tasks, but doesn't provide enough help for tail queries
- Search hints and suggestions can not only help users with their immediate search needs, but also provide some educational aspect
- Previous research focused on hints describing particular features of a search engine, which are optimal for designed search tasks
- Our *goal is to study the effect of strategic search hints*, which suggest a strategy to solve a search task and can help users (re-)formulate queries

## User Study

- We used uFindIt search game (<http://ir-ub.mathcs.emory.edu/uFindIt/>), which asks users to find answers to several search tasks using the provided web search interface and records all user interactions
- Participants were hired on Amazon Mechanical Turk (<http://mturk.com/>)
- Search tasks from "A Google A Day" game archive (<http://www.agoogleaday.com/>) were used. Such questions are usually hard to solve with a single query and users need to be able to split the task and (re-)formulate their queries carefully.
- For each task a specific search hint was designed. Such hints lead users to the answer by showing a way to split the original problem into sub-questions.
- Also a generic hint (common to all tasks) was designed. It states the divide-and-conquer search strategy in general terms and doesn't give an exact way to split the original search question.
- Users were assigned to one of three groups: no-hint, specific hint and genetic hint group, which means that one group of users didn't see any hints, one group saw specific hints and for the later group a generic hint was displayed for all tasks.
- All user search interactions as well as their submitted answers were recorded. Submitted answer was automatically checked and users could continue searching if the answer was incorrect (an option to skip any question was also provided)

## Tasks and Hints

Task	Question	Correct Answer	Specific hint
Task 1	I can grow body back in about two days if cut in half. Many scientists think I don't undergo senescence. What am I?	Senescence means "biological aging". Hydra is considered biologically immortal and regenerates fast.	1. Find what is senescence. 2. Find who does not undergo senescence. 3. Find who can also regenerate body and choose the one that satisfies both conditions.
Task 2	Of the Romans "group of three" gods in the Archaic Triad, which one did not have a Greek counterpart?	Archaic Triad includes Jupiter, Mars and Quirinus. Among those Quirinus didn't have a Greek counterpart.	1. Find the names of the gods from the Archaic triad. 2. For each of the gods find a Greek counterpart.
Task 3	As George surveyed the "waterless place", he unearthed some very important eggs of what animal?	"Gobi" in Mongolian means "Waterless place". The first whole dinosaur eggs were discovered there in 1923.	1. Find what is the "waterless place" mentioned in the question. 2. Search for important eggs discovery in this "waterless place".
Task 4	If you were in the basin of the Somme River at summers end in 1918, what language would you have had to speak to understand coded British communications?	Cherokee served as code talkers in the Second Battle of the Somme.	1. Find the name of the battle mentioned in the questions. 2. Search for which coded communications language was used in this battle.

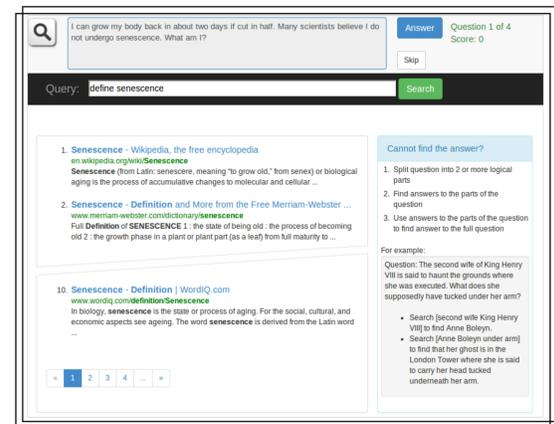
### Generic hint (common for all questions)

1. Split the question into 2 or more logical parts
2. Find answers to the parts of the question
3. Use answers to the parts of the question to find answer to the full question

For example, the question: "The second wife of King Henry VIII is said to haunt the grounds where she was executed. What does she supposedly have tucked under her arm?"

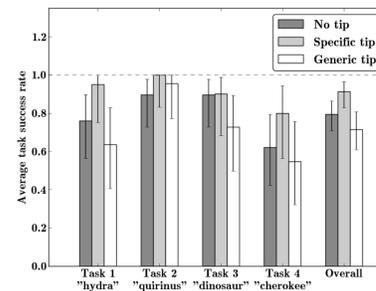
1. Search [second wife King Henry VIII] to find Anne Boleyn.
2. Search [Anne Boleyn under arm] to find that her ghost is in the London Tower where she is said to carry her head tucked underneath her arm.

## User Interface

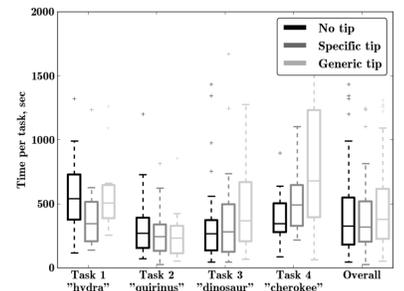


## Results

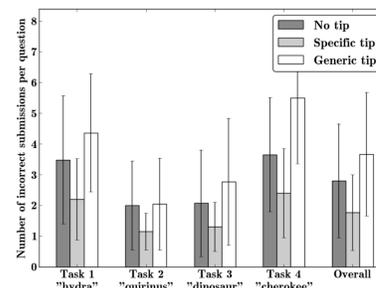
Average number of successful tasks



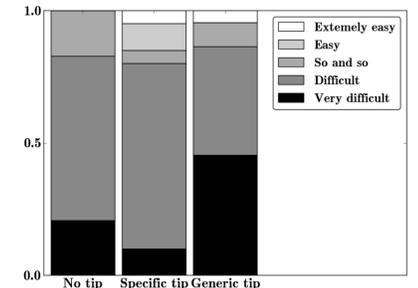
Average time per task



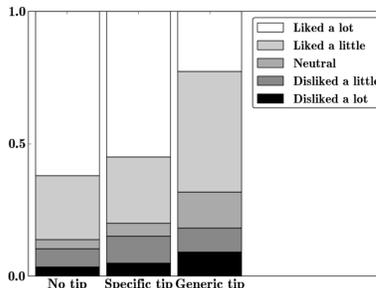
Average number of incorrect answer submission attempts



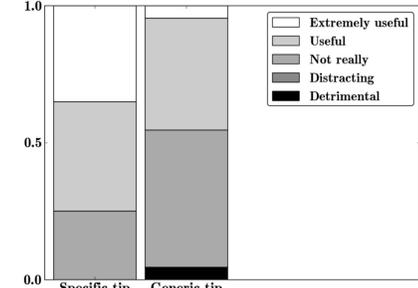
Users' response to survey question "How difficult was the game?"



Users' response to survey question "How did you like the game?"



Users' response to survey question "How useful were search hints?"



## Conclusion

- *Well designed strategic search hints can help users to find answers to difficult search tasks*
- *Hints that are too general and hard to implement can be detrimental to user search experience*, namely:
  - decreased success rate
  - increased searching time
  - more incorrect answer submissions (some users tried to "guess" the correct answer)
- *Good strategic search hints made the game feel easier for users, however overall satisfaction was lower than for a group of users who didn't receive any assistance*