

## Improving IT assessment with IT artifact affordance perception priming



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### ABSTRACT

Accurately assessing organizational information technology (IT) is important for accounting professionals, but also difficult. Both auditors and the professionals from whom they gather data are expected to make nuanced judgments regarding the adequacy and effectiveness of controls that protect key systems. IT artifacts (policies, procedures, and systems) are assessed in an audit because they “afford” relevant action possibilities but perception preferences shade the results of even systematic and well-tested assessment tools. This study of 246 business students makes two important contributions. First we demonstrate that a tendency to focus on either artifact or organizational imperative systematically reduces the power of well-regarded IT measurements. Second, we demonstrate that priming is an effective intervention strategy to increase the predictive power of constructs from the familiar technology acceptance model (TAM).

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## 1. Introduction

Organizations must successfully adopt, develop, and assess information system (IS) risks if they are to have effective and well-controlled accounting functions. For example, while enterprise resource systems (ERP) greatly benefit accounting practices (Hendricks, Singhal et al. 2007; Grabski, Leech et al. 2011), the adoption of those systems carries a high risk of uncertainty as adoption troubles for firms such as Nike, Whirlpool, Samsonite, Levi Straus, Hershey, and FoxMeyer (Chen 2001) help illustrate.

Accounting professionals play a variety of IS roles in adoption initiatives. A chief financial officer (CFO) may be held responsible for IS missteps (Gore, Matsunaga et al. 2011), especially where systems generate financial reports or in organizations where the chief information officer (CIO) reports to the CFO (Banker, Hu et al. 2011). Accounting professionals may also have some responsibility simply by being part of the ERP project team, which is common (Brown 2004). Adopting an ERP system, for example, may be subject to various internal controls that are assessed and reported on in financial audits. Reportable IT process judgments, such as these, are often binary: controls are considered to be either adequate or not. As a result, very important risks may go unaddressed because accounting professionals find that they fall below the threshold of reporting to management.

More complex processes and systems call for nuanced assessments. Lessons from ERP adoption (Gargeya and Brady 2005; Sauer, Gemino et al. 2007; Budzier and Flyvbjerg 2013; Jiang, McPherson et al. 2014) strongly suggest that management teams that clearly connect technology capabilities to their appropriate business needs are more likely to be successful. Unfortunately, a hindrance to formulating these connections stems from the variation of individual abilities to perceive technology capabilities in connection with organizational imperatives. For example, Shein (1996) describes a technical-organizational

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disconnect in his classification of management cultures. Executives and managers are removed from core technologies and focus on accomplishing strategic goals. At the other end are systems experts who focus on developing technology solutions. Somewhere in the middle are operators (and accounting professionals) who must get their work done. These cultures rarely communicate well, and for organizations to be more successful, Shein says, greater mutual understanding is needed.

Differences in technical-organizational perspectives may result, in part, from differing IT affordance perception preferences. IT affordances may be defined as perceived action possibilities associated with IT artifacts (Leonardi 2011). For example, ERP systems “afford” the potential to simplify consolidation and financial reporting procedures and make organizations more efficient, but the mechanisms to accomplish these goals are complex. Consequently, although affordances (action possibilities) are present, they may not be consistently perceived by individuals who use or assess ERP system capabilities and related procedures. Organizations train people to develop expertise, but training effectiveness is strongly affected by the experiences and predisposition of the trainee. Individual preferences to focus either on the IT artifact or the organizational purpose it fulfills can make it hard for an individual to apprehend the affordances offered by a system, process, or control. For example, system authentication and authorization procedures inevitably result in tradeoffs between convenience in completing tasks and the risk of fraud or error. Intelligent and effective compliance with the ever-changing IS control environment calls on users to grasp action possibilities that are afforded by controlling user access to IS artifacts. These and other action possibilities include many control activities with potential to affect organizational outcomes.

Auditors are called upon to make judgments about the efficacy of internal controls, including IT controls, as they audit financial statements. For example, changes to financial systems must be done in a controlled fashion to mitigate the risk of inaccuracy in audited data. The ISACA guidance for SDLC (System Development Life Cycle) reviews (ISACA 2010 p.107) suggests that SDLC risks include “Inadequate controls”, “inappropriate SDLC”, “Insufficient attention to interdependencies”, and “inadequate quality of the application system”. Various audit frameworks and the tools developed from those frameworks address similarly formulated risks for security and business continuity. Assessing the adequacy, appropriateness, and sufficiency of technical-organizational artifacts requires nuanced evaluation of capabilities, risks, and control adequacy. If control assessments are shaded by perception preference the resulting conclusions regarding the accuracy and completeness of the financial data or the ability of the organization to proceed as a going concern may be affected.

Studies in psychology show that individuals have difficulty recognizing the forces that shape their actions (Wilson and Brekke 1994; Wilson 2002), and we theorize that IT affordance perception preferences (IT perception predisposition, for the sake of brevity) may unconsciously influence whether an individual focuses narrowly on the technology artifact or the organizational outcomes. Therefore, the first goal of our study is to determine whether differences in IT perception predisposition systematically reduce the power of IT assessments. If so, then these differences complicate efforts to reliably identify acceptable IT solutions or assess their associated risks. For our experiment, we adopted constructs from the long-studied technology acceptance model (TAM): perceived usefulness is a primary driver of behavioral intent which in turn drives acceptance of IT systems (Davis Jr. 1986; Venkatesh and Davis 2000; Venkatesh, Morris et al. 2003). Although the specific items used to measure adoption are not used directly in internal control audits, they are somewhat similar in substance to tools used to assess various IT general controls. Further, acceptance is deeply important for accounting because willingness to adopt new, as yet unidentified, controls may have a major impact on the reliability of financially important information systems. Because they are well validated, the TAM constructs and assessment items are useful as proxies indicating the effect if IT preference on the accuracy of similar measurements of IS risk.

Our second goal is to identify whether implicit measures, which are not obvious to the participant, can “nudge” IT perception predisposition to a more balanced perspective. We anticipate that exposing an organizationally focused individual to IT artifact stimuli would make them temporarily more artifact perceptive. Similarly, exposing an artifact preference individual to organizational stimuli would make them more organizationally perceptive. If successful, we anticipate this type of “framing” could serve as an effective intervention strategy to help develop better shared perspective and improve the reliability of IT assessments.

More accurate assessments of the antecedents of IT adoption should positively influence the quality of financial reporting systems such as ERP systems, generally improve the effectiveness of IT processes, increase the failure-predicting power of IT control audits, and marginally increase the validity of IT control related audit opinions. As auditors move beyond random sampling using analytical modelling to target unusual transactions, their reliance on the quality of those system becomes increasingly important to the accounting community.

## 2. Background

Assessing financial reporting system controls requires auditors to exercise judgment regarding user responses, for example, on questionnaires and user/developer/manager surveys. However, an open question is whether auditors, decision makers, and potential users perceive a new or changed system affordance with sufficient depth to effectively assess risks and appropriately formulate controls. The reliability of those assessments is significant since problems can result in serious negative effects both on operations and financial reporting. For example, many financial reporting and auditing activities assume that such assessments are dependable for predicting system effectiveness and mitigating system failure. Because of the large costs associated with new system initiatives, organizations need tools to better steer resources towards those solutions most likely to be accepted by end users (Davis Jr. 1986) and benefit the organization. Because auditors rely on the data in such systems, they need to know that IT acquisition and risk assessment processes are in place and effective.

The assessment tools, surveys, and questionnaires used by auditors are systematically formulated based on recognized best practice; but the predictive power of specific items has not been subject to widespread validation in controlled experiments across multiple industries. In order to provide evidence that IT perception predisposition systematically impacts assessment accuracy and that priming can mitigate negative effects on auditing tools, this study borrows constructs from the widely studied TAM model. We assert that this is appropriate both because technology adoption is intrinsically relevant to IT audits, internal control weakness judgments, and IT general control evaluations, and because the form of the TAM items, which involve user judgments and self-reports of behavior and opinion, are sufficiently similar to important auditing tools so as to provide meaningful evidence. We posit that if IT perception predisposition affects the predictive power of TAM, it will also affect the predictive value of familiar audit instruments.

### 3. User acceptance of technology

The technology acceptance model (TAM) is a widely studied instrument for predicting user adoption (Venkatesh and Davis 2000; Venkatesh, Morris et al. 2003; Parameswaran, Kishore et al. 2014). Assessments of perceived usefulness (PU) of an artifact and the behavioral intent (BI) of individuals to use an artifact have been shown to predict use behavior (USE). TAM also includes a construct to assess perceived ease of use (PEOU), though its overall contribution to explanatory value is weak, compared to that of perceived usefulness, or non-significant (Sun and Zhang 2006). A number of mediating factors, most notably, age, gender, experience, and social expectation, have all been shown to be significant in influencing the explanatory value of BI (Venkatesh, Morris et al. 2003). These and other mediators such as social influence, complexity, and gender, which also influence the explanatory value of TAM models, have resulted in expansions to TAM (Venkatesh and Davis 2000; Venkatesh, Morris et al. 2003).

While demographic and organizational characteristics can help predict behavior, Venkatesh and Bala (2008) called for more prescriptive guidance. Partly in response to this research agenda, a number of moderating factors have also been shown to significantly impact TAM constructs. Sun and Zhang (2006) review many of these and classify them as either organizational, technology, or individual factors. Organizational factors include whether a technology is mandatory. Mandatory adoption of technology positively influences social norms and leads to higher acceptance (Venkatesh, Morris et al. 2003). Technology factors include whether a system is designed for individual use or group collaboration. Group technology also positively influences social norms and leads to higher acceptance (Sun and Zhang 2006). Individual factors include whether a study is conducted with students or general users, as studies with students typically result in higher explanatory value than field studies where real-world factors can confound the interaction of TAM constructs (Sun and Zhang 2006). Such organizational, technology, and individual characteristics are rarely considered in IT control assessments, though they promise to improve their accuracy and may facilitate more prescriptive insight into the adoption process.

### 4. Affordances

While TAM focuses on the antecedents of adoption, one deficiency is its inability to accommodate individual differences (Agarwal and Prasad 1998; Straub 2009). The coping model of user adoption (CMUA), for example, recognizes that adoption attitudes may change as users become accustomed to technology (Beaudry and Pinsonneault 2005; Beaudry and Pinsonneault 2010). While, to date, only a few constructs from CMUA have been validated as predictors of IT use (Beaudry and Pinsonneault 2010), conclusions based on this kind of analysis are likely to be actionable – that is, the situational factors can be changed to improve rates of adoption.

We also seek to incorporate an individual paradigm, IT perception predisposition, into IS assessment, as in the acceptance of technology. IT artifacts include information technology (IT) or machines that process, store, and disseminate information (Nevo and Wade 2010), such as computer hardware and software. IT artifacts can also apply to information systems (IS), or the interaction between people, policies, data, and technology (Kroenke 2014). IT artifacts may *afford* many possibilities for action (Leonardi 2011), but interaction with those artifacts is constrained by our ability to perceive these affordances (Gibson 1979; Turvey 1992). Although the material properties of IT artifacts are common, affordances are unique individual perceptions (Leonardi 2011), based, in part, on one's personal preference. Adapting these concepts in the context of IT assessment, we assert that if the features of an IT artifact offer certain organizationally relevant action possibilities, a potential affordance exists. Productive perception of an affordance requires both awareness of the feature and an understanding of promising relevant organizational action possibilities.

We theorize that preferences in IT artifact affordance perception push individuals toward one of two perspectives. Some prefer to focus on the material characteristics of IT artifacts (artifact focus), while others prefer to focus on organizational goals and outcomes (organizational focus). Put another way, IT artifacts may be viewed as making a contribution or else may be overlooked as facilitating sub components of organizational processes that achieve desired goals and outcomes. For example, some previous work suggests that IT professionals are more likely to have an artifact focus, while senior managers are more likely to have an organizational focus (Curry, Marshall et al. 2014).

We contend that this kind of systematic IT affordance perception preference often influences our priorities and judgments. One recent study identified thirteen drivers of IT audit quality, demonstrating important differences in perception between financial and IT auditors (Nielsen 2014). The results (p. 73) showed that while the two groups substantially agreed about the relative importance of most drivers of IT audit quality, financial auditors ranked "Business process knowledge and experience" as the most important factor and "IT and controls knowledge" as next to last at twelfth. In contrast, IT audit practitioners rated

these two factors about evenly at sixth and fifth respectively. These variations, off by 5 and 7 ordinal ranks, were the largest noted in the study where the average rank difference was less than 3 and no other factor showed a difference of more than 4. Clearly, these groups perceive audit-relevant evidence differently, and those differences are most strongly demonstrated in the perceived relative importance of organizational operations (business process) and IT/IT control functionality.

These findings parallel Kroenke's (2014) observations that describe two opposing responses to the rapid pace of business technology changes. The 'technophiles' (artifact focus) are eager to embrace new systems, while the organizationally focused may ignore IT, preferring instead to 'leave it to the pros'. We suspect that one's bias towards IT may be influenced over time by experience, and Kroenke (2014) seems to agree. He advocates that business professionals act contrary to their preference by reading articles on new technology, attending technical seminars, and participating in technology committees as a user representative. While strategies such as these may benefit individuals, identifying organizational strategies to moderate preferences may also help improve the quality of IT assessments and, thereby, risk/control analysis.

Venkatesh and Bala (2008) suggest "that there is a need to understand how various interventions can influence the known determinants of IT adoption and use." Likewise, Schein (1996) advocates a need for better understanding of approaches to improve communication between the different organizational cultures which naturally develop. We theorize that IT perception predisposition impacts how people respond to assessments of adoption and to interventions. Therefore, understanding this phenomenon matters if organizations are to formulate powerfully predictive IT assessment tools and execute effective intervention strategies. It may well be that adjusting to or altering the perception bias of personnel can lead to better strategic decisions regarding new IT system adoption and implementation of related internal control procedures.

## 5. Priming to influence IT perception predisposition

Individuals may well be unaware of the behavioral impact of operating from an IT perception predisposition bias. In other words, they act while being unaware of why they behave a certain way. Their preference may shift depending on the situation, as when a technically oriented IT administrator attends a meeting with the CFO for a planned upgrade, or an auditor inspects IT processes and controls. Because situational context influences behaviors, attitudes, and actions (Johnson, Morgeson et al. 2006; Leavitt, Reynolds et al. 2012) we anticipate that context would also cause shifts in IT perception predisposition.

Implicit measures have been widely used to investigate nonconscious behaviors, such as racial bias (Tulving and Schacter 1990; Schacter and Buckner 1998; Uhlmann, Leavitt et al. 2012), advertising (Roskos-Ewoldsen, Roskos-Ewoldsen et al. 2002), and political views (Krosnick and Kinder 1990). For example, content priming exposes the subject to a stimuli that will influence their subsequent action (Janiszewski and Wyer Jr. 2014). In a typical priming exercise, subjects are exposed to a priming stimuli before being asked to make a choice. For example, seeing words related to hostility or kindness increases the likelihood that the respondent will later characterize a target individual with traits related to the priming treatment (Srull and Wyer 1979). Many psychologists theorize that priming temporarily activates related information into accessible memory, which then influences subsequent behavior (Tulving and Schacter 1990; Yonelinas 2002).

While priming is a powerful persuasion method, it has rarely been used in IS contexts. Notable exceptions include, priming to improve group brainstorming (Dennis, Minas et al. 2013) individual decision making in virtual teams (Bhagwatwar, Massey et al. 2013), and influencing users to download software (Van Der Heijden 2013).

We anticipate that priming IT perception predisposition inconsistent with a respondent's preference will result in a better, broader value perception. The new perceptive data should improve the robustness of mental models, which are theorized to facilitate decision calculus (Little 2004). Improved perception should cause a higher explanatory value in assessments using a TAM model. That is, priming artifact-oriented individuals with organizational messages or organizational-oriented individuals with artifact messages would be expected to enhance the predictive power of the assessments. This assertion is captured in the following three hypotheses.

**Hypothesis H1.** Activation of an inconsistent IT perception predisposition will increase TAM's predictive power.

**Hypothesis H2.** Activation of a consistent IT perception predisposition will have no effect on TAM's predictive power.

**Hypothesis H3.** Activation of both consistent and inconsistent IT perception predisposition will reduce the positive effect of inconsistent priming on TAM's predictive power.

Recognizing how intentional priming can be used to improve the predictive power of assessments could lead to useful techniques for bridging the communication gaps amongst various organizational stakeholders. Hypothesis H3 explores the impact of nudging respondents towards both artifact and organizational perception. This kind of treatment may bring "missing" perception elements into play or may distract the respondent. This hypothesis has important implications because if a "two-sided" treatment such as the one referred to in H3 proves to be universally effective, understanding a participant's bias may be less important in developing improved IT assessments.

## 6. Methodology

The primary goal of our study examines whether IT affordance perception preferences systematically impact the predictive power of IT assessments borrowing constructs from the well-recognized TAM research model. Furthermore, it tests a

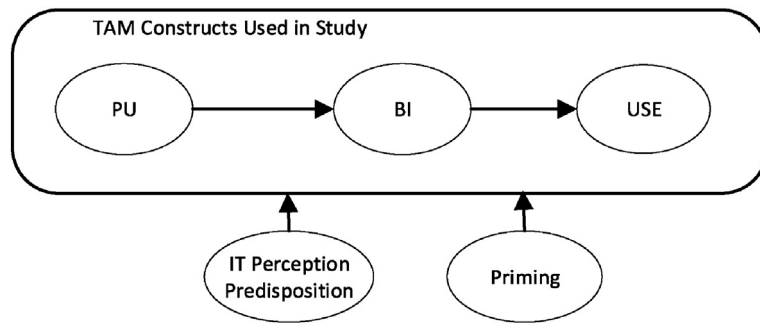


Fig. 1. Research Framework to Study IT Perception Predisposition and Priming on Perceptions of Usefulness.

methodology for increasing the predictive power of the model by accounting for such preferences. While preliminary work by Curry et al. (2014) found that differing levels of artifact affordance perception influenced levels of explanatory value in a less well-known IT success model, we seek to assess the effectiveness of IT perception predisposition intervention strategies using the better understood TAM constructs. As we noted in our introduction, there is a consensus that broadening technical and business perspectives can benefit IS adoption. Therefore, we posit that perceiving *both* artifact features and organizational purpose will result in a more nuanced and ultimately more accurate assessment.

As we noted, many studies find perceived ease of use (PEOU) non-significant in TAM studies. Gefen and Straub (2000) theorize PEOU is only effective when the task being studied is extrinsic to the technology. Therefore, we used a simplified TAM model shown in Fig. 1 that omits PEOU. The design examines whether IT perception predisposition influences assessments of PU and BI as they relate to USE, and whether treatments designed to moderate IT perception predisposition are effective. Our analysis contrasts effect size ( $f^2$ ), variations in the models' explanatory values ( $R^2$ ) based on differing treatments. Since this effect is a relative value based on measurements using identical constructs we anticipate no negative results using this simplified TAM model.

## 7. Assessing IT artifact perception preference

To classify respondents' IT perception predispositions, we adapted items developed by Curry et al. (2014). Following their recommendations, each item was framed as bipolar pairs: one focusing on organization and the other on artifact features. Thus each answer provides direct insight into a respondent's preference. Two pilot tests were conducted that helped refine item formulations and verify their suitability. Table 1 presents the items used in this study along with the instrument instructions.

## 8. Items to measure IT assessments

The PU, BI, and USE items adapted from Davis (1989) are presented in Table 2 and are similar to those used in other TAM studies.

We collected data in a university setting using 246 business undergraduate students. As Sun and Zhang (2006) note, a controlled academic experiment often facilitates TAM studies by eliminating other confounding drivers of adoption. Most students were either in their third or fourth year of university study and participated in a group project documenting business processes and IT systems using Visio, SharePoint, and Microsoft Access. Working in small teams to complete project deliverables gave each student experience using university IT systems to accomplish shared goals. Students were encouraged to use SharePoint for

**Table 1**  
Paired Items to Assess IT Perception Predisposition <sup>a</sup>.

ITEM	Organizational Statement	Artifact Statement
ITP1	I usually focus on the business results which IT systems support.	I usually focus on IT's contribution to achieving business results.
ITP2	I tend to think more about the steps in a business process than the IT behind those steps.	I tend to think more about the role of IT in a business process than the steps in the process.
ITP3	I enjoy working with others to help our organization achieve its goals.	I enjoy using IT products to help our organization achieve its goals.

<sup>a</sup> Items were structured as paired statements separated by a 5-point scale with the following instructions:

"For each pair of statements select the response that corresponds most closely with how you think. If you equally agree with both statements, choose response 3 in the center of the scale. If you agree with one statement more than the other, choose a response to the left or right of center (e.g. either 2 or 4) closest to the statement you agree with. If you strongly agree with one statement more than the other, choose a response at the ends of the scale (e.g. 1 or 5) closest to the statement you strongly agree with."

**Table 2**  
TAM Items Adapted from Davis (1989)<sup>a</sup>.

PU1	<The system > enhances the effectiveness of work by coordinating activities.
PU2	Collaboration with <the system > makes it easier to complete work.
PU3	Using <the system > helps accomplish goals more quickly.
PU4	Using <the system > increases productivity.
BI1	I intend to use <the system > for work.
BI2	I expect that <the system > will be used by others.
BI3	I plan to use <the system > .
USE1 <sup>b</sup>	The total number of activities that I completed in <the system > was:
USE2 <sup>c</sup>	The frequency that I use <the system > is:
USE3 <sup>c</sup>	The frequency that others use <the system > is:
USE4 <sup>c</sup>	Overall, <the system > is used:

<sup>a</sup> Unless otherwise noted, items used a five point scale from 'Strongly disagree' to 'Strongly agree'.

<sup>b</sup> Actual usage was recorded and each student was given a report of their total usage for the term. The item scale was based on five percentile ranges of 'less than 20', '21-35', '36-50', '51-70', and 'Greater than 71.'

<sup>c</sup> Item scale was from 'never to 'very often'.

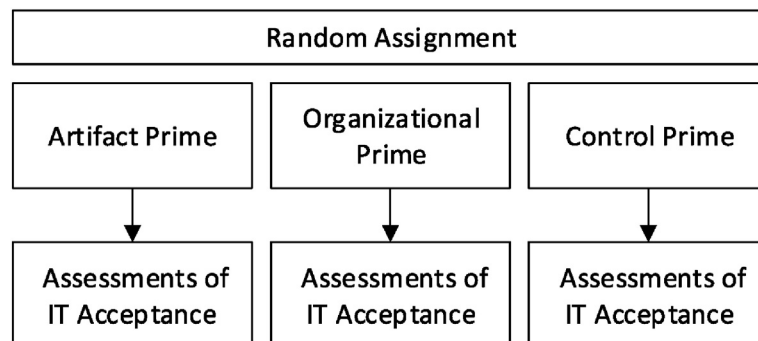
completing their team project in the course. Each team consisted of four to six members. Except for a one-hour orientation lab, and a requirement that each team store their project documents in SharePoint for instructor access, the use of SharePoint was voluntary. Most teams did use SharePoint for collaboration while completing their project. A small number of teams did little beyond completing the orientation lab and posting their project documents as required. Each time a student used SharePoint it was recorded by the system, so that actual usage statistics could be reported.

During the last weeks of the course, students were asked to complete a paper-based survey in exchange for extra credit points roughly equivalent in value to a regular quiz. Prior to passing out the survey, each student was given an individual report of SharePoint usage for the term and instructed to use this in answering item USE1. The survey consisted of a priming treatment and items to assess both IT perception predisposition and TAM constructs. Because the university had announced plans to roll out Office 365 which included personal SharePoint sites for student use, the BI items were actual assessments of intent to accept this over other collaboration alternatives. The instructions asked students to think of the university as "their organization," and informal discussions afterward suggested most students had little difficulty with this perspective.

## 9. Priming



To cognitively activate artifact and organizational representations of information, we used a memory recall priming methodology similar to that reported by Leavitt et al. (2012). The priming methodology in our experiment is depicted in Fig. 2, and the priming items are presented in Table 3. A randomly selected group of participants were presented with either an artifact, organizational, or control prime. The prime consisted of asking respondents to recall two situations. Each situational recall item had either a heavy artifact emphasis or a heavy goal accomplishment emphasis using SharePoint. Two pilot tests helped with refinements to the priming items until they sufficiently activated the desired memory so that there was a balanced and observable influence on the TAM items.

The memory activated by priming degrades quickly (Tulving and Schacter 1990), but anchoring the recalled memory can lengthen the activation and also increase its reliability (Siedlecki 2014). Two self-observation questions (e.g. "can you picture the room you were in at the time?") were asked, as well as asking the participant to briefly describe the memory in a few sentences. Leavitt et al. (2012) found that embedding watermarks of an image conceptually related to the prime was effective



**Fig. 2.** Priming Experimental Methodology.

**Table 3**  
Priming Items<sup>a</sup>.

Artifact Prime1	IT systems such as SharePoint are a collection of 'components', such as servers, networks, personal computers, web browsers, and more, all connected together. Can you recall a situation using SharePoint where you were aware of interacting with <u>two</u> or more components of this system?
Artifact Prime 2	Working with an IT system such as SharePoint can involve interacting with electronic information such as tasks, documents, and other details stored in a computer. Can you recall a situation in using SharePoint where you were aware that information was being stored electronically?
Artifact Image <sup>b</sup>	
Organizational Prime1	SharePoint can enable people in organizations to collaborate and coordinate their work even when they are in different physical locations. Can you recall a specific instance when you used SharePoint to collaborate with someone in a different location than your own?
Organizational Prime2	SharePoint can help coordinate activities and share ideas for accomplishing team goals. Can you recall a specific goal which SharePoint helped your team complete?
Organizational Image <sup>b</sup>	

<sup>a</sup> All items used a yes/no scale. A small text box was provided for the self-observation responses.

<sup>b</sup> The imagery was displayed in the upper right-hand corner of the instrument's approximate 5 pages.

in keeping the prime in active memory. In our experiment, a small image related to the prime was placed on the upper right-hand corner to create an association with their recalled memory. This image was then displayed on each subsequent page.

The control group received one artifact prime and one organizational prime, with the two different prime images being alternated on the survey pages. The order of the artifact and organizational prime items and images were both randomly alternated for the control group.

## 10. Classifying IT bias

To classify respondents by IT bias, we combined items using the principal component analysis method similar to that reported by Curry et al. (2014). We also obtained similar groupings using a simple summation of item scores (correlation .87,  $p < 0.01$ ) and k-means cluster (correlation .67,  $p < 0.01$ ). Table 4 presents the descriptive statistics for the three IT perception predisposition items previously listed in Table 1.

Interpreting these descriptive statistics in context includes recognizing that the value 3 was cast as a neutral or balanced response between artifact and organizational formulations. Not surprisingly, the organizational preference group was, on average, more likely to focus on processes over IT artifacts, for items 1 through 3. The artifact-focused group tended to be, on average, slightly more artifact- focused for item 1 and more neutral on items 2 and 3. While various interpretations of the mean values are possible, considering the in-group averages, we infer that the organizational group is, by preference, more strongly organizational than the artifact group is artifact-focused. This has some impact on the analysis below.

We also conducted 13 interviews to validate these items' ability to assess IT perception predisposition and to gain more in-depth context of how they were intellectually interpreted by respondents. We present a few excerpts in Table 5 intended to illustrate how each item was interpreted either in organizational or artifact preference.

## 11. Results

We analyzed the data using PLS models in SmartPLS software version 3.19 (Ringle, Wende et al. 2014). We subdivided cases based on IT perception predisposition as well as on priming treatments. The models' explanatory values ( $R^2$ ) are reported and then contrasted using Cohen's (1988) guidelines for effect size ( $f^2$ ) in Table 6. Regression path weights for the associations modeled in Fig. 1 are also included to help identify drivers of effect size change.

**Table 4**  
Descriptive Statistics for IT Perception Predisposition Items.

Group	Count	ITP1		ITP2		ITP3	
		Mean	t-test	Mean	t-test	Mean	t-test
All	246	2.74		2.25		2.43	
Org. preference	126	2.21	(244)7.4, $p < .001$	1.53	(244)14.4, $p < .001$	1.92	(244)7.9, $p < .001$
Artifact focus	120	3.28		2.99		2.97	

**Table 5**

Excerpts to illustrate Interpretation of IT Perception Predisposition Items Listed Table 1.

ITEM	Organizational Preference	Artifact Focus
ITP1	"I strongly focus on the steps and try to figure out how to get from A to B. Technology usually falls in one of the steps. But I don't look how to implement it in that step."	"There is stigma and bias towards IT that is a little worse than other areas of the company. But you can appreciate what's going on if you take time to learn what they do."
ITP2	"I take IT for granted. I don't think how it's getting done. It is just getting done and I am happy with it."	"I love IT, I love computers. I understand it all comes back to business, but I am focused on IT's contributions."
ITP3	"I just don't have knack for that kind of stuff [IT]. I think it's more for people who are detail oriented. I am more big picture."	"I prefer using IT products to achieve organizations goals. Then you are not wasting two people's time, like when I have to go to finance and talk to them about our budget I am hovering over their cubicle wasting time. As opposed to me looking in our database and finding the answer myself."

The results are summarized in Table 7 to more clearly indicate how consistent and inconsistent priming influenced the predictive power of TAM as predicted by H1 and H2.

This work explores how IT perception predisposition influences IT assessment. Beginning with the idea of affordance as an action possibility associated with artifact features, our theory suggests that perceiving both artifact features and organizational purpose will result in more nuanced and ultimately more accurate assessments. In short, incomplete affordance perception leads to weaker assessment. Our hypotheses are based on the idea that if assessments are better, the predictive power of well-conceived models based on those assessments (particularly the TAM model in this study – but more broadly in various IT processes assessed in establishing the reliability of financial systems) will be more powerfully predictive. The data shown in Tables 6 and 7 generally support our three hypotheses, providing evidence that heightened and balanced perception results in more powerful IT assessments. Although we report data for the BI→USE path, we note that this path has performed less consistently than the PU→BI path in many previous TAM studies, so conclusions based on USE should be drawn with caution.

### H1. Activation of an inconsistent IT perception predisposition will increase TAM's predictive power.

H1 is important because it highlights both problem and solution. Confirmation of H1 both demonstrates an influence mechanism - preference drives incomplete perception, which in turn negatively influences assessment - and prescribes a treatment.

Primarily we asked respondents to perform two thought tasks designed to activate perception. Evidence for H1 comes from respondents for whom the artifact activation was contrary to perception preference. Results for these respondents are reported in Table 6 as 'All inconsistently primed' and are sub-divided into two sub-groups 'Pref: artifact prime: org.' and 'Pref: org. Prime: artifact'. Explained variance for each of these three sub-groups was higher than the explained variance for a model including all respondents. These comparisons showed a 'large' effect on BI (.25<sup>++</sup>) for artifact-focused respondents and small effects for both

**Table 6**

Contrasting Treatment Groups vs. All Respondents.

Model (size)	BI		USE		Path Weights	
	R <sup>2</sup>	f <sup>2</sup>	R <sup>2</sup>	f <sup>2</sup>	PU- > BI	BI- > USE
All (246)	.52		.09		.58**	.29**
Pref: artifact (119)	.59	.15 <sup>+</sup>	.13	.05 <sup>+</sup>	.63**	.36**
Pref: org. (127)	.48	-.09 <sup>+</sup>	.08	-.01	.51**	.28**
Explained variance was higher for artifact-focused respondents						
<b>Inconsistent Prime: Higher predictive power for both BI and USE (Support for H1)</b>						
All inconsistently primed (103)	.58	.12 <sup>+</sup>	.18	.11 <sup>+</sup>	.67**	0.43**
Pref: artifact prime: org. (48)	.64	.25 <sup>++</sup>	.31	.25 <sup>++</sup>	.72**	0.56**
Pref: org. Prime: artifact (55)	.53	.03 <sup>+</sup>	.13	.05 <sup>+</sup>	.65**	0.36
<b>Consistent Prime: Lower predictive power for BI path (Support for H2)</b>						
All consistently primed (97)	.44	-.16 <sup>++</sup>	.10	.02	.48**	0.32**
Pref: artifact prime: artifact (45)	.47	-.11 <sup>+</sup>	.29	.23 <sup>++</sup>	.54**	0.54**
Pref: org. Prime: org. (52)	.43	-.18 <sup>++</sup>	.06	-.03 <sup>+</sup>	.44**	0.24
<b>Control (Balanced) Prime: Higher predictive power for BI (Support for H3)</b>						
All control prime (46)	.61	.18 <sup>++</sup>	.04	-.05 <sup>+</sup>	.57**	.19 <sup>a</sup>
Bias: artifact prime: control (26)	.76	.50 <sup>+++</sup>	.02	-.07 <sup>+</sup>	.65**	-.14 <sup>a</sup>
Bias: org. Prime: control (20)	.37	-.32 <sup>++</sup>	.07	-.02 <sup>+</sup>	.46**	.26 <sup>a</sup>

All effect sizes based on contrast to full sample (246); respondent counts are shown in parentheses.

Effect size: <sup>+</sup> = small, <sup>++</sup> = medium, <sup>+++</sup> = large; according to Cohen's (1988) guidelines.

Significance \* = p < .05, \*\* = p < .01, \*\*\* = p < .001.

<sup>a</sup> USE path weights were non-significant for respondents receiving mixed priming messages.



**Table 7**  
The Effect of Treatments Given Perception Preferences.

Model (size)	BI		USE	
	R <sup>2</sup>	f <sup>2</sup>	R <sup>2</sup>	f <sup>2</sup>
Prime: artifact (100)	.48		.15	
H1: Preference: org. Prime: artifact (55)	.53	.10 <sup>+</sup>	.13	-.02 <sup>+</sup>
H2: Preference: artifact prime: artifact (45)	.47	-.02 <sup>+</sup>	.30	.17 <sup>++</sup>
Prime: organizational (100)	.53		.12	
H3: Preference: artifact prime: org. (48)	.64	.23 <sup>++</sup>	.31	.22 <sup>++</sup>
H2: Preference: org. Prime: org. (52)	.43	-.20 <sup>++</sup>	.05	-.07 <sup>+</sup>

Effect sizes based on contrast to all respondents with the same prime.

Effect size: <sup>+</sup> = small, <sup>++</sup> = medium, <sup>+++</sup> = large; according to Cohen's (1988) guidelines.

organization-focused respondents (.03<sup>+</sup>) and for the inconsistent treatment group in total (.12<sup>+</sup>). A similar pattern of effect was observed for the USE construct (.25<sup>++</sup>, .11<sup>+</sup>, .05<sup>+</sup>). In short, inconsistent activation increased predictive power as expected for all the tested model paths.

Similar results are shown in Table 7, which contrasts effect sizes by perception preference within a treatment group. The artifact prime was shown to have a small but positive effect on organizationally focused individuals along the PU- > BI path, although an unexpected but small negative effect was observed along the less-reliable BI- > USE path. For artifact-focused individuals, the organizational prime had medium size and positive effects on explained variance: .23<sup>++</sup> and .22<sup>++</sup> for BI and USE respectively. This analysis was important in that one treatment or the other could have been more generally efficacious. These data suggest that the impact of the treatments was systematic as predicted for preexisting perception preferences.

## H2. Activation of a consistent IT perception predisposition will not increase TAM's predictive power.

H2 is important in validating that activating inconsistent preferences (as in H1) was importantly different from activating consistent preferences. Support for this hypothesis is provided by the medium-sized and negative effect (-.16<sup>++</sup>) observed when results for the 97 consistently primed individuals is contrasted with results for the complete sample. These results are consistent for both organizationally and artifact-focused respondent groups, with -.11<sup>+</sup> and -.18<sup>++</sup> effect size differences observed. Further, contrasting results along the BI→USE path for consistently primed individuals vs. the sample in total resulted in an effect of only .02, which is not a significant increase according to Cohen's guidelines.

As shown in Table 6, where results are organized to show how a given priming treatment differently affected individuals based on their IT perception predisposition, most of our data support H2. Organizationally focused priming of organizationally minded respondents was detrimental or inconsequential with a medium-size negative effect -.20<sup>++</sup> for BI and a small but negative effect (-.07<sup>+</sup>) on USE. The path weight for USE in that sub-group was also non-significant. (Table 6, Pref: org. Prime: org., shows a non-significant path weight of .24). For artifact-based respondents, there was a small but negative effect on BI (-.02<sup>++</sup>). However, there was a surprising medium-sized positive effect along the USE path. We decline to speculate on the cause of the variation but, as noted, USE has been shown to be less reliable than BI in previous TAM studies.

Summarizing evidence for H2, our results indicate that reinforcing preexisting perception preferences was either detrimental or inconsequential as reflected in the predictive power of the tested model.

## H3. Activation of both consistent and inconsistent IT perception predisposition will reduce the positive effect of inconsistent priming on TAM's predictive power.

As previously noted, the control or balanced prime consisted of asking respondents to perform one organizationally focused task and one artifact-focused task. It may be that this pair of tasks activated both artifact feature perception and a focus on organizational imperative. Support for H3 is shown in Table 6 in the medium-sized .18<sup>++</sup> increase in effect for BI in the 'All control prime' row. The effect, however, seems to have come from the artifact-focused individuals rather than the small group of organizationally focused individuals who received the balanced prime. Given that respondents with an artifact predisposition in the sample as a whole tended to have higher explained variance overall, it is not surprising that control priming, which was expected to have little or no effect, resulted in a negative effect size for other participants. Still, the magnitude (-.32<sup>++</sup>) was larger than anticipated. Perhaps this is because the treatment over-activated a preference. That is to say, activating both preferences benefited the artifact-focused individuals by decreasing variance between the PU and BI items, but we speculate that if the organizational-focused individuals were already more balanced, the prime added variance to their assessment. In short, inconsistent priming helped, consistent priming was negative, but mixed priming resulted in mixed outcomes.

Although the analysis shown here was based on assignment to preference groups using principal component analysis over the IT perception predisposition items, we tested the sensitivity of our results by using both summative and clustering methodologies for group assignment. The pattern of effect size differences was largely consistent even as group membership changed incrementally based on the grouping method.

## 12. Discussion

This study explores how system evaluations are shaded by individual perception preferences and how assessment tools can be usefully adjusted through priming to allow for those preferences. Accurate assessment is critical for risk mitigation, operational planning, and financial system control analysis in today's increasingly IT-dependent organizations. In this work, we examined how IT affordance perception preference systematically influences the predictive power of constructs from the TAM model. TAM is a well-known model offering a predictable and data-rich history appropriate for systematic validation. Few, if any, audit survey items are sufficiently validated to provide compelling evidence of the impact of systematic IT perception predisposition treatments. We believe that the TAM items are similar enough in substance to questions used in other assessments that our experiments provide important and somewhat generalizable insights. Given that our results indicate that perception preferences systematically impact the predictive power of the TAM constructs, it is reasonable to expect a similar effect on other IT process assessments.

Applying the two-sided notion of affordance (which entails both artifact features and action possibility) we posited that individuals may neglect to focus on either artifact features or organizational imperative as they assess systems and perceive affordances. As discussed in previous sections, this paradigm, which distinguishes technical and organizational perspectives, is consistent with various studies, observations, and reported organizational difficulties. A person's artifact vs. organizational valence may not be intentional or conscious. Previous research has shown that non-conscious factors can influence choices even when those factors are not directly reflected in survey results. Our results showed patterned and systematic effects associated with organizational vs. artifact-focused predispositions.

Similar non-conscious factors have been shown to be malleable when treated with priming and framing. Our experiment systematically applied priming with the intent of activating cognitive preferences, aiming to demonstrate the interaction of preference and prime on IT assessment. Our experimental design tested the notion that activating an individual's weaker affordance perception components would improve the predictive power of IT assessment. Participants in our study implicitly identified their perception preference and we systematically applied priming. Our results largely confirmed our hypotheses that 1) inconsistent priming would have a positive effect, and 2) that consistent priming would be negative or inconsequential.

Fortunately, our results were fairly consistent over different group assignment methodologies. If these mechanisms are operant for other assessments in broader contexts, it follows that organizations should consider the perception preferences of respondents when assessing facets of system quality or system usefulness. Further, to increase the power of those assessments they should use adaptive data collection mechanisms. It seems likely that CFOs, help desks, and project managers intuitively tune their questions and input along the lines suggested by this study.

We believe our questions and results are relevant to the accounting information systems literature because responding to the perceived usefulness items (PU) requires user judgments which are not unlike judgments made by auditors and clients as IT controls are assessed. In order to respond to the PU items shown in Table 2 respondents make nuanced judgments about the action possibilities afforded by the artifact in question. The words 'enhances' (PU1), 'easier' (PU2), 'more quickly' (PU3), and 'increases' (PU4) suggest that the impact of system use is to be compared either to the current situation or to some hypothetical ideal. IT control assessments, for example require judgment over whether an embedded control enhances control effectiveness (similar to PU1), makes it easier to mitigate risk (similar to PU2), or helps accomplish the goal of controlling risk (similar to PU3 and PU4). Auditors are called upon to gather and interpret evidence to decide whether or not controls are appropriately designed, adequately performed, and sufficiently effective. We assert that as audit participants generate and interpret evidence they are exercising cognitive processes which seem likely to parallel the cognition exercised in responding to the well-tested TAM items. Of course this assertion is worth validating in future work.

The insights derived from this line of work may allow more targeted and effective messaging and assessment. In short, one-size-fits-all IT messages may be sub-optimal. Training and assessment initiatives need to account both for what the participant knows and for how they might prefer to perceive the subject. Our results suggest that while bringing new perspectives to respondents can increase assessment quality, reinforcing a pre-conceived preference may reduce affordance perception with measureable and negative impact. Further, dual-direction or mixed messaging may distract, confuse, or for some other reason drive unpredictable outcomes. Auditors also send implicit messages in the form and substance of audit instruments. Our results suggest that these messages may systematically influence the quality of the answers to some questions depending on the IT perception predisposition of the people who answer the questions.

Auditors could implement these findings by adjusting how questions are asked or answers are interpreted by considering predispositions a respondent may have to emphasize artifact feature or organizational imperative. This insight could be implemented by providing prime-like contextual signals in survey instruments or by assessing respondent IT perception predisposition before interpreting survey results.

## 13. Limitations

Care should be taken in applying our findings to other situations. As we noted above, more work is necessary to determine the exact levels of priming that result in the most accurate organizational assessments. Since this is only the second study focusing on IT perception predisposition, and insufficient data exists to set authoritative threshold levels, we also suggest caution in classifying IT perception predisposition. We presented one sample with means for the IT perception predisposition items. We identified differentiated groups of approximately the same size to facilitate statistical analysis, but that may not be as accurate as other

methods. More work remains to be done to collect other samples from a wider range of organizations to help classify with more certainty.

#### 14. Conclusion and future work

Our experimental design, in essence, posits that if TAM correctly captures drivers of adoption and if the underlying constructs assessed by the items are powerfully predictive, then increasing the accuracy of the assessment will increase the predictive power of the tool. The applied treatment (inconsistent priming) seems to have had the hypothesized effect. These findings provide some evidence both that less accurate assessment resulting from unmitigated IT perception predisposition reduced the predictive power of the well-validated TAM assessment items and that systematic action can be taken to decrease the negative effect of IT perception predisposition. If these findings are generalizable to other assessments, such as those used in assessing the efficacy of controls over financial reporting systems, auditors may be able to more accurately assess control risk, more accurately identify reportable control weaknesses, and more confidently establish the reliability of financial systems. This reliability may become increasingly important as auditors move to pattern recognition and outlier detection in choosing which transactions to review in an audit.

The evidence presented here establishes the promise of IT perception predisposition as a usefully assessed and manipulated construct - in managing technology adoption projects at least. Further, it seems to us that IT artifact affordance perception preferences would also impact other IT processes such as assessing risks, designing and auditing controls, and developing/maintaining accounting information systems. It may well be that assessments which rely on IT system audits are subject to systematic bias that increases organizational risk and, over time, reduces organizational value. Our work suggests that interventions such as priming and framing can be used to intentionally address these measurement issues.

Further, while this work considers the impact of IT perception predisposition on assessment tools, it is quite possible that nudging artifact-focused practitioners, auditors, or organizational managers towards a balanced habit of perception that integrates artifact feature with organizational possibility can increase organizational IT quality.

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