

Using a Lexical Approach to Investigate User Experience of Social Media Applications

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Abstract. The objective of this research is to examine the most important issues in user experience about social media applications (SMAs) by using a lexical approach. After reviewing prior studies about user interactions with SMA, a process based on the revised lexical approach [52] is adopted to explore patterns among the adjectives in online reviews of SMAs. This process includes four stages: Stage 1: Collecting online reviews, Stage 2: Building a dictionary of SMA descriptive adjectives, Stage 3: Extracting user ratings of adjectives, and Stage 4: Factor analyses. The detailed development process is discussed.

Keywords: Social media applications · Lexical approach · Usability · User experience

1 Introduction

Social media applications (SMA) continue to grow at a fast pace. People of all generations use social media to exchange messages and share experiences of their life in a timely fashion. SMAs are not only a major form of communication but also used increasingly for entertainment, educational, therapeutic, and work-related purposes [37]. To build the best experience we need to understand what elements of using SMA that affect users most. Previous research suggests that user experience of SMA could be affected by SMA designing elements, information processing, and environment. SMA usage could also be influenced by personality, user sociality, and user needs. At the same time, SMA uses impacts user experiences of other systems, products and services in many ways. In addition, it drives user behavior toward specific actions. Furthermore, user experience and implicit feedback from SMA impact e-commerce websites on building an experience and personalization. However, what are really influencing user experiences of SMA are not well studied. Inspired by the lexical approach used in studying personality traits [1], this study attempts to approach user experience through the language used by SMA users. Similar to personality research, it is believed that SMA descriptive words (adjectives or nouns) will play a pivotal role in SMA. The objective of this research is to examine the most important issues in user experience about social media applications by analyzing the adjectives used by users in online reviews of SMAs.

2 Literature Review

Experts based on different perspectives have inspected social media effects on user experience [23]. Researchers also note that one could change user experience of SMA, through SMA designing elements, information processing, and environment [25].

User personality, user sociality, and user needs could affect users experiences of SMA [1]. In addition, SMA uses could improve users experience on other systems, products and services [36]. Moreover, user experience and implicit feedback from SMA could help to build good experience and personalize products and services for users [17].

This section examines prior research on SMA interface design, role of user characteristics, marketing research, and prior SMA experience.

2.1 SMA Interface Design

Prior research suggests that the characteristics of the system of engagements and content enhance viewership of user-generated content, and that the type of background is crucial to user attitude toward the content of the page [39, 41].

Lampe, Ellison & Steinfield (2007) find that shared referents is more likely to increase the amounts of friends than the fields used to express likes and dislikes [25]. Facebook is based on four elements that lead to larger adoptions: provoke/retaliate, reveal/compare, expression, and group exchange [48]. It is also found that the influence in social networks is based on two normal and recognizable patterns, competition and deception, adopted by Facebook [48]. Borgatti and Cross [9] define the way of getting information from others as a process of (1) knowing: comprehending what that individual knows; (2) valuing: surveying what that individual knows; (3) Accessing: having the capacity to get auspicious access to that information; and (4) Costing: understanding that looking for the information from that individual is cost effective [9]. Grange and Benbasat [15] propose that getting Information from and into SMA affected by both user experience and the platform itself [15]. SMA makes information accessible and reduces the cost of sharing information between users [15]. Hutton and Fosdick [16] indicate that users motivation depends on the social media platform and how extract and process information to it. Moncur [29] states that increasing the desirability of personal social networks increases the usefulness of social networks sites. Social network environment changes its members' behavior when compared to non-members. The effect of online activities extends to affect offline events as well. Social media can also be used as lifestyle changing tool [34]. Acquisti and Gross [3] note that people concerned with privacy still join the network and they deal with their privacy concerns by trusting their capability to control the information they give and who gets access to it. It is found that an individual's privacy concerns are only a weak predictor of the membership to the network [3].

2.2 Role of User Characteristics

Social media use is not only influenced by the social media environment itself, it can also be affected by user personality, user sociality, and user needs. Ross et al. [40] indicate that personality structures, inspiration and capability can have a vital bearing on online activities. For example, the time spent on the SMA is positively connected with loneliness and shyness [2, 32]. In the meantime, shyness is negatively associated with the amount of Friends on the SMA [32]. Furthermore, highly extroverted users would have larger number of friends and would engage in more groups than those who have less extroverted characteristics, and users with higher neuroticism characteristics would be more willing to share personally-identifying information on SMA, and less likely to use private messages [6–8, 32]. In addition, user preference of specific social network platforms is associated with differences in personality and the platform design and features. For example, people with high sociability, extraversion and neuroticism have a preference for Facebook while those who have a preference for Twitter have a high need for cognition [18]. Ellison et al. [12] suggest that Facebook usage would provide greater benefits for users facing low self-esteem and low life satisfaction. Social media has the potential to be a socializing and powerful tool [26, 35]. Social network design and uses is inevitably associated with a user's social world and areas of life (work, family, and friends) [30]. The way people think about and manage communication in their social life determines future efforts in social media design. Looking to a specific tool like Facebook, Park et al. [35] show a positive relationship between the intensity of Facebook use and students' life satisfaction, social trust, civic engagement, and observed political participation. Correa et al. [11] claim that the relationship between extraversion and social media use is particularly important among the young adult cohort. McKenna et al. [28] find that users who present their true self in the Internet were more likely than others to have close online friendship and moved these relationship to a "face-to-face" basis. Users' needs and the awareness of the value of the social media can change user experience within it. This even starts from the level of adoption and how it affects the use of social media services [50, 51]. Zhao et al. [51] argue that individuals choose the identities that aid them to better situate within a given social environment depending on the characteristics of the environment in which they find themselves. People with a high need for cognition are more experienced on the Internet, use more hyperlinks, stay longer in the site and use information services in the Internet relatively more than those with a low need for cognition [5, 23]. On the other hand, it is noted that people with low need for cognition prefer interactive over linear sites [5]. Swickert et al. [43] argue that Personality is marginally related to Information Exchange (email and accessing information) and Leisure (instant messaging and playing games).

2.3 SMA Experience and Marketing Research

SMA affects e-commerce websites and its uses in many ways. Kim and Ahmad [22] find that building an experience and personalizing are two of the most effective factors in social media that have a huge impact on e-commerce websites. In fact, social media

leads to both negative and positive experiences. It would be easy to spread bad experiences to a large number of users in the social media platform [22]. It is also easy to accumulate a huge number of good experiences and use word-of-mouth marketing to deliver it [22]. A huge part of the e-commerce market experiences nowadays rest on trust and distrust on SMA. With the open community in social media, users and businesses are building an experience based on this community [22]. In addition SMA is a good tool in providing personalized information and recommended products and services. SMA provides a lot of implicit feedback that could build excellent source of information about users. Thus, a common task of recommender systems is to improve customer experiences through personalized recommendations based on prior implicit feedback [36]. Recommendation system could influence consumers' decision-making [17, 49]. Burke [38] proposes that adding users' preferences to recommendation systems would make personalization more specific and accurate. Jawaheer et al. [21] show that explicit and implicit feedbacks provide different degrees of expressivity of the user's preferences. Joachims et al. [19] suggest that accuracy of implicit feedback would add more personal information to the explicit feedback of the user. Oku et al. [31] propose a recommendation system considering past /current /future users' situations and conditions that influence users expression of information and status at that time. The status of users in social media networks provides information based on: (users past actions and occurred situations at that time, current situation to obtain information from the user status, and future actions the user plan from now and expected situations) [31]. It is found that the user's action patterns depend on situations at each time [31]. It is necessary to extract the user's action patterns considering the situations at each time when the user took the actions [31]. Peska et al. [33] argue that, based on user behavior, collaborative and object rating methods are significantly better than the random method in most of the observed performance measures.

2.4 Role of Prior SMA Experiences

Sykes et al. [44] propose that improved user understanding of a system such as social media application leads to better performance within it and better explanations as to how to use it. SMA users and users who call customer service tend to report different types of performance issues [37]. In addition, Fischer and Reuber [13] state that social media interaction increases the amount of access to resources and it can expand the community [13]. They propose that this huge amount of resources and the connection with more communities makes a significant difference in decision-making and communication [13]. However, they found that investing heavily in social network interactions could lead to less productivity [13]. Also, it could be tricky without considering community orientation and community norm adherence [13]. The type of event in social media and the manner in which users engage in the social media platform changes the purpose of using the social media [10, 46]. In a study on understanding online social network usage from a network perspective, Schneider et al. [42] find that users commonly spend more than half an hour interacting with the online social networks while the byte contributions per online social network session are relatively small.

3 The Lexical Approach

The lexical approach originally used to investigate personalities is based on a lexical hypothesis. The hypothesis states that when salient individual differences are socially relevant to life, these distinctive attributes are encoded into natural languages. If many people recognize a difference, the difference is likely to be expressed by similar terms. Personality traits therefore can be identified by exploring personality descriptive adjectives in natural languages [1, 52, 53]. Zhu and Fang [52] introduced a revised lexical approach to study user experience in game play by analyzing online reviews. Four stages were involved in this revised lexical approach: (1) Stage 1: Collecting online reviews, (2) Stage 2: Building a dictionary of game descriptive adjectives, (3) Stage 3: Extracting game player ratings of adjectives, and (4) Stage 4: Factor analyses [52].

In this study, we argue that the revised lexical approach proposed by Zhu and Fang [52] can be applied to investigate user experience of SMA. It is hypothesized that SMA users will use adjectives to describe important issues/factors in online reviews as they experience SMAs. If we can aggregate a large collection of online reviews about SMAs, the most critical issues/factors related to SMAs would be reflected in the common patterns of adjectives used by users. Section 4 elaborates the detailed lexical analysis process.

4 Method

As suggested by Zhu and Fang [52], this study will employ a lexical analysis process with the following 4 stages:

- Stage 1: Collecting online reviews
- Stage 2: Building a dictionary of SMA descriptive adjectives
- Stage 3: Extracting user ratings of adjectives
- Stage 4: Factor analyses.

Stage 1 Collecting Online Reviews: The primary objective of Stage 1 is to download social media applications reviews from independent online websites and store these reviews in a structured relational database for subsequent analysis. Since the following lexical analysis focuses on the language used by SMA users, only textual information is downloaded. To ensure the quality and representativeness of online content, the following criteria are used to choose the websites where SMA reviews would be downloaded:

- A popular independent SMA review website that has attracted a significant amount of traffic. This criterion helps ensure the diversity of SMA users.
- A highly ranked SMA review websites that user trust. This criterion ensures the popularity and dominance as perceived by the SMA industry.
- A website that contains reviews of a wide variety of SMA. This criterion strives to achieve the maximal generalizability.

Table 1. Sources of online reviews about SMA

Website	Applications	Apps with users reviews	User reviews	Traffic	Alexa rank
148apps.com	7363	948	2383	934,900	21038
Theiphoneappreview.com	3857	243	1616	152,100	170251
Iphoneappreviews.net	1340	901	5024	20,100	915809
Dailyappshow.com	3880	1031	1868	214,700	115367
Appvee.com	1294306	9740	9740	59,600	447364
Whatsoniphone.com	7028	456	2210	114,600	232334
Freshapps.com	45872	1425	3164	57,800	460307
Total number of user reviews	26005				

Based on the aforementioned criteria, seven websites were chosen to download SMA reviews from: 148apps.com, Theiphoneappreview.com, Iphoneappreviews.net, Dailyappshow.com, Appvee.com, Whatsoniphone.com, and Freshapps.com. Table 1 presents the details about these websites. These websites provides us independent reviews by different users: users, developer, expert reviewers and businesses.

A special web crawler program was developed for each of the seven SMA websites using Perl. Perl was selected as the main programming language due to its powerful facility for text manipulations. It has also been used in many scientific inquiries such as bioinformatics. For this study, ActivePerl was installed on Microsoft Windows 7 system and Komodo IDE was used as the main text editor. The following issues were addressed when developing the web crawlers:

- Only texts of SMA reviews are downloaded. Any texts contained in other forms such as image, video, or advertisements are excluded.
- All of the HTML tags or any markup language tags are recognized and removed from the texts.
- Repeated contents are removed. Others might quote same reviews in forum- style content. To minimize possible bias caused by repeated contents, the web crawler programs are designed to detect such contents to the best we could and to remove them during downloading.
- The web crawler programs are developed to traverse entire hierarchical structures on the seven selected SMA Websites that might contain useful content.
- The web crawler programs are designed to resume downloading without duplicating any content if the downloading process is halted by any exceptions.
- Once the SMA reviews are downloaded, they will be stored with all relevant meta information available on the websites such as title and reviewer in a structured relational database. This database will be used as the source of information for future content analyses.

Stage 2 Building a dictionary of SMA descriptive adjective: This stage is designed to parse adjectives describing SMAs from the downloaded online reviews. Four tasks will be involved in this stage: (1) parsing individual words from original texts and checking

the part of speech (PoS); (2) detecting SMA-descriptive terms; (3) filtering out stop words and retaining new jargons created by users; (4) capturing overall frequency and the number of reviews containing a word. To complete these tasks in order, a natural language processing (NLP) application will be developed using relevant Perl modules.

Stage 3 Extracting user ratings of adjective: In Stage 3, each online review will be treated as an independent observation. They will be converted to a dataset by a computer program as follows: (1) Each word on the list of adjectives produced in Stage 2, “Building a dictionary of SMA descriptive adjectives”, is treated as an individual item. The list of adjectives is saved as the field names (columns) of a database table. (2) All online reviews are retrieved one at a time. Each review about one game is processed as an individual record. Adjectives used in the same review must be somehow related because they are used to describe the same application. If an adjective appears in this review, the value for this adjective (field) is set to 1. Otherwise, a zero value is registered.

Stage 4 Factor Analysis: In this stage, an exploratory factor analysis will be conducted to discover potential patterns among the SMA descriptive adjectives. The resulting patterns will reflect the most critical issues/factors concerning SMAs.

5 Current Progress and Next Step

We have completed Stage 1 and are currently working on Stage 2 to extract SMA-descriptive words. As the next step, we will convert the online reviews into a binary matrix and then conduct the factor analysis to discover patterns among the adjectives.

References

1. Ashton, M.C.: Individual Differences and Personality. Academic Press, San Diego (2007)
2. Amichai-Hamburger, Y., Ben-Artzi, E.: Loneliness and Internet use. *Comput. Hum. Behav.* **19**(1), 71–80 (2003)
3. Acquisti, A., Gross, R.: Imagined communities: awareness, information sharing, and privacy on the Facebook. In: Danezis, G., Golle, P. (eds.) PET 2006. LNCS, vol. 4258, pp. 36–58. Springer, Heidelberg (2006)
4. Amichai-Hamburger, Y.: Internet and personality. *Comput. Hum. Behav.* **18**(1), 1–10 (2002)
5. Amichai-Hamburger, Y., Kaynar, O., Fine, A.: The effects of need for cognition on Internet use. *Comput. Hum. Behav.* **23**(1), 880–891 (2007)
6. Amiel, T., Sargent, S.L.: Individual differences in Internet usage motives. *Comput. Hum. Behav.* **20**(6), 711–726 (2004)
7. Amichai-Hamburger, Y., Vinitzky, G.: Social network use and personality. *Comput. Hum. Behav.* **26**(6), 1289–1295 (2010)
8. Amichai-Hamburger, Y., Wainapel, G., Fox, S.: On the Internet no one knows I’m an introvert : extroversion, neuroticism, and Internet interaction. *CyberPsychol. Behav.* **5**(2), 125–128 (2002)

9. Borgatti, S.P., Cross, R.: A relational view of information seeking and learning in social networks. *Manage. Sci.* **49**(4), 432–445 (2003)
10. Cha, M., Haddadi, H., Benevenuto, F., Gummadi, P.K.: Measuring user influence in Twitter: the million follower fallacy. In: *ICWSM 2010*, pp. 1017 (2010)
11. Correa, T., Hinsley, A.W., De Zuniga, H.G.: Who interacts on the Web?: the intersection of users' personality and social media use. *Comput. Hum. Behav.* **26**(2), 247–253 (2010)
12. Ellison, N.B., Steinfield, C., Lampe, C.: The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *J. Comput. Mediat. Commun.* **12**(4), 1143–1168 (2007)
13. Fischer, E., Reuber, A.R.: Social interaction via new social media:(How) can interactions on Twitter affect effectual thinking and behavior? *J. Bus. Ventur.* **26**(1), 1–18 (2011)
14. Goldberg, L.R.: An alternative 'description of personality': The big-five factor structure. *J. Pers. Soc. Psychol.* **59**(6), 1216–1229 (1990)
15. Grange, C., Benbasat, I.: Information technology capabilities for digital social networks. In: *International Conference on Computational Science and Engineering, CSE 2009*, vol. 4, pp. 1054–1059. IEEE, August 2009
16. Hutton, G., Fosdick, M.: The globalization of social media: consumer relationships with brands evolve in the digital space. *J. Advert. Res.* **51**(4), 564–570 (2011). doi:[10.2501/JAR-51-4-564-570](https://doi.org/10.2501/JAR-51-4-564-570)
17. Hu, Y., Koren, Y., Volinsky, C.: Collaborative filtering for implicit feedback datasets. In: *Eighth IEEE International Conference on Data Mining, ICDM 2008*, pp. 263–272. IEEE, December 2008
18. Hughes, D.J., Rowe, M., Batey, M., Lee, A.: A tale of two sites: Twitter vs. Facebook and the personality predictors of social media usage. *Comput. Hum. Behav.* **28**(2), 561–569 (2012)
19. Joachims, T., Granka, L., Pan, B., Hembrooke, H., Radlinski, F., Gay, G.: Evaluating the accuracy of implicit feedback from clicks and query reformulations in web search. *ACM Trans. Inf. Syst. (TOIS)* **25**(2), 7 (2007)
20. Java, A., Song, X., Finin, T., Tseng, B.: Why we Twitter: understanding microblogging usage and communities. In: *Proceedings of the 9th WebKDD and 1st SNA-KDD 2007 Workshop on Web Mining and Social Network Analysis*, pp. 56–65. ACM, August 2007
21. Jawaheer, G., Szomszor, M., Kostkova, P.: Comparison of implicit and explicit feedback from an online music recommendation service. In: *Proceedings of the 1st International Workshop on Information Heterogeneity and Fusion in Recommender Systems*, pp. 47–51. ACM, September 2010
22. Kim, Y., Ahmad, M.A.: Trust, distrust and lack of confidence of users in online social media-sharing communities. *Knowl.-Based Syst.* **37**, 438–450 (2013)
23. Kaynar, O., Amichai-Hamburger, Y.: The effects of need for cognition on Internet use revisited. *Comput. Hum. Behav.* **24**(2), 361–371 (2008)
24. Kumar, N., Benbasat, I.: Para-social presence: a re-conceptualization of 'social presence' to capture the relationship between a web site and her visitors. In: *Proceedings of the 35th Annual Hawaii International Conference on System Sciences, HICSS 2002*, pp. 106–112. IEEE, January 2002
25. Lampe, C. A., Ellison, N., Steinfield, C.: A familiar face (book): profile elements as signals in an online social network. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pp. 435–444. ACM, April 2007
26. Lee, J., Lee, H.: The computer-mediated communication network: exploring the linkage between the online community and social capital. *New Media Soc.* **12**(5), 711–727 (2010)
27. McKenna, K.Y., Bargh, J.A.: Plan 9 from cyberspace: the implications of the Internet for personality and social psychology. *Person. Soc. Psychol. Rev.* **4**(1), 57–75 (2000)

28. McKenna, K.Y., Green, A.S., Gleason, M.E.: Relationship formation on the Internet: What's the big attraction? *J. Soc. Issues* **58**(1), 9–31 (2002)
29. Moncur, W: Improving control of information sharing on social networking sites. In: *Workshop Social Mediating Technologies: Setting the Research Agenda at CHI* (2009)
30. Ozenc, F.K., Farnham, S.D.: Life modes in social media. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. pp. 561–570. ACM, May 2011
31. Oku, K., Nakajima, S., Miyazaki, J., Uemura, S., Kato, H., Hattori, F.: A recommendation system considering users' past/current/future contexts. In: *Proceedings of CARS*, September 2010
32. Orr, E.S., Sasic, M., Ross, C., Simmering, M.G., Arseneault, J.M., Orr, R.R.: The influence of shyness on the use of Facebook in an undergraduate sample. *CyberPsychol. Behav.* **12**(3), 337–340 (2009)
33. Peska, L., Eckhardt, A., Vojtas, P.: UPComp-a PHP component for recommendation based on user behaviour. In: *2011 IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT)*, vol. 3, pp. 306–309. IEEE, August 2011
34. Ploderer, B., Howard, S., Thomas, P., Reitberger, W.: Hey World, Take a Look at Me!: Appreciating the human body on social network sites. In: Oinas-Kukkonen, H., Hasle, P., Harjumaa, M., Segerstahl, K., Øhrstrøm, P. (eds.) *PERSUASIVE 2008*. LNCS, vol. 5033, pp. 245–248. Springer, Heidelberg (2008)
35. Park, N., Kee, K.F., Valenzuela, S.: Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes. *CyberPsychol. Behav.* **12**(6), 729–733 (2009)
36. Peška, L., Vojtáš, P.: Estimating importance of implicit factors in e-commerce recommender systems. In: *Proceedings of the 2nd International Conference on Web Intelligence, Mining and Semantics*, p. 62. ACM, June 2012
37. Qiu, T., Feng, J., Ge, Z., Wang, J., Xu, J., Yates, J.: Listen to me if you can: tracking user experience of mobile network on social media. In: *Proceedings of the 10th ACM SIGCOMM Conference on Internet Measurement*, pp. 288–293. ACM, November 2010
38. Burke, R.: Hybrid recommender systems: survey and experiments. *User Model. User-Adap. Inter.* **12**(4), 331–370 (2002)
39. Ransbotham, S., Kane, G.C., Lurie, N.H.: Network characteristics and the value of collaborative user-generated content. *Mark. Sci.* **31**(3), 387–405 (2012)
40. Ross, C., Orr, E.S., Sasic, M., Arseneault, J.M., Simmering, M.G., Orr, R.R.: Personality and motivations associated with Facebook use. *Comput. Hum. Behav.* **25**(2), 578–586 (2009)
41. Stevenson, J.S., Bruner, G.C., Kumar, A.: Webpage background and viewer attitudes. *J. Advert. Res.* **40**(1/2), 29–34 (2000)
42. Schneider, F., Feldmann, A., Krishnamurthy, B., Willinger, W.: Understanding online social network usage from a network perspective. In: *Proceedings of the 9th ACM SIGCOMM Conference on Internet Measurement Conference*, pp. 35–48. ACM, November 2009
43. Swickert, R.J., Hittner, J.B., Harris, J.L., Herring, J.A.: Relationships among Internet use, personality, and social support. *Comput. Hum. Behav.* **18**(4), 437–451 (2002)
44. Sykes, T.A., Venkatesh, V., Gosain, S.: Model of acceptance with peer support: a social network perspective to understand employees' system use. *MIS Q.* **33**(2), 371–394 (2009)
45. Seraj, M.: We create, we connect, we respect, therefore we are: intellectual, social, and cultural value in online communities. *J. Interact. Market.* **26**(4), 209–222 (2012)
46. Viswanath, B., Mislove, A., Cha, M., Gummadi, K.P.: On the evolution of user interaction in Facebook. In: *Proceedings of the 2nd ACM Workshop on Online Social Networks*, pp. 37–42. ACM, August 2009

47. Valenzuela, S., Park, N., Kee, K.F.: Is there social capital in a social network site?: Facebook use and college students' life satisfaction, trust, and participation1. *J. Comput. Mediat. Commun.* **14**(4), 875–901 (2009)
48. Weiksner, G., Fogg, B.J., Liu, X.: Six Patterns for Persuasion in Online Social Networks. In: Oinas-Kukkonen, H., Hasle, P., Harjumaa, M., Segerståhl, K., Øhrstrøm, P. (eds.) *PERSUASIVE 2008*. LNCS, vol. 5033, pp. 151–163. Springer, Heidelberg (2008)
49. Xiao, B., Benbasat, I.: E-commerce product recommendation agents: use, characteristics, and impact. *MIS Q.* **31**(1), 137–209 (2007)
50. Xu, X., Venkatesh, V., Tam, K.Y., Hong, S.J.: Model of migration and use of platforms: role of hierarchy, current generation, and complementarities in consumer settings. *Manage. Sci.* **56**(8), 1304–1323 (2010)
51. Zhao, S., Grasmuck, S., Martin, J.: Identity construction on Facebook: digital empowerment in anchored relationships. *Comput. Hum. Behav.* **24**(5), 1816–1836 (2008)
52. Zhu, M., and Fang, X.: Introducing a revised lexical approach to study user experience in game play by analyzing online reviews. In: *Proceedings of the 10th Interactive Entertainment Conference (IE2014)*, 02-03 December 2014, 978-1-4503-2790-9/14/12. ACM, Newcastle, NSW, Australia, New York (2014). <http://dx.doi.org/10.1145/2677758.2677760>
53. Zhu, M., Fang, X., Chan, S.S., Brzezinski, J.: Building a dictionary of game-descriptive words to study playability. In: *CHI 2013 Extended Abstracts on Human Factors in Computing Systems*, pp. 1077–1082. ACM, April 2013



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