



# Query Formulation Assistance for Kids:

What is Available, When to Help, & What Kids Want

*Presented by*

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# Project scope

**Target Audience:** Young school-aged children

**Technology Studied:** Query suggestion strategies available in search tools (e.g., search engines)

**UX Method used:**

- Qualitative (**Participatory design sessions**)
- Quantitative (**Log file analysis**)



# The team



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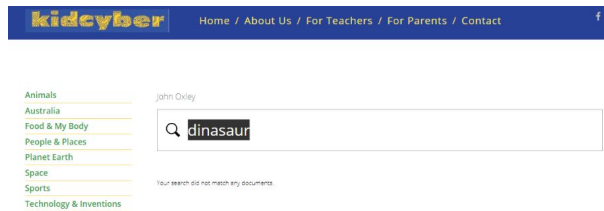
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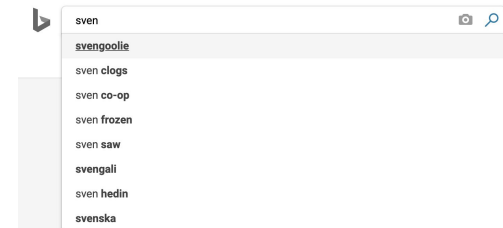
# Motivation



Children often experience challenges formulating effective queries



Limited / no support from child-oriented search tools



Available support from popular tools are geared towards adult users

# Proposed exploration



- [Q1] In what ways can children get help when formulating queries?
- [Q2] Do children favor assistance that target them specifically?
- [Q3] What type of help do children expect for QF?



## Question 1

- *In what ways can children get help when formulating queries?*

# What is available: Interfaces



## Perspectives

- Spelling correction
- Query suggestions (QS)

Examined search engines and browsing sites



# What is available: Interfaces

Type	Spelling correction	QS
Search engine	75%	33%
Site	30%	30%

Summary of QF functionality offered by examined interfaces



# What is available: Plugins



## REQUIK

Examined plugins

## Perspectives

- Spelling correction
- Query suggestions (QS)

Type	Spelling correction	QS
Plugins	100%	75%

Summary of QF functionality offered by examined plugins



# Takeaway

- Most of these search technologies do **not** offer query suggestions at all, or don't offer suggestions for certain query types (e.g., misspelled or very long queries)
- Some search interfaces would not retrieve results at all for misspelled queries and would also not offer any form of query formulation assistance to children
- Very few child-oriented search engines offer query suggestions to children



## Question 2

- *Do children favor assistance that target them specifically?*



# QS strategies examined

**REQUIK**

Child-friendly query  
suggestions

**bing**

General audience query  
suggestions



# When to help: Observing children using QS

## Participants

<b>Respondents</b>	8
<b>Ages</b>	6 – 10 years
<b>Demography</b>	5 boys and 3 girls
<b>Query size</b>	235
<b>QS</b>	1,409
<b>Device used</b>	Desktop computer
<b>Each session length</b>	40 minutes
<b>Number of sessions</b>	2



# When to help: Observing children using QS



Select Your Grade Level

Submit Query

Pre-K  
Kindergarten  
1st Grade  
2nd Grade  
3rd Grade  
4th Grade  
5th Grade  
6th Grade  
7th Grade  
8th Grade  
9th Grade  
10th Grade  
11th Grade  
12th Grade

Grade level from the list.

Children indicate their grade levels

[Home Page](#)



Enter Search or Type URL...

Initial generic search interface



# When to help: Observing children using QS

sessionid	queryid	suggestion	source	islike
10	25	dolphin mammal or reptile	bing	1
10	25	dolphin mammal books for kids	requik	0
10	25	dolphin mammal facts	bing	0
10	25	dolphin mammal movies	requik	1
10	25	dolphin mammal images	requik	1
10	25	dolphin mammals	bing	0

Information stored in log file

# When to help: Observing children using QS



Children performing search tasks  
(5 adults involved in the observation process)





# When to help: Observing children using QS [Session 1]

bing

Home Page

Which suggestions do you like?

Suggestions	Click on me
coco vs book of life	<input type="radio"/> <input type="radio"/>
coco	<input type="radio"/> <input type="radio"/>
coco full movie watch online	<input type="radio"/> <input type="radio"/>
coconut oil benefits	<input type="radio"/> <input type="radio"/>
coco when does it come out	<input type="radio"/> <input type="radio"/>
cococ	<input type="radio"/> <input type="radio"/>
coco kids movie	<input type="radio"/> <input type="radio"/>

REQUIK

Children indicate suggestions they prefer (QS strictly)



# When to help: Improved indication effectiveness of QS [Session 2]

sven from mov

GO

Suggestions for: sven from mo

Query Suggestions	Like?
sven from frozen costume	 
seven from house	 
sven from frozen	 
sven from movie frozen	 
sven henriksen mo i rana	 
sven moose from frozen	 

SUBMIT

CLOSE

## [Seven \(1995 Film\) - Wikipedia](#)

Seven (stylized as se7en) is a 1995 american crime thriller film directed by david fincher and written by andrew kevin walker.it stars brad pitt, morgan freeman, gwyneth paltrow, john c. mcginley, r. lee ermey, and kevin spacey.it tells the story of david mills (pitt), a detective who partners with the retiring william somerset (freeman) to track down a serial killer (spacey) who uses the ...

## [Sven \(Frozen\) - Wikipedia](#)

Sven is a fictional character who most prominently appears in the animated film frozen (2013) produced by walt disney animation studios.he is a reindeer that lives together with his companion, kristoff.sven, alongside kristoff, assists princess anna in her search for her sister, queen elsa, who has run away after placing the kingdom of arendelle under an eternal winter.

## [Sven | Disney Wiki | FANDOM Powered By Wikia](#)

Sven is a major character in disney's 2013 animated feature film, frozen. he is kristoff's loyal pet reindeer and best friend. sven was orphaned as a calf, and nearly died before being rescued by kristoff. the two remained by each other's side ever since as best friends.

## [Characters | Disney Frozen](#)

Sven a reindeer with the heart of a labrador, sven is kristoff's loyal friend, sleigh-puller and conscience. snowgies snowgies are little snowmen elsa unwittingly creates every time she sneezes—and she sneezes a lot. hans hans is a handsome royal from a neighboring kingdom who comes to arendelle for elsa's coronation. ...

Children indicate suggestions they prefer (QS + Search)



# When to help: Search tasks

Session	Search tasks
Session 1	Name 3 countries and their capitals other than the USA countries
	How tall are elephants?
	What is inside a cocoon?
Session 2	Situational and not specific prompts, e.g. You are at your friend's house, how will you search for interesting books to show them on their computer?

Example of search tasks assigned to children



# QS preference by query type

Query type	QS1a	QS1b	QS2
Misspelled	37%	64%	34%
Informational	22%	40%	32%
Question	31%	35%	19%
Incomplete	7%	17%	16%

Query type frequency

**Misspelled:** “*tomas and freinds*” instead of “*thomas and friends*”

**Informational:** “*giraffe neck bone length*”

**Question:** “*how tall are elephants*”

**Incomplete:** “*arizona capi*”

Examples of queries based on their types



## Results: QS preference by query type

Query type	QS1a	QS1b	QS2
Misspelled	Requik [59%]	Requik [60%]	Bing [56%]
Informational	Bing [61%]	Requik [59%]	Requik [51%]
Question	Requik [75%]	Requik [65%]	Requik [58%]
Incomplete	Requik [52%]	Requik [57%]	Requik [56%]

Children's preferred suggestions  
grouped by query type



# Takeaways

- It is important for the query suggestion algorithm to interpret a misspelled query and offer suitable suggestions, as this query type is common among children
- Children prefer suggestions that:
  - Are topically diverse
  - Contain terms that they are familiar with
  - Are natural language like (e.g., *what makes a dolphin a mammal?*) as opposed to those that are succinct and short (e.g., *dolphin mammals*)
- Overall, children's preferences for child-oriented query suggestions surpassed that of general-purpose ones



## Question 3

- *What type of help do children expect for QF?*



# What kids need: Participatory design lessons for QS

## Participants

<b>Respondents</b>	8
<b>Method</b>	Cooperative Inquiry
<b>Ages</b>	7 – 11 years
<b>Demography</b>	4 boys and 4 girls
<b>Each session length</b>	90 minutes
<b>Number of sessions</b>	3





# What kids need: Participatory design lessons for QS

- Fosters reflection as a group
- Allows collaboration between researchers and the children that participated in the study
- Allows flexibility in design activities



**Children and adults involved  
in the design process**



# Design session 1: Design search tool [Big Paper]

**Goal:** How would children design tools that target them specifically?

**Technique used:** Big Paper

## Why Big Paper technique?

- Big Paper uses large pieces of paper, like those found on easel pads, as the medium for design
- There is room for every design partner (**children**) to draw their own ideas, without having an unconstrained view about the design problem
- Big Paper can generate a wide array of design ideas and approaches for the design problem



# Design Session 1: Design search tool [Big Paper]

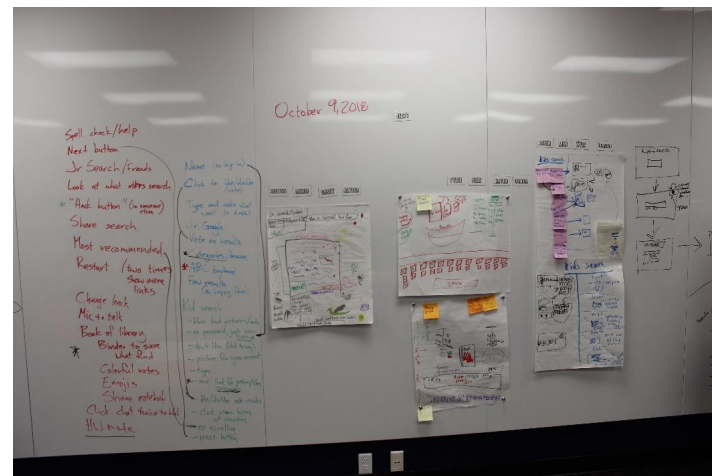
## Setup

- Three groups of children and adults worked collaboratively throughout the session (at least 2 children in each group)
- Space was adequate so that each group was able to work on their own without being influenced by other groups' ideas

# Design session 1: Design search tool [Big Paper]

## Insights

- Social aspects
  - Up- and down- voting of search results collaboratively
  - Chat feature (searching for information online with peers)
  - Contact a friend feature
  - Specify who was searching
- Interactive aspects
  - Simplify interface with no scrolling
  - Categorize search results



Designs suggested by different groups



## Design session 2: Collaborative design prototype [Mixing Ideas]

**Goal:** How would children collaboratively design a child-specific tool?

**Technique used:** Mixing ideas

### Why Mixing Ideas technique?

- Younger kids find it challenging working as partners in the design process. They instead prefer to work individually in the creation of their designs rather than collaboratively with others
- Design partners first create their own individual designs and talk about them with the large group
- Researchers then examine the designs and work with kids to combine them into one new design



# Design session 2: Collaborative design prototype [Mixing Ideas]

## Setup

- Split the session into three parts
- First part, we asked each child to design their own search tool centered on search and query suggestions
- Second part, children worked in pairs along with one or two adults
- Third part, there were four children in each group along with 2-3 adults
- At the end, we had just two prototypes

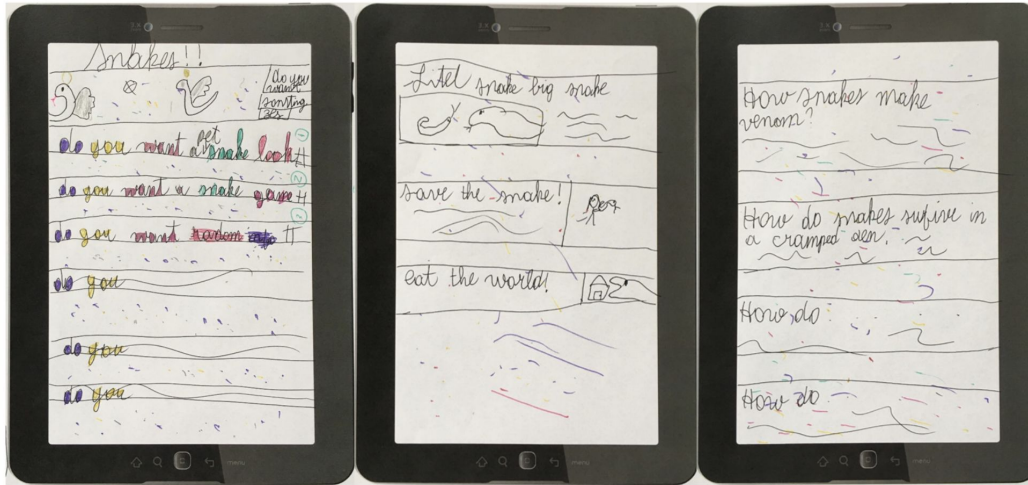


# **Design session 2: Collaborative design prototype [Mixing Ideas]**

## **Insights**

- Reading words or hearing sounds related to QS and result
- Spelling suggestions
- Visuals that helped confirm understanding

## Design session 2: Collaborative design prototype [Mixing Ideas]



Examples of QS a children's search tool would provide (as indicated by a 10 year-old girl)





# Design session 3: Design and improve QS [Big Paper]

**Goal:** How would children improve QS?

**Technique used:** Big Paper

## Setup

- For this activity there were four groups of children and adults (2 children in each group)
- We described how popular search engines offer suggestions by providing text options underneath the query box
- We also gave them some initial query words along with the query suggestions that Google provided for each of the words
- Each of these were printed on small pieces of paper the children could glue or tape to the big paper
- Space was adequate so that each group was able to work on their own without being influenced by other groups' ideas



# Design session 3: Design and improve QS [Big Paper]

## Insights

- QS should include more information, such as links to events
- Temporal information should influence results and QS
- Selecting a QS should lead to new suggestions and results
- QS should include a visual representation next to it to promote understanding and recognition
- Presentation should be improved: font size and color
- Limit the number of QS that could be displayed, but allow for more to be shown



# Takeaways from design sessions and recommendations

- Visuals can readily help users recognize whether or not their search intent was understood by the computer and that an accurate response was returned
- Audio output emerged as a modality to confirm that the QS matches the user's search intent
- Query suggestion strategies should consider temporal information, e.g., location, current time, and season
- Spelling corrections are important and differ from QS, and should be in different places and/or have different colors
- Presentation matter: font size of the suggestions, the color of the interface, and the number of suggestions should be improved



# Conclusion

We identified:

- **What is available:** By examining existing tools that assist children during query formulation
- **When to help:** Through examining children's perceptions about QS that target them, as opposed to one designed for diverse users
- **What children need:** Participatory design sessions with children that helped determine children's preferences in search engine and QS design



## Impact of our findings

- Outcomes of our work can guide researchers and designers as they implement query formulation strategies that can help children in their quest for information



## Future work

- Go beyond searches query formulation strategies available for English speakers
- Investigate how social aspects influence the quality of query suggestions to be presented to children
- Additional studies to examine how children interact with other available query formulation strategies



# Thank you!



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