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# Assessment of subjective influence and trust with an online social network game

Michael Seufert<sup>\*</sup>, Valentin Burger, Karl Lorey, Alexander Seith, Frank Loh, Phuoc Tran-Gia

*Institute of Computer Science, University of Würzburg, Am Hubland, D-97074, Würzburg, Germany*

## 1. Introduction

Since online social networks provide users with the possibility to manage real life friendships and to communicate online, they are well suited for information exchange in any form. This intensive information exchange comprises influence and trust processes and leads to formation of opinion as well as decision making. In contrast to real life interaction, online social networks (OSNs) make it possible to study this process by providing much of the information the user was exposed to, before making his decision. This data helps researchers to understand what led to an opinion, a decision, or an action in general, as they have most of the relevant information at their hands.

While there has been a lot of work on influence and specifically the effects of influence in online social networks, there has not been enough work to fully understand the reasons for the measured influence. Furthermore, a lot of work applied very specific and narrow definitions of influence, as influence was mainly measured by the ability to encourage others to some activity. Accordingly, these definitions of social influence only cover external effects but ignore internal effects and thus are measuring only a part of social influence.

Also trust has been the subject of many works in different fields. Models of trust relationships are highly required and could be employed by many applications, such as security and e-services. However, not all facets of trust are fully understood, e.g., how trust relationships are built or how trust is gained and maintained. Moreover, a representation of trust values associated with relationships is difficult. Current approaches try to infer trust from objective data with the help of rather simplistic assumptions, but their validity and goodness have not been proven.

These shortcomings strengthen the call for more detailed investigations and modeling of influence and trust. This work presents a framework for subjective assessment tests in an online social network. It allows asking test users for subjective opinions on relationships with their friends. At the same time objective data about the structure of their social network and about their interactions can be obtained. This fosters research on both subjective and objective aspects of interactions in online social networks. During this work, the presented framework was integrated into Facebook and a test for assessing influence and trust was designed. The results provide insights into the subjective rating of the social influence of and interpersonal trust in Facebook friends. Note that the online social network is not considered to be a closed environment. This study acknowledges that social influence and trust may initiate from both sources within the online social network, like exchanged messages or posted pictures, and external sources,

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<sup>\*</sup> Corresponding author.

E-mail address: [seufert@informatik.uni-wuerzburg.de](mailto:seufert@informatik.uni-wuerzburg.de) (M. Seufert).

like direct conversations or joint activities. Thus, in this work, Facebook is used as a means for acquiring study participants and their subjective opinions on real world friends together with objective social network data, which was exposed by the users and is accessible by the test framework. Still, the concepts of social influence and interpersonal trust shall be assessed in a holistic way comprehending all kinds of influence factors.

The goal of this work is to study whether it is possible to assess complex psychological concepts, like social influence and interpersonal trust, with an online social network game. For both trust and influence, additional social qualities (i.e., subcategories) are surveyed that are correlated with a person's trust and influence. Moreover, this work investigates correlations between the objective metrics of users, which can be obtained through the online social network, and the subjective opinions on influence and trust. The results of the conducted study show that interpersonal trust in friends is rated high, while users give low scores to being influenced by their friends. Using subcategories to implicitly assess influence and trust, we observe high correlations for most subcategories. However, the limited objective data, which was available in Facebook mainly due to users' privacy settings, could not be used to predict influence and trust of relationships.

This work is structured as follows. Section 2 outlines related work on psychological tests in online social networks. Section 3 presents the underlying models for social influence and interpersonal trust, on which our study is based. Section 4 describes the app design, gamification elements, and the framework. The results on influence and trust are presented and discussed in Section 5, and Section 6 concludes.

## 2. Related work

To the best of our knowledge, only few subjective psychological tests have been conducted in OSNs until now. [Krotoski, Lyons, Barnett \(2009\)](#) investigated how to predict attitude and behavior from information about avatars in Second Life. Thereby, he carried out an online survey among users of this social network to obtain information about them and their personal social network. [Wilson, Gosling, and Graham \(2012\)](#) provide an extensive review of Facebook research in the social sciences, classifying the articles according to descriptive analysis of users, motivations for using Facebook, identity presentation, the role of Facebook in social interactions, and privacy and information disclosure. [Friggeri, Lambiotte, Kosinski, and Fleury \(2012\)](#) used a Facebook app to examine a user's personality and how it influenced the nature of the user's social network. They provided users with a personality test to find out about their openness, conscientiousness, extraversion, agreeableness, and neuroticism. [Lewis, Gonzalez, and Kaufman \(2012\)](#) investigated social selection and peer influence based on a Facebook dataset of users' tastes and show that the social impact of a taste may depend on its medium and on the particular content of the preference. [Bond et al. \(2012\)](#) investigated social influence based on political mobilization messages on Facebook and show that the messages directly influenced political self-expression, information seeking and real-world voting behavior of millions of people. The messages not only influence the users who receive them but also the users' friends, and friends of friends. The relationships in social networks are leveraged in [Chard, Bubendorfer, Caton, and Rana \(2012\)](#) to infer a level of trust between users. The approach is demonstrated by using a social storage cloud implementation in Facebook. In [Jiang, Wang, and Wu \(2014\)](#), an algorithm is developed that generates trust graphs in large online social networks based on small network characteristics and by taking advantage of weak ties. [Palazon, Sicilia, and Lopez \(2015\)](#) examine the role of Facebook friends on the intention to

join brand pages by conducting a Facebook experiment. In their case the Facebook experiment is developed to quantify the influence of the tie strength of Facebook friends.

Psychological aspects of relationships, e.g., popularity, influence, or trust, are of special interest and much research was conducted in this field (e.g., [Adali et al., 2010](#); [Bakshy, Hofman, Mason, & Watts, 2011](#); [Golbeck & Hendler, 2006](#); [Kwak, Lee, Park, & Moon, 2010](#)). Details on the psychological backgrounds are provided in Section 3. However, almost all of these works try to deduce results from objective information like personal data or interaction traces. There has been little work on a subjective assessment of these psychological properties, mainly due to the size and complexity of such a survey. [Xu, Benbasat, and Cavusoglu \(2012\)](#) conduct a survey on trust and privacy in Facebook, investigating both given and received trust. [Ganesh and Sethi \(2013\)](#) present empirical results from a Facebook reputation system, in which users could rate their friends to help other people on whom to trust. In addition to trust, this work also investigates influence in social networks based on subjective assessments considering six principles of influence. To overcome the lack of subjective surveys towards influence and trust a Facebook application with gamification framework is used in this work to conduct personalized surveys in OSNs. The gamification framework used is presented by [Seufert, Lorey, Hirth, and Hoßfeld \(2013\)](#) and will be described in detail in this work. Similar to [Rafelsberger and Scharl \(2009\)](#), gamification and social networks are combined to encourage users to participate in the subjective psychological assessment tests. In their case the gamification framework is used for sentiment detection. Further details on gamification are provided in Section 4.2.

## 3. Underlying influence and trust models

This section presents the underlying models of social influence and interpersonal trust on which our study was built. The concepts and models described only provide some insights and are far from being complete. For a more in depth study of the psychological backgrounds, the interested reader is referred to the respective scholarly literature.

### 3.1. Social influence

Early sociological studies of social influence were done by [Kelman \(1958\)](#), in which he defined three processes of attitude change, namely, compliance, identification, and internalization. Compliance describes the response of individuals to a request. Identification is the adoption of an attitude because of liking or admiration. Internalization describes the adoption of norms or behavior from others. Since then the importance of influence in social networks has been acknowledged on a large scale. Influence has the ability to affect information dissemination and can therefore increase word-of-mouth diffusion, which in turn may even change public opinion. Thus, researchers and marketers have focused on understanding influence and leverage its effects.

It has been shown that influential individuals called "influencers" or "influentials" can maximize the effects of influence as they are able to influence a disproportionately high number of users. With this knowledge [Keller and Berry \(2003\)](#) defined criteria to identify these influencers. They defined five categories that make up an influential individual: Activists, Connectedness, Impact, Active minds, Trendsetters. This definition ignores the model of influence between two individuals and merely focuses on identifying overall influential individuals.

Generally, social influence is described between sources and targets over time. The most common approach in sociology is to narrow this down to the influence of one individual over another

individual at one point in time (Mason, Conrey, & Smith, 2007). This is just a simplification though, since influence can also vary over time and depend on the number of influencers. Other models take this into account by including several sources or the dimension of time.

Cialdini (1987) refined previous studies in by examining what leads to individuals getting influenced by other individuals. Therefore, he defined the “Six Weapons of Influence” that make a person more prone to get influenced. This model corresponds to the previously mentioned model of influence between two individuals. The influence assessment test is based on these principles and tries to cover them with questions.

### 3.1.1. Reciprocation

Reciprocation describes the tendency of individuals to treat others in the same way as others treat themselves. Therefore, individuals rate actions of others by their intentions and effects and respond with a similar behavior. For example, if a person grants someone a favor it is more likely that the favored person tries to return it. If on the other hand a person treats another person badly, this person is more likely to respond equally badly. This goes so far that the reaction can even be more drastic than the original action and can also even lead to ignoring previous sentiments towards a person (Regan, 1971). Social effects like “an eye for an eye” and “tit for tat” can be ascribed to reciprocation.

### 3.1.2. Commitment and consistency

Individuals want to be consistent in their behavior and with what they have already done. If they make a decision or commit orally or verbally to a goal, they will try to achieve it as they have accepted it as being consistent with their self-image. Similarly, they will commit themselves also to other individuals. If they had previously approved or disapproved the opinion or behavior of another person, they will not change their attitude towards that person. This means that persons who were influenced by other persons are likely to become influenced again by the same person in the future.

### 3.1.3. Social proof

Social proof describes the effect that individuals tend to check the behavior of others to validate their own behavior. This is, for example, the case when individuals don't know what to do. Then, they look at the behavior of others or even assume what others would do. As they try to validate their behavior, they compare with others that they believe to behave correct. There are several well-known effects of social proof, for example, the bystander effect where people do not help because others are not helping either. This effect can even go beyond doing what others do by just doing what one assumes others would do. Similarity and high social status can increase the effects of social proof as individuals tend to check their own behavior more rigorously to others that are similar or socially situated higher.

### 3.1.4. Liking

Liking describes the effect to find a person pleasant or attractive. Users are more likely to get influenced by friends that they like or admire. Consequently, individuals are prone to fulfill requests of friends as an effect. While these are obvious examples, this effect can also be exploited by total strangers. As an example, Cialdini (1987) describes Tupperware parties that exploit this principle, as the host invites friends. Therefore, these friends buy from a person they like and not from an anonymous salesperson. Thus, the guests are more likely to get unknowingly influenced into buying something, because of already liking the host.

### 3.1.5. Authority

Authority describes the legitimate power of one individual over others. It can have several reasons such as formal authority, social status, or knowledge. It is crucial that subordinates accept authority, as this differentiates it from plain power. Obedience to authority figures can enable them to influence others. This goes so far that they even perform questionable tasks when ordered to do so. One example is the Milgram experiment where authority figures told participants to induce pain to another test subject. The other test subjects were actors and reacted accordingly, claiming to be in severe pain. Even though, most of the test subjects did not stop because the authority figure told them to continue.

### 3.1.6. Scarcity

Scarcity describes the rare availability of something. Scarcity or even just perceived scarcity is known to create demand. Cialdini (1987) describes this principle of influence by stating that “opportunities seem more valuable to us when their availability is limited.” This effect can be leveraged to influence individuals by creating or faking scarcity and thus triggering demand. One of the examples mentioned by Cialdini (1987) for this influence reason is that individuals feel the urge to answer phone calls even when talking with another person. This is because individuals tend to think that the caller could have limited availability and only enough time for this one call.

## 3.2. Interpersonal trust

Interpersonal trust is a basic feature of all social situations that demand cooperation and interdependence (Johnson-George & Swap, 1982). Thus, trust is a part of human beings and human interactions. It is an important part of love and friendship, and relationships depend upon it (Wang & Emurian, 2005). However, it is difficult for researchers to find a common definition. There is a wide range of approaches and definitions of trust being an abstract and multi-faceted concept (Lewis & Weigert, 1985). The early work of Wrightsman (1964) uses the general concept of trustworthiness, which he defines as the extent to which people are seen as moral, honest, and reliable. Rotter (1967) focuses more on relationships and defines interpersonal trust as generalized expectancy that the verbal statements of others can be relied upon. Kee and Knox (1970) differentiate between trust and suspicion and define it in terms of an individual's subjective probability about another's trustworthiness. In addition, trust and suspicion as manifested in behavior were conceptualized as a function of three classes of independent variables: previous experience, structural and situational factors, and dispositional factors.

In contrast, Lewis and Weigert (1985) define two aspects, emotional and cognitive trust. They state that trusting behavior may be primarily motivated by positive affect for the object of trust (emotional trust), or by rational reasons why the object of trust merits trust (cognitive trust), or a combination of both. Dunn and Schweitzer (2005) found a significant influence of emotions on trust. For example, the found that happiness and gratitude, emotions with positive valence, increase trust, and anger, an emotion with negative valence, decreases trust.

A related approach to trust and its definition was done by Johnson-George and Swap (1982). They formulated a scale to assess interpersonal trust in a specific individual, which will also be used in this work. In that they differentiate between general trust, reliability, and emotional trust. General trust addresses trust itself and therefore is the direct approach to ask about trust. However, it also is a combination of the other two aspects, which are shortly summarized in the following.

### 3.2.1. Emotional trust

Emotional trust is connected to feelings and emotions like friendship, love, agreement, and comfort. Thus, the test items refer to situations involving confiding, freedom from criticism and embarrassment, and other emotion-laden situations. Moreover, it also includes elements of the other's credibility or honesty. Emotional trust needs time to develop and grows stronger with the grade of intimacy between two individuals.

### 3.2.2. Reliability

Reliability refers to keeping promises and commitments, or the generalized expectancy that statements or actions of others can be relied on. Reliability is a quality that seems more superficial and less special than emotional trustworthiness as behaving in a reliable manner is a norm of everyday social interaction. Johnson-George and Swap (1982) found the tendency that subjects rate higher on reliability than on emotional trust. This is caused by the fact that a person can develop reliable trust to someone even in early stages of trust formation.

### 3.3. Test design

Still, the question remains, which of the proposed models can be utilized for a subjective assessment of influence and trust with an online social network game. Due to the special characteristics of the test, short and simple questions targeted on a specific user have to be used. Moreover, the questions have to be varied to avoid boredom of the participants. Therefore, not only questions asking directly for influence and trust of a friend, but also the models of Cialdini (1987) and Johnson-George and Swap (1982) are used, which were described above, and which allow to cover the different aspects of influence and trust with explicit questions. Later, the appropriateness of these models can be investigated by analyzing the results obtained in the study.

The influence assessment test is designed to measure influence by measuring the proneness to get influenced by another individual. Therefore, we formulated several questions that each aim to cover one of the subcategories of Cialdini (1987) using results from various studies and common sense. Furthermore, a main question is presented, which directly asks for influence. The trust assessment test is designed in a similar way. We selected questions from the scale presented by Johnson-George and Swap (1982) that cover both subcategories (emotional trust and reliability) and added a

main trust question. All questions are personalized, which means that they are about a specific friend of the user. Therefore, placeholders are used during the generation, which are later replaced with real names by the application.

An answer can be chosen out of several answer options on a five point Likert scale. After the user has chosen an answer option, the answer is saved by the application. Then, the next question is presented to the user. To cope with the problem that users can stop using the app at any time, which results in a random number of answers per user, an intelligent question selection had to be implemented in order to obtain an acceptable data confidence (Seufert et al., 2013). Therefore, the psychological assessments are divided into two parts. One part assesses influence or trust, respectively, on a broad scale for all friends with the help of the main question. The other part examines the subcategories in detail for a subset of users.

Fig. 1 illustrates the question selection algorithm in detail. When the user first accesses the app, and periodically after every 20 questions, he adds two of his friends to the subset for detailed assessment. Furthermore, the application selects a friend, who also actively uses the application, and one random friend to cover also friends, which would not have been selected by the user. For each question, first the test (e.g., influence test, trust test) is selected according to probabilities, which are set as parameters. When the influence or trust test was selected, again a random decision was made for either broad or detailed assessment according to a given probability. In case of broad assessment, a random friend is selected, which had not been selected before, and a random version of the main question is presented about this friend. In case of the detailed assessment, a friend is selected from the subset. Then, the subcategory with the fewest answers so far is selected, and a random question from the selected subcategory is presented. The whole process repeats for every question.

Additionally, three other tests were added to the study. The first test is about the authenticity of users and consistency of answers. This test contains questions whether the friend is a real person that the user has actually met before. Second, the test repeats previous questions and checks for consistent answers in order to ensure a reliable test execution. Therefore, quality metrics were implemented in the app, which compute the user's answer quality based on his clicking behavior and his answers to the consistency questions. Finally, a fun test, which asks about the coolness of friends, is integrated to keep users interested and increase the variety. This

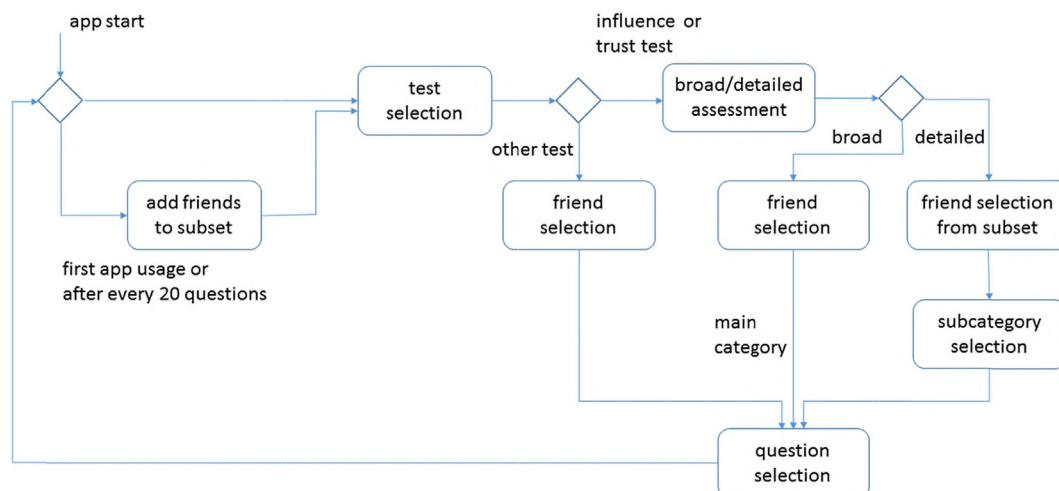


Fig. 1. Question selection algorithm.



**Table 1**  
Example questions used in the test.

(Sub-) Category	Example questions
Influence	How much influence does [[name]] have on you?
- Reciprocation	Did [[name]] do you a favor?
- Commitment and Consistency	Did you ever follow an advice of [[name]]?
- Social Proof	Do you watch how [[name]] is dressed?
- Liking	How do you like the profile picture of [[name]]?
- Authority	Would you ask [[name]] for advice?
- Scarcity	Do you think [[name]] posts frequently?
Trust	How much do you trust [[name]]?
- Emotional Trust	Can you talk freely to [[name]]?
- Reliability	Would you lend money to [[name]]?
Authenticity	Have you met [[name]] in person?
Fun	Should [[name]] take part in a TV casting show?

prevents users from getting bored over time and hides the serious nature of the psychological assessment tests. For our study, we set the parameters of the test selection as follows: influence test 45%, trust test 34%, authenticity 7%, consistency 7%, fun 7%. For the influence and trust test, the broad assessment was selected with probability 25%. All in all, 164 different questions were included in the test. One example per category is listed in Table 1. A complete listing of the instrument can be found in the [appendix](#).

#### 4. Design and implementation of the app

In order to ask the users directly where social network interaction is happening, a Facebook game application was implemented to conduct the subjective assessment of influence and trust. This section describes the app design, the gamification elements, and the framework.

##### 4.1. App design

The Facebook Graph API and integration for apps is used to create a gamified app called “My Secret Insights”. The app is based on the assessment framework and is used to carry out tests while providing users with incentives to answer many questions with the help of gamification. The objective of the game is to answer as many questions as possible and earn points with these answers. Each answer is about a specific friend and can be answered by clicking on one of several answer options.

At the beginning and after a certain amount of points is reached, users can select new friends to answer questions about. To provide users with incentives to answer question, it is possible to unlock gifts with earned points. These gifts provide insight to the user's social network and other game-related statistics like rankings. Gamification elements like rankings, scores, and leaderboards are used to spark users' competitiveness.

The design of the app is centered on answering questions. Furthermore, it enables easy access to unlocked gifts. Fig. 2 shows the main page with the menu at the top, a prominent header welcoming users, and a game overview.

A responsive design enables easy access even with small screen widths. This is important as Facebook puts a sidebar with advertisements next to the inline frame that reduces the width of the inline frame drastically. Therefore, users with a small display have a very narrow viewport and would not be able to use the app without much horizontal scrolling. The page for answering questions, which is centered on a question and possible answer options, is shown in Fig. 3. It should enable users to answer questions fast by providing all necessary information. The main content contains the question, a profile picture of the user the question is about to the right, and

the possible answer options as buttons below the questions. These buttons enable the user to answer questions immediately in contrast to radio buttons found in most questionnaires which would require two clicks.

Alternating information panels can be found to the right of the main content. Their purpose is to keep the user informed while answering questions. As the user probably has a goal, for example, to beat his friend or to unlock the next gift, the aim of these panels is to provide the needed information. Otherwise, the user would have to open up another site or click somewhere. However, with the help of the panels this is not the case and questions can be answered without interruption. These information panels either display information about the current answer quality (quality panel), the current points and rank (points panel), or the next available gifts (gift panel).

Besides answering questions, the app allows users to access earned gifts. Gifts are part of the provided incentives to answer questions as they can be unlocked with points. Every gift is available at a previously defined number of points. Gifts enhance the user interface, allow comparing to others, or providing insight to a user's social network. The smallest gift is available with one point and allows the user to see his own points. Bigger gifts like the friendship graph are available when the user has earned more points. Additionally, some incentives make use of selected friends. The friendship graph, for example, shows only selected friends and expands with every new selected friend. The “Insights” menu enables access to an overview of all available gifts and all gift-pages.

The framework is implemented with the LAMP stack, consisting of Linux, Apache, MySQL, and PHP. The application framework is purely object-oriented and uses the Model-View-Controller (MVC) software architecture pattern for a clear separation of data storage and user interaction with it. This is done with the help of Zend Framework 2<sup>1</sup> which provides an MVC architecture to create enterprise applications. MySQL provides the database and is accessed with SQL statements from PHP. To access the Facebook API, the Facebook PHP SDK is used. The framework generates HTML pages which can be accessed with any modern web browser. To ease the design process and to provide an extensible HTML markup, Twitter Bootstrap<sup>2</sup> is used. One of the main reasons to use Bootstrap is that it also provides the option to create a responsive design. To access the Facebook API from the client side, the Facebook JavaScript SDK is used. More technical details on the framework can be found in [Seufert et al. \(2013\)](#).

##### 4.2. Gamification

Gamification means the use of game design elements in non-game contexts ([Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011](#)) and can help to improve motivation, participation, and interaction duration even for standard tasks ([Flatla, Gutwin, Nacke, Bateman, & Mandryk, 2011; Zichermann & Cunningham, 2011](#)). The idea of gamification has been used in the design of various scientific applications, e.g., for image tagging ([Von Ahn & Dabbish, 2004](#)), populating ontologies ([Krause, Takhtamysheva, Wittstock, & Malaka, 2010](#)), improving natural language questions in search engines ([Aras, Krause, Haller, & Malaka, 2010](#)), or to assist solving complex biological problems ([Cooper et al., 2010; Kawrykow et al., 2012](#)). Recently, more and more commercial application and services, like FourSquare<sup>3</sup> or StackOverflow<sup>4</sup>, use gamification

<sup>1</sup> <http://framework.zend.com> — Accessed July 2015.

<sup>2</sup> <http://www.getbootstrap.com> — Accessed July 2015.

<sup>3</sup> <https://foursquare.com/> — Accessed July 2015.

<sup>4</sup> <http://stackoverflow.com/> — Accessed July 2015.

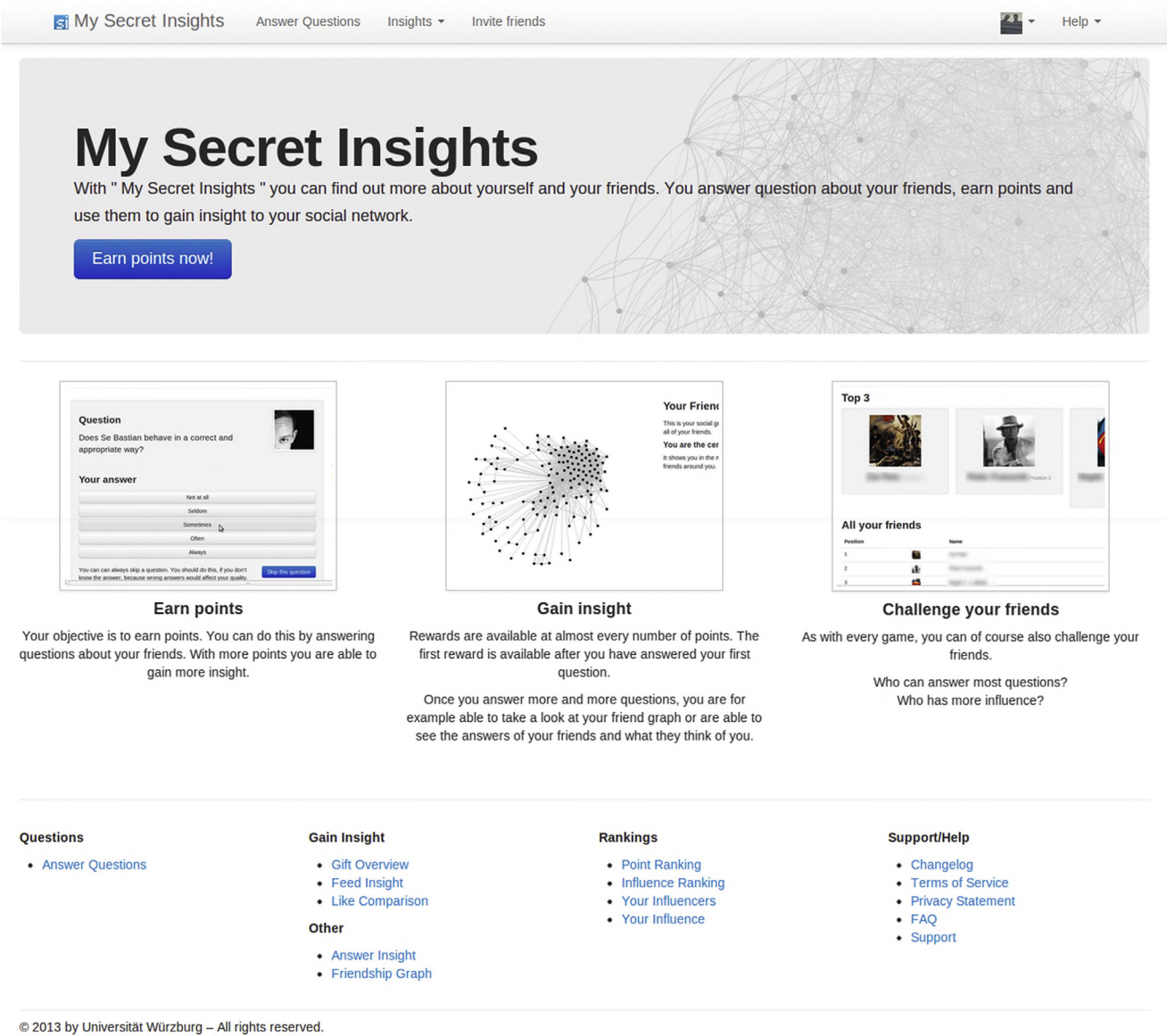


Fig. 2. The homepage of “My Secret Insights”.

techniques like badges or points to increase user interactions and contributions.

Gamification is used in the application to motivate users to answer as many questions as possible. Therefore, the app is a game centered on points which can be earned by answering questions. In return, these points can be used to unlock gifts. As many gifts as possible are offered, which can be unlocked frequently, to provide the users a sense of achievement, to avoid boredom, and to keep them participating. In the beginning, features of the user interface have to be unlocked. This introduces the concept of gifts to the users and makes the interaction with the app more comfortable.

Then, gamification elements like rankings, scores, and leaderboards can be unlocked, which allow users to compare to others and aim to spark users' competitiveness. Some of these gifts are staggered and contain several levels of information, which have to be unlocked one after another. For rankings, for example, a user first unlocks only his own score, then, his own rank, then, the ranks of his friends, and eventually, the scores of his friends. Fig. 3 shows a

completely unlocked point ranking as feedback panel to the right. Finally, there are gifts containing insights to specific information about the users' social network, or about answers to the subjective tests. The insights aim at the users' curiosity to get new information about themselves and about their friends. Such gifts are feed insights, i.e., statistics about friends' postings or likings on a user's own wall, like comparisons, i.e., the page likes of a friend are compared to own page likes, and the friendship graph, i.e., a visualization of the social network of a users' friends. Moreover, results of the subjective assessment test can be shown. Thereby, a user can find out how he thinks about a friend (aggregated answers) and what his friends think about himself (average of aggregated answers).

The gifts are designed in such way that they show only information about a restricted number of friends. Some gifts are applicable to friends, who were selected by the user and about whom he already answered questions. Others only provide insights about participating friends, i.e., friends that use the app themselves and participate in the subjective assessment test. This means, gifts and

My Secret Insights

Answer Questions

Insights

Invite friends

Help

## Answer questions and earn points

### Question

Do you think posts frequently?

### Your answer

You can always skip a question. You should do this, if you don't know the answer, because wrong answers would affect your quality.

### Points

You get one point for every answer. When reaching a specific score, you unlock rewards.

You currently have 331 points.

With this score you are on rank 1 among your friends. Congratulations!

Position	Name	Points
1		331
2		273
3		200
4		0
5		0

Fig. 3. The page for answering questions with the point ranking panel to the right.

their information content are growing with the number of selected friends (i.e., the number of answered questions) or the number of participating friends. Thus, gifts do not have a one-time value but encourage users to return to previously unlocked gifts as they might show new insights. Furthermore, this also motivates users to answer more questions and to invite more friends to participate in the subjective assessment test. Therefore, Facebook's request feature was placed prominently in the menu bar and friend selection panel. This feature allows to send an app invitation to friends from everywhere within the app without leaving the current page. Additionally, bragging, i.e., the ability of the app to post on behalf of the user, was employed. Thus, the app can trigger a Facebook dialog which proposes a status post on the user's own wall, e.g., every time the user unlocks a new achievement. This can also help to get friends interested in the app, as the status post contains a link to the game and presents its benefits, e.g., a short description and a picture of the unlocked gift.

As the subjective assessment is done in an unsupervised environment, the quality of obtained answers has to be assured. It has been shown by [Suri, Goldstein, and Mason \(2011\)](#) that users tend to cheat in paid online tasks, even if the expected gain is rather small. Thus, gamification elements, e.g., unlocking gifts, could also tempt users to gain points faster by giving debased or wrong answers. To prevent this behavior, several mechanisms for quality assurance in subjective users studies ([Hoßfeld et al., 2014](#)) were integrated into the framework. This includes the ability to recognize suspicious clicking patterns, e.g., very fast clicking of always the first answer option. Second, if applicable, the answers of a user about a friend can be compared to his (intra-rater reliability) and others' (inter-rater reliability) previous answers about this friend. Finally, a test was included, which repeats previous questions, to check

consistent rating of the users. Based on these mechanisms, an answer quality score is computed, which is presented to the user in a separate panel. The app is able to warn users if their score is too low and explains any subtractions. Thus, the participants receive immediate feedback on their rating performance and can improve their rating behavior.

## 5. Results

After the application was designed and implemented ([Seufert et al., 2013](#)), the psychological assessment tests for social influence and interpersonal trust were elaborated and integrated and the game was extensively tested. Finally, the My Secret Insights app was launched on November 23, 2014. This section presents the results of the first three months with respect to participation, as well as the results with respect to subjective influence and trust.

### 5.1. Subjective assessment participation

After the official launch of the Facebook application, several means of advertisement (private messages, forum/group postings, and YouTube video) were used to recruit participants. Until end of March 2015, 216 people had activated the app via Facebook and gave the basic permission to access their friend list. Nearly 50% of those (107 users) actively participated and answered 13,525 questions about their friends. [Table 2](#) presents the demographics of the users. As the app requested minimal permissions during installation, only age, sex and country of the users were obtained. Most users did not indicate their age in Facebook, therefore, the exact distribution is omitted in the table. However, due to the



**Table 2**  
User demographics.

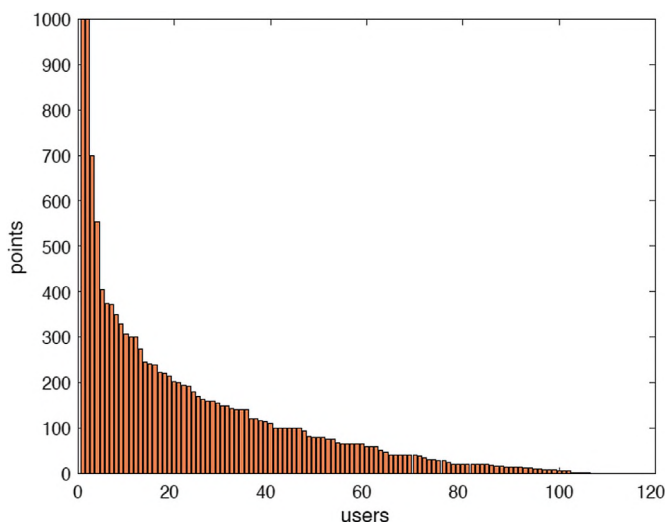
Installation of facebook app	216
Participation in Game	107
Age Group	20–25
Sex	
- Male	58
- Female	49
Country	
- Germany	89
- USA	14
- UK	2
- Poland	1
- Spain	1

personal recruitment, mainly German students with ages from 20 to 25 participated in the game.

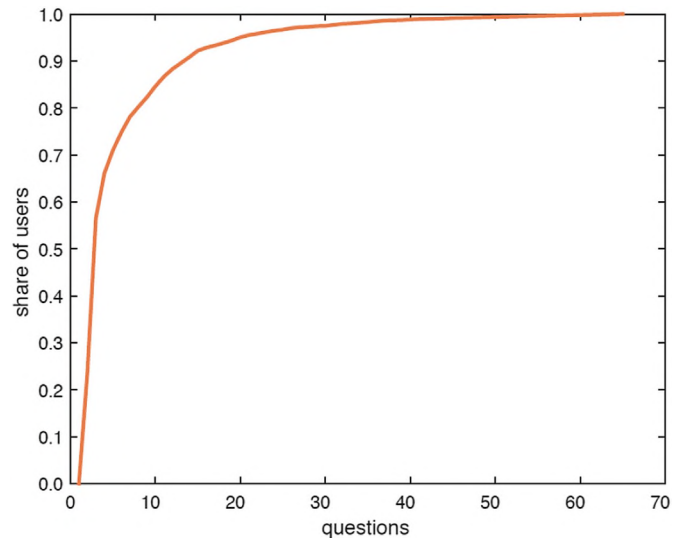
Fig. 4 visualizes the participation of the users. The x-axis shows the 107 users and the y-axis shows the points, i.e., the number of answered questions, of each of the users. 60 users have answered less than 100 questions, while 21 of these 60 have answered less than 20 questions. 27 people answered between 100 and 200 questions. More than 200 questions were answered by 20 people. The ten most active users sum up to 5392 answered questions. Only two people reached for the last gift at 999 points, the extended friendship graph, successfully. The 107 users covered an amount of 2347 different friends with their answers.

This coverage is depicted as CDF in Fig. 5. The x-axis shows the amount of questions, the y-axis the share users in percent. It can be observed that while many users are covered with one or two (main) questions, a small amount of users is covered in detail with many questions. For example, only 30 users have more than 40 questions answered about them. This is an expected result from the design of the question selection algorithm. Out of the 13,525 answered questions, 6081 were influence questions (45%), 4,542 were trust questions (34%), and the rest were other questions (21%).

A complete social network graph is unavailable from Facebook as most (non-participating) users restrict third-party access to their friend list. This means, although it was possible to get all friend lists of the participating users, which included in total 56,124 different Facebook profiles, it is rarely possible to obtain interconnections among these profiles, which results in a truncated graph of limited



**Fig. 4.** Participation of users.



**Fig. 5.** Question coverage.

value. However, from the data gathered with the My Secret Insights app, a participation graph can be created. The participating users and their friends about whom they answered questions form the nodes of this graph, in which an edge is established for every answer of a user about a friend. Table 3 lists the characteristics of the participation graph. The average node degree is 2.302 and gives the average number of friends about which questions were answered. Weighting each edge with the number of questions between a user-friend-pair, gives an average node degree of 10.622. This means, on average 10 questions were answered from or about every user. The average path length is 3.956 and the graph shows an average clustering coefficient of 0.788. The participation graph has 19 connected components, but most nodes are included in its largest component (2,035 nodes). This means, that rather small social distances can be observed among the study population, which again depends on the large share of personally recruited participants.

Further statistic data allows the evaluation of the app design. The average My Secret Insights user remains for 11 s on a page and visits 40 pages per session. The average session is 7 min 13 s long, and 77% of the time is spent on the question page, 5% on adding friends to the subset of detailed coverage, and the rest of the time is spent on the gift pages and the homepage. This shows that the app is well designed and enables a quick and extensive answering of questions. 44 out of the 107 users returned to the app after the first day of their visit, which equals to 41% returning visitors. Only 19 users returned on three or more different days to answer questions. Gamification effects were observed between some users, especially in smaller groups, who really tried to be better than their friends. Therefore, the conclusion is that gamification is a principle from which an app can benefit, but not

**Table 3**  
Characteristics of the participation graph.

Number of Nodes	2,412
Number of Edges	13,525
Average Node Degree	2.302
Average Weighted Node Degree	10.622
Average Path Length	3.956
Average Clustering Coefficient	0.788
Connected Components	19
Size of Largest Component	2,035

everyone is affected by it. For example, the two top users would not have answered 999 questions, without the extended friendship graph as a reward for doing so. For others, however, the incentive was not desirable enough. Nevertheless, gamification had no negative effects on our results, instead some positive effects could be observed.

## 5.2. Evaluation of influence and trust

In order to develop a model to determine influence and trust of people by opinions of friends and objective metrics derived from the social network structure, the general rating behavior of My Secret Insights users is investigated. To find how ratings differ among different users, the standard deviation of ratings is determined. Finally, the relation between subcategories and the ratings for influence and trust is investigated.

Fig. 6 shows the cumulative distribution of the fraction of friends rated with a specific (a) influence and (b) trust score. Fig. 6(a) shows the cumulative distribution of influence ratings. The rating given is coded in the color and reaches from 1 (low influence) to 5 (high influence). The fraction of friends rated with low influence is highest on average. More than 10% of users pretend that none of their friends has an influence on them. For higher influence ratings the fraction of friends rated decreases. 90% of the users rate less than 10% of their friends with high influence, and 70% of the users rate none of their friends having a high influence. The results show that users pretend that they are not influenced by their friends. Most users assign only low ratings on the influence of friends. If higher influence ratings are assigned, they are only given to very few of their friends. The reason for this behavior could be that the users don't want to admit that they are influenced. This behavior is clarified in Fig. 7(a), which shows the percentiles of the fraction of users rated dependent on the influence rating given. All percentiles decrease with higher influence ratings. Fig. 6(b) shows the cumulative distribution of trust ratings and Fig. 7(b) shows the corresponding plot for the percentiles dependent on the trust rating. On average the highest fraction of friends is rated with a medium trust score of 3. The fraction of friends rated with lower or higher trust scores decreases. On average least friends are rated with the lowest trust score of 1 which can be expected since friends should be able to trust each other. It is still remarkable that 60% of the users do not trust 10% of their friends. However, the percentiles are skewed towards higher trust ratings, which shows that users tend to trust their friends. The results can be explained that either users do not want to admit that

they don't trust their friends or that there is a base trust among friends in social networks.

In order to investigate if there are users that have a high influence, or that enjoy more trust than others, we study the ratings of users that received at least 10 ratings. Fig. 8(a) shows the distribution of influence ratings for the three users that received the most influence ratings. The users are coded in the different colors of the bars. The distribution of the blue and green user is similar; both are rated with a medium influence on average. The red user seems to have more influence, since it received influence score 4 most frequently and since it also has the highest share of score 5 ratings. This result shows that users have different influence. Fig. 8(b) shows the distribution of trust ratings for the 6 users who received most trust ratings. The 6 users can be divided in two groups. The dark blue, the turquoise, the orange and red user are highly trusted, receiving trust score 5 most frequently. The light blue and yellow user are less trusted, receiving mainly trust score 4 and also trust score 3 more frequently. Hence, there are users that enjoy more trust than others.

To evaluate to what degree the ratings assigned and received by an individual user vary, the standard deviation of ratings is studied. Fig. 9(a) shows the cumulative distribution function of the standard deviation of ratings for influence and trust assigned and received. More than 10% of users assigned always the same rating for influence or trust resulting in a standard deviation of 0. The standard deviation of ratings assigned for trust tends to be higher than for received ratings. This might depend on the fact that users generally assigned low ratings for influence. The standard deviation of ratings received was evaluated for users that received at least 2 ratings. The standard deviation is 0 in more than 80% of the cases. This could depend on the fact the users agree on the trust and influence of a person. However the reason could also be the small sample size. Fig. 9(b) shows the cumulative distribution of the standard deviation of received ratings for users that received at least 5 ratings. The standard deviation here is much higher. The standard deviation of trust ratings is lower than the standard deviation of influence ratings on average. Hence, users seem to concur more on the trust of a person than on its influence.

To model the influence and trust of people by objective metrics derived from the social network structure the ratings can be correlated with different metrics of the network nodes. As a first step we investigate if the number of friends, i.e. the node degree, is correlated with a person's trust or influence. Fig. 10 shows the scatter plot for the correlation of the number of friends and (a) the average influence rating received and (b) the average trust rating received, for users that received at least 5 ratings. The correlation

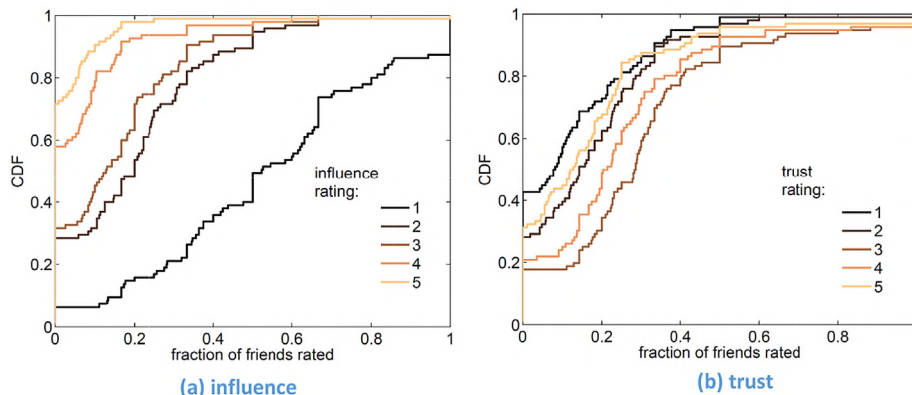


Fig. 6. Cumulative distribution of the fraction of friends rated with (a) influence and (b) trust rating 1 (low) to 5 (high).

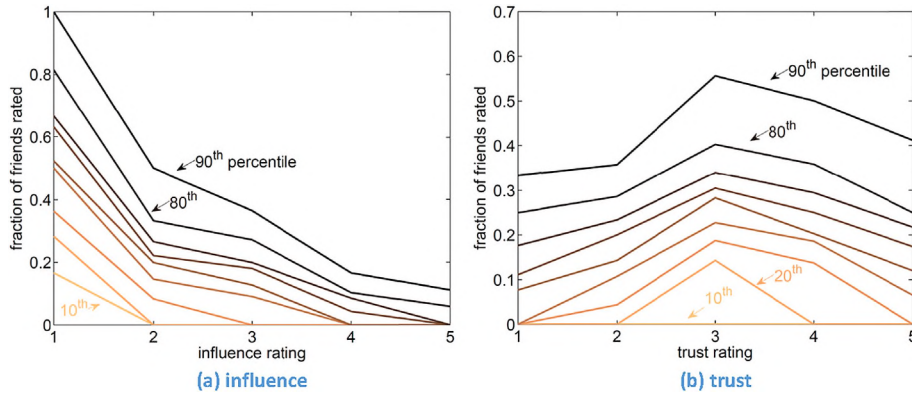


Fig. 7. Percentiles for the fraction of friends rated for (a) influence and (b) trust.

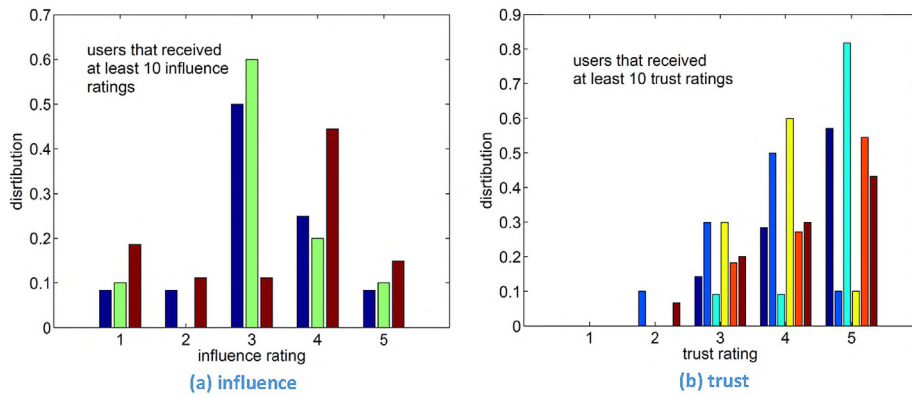


Fig. 8. Ratings received of friends rated for (a) influence and (b) trust.

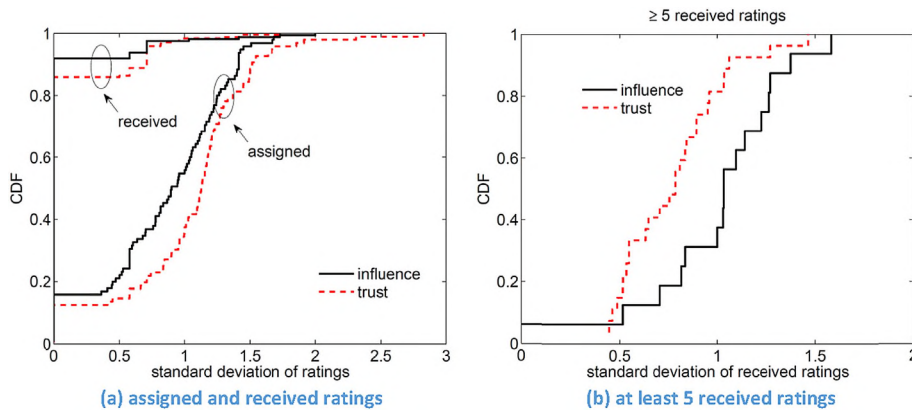
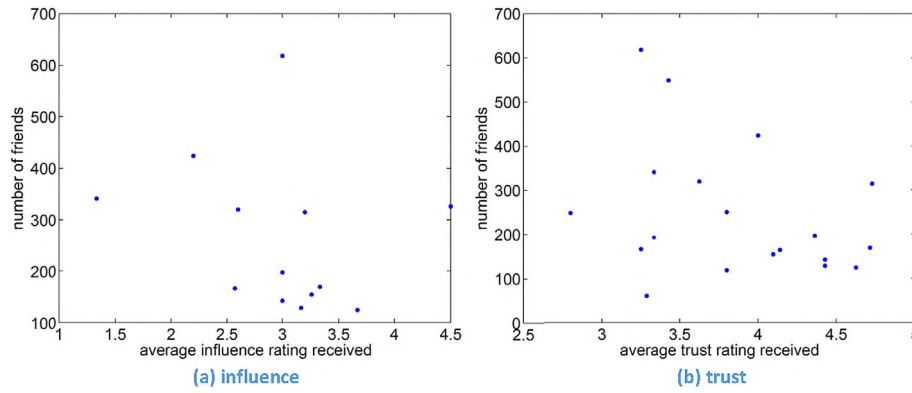


Fig. 9. Cumulative distribution of standard deviation of (a) ratings assigned and received and (b) ratings received by users that received at least 5 ratings.

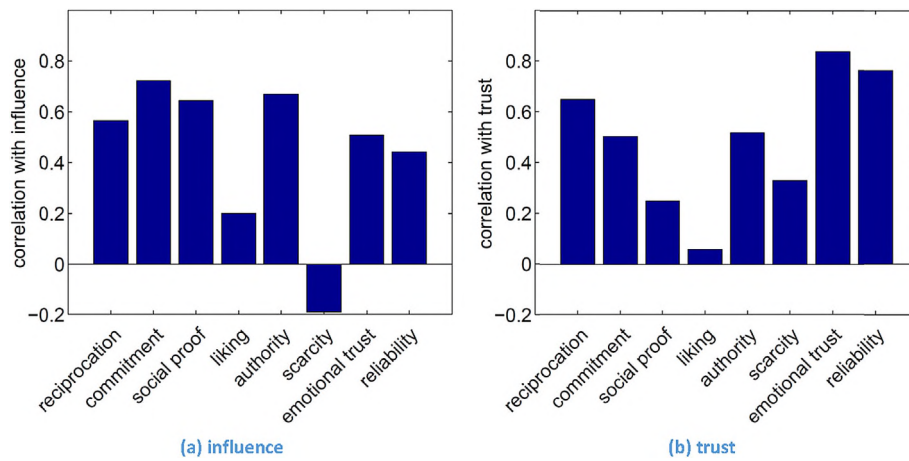
coefficient is  $-0.17$  and  $-0.32$  of influence and trust with number of friends, respectively. Hence, there is no correlation measurable, but the small set of ratings received for individual users does not support a conclusion. Hence, to derive models from objective metrics derived from the social network structure larger datasets are necessary.

Finally trust and influence of people can be determined by opinions of friends. In order to investigate in how far friends opinions correlate with a person's influence and trust the answers on the subcategory questions were evaluated. Fig. 11 shows the correlation of the different subcategories with (a) influence and (b)

trust. Categories 1 to 6 (reciprocation to scarcity) are related to influence and categories 7 and 8 (emotional trust and reliability) are related to trust. Liking and scarcity do not correlate with influence, which is reasonable, since the frequency a person posts and its profile picture are not connected to its qualities. The other subcategories related to influence have correlations around 60%–70% with the influence score and can be used to infer a friends influence. The highest correlations can be observed between the subcategories of trust and the trust ratings. Hence, emotional trust and reliability are strong indicators if a person is trustworthy and can be used to identify trusted users.



**Fig. 10.** Correlation of number of friends with (a) average influence rating received and (b) average trust rating received.



**Fig. 11.** Correlation of subcategories with (a) influence and (b) trust.

The main categories and subcategories were also assessed in terms of Cronbach's  $\alpha$ , which indicates if all subscales measure the same construct (Cronbach, 1951). All relationships, which were rated on all subscales, i.e., 265 (influence) and 555 (trust) relationships, could be considered. The high scores of  $\alpha = 0.9490$  (influence) and  $\alpha = 0.8931$  (trust) indicate that the used categories are internally consistent. For the single items of each scale, a computation of  $\alpha$  was not feasible as for no relationship all items of a scale were rated due to the test design. A dedicated within-subject experiment would be needed to further evaluate the quality of the used questionnaire.

### 5.3. Discussion

The high participation in the "My Secret Insights" game shows that it is possible to easily recruit users for a complex psychological study with the help of an online social network game. The users valued the gamification elements like points, rankings, and unlockable gifts, and were also driven by the curiosity to learn new insights about themselves and their friends. An additional benefit of conducting the study in an online social network is that objective data about the user, the friends, and the relationships are available. In our Facebook app, the data could be obtained by the Facebook API, if the user granted the required permissions. Again the gifts were used, which analyzed and presented insights from these data as an incentive to get permissions from the users. However, the design of the psychological study had to be

modified. Short and simple questions targeted on a specific user have to be used, and the questions had to be varied to avoid boredom of the participants.

Therefore, in this work, we planned to investigate if it is possible to investigate complex phenomena like social influence and interpersonal trust with a game. The results of the main questions that users are fine showing their trust in people but do not like to admit being influenced, were expected and are well in line with our hypothesis. As the test execution was monitored and unreliable ratings were filtered, the results have a high confidence. Moreover, we showed that a broad assessment of a large number of friends was possible. However, the results are limited in that the test participants were mainly German students between 20 and 25 years old. Thus, from our current data no generalized results can be derived. The app would have to be promoted on a larger scale to have a larger and more diverse study population.

Having only main questions will quickly bore the participating users in a fast paced online social network game. Thus, for each psychological concept, we selected a model from literature that allowed to assess subcategories with simple and diverse questions. Most subcategories have a high correlation with the main influence questions, which supports our hypothesis. Liking and scarcity might fail here because many of the questions were also targeted toward the representation and behavior of the friend in the OSN (e.g., profile picture, frequency of postings), which might not be a good indicator of the real qualities of that person. However, a targeted study would be needed to investigate this effect.



Finally, we investigated if the objective data obtained about the participants and their friends provide a valuable estimate of influence and trust. Although the idea of correlating objective data and subjective ratings is nice, the limitation here was that the complete social network graph of the participating users was not available. This is due to the high privacy settings of the German users, which rarely allow third party access to their friend list. Thus, the only objective data we could analyze was the number of friends of the users, for which we observed no significant correlation between number of friends and influence or trust. If a complete graph was available in future or in a different social network, more sophisticated metrics, like betweenness centrality or clustering coefficient, could be analyzed, for which a higher correlation is expected.

## 6. Conclusion

This work presents a flexible framework for personalized surveys on relationships in OSNs. Therefore, a Facebook app was developed, which follows a gamification design. The integration into Facebook allows gathering and storing objective data like personal information, interactions, and a social network subgraph consisting of all app users, the friends of these users, and all connections between them. Thus, the app is able to create a real life OSN dataset for the analysis of relationships. Unlike previous approaches, which estimated psychological properties only from such objective data, in this game, users are asked directly to rate their own relationships. Thereby, subjective information about the friend relationships can be obtained.

The app, which is called “My Secret Insights”, was launched for a subjective assessment of influence and trust. Therefore, two tests were designed, which rely on psychological models from literature. The tests are structured to allow for a broad assessment of many users with the help of main questions, as well as a detailed assessment of a small subset of friends with the help of the sub-category questions. In the first three months, over 100 users actively answered more than 13,000 questions about their friends. This shows that the app is well designed to quickly and effectively answer questions. Moreover, the included gamification elements show positive effects on the user participation.

The results show, that while users are fine showing their trust in people that do not like to admit being influenced by friends. However, the influence and trust of users differs. There are users that have more influence and enjoy more trust than others. To be able to identify friends that have an influence on a user without asking the user directly about their influence, the correlation of social qualities with influence and trust was studied. The results show that qualities like commitment or authority are indicators for influential persons.

Considering all these points, this work is able to provide the basis for a deeper understanding of psychological aspects in online social networks. Since it is able to survey properties of relationships between two individuals and fetch data from the Facebook Graph API, it bridges the gap from subjective data to objective measurements and actual interaction between users in online social networks. Thus, it can be used to analyze correlations between subjective ratings and objective data. Furthermore, the presented framework establishes the basis for future research on both the structure of online social networks and the interactions within, especially focusing on subjective aspects.

## Appendix

In this following, the complete instrument is given as the listing of questions per (sub-)category. The placeholder `[[name]]` is

substituted by a friend, which was selected according to the question selection algorithm (cf. Fig. 1).

---

### Influence

How much influence does `[[name]]` have on you?

How high is `[[name]]`'s influence on you?

How strongly does `[[name]]` influence you?

### Reciprocity

How many likes do you get from `[[name]]`?

How many comments do you get from `[[name]]`?

How often does `[[name]]` share your postings?

How often does `[[name]]` invite you to an event?

How often does `[[name]]` like your postings compared to the postings of other people?

How often does `[[name]]` comment on your postings compared to postings of other people?

How often does `[[name]]` share your postings compared to the postings of other users?

Does `[[name]]` invite you to events more often than other people?

Does `[[name]]` care about you?

Are you indebted to `[[name]]`?

Does `[[name]]` show engagement on things or topics which are interesting to you?

Does `[[name]]` show engagement on things or topics which are important to you?

Did `[[name]]` do you a favor?

Did `[[name]]` help you in a hard situation?

Did `[[name]]` complete a task for you?

### Commitment and Consistency

Did you send `[[name]]` the invitation to become friends?

Did you ever view a posting of `[[name]]`?

Did you ever like a posting of `[[name]]`?

Did you ever comment on a posting of `[[name]]`?

Did you ever share a posting of `[[name]]`?

Did you ever visit a web page which was posted by `[[name]]`?

Did you ever use an app for which `[[name]]` sent you an invitation?

Did you ever agree on `[[name]]`'s opinion?

Did you ever follow an advice of `[[name]]`?

Did you ever do something which was recommended by `[[name]]`?

Did you ever do something to which `[[name]]` encouraged you?

Did you ever do something because `[[name]]` insisted?

Did you ever change your opinion because of `[[name]]`?

Did you ever buy something which was recommended by `[[name]]`?

Did you ever go to a place which was recommended by `[[name]]`?

### Social Validation

Do you think many people like the postings of `[[name]]`?

Do you think many people comment on `[[name]]`'s postings?

Do you think many people share `[[name]]`'s postings?

Do you think that `[[name]]`'s postings are interesting to many people?

Do you think that the postings which `[[name]]` likes are interesting to many people?

Do you think that the postings which `[[name]]` shares are interesting to many people?

Is `[[name]]` a role model for you?

Does `[[name]]` behave in a correct and appropriate way?

Do you think `[[name]]` is an honest person?

Can you rely on `[[name]]`?

Do you have confidence in `[[name]]`?

How many properties does `[[name]]` have which are typical for your friends?

If you were not sure how to behave in a certain situation, would you watch how `[[name]]` behaves?

Do you watch how `[[name]]` is dressed?

Did you ever use expressions of `[[name]]` in your own vocabulary?

### Authority

Did `[[name]]` ever criticize somebody because of his/her posting?

Did `[[name]]` ever compliment somebody because of his/her posting?

Do you think `[[name]]` is well informed about the topics of his/her own postings?

If you were not sure whether you should like a posting, would you look if `[[name]]` also liked it?

Did `[[name]]` ever delete one of your postings?

Is `[[name]]` your boss?

Do you think `[[name]]` is well informed about the topics in which you are interested?

Do you think `[[name]]` is an authority in a certain topic?

Do you think `[[name]]` is well informed about lots of different topics?

(continued)

Would you ask [[name]] for advice?  
 Did [[name]] ever criticize you?  
 Did [[name]] ever compliment you?  
 How often did [[name]] take a decision for you?  
 How important is [[name]]'s opinion for you?  
 Would you publicly criticize [[name]]?  
*Liking*  
 How do you like the profile picture of [[name]]?  
 How do you like the cover photo of [[name]]?  
 How often do you like postings which [[name]] also likes?  
 Do you follow [[name]]'s life in Facebook?  
 Does [[name]] post about topics in which you are interested?  
 How interesting are [[name]]'s postings to you?  
 How often do you invite [[name]] to an event?  
 How close are [[name]] and you?  
 Do you think [[name]] is attractive?  
 Do you like [[name]]?  
 How many hobbies do [[name]] and you have in common?  
 How many interests do [[name]] and you have in common?  
 Do [[name]] and you have similar values and beliefs?  
 How often do you appreciate something which [[name]] also appreciates?  
 How often do you go to places to which [[name]] also goes?  
*Scarcity*  
 How often do you see postings of [[name]]?  
 How often do you see news from [[name]] in the news feed?  
 How often do you communicate online with [[name]]?  
 Do you think [[name]] is frequently online in Facebook?  
 Do you think [[name]] posts frequently?  
 Do you think [[name]] frequently likes postings?  
 Do you think [[name]] frequently comments on postings?  
 Do you think [[name]] frequently shares postings?  
 When was the last time [[name]] posted?  
 When was the last time [[name]] commented on a posting?  
 When was the last time [[name]] shared a posting?  
 When was the last time [[name]] liked a posting?  
 When was the last time you met [[name]]?  
 How often do you hear news about [[name]]?  
 How often do you meet [[name]]?  
 How often do you talk to [[name]]?  
 When was the last time you talked to [[name]]?  
 When was the last time you heard news about [[name]]?  
*Trust*  
 How much trust do you have in [[name]]?  
 How high is your trust in [[name]]?  
 How much do you trust [[name]]?  
*Emotional Trust*  
 [[name]] unexpectedly laughs at something you did or said. Do you consider him/her critical and unkind?  
 Can you talk freely to [[name]]?  
 Would [[name]] intentionally misrepresent your point of view in front of others?  
 You didn't handle a situation very well. Would [[name]] criticize you in front of other people?  
 You tell [[name]] what you worry about. Would he/she think your concerns are silly?  
 If [[name]] knew what kind of things hurt your feelings, would he/she use them against you if your relationship deteriorated?  
 [[name]] cannot meet with you because something important came up. Do you believe him/her?  
 You tell [[name]] about your worries. Would he/she discuss your concerns with others?  
 There is something very important for you and you need someone who listens. Would you ask [[name]]?  
 [[name]] gave you a compliment. Would you question if he/she really meant what was said?  
 Do you think [[name]] plays fair?  
 Do you think [[name]] tells you the truth?  
 Would you tell [[name]] about your worries?  
*Reliability*  
 Your alarm clock is broken and you ask [[name]] to call you at a certain time. Does he/she call you?  
 [[name]] promised to do you a favor. Does he/she keep the promise?  
 [[name]] wants to give you a ride but does not arrive on time. Do you think there is a good reason for the delay?  
 Imagine you are injured or hurt. Would [[name]] do what was best for you?  
 [[name]] borrowed something and returns it broken. Does he/she offer to pay for the repairs?

(continued)

[[name]] promised to feed your pet while you are away. Do you worry how well he/she cares for it?  
 Would you lend money to [[name]]?  
 [[name]] borrowed money from you. Does he/she pay it back to you as soon as possible?  
 You have to catch an airplane. Would you be sure [[name]] gets you to the airport in time?  
 You cannot get to the post office. Can you rely on [[name]] to mail an important letter for you?  
 You decide to meet with [[name]] for lunch. Are you sure [[name]] will be there?  
 Would you go hiking with [[name]] in an unfamiliar territory, if [[name]] assured you that he/she knew the area?  
 You want to buy a used smartphone from [[name]]. Do you believe his/her estimate of the smartphone's worth?  
*Classification*  
 Do you know [[name]]'s real name?  
 Do you know [[name]]'s birthday?  
 Have you met [[name]] in person?  
 Do you consider [[name]] a true friend?  
*Coolness*  
 Should [[name]] take part in a TV casting show?  
 How high are the chances that [[name]] would win in a singing competition?  
 Would you invite [[name]] to a lonely island?  
 Did [[name]] ever read a book?  
 What kind of food would [[name]] prefer?  
 Where would [[name]] prefer swimming?  
 If [[name]] was a turtle without a shell, he/she would be ...  
 Is [[name]] scared of spiders?  
 Does [[name]] believe in love at first sight?  
 Does [[name]] believe in extraterrestrials or life on other planets?  
 Does [[name]] believe in ghosts?  
 If [[name]] and another person of the same sex were the only people on earth, would he/she go gay?  
 Would you change your name to [[name]]?  
 Would you take your own life to save [[name]]?  
 Will people remember [[name]]'s name after his/her death?  
 Who would [[name]] rather get stuck in an elevator with?  
 Which superhero would [[name]] be?  
 If [[name]] was a city, which one would he/she be?  
 What tattoo would [[name]] get?  
 What animal would [[name]] be?  
 If [[name]] could choose any superpower, what would he choose?  
 If [[name]] was of the opposite sex, would you still be friends?  
 If [[name]] was of the opposite sex, would you make out?  
 Would [[name]] ever have an affair?  
 What boundary would [[name]] rather build around his/her house?  
 What celebrity would [[name]] go on a date with?  
 How should [[name]] dress up for Halloween?  
 How should [[name]] dress up for carnival?  
 What band member would [[name]] be?  
 What Simpsons' character would [[name]] be?  
 What would [[name]] choose if he/she could have only one thing?  
 What sports should [[name]] do?  
 When is [[name]] online on the Internet?  
 Would you elect [[name]] for president?

## References

- Adali, S., Escrivá, R., Goldberg, M. K., Hayvanovych, M., Magdon-Ismael, M., Szymanski, B. K., et al. (2010). Measuring behavioral trust in social networks. *In Intelligence and Security Informatics (ISI)*, 150–152.
- Aras, H., Krause, M., Haller, A., & Malaka, R. (2010). Webpardy: Harvesting QA by HC. *In Proceedings of the ACM SIGKDD workshop on human computation* (pp. 49–52).
- Bakshy, E., Hofman, J. M., Mason, W. A., & Watts, D. J. (2011). Everyone's an influencer: Quantifying influence on twitter. *In Proceedings of the fourth ACM International Conference on web search and data mining* (pp. 65–74).
- Bond, R. M., Fariss, C. J., Jones, J. J., Kramer, A. D., Marlow, C., Settle, J. E., et al. (2012). A 61-million-person experiment in social influence and political mobilization. *Nature*, 489(7415), 295–298.
- Chard, K., Bubendorfer, K., Caton, S., & Rana, O. F. (2012). Social cloud computing: A vision for socially motivated resource sharing. *IEEE Transactions on Services Computing*, 5(4), 551–563.
- Cialdini, R. B. (1987). *Influence*, 3.
- Cooper, S., Khatib, F., Treuille, A., Barbero, J., Lee, J., Beenen, M., et al. (2010).

- Predicting protein structures with a multiplayer online game. *Nature*, 466(7307), 756–760.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334.
- Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification. using game-design elements in non-gaming contexts. *CHI'11 Extended Abstracts on Human Factors in Computing Systems*, 2425–2428.
- Dunn, J. R., & Schweitzer, M. E. (2005). Feeling and believing: The influence of emotion on trust. *Journal of Personality and Social Psychology*, 88(5), 736.
- Flatla, D. R., Gutwin, C., Nacke, L. E., Bateman, S., & Mandryk, R. L. (2011). Calibration games: Making calibration tasks enjoyable by adding motivating game elements. In *Proceedings of the 24th annual ACM symposium on user interface software and technology* (pp. 403–412).
- Friggeri, A., Lambiotte, R., Kosinski, M., & Fleury, E. (2012). Psychological aspects of social communities. In *Proceedings of 2012 International Conference on privacy, security, risk and trust (PASSAT) and 2012 International Conference on social computing (SocialCom)* (pp. 195–202).
- Ganesh, J., & Sethi, P. (2013). Reputation and trust in social Networks: Empirical results from a Facebook reputation system. In *Proceedings of Americas Conference on information systems*.
- Golbeck, J., & Hendler, J. (2006). Inferring binary trust relationships in web-based social networks. *ACM Transactions on Internet Technology (TOIT)*, 6(4), 497–529.
- Hoßfeld, T., Hirth, M., Redi, J., Mazza, F., Korshunov, P., Naderi, B., et al. (2014). *Best practices and recommendations for crowdsourced QoE-Lessons learned from the qualinet task force crowdsourcing*. Qualinet Whitepaper (No. EPFL-REPORT-204797).
- Jiang, W., Wang, G., & Wu, J. (2014). Generating trusted graphs for trust evaluation in online social networks. *Future Generation Computer Systems*, 31, 48–58.
- Johnson-George, C., & Swap, W. C. (1982). Measurement of specific interpersonal trust: Construction and validation of a scale to assess trust in a specific other. *Journal of Personality and Social Psychology*, 43(6), 1306.
- Kawrykow, A., Roumanis, G., Kam, A., Kwak, D., Leung, C., Wu, C., et al. (2012). Phylo: A citizen science approach for improving multiple sequence alignment. *Journal PLoS ONE*, 7(3), e31362.
- Kee, H. W., & Knox, R. E. (1970). Conceptual and methodological considerations in the study of trust and suspicion. *Journal of Conflict Resolution*, 357–366.
- Keller, E., & Berry, J. (2003). *The influentials: One American in ten tells the other nine how to vote, where to eat, and what to buy*. Simon and Schuster.
- Kelman, H. C. (1958). Vange. *Journal of Conflict Resolution*, 51–60.
- Krause, M., Takhtamysheva, A., Wittstock, M., & Malaka, R. (2010). Frontiers of a paradigm: Exploring human computation with digital games. In *Proceedings of the ACM sigkdd workshop on human computation* (pp. 22–25).
- Krotoski, A. K., Lyons, E., & Barnett, J. (2009). The social life of second life: An analysis of the social networks of a virtual world. In *Proceedings of the 20th International workshop on network and operating systems support for digital audio and video* (pp. 47–65).
- Kwak, H., Lee, C., Park, H., & Moon, S. (2010). What is Twitter, a social network or a news media?. In *Proceedings of the 19th International Conference on world wide web* (pp. 591–600).
- Lewis, K., Gonzalez, M., & Kaufman, J. (2012). Social selection and peer influence in an online social network. *Proceedings of the National Academy of Sciences*, 109(1), 68–72.
- Lewis, J. D., & Weigert, A. (1985). Trust as a social reality. *Social Forces*, 63(4), 967–985.
- Mason, W. A., Conrey, F. R., & Smith, E. R. (2007). Situating social influence processes: Dynamic, multidirectional flows of influence within social networks. *Personality and Social Psychology Review*, 11(3), 279–300.
- Palazon, M., Sicilia, M., & Lopez, M. (2015). The influence of "Facebook friends" on the intention to join brand pages. *Journal of Product & Brand Management*, 24(6), 580–595.
- Rafelsberger, W., & Scharl, A. (2009). Games with a purpose for social networking platforms. In *Proceedings of the 20th ACM Conference on hypertext and hypermedia* (pp. 193–198).
- Regan, D. T. (1971). Effects of a favor and liking on compliance. *Journal of Experimental Social Psychology*, 7(6), 627–639.
- Rotter, J. B. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality*, 35(4), 651–665.
- Seufert, M., Lorey, K., Hirth, M., & Hoßfeld, T. (2013). Gamification framework for personalized surveys on relationships in online social networks. In *Proceedings of the 2013 IEEE/ACM 6th International Conference on utility and cloud computing* (pp. 482–487).
- Suri, S., Goldstein, D. G., & Mason, W. A. (2011). Honesty in an online labor market. *Human Computation*, 11.
- Von Ahn, L., & Dabbish, L. (2004). Labeling images with a computer game. In *Proceedings of the SIGCHI Conference on human factors in computing systems* (pp. 319–326).
- Wang, Y. D., & Emurian, H. H. (2005). An overview of online trust: Concepts, elements, and implications. *Computers in human behavior*, 21(1), 105–125.
- Wilson, R. E., Gosling, S. D., & Graham, L. T. (2012). A review of Facebook research in the social sciences. *Perspectives on Psychological Science*, 7(3), 203–220.
- Wrightsmann, L. S., Jr. (1964). Measurement of philosophies of human nature. *Psychological Reports*, 14(3), 743–751.
- Xu, C. M., Benbasat, I., & Cavusoglu, H. (2012). Trusting those who trust you: A study on trust and privacy on Facebook. In *Proceedings of the 33rd International Conference on Information Systems*. <http://aisel.aisnet.org/iciis2012/proceedings/ResearchInProgress/>.
- Zichermann, G., & Cunningham, C. (2011). *Gamification by design: Implementing game mechanics in web and mobile apps*. O'Reilly Media, Inc.