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# Users Psychological Profiles for Leisure Activity Recommendation: User Study

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## ABSTRACT

Leisure activities are essential in the individual's pursuit of well-being and higher satisfaction with life. In the last few years, the event-based social networks and event-promoting services on Facebook, Couchsurfing etc., have seen a boosting use. Their users are looking for personalised experience but they are often overwhelmed with the number of available options. To overcome this issue, recommender systems serve as users' personal guides. They exploit various techniques and types of influence (geographic, temporal, social, etc.). In this work, we investigate the impact of individuals' psychological profiles on their selection of leisure activities. We describe a comprehensive user study that we have conducted and an associated collection that could be further exploited for the recommendation of leisure activities.

## CCS CONCEPTS

• **Information systems** → **Personalization**;

## KEYWORDS

recommendation of leisure activities, psychology-driven model, orientations to happiness, personality traits, collection

## 1 INTRODUCTION

Leisure activities are an essential part of human life and constitute steps towards the well-being and higher satisfaction with life. Nowadays, there exist many specialised (online) services, such as event-based social networks (EBSNs) like Meetup<sup>1</sup>, or promotion of events on Facebook, Couchsurfing etc., that offer a great variety of social events to join. Thus, Meetup.com suggests 133 events scheduled for Monday, June 26 2017 in Chicago (USA), 79 in Vancouver (Canada), and 41 in Leeds (UK). Users of such services are looking for personalised experience and are often overwhelmed with the number of existing opportunities. To overcome this issue, recommender systems appear as a solution by serving as users' personal guides. The selection of leisure activities by individuals is a very

complex process. Thus, in order to provide users with the options that best fit their interests, various aspects should be explored.

Recently, psychological aspect of humans' preferences has attracted research interest in the field of Information Retrieval and Recommender Systems. Recent works have shown that incorporating personality traits into recommendation process improves the recommendation accuracy [7] and helps to eliminate the cold-start problem [6]. Thus, personality-based method have been successfully applied to the movie [7] and music [6] recommendation domains. However, no work has been done in the domain of leisure activities/event recommendation<sup>2</sup>.

We assume that humans' psyche determines to some extent their pathways to happiness, which in their turn influence the selection of leisure activities. In order to test this hypothesis, we conduct a complex user study that allows us to collect multi-aspect psychological profiles of individuals as well as their choice of leisure activities. To the best of our knowledge, this is the first attempt to create such a polyvalent user data.

## 2 BACKGROUND

The undertaken user study has a psychological background that we present briefly in this section in conjunction with a short discussion of the problem of event recommendation.

### 2.1 Psychological Background

*Personality* is a combination of individual's characteristics or qualities that define one's style of thinking, feeling and behaving [2]. The most used personality model is called *Big5* factor model, which distinguishes five traits: *Imagination* or *Openness to Experience*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* [9]. Personality traits can be acquired explicitly by means of quiz, or implicitly by inferring them from linguistic features of user's texts, user's use of social networks, digital footprints [2]. Wu *et al.* [14] apply the correlation of personality traits and movie preferences to the movie recommendation. They infer a regression model that derives users' personality from their interaction behaviour with movies. The recommendation model exploits the inferred personality by incorporating it into collaborative filtering (CF) process.

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<sup>1</sup>www.meetup.com

<sup>2</sup>We use notions of *leisure activity* and *event* interchangeably.

*Orientations to Happiness* (OTH) are the cognitive strategies that are used by individuals to seek happiness and include three related yet distinct pursuits: *Pleasure*, *Engagement*, and *Meaning* [11]. The pursuit of *Pleasure* primarily includes the experience of sensory pleasure and positive emotion, and is based on hedonic principles. The orientation towards *Meaning* is eudaimonic and includes pursuing activities that give a sense of purpose and connection to something larger than oneself. The route via *Engagement* refers to the psychological experience of flow state [3] that is characterised as a full immersion, involvement and complete focused motivation in the process of the activity, feelings of euphoria after the end of the performance of the activity [5]. OTH are believed to be relatively stable over the time. To the best of our knowledge, OTH have not been used in user modeling nor in recommendation field.

*FoMO* (Fear of Missing Out) is a rising phenomenon that is defined as a "pervasive apprehension that others might be having rewarding experiences from which one is absent", and therefore "is characterized by the desire to stay continually connected with what others are doing" [12]. *FoMO* is reported not only to be a driving force behind the use of Internet, especially on mobile devices, but also behind our social involvement and engagement in multiple events [1]. However, to the best of our knowledge, there has been no reported effort of its exploitation in the recommendation field.

## 2.2 Event Recommendation

The *event recommendation* problem consists in providing a user with a list of events he/she may be interested in. Unlike traditional recommendation domains (e.g. books, movies), event recommendation handles items that lack collaborative data (e.g. ratings) due to their occurrence in future [8]. This raises the cold-start problem. In order to eliminate this issue, contextual data may be used (i.e. user's demographics, social, geographical, temporal aspect etc.).

## 3 USER STUDY

To the best of our knowledge, there is no freely available dataset containing both individuals' psychological profiles and their preferences for leisure activities. Therefore, we conducted a user study in order to collect required data.

### 3.1 Data Collection

We have conducted an anonymised user study via online survey using LimeSurvey platform (www.limesurvey.org/). Participants were recruited via a link to the online questionnaire sent by email to several research and university mailing lists, as well as promoted via Facebook. Thus, 174 participants took part in the survey, but 84 out of them completed it only partially, making it unsuitable for further use. The testing took about 20 minutes to complete.

Participants were first asked questions about their demographic background (i.e. age group, sex, education level, employment, and marital status). Second, they filled in various psychological tests, including *Orientations to Happiness* measured using Peterson's scale [10], *Personality traits* using Mini-International Personality Item Pool (Mini IPIP) [4], *FoMO* based on Przybylski's *FoMOs* scale [12], as well as some others that we do not cite here due to the space limit. In the third part, respondents were asked to indicated the categories of leisure activities they are usually engaged in. The list of activities

consisted of 23 categories from Meetup.com (e.g. *Learning*, *Food & Drink*, *Tech*, *Art*, *Film*, *Movement* etc.), to which we added 5 more categories, namely *Theatre*, *Show*, *Performance*, *Drinking Alcohol & Partying*, *Sex & Making Love*, *Gardening & Outdoor housework*, and *Cooking*. We further asked respondents to evaluate their experience of the selected activities in terms of:

- (1) involved *Social contact* (6-point scale from *I always do it alone* to *I always do it with others*) [13],
- (2) required *Effort* (6-point scale from *It requires no effort or skill when I do it* to *It requires heaps of effort or skill when I do it*) [13],
- (3) determined *Structure* (6-point scale from *It has no rules, time-limits, uniforms, etc. when I do it* to *It has heaps of rules, time-limits, uniforms, etc. when I do it*) [13],
- (4) experienced *Pleasure* (9-point scale) [5],
- (5) brought *Meaning* (9-point scale) [5],
- (6) immersed *Engagement* (9-point scale) [5].

These evaluations were followed by more general questions about the number of leisure activities a respondent was involved to in day/week/weekend, and the average duration of activities.

The next section of the survey contained information about respondents' vacation<sup>3</sup> preferences. For instance, participants were asked about (1) their recently taken vacations (in the last 6 years, 2-3 years, last year), their intent w.r.t. the number of things to do (maximum vs. a few), (2) the frequency of their endorsement with particular types of holidays, namely Beach holiday, Sightseeing, In a city, Nature based, Friends/family visits, Package based, Festivals (2 and more days), Cruise (2 and more days), Other, (3) the type of group they usually go on holidays with, and (4) their holidays planning habits (daily planning/must-do/no planning).

### 3.2 Analytics

In this subsection, we present some data analytics concerning the participants' demographics, psychological profiles, and leisure.

The study included 27 (30%) female and 63 (70%) male participants. Their age range varied from 18-24 to 55-64 with 41 participants (45.56%) in the group of 25-34. Half of the individuals hold Masters degree, while 30 (33.33%) were Ph.D. The employment composition was 54 (60%) full-time employed, 20 (22.22%) students, 5 (5.55%) unemployed, 3 (3.33%) self-employed, and 3 (3.33%) had part-time job. The majority of participants (65.55%) were never married, 26 (28.88%) married, 2 (2.22%) divorced, 2 (2.22%) separated, and 1 (1.11%) widowed.

Table 1 gives some descriptive statistics about psychological measures reported by participants. We do not observe a high variance in the reported OTH across participants. We can also state that the majority of respondents (38.89%) pursues happiness primarily via *Pleasure*<sup>4</sup> rather than via *Engagement* (26.67%) or *Meaning* (24.44%), while 10% of respondents showed at least two equally rated dominant orientations. In addition, Fig. 1 presents the distribution of users w.r.t. the group of *FoMO*. It testifies that the vast majority of participants was suffering from *FoMO* or at least at risk for it, while only 15 participants (16.7%) did not show *FoMO* "symptoms".

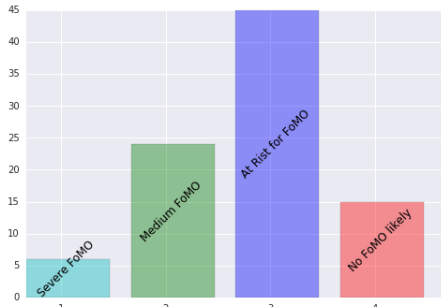
Next, we consider the selection of leisure activities by respondents. The average number of selected categories by participants

<sup>3</sup>Holidays of 2 and more nights.

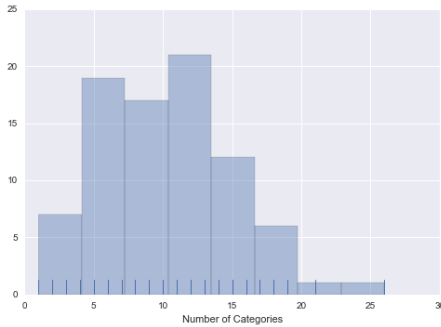
<sup>4</sup>An OTH that was rated higher by an individual [5].

**Table 1: Descriptive statistics**

| Scale                   | Mean (SD)      | Min   | Max   |
|-------------------------|----------------|-------|-------|
| OTH: Pleasure           | 3.259 (0.735)  | 1.167 | 4.667 |
| OTH: Meaning            | 3.139 (0.87)   | 1.5   | 5.0   |
| OTH: Engagement         | 3.22 (0.622)   | 1.833 | 4.667 |
| Big5: Extraversion      | 11.244 (3.574) | 4.0   | 19.0  |
| Big5: Agreeableness     | 15.467 (2.785) | 7.0   | 20.0  |
| Big5: Conscientiousness | 11.9 (3.672)   | 4.0   | 20.0  |
| Big5: Neuroticism       | 11.456 (3.141) | 4.0   | 18.0  |
| Big5: Imagination       | 16.611 (3.28)  | 6.0   | 20.0  |
| FoMO                    | 20.011 (5.849) | 9.0   | 36.0  |



**Figure 1: Distribution of users regarding the group of FoMO.**

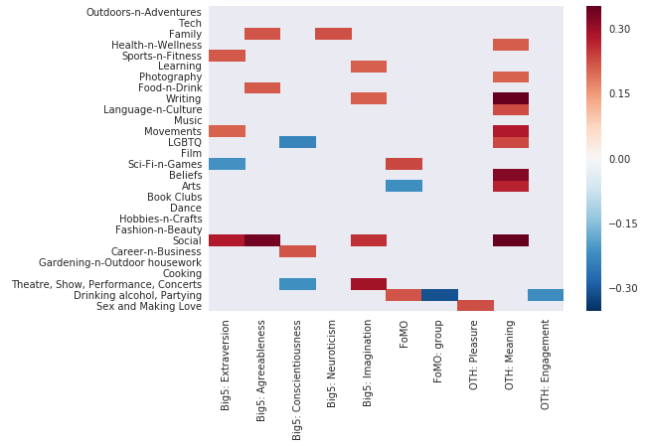


**Figure 2: Distribution of the number of categories selected by user.**

is 10.11. The distribution of the number of categories of leisure activities participants are engaged in is displayed in Fig. 2. The graph outlines that individuals are interested in numerous types of leisure. Furthermore, Table 2 reports the top-5 categories w.r.t. the ratings on Pleasure, Meaning, Engagement, Social Contact, Effort, and Structure. The categories given in bold correspond to the top-5 most liked categories.

Furthermore, we have conducted a correlation analysis using Pearson’s coefficient. The objective was to assess the degree of a relationship between categorical preferences and psychological profiles.

<sup>5</sup>Categories from top-5 most occurred are given in bold.



**Figure 3: Heatmap of correlations between leisure categories and Big5 Personality traits, FoMO<sup>6</sup>, and OTH ( $p < 0.05$ ).**

Figure 3 displays the significant correlations between leisure activity categories and Big5 Personality traits, FoMO and OTH with the significance level  $p < 0.05$ . It should be noted that most of the categories do not correlate with all the above-mentioned features. However, some behaviour patterns may be extracted. First, a category that correlates the most with the psychological features is *Social*, showing significant positive correlation with *OTH: Meaning* (0.325) and three personality traits, namely *Extraversion* (0.261), *Agreeableness* (0.343), and *Imagination* (0.238). Second, we could note a strong correlation of nine categories with *OTH Meaning: Health & Wellness* (0.2), *Photography* (0.196), *Writing* (0.338), *Language & Culture* (0.226), *Movements* (0.269), *LGBTQ* (0.197), *Beliefs* (0.292), *Arts* (0.272), and *Social* (0.325). *FoMO* significantly correlates with *Drinking Alcohol & Partying* (0.233), *Sci-Fi & Games* (0.242) and *Arts* (-0.221). Third, it can be seen that 10 out of 28 categories do not significantly correlate with any psychological measure, namely: *Outdoors & Adventures*, *Tech*, *Music*, *Film*, *Book Clubs*, *Dance*, *Hobbies & Crafts*, *Fashion & Beauty*, *Gardening & Outdoor housework*, *Cooking*. Moreover, it can be noted that *OTH: Pleasure*, *OTH: Engagement* as well as *Neuroticism* show significant correlation with only one category each, namely *Sex & Making Love*, *Drinking Alcohol & Partying*, and *Family*, respectively.

We also explored the correlations between individuals’ psychological profiles and some quantitative measures of individuals behaviour, namely: *Number of daily activities*, *Number of weekly activities*, *Number of weekend activities*, *Average duration of activities*, and *Number of categories*. The results have shown that *Number of weekly activities* (0.243) is significantly positively correlated with *Agreeableness*. Moreover, *Number of categories (Likes)* is highly correlated with *Meaning* (0.315). *Number of daily activities* is negatively correlated with *Engagement* (-0.217).

Next, we have investigated if the respondents reported the same experience of their leisure activities in terms of their Social contact, Effort, Structure, Pleasure, Meaning, and Engagement. In order to

<sup>6</sup>FoMO denotes the score obtained w.r.t. the scale, while FoMO group stands for the classification w.r.t. to the obtained score.

**Table 2: Top-5 categories w.r.t. occurrence, OTH, Social contact, Effort, Structure<sup>5</sup>.**

| Pleasure                            | Meaning                  | Engagement                          | Social Contact                      | Effort                   | Structure                 |
|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|---------------------------|
| <b>Sex &amp; Making Love</b> (8.19) | LGBTQ (8.33)             | Career & Business (7.04)            | Drinking alcohol & Partying (5.63)  | Career & Business (4.36) | Career & Business (4.28)  |
| Book Clubs (7.8)                    | Family (7.87)            | <b>Sex &amp; Making Love</b> (6.98) | Family (5.61)                       | Writing (4.32)           | Health & Wellness (3.63)  |
| Dance (7.55)                        | Career & Business (7.64) | <b>Learning</b> (6.72)              | Social (5.5)                        | <b>Learning</b> (4.15)   | Sports & Fitness (3.45)   |
| <b>Music</b> (7.4)                  | Writing (7.32)           | Sports & Fitness (6.63)             | <b>Sex &amp; Making Love</b> (5.02) | Sports & Fitness (3.7)   | Movements (3.13)          |
| Family (7.28)                       | <b>Learning</b> (7.27)   | Writing (6.42)                      | Theatre & Show (4.82)               | Language & Culture (3.5) | Language & Culture (3.11) |

**Table 3: Krippendorff’s alpha of the agreement in rating of Social contact, Effort, Structure, Pleasure, Meaning, and Engagement of the categories.**

| Social | Effort | Structure | Pleasure | Meaning | Engagement | All   |
|--------|--------|-----------|----------|---------|------------|-------|
| 0.414  | 0.244  | 0.113     | 0.071    | 0.216   | 0.093      | 0.549 |

assess it, we have estimated the agreement level between the reported values using Krippendorff’s alpha. The results are presented in Tab. 3. It could be noted that the agreement level is relatively low which indicates that the individuals experience the same types of activities in a different way. The low agreement level may also be due to the ‘missing’ data, since respondent evaluated only categories selected as representing interest for them.

#### 4 DISCUSSION AND CONCLUSION

In this paper, we presented a polyvalent user study and a corresponding novel dataset containing both individuals’ psychological profiles and leisure preferences. The collected data shed some light on the users’ selection of leisure activities determined to some extent by their psychological profiles. Thus, based on that dataset one can extract bi-directional relationship between users’ psychological profiles in terms of their OTH, Personality traits, and FoMO level and their selection of leisure activities. The extracted patterns may be used in the estimation of the users’ interest in a leisure category. The estimated scores can be further combined with other recommendation techniques. For instance, the interest scores for user-event pairs can be introduced as a component of a feature vector used in a Learning-to-Rank algorithm for event recommendation, such as MCLRE (Multi-Contextual Learning to Rank) [8]. The dataset will be publicly available at the author’s research team web page in order to encourage future research on recommender systems using psychology-based models.

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