

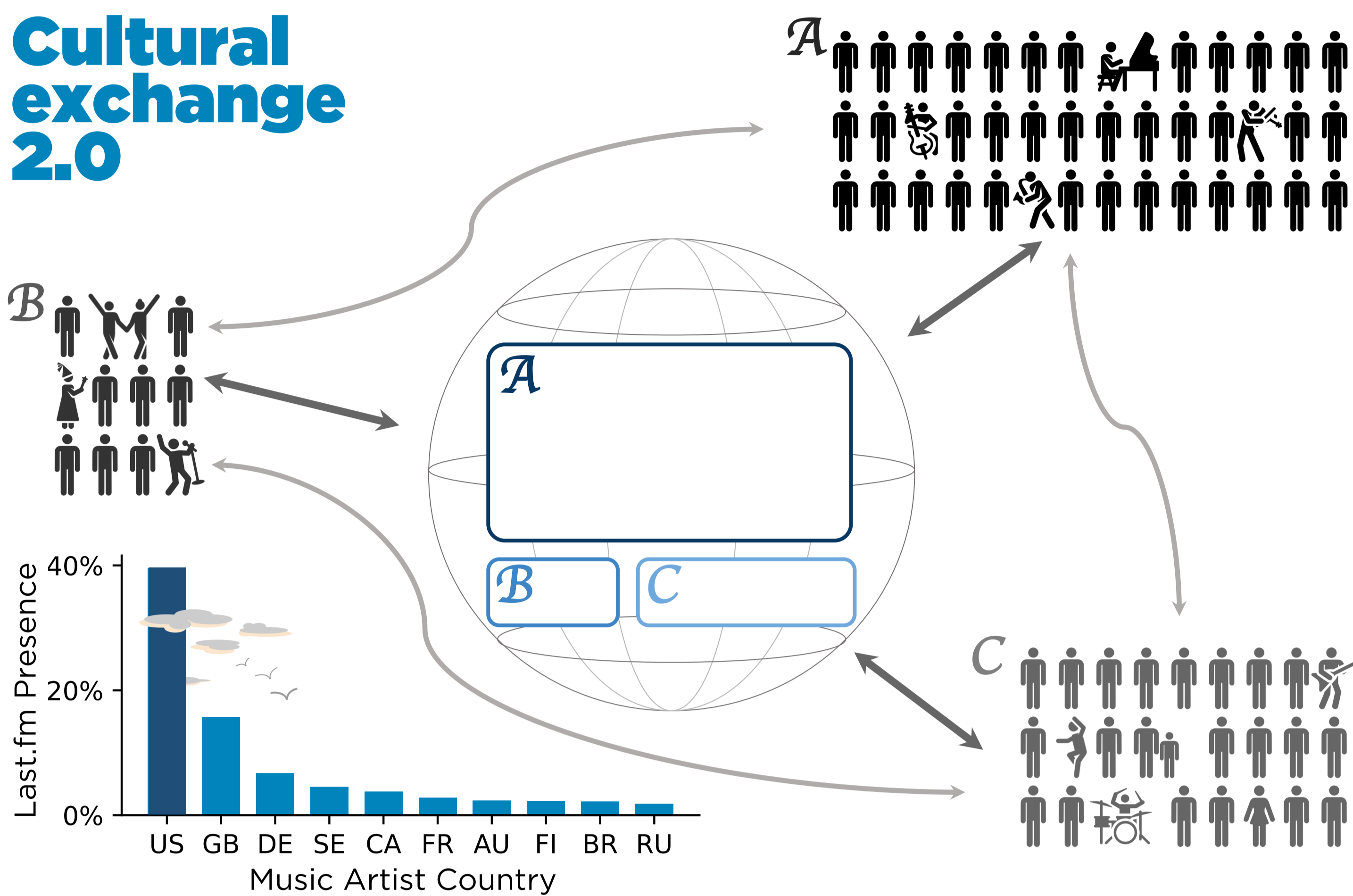
# Traces of Globalization in Online Music Consumption Patterns and Results of Recommendation Algorithms

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## Motivation

### Cultural exchange 2.0



- With the emergence of online streaming platforms music consumption becomes centralized
- Music appreciated by users of more represented cultures may overshadow music preferred by users of less represented cultures
- In 2018-2019 about 40% of music tracks scrobbled on Last.fm were produced by artists from the United States

## Research questions

- **RQ 1:** How prominent is the aspect of US “cultural imperialism” in the sphere of online music consumption? Is its influence uniform across countries?
- **RQ 2:** How significant is domestic music consumption in different countries? Are there any signs of “glocalization”?
- **RQ 3:** Do music recommender systems influence users’ inclination towards music coming from certain countries?

## Method

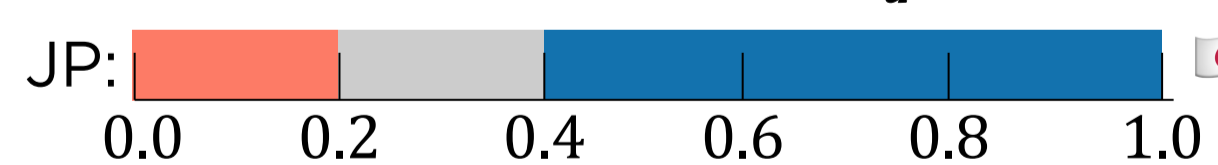
- $u$  - user id,  $t$  - music track id
- Each user comes from country  $c_u$
- Each track is produced by artist from  $c_t$
- Listening event (LE) - tuple  $\langle u, t \rangle$  signifying that user  $u$  played track  $t$
- In the toy example on the right user  $u_3$  triggered two LEs:  $\langle u_3, t_5 \rangle$  and  $\langle u_3, t_4 \rangle$
- We denote all LEs produced by users from  $c_u$  with tracks from  $c_t$  as  $I_{c_u, c_t}$
- We denote all LEs produced by users from  $c_u$  as  $IU_{c_u}$
- We denote all LEs with tracks from  $c_t$  as  $IA_{c_t}$

User	Country	Played Tracks
$u_1$	JP	$t_1$ , $t_2$ , $t_3$
$u_2$	JP	$t_2$ , $t_5$
$u_3$	US	$t_5$ , $t_4$

### RQ 1: Domestic vs US-produced music

How much attention do listeners from country  $c_u = \text{JP}$  pay to music produced in the US and in their own country?

$$ATT_{c_u, c_t} = \frac{|I_{c_u, c_t}|}{|IU_{c_u}|}$$



Users from	Music from	Count	Attention
JP	US	1	0.2
	JP (domestic)	3	0.6
	other	1	0.2

### RQ 2: Attention from domestic public

Which proportion of attention to music from country  $c_t = \text{US}$  comes from “domestic” public?

$$PDP_{c_t} = \frac{|I_{c_t, c_t}|}{|IA_{c_t}|}$$

Music from	Users from	Count	Proportion
US	US (domestic)	1	0.5
	other	1	0.5

### RQ 3: Recommendation experiment

Do recommenders suggest more or less local music than users actually consume?

- Assuming users consume all top 10 tracks recommended to them we compare the distribution of US / local music recommended to actual user consumption, as calculated for RQ 1



- We consider two recommendation algorithms: **ItemKNN**, **NeuMF**
- Three samples of 100k items are taken as training sets, average results reported

## Dataset

- User listening activity on Last.fm in 2018-2019 (sample of LFM-2b dataset)
- Artist country information crawled from MusicBrainz.org
- We concentrate on 20 countries with at least 100 users and 1000 tracks
- Among them US is the most represented with 1,763 users and 252,370 tracks
- Least represented is Turkey with 115 users and 1,478 tracks

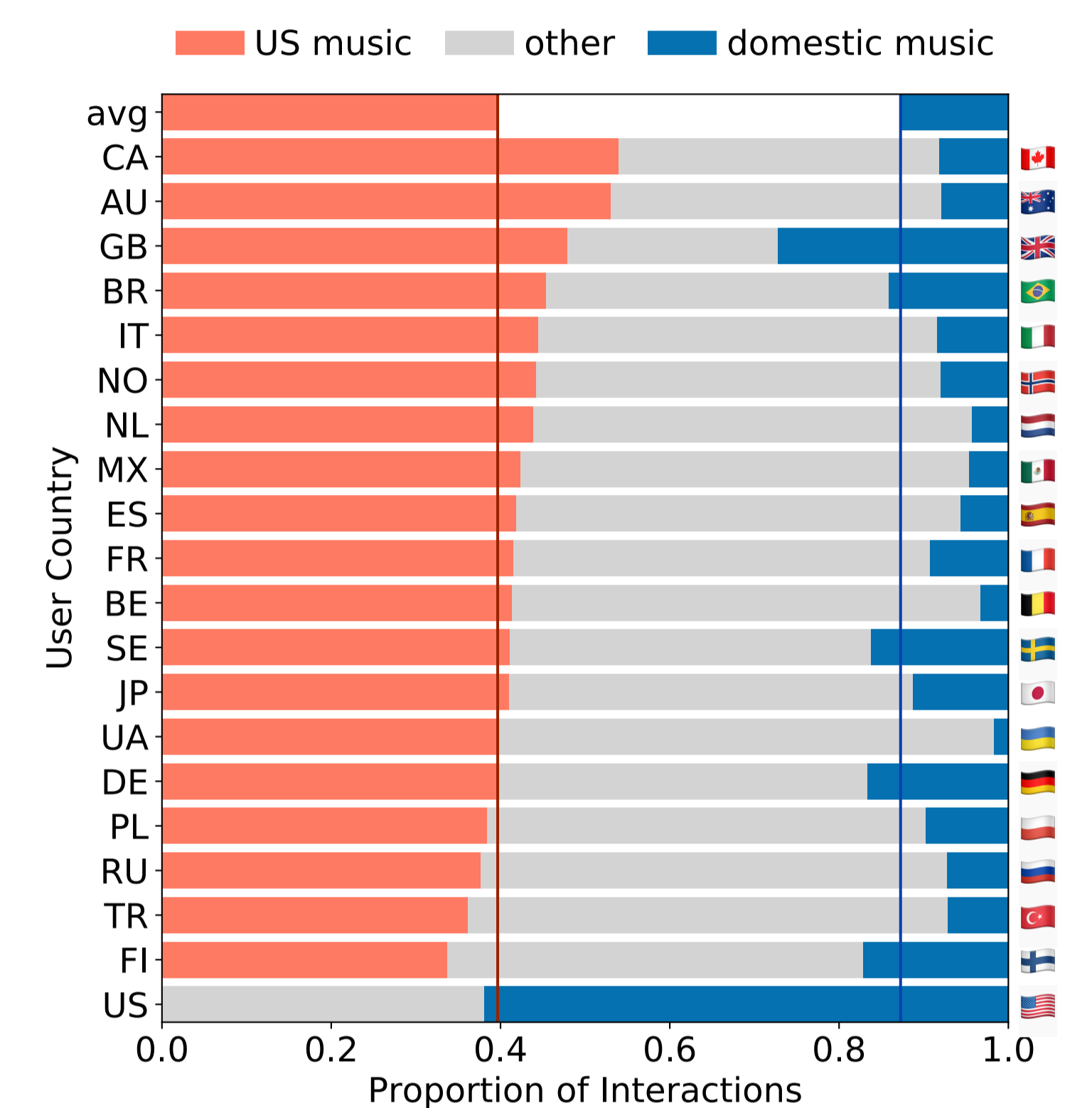
	Tracks	Users	Interactions
Total	637,236	12,875	14,640,001

## Results

### RQ 1: Cultural imperialism

Right: distribution of attention users from different countries pay to US made and their domestic music.

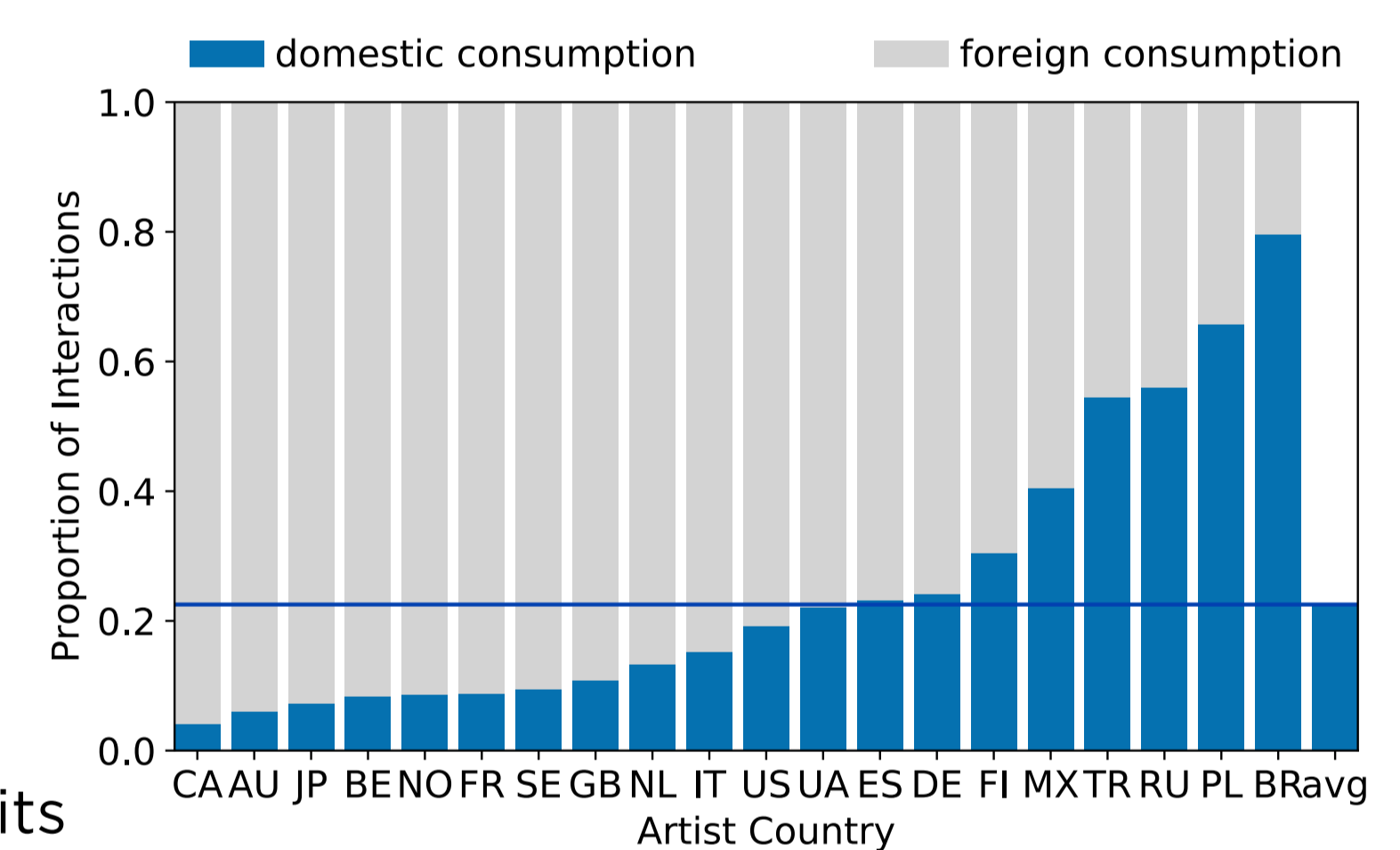
- CA, IT, NL and others show above average consumption of US music and below average of domestic music, possibly suppressed by global trends
- Fewer countries such as GB, BR, SE, pay above average attention to both local and US music, hinting on comfortable coexistence of the two
- Some countries are influenced by US music to a smaller degree, e.g., PL, TR, FI



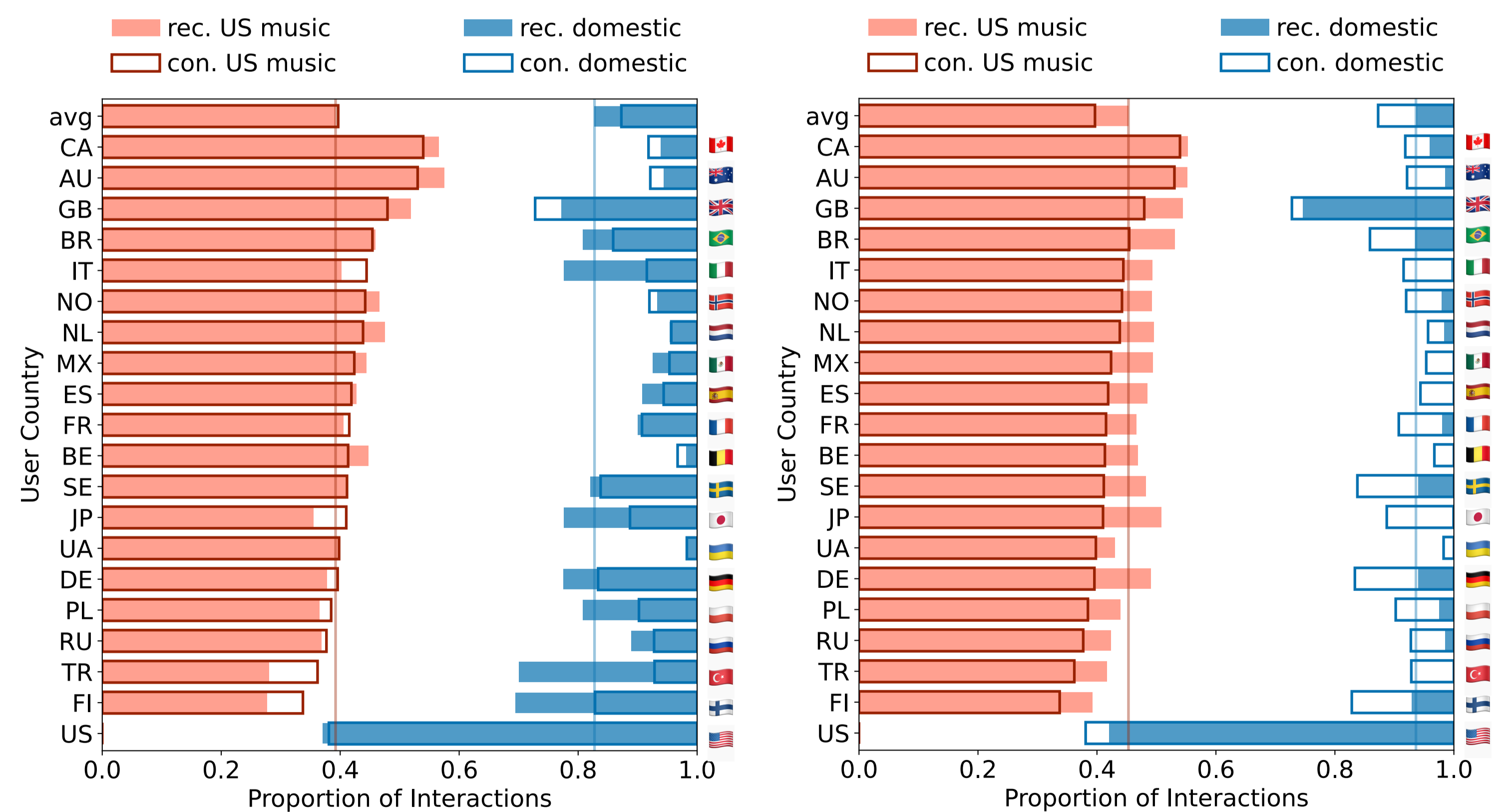
### RQ 2: Glocalization

Right: proportion of “domestic attention” received by artists from different countries.

- GB, SE adapt and contribute to global trends; their music receives notable attention from without
- Most attention to BR music comes from within; heavy adaptation of trends
- FI is less affected by US trends, yet its music is appreciated in other countries



### RQ 3: Recommendation experiment



#### ItemKNN

- On average recommends the same proportion of US music as consumed by the users

#### NeuMF

- Recommends bigger proportion of US music
- Suppresses domestic music

## Conclusions

- **RQ 1:** US produced music holds strong positions among Last.fm users, however its influence is not uniform across countries
- **RQ 2:** We observe different patterns of Glocalization - local culture confronting or adapting global trends
- **RQ 3:** Recommender systems may influence the mode of cultural exchange between countries. The influence is algorithm-dependent