
Enabling smartphone push notifications: the effect of a framed opt-in request

Diana Gavilan*

Facultad de Ciencias de la Información,
Universidad Complutense de Madrid,
Avda. Complutense s/n, 28040, Madrid, Spain
Email: dgavilan@ucm.es
*Corresponding author

Maria Avello

Department of Marketing,
Facultad de Ciencias Económicas y Empresariales,
Universidad Complutense de Madrid,
Madrid, Spain
Email: mavello@ucm.es

Abstract: The use of push notifications is one of the most relevant strategies to proactively communicate with a user from within various apps. Europe has adopted an opt-in requirement wherein users have to explicitly express that they agree to receive push notifications from apps. This paper examines the influence of two different approaches for framing this opt-in request: focusing on the experiential value the user would eventually receive through the information provided by the notifications (moderated by the personal involvement with the app) and focusing on the social proof aspect, i.e., the behaviour of the majority of the app users (moderated by the user's susceptibility to interpersonal influence). The results indicate that improving the quality of the information provided to the user help firms attain higher levels of user participation. This research deepens the understanding of the consumer's decision process in the context of mobile advertising.

Keywords: opt-in; opt-out; frame request; push notifications; experiential value; personal involvement; social proof; mobile apps; user decision; mobile context; mobile marketing.

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Biographical notes: Diana Gavilan completed his PhD in Economics from the Complutense University at Madrid and BA in Sciences Information (Extraordinary Award) from the Complutense University. Currently, she is a Marketing Professor at the Complutense University. Her research interests are in the field of online decision making and sensory marketing. She is a co-author of two books and more than 40 published articles. She is a regular lecturer in professional forums. She has contributed to this paper with the writing of the literature review, the experimental design, and the discussion sections.

Maria Avello completed PhD in Economics from the Complutense University at Madrid and BA in Business Administration from the Deusto University. Currently, she is a Marketing Professor at the Complutense University. Her research interests are in the field of consumer behaviour and online decision making. She is a co-author of more than 20 published articles and international conferences. She has contributed to this paper with the writing of the methodology section and data analysis.

1 Introduction

The constant increase in the number of apps available on Apple's App Store and Google's Play Store – 2.2 million apps and 2.8 million apps respectively – opens a profitable opportunity for companies that are willing to proactively inform their users about a wide variety of events such as promotions, location-based offers, new offerings (Kang, 2014; Grewal et al., 2016), etc. In such competitive environment, firms need to fight a battle for the user's attention and attract them to their apps or websites. Therefore, companies are constantly searching for tools to reach consumers directly and regularly (Li and Fang, 2019). An effective communication tool available is push notifications.

Push notifications combine the power of short text messages with the appeal and sensory richness of images to specifically target selected users based on their personal interests, past behaviour, or specific time and place they are in (Poppinga et al., 2015).

However, the effectiveness of push notifications is highly dependent on user acceptance. The method of expressing acceptance or rejection to push notifications is relevant from both a marketing and a legal perspective. Two mechanisms are enabled for users to express their acceptance or rejection preferences: the opt-in, in which the user must explicitly accept the receipt of push notifications, and opt-out, in which the user receives notifications by default and has the option to unsubscribe. In the USA, the Direct Marketing Association (DMA) promotes an opt-out approach, whereas in Europe, the European Union Data Directive (1995) endorses the opt-in approach, recently reinforced by the General Data Protection Regulation (GDPR) introduced in 2018. Since one of the concerns in the GDPR is consent, push notifications are vastly addressed in this text.

Using an opt-in vs. an opt-out approach is a major challenge for both mobile operators and companies. In an opt-out approach the consumer is not confronted with the decision to accept or reject the permission request because the decision is made for him by the default option. Hence, users accept most proposals as predicted by the Norm theory (Kahneman and Miller, 1986). In contrast, in an opt-in approach it is necessary to get the user to accept the request (Westermann et al., 2015).

From the users' point of view, it is difficult to anticipate what the advantages and disadvantages of agreeing to receive push notification might be (Lai and Hui, 2006; Wang and Lin, 2017). On the one hand, by accepting push notifications users learn about events and enjoy a better user experience and exclusive price offers and promotions, but on the other hand, they expose themselves to the threat of becoming overwhelmed with messages that eventually turn out to be a source of interruptions and distractions. Push notifications can be disruptive (Duke and Montag, 2017; Levy et al., 2016) and, even worse, annoying.

Despite the importance that push notifications are gaining in delivering timely key information to potential consumers of a brand or retailer (Mehrotra et al., 2016), there has been limited research on how brands and app designers can increase user acceptance rate of push notifications. Therefore, the question that arises is how marketers should ask for permission to get the user's acceptance of push notifications while providing the information needed to take such decision. The study of how to present the opt-in request to the user can be drawn from the framing effect, described by Tversky and Kahneman (1981).

The framing effect shows that a person's decision largely depends on whether the option is presented with a positive or negative connotation, i.e., as a loss or as a gain.

While a large body of research has analysed decisions in a gain-loss situation, there is scarce literature analysing the framing effect in two different gain situations independently, and how they lead to changes in their relative attractiveness.

Therefore, the present study aims to examine independently the effect of the framing of the opt-in request in two positive gain alternatives on the likelihood of accepting push notifications (Johnson et al., 2002; Westermann and Wechsung, 2015).

Specifically, we propose that when an opt-in question is framed with an emphasis on the potential positive benefits to the user experience (experiential value) (Levin et al., 1998); or when opt-in request describes the common behaviour of others (social influence) as described by Cialdini (1993), the likelihood of accepting push notifications would significantly increase. Conversely, when the opt-in is requested without providing any personal or social benefit, and without providing any explanation of what the implications of accepting are, the user will tend to decline to receive push notifications.

An experimental field study was conducted, considering the role of the user's personal involvement (PI) (Zaichkowsky, 1985) with the application and the susceptibility to interpersonal influences (Bearden et al., 1989) as moderating variables.

This approach to the opt-in deepens the understanding of an area that still includes critical aspects that need to be addressed: the consumer decision-making process in the mobile advertising context (Grewal et al., 2016; Varnali and Toker, 2010). We provide evidence that the way in which the user is asked for explicit permission to receive push notifications significantly influences the likelihood of acceptance and also improves the quality of the information provided to the user, thereby enabling firms to attain higher levels of consumer engagement. Results have theoretical implications to user's decision making in the digital environment. At the same time, this research highlights the potential vulnerability of the app users. If the goal of the 2018 regulation (GDPR) was to promote user protection by adopting an opt-in approach, rather than an opt-out approach, the results of this research warn of the weakness of this protection. Additional mechanisms may be required to ensure user protection for digital communication tools.

In the following sections we provide an overview of the literature on push notifications and the framing of the opt-in request, followed by the hypotheses raised. Next, we report the methodology of the experiment and the results obtained. Finally, we conclude by discussing the results and presenting suggested future research directions in the field.

2 Literature review and hypothesis

Mobile devices are important personal communication tools (Bacile et al., 2014), that most users keep within reach during the day, as well as nearby while sleeping. This keeps McLuhan's words still relevant and up to date. The medium transforms human behaviour by influencing the way the message is perceived and the ease with which content is accessed (McLuhan, 1964).

2.1 Mobile use, push notifications and opt-in request

Marketers are seeking to take advantage of the opportunity presented by consumers' intensive use of their smartphones to reach them directly and constantly, creating new opportunities to target their communications. The ubiquity of smartphones combined with the use of apps, allows firms to drive strategies to boost user-brand engagement, improve conversion, monetisation, app usage and brand loyalty (Lee and Gopal, 2016; Gavilan et al., 2020). Mobile apps provide a direct and close communication channel with customers, where the key technological enabler of customer interaction is push notifications. Push notifications inform customers through alerts, driving behaviour toward the landing page of a targeted product, offer, news... These messages are concise and succinct, easy to check at a glance and to disregard if desired. However, push notifications are authorised communications, so companies depend on the user's acceptance, who must decide whether to accept them or not.

The opt-in process is a standard step used by many mobile platforms, smartphone operating systems and apps to allow users to decide whether a third party can access certain protected resources such as personal data, location or availability to send push notifications.

Users sometimes have trouble understanding why they need to accept the permission request, why the app being installed requires access to certain private resources (Harris et al., 2016). In this scenario, making an informed decision becomes difficult (Felt et al., 2012). Hence, the permission request may include explanations about what acceptance of the request would entail and/or some justification of why authorisation is necessary, aiming to make the request more comprehensible and/or easy to accept by the user. Eventually, these requests confront the user with the need to balance potential benefits (enjoying richer user experiences, discounts, promotions, or targeted advertising), and perceived risks, (massive reception of unwanted messages, discomfort due to distractions and interruptions and the perceived risk of loss of privacy). Given the high number of applications installed per mobile phone, this risk becomes almost unbearable for many users, who tend to reject the opt-in option after a brief thought.

2.2 Heuristic processing of information and framed request

The framing effect takes place when our decisions are influenced by the way information is presented. Equivalent information can be more or less attractive depending on what features are highlighted (Tversky and Kahneman, 1981; Kumar et al., 2020; Septianto et al., 2021).

At the time of installation of the app, when users face a permission request, their answers are provided without full attention to the substantive details of the information in the request (Felt et al., 2012). In this circumstance heuristic processing of information

occurs (Chaiken, 1980). This method of information processing involves the use of simple rules developed by the individuals through their past experiences or the observation of others, simplifying the decision-making process (Fiske and Taylor, 1991). Users under heuristic processing of information are sensitive to the positive features that benefits them, focus on readily accessible information, and avoid detailed processing of message content or consider the strength of the arguments.

In social theory, framing “is a rhetorical tool used by communicators to delimit the scope of a situation or argument” (Hallahan, 2008). A frame consists of a schema of interpretation that subjects rely on to understand and respond to events. Though, personal decisions often depend on the individual’s frame. A large volume of literature indicates that when consumers do not fully understand the implications of their choices, framing the information facilitate their decisions.

In a context where the subject processes information heuristically, the formulation of the questions makes a large difference in responses (Cheng et al., 2014; Kahneman and Lovalló, 1993). A framed question that emphasises the positive aspects of an option tends to evoke favourable associations in the decision-maker’s memory and in turn serves as an argument to reinforce the decision taken (Levin et al., 1998). When the information provided to frame a specific request is congruent and easy to understand, the desired behaviour is activated without the need to provide long and complex explanations with a large amount of detail (Abelson, 1976). In other words, the acceptance of a request depends on the specific syntax rather than on the specific content of the statement.

2.3 Framing the opt-in message with an experiential value

The theory of consumption values (Seth et al., 1991) attempts to explain consumers’ decisions as a function of multiple independent values that contribute differentially in any given choice situation. The usage experience of an app itself can also be rich in value, for instance, access to special offers, discounts, private sales, VIP services or immediate information, represent a likely source of value for the user. To benefit from this experiential value, it is necessary to interact with the app.

Advocating the experiential value of using the app in the form of positive and easily comprehensible information given at the right time frame the opt-in request. In these circumstances, the user in doubt about how to proceed, transform the decision in a trade-off between an unknown risk versus the visible experiential value.

Underlying the theory of consumption value is the assumption that the perception of the value is primarily driven by the motivation of the individual. The relevance of the experiential value is based on the user’s needs, wants and interests. The appeal of an enhanced user experience or special offers increases as the user is more involved with the app and its content. The PI between the user and the app’s content will increase the experiential perceived value that are offered and then facilitates the decision-making process (Zaichkowsky, 1985).

A higher level of PI with the content of the app can result in higher users’ perception of the experiential value offered and, hence, in their willingness to accept an opt-in request for receiving push notifications. Therefore, we posit the following hypothesis:

- H1 Framing the opt-in question (while installing an app) with an emphasis on the users' experiential value rather than asking a simple opt-in question will increase the likelihood of the users accepting the push notifications. Furthermore, this effect would be stronger for those subjects who display higher (vs. lower) levels of PI with the app.

2.4 Framing the opt-in request with an emphasis in social benefits

The literature recognises that consumer behaviour cannot be fully understood unless the effects of other people's influence in the decision-making process are considered (Stafford and Benton, 1977). This is particularly relevant when subjects heuristically process the information through the observation of their peers' behaviour to simplify the decision-making process. Social proof heuristics refer to people's tendency to look to the actions of others for clues about what constitutes as an appropriate action (Cialdini, 1993); thus, an imitation of interpersonal influences becomes a characteristic response to uncertainty in decision making (Cyert and March, 1963).

This social proof heuristic can be triggered by a message that indicates what many other people have already done before, such as sharing their personal data and location or authorising push notifications. Social proof is most influential when people do not have the capacity or motivation to make a well-deliberated decision (Amblee and Bui, 2011) or when they are uncertain about the value of a course of action (Rao et al., 2001). In this context, information about the other people's actions becomes relevant for providing a satisfactory explanation of how the user should behave.

Despite the recognition of a general personality trait based on person's relative influence ability by the behaviour of others, subjects widely differ in their tendency to learn by observing others and/or seeking information from others (Bearden et al., 1989). A consumer's susceptibility to interpersonal influence is a two-dimensional construct (Kelman, 1961). The informative dimension refers to the acceptance of information or advice from people who are not known by the subject but who can be considered reliable models of the reality, prior to making decisions (Burnkrant and Cousineau, 1975). Recent research in the technological domain recognises the moderating effect of susceptibility to interpersonal informational influence (Nabi et al., 2019; Jorgensen and Ha, 2019). Therefore, we state the following hypothesis:

- H2 Framing the opt-in question (during an app's installation) with an emphasis on social influence, rather than asking a simple opt-in question, would increase the likelihood of a user accepting the push notifications. Furthermore, this effect would be stronger for those subjects who display higher (vs. lower) levels of susceptibility to interpersonal informational influence.

3 Methodology

To test the influence of framing the opt-in request – and the moderating role of the user's involvement and susceptibility to interpersonal influence – in the likelihood of the user accepting push notifications, we conducted an experiment using an online survey (Fricker and Schonlau, 2002).

Each participant had to provide information on their intention to accept push notifications from a new and fictitious catering app, WiseMenu, according to one of three setting conditions: a simple standard opt-in question, an opt-in question framed on the user's experiential value or an opt-in question framed on social proof. The experimental design was a between-groups given that the opt-in question based on experiential value and opt-in question based on social proof were independent variables. The aim of the experiment was to compare the effects of each form of questioning independently in the likelihood of the users accepting the push notifications. Hence, a factorial design would not have been appropriate.

Each participant had to provide information on their intention to accept push notifications from a new and fictitious catering app, WiseMenu, according to one of three setting conditions: a simple standard opt-in question, an opt-in question framed in experiential value or an opt-in question framed in social proof.

3.1 Sample

For the purpose of this study, 392 undergraduate students were recruited from a large Spanish university. Students who belong to Gen Z are heavy users of smartphones and apps and are familiar with push notifications. Females accounted for half of the total sample (52%), and participants ranged from 19 to 33 years of age ($M = 24.5$). On average, each student had 12 applications downloaded to his/her mobile phone. Among those who completed the survey, four €25 Netflix prepaid cards were raffled.

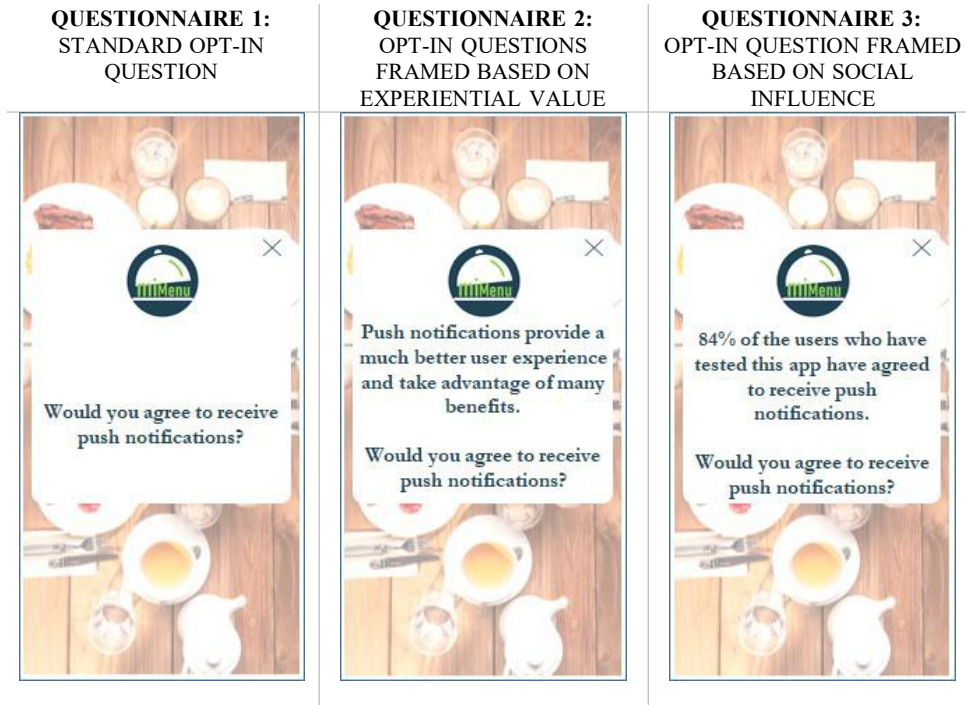
3.2 Design and pre-test

To enhance the likelihood of the subjects feeling comfortable and perceiving the environment as friendly while answering the app-related questions, we administered a brief questionnaire to a sample of 28 students prior to the experiment and asked them several questions about their interest in various app categories. Participants rated their level of interest and degree of familiarity with fashion apps, news apps, catering apps and transport apps on a seven-point Likert scale (1 = lowest and 7 = highest). Catering was rated high in both dimensions ($MCatering = 5.6$, $SD = 1.57$ for interest; $MCatering = 5.41$, $SD = 1.65$ for familiarity).

Three versions of the same questionnaire were developed. In version 1, participants answered the simple standard opt-in question; in version 2, they answered the opt-in question framed in experiential value; and in version 3, participants answered the opt-in question framed in social influence (Figure 1).

To mask the objective of each questionnaire, we included several filler questions about the catering app's functioning, design, organisation, content offerings and associated benefits, along with questions related to the respondent's profile. The questionnaire's layout was developed by an advertising designer who provided a logo and several pictures related to the apps about which respondents would be questioned.

To assess the appropriateness of the survey, the suitability of the procedure and the understandability of the questions, we requested feedback from three experts in social science research.

Figure 1 The three versions of the opt-in request (see online version for colours)

Finally, we conducted a pre-test with a total sample of 32 students. Participants were asked to evaluate their understandability of the questions and wording, the effort required to fill in the answers, and their satisfaction with the length of the questionnaire on a seven-point Likert scale (1 = lowest and 7 = highest).

Each participant was randomly assigned one of the three versions of the questionnaire. Results showed that the understandability of the questions ($M = 5.63$, $SD = 0.91$), wording ($M = 5.66$, $SD = 1.00$), effort to fill in ($M = 2.28$, $SD = 0.92$), and length ($M = 5.06$, $SD = 0.98$) were all suitable. In addition, there were no significant differences for any of the tested variables: understandability of the questions ($F(2, 29) = 0.157$, $p > 0.05$), wording ($F(2, 29) = 2.442$, $p > 0.05$), effort to fill in ($F(2, 29) = 2.551$, $p > 0.05$), and satisfaction with length ($F(2, 29) = 0.117$, $p > 0.05$). No significant gender-based differences were observed.

3.3 Procedure

All participants were informed at the beginning that the study involved research on mobile apps and signed the informed contentment to participate in the study. According to their month of birth, each participant was randomly assigned one of the three versions of the questionnaire. To preserve external validity, we contextualised the survey creating a familiar situation. Participants were told that the research was aimed at evaluating the interest around a new catering app. Each questionnaire began with a brief descriptions of the app's goals, features and labels that categorised the content of the app and the logo. Immediately after, the participants were informed that they had to install the app and that an opt-in question would appear according to the version – a simple standard opt-in

question (n = 128), an opt-in question framed in experiential value (n = 130) or an opt-in question framed in social proof (n = 134) – followed by three filler questions regarding the app design.

All participants, regardless of whether they were asked the simple opt-in question, the question framed in experiential value or the question framed in social proof, answered the questions regarding their PI with catering apps and the susceptibility to interpersonal informative influence. These items were deliberately placed at the end of the questionnaire to avoid biases with the opt-in questions. Responding to the questions took the subjects between 7 and 10 minutes.

3.4 Measurement scales

The independent variables were the conditions related to framing the opt-in question: simple standard opt-in question, opt-in question framed in experiential value and opt-in question framed in social proof.

Table 1 Measurement scales

<i>Variables</i>	<i>Items</i>		
Standard opt-in question	Would you agree to receive push notifications?		
Opt-in questions framed based on experiential value	Push notifications provide a much better user experience and take advantage of many benefits. Would you agree to receive push notifications?		
Opt-in question framed based on social influence	84% of the users who have tested this app have agreed to receive push notifications. Would you agree to receive notifications as well?		
<i>Variables</i>	<i>Items</i>	<i>Reliability</i>	<i>Literature</i>
Personal involvement (PI)	useless–useful worthless–valuable not beneficial–beneficial unappealing–appealing unwanted–wanted	$\alpha = 0.92$	Adapted from Zaichkowsky (1985)
Subject’s susceptibility to interpersonal informational influence (SIII)	To make sure I buy the right product or brand, I often observe what others are buying and using If I have little experience with a product, I often ask my friends about the product I often consult other people to help choose the best alternative available from a product class I frequently gather information from friends or family about a product before I buy it	$\alpha = 0.82$	Adapted from Bearden et al. (1989)

In order to ensure construct validity, we adopted validated scales to measure the independent variables. PI was measured using Zaichkowsky’s (1985) adapted semantic differential scales, rated on a seven-point Likert scale. The subject’s susceptibility to

interpersonal informational influence (SSII) was measured using adapted scales by Bearden et al. (1989) and a seven-point Likert scale, with 1 being ‘completely disagree’ and 7 being ‘totally agree’ (Table 1).

The dependent variable was the likelihood of a user accepting to receive push notifications and was measured with one item on a Likert-seven scale, with 1 being ‘not likely at all’ and 7 being ‘totally likely’. This item was taken from an earlier study, (Agarwal and Prasad, 1999; Venkatesh and Davis, 1996) following the considerations of Ajzen and Fishbien (1980): the intention to accept push notifications was worded with reference to a specific target (to accept push notifications), but was relatively unspecific with respect to time frame.

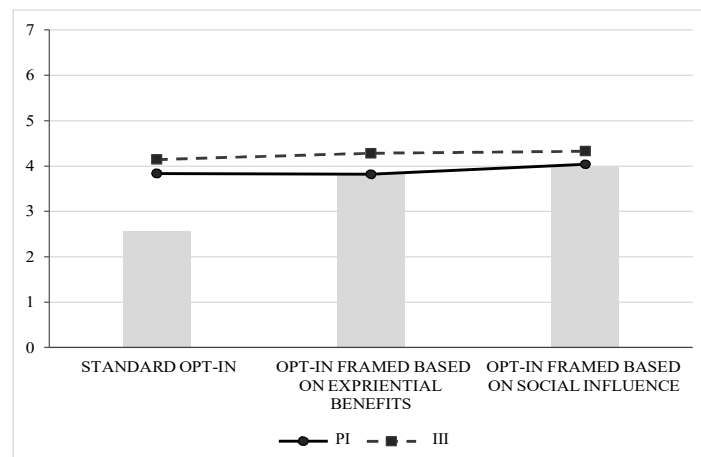
4 Data analysis and results

The five items of the PI scale and the four items of the susceptibility to interpersonal informational influence scale were subjected to principal component analysis (PCA). The suitability of the data for factor analysis was assessed. The KMO value was 0.906, and Bartlett’s test of sphericity reached statistical significance, supporting the factorability of the correlation matrix. The number of extracted factors with eigenvalues equal to or greater than 1 was two (one dimension for PI and one for SSII). All items were assessed on the appropriate factor and factor loadings were higher than 0.6. The scales were summed and averaged separately to form an index of PI and SSII to be used in statistical analysis.

Results showed that the manipulation of the opt-in request was successful. The participants exposed to a simple standard opt-in question reported a significantly low intention to accept push notifications ($M = 2.56$, $SD = 1.11$) compared to those exposed to an opt-in question framed based on experiential value ($M = 3.84$, $SD = 1.27$) or social influence ($M = 3.97$, $SD = 1.01$) and ($F(2, 389) = 59.040$, $p < 0.000$).

Neither PI ($F(2, 389) = 0.876$, $p > 0.05$) nor the participants’ susceptibility to interpersonal informational influence (SSII) ($F(2, 389) = 0.547$, $p > 0.05$) differed among the groups. Figure 2 provides a summary of this initial result.

Figure 2 Means of the variables



4.1 Moderation results

To analyse the interaction effect, we used SPSS version 22.0 together with model 1 in the PROCESS v3 macro (Hayes, 2017) that is specifically designed to estimate simple moderations using linear regression analyses. In addition, it provides the coefficients to interpret the results, visualise the moderation effects and probe the interaction.

This analysis was run in two steps. First, the interaction between the opt-in request framed on experiential value and PI was analysed. Next, the interaction between the opt-in request framed on social influence and the susceptibility to interpersonal influence was examined.

The independent variable was coded as -0.5 and 0.5 and the moderator variable was mean centred prior to the analysis.

4.1.1 Framing the opt-in question with an emphasis in experiential value

Table 2 summarises the moderating effect of PI on the likelihood of a user accepting push notifications when the opt-in request is framed with emphasis on experiential value.

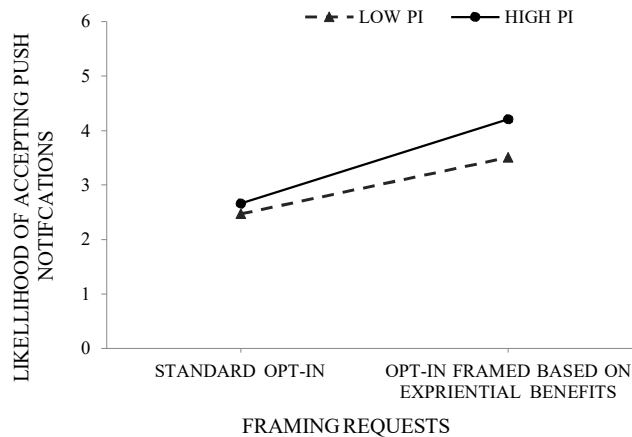
Table 2 Coefficients of the moderation model

Moderator	Coeff.	SE	t	LLCI	ULCI	R ²
Involvement with app (n = 258)						0.256***
Framing opt-in question	1.2862	0.1462	8.796***	0.9983	1.5742	
Personal involvement (PI)	0.1398	0.0506	2.765**	0.0402	0.2393	
Interaction: framing × PI	0.1540	0.1011	1.523	-0.0452	0.3532	

Notes: **p < 0.05 and ***p < 0.001.

Framing the opt-in question based on experiential value and PI with the app independently predicted higher scores in the likelihood of a user accepting the push notifications. However, contrary to what we had predicted in H1, the interaction between both variables was not significant. This result is depicted in Figure 3.

Figure 3 Interaction effect of the user’s PI and the framing request on the likelihood of accepting push



For the standard opt-in question condition, the likelihood of accepting push notifications was significantly higher for those subjects who stated being more involved with the app. However, high levels of PI with the app did not seem to reinforce this effect in the framed condition. The likelihood of a user accepting push notifications for both conditions was independent of the user's PI with the app.

4.1.2 Framing the opt-in question with an emphasis on social influence

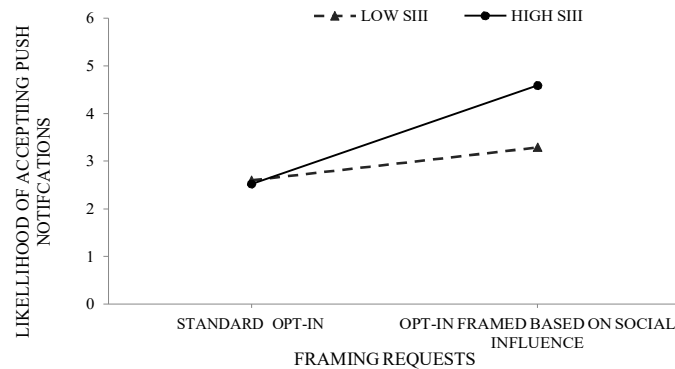
In accordance with H2, the interaction between framing the opt-in question and the susceptibility to interpersonal informational influence was significant; the impact of framing the opt-in question based on social influence depended on the individuals' level of susceptibility to interpersonal informational influence. The results of the moderation effect are displayed in Table 3 and Figure 4.

Table 3 Coefficients of the moderation model

Moderator	Coeff.	SE	<i>t</i>	LLCI	ULCI	<i>R</i> ²
Subject's susceptibility to interpersonal informational influence (n = 262)						0.391***
Framing opt-in question	1.3749	0.126	10.906***	1.1266	1.6231	
Susceptibility to interpersonal informational influence (SIII)	0.1909	0.043	4.465***	0.1067	0.2751	
Interaction: framing × SIII	0.4191	0.085	4.909***	0.2510	0.5873	

Notes: ***p* < 0.05 and ****p* < 0.001.

Figure 4 The interaction effect of susceptibility to interpersonal influence and the framing requests



The Johnson-Neyman technique was used to evaluate the region of significance defined by the interaction. The results showed that the impact of framing the opt-in question on the likelihood of the user accepting push notifications was statistically significant only for values of susceptibility to interpersonal informational influence above 2.02. This means that as susceptibility to interpersonal informational influence increases, the relationship between framing the opt-in question based on social influence and the likelihood of the user accepting push notifications becomes stronger.

5 Discussion

The primary objective of this research was to further examine independently the role of two different gain strategies for framing the push notification opt-in request during the process of installing an app on an electronic device. Results provide evidence that framing the opt-in request by drawing attention to positive gains (experiential value and social proof) has a positive effect on the likelihood of the user accepting push notifications. Furthermore, it corroborates the hypothesis that the way the questions are framed is relevant to the respondent's answer (Johnson et al., 2002).

At the same time, the strong influence of the framing request on the decision to accept or reject push notifications calls into question the true will of the user. Therefore, the discussion of the results obtained can be made in the light of the impact of an effective marketing strategy, or as evidence of the vulnerability of the mobile device user.

Participants reacted differently to the framing of two-alternatives of the opt-in request. Those who were presented with the option of enjoying experiential value (vs. a simple opt-in question) increased their likelihood of accepting. The same result was obtained for those participants who were more engaged with the app. However, we could not conclude that framing the opt-in request on experiential value depends on user involvement. The interaction was not significant, thus H1 was partially accepted.

Those participants who were presented with the opt-in request framed in the social proof heuristic (vs. a simple opt-in question) showed a higher likelihood of accepting push notifications as well as those most susceptible to interpersonal social influence. Additionally, the interaction between both variables was significant.

The use of the social proof heuristic to facilitate easier and faster deliberation is supported by recent literature in several decision contexts such as retailing decisions (Amblee and Bui, 2011; Salmon et al., 2015) or hotel evaluations (Gavilan et al., 2018).

These results are consistent with Tan et al.'s (2014) findings for the Apple iOS environment. They, too, observed an increase in the adoption rate when permission requests were accompanied by an explanation. These authors attributed their results to the potential placebo effect of the information (Langer et al., 1978). The mere inclusion of any explanation when the user is prompted with a permission request increases the adoption rate, irrespective of whether the argument provided useful information. Despite the explanations seeming different, both papers assume that the recipients undergo heuristic processing and tend to not pay attention (Felt et al., 2012); hence, they are sensitive to positive features that benefit them, and justify their decision to opt in. If the information is readily accessible and does not require detailed processing of the message content, it would be enough to influence the likelihood to accept. Interestingly, in our study there were no significant differences between the two framing options analysed.

The experiment we conducted provided evidence to support the claim that consumers' decisions are prone to be influenced by the way in which requests are formulated. This suggests that decision theories can also be applied in an online context. In this regard, it would be desirable to study the potential impact of the application of user inertia in decision-making. We observe an increasing use of highlighted button options for decisions that firms want to favour and pale, unremarkable buttons for decisions that firms want to discourage. This way of habituating the user to 'dodge' visual traps in navigation decisions could be detrimental to rational and analytical user behaviour.

In the digital environment, people tend to make automatic and quick decisions, and heuristics, biases, and habits have a strong influence in their decision-making process. To certain extent, the observed framing effect could be assimilated to a digital nudge – subtle changes in the environment that affect the outcomes of a decision-making process, which instead of seeking the long-term welfare of people, only aims for a marketing goal. Brignull et al. (2015) call this a dark pattern; the use of knowledge of human behaviour (e.g., psychology) by designers to implement misleading functionality that is not in the user's best interest. This dark pattern can be manipulative rather than persuasive since it only serves business purposes but not the user's goal.

From a theoretical perspective, this paper contributes to the expansion of the research domain pertaining to the capabilities of technologies in revolutionising the commercial world as well as the cumulative literature on the constructive and erratic behaviours of consumers. We particularly look into the fundamental principles underlying the opt-in approach and the significant effects of the framed requests on the willingness to accept a proposition. This could be extended to include the sharing of one's location, personal data, etc. However, further research in this area is required.

Research should be undertaken on how the information on the use of personal data may influence the willingness to share geolocation information or other recorded activity data. In this direction, it would be interesting to analyse the difference between providing arguments that satisfy the desire to preserve the user's privacy and those arguments in which the transfer of the data could contribute to generating social welfare. The COVID-19 crisis has highlighted the need for cooperation to facilitate the traceability of contacts.

The results also yielded interesting and useful implications for firms and app developers who aim to enhance the acceptance rate of push notifications (Siau and Shen, 2003). By framing suitable opt-in requests, firms would be a step closer to increasing their acceptance rate. However, companies should be aware that the use of any of the framing strategies analysed in this paper involves a certain level of commitment for the brand. If the opt-in question promises 'a much better user experience and many benefits', user expectations will rise, and if the opt-in request mentions the standard behaviour of users, the subject would perceive this behaviour as a suitable option, which, in turn, would increase their expectations. Once the user consents to receive push notifications, a challenging journey begins that involves sending the right information, at the right moment to the right person. Thus, firms should decide on an appropriate level of marketing intensity and avoid over marketing (Kumar et al., 2014). A high frequency of communication, interruptions or push notifications that do not match the user's preferences and interests would be harmful to the firm-customer relationship, reducing the customer's interest in participating in the permission marketing program, i.e., this hinders the design of future opt-in requests.

Opt-in to accept push notification is a relatively new decisional context for the user. In our study we try to provide evidence of the influence of framing requests. Doing an experiment to test the hypotheses allowed us to control for exogenous variables, but in return some limitations arise, such as the fictional context or the need to choose a specific app to test the hypothesis. We provide evidence of ecological validity, but future research is needed. This study should follow up in a new 'in the wild' study to observe the effect of framing the opt-in request in the intention to accept push notifications, in natural conditions.

Finally, the heuristic treatment of the interpretation of information during the process of installing an app has not been considered by the European legislation. The GDPR of 2018 compels companies to request opt-in permissions for authorised commercial messages. But results show that the user is vulnerable to the framing effect in the digital context. Therefore, this law puts in the hands of companies the responsibility and ethic to truly protect the consumer to make the choices they want.

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