

HUMAN-IN-THE-LOOP PERSONALIZATION

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A special event in honor of Georg Gottlob's influential and long-lasting research contributions, February 25th, 2018



In Georg's terms

- Value Added Data Systems **support users** in discovering data of **relevance** to their questions...
think personalization
- Adding value to data involves the **best effort** to provision data to users... think constraint satisfaction
- Users can provide feedback on the results obtained, **enabling changes to all data management tasks**, and thus a continuous improvement in the user experience... ok, let's try that too

Audio Transcription NYPL Lab

Together We Listen



Help [The New York Public Library](#) fix computer-generated transcripts from hundreds of stories from the library's [Community Oral History Project](#).

YOU THERE? TRYING TO FIND THE

0:10 ● Yea- yeah. Um, [laughs] where to start?





▶ ○ Uh, wh want to show

0:17 ○ it's a community driven project **An example of editing a transcript**

An example of how the transcript editor works (click for sound)

Select an interview to get started.

Filter by Collection: **All Collections** Sort by: **Title (A to Z)** Search Title/Description 🔍

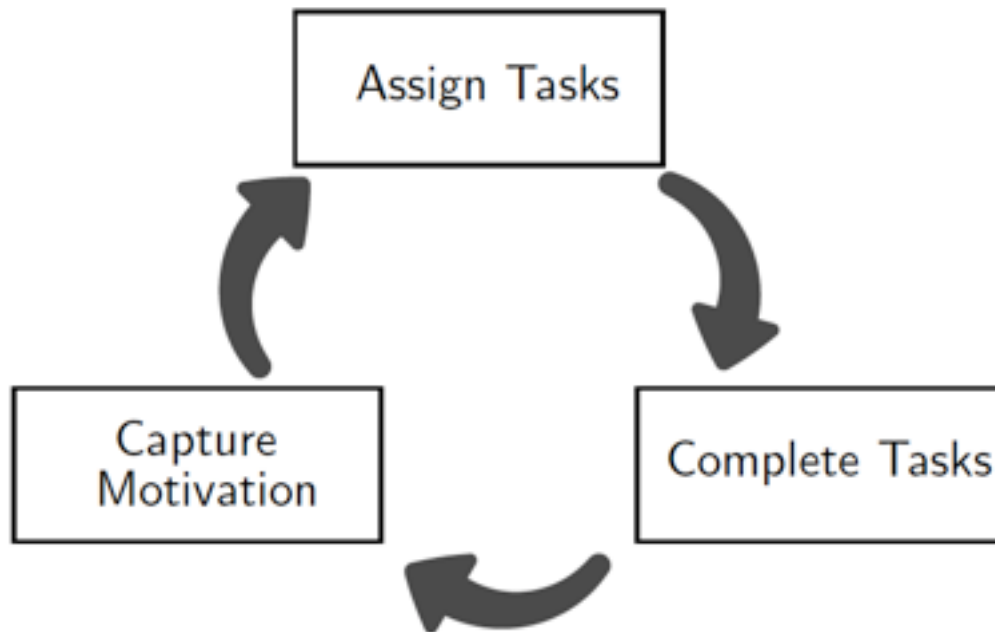
 <p>VISIBLE LIVES Adam Payne Interviewed by Monica Diaz 57m 53 contributors 61% reached consensus</p>	 <p>YOUR VILLAGE, YOUR STORY Addis Williams Addis Williams, who began working in show business at age seven or eight, discusses his 1h 4m 43 contributors 34% reached consensus 2% awaiting review</p>	 <p>VOICES FROM EAST OF BRONX P... Adele Acampora Pasmantier Long-time Bronx resident Adele Acampora Pasmantier shares memories of her close-knit Italian 1h 10m 20 contributors 28% reached consensus 1% awaiting review 8% have edits</p>	 <p>A PEOPLE'S HISTORY OF HARLEM Aden Seraile Aden Seraile was born in Harlem where he lives now. He recalls the neighborhood's bad 31m 26 contributors 83% reached consensus</p>
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Task assignment as a form of personalization

- We have been solving task assignment as a single-shot optimization problem matching tasks and workers
- In practice
 - Workers are involved in a series of tasks
 - Their motivation evolves over time

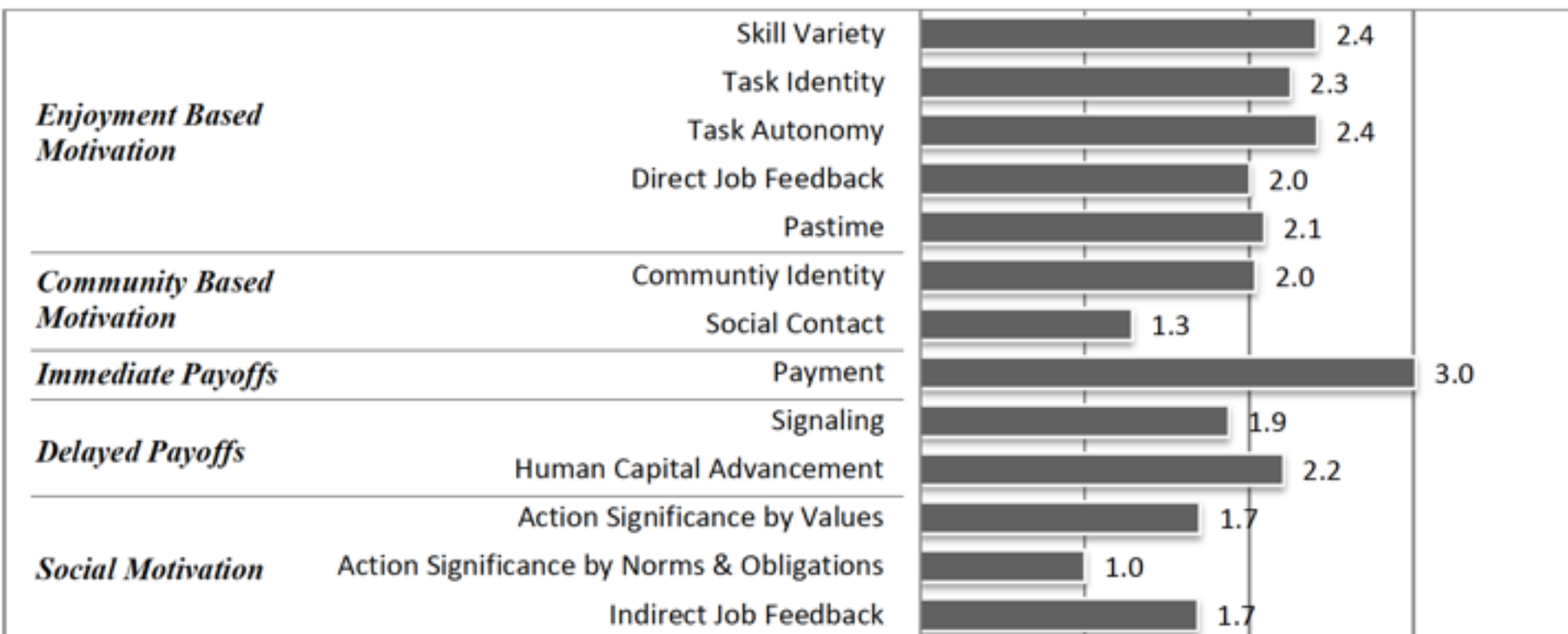
Adaptive task assignment

Observe, model, optimize...



Motivation in Amazon Mechanical Turk

More than fun and money. worker motivation in crowdsourcing-a study on mechanical turk. N. Kaufmann, T. Schulze, and D. Veit. AMCIS 2011



Two motivation factors

with J. Pilourdault, S. B. Roy, D. Lee. EDBT 2017, ICDE 2018

balance between

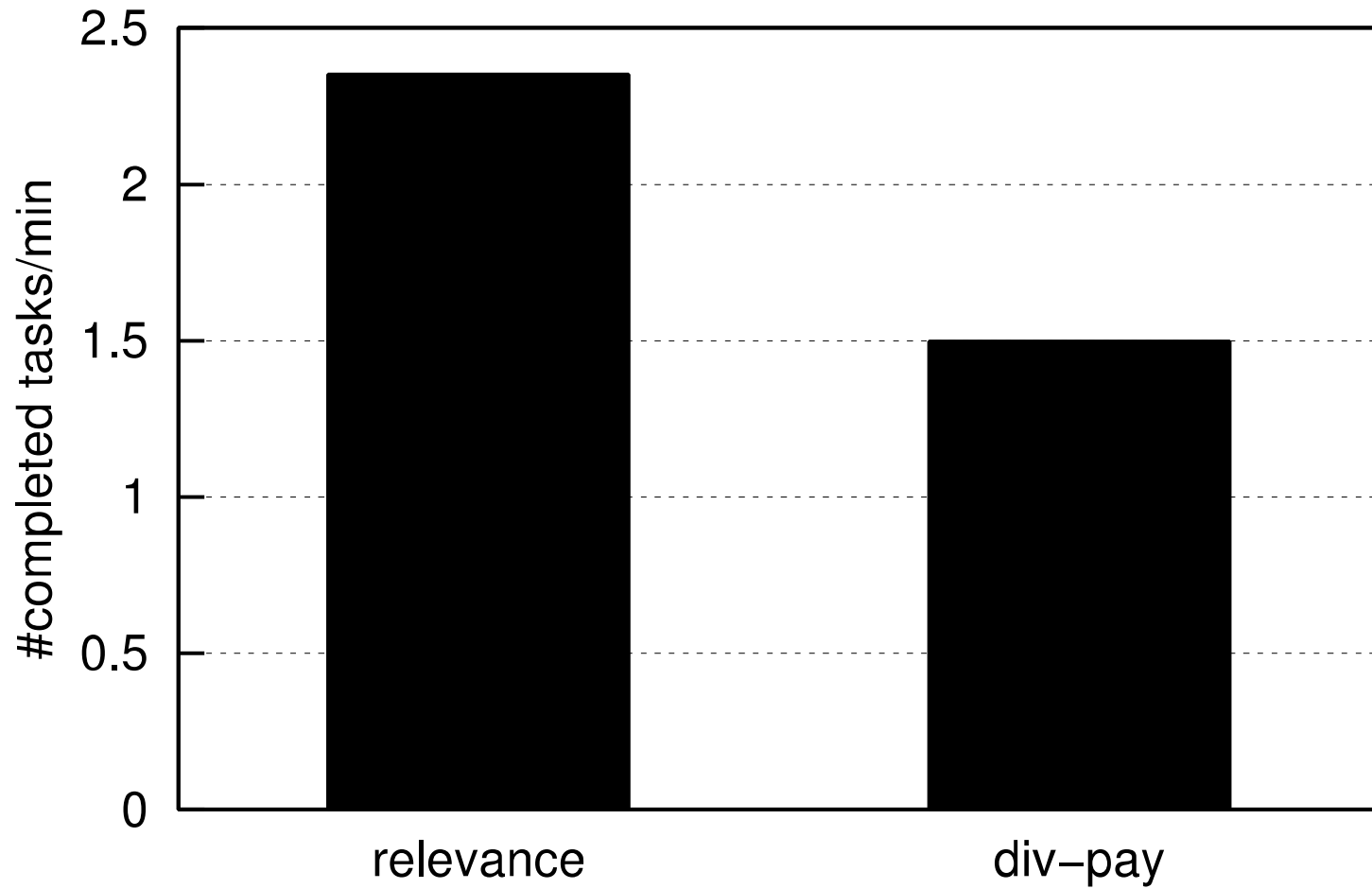
intrinsic factor, *task diversity*, and
extrinsic factor, *task reward*

$$\begin{aligned} \text{motiv}(\mathcal{T}, w) = & \alpha_w TD(\mathcal{T}) \\ & + \beta_w \times TR(\mathcal{T}, w) \end{aligned}$$

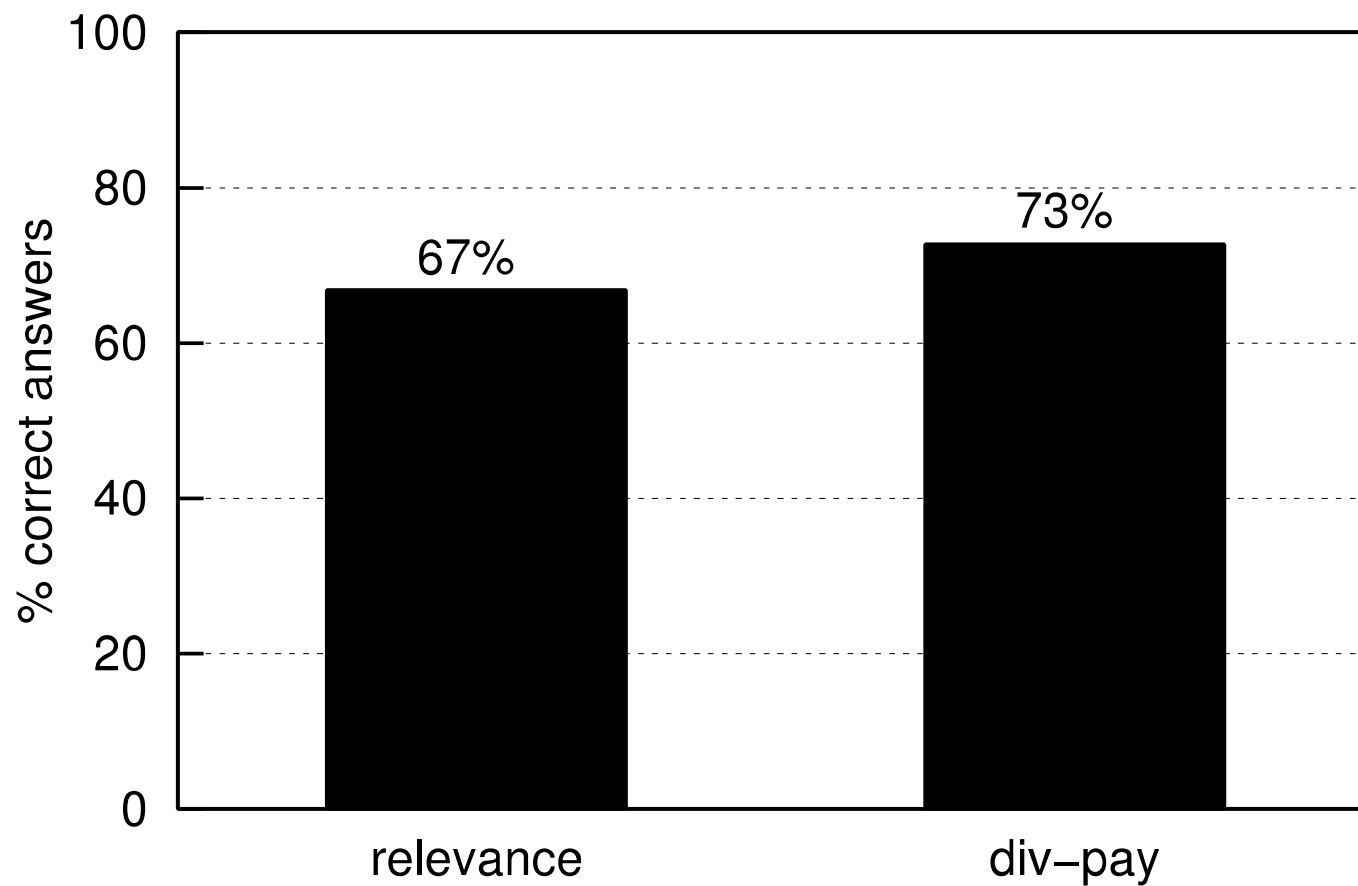
Adaptive Task Assignment

- 158,018 tasks from CrowdFlower in 22 kinds
- 58 workers in AMT who completed 2,715 tasks in 80 work sessions
- 2 task assignment strategies:
 - Tasks matching a worker's profile: RELEVANCE
 - Tasks achieving a diversity/payment balance: DIV-PAY

Task Throughput

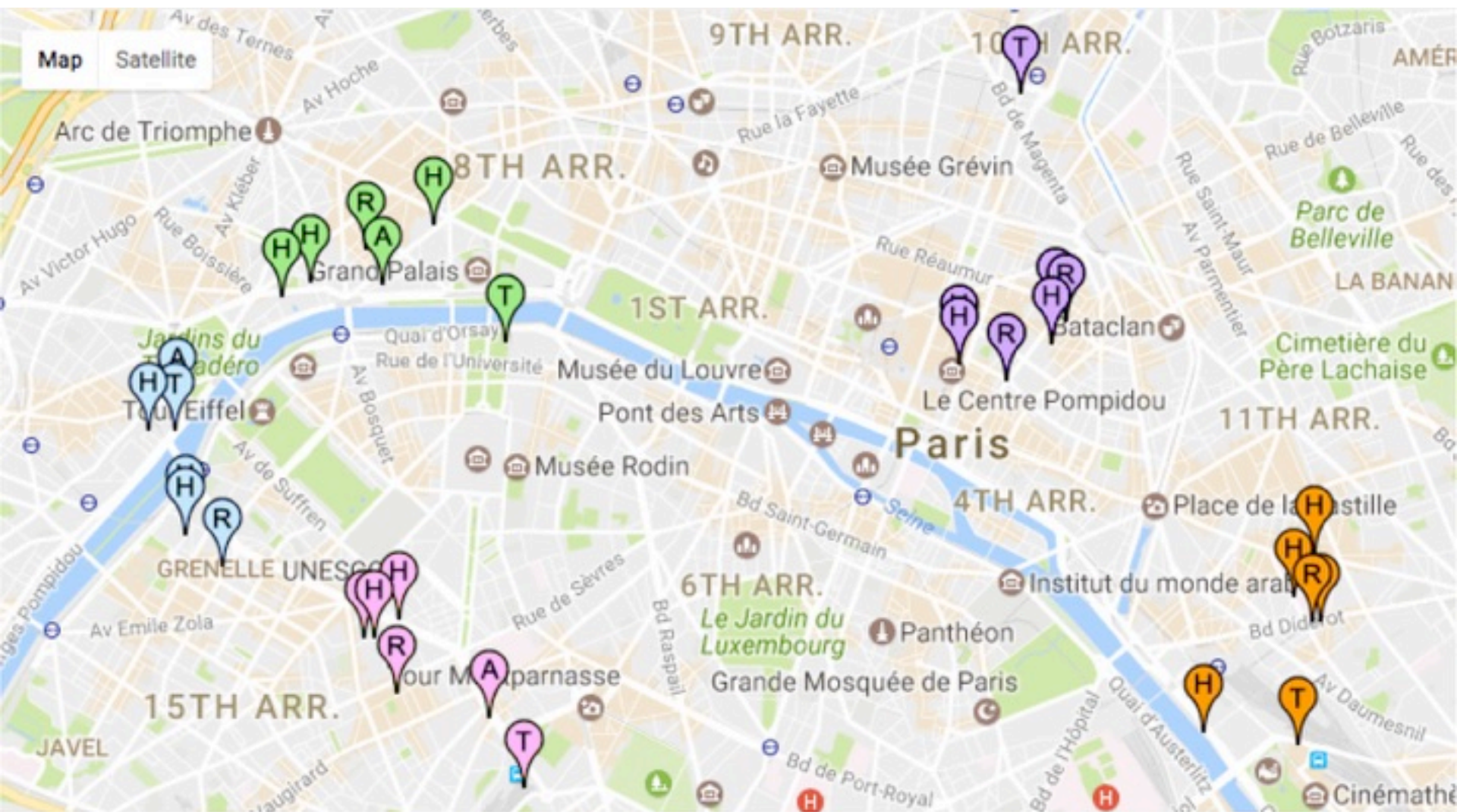


Outcome Quality



Travel Package

$$TP_u = \{CI_1, CI_2, \dots, CI_k\}$$



Personalized Travel Packages

Manish Singh, Ria Mae Borromeo, Anas Hosami, Sihem Amer-Yahia, Shady Elbassuoni:
Customizing Travel Packages with Interactive Composite Items. DSAA 2017: 137-145

Given a user, return k Composite Items

Items

$\langle i.id, i.name, i.long, i.lat, i.type, i.sub, i.cost, i.tags \rangle$

TourPedia: POIs in 8 cities, divided into 4 types: *accommodation*, *transportation*, *restaurant*, and *attraction*.

Foursquare: augments TourPedia with *i.sub*, *i.cost* and *i.tags*

<i>i.id</i>	<i>i.name</i>	<i>i.type</i>	<i>i.lat</i>	<i>i.long</i>	<i>i.sub</i>	<i>i.tags</i>	<i>i.cost</i>
1	Le Burgundy	<i>acco</i>	48.8679	2.3256	hotel	<i>luxury suites cognac champagne bar gastronomic restaurant spa</i>	3.00
2	The Bicycle Store	<i>trans</i>	48.8642	2.3658	bike shop	<i>accessoires velo beach cruiser bicycle paris fixed gear</i>	2.71
3	Un Zèbre à Montmartre	<i>rest</i>	48.886	2.3348	french	<i>bankers bar brunch café comedy fireplace frat hipsters liquor margaritas</i>	3.20
4	Les Arts Décoratifs	<i>attr</i>	48.8632	2.3334	museum	<i>arts contemporary decorative exhibition fashion gallery mode modern museum</i>	3.86

Travel Package

$$TP_u = \{CI_1, CI_2, \dots, CI_k\}$$

$$\operatorname{argmax}_{C,W} \alpha \sum_{j=1}^k \sum_{i=1}^{|\mathcal{I}|} w_{ij}^m \quad \begin{array}{l} \text{geosim}(i, c_j) + \\ \text{representative} \end{array}$$

$$\sum_{j=1}^k \max_{CI_j \in \mathcal{V}_{CI}} \left(\beta \sum_{i \in CI_j} \begin{array}{l} \text{geosim}(i, c_j) + \\ \text{cohesive} \end{array} \right. \\ \left. \gamma \sum_{i \in CI_j} \begin{array}{l} \text{persim}(i, u) \\ \text{personalized} \end{array} \right)$$

$$s.t. \forall i \in [1, |\mathcal{I}|], \sum_{j=1}^k w_{ij} = 1$$

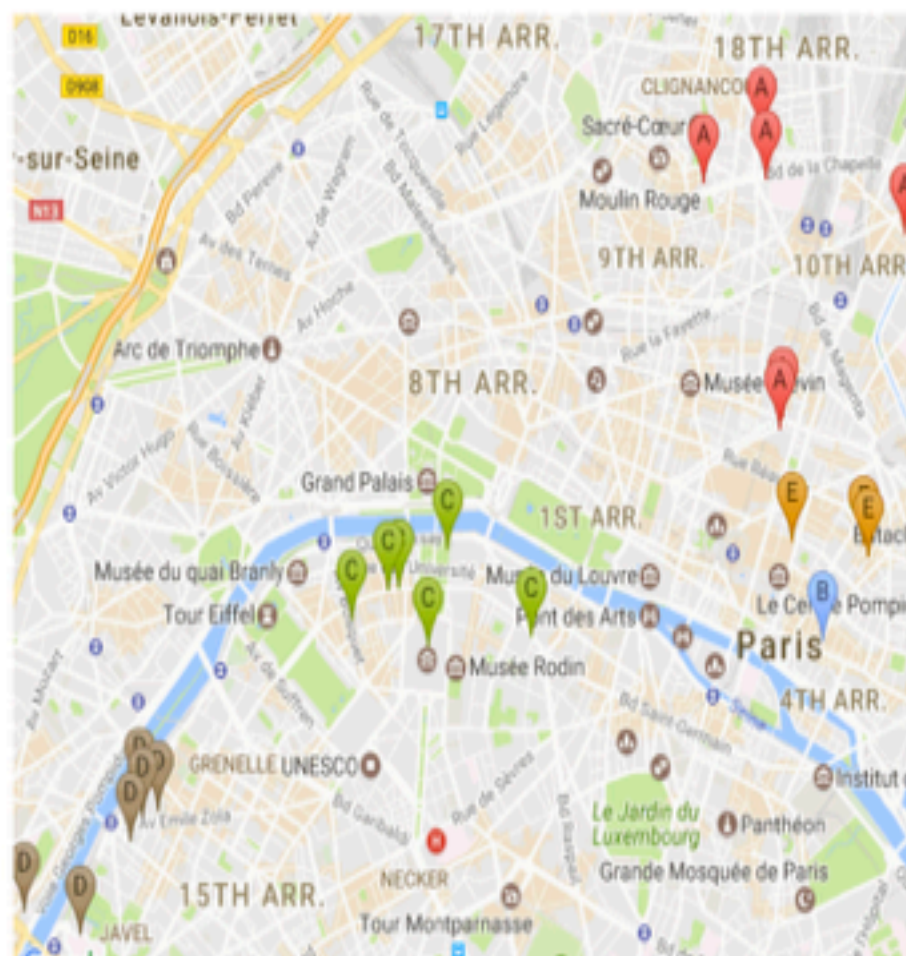
Validation

- User study on Amazon Mechanical Turk (AMT)
 - 30 users
 - \$1.30 per user
- Users
 - provide travel profile and query
 - participate independent and comparative evaluation

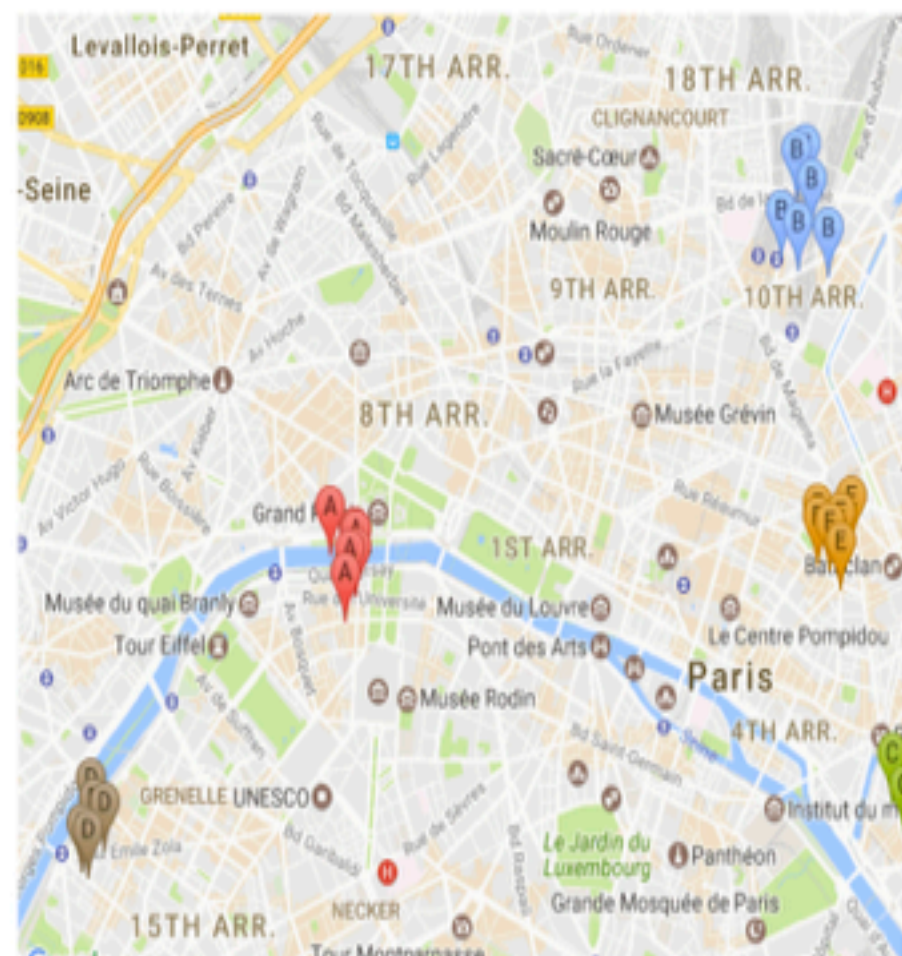
1. Do you see a significant difference between the two plans? ☐ Yes ☐ No

• In general, which plan do you prefer? ☐ Plan 1 ☐ Plan 2 Reason:

Plan 1



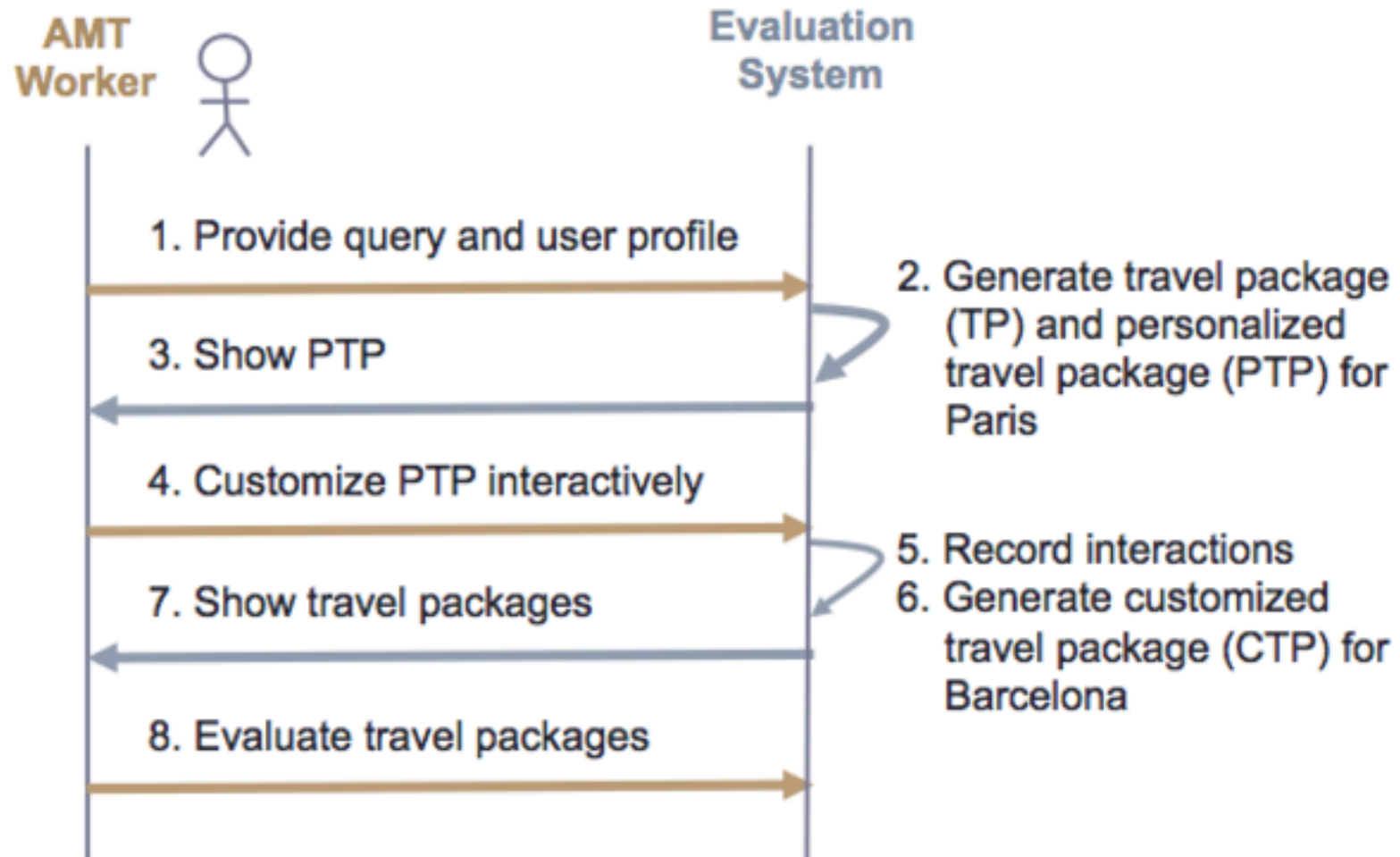
Plan 2



Findings: Personalization

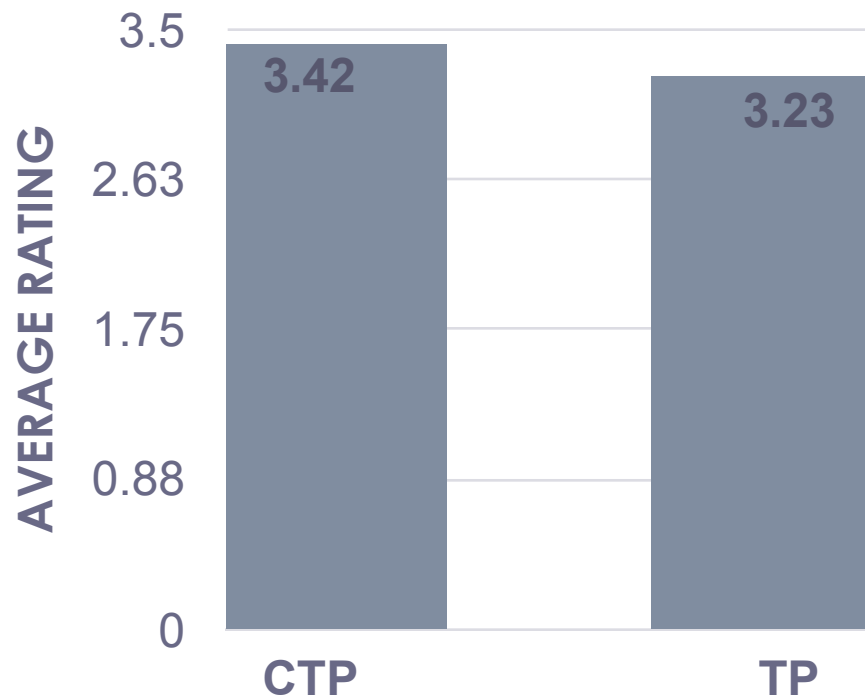
- Workers prefer to personalize POIs in CIs
- Tension btwn personalization and cohesiveness

Introducing Customization

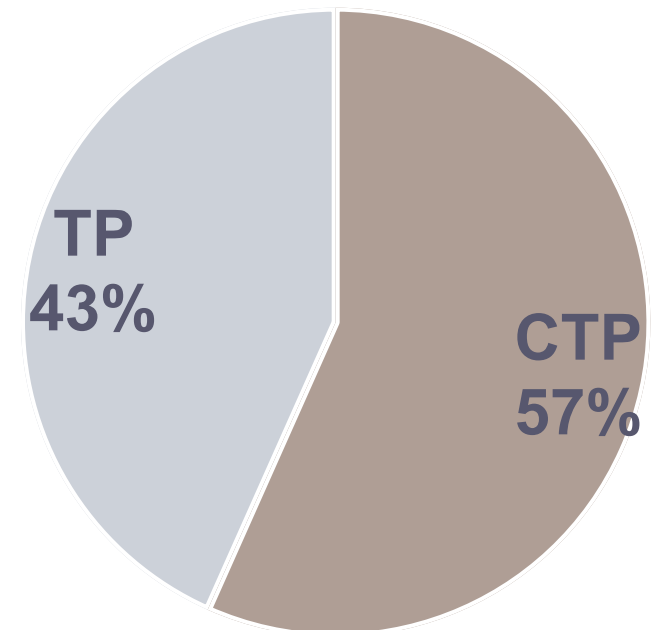


Findings: Customization

Independent
Evaluation of TP vs.
CTP in Barcelona



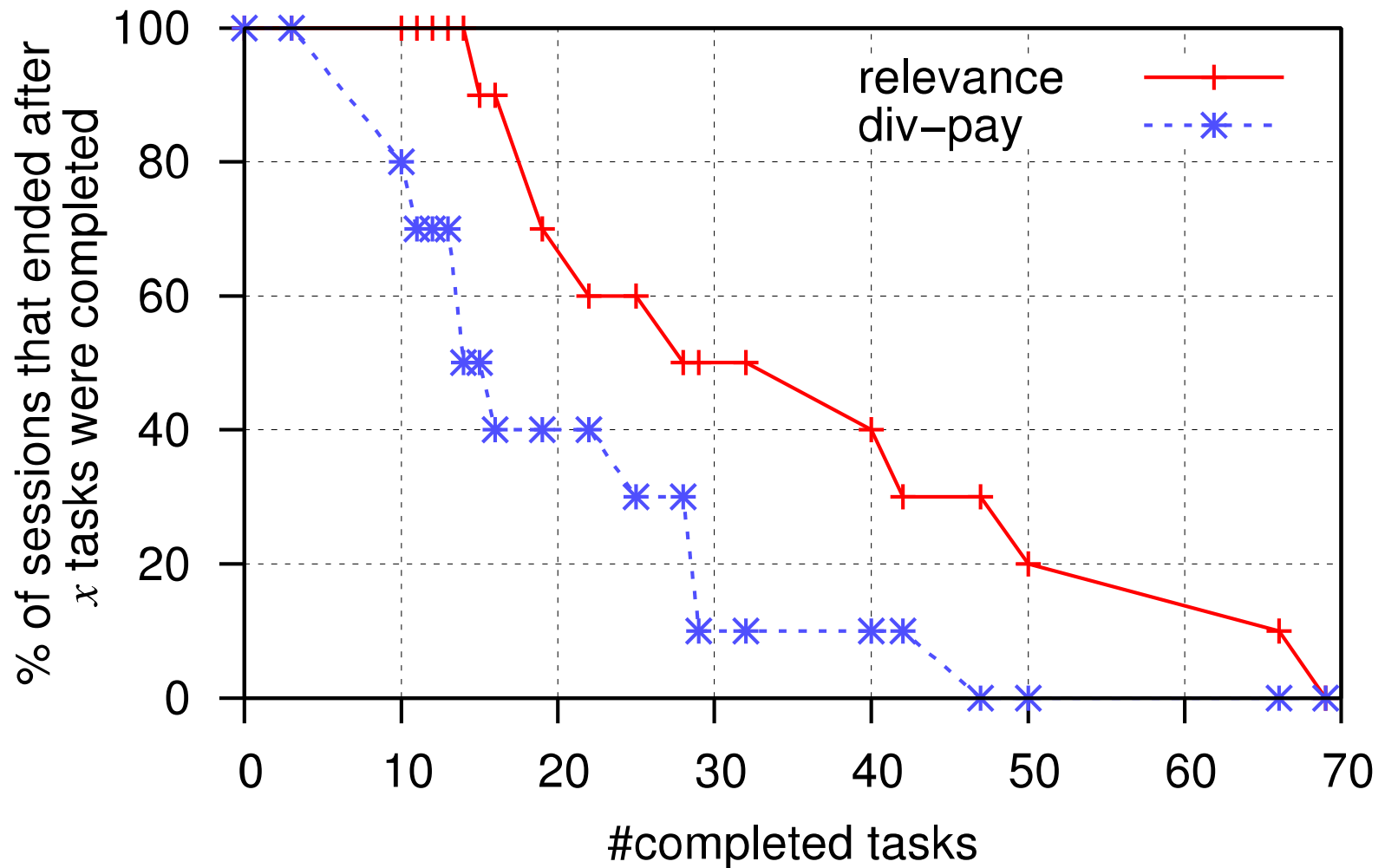
Comparative
Evaluation of TP vs
CTP in Barcelona



Findings: Customization

- User interactions with CIs are necessary to learn other criteria such as preferred location, CI cohesiveness, and POI diversity
- For users who prefer cohesive over personalized POIs, customization achieves good trade-off
- Refined travel preferences carry across cities: Paris/Barcelona

Worker Retention



Bottom line

- One-shot personalization not enough
- To achieve user satisfaction, the right balance between personalization (second-guessing) and user intervention (human-in-the-loop) is necessary
- How to combine user intervention and adaptivity is intriguing
- What to let users intervene on is also open
 - On results
 - On their own profile, think Google Ads Settings