

# Search Mindsets:

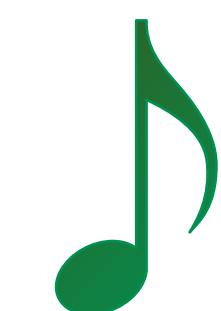
## Understanding Focused and Non-Focused Information Seeking in Music Search

**Spotify®**

Ang Li\*, Jennifer Thom, Praveen Chandar, Christine Hosey, Brian St. Thomas, Jean Garcia-Gathright

\*School of Information Science, University of Pittsburgh, Pittsburgh, PA  
Spotify, Boston, MA

### Motivation



**Music listening** has long been recognized as an important part of our everyday life.



Advances in technologies have enabled listeners access to **millions** of songs almost **anywhere, anytime** through online music streaming platforms such as **Spotify**



In facing the challenge of information overload, **Search** still remains an important way for users to find the right music that they want to consume



**In general web search,**  
▶ Search activities have been categorized into: Look-up Vs. Exploratory search  
▶ They demonstrate distinctive search strategies and behavior

**Search Mindset** within **Music Domain**:  
▶ **Focused**: Users have a specific item to find  
▶ **Non-focused**: Users have an open-ended search need or just a seed of idea in mind

### Research Goal



Current study intends to **characterize** and **distinguish** between **focused** mindsets and **non-focused** mindsets

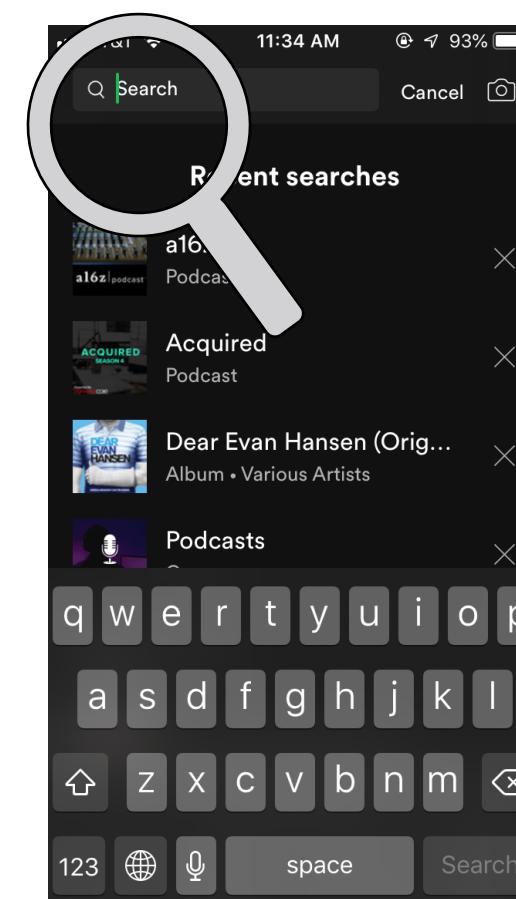
**RQ1:** How does music **search mindset** vary among users?

**RQ2:** How does users' **search behavior** differ between mindsets?

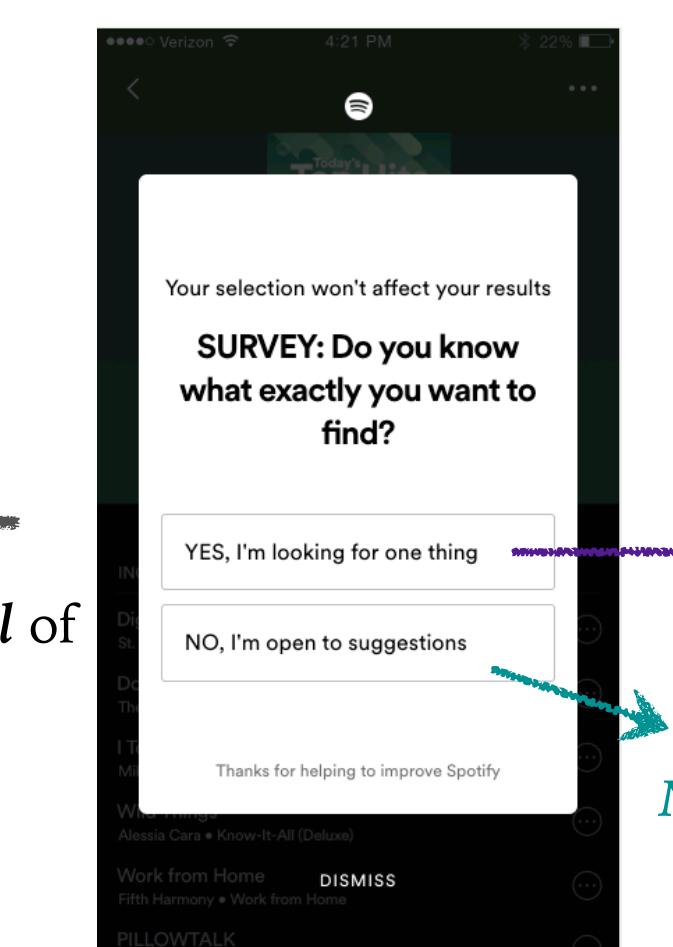
**RQ3:** Can we **infer** users' mindset based on their behavioral signals when they interact with the music streaming platform?

### Mixed-Method Approach

#### Search session behavior data analysis

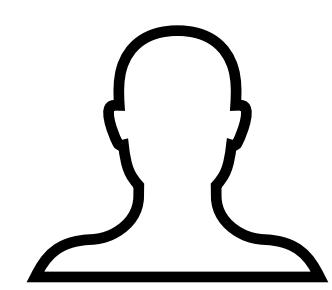


#### Spotify Large scale in-app Survey



#### Survey Design

- ▶ Survey was able to capture respondents' mindset with fidelity
- ▶ Respondents would interpret and answer the questions
- ▶ The triggering process



- ▶ 10 users (6 females, 4 males)
- ▶ Android mobile phone
- ▶ Have searched on Spotify at least 3 times in the week before our study
- ▶ Face-to-face, 30 minutes usability tests combined with semi-structured interviews
- ▶ 3 phases: warm-up, search tasks (natural, **focused**, **non-focused**), post-interview

#### Dataset

Sent out to 50K users, live for 3 weeks  
 • 2,234 users respond the survey  
 • Generated 27,504 search sessions  
   ▶ 1,779 search session with surveyed mindset label  
   ▶ 25,725 search session without a label

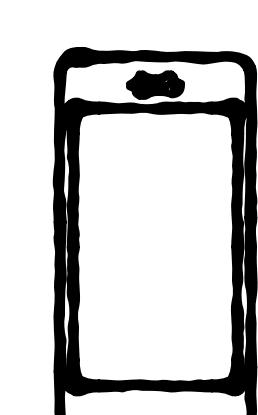
#### Session features

Sessions are separated by 10 mins dwell time



#### User features

- Demographics
- Engagement
- Music Preference



#### Session features

- Time/ Day of Week
- Length
- # Switching



#### Activity features

- Query
- Search
- Clicks
- Stream

### Results – Music Search Mindset

#### RQ1: Music searches – Users are more likely to have a **focused** mindset

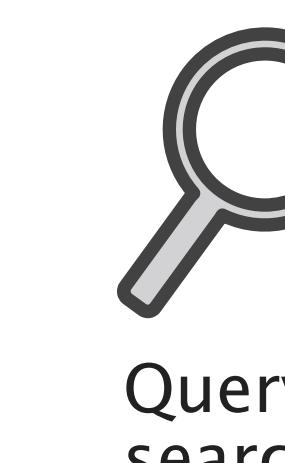
- ▶ 65% of the survey responses indicated **focused** searches.



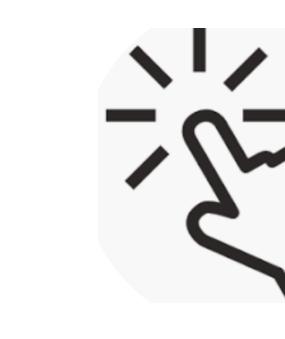
- ...Users' search mindset is associated with their **music preferences**
- ▶ Discovered MORE novel music tracks <- -> **non-focused** mindset

#### RQ2: Users searching, clicking and streaming behavior differ between **focused** vs. **non-focused** mindset

- ▶ When users search with a **focused mindset**, they put **MORE efforts** in search:



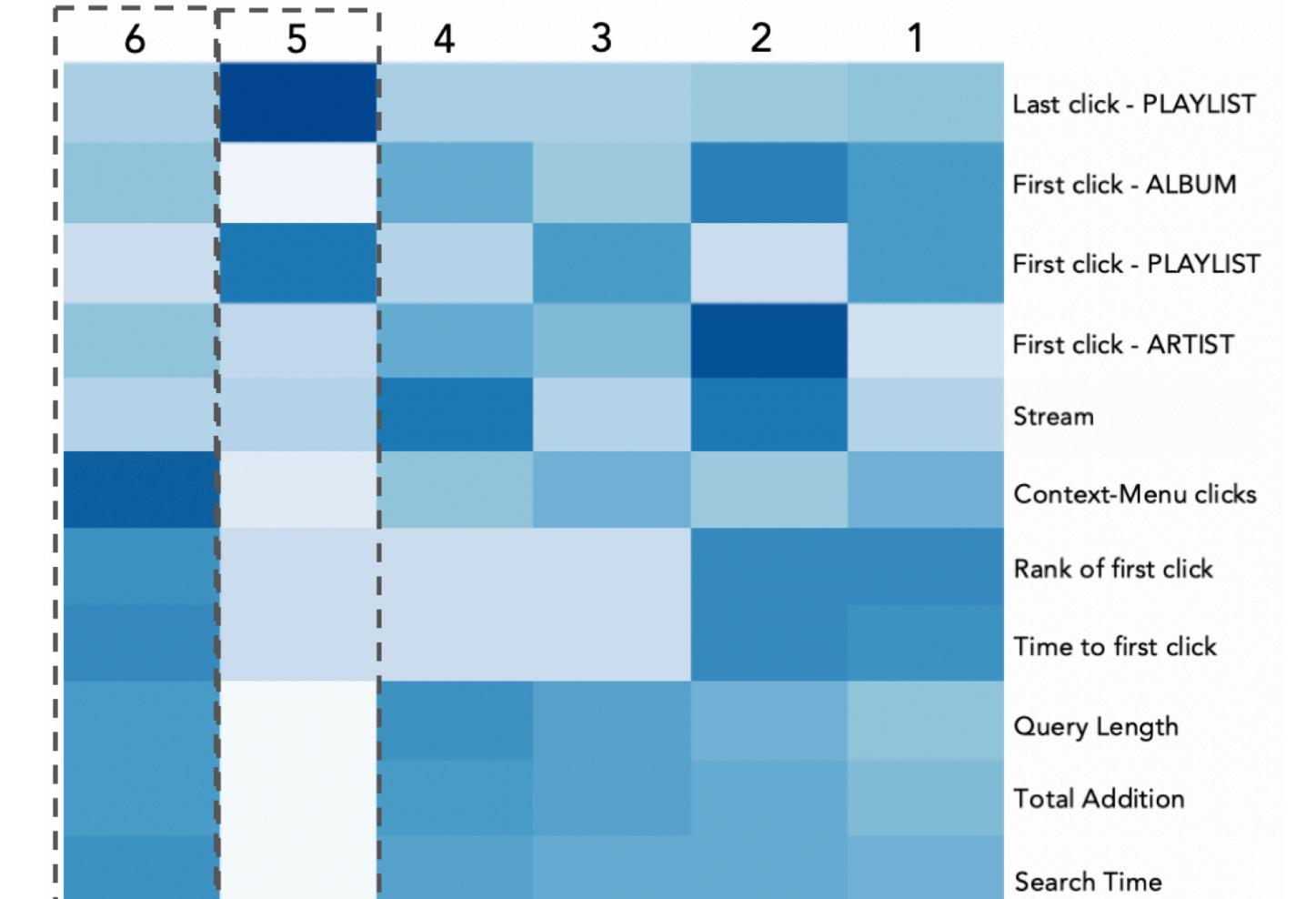
Query/  
search



Click

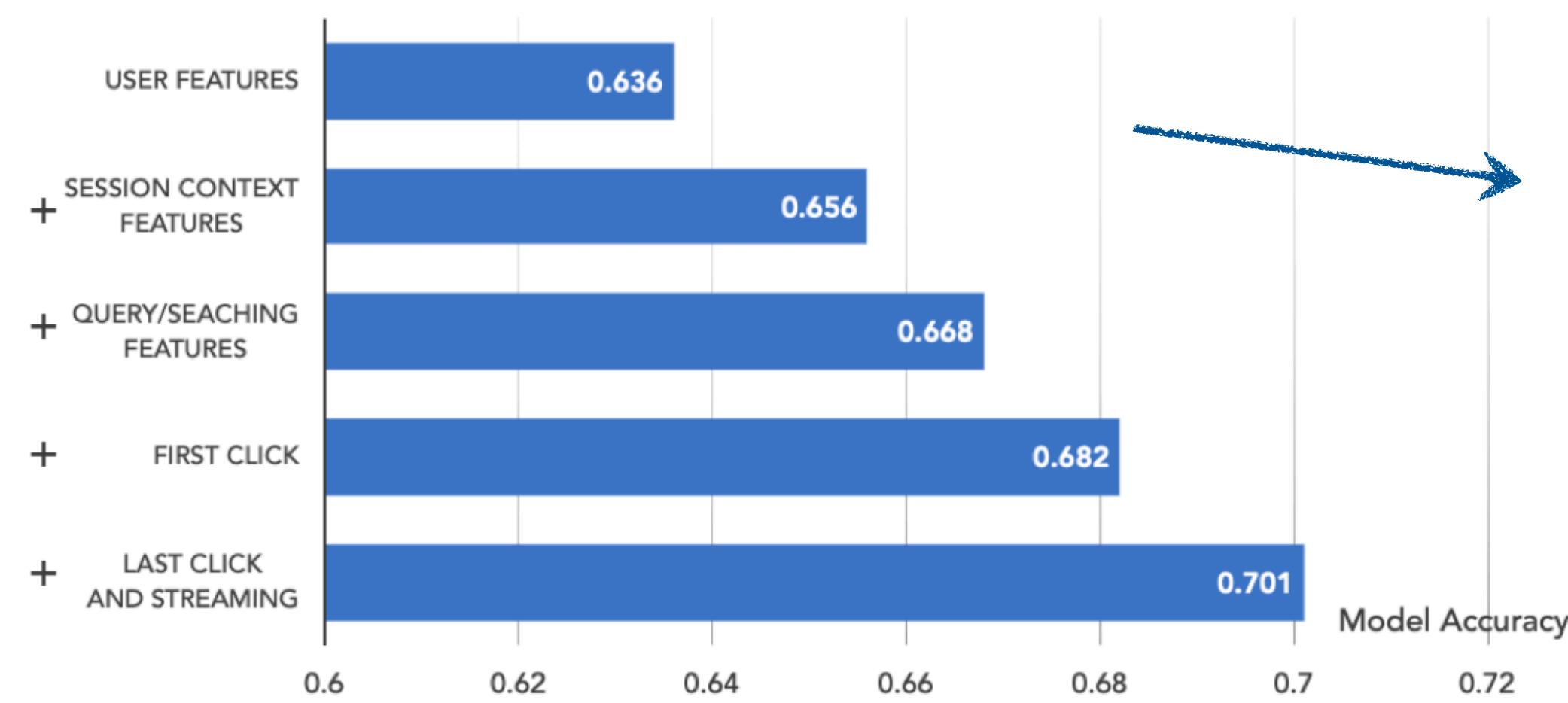


Stream



Utilizing unlabeled data — validates the patterns at large scale:  
 • cluster 5 & 6 represent the non-focused and focused mindset search session

#### RQ3: Search mindset can be inferred from lower-level user behavioral signals



It is challenging to predict search mindset at very beginning of a session — users' **past music preference** can provide a baseline estimation

As users' behavior signals increase chronologically, the search system can be **adjusted** at real-time to accommodate for different search **mindsets**

- **Focused**: system can provide support that reduce **search effort**
- **Non-focused**: recommendations can prioritize the result **diversity**

### Limitations

- ▶ The survey triggered only once per user's lifetime – no idea of variation of the mindsets between sessions
- ▶ Other factors, such as user goals, can also play a role
- ▶ Only Android users, within Spotify can make the current work hard to generalize