The Dark Side of Personalization Recommendation in Short-Form Video Applications: An Integrated Model from Information Perspective

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Abstract. Based on the psychological reactance, this study tries to explore the dark side and grey role of the personalization recommendation system of short-form video application in understanding the discontinuance behavior. Specifically, two major depressing consequences of the personalization recommendation system are proposed, namely, privacy concerns and perceived information narrowing. Specifically, personalization recommendation system of short-form video App has significant positive influence on both privacy concern and perceived information narrowing. Besides, the empirical study shows perceived information narrowing is positively related to psychological reactance. However, personalization recommendation system does not lead to discontinuous usage behavior through privacy concerns or perceived information narrowing. Although personalization recommendation has not an indirect effect on discontinuous usage behavior, personalization recommendation has a potential risk to create psychological pressure on users, making personalized recommendations counterproductive. This study renders new insights on the dark side of the personalization recommendation system and provides practical suggestions for short-form video application providers.

Keywords: Personalization recommendation system · Privacy concern · Perceived information narrowing · Psychological reactance · Discontinuous usage behavior

1 Introduction

In recent decades, companies strive to develop and produce various personalization recommendation systems (PRS) and personalized services to their customers, and to overcome the user's needs, the best example is Amazon App's personalized book recommendations [1, 2]. Computer science engineers and scholars are committed to collect users' behavior data, through various kinds of optimized algorithms and advanced analysis techniques, which present more accurate recommendations. However, the personalized recommendation would not be a bonus for the users and may cause them

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unfavorable beliefs to the contrary [1, 3–7]. For instance, as PRS hugely relied on the data collection of users' personal information (e.g. personal identifiers and biographical information), privacy concern may be the foremost reason for consumer reactance [3, 6–8]. Besides, Pariser also warns that high personalization levels limit the diversity of material one sees and resulting in reduced creativity [9]. Although there are potential negative effects of PRS, scant studies have systematically investigated the dark side of PRS from information perspective by integrating the privacy concern and psychological reactance theory. Furthermore, it is unknown whether a negative impact caused by PRS can become a progressively spreading problem or even a phenomenon of user's decline. It may be interesting to find if there is a relationship between users' discontinuance behavior related to the negative impact of PRS.

In the current decade, PRS is widely applied in short-form video application (App). The short-form video gives provision to the users for quickly and easily creating and uploading 15-s videos to share with their friends and family or the whole universe of the internet. The App developers estimate the user's preference through algorithm by tracking the videos click and display those videos that match the user's preference of watching. This article chooses TikTok as the research object, because the APP has a very prominent personalized recommendation function. In the previous interviews, many users talked about being affected by the personalized recommendation function. The characteristics of the personalized recommendation function can be clearly perceived by the users, so it can be regarded as "Personalized recommendation added short video App". High personalization level, especially customize contents and special effect filters, reduces the users' choice cost and information load, but consequently has aroused public concern over the risk of excessive use [10]. Preliminary studies highlighted over-customized content of the App may result in negative feelings and behavior [1, 2]. Like the Chinese short-form video App, namely, TikTok for example, the statistics show that TikTok has been downloaded nearly 800 million times worldwide but approximately 22% of TikTok users have used for some time, then they deleted the App and doesn't use it anymore [11]. Inevitably, this discontinuous usage behavior of users will generate challenges for the App providers because of the decline in consumer's interest and high cost of developing and presenting Apps on mobile devices, thus the roller coaster phenomenon reflects users' negative consequences. That's what considerable attention is required for the production of mechanism, that what are the negative consequences which can be derived from the usage of the PRS.

Therefore, this study conducts an empirical study to examine this issue. Specifically, two research questions are addressed in this study. First, from the perspective of psychological reactance theory, we would like to know how PRS leads to users' perceived information narrowing, which causes an influence on users' discontinuous usage behavior. We will measure the real usage behavior rather than the usage intention or attitude. In the second one, we would like to dig out how PRS influenced privacy concern, which leads to influence users' discontinuous usage behavior. Our study gives theoretical implications for the discipline as well as new insights about the personalized recommendation for practitioners. To the best of our knowledge, this will be the first study not only to propose an integrated model but also systematically investigate the

dark side of personalized recommendation from both the privacy concern and perceived information narrowing angles in Apps simultaneously.

The rest of this study is organized as follows. First, we present an overview of PRS and the theory of psychological reactance and then develop hypotheses. Next, we delineate the research methodology, carry out the data analysis, and conclude the results. Finally, we exhibit our findings and implications for both researchers and professionals.

2 Literature Review and Theoretical Background

2.1 Overview of PRS

To solve the problem of information flood and data overload, system developers introduced a solution which named as PRS [12]. This solution can proactively and smartly suggest items of interest for the consumers based on their objective behavior or explicitly searched preferences [13]. PRS, depends on various types of algorithms that can be classified into four categories: content-based filtering, collaborative filtering, knowledge-based filtering, and hybrid filtering [14–17]. The Amazon website utilizes collaborative filtering, in which the list of recommended items would include a set of books and music that are supposed to be of interest to the user who can browse them anytime anywhere using a smartphone. Furthermore, current PRS is in App generally calculate on collaborative filtering systems [17].

2.2 Privacy Concern

Various scholars defined privacy as a process of anonymity preservation, which is strongly connected with control over one's information [18, 19]. Although PRS helps provide tailored services, the process of collecting users' data and the use of algorithm or techniques to analyze would make users uncomfortable in the way they presumed the invasion of their data by an unauthorized handling of people or unknown third-party organizations, and thus loss over control on their data [17]. The higher degree of seriousness the privacy violation, the stronger would be the users' anxiety. According to the Protection motivation theory, the awareness of "my personal information was threatened and was in the risk" can motivate individuals' protection response: to bound others from accessing personal information [18, 20, 21]. As matter of fact to decrease the use of PRS of App means to abandon the use of App, it refers to individuals' protection response. The previous studies also reported that the higher level of privacy concern more likely motivates individuals to adopt actions to reduce risks [22–24].

2.3 Perceived Information Narrowing

Perceived information narrowing is firstly proposed by Sunstein [25]. In Republic. Com, he described that people tend to selectively associate with individuals of similar viewpoints and consume information appealing to their perspectives, thus resulting in a homogeneous material one sees and information cocoons [25]. Sunstein also presented empirical studies and demonstrated that PRS of the system of communications on one

hand has greatly increased people's ability to filter what they want to read, see, and hear, but on the other hand, such unlimited filtering and years of information assimilation would largely decrease the range of possible choices [25]. The information cocoon room increases the difficulty and trouble of communication between different groups, limits the scope for individuals to receive specific information, thereby continuously enhancing current interests and opinions, and hindering the possibility of accepting other opinions [26]. Due to easier selectivity online, individuals prefer to intake attitude-consistent messages and thus exhibit a confirmation bias [27]. According to the present investigations, Sude considers when the time allocated to attitude-consistent messages exceeds time allocated to attitude-discrepant messages, even though both messages types are available to the same extent, this pattern indicates a confirmation bias [28]. When people are in the information cocoon that they construct, the information society and environment will become more closed, just like in the "echo chamber". Hundt used the word "echo chamber effect" to indicate that in a closed system environment, repeated and recurring dissemination of information can lead to people's ideas to constantly magnifying and consolidated, the absence of critical discussions and a controlled set of opinions about a topic [29]. Negroponte also points out that PRS successfully helps users to constitute "the daily me", but leads them to lose the freedom for information encountering and serendipity [30]. Other similar studies highlighted this phenomenon and named it "filter bubbles". While PRS in mobile Apps could help to filter information and provide the accurate information congruent with users, it could also foster the users' proneness to tunnel vision when they search and process information. In this paper, we use the concept of perceived information narrowing to describe the psychological state after a long time of used PRS.

2.4 Psychological Reactance Theory

Psychological reactance theory (PRT) concerned with how individuals react when their liberty to choose is limited [31, 32]. The magnitude of reactance is posited to be a direct result of how much individuals are aware that they have the freedom to engage in that particular behavior [31, 32]. Previous research has shown that reactance is positively correlated with consumers' contractor behavior, such as the increased attraction for non-recommended products [33], to ignore recommendations [4] or limit the intention to usage service [3]. PRT has been applied to a diverse array of research fields including online advertising [34, 35], the persuasive communication [36, 37], and product or service recommendations [33, 38, 39]. The current article invokes psychological reactance theory to explain the effects that PRS have on the discontinuous usage behavior.

3 Research Hypotheses

PRS is a technique and methodology to solve the problem of information overload in the internet and cyber environment, short-form video App engineers generate a list of recommendations for users to help them find similar short-form videos of their interest. However, personalization has a mixed effect on users, and that personalized services may lead users to negative reactions [40]. Some empirical studies show that users may

presume this personalized recommendation phenomenon negatively as an invasion of privacy [41], and users' disapproval may become a major obstacle for the continuous use of short-form video Apps. Other studies show that personalized recommendation technology reduces the possibility of the occurrence of diverse information, which will lead users to receive a large number of homogeneous information and the user's antipathy [42]. Summing up, this study makes the following hypotheses.

H1. PRS of short-form video App is positively related to privacy concerns.
H2. PRS of short-form video App is positively related to perceived information narrowing.

Although information is recommended and referred according to the user needs, inductive information without user authorization and permission can obstruct the user's normal decision-making and information search process. Taking a business scenario for an example, consumers do not like to buy recommended commodities, which may lead to them feeling anger [43]. High volumes of the same short-form videos may also make users feel invariable and boring. If the methodology of pushing this personalized recommendation information is obvious and single, other sounds have actively deteriorated [44]. The users may think that the application is trying to influence the strategies and methods of their decision which will create psychological reactance. Therefore, this study makes the following hypothesis.

H3. Perceived information narrowing is positively related to psychological reactance.

Recommendation Systems rely on users' cognitive aspects included personality, behavior, and attitude [45]. Through a psychological lens, excessive inducement and persuasion can threaten or limit people's freedom of decision-making, and lead to psychological reactance [3]. The performance of users' psychological reactance to personalized recommendation information is mainly the discontinuous usage behavior. The concept of discontinuous usage was originated from the field of medicine, it was originally used to study the discontinuous usage of drugs [46]. Later on, some scholars introduced it into the field of information systems to study the termination of information systems. For example, researchers studied that, the final stages of the information system life cycle, exploring the discontinuity of information systems from a deeper and digger perspective, using semi-structured interviewing methods to summarize and determine the significant impact on the intent of information system disruption [47]. In addition to that, scholars have also studied discontinuous usage in other modes, such as the discontinuous usage of consumer products [48], the discontinuous usage of voice-activated Intelligent Personal Assistants [49], the users' discontinuous usage in social network context [50], and users' cessation or reduction of Facebook usage due to psychological and behavioral consequences [51]. When also know that the unsustainable usage caused by psychological reactance is worthy of attention. Therefore, this study proposes another hypothesis.

H4. Psychological reactance is positively related to discontinuous usage behavior.

For the purpose to improve the accuracy and precision of recommendation, short-form video App providers collect more personalized information from users when providing a personalized recommendation. Concern over privacy matters, the user's curiosity increases more and more when they are learning to take care of whether their personal information is being collected in extraordinary ways. With the advent of internet technology, the unrestricted nature of the cybersecurity has made privacy a major concern for all online activities [52]. Studies show that present concern about information privacy can affect the usage of applications. When customers become aware of privacy concerns, the click-through ratio drops dramatically [6]. User's anxiety about personal privacy leads them to more and more cautious privacy disclosure behavior, which shows a further reduction in usage behavior [53]. Therefore, this study generates another hypothesis.

H5. Privacy concern is positively related to discontinuous usage behavior.

Summarizing the above literature review and hypotheses, we develop and construct our conceptual model as shown in Fig. 1. Based on psychological reactance and privacy concerns, we discover the impacts of personalized recommendations enabled by short-form video Apps on users' discontinuous usage behavior.

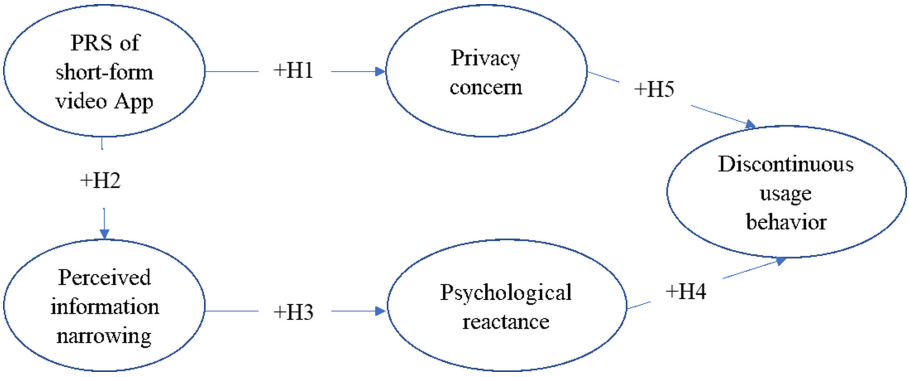

Fig. 1. Structural model

4 Research Methodology

4.1 Research Design

All the items were adapted from the existing literature. Specifically, item of PRS of short-form video App was adapted from Pappas et al. [54], item of Privacy concern was adapted from Huang et al. [55], item of Psychological reactance was adapted from Chen et al. [7], item of Discontinuance usage behavior was adapted from Maier [56], item of Perceived information narrowing was adapted from Du et al. [57]. As the sample comes from China, we translated the questions into Chinese. All the items were measured using

Table 1. Measures of construct

Construct	Items
PRS of short-form video App	**PRS1.** Short-form video Apps can provide and show me with personalized videos tailored to my activity context
	PRS2. Short-form video Apps can provide me with more relevant promotional information tailored to my preferences or personal interests
	PRS3. Short-form video Apps can provide me with the kind of videos that I might like
Privacy concern	**PC1.** I am concerned that too much personal information is collected when I use short-form video Apps
	PC2. I have doubts over how sound my privacy is protected when I use short-form video Apps
	PC3. My personal information could be subject to misuse and unauthorized access when transacting through short-form video Apps
Perceived information narrowing	**PIN1.** The type of information that short-form video Apps recommend to me is relatively single, which makes me miss other types of information
	PIN2. It is more like similar information to me when I use short-form video Apps
	PIN3. Long-term use of the personalized information recommended by short-form video Apps makes my options limit and limit
Psychological reactance	**PR1.** The usage of personalized recommendations on short-form video Apps is forced upon me
	PR2. The usage of personalized recommendations on short-form video Apps is unwelcomed
	PR3. The usage of personalized recommendations on short-form video Apps is interfering
	PR4. The usage of personalized recommendations on short-form video Apps is intrusive
Discontinuous usage behavior	**DIS1.** I use other alternatives to short-form video Apps
	DIS2. I use the alternatives to short-form video Apps for ore than two weeks
	DIS3. I already have one or more alternatives to short-form video Apps

a five-point Likert scale, ranging from (1) strongly disagree to (5) strongly agree. In the first part of the survey, we construct a screening option to ask respondents if they still use the App (the valid answer is the "No"). The content, terminology and language of the survey were evaluated with the help of two experts. Table 1 shows the items and constructs.

4.2 Sample and Data Collection

In order to measure the real usage behavior and access to the target sample, we contacted with teachers from different university departments and requested them to distribute the link for the online survey to students in their classes. Students were assured about the confidentiality of their personal information and were requested by their teachers to volunteer in this study by completing a questionnaire that explored their short-form video Apps usage. To increase the response rate, the researchers conducted a second round of follow-up with their colleagues. The questionnaire was distributed in 2019 for over two months. The link to the questionnaire was distributed among 300 students, out of the 275 who returned the questionnaires. A total of 27 responses were discarded and deleted due to incomplete information and answered "Yes" to the question of still use the App, resulting in a final sample consisting of 248 valid responses.

5 Data Analysis

For data analysis, we applied partial least squares (PLS) as the structural equation modeling approach with SmartPLS 3.0 software [58]. PLS was chosen to validate the conceptual model for it, as it doesn't require multivariate normality of the data [59] and was fit for the exploration study [58].

5.1 Measurement Model

At first, we assessed the reliability of the measurement items by examining the values of Cronbach's α and composite reliability (CR). As presented in Table 2, the scores of Cronbach's α and CR for all the constructs are higher than the criterion values of 0.7 suggested by Fornell and Larcker (1981) [60], which indicates that all the constructs have good reliabilities. Next, we evaluated convergent validity and discriminant validity. The average variance extracted (AVE) values of each construct are higher than 0.5 and the loading values of all items are above 0.7, suggesting that all the constructs have good convergent validity [60]. Table 3 shows the correlations between constructs and square roots of AVEs. We can see that the square root of each construct's AVE is larger than its correlations with other constructs, suggesting sufficient discriminant validity [61].

Table 2. Overview of the measurement model

Construct	Item	Outer loading	Cronbach's Alpha	CR	AVE
PRS of short-form video App	PRS 1	0.925	0.944	0.965	0.902
	PRS 2	0.963			
	PRS 3	0.960			
Privacy concern	PC 1	0.953	0.939	0.961	0.892
	PC 2	0.930			
	PC 3	0.950			
Perceived information narrowing	PIN 1	0.932	0.927	0.954	0.873
	PIN 2	0.919			
	PIN 3	0.951			
Psychological reactance	PR 1	0.887	0.937	0.956	0.843
	PR 2	0.920			
	PR 3	0.927			
	PR 4	0.939			
Discontinuous usage behavior	DIS 1	0.921	0.912	0.945	0.851
	DIS 2	0.940			
	DIS 3	0.906			

Table 3. Correlations between constructs and square roots of AVEs

Construct	DIS	PRS	PR	PIN	PC
DIS	**0.923**				
PRS	0.427	**0.950**			
PR	0.263	0.250	**0.918**		
PIN	0.246	0.524	0.632	**0.934**	
PC	0.240	0.526	0.475	0.711	**0.944**

Note: DIS = Discontinuous usage behavior; PRS = PRS of short-form video App; PR = Psychological reactance; PIN = Perceived information narrowing; PC = Privacy concern. The diagonal elements represent the square root of AVE

5.2 Structure Model

Figure 2 displays standardized path coefficients. Overall, this study examines five hypotheses, and the results support most of them. Specifically, PRS of short-form video App had significant positive influences on both privacy concern ($\beta = 0.526$, $p < 0.001$)

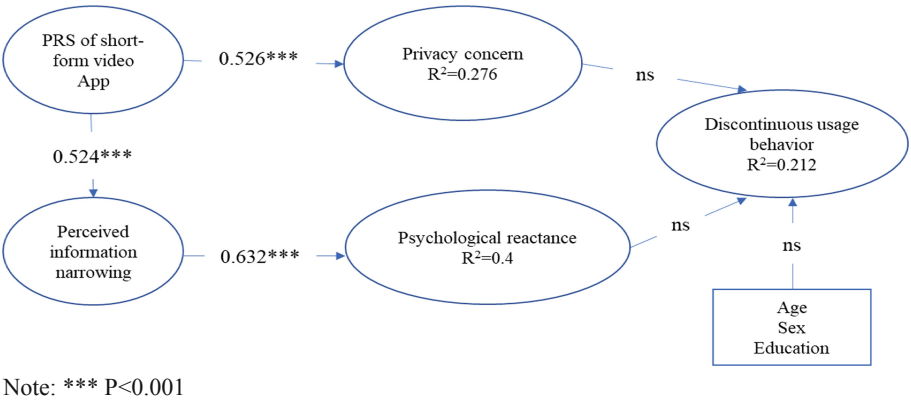

Fig. 2. Results of the structure model

and perceived information narrowing ($\beta = 0.524$, $p < 0.001$), thus H1 and H2 were supported. Perceived information narrowing was positively related to psychological reactance ($\beta = 0.632$, $p < 0.001$), but not related to discontinuous usage behavior ($\beta = 0.186$, $p > 0.05$). Thus, H3 was supported, but H4 was not. To our surprise, although privacy concern has a negative but non-significant relationship with discontinuous usage behavior ($\beta = -0.06$, $p > 0.05$), suggesting H5 was not supported. Besides, we also check the influence of control variables, including age, sex and education, but none of them has a significant effect. Furthermore, we calculated the explained variances. Specifically, it shows discontinuous usage behavior is 0.212, and privacy concern is 0.276. We give more detailed discussions in the following section.

6 Discussion and Conclusion

6.1 Discussion

The aim of this study is to explore and dig out the negative effects of the PRS of short-form video App. This study is particularly important in the way because it is one of the first studies to take the PRS of smartphone App as the research object. Specifically, this study supplements the existing research on information cocoon room based on content intelligent distribution platform from the perspective of PRS of short-form video App, to determine and analyze the impact of PRS on users' discontinuous usage behavior [62]. To the best of our knowledge, this is the first study to propose and empirically two major depressing consequences of the personalization recommendation system. Although prior research acknowledges that long time of PRS could make people boring, neither it is the role of PRS that not enough to lead to the discontinuous usage behavior (indirect effect), nor the direct influence of privacy concern and psychological reactance expressed.

Based on the information cocoons theory, this study highlighted on the construct of Perceived information narrowing, and proved how the PRS of short-form video App induces the perceived information narrowing which in turn causes users' psychological reactance. The study strongly supported the hypotheses, that is a negative psychological

state (such as perceived information narrowing) could generate after a long time of used PRS.

Based on the Privacy concern theory, this study reconfirmed PRS of short-form video App induces and highlight users' privacy concerns. It is confirmed with the previous studies [63]. Surprisingly, privacy concern is not predicted by the discontinuous usage behavior, which is possibly explained by the privacy paradox. According to Norberg et al., the privacy paradox is the relationship between individuals' intentions and disclosure behavior either to disclose fake personal information or their actual personal information. In the Internet environment, users want to know their privacy will be revealed, but would rather sacrifice privacy in exchange for services. In this context, users are aware of the risk of information leakage when the use of short-form video App, but haven't a strong willingness to stop usage behavior. We can see privacy paradox plays its pivotal role. From the empirical study, it shows both privacy concerns and psychological reactance have no significant effect on discontinuous usage behavior, which clearly indicated PRS of short-form video App has no indirect effect on discontinuous usage behavior. There are two possible explanations. One is that the perceived information narrowing is an unconscious state of mind, thus the negative effect of personalization recommendation system in short-form App is not fully perceived by users and does not necessarily lead to users' discontinuous usage behavior. The other possible explanation is that PRS in short-form App is not enough to cause users' discontinuous usage behavior, there are other more critical factors, such as exhaustion or technostress [64].

6.2 Theoretical Implications

This research has several theoretical contributions. First, instead of focusing on the positive side of PRS, our study investigated the users of short-form video Apps who have a suspension behavior and research on the dark side of using PRS, which was previously been ignored. With the increasing App developers are crazy about PRS and the recommended algorithm, the dark side of PRS becomes more and more salient and quashed, and also has not raised enough attention in existed literature. However, in this study, we verified two types of negative consequences that resulted from PRS of short-form video Apps, through which, this research complements previous studies, and contributes to a more comprehensive understanding of the dark side of PRS developer.

Second, based on the information cocoons theory, we contributed to provide an understanding of how the PRS narrowing the user's vision which further leads to the users' negative psychological reactions. Previous studies also highlighted such negative psychological state [25, 29], but lack of a deep understanding of the concept, as well as the analysis of antecedents and outcomes.

Third, this study investigated discontinuance usage behavior rather than attitude or intention, thus complements previous studies that have mainly focused on the behavior intention [65].

6.3 Practical Implications

This study indicated that the App engineers should consider the disadvantages of personalized recommendation, pay strong attention to users' psychological reactions, and

provide personalized recommendation services appropriately. As we pointed out, while personalized services are usually convenient, easy to use, and accurate, users may be psychologically resistant to them, making personalized recommendations counterproductive. Besides, with the use of short-form video more and more in people's daily life, perceived privacy concern will be increasing. It is also a potential risk to cause users' reject using [63], as a direct influence between PRS and discontinuous usage behavior could be verified in the future study. Apps providers thus should prevent the centralization of information and increase the diversification of recommendation information. Personalization would not be a bonus but the fuse of the abandoned behavior, which should be taken into account by App designers and their companies. Therefore, these Apps need to be rigorously reviewed and continuously controlled.

6.4 Limitation and Future Research

This study has some limitations that provide direction for future research. Firstly, this study does not discuss the effect of types of privacy on psychological reactance and discontinued usage. Future studies may go into deep the impact of privacy types. Secondly, the study collects data only in China, and its results should be studied and tested in other cultures. Thirdly, the samples are focused on the student user groups, thus the impact of other types of user groups is not discussed. To overcome these shortcomings, future research should focus on and consider the moderate impact of different occupations and experience groups.

References

1. Nunes, P.F., Kambil, A.: Personalization? No thanks. Harv. Bus. Rev. **79**(4), 32–33 (2001). https://doi.org/10.1111/1468-0440.00114
2. Piggot, J.: Micro-Segmentation and Personalization in Information Systems in the Financial Service Industry. (2015). https://doi.org/10.13140/RG.2.1.3073.9366
3. Lee, G., Lee, W.J.: Psychological reactance to online recommendation services. Inf. Manage. **46**(8), 448–452 (2009). https://doi.org/10.1016/j.im.2009.07.005
4. Fitzsimons, G., Lehmann, D.: Reactance to recommendations: when unsolicited advice yields contrary responses. Market. Sci. **23**(1), 82–94 (2004). https://doi.org/10.1287/mksc.1030.0033
5. Berk, M., Blank, J., Daniels, D., Schatsky, D.: Beyond the personalization myth: cost-effective alternatives to influence intent. Jupiter Research Site Technologies and Operations (2003). 2
6. Aguirre, E., Mahr, D., Grewal, D., Ruyter, K.D., Wetzels, M.: Unraveling the personalization paradox: the effect of information collection and trust-building strategies on online advertisement effectiveness. J. Retail. **91**(1), 34–49 (2015). https://doi.org/10.1016/j.jretai.2014.09.005
7. Chen, Q., Feng, Y.Q., Liu, L.N., Tian, X.: Understanding consumers' reactance of online personalized advertising: a new scheme of rational choice from a perspective of negative effects. Int. J. Inf. Manage. 44(FEB), 53–64(2019). https://doi.org/10.1016/j.ijinfomgt.2018.09.001.
8. Newell, S., Marabelli, M.: Strategic opportunities (and challenges) of algorithmic decision-making: a call for action on the long-term societal effects of 'datification.' J. Strat. Inf. Syst. **24**(1), 3–14 (2015). https://doi.org/10.1016/j.jsis.2015.02.001

9. Pariser, E.: The Filter Bubble: How the New Personalized Web Is Changing What We Read and How We Think. Penguin, London (2011)
10. Zhang, X., Wu, Y., Liu, S.: Exploring short-form video application addiction: socio-technical and attachment perspectives. Telemat. Inform. **44**(SEP), 101–121 (2019). https://doi.org/10.1016/j.tele.2019.101243.
11. O'Connell, C.: 24% of Users Abandon an App After One Use (2017). https://info.localytics.com/blog/24-of-users-abandon-an-app-after-one-use.
12. Hossein, A., Rafsanjani, N., Salim, N., Aghdam, A.R., Fard, K.B.: Recommend. Syst. Rev. **3**(5), 47–52 (2013)
13. Pu, P., Chen, L., Hu, R.: Evaluating recommender systems from the user's perspective: survey of the state of the art. User Model. User-Adap. Interact. **22**(4–5), 317–355 (2012). https://doi.org/10.1007/s11257-011-9115-7
14. Jannach, D., Zanker, M., Felfernig, A., Friedrich, G.: Recommender Systems: An Introduction. Cambridge University Press, Cambridge (2011)
15. Yue, S., Larson, M., Hanjalic, A.: Collaborative filtering beyond the user-item matrix: a survey of the state of the art and future challenges. ACM Comput. Surv. **47**(1), 1–45 (2014). https://doi.org/10.1145/2556270
16. Su, X., Khoshgoftaar, T.: A survey of collaborative filtering techniques. Adv. Artif. Intell. **2009**(12), 1–9 (2009). https://doi.org/10.1155/2009/421425
17. Pimenidis, E., Polatidis, N.,Mouratidis, H.: Mobile recommender systems: identifying the major concepts. J. Inf. Sci. 165–176 (2018). https://doi.org/10.13140/RG.2.2.24011.08488
18. Portilla, I.: Privacy concerns about information sharing as trade-off for personalized news. El profesional de la información **27**(1), 19–26 (2018). https://doi.org/10.3145/epi.2018.ene.02
19. Taddei, S., Contena, B.: Privacy, trust and control: Which relationships with online self-disclosure? Comput. Hum. Behav. **29**(3), 821–826 (2013). https://doi.org/10.1016/j.chb.2012.11.022
20. Posner, R.: The economics of privacy. Am. Econ. Rev. **71**(2), 405–409 (19 81). https://doi.org/10.2139/ssrn.2580411.
21. Mai, J.: Three models of privacy: new perspectives on informational privacy. Nordicom Rev. **37**, 171–175 (2016). https://doi.org/10.1515/nor-2016-0031
22. Youn, S.: Determinants of online privacy concern and its influence on privacy protection behaviors among young adolescents. J. Consum. Aff. **43**(3), 389–418 (2009). https://doi.org/10.1111/j.1745-6606.2009.01146.x
23. Mohamed, N., Ahmad, I.: Information privacy concerns, antecedents and privacy measure use in social networking sites: evidence from Malaysia. Comput. Hum. Behav. **28**(6), 2366–2375 (2012). https://doi.org/10.1016/j.chb.2012.07.008
24. Li, Y.: Theories in online information privacy research: a critical review and an integrated framework. Decis. Support Syst. **54**(1), 471–481 (2012). https://doi.org/10.1016/j.dss.2012.06.010
25. Sunstein, C.R.: Republic. com. Princeton University Press. Princeton (2002)
26. Chen, T.: Opportunities, anomalies and governance of new media under capital logic: case study of wechat subscription "Mi Meng". In: 2nd International Symposium on Social Science and Management In-novation (SSMI 2019). Atlantis Press. https://doi.org/10.26914/c.cnkihy.2019.048893
27. Bennett, W.L., Lyengar, S.: A new era of minimal effects? The changing foundations of political communication. J. Commun. **58**(4), 707–731 (2010). https://doi.org/10.1111/j.1460-2466.2008.00410.x
28. Sude, D.J., Pearson, G.D.H., Knobloch-Westerwick, S.: Journal pre-proof Self-expression just a click away source interactivity impacts on confirmation bias and political attitudes. Comput. Hum. Behav. **114**, 2020. https://doi.org/10.1016/j.chb.2020.106571.

29. Hundt, M., Schneider, B., Mennatallah, E.F., Daniel, A.K., Alexandra, D.: Visual analysis of geolocated echo chambers in social media. In: EuroVis 2017 Eurographics/IEEE VGTC Conference on Visualization 2017, pp. 125–128 (2017). https://doi.org/10.2312/eurp.20171185.
30. Negroponte, N.: Being Digital. Alfred A. Knopf, New York(1995)
31. Chandler, T.: Why discipline strategies are bound to fail. Clear. House J. Educ. Strat. Issues Ideas **64**(2), 124–126 (1990). https://doi.org/10.1080/00098655.1990.9955826
32. Brehm, J.W.: A Theory of Psychological Reactance. Academic Press, New York (1966)
33. Kwon, S., Chung, N.: The moderating effects of psychological reactance and product involvement on online shopping recommendation mechanisms based on a causal map. Electron. Commerce Res. Appl. **9**(6), 522–536 (2010). https://doi.org/10.1016/j.elerap.2010.04.004
34. Edwards, S., Li, H., Lee, J.: Forced exposure and psychological reactance: antecedents and consequences of the perceived intrusiveness of pop-up ads. J. Advert. **31**(3), 83–95 (2002). https://doi.org/10.1080/00913367.2002.10673678
35. Youn, S., Kim, S.: Understanding ad avoidance on Facebook: antecedents and outcomes of psychological reactance. Comput. Hum. Behav. **98**, 232–244 (2019). https://doi.org/10.1016/j.chb.2019.04.025
36. Dillard, J., Shen, L.: On the nature of reactance and its role in persuasive health communication. Commun. Monogr. **72**(2), 144–168 (2005). https://doi.org/10.1080/03637750500111815
37. Moyer-Gusé, E.: Toward a theory of entertainment persuasion: explaining the persuasive effects of entertainment-education messages. Commun. Theory **18**(3), 407–425 (2008). https://doi.org/10.1111/j.1468-2885.2008.00328.x
38. Han, K., Kim, S.: Toward more persuasive diabetes messages: effects of personal value orientation and freedom threat on psychological reactance and behavioral intention. J. Health Commun. **24**(2), 95–110 (2019). https://doi.org/10.1080/10810730.2019.1581304
39. Lee, G., Lee, J., Sanford, C.: The roles of self-concept clarity and psychological reactance in compliance with product and service recommendations. Comput. Hum. Behav. **26**(6), 1481–1487 (2010). https://doi.org/10.1016/j.chb.2010.05.001
40. Samah, N., Ali, M.: Individual differences in online personalized learning environment. Educ. Res. Rev. **6**(7), 516–521 (2011). https://doi.org/10.5897/ERR.9000199
41. Lee, S., Lee, Y., Lee, J., Park, J.: Personalized e-services: consumer privacy concern and information sharing. Soc. Behav. Pers. Int. J. **43**(5), 729–740 (2015). https://doi.org/10.2224/sbp.2015.43.5.729
42. Guo, X., Gan, X.Y.: Burst your bubbles: reflection on the formation and resolution of filter bubbles in an era of recommendation algorithm. Global Media J. **5**(2), 76–90 (2018)
43. Rajat, K.B., Pradip, K.B., Rashmi, J.: A rule-based automated machine learning approach in the evaluation of recommender engine. Benchmark. Int. J. **27**(10), 2721–2757(2020). https://doi.org/10.1108/BIJ-01-2020-0051.
44. Nguyen, C.T.: Echo Chambers and Epistemic Bubbles. Cambridge Unniversity Press **17**(2), 141–161 (2020). https://doi.org/10.1017/epi.2018.32
45. Beheshti, A., Yakhchi, S., Mousaeirad, S., Ghafari, S.M., Goluguri, S.R., Edrisi, M.A.: Towards cognitive recommender systems. Algorithms **13**(8), 12–13 (2020). https://doi.org/10.3390/a13080176
46. Belknap, J.K., Ondrusek, G., Berg, J., Waddingham, S.: Barbiturate dependence in mice: effects of continuous vs. discontinuous drug administration. Psychopharmacology **51**(2), 195–198 (1977). https://doi.org/10.1007/BF00431740.
47. Furneaux, B., Wade, M.R.: An exploration of organizational level information systems discontinuance intentions. MIS Q. **35**(3), 573–598 (2011). https://doi.org/10.1016/j.biopsycho.2011.11.004

48. Lakshmanan, A., Krishnan, H.S.: The aha! experience: Insight and discontinuous learning in product usage. J. Market. **75**(6), 105–123 (2011). https://doi.org/10.2307/41406862
49. Zhao, L., Lu, X., Hu, Y.: a proposed theoretical model of discontinuous usage of voice-activated intelligent personal assistants (IPAs). In: PACIS (2018)
50. Zhao, L., Lu, Y.B., Yang, J., Zhang, S.W.: Get tired of socializing as social animal? An empirical explanation on discontinuous usage behavior in social network services. In PACIS (2015)
51. Luqman, A., Cao, X., Ali, A., Masood, A., Yu, L.: Empirical investigation of Facebook discontinues usage intentions based on SOR paradigm. Comput. Hum. Behav. **70**(5), 544–555 (2017). https://doi.org/10.1016/j.chb.2017.01.020
52. Wu, K.W., Huang, S.Y., Yen, D.C., Popova, I.: The effect of online privacy policy on consumer privacy concern and trust. Comput. Hum. Behav. **28**(3), 889–897 (2012). https://doi.org/10.1016/j.chb.2011.12.008
53. Naveen, F.A., Krishnan, M.S.: The personalization privacy paradox: an empirical evaluation of information transparency and the willingness to be profiled online for personalization. MIS Q. **30**(1), 13–28 (2006). https://doi.org/10.2307/25148715
54. Pappas, I.O., Kourouthanassis, P.E., Giannakos, M.N., Chrissikopoulos, V.: Sense and sensibility in personalized e-commerce: how emotions rebalance the purchase intentions of persuaded customers. Psychol. Market. **34**(10), 972–986 (2017). https://doi.org/10.1002/mar.21036
55. Huang, C.D., Goo, J., Nam, K., Yoo, C.W.: Smart tourism technologies in travel planning: the role of exploration and exploitation. Inf. Manage. **54**(6), 757–770 (2017). https://doi.org/10.1016/j.im.2016.11.010
56. Maier, C., Laumer, S., Weinert, C., Weitzel, T.: The effects of technostress and switching stress on discontinued use of social networking services: a study of Facebook use. Inf. Syst. J. **25**(3), 275–308 (2015). https://doi.org/10.1111/isj.12068
57. Du, J., You, J.: Consumers' willingness to adopt personalized push under the effect of "information cocoon house": the perspective of psychological resistance. Enterpr. Econ., 103–110(2019).
58. Ringle, C.M., Wende, S., Becker, J.M.: SmartPLS 3. SmartPLS GmbH, Boenningstedt (2015)
59. Teo, H.H., Wei, K.K., Benbasat, I.: Predicting intention to adopt interorganizational linkages: an institutional perspective. Society for Information Management and The Management Information Systems Research Center (2003). https://doi.org/10.2307/30036518.
60. Fornell, C., Larcker, D.F.: Structural equation models with unobservable variables and measurement error: algebra and statistics. J. Market. Res., 382–388 (1981). dhttps://doi.org/10.2307/3150980.
61. Straub, D., Gefen, D.: Validation guidelines for IS positivist research. Commun. Assoc. Inf. Syst. **24** (2004). 10.17705/1CAIS.01324.
62. Wang, Y., Wang, P., Zhang, L., Zhang, W.: Research on the "Information Cocoons" of content intelligent distribution platform from the perspective of network information ecological chain. Res. Library Sci. **2** (2018)
63. Alyson, L.Y., Anabel, Q.H.: Information revelation and internet privacy concerns on social network sites: a case study of Facebook. Communities Technol. (2009). https://doi.org/10.1145/1556460.1556499
64. Chen, J.V., Tran, A., Nguyen, T.: Understanding the discontinuance behavior of mobile shoppers as a consequence of technostress: an application of the stress-coping theory. Comput. Human Behav. 83–93 (2019). https://doi.org/10.1016/j.chb.2019.01.022.
65. Huang, C.K., Chen, S.H., Tang, C.P., Huang, H.Y.: A trade-off dual-factor model to investigate discontinuous intention of health app users: fFrom the perspective of information disclosure. J. Biomed. Inform. 2–10 (2019). https://doi.org/10.1016/j.jbi.2019.103302