

# **Leveraging Communication Tools to Reduce Consumers' Privacy Concern in the On-demand Services: An Extended S-O-R Model of Perceived Control and Structural Assurance**

*Research-in-Progress*

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## **Abstract**

*To use the on-demand services, consumers need to disclose themselves to some extent, which inevitably raises their privacy concerns. Different from previous literature exploring privacy assurance mechanisms, we employ the stimulus–organism–response framework to investigate how communication tools (environmental stimuli) influence consumers' perceived control, structural assurance, as well as their service platform- and provider-related privacy concerns (organisms), which subsequently impact new consumers' intention and regular consumers' continuance intention to use the on-demand services (behavior responses). The models will be tested based on survey data collected from on-demand service consumers. The potential theoretical contributions and practical implications are discussed.*

**Keywords:** Stimulus–organism–response model, communication tools, platform-related privacy concern, provider-related privacy concern

## **Introduction**

As a prevalent economic paradigm nowadays, on-demand services convene different people owning idle resources to facilitate the provision of resources via online platforms, such as ride-sharing service (e.g. Uber, Lyft, etc.) and food-delivery service (e.g. Postmates, Doordash, etc.). On-demand services have displayed distinguished features from traditional business models, showing potentials to enable greater access to services for people who cannot suit their needs through traditional business models. To fulfill the targeted on-demand services, both service consumers and providers need to disclose their personal information to some extent to use the service effectively and efficiently. However, they may hold uncertainty about the security of personal data disclosed, which inevitably raises consumers' concern about leaking personal information, i.e., privacy concern.

A handful studies have investigated various mechanisms to reduce privacy concern (Li 2014; Dinev et al. 2015; Bansal et al. 2016; Gu et al. 2017). Although most online platforms have offered privacy assurance mechanisms, it has also been found that privacy policies and assurance measures are too complicated and thus are rarely read by consumers (Tsai et al. 2011). There is still a lack of research that has sought

alternative ways to reduce consumers' privacy concern, for instance, leveraging communication tools provided in the on-demand services which may increase both the interactivity and social presence to build trust and then alleviate privacy concern. Meanwhile, previous research about privacy concern has largely been centered on consumers' cognitive responses, such as perceived privacy benefits or risks (Dinev et al. 2015). Although the role of affective responses, such as emotions, in explaining privacy paradox has also received some attention (Li et al. 2017), there is still a lack of studies considering both cognitive and affective reactions to understand privacy concern, and seeking for alternative representatives for cognitive and affective reactions besides the frequent use of privacy risks and emotions (Li et al. 2011; Li et al. 2017).

In this study, we employ the stimulus–organism–response (S-O-R) model (Bitner 1992), which suggests that environmental stimuli influence people's organismic experiences and subsequently affect responses. Given the spread of technological artifacts, we examine the effectiveness of communication tools as environmental stimuli in our S-O-R model. Therefore, we try to answer the following three research questions: a) how the effectiveness of communication tools affect consumers' cognitive and affective reactions? b) how consumers' cognitive and affective reactions influence their service platform-related privacy concern and service provider-related privacy concern? c) whether new consumers and regular consumers react differently to the service platform-related privacy concern and service provider-related privacy concern, in terms of their intention/continuance intention to use the on-demand services?

## **Literature Review**

### ***Privacy Concerns***

In order to match service providers and consumers with respective needs efficiently, a majority of on-demand service platforms collect consumers' personal information as much as possible, which makes privacy concern an important issue faced by on-demand service consumers, thus needs to be solved. Privacy concern aroused by self-disclosure, is considered as the central issue in the privacy literature (Gu et al. 2017). Previous literature has predominately focused on investigating the impact of individuals' general privacy concern. For example, Dinev and Hart (2006) found that individuals were more willing to self-disclose in online transactions when their general interests in the content surpassed general Internet privacy concerns. Son and Kim (2008) noted that general privacy concern might motivate privacy-protective responses, such as negative word-of-mouth, complaints to peers, and report to third parties. Although recent research has started to formally examine context-specific privacy concerns, for instance, Xu et al. (2012) have showed that individuals' general privacy concerns reflect their inherent needs and attitudes towards maintaining privacy whereas transactional privacy concerns focus on specific assessments of privacy in which their privacy needs are evaluated against information disclosure in a transaction, not many studies have been done in this regard. Thus, we would like to contribute some value to this stream of research.

### ***Privacy Concern Reduction Mechanism***

Previous research has investigated how to reduce consumers' privacy concern through various privacy mechanisms. For instance, Pavlou et al. (2007) proposed three uncertainty mitigating factors in online exchange relationships: trust, website informativeness and social presence. Xu et al. (2012) sought to study the effects of different privacy assurance approaches, falling into two generic categories: personal control enhancing mechanism and proxy control enhancing mechanism, on concerns for information privacy; the results supported that perceived control over personal information plays a key role. Miltgen and Smith (2015) found that regulatory knowledge affected privacy risk concerns through the mediating perceived privacy regulatory protection. Mousavizadeh et al. (2016) proposed two information security assurance mechanisms (i.e., assurance statements and third-party assurance seals services) to see how

these security assurance mechanisms influence privacy concern. Analysis shows that assurance seals supplement the effects of assurance statements on privacy concern.

Although previous studies have discussed the value of these mechanisms, it has been much silent in the exploration of other mechanisms to reduce consumers' privacy concern. Differently, this study attempts to fill the gap by examining how the effectiveness of communication tools provided in the on-demand services affects consumers' privacy concern. Specifically, we propose that the effectiveness of communication tools could reduce consumers' service platform-related privacy concern and service provider-related privacy concern as well as new/regular consumers' intention/continuance intention to use the on-demand services mediated by their perceived control and structural assurance obtained through communication.

## **Theoretical Foundation**

Considering the situation-specific nature of privacy behaviors, we adopt the stimulus–organism–response (S–O–R) model in the environmental psychology as the overarching theory to understand the affective and cognitive reactions of consumers and their impacts on privacy behaviors (Bitner 1992). The S-O-R model posits that various environmental cues act as stimuli that affect consumers' cognitive and/or affective reactions (organisms), which in turn affect their behavior (responses) (Mehrabian and Russell 1974). The stimuli are contextual cues external to consumers that attract their attention. The organism reflects the cognitive and affective reactions intervening between the stimuli and user response. The response can range from conscious/unconscious to internal/external forms, such as perceptions and/or behavioral intentions (Janiszewski et al. 2013).

### ***Effectiveness of Communication Tools as Environmental Stimuli (S)***

Four representative communication tools are found in the context of on-demand services from computer-mediated communication literature: Chatbot, instant messaging/phonecall, notice board, and comment/rating system. With a Chatbot, consumers' inquiries can be integrated into a one-to-one communication, which offers consumers an interactive channel to enable the exchange of service-related information. With instant messaging/phonecall, consumers could contact the service providers directly and get latest information. Notice board offers consumers an opportunity to obtain information from the platform serving as a retrospective notice board. Once the platform posts any announcement, it is displayed in the notice board to all the consumers promptly. Comment/rating system enables consumers to examine past services by reviewing the feedback profile. It can be viewed as a communication tool specific to ratings and text evaluations, where consumers can disseminate positive or negative comments on the system according to their service experiences.

### ***Cognitive Reaction, Affective Reaction and Privacy Concern as Organisms (O)***

As postulated in the S-O-R model, organism includes consumers' reactions to stimuli. The organism reflects the cognitive and affective reactions intervening between the stimuli and the response, where the cognitive reaction is an information-processing view of consumers' psychological functions and the affective reaction captures consumers' experience of feeling or emotion (Benlian 2015).

Cognitive/affective reaction refers to the cognitive/affective mediating processes through which environmental stimuli influence consumers' behavior (Xiao and Benbasat 2011). Usually, cognitive reactions consist of thoughts, or knowledge structures about IT products or e-commerce websites, formed either through direct interaction or through the processing of secondary source information. Affective reactions refer to beliefs, emotions, or feelings, activated by the stimuli in the online environment (Lee and Chen 2011). To represent cognitive reactions, we propose the construct of perceived control, which is defined as the awareness that consumers have towards their personal information. Compared with

cognitive reaction, structural assurance is proposed to reflect affective reaction, and is defined the belief or feeling that on-demand service platforms are in place to promote successful services.

*Perceived Control as Cognitive Reaction (O)*

Privacy invasion occurs when an individual loses control over interactional boundaries and/or control over the use of information by others (Laufer and Wolfe 1977). The ability to control is decisive in managing privacy in social interactions or interpersonal relationships (Li et al. 2017). This view of the central role of privacy control in interpersonal exchanges was shared by previous studies (Li et al. 2017; Chan et al. 2017). For example, privacy control was considered a critical cognitive appraisal to justify information exchange between two parties (Li et al. 2017). Perceived control has also been seen as a representative of cognitive reaction in the context of online impulse buying (Chan et al. 2017). Therefore, in this study, perceived privacy control is used to represent cognitive reaction in the S-O-R model, and refers to the perceived level of control over the disclosure and subsequent use of personal information (Li et al. 2017).

*Structural Assurance as Affective Reaction (O)*

In the literature two types of institution-based trust are discussed (McKnight et al. 1998): (1) situational normality, defined as the belief that success is likely because the situation is normal, and (2) structural assurances, defined as the belief that success is likely because such contextual conditions as promises, contracts, regulations, and guarantees are in place. Contracts or promises make trustors feel comfortable since they could indicate trusting intention. Regulations enable people to feel assured about their expectations of the other party's future behavior. Guarantees mitigate the perceived risk involved in forming trusting intention. Therefore, structural assurance belief leads to trusting intention. In our research context, structural assurance is defined as the feeling that on-demand service platforms are in place to promote successful services.

*Service Platform-related and Provider-related Privacy Concern (O)*

Differently, when applying the S-O-R model, this study includes not only consumers' cognitive and affective reaction as organisms, but also subsequent organisms reflected by consumer's service platform- and provider-related privacy concerns. Privacy concerns are worries about opportunistic use of personal information disclosed, which reflects consumers' reaction to the disclosure of personal information as a privacy loss (Karwatzki et al. 2017). Comparing with more common adaptation of one-layer S-O-R model, this two-layers model reflects not only consumers' direct, immediate reactions to environmental stimuli but also their potential reactions closely related to future behaviors. In this regard, privacy concern could be seen as organism in the S-O-R model.

*Intention/Continuance Intention to Use as Responses (R)*

As mentioned earlier, the response portion of the S-O-R model can be elicited in many forms, ranging from changes in beliefs, perceptions, to judgment of value (Animesh et al. 2011; Song et al. 2013; Benlian 2015). Accordingly, in the on-demand service context, we operationalize the responses as consumers' intention/continuance intention to use the on-demand services. Online consumers are commonly exposed to various technological features or functions, which trigger their behavior in usage. Since actual behavior is difficult to measure, it is quite common to measure the behavioral intention as a surrogate to the actual behavior (Venkatesh et al. 2016). Therefore, we adopt intention/continuance intention to use on-demand services as the response in the research model.

## Theoretical Model and Hypotheses

### Research Model

Drawing from the stimulus–organism–response model (Bitner 1992), we theorize that the effectiveness of Chatbot, instant messaging/phonecall, notice board, and comment/rating system affects consumers' intention/continuance intention to use on-demand services, through which impacts consumers' perceived control over personal information and structural assurance of the platform, and subsequently impacts service platform-related and provider-related privacy concern. The research model is shown in Figure 1.

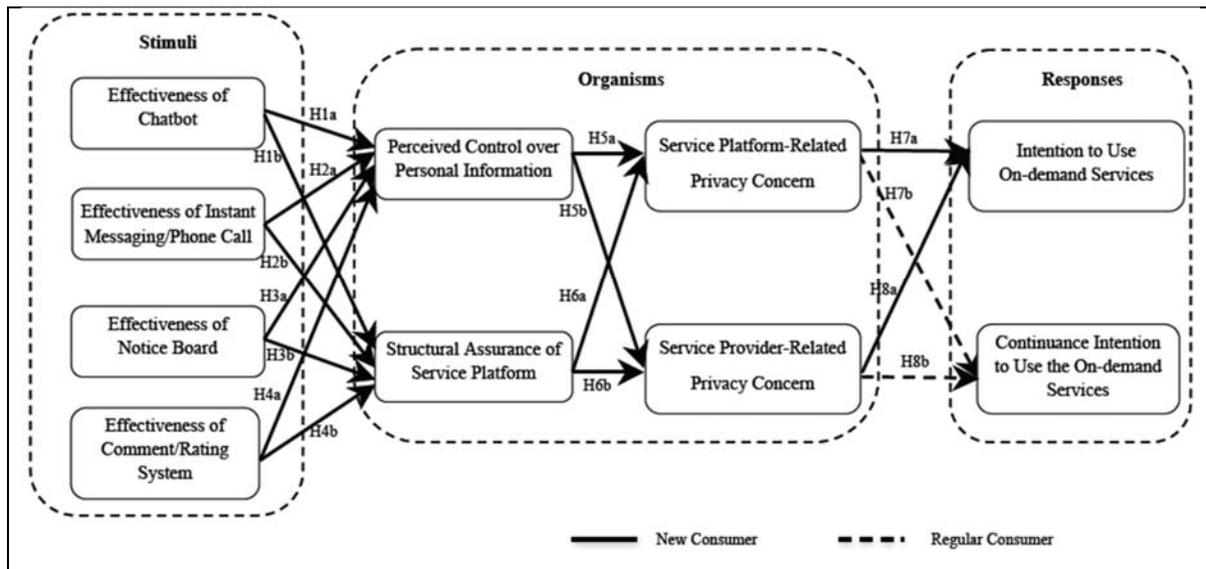


Figure 1. Research Model

### Hypotheses

#### Effectiveness of Communication Tools

In a computer-mediated-communication context, consumers' control over communication would be enhanced since the communication technologies transmit and present the message to the receivers more effectively (Lowry et al. 2009). Well-connected IT design components could render better comprehension between consumers and the platform, providing greater perceived control (Lee and Chen 2011). Meanwhile, consumers usually perceive more control when they find it is easy to search, navigate or interact through the platform in the online environment (Jiang et al 2010). With chatbot, simultaneous communication between consumers and service platform is built, and consumers' requests or complaints could be reflected and coordinated enabling more effective problem solving thus enhances consumers' perceived control of potential risks during the service. With instant messaging/phone call, simultaneous communication between consumers and service providers is built, and consumers' questions could be informally integrated into a one-to-one interaction thus enhances consumers' perceived control. With notice board, consumers could view the messages send by the service platform. Comment/rating system enables consumers to examine past services by reviewing the comments or ratings before actually starting a new service, which could be seen as a process that consumers can disseminate positive or negative comments according to their experiences. Therefore, we posit that:

**Hypothesis 1a:** *The effectiveness of chatbot is positively associated with consumers' perceived control over personal information.*

**Hypothesis 2a:** *The effectiveness of instant messaging/phone call is positively associated with consumers' perceived control over personal information.*

**Hypothesis 3a:** *The effectiveness of notice board is positively associated with consumers' perceived control over personal information.*

**Hypothesis 4a:** *The effectiveness of comment/rating system is positively associated with consumers' perceived control over personal information.*

Structural assurances are defined as consumers' belief of likely success. Chatbot provides an open channel for communication between consumers and service platform, giving a sense of social presence, which may contribute to the service success. Similarly, the use of instant messaging/phone call could also give consumers a sense of service providers' presence during the service. The notice board provides a medium that allows consumers to receive information from the service platform timely and to digest information, leading to better communication and mutual comprehension. The comment/rating system allows consumers to conduct a retrospective review of prior comments and ratings and provides a form of memory that can help consumers understand past services, thus increasing the likely of success for services. Therefore, we posit that:

**Hypothesis 1b:** *The effectiveness of chatbot is positively associated with consumers' structural assurance of service platform.*

**Hypothesis 2b:** *The effectiveness of instant messaging/phone call is positively associated with consumers' structural assurance of service platform.*

**Hypothesis 3b:** *The effectiveness of notice board is positively associated with consumers' structural assurance of service platform.*

**Hypothesis 4b:** *The effectiveness of comment/rating system is positively associated with consumers' structural assurance of service platform.*

#### *Perceived Control over Personal Information*

In the online environment, consumers show a greater tendency to own control of the use of their information (Lee and Chen 2011). Due to the uncertainty commonly involved in the self-disclosure in the online settings, consumers could protect their privacy by deciding to what extent to disclose their personal information and what kind of personal information to be disclosed. Privacy invasion normally occurs when people lose control over interactional boundaries or lose control over the use of information by others (Li et al. 2017). Consumers who have experienced a higher level of perceived control tend to believe the service platform as reliable, and the service providers as trustworthy, thus is associated with less privacy concern (Lee and Chen 2011). Therefore, we posit that:

**Hypothesis 5a:** *Consumers' perceived control over personal information is negatively associated with their service platform-related privacy concern.*

**Hypothesis 5b:** *Consumers' perceived control over personal information is negatively associated with their service provider-related privacy concern.*

#### *Structural Assurance of Service Platform*

When people are involved in high levels of perceived risk, they will require more structural assurances, which, in turn, lead to positive trusting beliefs and decreased concerns (McKnight et al. 1998). Structural assurance appears to display a salient positive effect on the consumers' trust in the online platform (Chau et al. 2007), which may show a negative effect on their concerns, e.g. privacy concern about their personal information disclosed to the platform. Structural assurance provides information about the efficacy of existing structures such as guarantees, regulations, promises, and operational procedures

(Srivastava and Chandra 2018). In the context of on-demand services, consumers can refer to information conveyed through structural assurance mechanisms to mitigate their privacy concern. When consumers find these assurances to be relatively protective, platform-related privacy concern is reduced. Meanwhile, service provider-related privacy concern, whose actions are under the supervision of the platform as contracted employees, will also be reduced. Therefore, we posit that:

**Hypothesis 6a:** *Consumers' structural assurance of service platform is negatively associated with their service platform-related privacy concern.*

**Hypothesis 6b:** *Consumers' structural assurance of service platform is negatively associated with their service provider-related privacy concern.*

#### *Service Platform- and Service Provider-Related Privacy Concern*

Privacy concern has been well elaborated in the literature that negatively affects consumers' intention/continuance intention to use the technology, the service or the function (Lowry et al. 2011; Miltgen et al. 2013; Ku et al. 2013; Li 2014; Gu et al. 2017). No matter which type of privacy concern, worries either from the service platform or service providers may decrease consumers' intention or continuance intention to use the on-demand services. Therefore, we posit that:

**Hypothesis 7:** *(a) Consumer's service platform-related privacy concern is negatively associated with a new consumer's intention to use the on-demand services, (b) as well as regular consumer's continuance intention to use the on-demand services.*

**Hypothesis 8:** *(a) Consumer's service provider-related privacy concern is negatively associated with a new consumer's intention to use the on-demand services, (b) as well as regular consumer's continuance intention to use the on-demand services.*

#### *New vs. Regular Consumers*

We define new consumers as those consumers who have very limited prior experience in using on-demand services. They may have some interest in use but have not yet done so. This distinguishes them from regular consumers who have some prior knowledge or experience in using on-demand services. For new consumers, they are lacking of prior information, e.g. past experience, with the on-demand services. One immediate and effective way for them to obtain relevant information is through the interactions with the service platform before they actually get access to the services. In the absence of certain information, new consumers are more likely to rely on the information sources they have and interpret the interactions as signaling something positive (Fouk and Long 2016). Thus, we suggest that comparing with regular consumers, the impact of service platform-related privacy concern will be stronger for new consumers; meanwhile, the impact of service provider-related privacy concern will be weaker for them. When people require information, they are more motivated to evaluate the other party as warm and trustworthy (Cuddy et al. 2011). Here, we also believe that the level of new consumers' platform privacy concern will be lower than the level of regular consumers' platform privacy concern. Since as the familiarity with the service platform increases, regular consumers' privacy concern will decrease accordingly (Li 2014). Therefore, we posit that:

**Hypothesis 9a:** *The impact of service platform-related privacy concern will be stronger for new consumers than regular consumers.*

**Hypothesis 9b:** *The impact of service provider-related privacy concern will be weaker for new consumers than regular consumers.*

## **Methodology**

Survey methodology will be adopted to test our research model, which a commonly adopted methodology to capture respondents' perceptions and could reach a large sample set. We are targeting at both on-demand service consumers and those who have never used on-demand services. They will be recruited to report their perceptions about their use of computer-mediated communication tools and privacy concerns. At the beginning of survey, we use a short script to explain our research objective, and then ask the respondents to answer the designed questions based on their past experience. Demographic statistics including age, gender, education level, frequency of use and mobile experience will also be collected, which will be served as control variables when analyzing the data.

## **Contribution and Implications**

This research is expected to contribute to the existing literature in several aspects. First, we explore new mechanisms to reduce consumers' privacy concern by leveraging communication tools rather than relying on privacy assurance mechanisms. Since communication tools effectively help build trust by enhance the interactivity and social presence, we believe it could also help reduce privacy concern. Second, we extend previous literature about privacy concern by differentiating two types of consumers' privacy concerns: platform-related and provider-related privacy concerns, which are contextualized in the context of on-demand services. Third, our study extends the stimulus–organism–response model by enriching the layers of organisms. We consider both consumers' cognitive and affective reactions to communication tools as well as their two types of privacy concerns as organisms. Comparing with more common adaptation of one-layer S-O-R model, this two-layers model reflects not only consumers' direct, immediate reactions to environmental stimuli but also their potential reactions closely related to future behaviors. Finally, our study could help designers and developers to better understand privacy concerns in the context of on-demand services and improve individualized services, for instance, they may refine the design of communication tools to enhance user experiences.

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