Investigating the Role of Personality Traits and Influence Strategies on the Persuasive Effect of Personalized Recommendations

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ABSTRACT

Recommender systems provide suggestions for products, services, or information that match users' interests and/or needs. However, not all recommendations persuade users to select or use the recommended item. The Elaboration Likelihood Model (ELM) suggests that individuals with low motivation or ability to process the information provided with a recommended item could eventually get persuaded to select/use the item if appropriate peripheral cues enrich the recommendation. The purpose of this research is to investigate the persuasive effect of certain influence strategies and the role of personality in the acceptance of recommendations. In the present study, a movie Recommender System was developed in order to empirically investigate the aforementioned questions applying certain persuasive strategies in the form of textual messages alongside the recommended item. The statistical method of Fuzzy-Set Qualitative Comparative Analysis (fsQCA) was used for data analysis and the results revealed that motivating messages do change users' acceptance of the recommender item but not unconditionally since user's personality differentiates the effect of the persuasive strategies.

Keywords

Persuasion, Persuasive Technologies, Personalization, Recommender Systems, Personality, Elaboration Likelihood Model.

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1. PERSUASIVE MESSAGE PROCESSING

Persuasive Technologies utilize several techniques in order to shape, reinforce or/and change humans' attitudes and behaviours without coercion or deception (Fogg, 2002). On the other hand, Recommender Systems represent a class of personalization technologies that aim to tailor products/information/services according to their users' interests, preferences and needs. Thus, personalized recommendations can significantly strengthen the effect of persuasive interventions due to the inherent influence of personalized communication. Berkovsky et. al. (2012) suggest that most of the extant research examine personalization and persuasive technologies in isolation although "*both personalized and persuasive technologies aim to influence user interactions or the users themselves*", acknowledging "*…the huge untapped potential of personalization to maximize the impact of persuasive applications*" (Berkovsky et. al., 2012).

In information-theoretical terms, persuasion is modeled by the Elaboration Likelihood Model (Petty and Cacioppo, 1986), which suggests that individuals with low motivation or ability may not elaborate the information provided (e.g. through a recommendation) and therefore users' neutral or negative behavioural response in recommendations (expressed in the form of low rating or non-selection of the recommended item) may not depict their actual intention towards the recommended item. In such cases, the utilization of additional peripheral cues (motivating elements) may increase the persuasive effect of recommendations by engaging users to further elaborate the provided information (Fogg, 2009) in order to investigate the potential to adopt the recommendation. In Recommender systems, explanations are typically used to provide users additional information that will support them in their decision making

process and can be eventually utilized as the means to pass users persuasive messages (Tintarev and Masthoff, 2011).

Along the above lines, the first objective of this research is to investigate the persuasive effect of the influence strategies proposed by Cialdini (1993), namely Reciprocation, Consistency, Social Proof, Liking, Authority, Scarcity, which are implemented as persuasive messages in the form of recommendations explanations in a movie recommender system developed for the purposes of this study.

Moreover, previous studies (e.g. Kaptein and Eckles, 2012) suggest that persuasive messages do not always achieve their goal to persuade users. Indeed, if users receive "wrong" messages (i.e. irrelevant or annoying) then negative behavioural responses may be generated. In this context, previous studies (e.g. Halko and Kientz, 2010) have demonstrated the significance of the individual's personality in the (negative or positive) behavioural responses to persuasive messages. Following the above argumentation, the second objective of this study is to examine the role of personality in the acceptance of the recommendations and identify possible differentiations in the users' response on the persuasive strategies that may attributed on their personality type.

In this study, we focus on peripheral cues such as short persuasive messages, developed upon Cialdini's (2001) six influence strategies, presented to user as recommendation explanations. We consider such messages as peripheral cues because they neither affect the quality of argumentation (i.e. how close to the users interests the recommended items are) nor change the recommended item but when users lack of motivation or ability, these peripheral variables influence users by triggering internal heuristic processing rules (Tam and Ho, 2005), which eventually would lead to persuasion

The rest of the paper is organized in five sections. In Section 2 the hypothesis development. Our experiment is presented in Section 3, while in Section 4 the experimental results are discussed. Discussion of the study's findings and a discussion of areas for further research conclude the paper.

2. HYPOTHESIS DEVELOPMENT

2.1 Influence strategies as messages in recommendation explanations

The mainstream of research in Recommender Systems has traditionally focused on designing and developing accurate recommendation algorithms (e.g. Xiao and Benbasat, 2007). More specifically, extant research indicates that the factor that mostly determines the success of a Recommender System is the provision of recommendations that are more close to consumer's preferences. According to the ELM perspective, the accuracy of recommendation algorithms determines the quality of argumentation. In other words, if the recommended item is close to the user preferences, this will eventually lead to persuasion through the central route, i.e. through in-depth processing of the recommendation. ELM suggests that the alternative (peripheral) path may also lead to persuasion if appropriate cues are provided. Such peripheral cues may be implemented as motivating messages in the form of recommendation explanation (Herlocker, 2000).

A recommendation explanation can be considered as any type of additional information accompanying a system's output, having as ultimate goal to persuade users to try or purchase the item that is recommended (Tintarev and Masthoff, 2011). Tintarev and Masthoff (2012) indicate that explanations have an important role in Recommender Systems since an explanation is a mean through which a consumer perceives the value of the recommended item so as to decide whether is close to his/her interests or not. Explanations can operate like motivators and are being used by several systems such as MovieLens (Herlocker et al., 2000) and Social software items (Guy et al., 2009). However, there is no clear indication in extant literature about what would be the content of explanations (i.e. the message passed to users) that can actually lead to persuasion. For example, a description of how the recommendation has emerged (i.e. transparency of recommendations) has been shown to be associated with an increase of trust in recommendations (Herlocker et al., 2000) while still there is no enough empirical evidence that demonstrates what type of messages could lead to persuasion (Halko and Kientz, 2010).

A number of persuasive (or influence) strategies have been proposed in the literature and can be eventually be utilized in the design of persuasive messages. For example, Fogg (2002) describes 42 persuasion strategies and Cialdini (2001) 6 influence strategies (also known as Six Weapons of Influence) In this study, we rely upon Cialdini's influence strategies since they have been broadly used and verified there are evidences that if influence strategies are implemented in a system then they increase its persuasive effect (e.g. Fogg, 2002). According to Cialdini (2001). Cialdini's (2001) influence strategies are the following:

- Reciprocity: humans have the tendency to return favors,
- Commitment or consistency: people's tendency to be consistent with their first opinion,
- Social proof: people tend to do what others do,
- Scarcity: people are inclined to consider more valuable whatever is scarce,
- Liking: people are influenced more by persons they like and
- Authority: people have a sense of duty or obligation to people who are in positions of authority.

Cialdini (1993) suggested that when a compliance professional (e.g. salesperson) uses the above six influence strategies (Reciprocity, Commitment, Social proof, Scarcity, Liking and Authority) in his/her strategy then (s)he managed to influence more successfully the customer to consume a product/service/information. In the same vein, Kaptein et al. (2012) suggests that applying the influence strategies on text messages people get persuaded to reduce snacking consumption. We adopted Cialdini's influence strategies because they have already been tested and validated in other domains such as in e-commerce (Kaptein, 2011), use of credit cards (Shu and Cheng, 2012). They also provide a solid framework in order to investigate the persuasive power of messages as peripheral cues in recommender systems. The above leads to following hypothesis of our study:

H1: Influence strategies (applied as peripheral cues through messages in recommendations explanations) will have a positive persuasive effect on individuals' disposition towards the recommended item.

The examination of the above hypothesis will allow us to demonstrate (if validated) that when the preference matching level of the recommended item is low (i.e. when the recommended item is not close to the user's preferences and interests), then enhancing the recommendation by applying influence strategies in

the form of short explanatory messages, the user will be persuaded to use the recommended item, thus changing his/her original negative behavior towards the recommended item to positive intention to use item.

Influence strategies rely upon different psychological principles that may lead to persuasion and therefore it is expected that they will present different degrees of persuasive effect on the recipients of the respective persuasive messages. Thus, the second hypothesis of our research is:

H2: Influence strategies lead to different degrees of persuasive effect on individuals' disposition towards the recommended item.

2.2 Personality

Kaptein and Eckles (2012) in their study demonstrated that influence strategies do not always lead to persuasion. They indicate that in case a consumer receives a message with 'wrong' principle then this can bring undesired effects. The above suggests that there are also other factors that should be taken into consideration when a persuasive message is used, one of which is individual's personality. A human's personality is defined as 'a dynamic organisation, inside the person, of psychophysical systems that create the persons' characteristic patterns of behaviour, thoughts and feelings' (Allport, 1961, p. 11).

Given that, one of the major aims of a Recommender System is to help consumers in decision making processes, the fact that personality influences how people make their decisions (Nunes et al., 2012), consumer's personality should be taken into consideration when a persuasive message is provided with a recommendation. Indeed, previous studies suggest a relationship between human's preferences and tastes with their personality in different domains such as movies (e.g. Chausson, 2010), music and paintings (Rawlings et al., 2000).

There is a variety of personality taxonomies one of which is Big 5 Dimensions of Personality (John et al., 2008). The personality traits suggested by the Big Five taxonomy are: Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness. According to psychological research (Jang et al., 2012) the facets for each personality trait are:

- Extraversion: Gregariousness, Assertiveness, Activity, Excitement-Seeking, Positive Emotions, Warmth.
- Agreeableness: Trust, Straightforwardness, Altruism, Compliance, Modesty, Tender-Mindedness.
- Conscientiousness: Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, Deliberation.
- Neuroticism: Anxiety, Angry Hostility, Depression, Self-Consciousness, Impulsiveness, Vulnerability.
- Openness: Ideas, Fantasy, Aesthetics, Actions, Feelings, Values.

The first study that examined message-person congruence effects with a comprehensive model of personality traits is that of Hirsh et al. (2012). Since then message-person congruence effects have been examined in relation to a variety of psychological characteristics (Dijkstra, 2008). Hirsh et al. (2012) demonstrated that persuasive messages are more effective when they are custom-tailored to their interests and concerns. Moreover, Tintarev et al. (2013) demonstrated that people who are characterized from Open to Experience (one of the Big 5 personality traits) tend to prefer diverse recommendations. Additionally, Halko and Kientz (2010) combined persuasive strategies with user's personality using Big Five Dimensions of Personality and the results of their study revealed relationships between individuals' personalities and persuasive technologies which means that not all people are affected from the same persuasive means. Finally, Smith et al. (2016) examined the impact of patients personality on Cialdini's influence strategies in the form of reminders. The research indicated that patient's with high emotional stability seem to be more responsive to all strategies of persuasion, while patients with low agreeableness rated all Cialdini's strategies higher than those with high. Finally, the research demonstrated that the reminders of "Authority" and "Liking" are the most popular.

3. EXPERIMENTAL DESIGN AND PROCEDURE

3.1 Design of Persuasive Explanation

For the execution of the experiment we had first to design the persuasive explanations that would accompany each recommended movie. For this task we followed the methodology proposed by Kaptein et al. (2012). More specifically, a group of three researchers familiar with Persuasive Technology, created thirty (30) textual explanations, i.e. five (5) for each Cialdini's influence strategies. The content of each explanation was developed in order to comply with the main purpose of each principle in the movie domain. For instance, for the influence strategy of Social Proof, the five possible persuasive explanations that were constructed are: (1) The 85% of this research's users rated the recommended movie with four (4) or five (5) stars. (2) The recommended movie is on 'to watch' list of 85% of this research's users. (3) Most of the users with the same age and sex as yours, rated the recommended movie with 4 stars! (4) The recommended movie's video trailer on youtube has more than 550,000 views. (5) The recommended movie's video trailer on youtube has more than 1600 likes and only 200 dislikes.

Seventeen (17) experts in the field of Information Systems and Marketing were invited in order to evaluate each explanation in terms of its compliance with the respective influence strategy. First, a brief presentation of the strategies was given to the evaluators so as to be more familiar with the influence strategies and then they were asked to evaluate the set of persuasive explanations. Each evaluator declared the compliance of each explanation to the respected influence strategy through a 1 to 5 rating scale (from "Completely Disagree" to "Completely Agree"). The persuasive explanation with the highest average was considered as the best-matching explanation for this particular influence strategy.

The six (6) best-matching persuasive explanations (one for each strategy), were chosen for the experiment are the following:

Reciprocity: A Facebook friend, who saw the movie that you suggested him/her in past, recommends you this movie.

Scarcity: The recommended movie will be available to view from 15/1/2014 to 31/1/2014 on cinemas.

Authority: The recommended movie won 3 Oscars!

Social Proof: The 87% of users in this survey rated the recommended movie with 4 or 5 stars!

Liking: Your Facebook friends like this movie.

Commitment: This movie belongs in the kind of movies you enjoy to watch.

3.2 Experiment design and execution

A within subjects experimental design was followed in this research. One of our main concerns in the execution of the experiment was to manage participants' burden by avoiding extensive exposure to treatments and questionnaires (only the psychographic questionnaire consisted of 44 items) while preserving the validity of the experiment. One option to deal with problem was to expose different groups to different cues (i.e. follow a between subjects design). However, this would significantly reduce the sample size within each group and also taking into account the anticipated low number different personality types represented in each of the groups it would have limited our ability to produce valid statistical results. Thus, we selected the within subjects design.

At the first step of the experiment, a set of 20 movies where presented to participants (with no explanations besides the typical information provided by iMDB, such short description of the story, lead actors etc.), where they were asked to state (by checking the appropriate option) whether they have watched each movie and then provide their ratings (in 1-5 scale). Users were explicitly instructed to provide their intention to watch a movie (for all unwatched movies) in the form of a rating. For the movies they had already watched they provided their actual evaluation. Recommendations were drawn from the set of unwatched movies.

The set of 20 movies was randomly selected from a pool of 60 movies from different genres and presented to the participants along with the typical information for each movie (movie's genre, its plot, and the starring actors). The first criterion for the inclusion of a movie in the pool of 60 movies was its genre (action, drama, romance, etc.). In the pool of 60 movies there were at least three movies from each genre, although most of the movies belong to more than one genre. The second criterion was the popularity of the movie, With the term popular movie is meant a movie with high average rating (above 8.0) from a large amount of users (above 1000 users).. Since popular movies are more likely to collect higher ratings while unpopular ones may not be known to the experimental participants (and therefore attract lower ratings), we included in the sample both popular and unpopular movies according to their iMDB ratings. Although that the number of 20 movies was large enough to ensure that at least some of them wouldn't have been watched by the participant, the system was designed to select from the pool of 60 movies and present to participants alternative movies in the extreme case that all 20 movies have been actually watched by the user.

At the second (recommendation) step of the experiment (see Figure 1), the (unwatched) movie for which the participant has expressed the lowest intention to watch (note that if more than one movie was rated with the lowest score, then the recommended movie was selected randomly from the above set of low-rated movies) was presented to the user exactly as the original presentation but enhanced with persuasive explanations. Selecting to present users with the lowest rated movie, is in alignment with our theoretical ELM foundations, which suggest that when the preference matching of the user with respect to the recommended item is low then the peripheral route will be followed. Moreover, this choice enable us to track more easily any changes in the user's intention to watch the movie since in computational terms it is much easier to identify changes in intentions from the lower to the higher levels of the 1-5 scale. It must be noted that the rating expresses the users' intention to watch (or not) the recommended movie is considered in our study as a measure of persuasion (i.e. acceptance of the recommendation), which is operationalized by computing the difference between the original and the final ratings. However, the exact meaning of the "acceptance the recommendation" depends on the business objectives of a site. For example, in some cases (as in e-commerce) the desired behaviour may be to request more information, or to purchase the product and so on.

Figure 1. Second Step of the experiment.

As mentioned above, the recommended movie was enriched with persuasive explanations, based on Cialdini's Principles (i.e. the explanations designed in the first part of the experiment) and the participant was asked to assess the recommended movie in order to examine whether (and which) strategies influenced users in order to change their intention to watch the recommended movie. More specifically, the recommended movie was presented with the same set of information as the first step (title, actors, etc.) while participants were asked to declare their intention to watch the recommended movie, taking into consideration one of the 6 persuasive explanations each time, which were presented as a list below the recommended movie. The order of the persuasive explanations was appeared in a random way to each user but there were the same texts for all of them. For that reason the expressions that were used in the persuasive explanations were in a generic form, e.g. the wording 'the recommended movie' was used instead of the actual title of the recommended movie and so on.

The absolute difference between the original and the final rating was used to measure the persuasive effect. As the "final" rating with respect to the first hypothesis (examining if there are differences before and after the application of the persuasion strategies) we used the highest rating that users provided (independently of the strategy that corresponds to that rating). For the evaluation of the second hypotheses (examining if there are differences among strategies with respect to their persuasive effect), the rating given by the users' as evaluation of each strategy was considered as the "final" rating.

At the third and last step of the experiment participants were asked to complete the psychographic questionnaire that was used to classify users into the Big 5 personality traits. The Big Five Inventory- 44 (BFI) was used, constitutes from 44 questions (John et al., 2008), and is already used in other studies (Bouchard and McGue, 2003; Shiota et al., 2006).

3.3 Sample

The experiment participants were invited through posts in University's Facebook groups (e.g. undergraduate, postgraduate and PhD students) and authors' personal mailing lists to participate in this research. The invitation message was asking recipients to participate in a research in which they would be

asked to rate recommendations provided by an online application as well as to fill in a psychographic questionnaire. The link to access the system was provided and a clear suggestion concerning the anonymity of their participation was included in the message. The invitation did not specify that the research involved movies evaluation. The participants' average scores for the items measuring the personality types in the 44-item psychographic questionnaire are (the standard deviation is included in the parentheses) Extraversion: 3.34 (0.49), Agreeableness: 3.47 (0.42), Conscientiousness: 3.34 (0.42), Neuroticism: 3.30 (0.48), Openness: 3.24 (0.46). The above descriptives showcase that the sample does not exhibit certain personality types more (or less) than others.

In total 117 users participated in our research. 61 (52%) participants of our sample were males while the rest 56 (48%) were females. Additionally, the 46% of the sample was aged between 18 and 24 years old, the 52% was between 25 and 34 years old and the 2% at the age of 35-44 years old.

3.4 Analysis Methodology

This research employs the prescriptions of the fuzzy-set qualitative comparative analysis methodology (fsQCA) to explore which personality traits explain the effectiveness of each persuasion strategy. Opposed to variance-based statistical methods (e.g. structural equation modelling or partial-least squares based regression models) in which the independent variables 'compete' with each other to explain one or more dependent variables, fsQCA treats the hypothesized causal factors as conditions that may be related to the phenomenon under investigation either by themselves or in combination with one another (Rihoux and Ragin,, 2009; Rihoux et al., 2011). Hence, fsQCA does not compute a single, optimal, solution that attributes weights to the independent variables; instead, the methodology proposes multiple alternative solutions, which require the presence or absence of each hypothesized causal factor. This is a fundamental difference from variance-based statistical methods and calls for operationalization of the variables in the dataset.

In effect, fsQCA employs fuzzy set theory and Boolean algebra to evaluate whether the cases in the dataset belong or not in a certain conceptual state. For example, in this research cases may be evaluated in order to assess whether an individual is extravert, open, agreeable, conscious, or neurotic. Likewise, the impact of each persuasion strategy on individuals' attitude change may also be operationalized to capture the degree to which the strategy actually manifested a behavior change. Such operationalizations are captured through fuzzy set membership scores ranging from 0 (non-membership to the set) to 1 (full membership to the set). In-between scores indicate the distance of each case from the outbound scores. The researcher may transform the cases' original values to fuzzy-set membership scores by using specialized fsQCA software. This process is coined with the term 'calibration'. In this research we used fsQCA 2.0 developed by the University of Arizona. The software was also employed throughout the remaining methodology stages.

Fuzzy-set QCA identifies conditions or combinations of conditions that are necessary or sufficient to explain an outcome. In this research, a combination of conditions reflects the personality profile of an individual. Such profile would include specific membership values to each personality trait following the calibration procedure. As such, a value close to 1 in a particular personality trait implies that the individual exhibits this trait. In contrast, membership values close to zero imply that the individual does not exhibit the said personality trait. Necessity of a condition implies that an outcome may not derive without the presence of the condition; nevertheless, the condition alone is not able to produce the outcome. Sufficiency of a condition implies that the condition alone is capable of producing the outcome. In practice, if a solution includes the presence of only one condition (i.e., a solution requires the presence or absence of only one personality trait),, then this condition is sufficient to produce the outcome. To estimate the sufficiency and/ or necessity of hypothesized conditions, fsQCA follows a Boolean minimization process based on truth table analysis. The outcome of this process includes the generic combinations of conditions that are sufficient for the outcome whilst remaining logically true. These are encapsulated in three solutions that differ based on their complexity, named as complex, intermediate, and parsimonious. Of interest is the parsimonious solution, which reduces the causal recipes to the smallest number of conditions possible.

This research explores how individuals' personality traits, in the form of five alternative dimensions, fit with different persuasive strategies. Nevertheless, an individual may not be exclusively categorized under a unique personality trait. Instead, individuals may exhibit elements of multiple traits, which collectively form their personality. Moreover, these personality traits are not fixed within all individuals; a particular persuasive strategy may be perceived as equally appropriate to individuals that exhibit completely dissimilar values on their fundamental personality qualities. As a result, we cannot assume that there is a single, universal, personality profile that explains the impact of a given persuasion strategy, which would call for the application of traditional statistical analysis methods based on regression models, but we need to examine how the different combination of the personality traits interweave in order to explain the suitability of a given persuasion strategy. The modus operandi of fsQCA covers this requirement, thus warrants us to adopt it as our guiding analysis methodology.

4. RESULTS

The first step of our analysis is involved investigating effect of each influence strategy on individuals' attitude towards watching a movie that they, initially, were unmotivated to watch. We performed two different comparisons to examine the persuasive effect of the influence strategies. In the first test, we measured the difference between the maximum of the ratings that each user provided for the six influence strategies and the original rating. The t-test results suggested that on average there are significant differences ($p < .001$) between the original rating and most persuasive (for each user) strategy (original and final ratings average scores: 1.49 and 3.05 respectively with standard deviation 0.50 and 1.23). In the second statistical test, we performed a t-test analysis that compares their initial beliefs and the ones formulated after the application of the strategy. The results suggest that all influence strategies were successful in increasing the likelihood of individuals to watch the movie (Table 1) nevertheless, this increase is marginal in absolute figures..

Table 1: T-test results. All comparisons are significant at p<.001

Influence Strategy	Mean (SD)	T-statistic (Original rating – intention after influence strategy is applied)
Original Rating	1.49(0.50)	n.a
Reciprocity	1.84(0.89)	-4.707 (p<.001)

Scarcity	1.73(0.97)	-2.953 (p<.001)
Authority	2.57(1.16)	-10.941 (p<.001)
Social Proof	2.67(1.17)	-12.349 (p<.001)
Liking	2.07(1.04)	-6.698 (p<.001)

Moreover, a one-way ANOVA test between the attitude changes of individuals for each influence strategy (see Table 2). The results of this analysis indicate that there are statistical differences among the six strategies at the p<.05 level (F= 14.941, p= .000). To probe for differences between the strategies we performed a Games-Howell Post Hoc Test. Based on these results we accept H1.

Table 2: ANOVA results (Sign. < 0.05)

Persuasive Strategy	Reciprocity	Authority	Scarcity	Social Proof	Liking	Consistency
Sign.	**.001**	**.001**	**.006**	**.001**	**.003**	**.007**

H2 was evaluated through the application of fsQCA methodology. We used the five personality traits as possible conditions that influence the acceptance of each influence strategy. As a first step, the prescriptions of fsQCA require for calibration of the cases into membership sets. Calibration was performed using the corresponding function provided by fsQCA 2.0 software. The function demands as input three threshold points; a full-membership value, a non-membership value and a cutoff point. Because the dataset consists of subjective cases, we used cluster analysis following the k-means algorithm (k=3) to calculate the three membership sets. More specifically, high values are correlated with the full-membership set, medium values are correlated with the crossover point set and finally low values are correlates with the non-membership set.

For the independent variables (personality traits) no cluster analysis was conducted due to the fact that the differences among the personality traits' scores were imperceptibly small. Thus, for this case we calculated the independent variables (personality traits) through frequencies with cut points for 4 equal groups, in SPSS. The percentiles that emerged correspond to the full-membership set for the high values, the crossover point set for medium values and finally the non-membership set for low values.

The results of fsQCA indicate 3-7 alternative solutions per influence strategy comprising of alternative combinations of the personality traits that lead to high acceptance of each influence strategy. Black circles indicate the required presence of a personality trait in a solution. White circles indicate the required absence of a personality trait from the solution. Blank cells indicate that in that particular solution, the presence or absence of that personality trait is indifferent. Each solution is accompanied by two additional measurements of fitness, which express the 'predictive power' of each solution, namely the consistency and coverage indexes. Consistency presents how consistent is the empirical evidence with the outcome which is investigated while coverage estimates the proportion of cases that address the outcome which is under investigation.

Table 3 illustrates the results of fsQCA for the Reciprocity influence strategy. The methodology, identified four solutions leading to high influence of an individual by the application of the respective strategy. The results indicate that the absence of even one personality trait is sufficient to individuals in order to be influenced by the Reciprocity strategy

Table 3: fsQCA results for the paths leading to high acceptance of Reciprocity.

	Solutions leading to high acceptance of Reciprocity influence strategy			
Personality Traits	**1**	**2**	**3**	**4**
Extraversion	○			
Agreeableness		○		
Conscientiousness			○	
Openness				○
Neuroticism				
Consistency	0.672	0.636	0.644	0.70
Coverage	0.578	0.624	0.572	0.639
Overall solution consistency	0.611			
Overall solution coverage	0.970			

The methodology identified 6 alternative paths leading to high acceptance of the Scarcity influence strategy. The majority of paths require two personality traits to be present in an individual's personality in order to be influenced by Scarcity strategy (Table 4). For example, individuals that are both agreeable and conscious, but do not exhibit traits of neuroticism are likely to be influenced by the scarcity influence strategy (solution 6).

Table 4: fsQCA results for the paths leading to high acceptance of Scarcity.

	Solutions leading to high acceptance of Scarcity influence strategy					
Personality Traits	**1**	**2**	**3**	**4**	**5**	**6**
Extraversion	○					
Agreeableness	●	○		●		●
Conscientiousness			○	●		●
Openness		●	●	○	●	
Neuroticism					○	○
Consistency	0.797	0.7	0.7	0.87	0.7	0.873
Coverage	0.295	0.416	0.358	0.193	0.376	0.206
Overall solution consistency	0.685					
Overall solution coverage	0.747					

The remaining Tables present the different paths, consisting of combinations of personality traits, which lead to high acceptance of the remaining four influence strategies. These tables may be interpreted as an atypical personality profile of individuals (one per produced fsQCA solution) in order to be influenced by each strategy (Table 5 – Table 8). Similar to the previous solutions, each table should be interpreted as a combination of mandatory personality traits (indicated with black circles) coupled with the mandatory absence of one or more personality traits (indicated with white circles). Hence, each solution represents a unique combination of the personality traits that should exist in order to explain the acceptance of a persuasive strategy.

Table 5: fsQCA results for the paths leading to high acceptance of Authority.

	Solutions leading to high acceptance of Authority influence strategy					
Personality Traits	**1**	2	3	4	5	6
Extraversion	○					
Agreeableness			●	●	○	○
Conscientiousness		○		●		●
Openness	●		○		●	●
Neuroticism		●		○	●	
Consistency	0.598	0.604	0.62	0.674	0.677	0.636
Coverage	0.294	0.303	0.357	0.182	0.252	0.25
Overall solution consistency	0.566					
Overall solution coverage	0.752					

Table 6: fsQCA results for the paths leading to high acceptance of Social Proof.

	Solutions leading to high acceptance of Social Proof influence strategy						
Personality Traits	**1**	2	3	4	5	6	7
Extraversion	○	●	○		●		●
Agreeableness				○	○		
Conscientiousness			○			○	○
Openness	●	○		●		●	
Neuroticism	●	●	○	●	●	●	●
Consistency	0.698	0.645	0.619	0.604	0.581	0.698	0.637
Coverage	0.31	0.25	0.303	0.317	0.250	0.31	0.190
Overall solution consistency	0. 713						
Overall solution coverage	0. 577						

Table 7: fsQCA results for the paths leading to high acceptance of Liking.

	Solutions leading to high acceptance of Liking influence strategy		
Personality Traits	**1**	2	3
Extraversion			○
Agreeableness	○		●
Conscientiousness		○	●
Openness	●		
Neuroticism		●	
Consistency	0.47	0.48	0.64
Coverage	0.41	0.31	0.192
Overall solution consistency	0. 456		
Overall solution coverage	0.643		

Table 8: fsQCA results for the paths leading to high acceptance of Consistency.

	Solutions leading to high acceptance of Liking influence strategy		
Personality Traits	**1**	2	3
Extraversion			○
Agreeableness	○		●
Conscientiousness		○	●
Openness	●		
Neuroticism		●	
Consistency	0.47	0.48	0.64
Coverage	0.41	0.31	0.192
Overall solution consistency	0. 456		
Overall solution coverage	0.643		

5. DISCUSSION

This research emphasizes on two elements of persuasive/ recommender systems. First, we empirically validate that the application of an influence strategy may indeed positively shift the attitude of an individual towards a specific recommended item. Nevertheless, not all influence strategies have the same persuasive effect. We attribute this deviation to the personality traits of the recommender system users. Hence, the second contribution of this study reflects on the development of personality profiles per influence strategy. Each profile, measured as a combination of personality traits that need to be present or absent from the personality mix, reflects the set of traits that fit most with each influence strategy (i.e., individuals sharing the same profile would indeed be persuaded following the application of the respective strategy). It must be noted that an important issue in utilizing recommendation explanations is that persuasive messages may be perceived as promotional ones and therefore impact users' trust in the recommender systems. For this reason we used a control variable measuring (in an 1-5 scale) users' trust in the system, which has shown that no such effect occurred (i.e. no significant differences were found between the trust levels before and after the presentation of the persuasive messages, which was on average 2.96 for the users with low intention to

watch the movie and 3.27 for the users with high intention to watch a movie).

In effect, most studies in the field of recommender systems have primarily focused on the algorithmic perspective through the proposition of algorithms that provide recommendations tailored to users' interests and preferences. In contrast, this study provides insights indicating that the provision of properly selected (i.e. taking into account users' personality) motivating messages have a persuasive effect on users intention to "use" the recommended item, e.g. to watch a movie.

According to the Elaboration Likelihood Model (ELM), when an individual has low motivation (or ability) to process a recommendation then she will not proceed through the central route of persuasion, i.e. he will not thoroughly assess the quality of argumentation in order to get persuaded. Instead, if appropriate peripheral cues are implemented (such as persuasive strategies applied in the form of messages, as suggested in our study) then she will eventually be influenced (i.e. motivated) to elaborate the recommendation following the peripheral route to persuasion. Such peripheral cues act as extra motivating triggers that influence a user by "diverting attention, reallocating cognitive resources, and evoking affective responses and behaviours" (Tam and Ho, 2005).

Current recommendation applications typically disregard items with low degrees of fitness with the users' current interests. The confirmation of the first hypothesis of this study indicate that even for such items, there is strong possibility that they may be favoured by the users if they are presented with the appropriate motivating peripheral cue. Moreover, not all people are influenced from the same persuasive messages. This study provides empirical evidence that there is a relationship between personality and Persuasive Strategies. People with specific combination of personality traits are affected more from particular persuasive messages.

The results of the experiment that was conducted surfaced that motivating messages are not uniformly applied to all recipients of recommendations. Users' personality traits are an important factor that differentiates the effect of influence strategies applied as persuasive explanations. More specifically, a person who is characterized by high extraversion seems to be influenced by all Six Persuasive Strategies. This is reasonable if we take into consideration that they enjoy interacting with the environment whilst such people have the tendency to seek for stimulation (Zhao and Siebert, 2006). Moreover, people with high extraversion have the tendency to be curious, novel, sociable, active, energetic (Costa and McCrae, 1992; Goldberg, 1992), and positive (Watson and Clark, 1997). Along this line, the fact that this type of people favour networking with others (Watson and Clark, 1997) make them more prudent to be influences by "Liking" strategies.

Individuals with high agreeableness are eager to help other people (Costa and McCrae, 1992) while they have the tendency to be kind, generous, fair and unconditional (Goldberg, 1992), so people with high agreeableness tend to be motivated from the "Reciprocity" influence strategy. The fact that people with low agreeableness tend to be suspicious (Digman, 1990).

People with high conscientiousness are dutiful (Major et al., 2006). In other words, they are careful to fulfil obligations, and thus when someone helps them they feel obligated so they become more motivated when a persuasive explanation implementing "Reciprocity" is presented to them. Despite our expectations, humans with low conscientiousness changed their intention to watch the movie influenced by the "Consistency" strategy rather than humans with high conscientiousness. This may be attributed to the fact that individuals with high conscientiousness avoid to take risks because that might make them feel uncertain or cause unexpected delays to their work (James and Mazerolle, 2002; Raja and Johns, 2004).

On the other hand, people with high openness tend to be characterized by creativity, sophistication, and curiosity (Barrick and Mount, 1991). This might explain why in most cases, the trait of openness is absent from the solutions indicated by fsQCA. Finally, individuals with low neuroticism lack confidence. This may explain why the application of the "Social Proof" strategy on neurotics in most of cases depicts low neuroticism and Liking, because they tend to be influenced by people who they like or what the majority says. Additionally, neurotics are characterized by anxiety and typically they do not trust others (Raja and Johns, 2004), so they tend to be consistent with their original thoughts in order to deal with their insecurity and therefore it is expected to get persuaded by the "Consistency" strategy.

The findings of the study must be interpreted taking into account its limitations. The sampling frame (students) and the relatively low sample size restrict the possibility of having an actual representation of the population in the sample in terms of personality types. By extending the experiment, in future research, to a larger sample of users we would also have the opportunity to avoid possible self-selection bias as well as to follow a between subjects design, showing not only more movies to each user but most importantly avoiding the learning effect associated with the presentation of all six strategies to all experiment participants. It must be noted that we tried to control the learning effect bias by showing to users recommendations with persuasive explanations in a random way, i.e. the mix of recommendations representing different persuasive strategies was presented in varying order to each of the participants. It is clear that this study provides insights concerning the movie recommendation domain in which it was applied. The generalization of our findings would be enabled only if this research is extended to other application domains. In our future research plans, besides the extension of our research to other domains (e.g. e-commerce) we aim to investigate additional factors that may influence persuasive communication, as for example the need for cognition, which is a personality variable and reflects people's intrinsic motivation to engage in and enjoy thinking (Cacioppo and Petty, 1982, p. 116).

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