How do the Contexts impact the Habit Formation of Information System Users?

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Abstract - What elements impact the usage continuance and the habit formation of information system users? How to utilize these elements in the field of user experience design? It is worth noting that both goals and contexts play key roles in helping information system users forming habits. Before the habit is formed, goals trigger the non-habitual behavior. When the behavior continuance goes up, stable contexts trigger the behavior, and automaticity is correspondingly generated. It is context-cued automaticity makes the habitual behaviors more efficient than non-habitual behaviors.

Index Terms - Continuance, Habit, Context, Information System Design

Ⅰ. Introduction

In order to know what elements impact the usage continuance and the habit formation of information system users, we studied on theories about the behaviors and habits of people in the field of psychology, and find that besides goals, contexts also play the most important role in helping information system users in habit formation.

In this paper, we will learn how the habits are formed, and how the contexts impact the habit formation process in people's normal life and when using information system. By learning the context role in the process of habit formation, we would like to help all the designers who are engaged in improving the usage continuance for the product, and hope users can form their own habits to pay more attentions in context design, which is normally ignored.

A. About Behaviors and Habits

1) What is the habits?

Habits are as learned sequences of acts that have become automatic responses to specific cues and are functional in obtaining certain goals or end states [1]. Habits are response dispositions that are activated automatically by the context cues that co-occurred with responses during past performance. Learned actions that have become automatic responses to cues and are intended to obtain one or more goals [2] habits are tendencies to repeat responses given a stable supporting context [3].

There are 3 key elements for defining the habits. They are goals, contexts, and automaticity. One habit can be viewed as one emotional and behavioral status. People have one specific goal first, and then they conduct one or some behaviors to meet the goal. When one behavior meets the goal well and better than other behaviors, people repeat the same behavior to meet the same goal. When behaviors are constantly repeated in stable contexts and they become automaticity, habit is formatted.

2) The Characteristics of Habits

Habits are cued by contexts. Habits are a form of slowly accrued automaticity that involves the direct association between a context and a response. Contexts triggers habitual responding. The automaticity underlying habits builds on patterns of co-variation between features of performance contexts and responses

Habit context–response associations are not mediated by goals. People's responses are cued by performance contexts independently of what they intended to accomplish.

There are two indexes to differentiate habitual behaviors with non-habitual behaviors. One index is the relation of goals, contexts and behaviors. Goals trigger non-habitual behaviors. Context triggers habitual behaviors. Another index is Automaticity as a key attribute of habit only exists in habitual behaviors.

3) Habit Formation

Below are some basic concepts, which need to be learnt before learning the formation process of habitual behaviors.

Needs are the physiological characteristic, which can generate corresponding goals to meet the needs and drive people to conduct behaviors to meet the goals.

Goals refer to desired, or anticipated, outcomes or end states. Goals can be the consequence of physiological needs, such as thirst and hunger, as well as various other "needs" or motives, such as restoring personal hygiene, making friends, acquiring knowledge, or becoming a professor [4].

Intentions represent the person's motivation in the sense of his or her conscious plan to exert effort to carry out a behavior [5].

Implementation intentions are the intentions that specify, where, and how these goals are acted upon [6].

Behavior is a product of a series of cognitive and affective events, typically preceded most closely by conscious intentions to perform the [7].
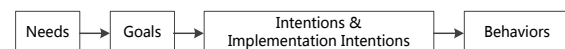

Fig 1   the Relationship of Needs, Goals, Intentions and Behaviors

Behavior Evaluation helps people to know how useful the behavior is for pursuing the specific goals after the behavior is

conducted. The evaluation results will impact people's choice of behavior for the specific goal.

The transition from Non-habitual behaviors to habitual behaviors can be separated into three stages. They are Behavior Adoption Stage, Behavior Continuance Stage and Habit Stage.

When people have a goal (goal-A), the goal stimulates people to accordingly have the intention to do some behaviors in order to pursue the goal. With intention working, once people find the cues or contexts consistent with what they already conceived, people will do the specific behavior (Behavior-B) to meet the goal. This process described above is called Behavior Adoption Stage.

After people conducted Behavior-B, they will compare goal-A with the feedback of Behavior-B as an evaluation. The better Behavior-B meets goal-A, the more satisfactions to Behavior-B people have. The evaluation process for Behavior-B is much helpful for people to decide on whether they should do Behavior-B or choose other behaviors when they face goal-A again. The more satisfactions to Behavior-B, the more possibility people will repeat Behavior-B to meet the same goal-A. This process described above is called Behavior Continuance Stage.
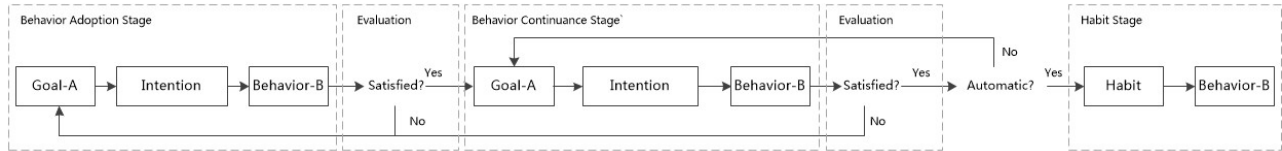

Fig 2   Behavior Transition Process

When Behavior-B continuously reacts with goal-A in stable contexts, the repetition of behavior can help people learn the relationship between the stable contexts with the reaction between behavior and goal. Then automaticity of behavior appears when people are cued by context, namely the habit is formed. In this process, we call people are in Habitual Behavior Stage.

All in all, as shown in Fig 2, there are three stages for people to form a habit. They are Behavior Adoption Stage, Behavior Continuance Stage, and Habitual Behavior Stage. In the process which non-habitual behavior becomes habitual, needs play a key role to help this transition being happened. It is intentions that the needs directly affect and stimulate people to do the specific behavior. Contexts have no influences in the behavior in both Behavior Adoption Stage and Behavior Continuance Stage. With the behavior continuously being conducted and repeated, contexts help people convey the stimuli-reaction relationship between goals and needs to the relationship between contexts and behaviors. So both goals and contexts play the key roles for habit formation of people.

B .   *About IS Behaviors and Habits*

1)   *IS Adoption Model*

The IS Adoption Model (see Fig 3) [8] explains how people are influenced to adopt the information obtained from computer-supported channels [9].

According to IS Adoption Model, the new users of one information system will be impacted by perceived usefulness and the ease of use.

The perceived usefulness is the degree to which the information is perceived to be valuable, informative and helpful. It has significant impacts on both satisfaction and continuance intention. Usefulness impacts attitude substantively and consistently during stages of IS use.
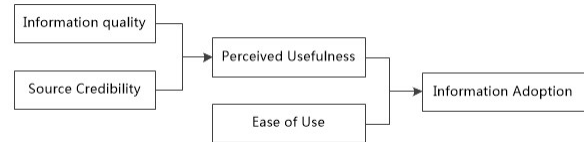

Fig 3   IS Adoption Model

Perceived usefulness is impacted by source credibility and information quality (augment quality). Information quality is an essential determinant of information usefulness. It is identified as the extent to which users think that information is relevant, timely, accurate, and complete [10].

Source credibility captures the extent to which users think that they can trust a piece of information or that the information is contributed by an expert [11].

2)   *IS Continuance Model*

According to the IS Continuance Model (See Fig 4) [12], the intentions of user to continue using IS are affected by:

User satisfaction with prior IS use, Post-adoption performance, and Expectation-performance discrepancy.

Fig 4   IS Continuance Model

3)   *IS Habit Formation*

There are three stages for people to form a habit (See Fig 5). They are IS Adoption Stage, IS Continuance Stage, and IS Habit Stage.
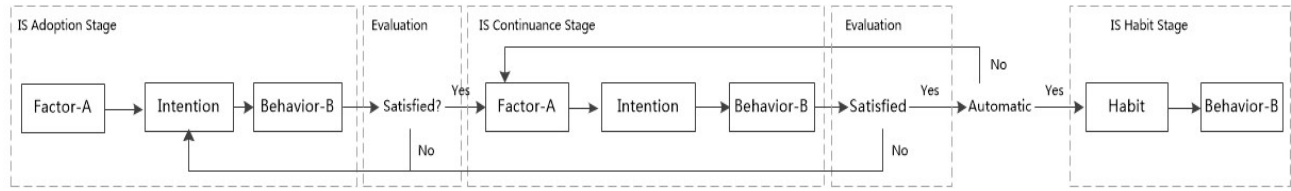
Fig 5   IS Behavior Transition Process

In IS Adoption Stage, users are affected by Factor-A (See Fig 6) [13] and consequently generate intention to use IS. With the guidance of intention, users do Behavior-B (use information product). And then users evaluate on Behavior-B. The higher users' satisfaction to Behavior-B is, the higher possibilities users will continue using the information product.

If users are satisfied with the first-time experience using the information product, they will continue using the information product. With intention's impact, users will continue Behavior-B. Only if users keep the satisfaction level, they will continuously use the information product. In this process, users are impacted by Factor-A, rather than context. And users' behaviors are not automatic yet. So we call this stage Non-habitual Behavior Continuance Stage.
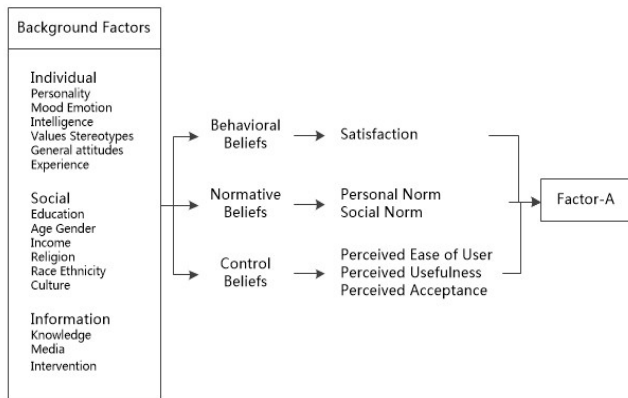

Fig 6   Factor-A

If users connect contexts with the relationship between Factor-A and Behavior-B, and gradually convey the stimuli-reaction relationship between goals and needs to the relationship between contexts and behaviors B in the process which users continuously use the information product, the automaticity will be consequently generated. By going through this process, users go into the IS Habit Stage.

As Fig 5 and Fig 6 show, Factor-A plays the most important key role in helping IS users to develop normal behavior to habitual behavior. It is intentions that Factor-A directly impact on and stimulate users to use the information product.

In both IS Adoption Stage and IS Continuance Stage contexts have no impacts on behaviors. But when users

continuously use information product (Behavior-B), contexts will help users convey the relationship between Factor-A and Behavior-B to the relationship between Behavior-B and contexts. So it is worth noting that besides Factor-A, contexts also play an indispensable role in helping users to form the habit.

III . Impacting Element Model for IS Habit Formation

Non-habitual behaviors becoming habitual must be impacted by two factors. One is intention consistency another is context stability.

A . Impacting Elements to Intentions

As Fig 1 and Fig 5 show, it is the needs that Factor-A impacts on first, and then consequently impact users' goals and intentions to use the information product, in the process of habit formation of IS users.

B . Configuration of Context

What is Context? Context is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves [14].

According to POPTM model in the field of design, context is composed of five elements, which are People, Objects, Places, Timeline and Places. For different users and scenarios, each of five elements has different impacting level to IS users.

C . Impacting Element Model of IS Habit Formation

There are two systems impacting the habit formation of IS users (See Fig 7). They are impacting element system to intentions and configuration system of context. Intentions need to work on behaviors for meeting the needs. Behaviors refer to specific contexts. The specific context can remind people of specific intentions which are related to specific needs. So before IS users form IS habit, behaviors are the medium to help impacting element model to intentions and configuration system of context to impact with each other. With the transition from IS non-habitual behaviors to habitual behaviors, and the automaticity is generated, both characteristics of impacting element model to intentions and configuration system of context are stable and uneasy to be impacted.
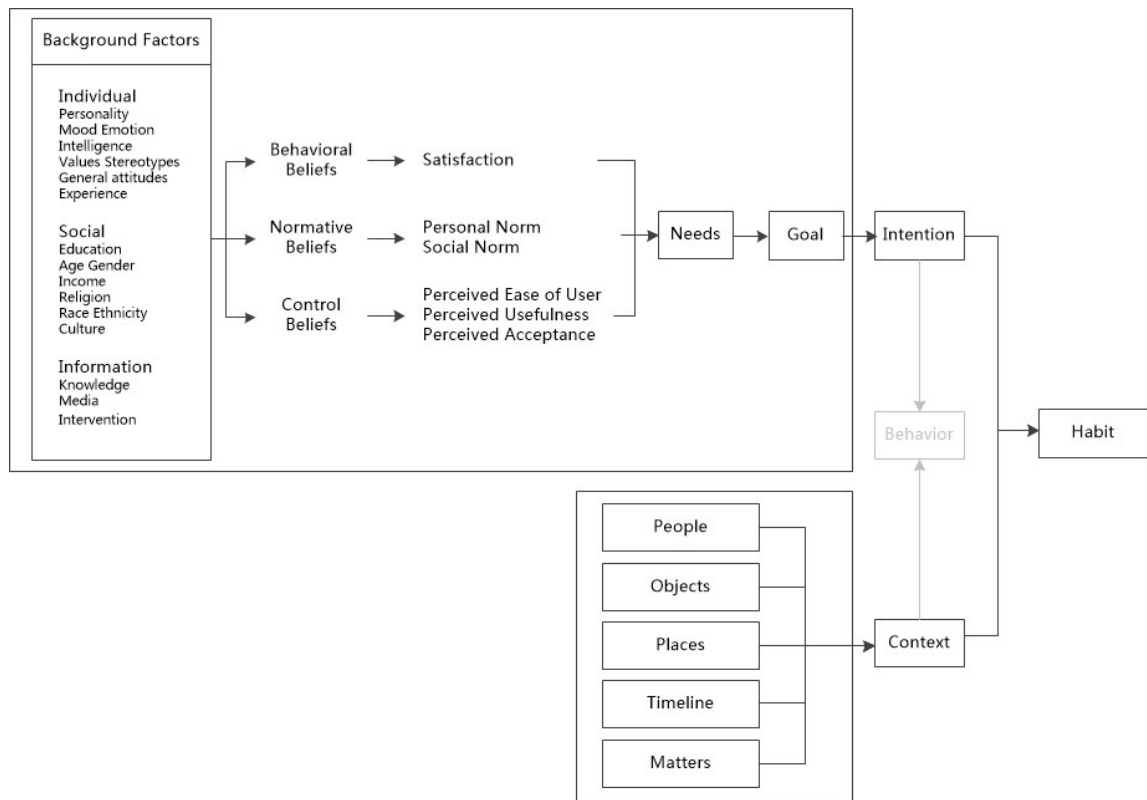
Fig 7   Impacting Element Model of IS Habit Formation

IV . Conclusions

For non-habitual behaviors, goals impact the continuance of behavior. If only the contexts are stable, non-habitual behaviors can be converted to habitual behaviors, and contexts can trigger the automaticity of behavior to make habit happen. So both needs and contexts are important and necessary to the habit formation of information product users.

In the field of User Experience Design, UX designers do the design by finding out users' needs (goals), but they ignored the importance of contexts in helping information product users forming habit. In order to help Information product users form habit, UX designers should make efforts in two aspects. One is to find out what users really need, design the product, and increase users' continuance of information product usage by understanding and using the impacting element model. Another is to design the interactive relationship between information product and contexts, enhance context stimulation, and help users converting the non-habitual behaviors to more effectively habitual behavior by understanding and applying configuration of context.

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