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THEORY AND REVIEW

THE EMBEDDEDNESS OF INFORMATION SYSTEMS HABITS IN ORGANIZATIONAL AND INDIVIDUAL LEVEL ROUTINES: DEVELOPMENT AND DISRUPTION

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Appendix A

Representative Habit Definitions from Prior Research

Table A1. Representative Habit Definitions Used in Research from Other Disciplines

Theoretical Definition	Example Studies	Behavioral Context
GOAL-DIRECTED AUTOMATIC BEHAVIOR: "learned sequences of acts that have become automatic responses to situations, and are functional in obtaining certain goals or desired effects" (Verplanken and Aarts 1999, p. 104) "habits are represented as links between a goal and actions that are instrumental in attaining this goal" (Aarts and Dijksterhuis 2000a, p. 54); "these associations are shaped by frequent performance of actions and require the activation of the goal to become manifest" (Aarts and Dijksterhuis 2000a, p. 60)	Aarts and Dijksterhuis (2000a, 2000b) Aarts et al. (1997a) Aarts et al. (1998) Verplanken and Aarts (1999) Verplanken et al. (1997) Verplanken et al. (1998)	Travel mode choice
	Aarts et al. (1997a)	Physical exercise
	van Empelen and Kok (2006)	Condom use
	Honkanen et al. (2005)	Eating seafood
	Orbell et al. (2001)	Ecstasy use
	Sheeran et al. (2005)	Social drinking
	Verplanken and Orbell (2003)	Four studies covering a wide range of behaviors representing both daily and weekly habits
	Verplanken (2006), study 2	Negative thinking about oneself
	Verplanken (2006) study 3	Underlining words in a novel

Table A1. Representative Habit Definitions Used in Research from Other Disciplines (Continued)

Theoretical Definition	Example Studies	Behavioral Context
BEHAVIOR THAT IS REPEATED IN A STABLE CONTEXT (*importance of goal-directedness is discounted*): "tendencies to repeat responses given a stable supporting context" (Ouellette and Wood 1998, p. 55) "behavioral dispositions to repeat well-practiced actions given recurring circumstances" (Wood et al. 2005, p. 918)	Ouellette and Wood (1998)	Meta-analysis of prior
	Wood et al. (2005)	Exercising, newspaper reading, and TV watching by students
	Wood et al. (2002)	Student participants kept a diary of all behaviors performed in their daily lives
	Thøgersen (2006)	Travel mode choice
QUICK, ACCURATE, AND EFFORTLESS BEHAVIOR: "practice automatizes voluntary acts so that they come to be performed quickly, easily, and with minimal focal attention" (Kimble and Perlmuter 1970, in Wood and Quinn 2004, p. 6) "A habit is a behavior that can be performed quickly, accurately, and effortlessly" (Carvajal 2002, p. 10)	Kimble and Perlmuter (1970)	Conditioning simple responses (finger press, eye blink) to a light or tone
	Carvajal (2002)	Sorting documents with key words into separate piles
FREQUENTLY PRACTICED BEHAVIOR THAT IS AUTOMATICALLY TRIGGERED BY STIMULUS CUES (*no explicit mention of goal-directedness or context stability*): "situation-behaviour sequences that are or have become automatic, so that they occur without self-instruction" (Triandis 1980, p. 204) Habit is "automatically activated by environmental cues without deliberate reflection" (Bamberg 2006, p. 823) "behaviour comes under the control of stimulus cues and is performed automatically with little effort or conscious awareness….Habits are performed frequently, but they are also performed automatically, efficiently, and with little effort or conscious awareness" (Norman and Conner 2006, pp. 58, 66)	Bamberg (2006)	Travel mode choice
	Norman and Conner (2006)	Binge drinking
	Ronis et al. (1989)	Health-related behaviors
	Saba and diNatale (1998, 1999) Saba et al. (1988) Saba et al. (2000)	Consumption of 9 types of fat-containing food products
	Towler and Shepherd (1991-1992)	Eating chips
	Triandis (1980)	
	Verplanken (2004)	Nurses chatting at work
ROUTINIZED BEHAVIOR: Focus of the study was on task routinization, which was defined as automaticity in behavior	Ohly et al. (2006)	Employees at a high-tech firm provided lists of their frequently performed tasks (e.g., developing software, dealing with documentation, handling emails, interacting with subordinates, attending meetings, dealing with customers)

Table A1. Representative Habit Definitions Used in Research from Other Disciplines (Continued)

Theoretical Definition	Example Studies	Behavioral Context
WELL-LEARNED BEHAVIOR / MENTAL STATE: Habit implies behavior that is learned well from repeated past performances: "habit is a mental state that is conceptually distinct from previous behavior. A person could perform a behavior many times and yet not think of herself as being in the habit, or she may perform a behavior only a few times and nevertheless consider the behavior to be habitual" (Triandis 1980, p. 386)	Trafimow (2000)	Condom use

Table A2. Representative Habit Definitions Used in Recent IS Research

Theoretical Definition	Example Studies	Behavioral Context
AUTOMATIC BEHAVIORAL TENDENCIES THAT RESULT FROM LEARNING: "the extent to which people tend to perform behaviors (use IS) automatically because of learning" (Limayem et al. 2007, p. 705) "the automatic behavior tendencies developed during the past history of the individual such that a particular situation/stimuli will elicit the behavior even when the individual does not instruct him or herself to perform the act" (Limayem et al. 2001, p. 277)	Limayem et al. (2007)	World Wide Web
	Limayem and Hirt (2003), Limayem et al. (2001)	Student use of WebBoard
	Khalifa et al. (2002)	Online grocery shopping
GOAL-DIRECTED AUTOMATIC BEHAVIOR: "the extent to which using a particular IS has become automatic in response to particular situations" (Limayem et al. 2003b, p. 2) "goal-directed automatic responses to system use when encountering the same situation" (Wu and Kuo 2008, p. 52)	Kim et al. (2005)	Website
	Limayem et al. (2003b)	World Wide Web (WWW)
	Cheung and Limayem (2005a, 2005b) Limayem et al. (2003a)	Student use of Blackboard
	Wu and Kuo (2008)	Google searches
BEHAVIORAL PREFERENCES: "previous usage preference of an IT" (Gefen 2003, p. 2)	Gefen (2003)	Online CD / book vendors
BEHAVIOR THAT OCCURS OUTSIDE CONSCIOUS AWARENESS: "a repeated behavioral pattern that automatically occurs outside conscious awareness"; "habit is made possible by a cognitive representation that links a situational cue and an action" (Kim and Malhotra 2005, p. 746)	Kim and Malhotra (2005)	Websites
	Kim and Malhotra (2005)	Web based information system

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Appendix B

Goal Hierarchies, Task Hierarchies, and IS Habit Disruption Strategies

We subscribe to the view of habits as a form of goal-directed automaticity that can be triggered by various features of one's performance context. Thus, some specific examples of the relationship between situational features, goal hierarchies, task hierarchies, and habits may be helpful for understanding how work-related IS habits operate in an organizational context, and how they can be disrupted.

In a study of consumer goal setting and goal striving, Bagozzi and Dholakia (1999) proposed a hierarchy of goals using the example of weight loss. While an individual's focal goal (*what* they want) is to lose weight, superordinate goals (*why* they want it, e.g., to live longer or to look and feel good) as well as subordinate goals (*how* they will achieve it, e.g., through exercise and dieting) are also present. While any of the goals in the goal hierarchy may be activated by a situational feature (e.g., viewing oneself in the mirror, walking past the refrigerator or exercise bike), it is the behavior associated with the *subordinate* goal (which originated from action planning) that actually has the potential to habituate over time.

We draw from Bagozzi and Dholakia's work to provide two examples that relate situational features and goal hierarchies to IS habits within organizations (Table B1). Notice that in both examples, the individual is aware of the situational feature or stimulus, but they are not necessarily aware of activation of all the various goals in the hierarchy or their choice of the action response. This is particularly true if either scenario has occurred frequently enough in the past for the response to become habituated.

Table B1. Situational Features and Goal Hierarchies			
Situational Feature	**Focal Goal ("*What* do you want?")**	**Superordinate Goal ("*Why* do you want to achieve the focal goal?")**	**Subordinate Goal ("*How* is the focal goal achieved?")**
System not working	Get it fixed	Be able to get work done	Call, email, or log problem in a tracking system
Business event occurs (e.g., a drop in sales of a certain product)	Determine the reason and get it corrected	Improve the company's bottom line or competitive position	Use a particular IS to drill into data, use a particular communication tool to contact and discuss the problem with others

It is important to determine the goal of a particular instance of IS use in order to break the link between the goal and the IS behavior, because goals are very closely associated with the contextual variable of task definition (Table 1). Since habitual work routines can be viewed as script or task hierarchies, a lengthy or complex work routine will generally have a single overarching business goal that it seeks to accomplish. However, smaller goals may also be associated with individual steps in the task sequence (Schank and Abelson 1977). These subtasks and subgoals are in turn associated with the business events and task definitions that make up the behavioral context. It is likely that these smaller subgoals actually direct much habitual IS behavior, and as such may be activated either consciously or subconsciously. By correctly identifying the goal or subgoal associated with a particular instance of habitual IS use, appropriate intervention strategies can be devised that break the goal–behavior link at the corresponding location in the task hierarchy.

Referring to the script disruption techniques shown in Figure 4 may be helpful here. If the organization is replacing an entire task sequence with a markedly different, tightly coupled, new one, the relevant goal most likely resides at the top level of the hierarchy, and one should simply need to break the link at the top level, such that the old sequence never has an opportunity to begin. Given the drastic difference between the old and new sequences, all triggers further down the hierarchy will be automatically bypassed. On the other hand, if the old and new task sequences are similar or share steps, or if the organizational routine is loosely coupled, one must pay much more attention to the exact point where the individual's IS use is triggered and seek to break that link. This is particularly true if the habitual use occurs at one of the work handoff points in a multi-actor organizational routine. Here, the top-level goal remains unchanged, and the subgoals become relevant. The task sequence has a much greater potential of being carried through to completion uninterrupted, unless action is taken to break the link at the subgoal/subtask level. Thus the objective of the intervention is to prevent this from happening.

Determining the exact goal that directs habit performance is made more complicated by the fact that pursued goals are often subconscious in nature, meaning that a person may not be able to articulate clearly her actual goal for performing a habitual behavior (see Cohen and Bacdayan 1994). In fact, she may never have even thought about it, but rather simply learned how to follow the standard operating procedure for a particular task. While all scripts are theorized to have their basis in goal attainment, over time (and through constant repetition) they begin to require less and less of the individual's attention to the point that the person may no longer even be aware of beginning the behavior. Thus, habitual IS use may continue even when the associated goal is no longer present (Wood and Quinn 2004). For example, a person may generate a particular report every day which no longer has any legitimate business purpose, simply because they always have. Thus we recognize that there are times where the exact goal cannot be elucidated; in such cases, interventions must focus on other contextual variables, including visibly observable business events that are subconsciously triggering the behavior.

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Appendix C

General Versus Specific IS Habits

Even though a given system may offer different features, habits initially develop in relation to choosing that system (or particular features of that system) for a given task, and not necessarily for all features and all tasks. However, while individual habits are task-specific, Limayem et al.'s (2007) introduction of the IS habit antecedent of "comprehensiveness of use" indicates that it is possible that the wider the range of tasks a particular system supports and the more habituated choice of that system has become for each individual task, the stronger the habit toward choosing the system *overall*, across *all* tasks.

This is similar to the way in which computer self-efficacy has been conceptualized at both the general and task-specific levels (see Marakas et al. 1998). Task-specific computer self-efficacy exists when an individual feels capable of performing a specific task using a computer, and is further associated with a specific computing environment and type of application (e.g., word processor, spreadsheet, database). General computer self-efficacy, on the other hand, exists when that individual feels capable of using a computer across a number of different application domains (Marakas et al. 1998). We draw from Marakas et al.'s conceptualization of the multiple levels of self-efficacy to demonstrate the relationship between task-specific and general IS habits and IS usage in Figure C1.

We can see from the left-hand side of this figure that many different tasks can be performed using a particular IS. Over time, the choice of that IS to perform some or all of these tasks may become habituated. If the set of tasks for which the system is habitually selected is large enough (in relation to all possible tasks that can be performed with that system), then a general system habit may develop. Just as each task-specific habit will predict future use of the system for that task, so too will a general system habit predict general (overall) use of that system in the future.

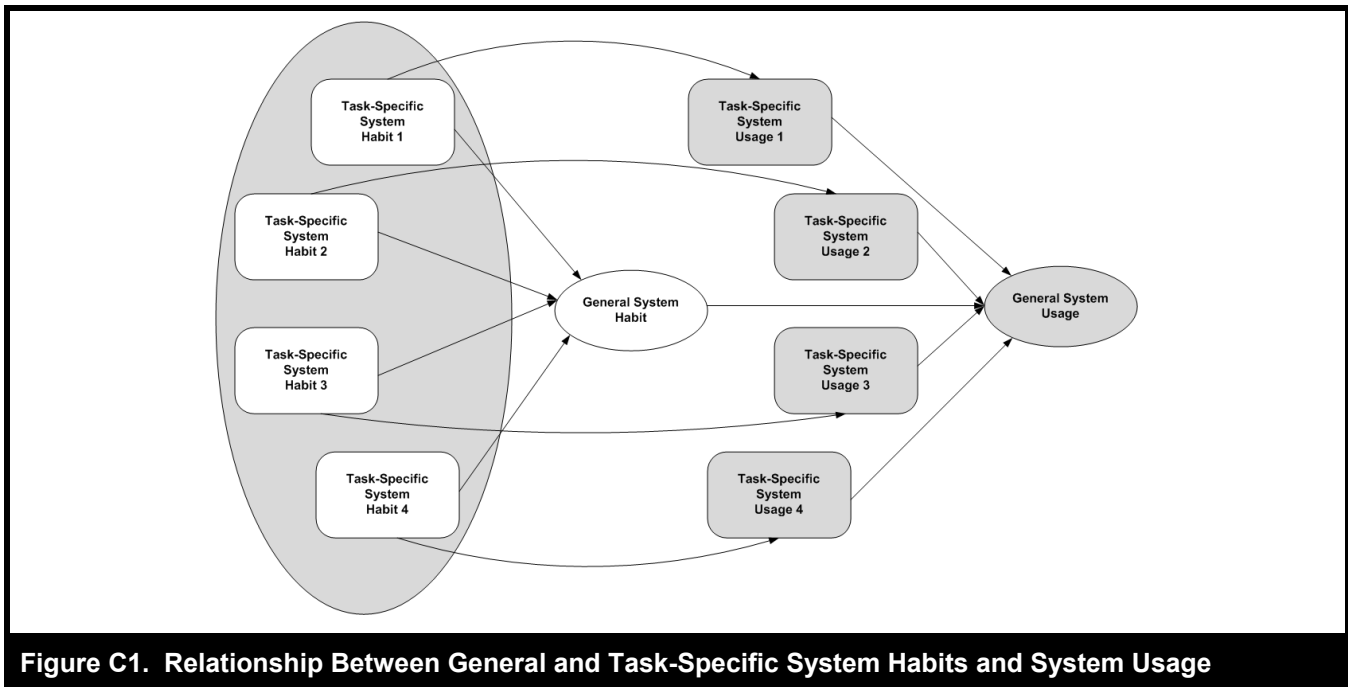

Figure C1. Relationship Between General and Task-Specific System Habits and System Usage

References

Limayem, M., Hirt, S. G., and Cheung, C. M. K. 2007. "How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance," *MIS Quarterly* (31:4), pp. 705-737.

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