

## Appendices

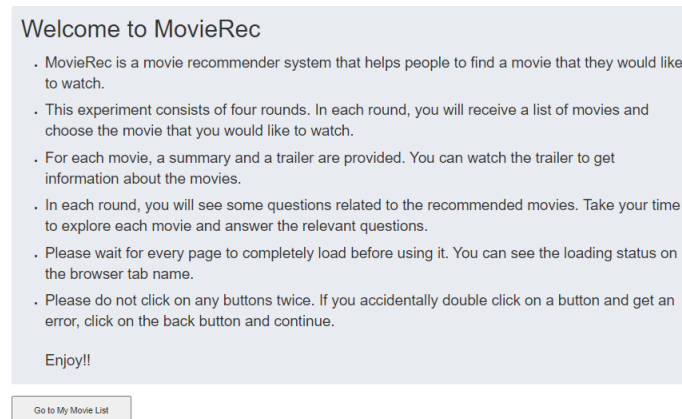
### Appendix A.

**Table A1.** Summary Statistics of MovieTweetings' Variables

	Min	Mean	Max	SD
Ratings	2	6.31	8.9	0.82
Number of Ratings	6	1094	17897	1765
Number of Unique Genre	19			
Number of Unique Users	52141			
Number of Unique Movies	4079			

### Appendix B.

The experiment started with an introduction to the platform.



**Figure B1.** Introduction to the Platform

Then, users were forwarded to a page with 100 movies, from which they needed to rate at least 20 movies. For each movie, the (main) genre and the year of release were provided. Additional information, such as the poster of the movie, its description, and a link to its YouTube trailer, was also offered. Users could access further information by clicking on each movie's name. The range of ratings is from 0 to 10.

### Instructions


- . Please rate **at least 20 Movies to proceed.**
- . To rate movies, you need to select a score from the drop-down box in the your rating column.  
(**Rating 10** = you like the movie the most. **Rating 0**= You like the movie the least).
- . If you need more information about movies, you can click on the name of each of them.
- . Once you are done with the rating, click on **Show Recommendations.**

You have rated 0 movies

Search:

Movie Title	Genre	Year	Your Rating
<a href="#">Inception</a>			0
<a href="#">Deadpool</a>			1
<a href="#">The Avengers</a>			2
<a href="#">The Dark Knight</a>			3
<a href="#">Avatar</a>			4
<a href="#">Interstellar</a>			5
<a href="#">Guardians of the Galaxy</a>			6
<a href="#">Django Unchained</a>			7
<a href="#">The Hunger Games</a>			8
<a href="#">Mad Max: Fury Road</a>			9
<a href="#">Iron Man</a>			10
<a href="#">The Dark Knight Rises</a>			
<a href="#">Jurassic World</a>			
<a href="#">Iron Man 3</a>			
<a href="#">Suicide Squad</a>	Action	2016	
<a href="#">Star Wars: The Force Awakens</a>	Action	2015	
<a href="#">Captain America: Civil War</a>	Adventure	2016	

Summary: Cobb, a skilled thief who commits corporate espionage by infiltrating the subconscious of his targets is offered a chance to regain his old life as payment for a task considered to be impossible: "Inception", the implantation of another person's idea into a target's subconscious. [YouTube Trailer](#)



**Figure B2.** List of Movies for User Rating

At this stage, when participants finished rating movies, they were randomly assigned to one of the four conditions, personalized (with/out decoy) and non-personalized (with/without decoy). Note that the two personalized and non-personalized conditions were shown back-to-back.

### Instructions

- . In the next round, the system will provide some movies that are **specifically chosen based on your preferences and the ratings you provided at the beginning.**
- . For each movie, the predicted rating shows how much **the system thinks you will like the movie.**
- . Take your time to explore each movie and answer the subsequent questions.

Show Recommendations

**Figure B3.** Instruction for the Personalized Condition

## Instructions

- In the next round, the system will provide some movies that **many people have watched and you also might be interested in watching**.
- Take your time to explore each movie and answer the subsequent questions.

Show Recommendations

**Figure B4.** Instruction for the Non-Personalized Condition

Then, the users observed a page with five recommended movies. To emphasize the difference between the personalized and non-personalized versions of the recommendations, we showed at the top of the page a brief description of how the recommended movies were calculated. Figures B5 & B6 demonstrate examples of recommendations in the conditions of non-personalized recommendations without a decoy item and personalized recommendations with a decoy item, respectively.

- The following is a set of 5 movies that many people have watched and you might also be interested in watching.
- For each movie the average rating shows how much people have liked the movie.

**The Lord of the Rings: The Fellowship of the Ring** (Genre: Adventure)  
 Other people on average like the movie: 8.0 out of 10



Young hobbit Frodo Baggins, after inheriting a mysterious ring from his uncle Bilbo, must leave his home in order to keep it from falling into the hands of its evil creator. Along the way, a fellowship is formed to protect the ringbearer and make sure that the ring arrives at its final destination: Mt. Doom, the only place where it can be destroyed.

**Gone Girl** (Genre: Mystery)  
 Other people on average like the movie: 8.0 out of 10



With his wife's disappearance having become the focus of an intense media circus, a man sees the spotlight turned on him when it's suspected that he may not be innocent.

**The Martian** (Genre: Drama)  
 Other people on average like the movie: 8.0 out of 10



During a manned mission to Mars, Astronaut Mark Watney is presumed dead after a fierce storm and left behind by his crew. But Watney has survived and finds himself stranded and alone on the hostile planet. With only meager supplies, he must draw upon his ingenuity, wit and spirit to subsist and find a way to signal to Earth that he is alive.

**Now You See Me** (Genre: Thriller)  
 Other people on average like the movie: 7.0 out of 10



An FBI agent and an Interpol detective track a team of illusionists who put off bank heists during their performances and reward their audiences with the money.

**The Hangover** (Genre: Comedy)  
 Other people on average like the movie: 7.0 out of 10



When three friends finally come to after a raucous night of bachelor-party revelry, they find a baby in the closet and a tiger in the bathroom. But they can't seem to locate their best friend, Doug, who's supposed to be tying the knot. Launching a frantic search for Doug, the trio perseveres through a risqué hangover to try to make it to the church on time.

Which movie you would like to watch?



- Harry Potter and the Deathly Hallows: Part 2
- Gone Girl
- The Martian
- Now You See Me
- The Hangover
- I don't like any of the above items.

Submit

Figure B5. An Example of Non-personalized Recommendations without a Decoy



- Below is another set of top 5 recommended movies that the system predicts you might be interested in watching.
- For each movie, the predicted rating shows how much the system thinks you would like the movie.

**Three Billboards Outside Ebbing, Missouri** (Genre: Crime)  
 The system predicts you would like this movie: 9.0 out of 10



After seven months have passed without a culprit in her daughter's murder case, Mildred Hayes makes a bold move, painting three signs leading into her town with a controversial message directed at Bill Willoughby, the town's revered chief of police. When his second-in-command Officer Jason Dixon, an immature moderate boy with a penchant for violence, gets involved, the battle between Mildred and Ebbing's law enforcement is only exacerbated.

**Escape Plan 2: Hades** (Genre: Crime)  
 The system predicts you would like this movie: 4.0 out of 10

Ray Breslin manages an elite team of security specialists trained in the art of breaking people out of the world's most impenetrable prisons. When his most trusted operative, Zhu Han, is kidnapped and disappears inside the most elaborate prison ever built, Ray must track him down with the help of some of his former friends.

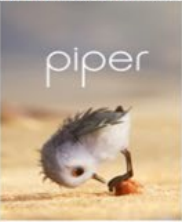

**Zootopia** (Genre: Animation)  
 The system predicts you would like this movie: 9.0 out of 10

Determined to prove herself, Officer Judy Hopps, the first bunny on Zootopia's police force, jumps at the chance to crack her first case - even if it means partnering with con-artist fox Nick Wilde to solve the mystery.



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**Piper** (Genre: Family)  
 The system predicts you would like this movie: 9.0 out of 10

A mother bird tries to teach her little one how to find food by herself. In the process, she encounters a traumatic experience that she must overcome in order to survive.

**The Fault in Our Stars** (Genre: Romance)  
 The system predicts you would like this movie: 9.0 out of 10

Despite the tumor-shrinking medical miracle that has bought her a few years, Hazel has never been anything but terminal, her final chapter inscribed upon diagnosis. But when a patient named Augustus Waters suddenly appears at Cancer Hill Support Group, Hazel's story is about to be completely rewritten.

Which movie you would like to watch?

Three Billboards Outside Ebbing, Missouri  
 Escape Plan 2: Hades  
 Zootopia  
 Piper  
 The Fault in Our Stars  
 I don't like any of the above items.

Submit

Figure B6. Example of Personalized Recommendations with a Decoy

At the end of each condition, participants were requested to answer some questions regarding their perceptions of the recommended movies and the recommender system.

Based on your recent choice, how much do you agree with the following statements.

Please rate based on the following criteria:

1=Strongly Disagree    2=Disagree Somewhat    3=Disagree    4=Neutral    5=Somewhat Agree    6=Agree    7=Strongly Agree

**The recommended movies were well-chosen.**

1 (Strongly Disagree)     2     3     4     5     6     7 (Strongly Agree)

**I am satisfied with the recommended movies.**

1 (Strongly Disagree)     2     3     4     5     6     7 (Strongly Agree)

**I rely on the system for deciding what movies to watch.**

1 (Strongly Disagree)     2     3     4     5     6     7 (Strongly Agree)

**The system is able to identify good movies.**

1 (Strongly Disagree)     2     3     4     5     6     7 (Strongly Agree)

**All of the recommended movies were aligned with my preferences.**

1 (Strongly Disagree)     2     3     4     5     6     7 (Strongly Agree)

**The recommended movies were personalized for me.**

1 (Strongly Disagree)     2     3     4     5     6     7 (Strongly Agree)

**Figure B7.** List of Questions Related to Users' Perception of the System

Finally, users answered some additional control questions shown in Figure B8.

Please answer the following questions.

**What is your gender?**

Male     Female     Other

**How old are you?**

Your Age:

**Are you a native English speaker?**

Yes     No

**How many movies do you watch per month?**

1-3     4-6     7-10     More than 10

**Have you used any recommendation systems before?**

Yes     No

**How familiar are you with recommendation systems and how they work?**

Please rate based on the following criteria: 1=Not at all    2=Slightly    3=Somewhat    4=Moderately    5=Extremely

1 (Not at all)     2     3     4     5 (Extremely)

**What is your most favorite movie genre?**

Drama     Comedy     Adventure     Horror     Science Fiction     Action     Others

**Figure B8.** List of Control Questions

## Appendix C.

We compared different algorithms based on their prediction accuracy to select the best personalization algorithm for our dataset. To evaluate the different algorithms, we used 10-fold cross-validation and the mean absolute error (MAE). As we can see in Table C1, singular value decomposition (SVD) has the lowest MAE; therefore, we used that to design the personalized recommendation system. For the popular recommendations, we select movies based on their aggregate rating.

**Table C1.** Comparison of Recommendation Algorithms

Algorithm	MAE
Singular Value Decomposition (SVD)	1.07
Non-negative Matrix Factorization (NMF)	1.11
Basic Collaborative Filtering (KNN)	1.35
Slope One	1.37
Co-clustering	1.13
Random	1.97

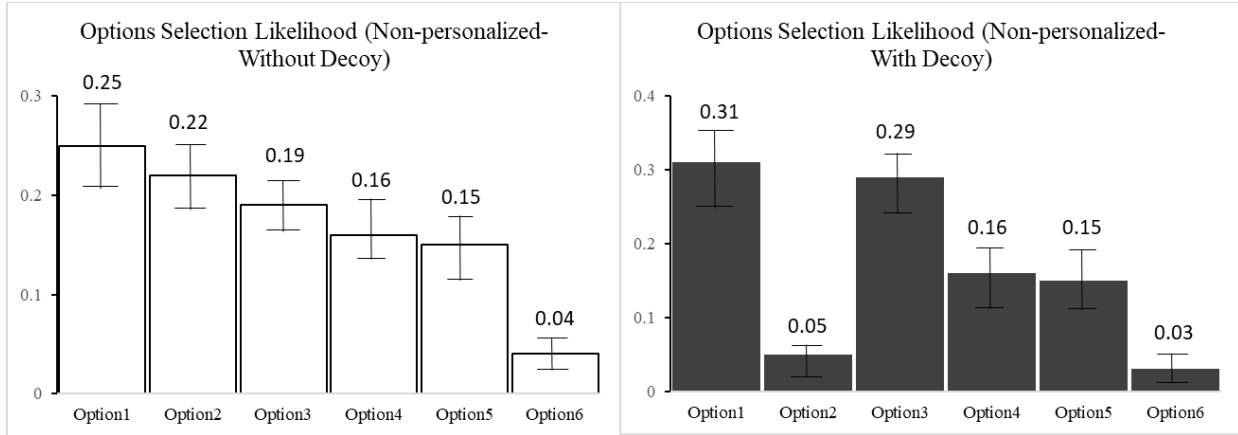
## Appendix D.

**Table D1.** Participants Summary Statistics

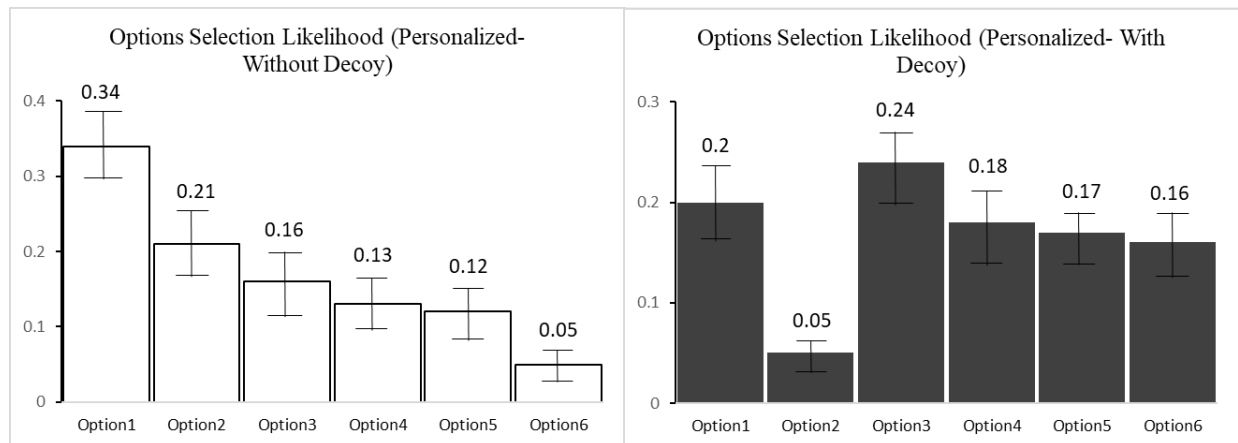
Number of Participants	Age: Mean (SD)	RS_Familiarity: Mean (SD)	Movie_Experience: Mean (SD)	Gender (Female)	Native_Speaker
632	19.29 (1.43)	2.5 (1.17)	1.57 (0.78)	55%	73.58%

## Appendix E.

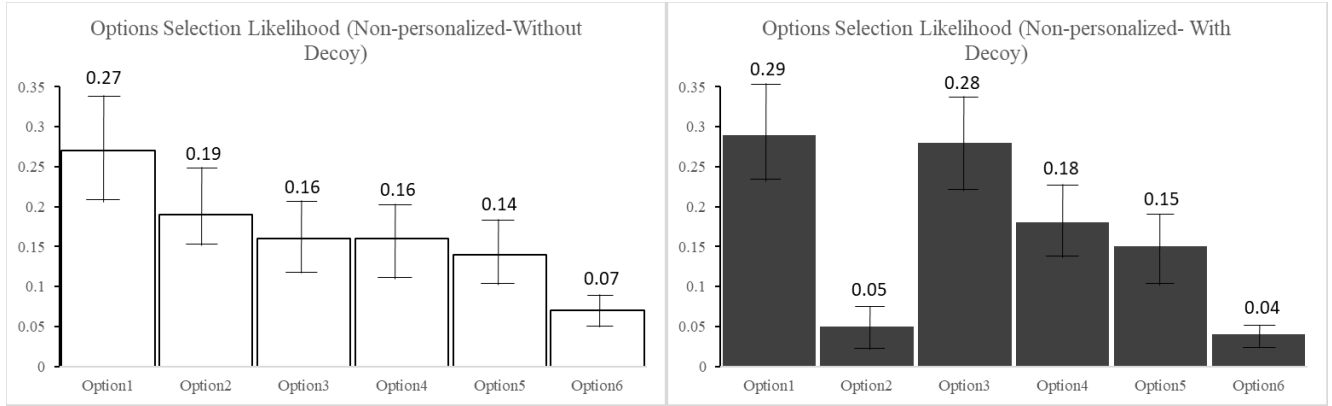
This section presents how a decoy impacts the selection likelihood of various choice options in a set in both the lab and MTurk experiments. As can be seen, the pattern of choices is consistent in both types of experiments.



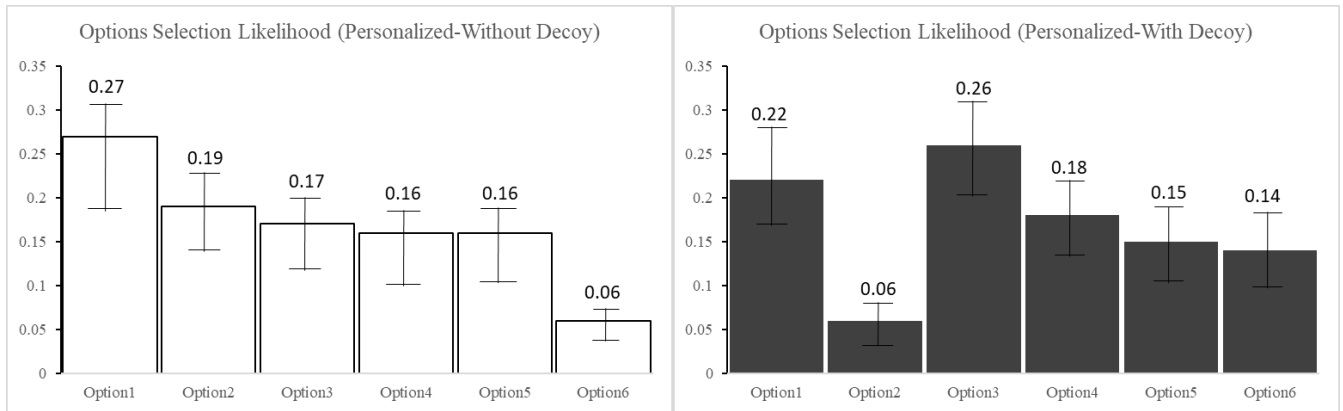
**Figure E1.** The Decoy Effect on Option in Non-Personalized Condition of the Lab Experiments



**Figure E2.** The Decoy Effect on Each Option in Personalized Condition of the Lab Experiments



**Figure E3.** The Decoy Effect on Each Option in Non-Personalized Condition of the AMT Experiment



**Figure E4.** The Decoy Effect on Each Option in Personalized Condition of the AMT Experiment