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This is a Special Issue edited by Joey Robertson as a result of the Sam Houston State University conference held in April. We appreciate the opportunity to present the outstanding papers selected from the participants of that conference.

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Tommy J. Robertson, Jr., Special Issue Editor
Sam Houston State University

MODELING STRUCTURAL SERVICE DESIGN DECISIONS

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ABSTRACT

In response to a literature gap exploring the service design antecedents of service quality, this paper identifies a service architecture system that hypothesizes causal linkages between structural design elements, system capability, both potential and realized, expectation signals and customer responses. Model specificity is added to a current service design framework by incorporating current service management theories in order to create a comprehensive architecture that will provide valuable modeling guidelines to service design researchers both from a theoretical and measurement perspective. Finally, in order to lend face validity to the specified architecture, structural equation modeling is used to test one of the models prescribed by the framework.

KEYWORDS: Service Quality, Service Design, Facility Design, Service Architecture

INTRODUCTION

Service operations management (SOM) is primarily concerned with the delivery of intangible goods or services, as well as, the interactions between the service provider and the customer. Recognized by the research of Chase (1978) and Buffa (1980), service operations management began to take shape in the late 1980's, nearly 10 years after their initial appeal. SOM research, however, developed slowly leading researchers to suggest that we finally begin taking services seriously (Bowen and Hallowell 2002). Over the last decade SOM researchers have taken heed of that call as service operations research has begun to flourish.

One of the major on-going developments within SOM literature is the measurement and interpretation of service quality. While approaches to measuring service quality differ (Cronin and Taylor, 1992; Grönroos, 1984; Parasuraman, Zeithaml, and Berry, 1988), the general concept of service quality measurement examines quality from the perspective of the consumer following transaction completion. While service management literature provides useful insights on service quality's link to customer satisfaction (Bitner, 1990; Parasuraman, Zeithaml, and Berry, 1988), purchase intentions and potential for repeat transaction (Cronin and Taylor, 1992),

little insight is offered on how to operationally deliver service quality through service design decisions.

The purpose of this paper is to build upon an extant service design architecture (Roth and Menor, 2003) and blend two research streams generally treated independently, namely, service quality and service design. Specifically a hierarchy of potential linkages among system design, system capability, technical outcomes, perceptual outcomes and business performance is put forth. This study will provide academic researchers with a comprehensive framework to examine service system design in the future. Equally important, our research will enable practitioners to focus on service quality via service design in the early stages of business development.

The remainder of this paper consists of three sections. The first section reviews SERVQUAL research and shows a need for studies that explore how system design decisions effect customer perceptions of service quality. The second section provides a summary of the Roth and Menor (2003) service architecture framework and adds specificity to the causal linkages. In the final section of the paper, we demonstrate how our specified service design model can aid in generating future research directions. In order to demonstrate the validity of our specified framework we will perform an empirical test of one of the generated models.

LITERATURE REVIEW

In terms of developing service quality measures, two primary schools of thought have emerged: Grönroos' service quality model and Parasuraman et al.'s SERVQUAL (Grönroos 1984; Parasuraman, Zeithaml, and Berry, 1988). While both approach service quality using a disconfirmation model, they define the multi-dimensional nature of service quality differently. In the Grönroos model, technical and functional quality of the service encounter influence service quality perceptions. Technical quality is the perception of *what* has been provided, and functional quality is the perception of *how* it has been provided (Grönroos, 1984). Grönroos considers technical quality as the objective side of perceived quality, while seeing functional quality as more subjective.

In contrast Parasuraman, Zeithaml, and Berry's (1985) original SERVQUAL model largely ignored the technical aspects of service quality and expanded upon and delineated the functional quality, also called process quality. Ten dimensions were initially proposed and later empirically reduced to five: tangibles, reliability, responsiveness, assurance and empathy (Parasuraman, Zeithaml, and Berry 1988). Since its inception, SERVQUAL has become the most common tool used to measure service quality.

While a comprehensive review of published studies is beyond the scope of this paper, a review of recently published studies that utilize SERVQUAL sheds useful insight into the current state of the field. We have identified four major themes within the SERVQUAL literature. The first theme is the use of SERVQUAL to validate instruments created specifically

for use in idiosyncratic fields such as health care (Silvestro, 2005), virtual communities (Kuo, 2003), education (Stodnick and Rogers, 2008) and information technology (Alzola and Robaina, 2005). A portion of this group of studies suggest general replacements for the SERVQUAL measurement scale A closely related second theme is the use of the SERVQUAL instrument, with only minor alterations, to draw comparisons between two or more samples. For instance this may involve using SERVQUAL to compare differences between two ports (Ugboma*,* Ibe, and Ogwude, 2004), two customer groups (Sahney, Banwet, and Karunes, 2004), or two national cultures (Kilbourne *et al.,* 2004). These studies demonstrate SERVQUAL can provide insights for practitioners on areas for improvement or advantages relative to competitors. Furthermore, they demonstrate to academic researchers that SERVQUAL exhibits criterion validity, which in turn, shows the readiness and suitability of SERVQUAL research to move forward to discuss possible antecedents and outcomes of the five dimensions of service quality.

The relationship between service quality and satisfaction makes up the third general service quality research stream. During the initial phase of research using SERVQUAL, service quality was hypothesized to be an antecedent to customer outcomes such as satisfaction (Parasuraman, Zeithaml, and Berry, 1988) and customer loyalty (Johns, Avci, and Karatepe, 2004; Rohini and Mahadevappa, 2006). The final theme focuses on identifying antecedents to SERVQUAL. Dimensions such as servicescape (Reimer and Kuehn, 2005), quality management system and technology (Sivabrovornvatana *et al.* 2005), frequency of use (Van Pham and Simpson, 2006), and customer backgrounds (Amambewela and Hall, 2006) have been investigated as variables that could influence service quality. This final group of studies suggests that key strategic variables do influence customer perceptions of service quality.

The idea that design variables might work as antecedents to service quality is in accord with the initial claims of Parasuraman, Zeithaml, and Berry (1988). Yet there has been very little research that uses large scale models to understand the impacts of structural service design decisions on service quality. Most of the service design research focuses on applied techniques, such as QFD and the House of Quality, to help translate the customer voice into design specifications (e.g. Hamilton and Selen, 2004). What appears to be missing in the service design literature is the study of the subsequent effects of those design decisions.

SERVICE SYSTEM ARCHITECTURE

In 2003, Roth and Menor detailed an SOM architecture for service design, which consisted of three primary stages: the strategic design choices, the realized service delivery system, and the customer's perceived value of the service. The main components of the strategic design stage include structural, infrastructural, and integration elements. The structural component consists of the facilities, process technology, and production processes used in service delivery representing the physical 'hardware' of the system. The infrastructural component consists of the people, policies, and practices forming the behavioral or 'software'

segment of the system. The integration component consists of supply chain, integration technologies, and adaptive mechanisms forming the strategic operating system. These three strategic design choices contribute individually to the realized service delivery, and therefore contribute to the customer's perception of the service.

Before discussing Roth and Menor's (2003) comprehensive architecture, it is worth noting that several other service management researchers have developed and/or tested more narrowly defined models that look at the effect of infrastructural and integration design choices on service delivery and customer perceptions. These architecture parallels lend face and content validity to Roth and Menor's (2003) more comprehensive framework. The parallels within infrastructural design choices include: employee cycle of success (Schlesinger and Heskett, 1991), the service profit chain (Heskett, Sasser and Schlesinger, 1994), the attachment framework (Ulrich *et al.* 1991), the Malcolm Baldrige Quality Model (Meyer and Collier, 2001) and European Excellence Quality Model (Eskildsen and Dahlgaard, 2000). In some form all of these models assert that developing supportive human resource practices (training, empowerment, etc) along with providing excellent working environments (e.g. providing tools to serve the customer, aligning store policies with customer goals, etc) leads to increased employee satisfaction and productivity which in turn results in a superior service encounter for the customer. And when customers value the enhanced encounter, their satisfaction and loyalty increase, which results in business growth and profitability.

As indicated above, much research has explored the links between infrastructural and integration design elements, system capability and customer outcomes, but very little has investigated the role that structural design decisions play in that link. In the next section, we detail an operationalized service design architecture in order to help generate future service design research models aimed at developing and extending structural design theory. Furthermore, in aim of lending face validity to our specified framework, we will empirically test a model that was generated using the newly detailed architecture. As noted, the explicit purpose of this paper is to add detail to current framework in order to give future researchers a structural network that can serve as a basis for generating not only research ideas, but also giving an idea of how to model the research by showing the inter-relationships among all the variables.

FRAMEWORK EXTENSION AND ELABORATION

Our specified design model is illustrated in ***Figure 1 --*** please note, congruent with the motivation of this research, the exogenous variable we are focusing on is structural design. In the remaining portion of this section we will discuss our architecture moving from left to right across the figure.

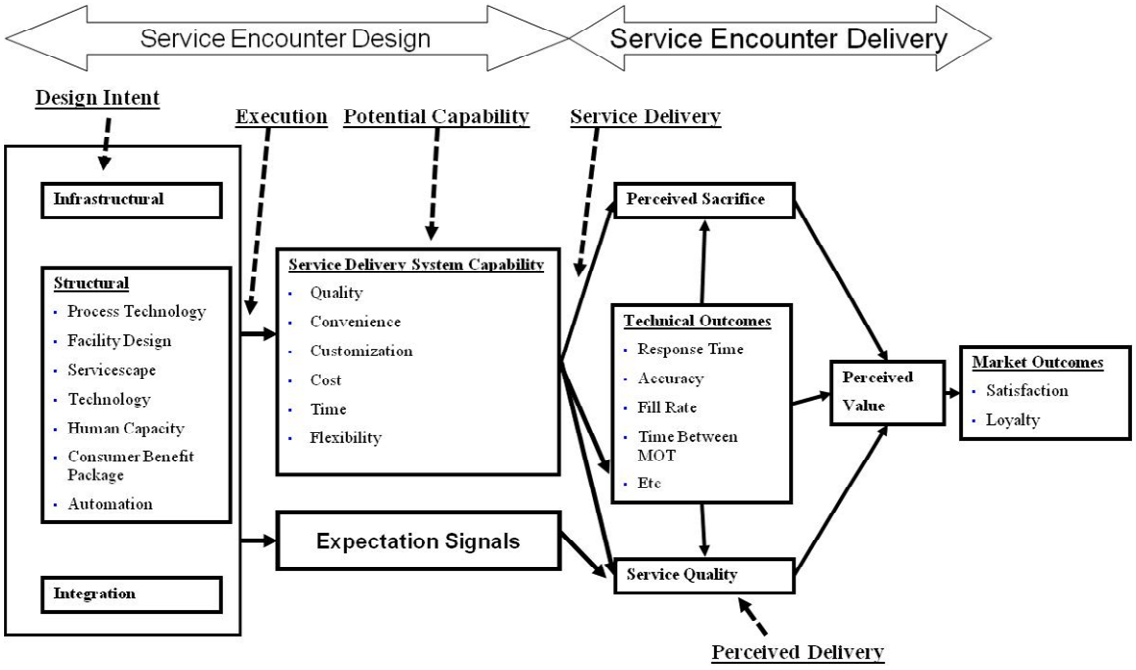

Figure 1 -- Detailed service design architecture

We begin by exploring the service design elements. It is here that firms make infrastructural, structural and integrative design decisions on how best to provide their service. The structural elements include, but are not limited to, the consumer benefit package, process technology, facility design, facility layout, automation, capacity, and servicescape. It is essential to remember that the decisions a firm makes at this point should be considered along the lines of "intent". For example, when deciding how many teller stations they need, bank management may do a queuing analysis whereby they state their specific design goal is to be sure that customer wait time does not exceed eight minutes. They would then design their facility with that specific intent: to develop a capability of providing quick response time.

It is important to make the distinction that the realization of the actual capability of the design decisions does not occur until the actual execution of the design. As Parasuraman et al (1985) point out, design intent and execution of said intent will not always lead to the theorized capability. They label this difference as Gap 2 in their Gap model of service quality. Continuing with the previous example, after doing the queuing analysis a bank may design a process with four teller spots in order to meet their eight-minute customer service goal. However, when carrying out their design, allocation of teller workspaces may be so inefficient that service times rise exponentially. In the end, the true capability may result in average queuing times far exceeding the design. This example demonstrates how both intent and execution of a service design is critical to successful implementation and capability development.

Now that we have identified that service design should be considered at both intent and execution levels, we will briefly detail some of the specific structural components. The first structural element is "Facilities and Layout". This notion can be broken into two distinct concepts: facility layout and servicescape. Facility layout generally involves the functional aspect of design, while servicescape focuses more on store atmospherics. Using a restaurant as an example, facility layout could include such elements as aisle width, table arrangement, distance between tables and kitchen, etc. Servicescape design would include decisions on lighting, decorations, music, signs, etc.

The next component of structural design, often called either process choice or process technology, will have a direct and immediate impact on customer contact time, cost, flexibility, customization, efficiency, quality, etc. Silvestro et al (1992) provide one typology for classifying service process choice relying heavily on the product / process matrix found in manufacturing strategy literature (i.e. job shop, batch, assembly line, continuous flow). Their four classifications include factory services, mass services, job shops and professional services. Their schema, much like the common Hayes and Wheelwright (1984) product/process matrix used in manufacturing discusses the inherent tradeoffs of the different processes. Staying with the restaurant example, a fast food restaurant that uses mass production techniques and prepares their food ahead of time will have much different capabilities of delivery time than an upper-scale steakhouse that prepares everything freshly as orders come in.

A final structural design element is the customer benefit package itself, which includes all of the goods and services, both core and peripheral, that the service firm provides to the customer. For example, a restaurant patron will receive a core good, the food itself, and a core service, the preparation of the food. Examples of peripheral services could include the patron using free wi-fi or complimentary valet parking. Cleary the mix of the deliverables that customers receive will influence the requirements and execution of the delivery system.

As shown above, delineating the structural design choices is often quite straightforward. However, the remainder of the architecture is a bit more unclear. We believe that structural design choices will have a two-fold result. First, they determine the potential capability of the system, or what Roth and Menor (2003) call "realized service delivery system". Second, they will also provide cues that signal expectations to the customer—as theorized by Bloom and Reve (1990) in their signal theory work. These are the same expectations that will often serve as an anchor when customers form their service quality impressions (ie. perceptions minus expectations) (Parasuraman et al, 1985).

When thinking of capability we must make the same precaution we did in the design state. That is, with capability, it is important that we recognize that design choices give the system "potential" capabilities. These potential capabilities may or may not eventually be realized. The design choices will create a set of parameters that detail the varying levels of execution that may be involved in the service encounter. For example, after a bank determines a need for, designs, and builds four teller stations, customer wait times will still not be

deterministic in nature. They will largely depend on how efficiently the tellers can execute their tasks. At this point, the service encounter occurs and potential capability changes into realized capability. Looking back at our previous example, a bank's design might allow it the potential capability to maintain average queues times between three and eight minutes. However, the realized capability for each individual customer will vary based on the efficiency and productivity of the teller serving them. The difference between a system's potential capability and realized capability is analogous to the concept that Parasuraman et al (1985) describe in Gap 3 of their service quality model.

Figure 2 is an illustration of how design decisions eventually become realized service deliveries. In this particular example, the service firm develops facility design parameters and specifications in order to maintain relatively short queue times, represented by the "design intent" line. The firm must then execute their design strategies. As seen in the diagram, this firm did not do a terribly good job executing their design strategy resulting in quite a bit of "slippage" and much worse potential capability then they had planned. Potential capability will then form the ends of the "realized delivery" spectrum. A customer will arrive and execution of the service delivery will occur. It is at this time that the "realized delivery", or the amount of time a particular customer has to queue, is determined. ***Figure 2a*** shows a potential probability distribution of queue times associated with an efficient server – note, most of the distribution occurs on the "short" side of queue time. Whereas ***Figure 2b*** depicts a probability distribution generated by an inefficient server with most of the times ranging on the "long" end of the queue time spectrum.

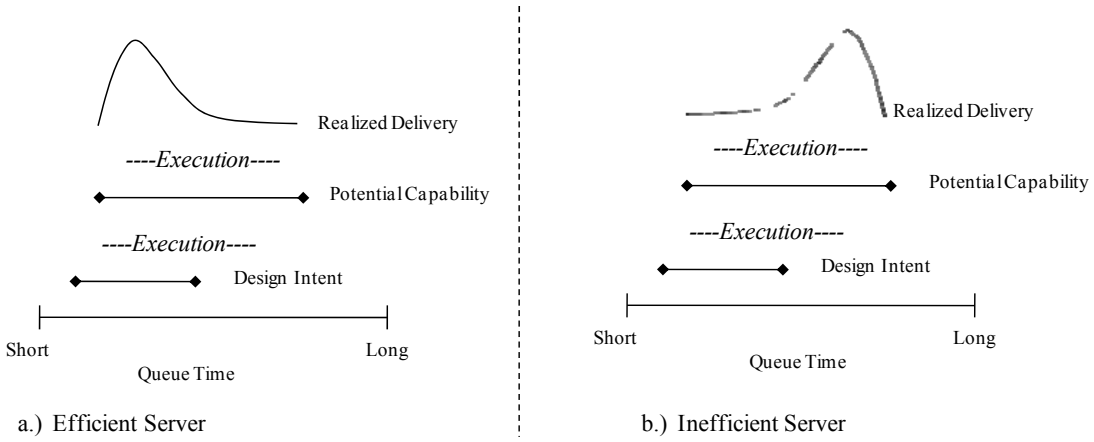

Figure 3 – Design intent, potential capability and realized delivery

Now that we have conceptually introduced the idea of capabilities, the next issue becomes how to operationalize those system capabilities. We believe that Hill's (1989) work

into order winners and order qualifiers can be used in this regard. Although the importance placed on the dimensions may be context dependent, the list of elements to include in a capability construct should be generalizable: cost, high performance quality, consistent quality, delivery speed, on-time delivery, volume flexibility and product flexibility. Measures for all of these variables are available in the extant literature.

Moving along the service architecture, we see that system capability will influence both technical outcomes and customer perceptions of service quality. As discussed earlier, researchers could use elements from the Grönroos (1984) service quality paradigm to define technical outcomes and the five dimensions from Parasuraman et al's (1985) SERVQUAL model to define perceptual outcomes. Both of these paradigms have been well represented in the literature and there is a wealth of survey measurement instruments researchers can draw upon when modeling their particular environment.

As system capability is playing a role in shaping customer outcome measures so are expectation signals. As theorized by Oliver (1980) and later expanded upon by Parasuraman, Zeithaml, and Berry (1988) in their work on disconfirmation theory, expectations signals are likely to influence customer perceptions of service quality. Let us provide an example, again staying in the dining industry. A customer walks into a fine dining restaurant and sees the servers in fine dress (part of the servicescape). The customer will use the server's attire as a cue to set a high expectation of service quality. These expectations will influence their anchoring scale when they form an overall impression of their dining experience. A customer who walks into a value-priced fast food restaurant will see different signals and use these cues to set lower expectations of service quality. The difference between the realized capability provided during a customer's service encounter and that customer's expectations predicted by this framework is the same concept as that described in Gap 5 of Parasuraman et al's (1985) service quality model.

The final portion of the service architecture examines the links among the customer outcomes variables. Much research has examined the effects that quality, both functional and technical, have on customer-oriented variables. One model gaining momentum in the service management literature is the means-end model proposed by Zeithaml (1988). The model relates perceived quality, value and customer behavior. In its original form, this model asserts that perceived quality, made up of both service quality and product quality, drives perceived value, which in turn drives future purchase behavior. As such, this mean-end model is used to add clarity and precision to the customer outcomes portion of Roth and Menor's (2003) architecture. Overall, our service architecture shows that quality influences value which in turn influences customer satisfaction and loyalty.

EMPIRICAL MODEL

In aim of lending validity to the proposed, specified framework, we will now test a structural model developed from said framework. The specific structural design decision used as

the exogenous driver of the system is store design. Two technical outcomes chosen for inclusion are customer queuing time at the register and the customer's ease of flow through the store. Furthermore, we captured a perceptual measure of store design – servicescape. The customer outcome measures used include service quality, perceived value, customer satisfaction and customer loyalty. ***Figure 3*** is a visual illustration of the model tested – for sake of clarity, omission of manifest variables and error terms has occurred. Please note the purpose of this study is not to build an exhaustive and definitive study into the effects of store design. The main goal is to show how use of the specified service framework aids in generation of research ideas and models.

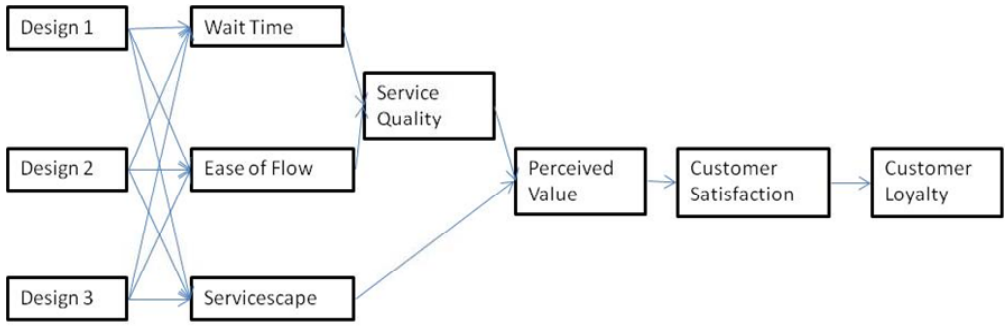

Figure 3 -- Facility design model to be tested

This research works exclusively with one large retailer of specialty fashion apparel. The retailer has over 1,000 stores located throughout the U.S. and is considered the industry leader in its market (a Fortune 500 company). Ten retail districts, chosen at random, participated in the main study. The ten districts, including ninety stores in total, spanned the entire United States. Store management was responsible for handing out the surveys, fifty at each store. In total, 1,180 of the 4,500 surveys were returned usable, yielding a response rate of 26.2%.

The development of the survey instrument followed an iterative process. Generation of individual survey items came from prior empirical research. When identified items were not available, questions were generated from the multitude of anecdotes and case studies for each of the constructs. To ensure use of appropriate industry-specific terminology, both store and corporate managers then reviewed these items. *Appendix A* details the items used on the final survey instrument. A brief description of each latent construct and how it is measured is given below. Unless otherwise stated, all questions used a 7 point Likert scale with anchors of 1 = strongly disagree and 7 = strongly agree.

Store Design – This retailer employs six distinct structural store design layouts. The layouts vary mainly by the number of departments they have, the size of the departments, and whether or not the store has

an attached beauty, perfume, and cosmetic department. Of the 1,180 customers, 611 were from Design #1, 189 were from Design #2 and 298 were from Design #3. The remaining 82 were from stores that had one of three other design layouts and because of sample size issues, were dropped from this study. There are three store design variables, all of which use binary coding.

Ease of Flow – Three questions measure ease of customer flow. Previous research has shown customers find it valuable to have ample space to browse, have many paths to take throughout the store, and that all merchandise is easily accessible. The questions used in this research were developed from previous studies dealing with customer perceptions of store layout (Wakefield and Blodgett 1996; Sirohi, McLaughlin, and Wittink 1998).

Wait Time – One question measures a customer's perception of how long they had to wait at the retailer's check out line.

Servicescape – Seven questions measure store servicescape. Bitner (1992) popularized the term servicescape and used it to refer to the overall store atmosphere created by the stores ambient conditions, signs, symbols and artifacts. The seven questions used in this study were developed from Bitner's (1992) as well as Sirohi, McLaughlin, and Wittink (1998).

Service Quality – Five questions measure service quality. Adapted from Parasuraman, Zeithaml, and Berry's SERVQUAL scale (1988), these questions solicit customer perceptions of the service provider's reliability, assurance, empathy and responsiveness. Note, the tangibles portion of the SERVQUAL scale was omitted because of its heavy overlap with the servicescape construct.

Perceived Value –Often defined as the ratio of perceived benefits to perceived sacrifice we drew upon Zeithaml et al's (1998) survey instrument.

Customer Satisfaction – Four questions measure customer satisfaction in this study. They were adapted from work by Voss, Parasuraman, and Grewal (1998).

Customer Loyalty – Three questions measure customer loyalty. They include a question each eliciting customer's intent to repurchase, likelihood to recommend, and share of wallet (Hallowell, 1996).

Method

Before assessing the structural component of the proposed model, it was necessary to verify the measurement component. The six latent constructs were subjected to reliability and validity analysis. Cronbach alpha scores were calculated to test for reliability. Because these scales have been well developed, a cut-off of .70 is suggested (Nunnally, 1978). Once reliability is established, assessments of convergent and divergent validity measures occur. Convergent validity was evaluated by examining the structure of the eigenvalues when the items within a scale were subjected to principal components analysis: only one eigenvalue should be greater than 1.0, the percent of variance explained (%VE) should be at least 40, and the factor loadings should be above 0.4 (Ahire and Devaraj, 2001). Divergent validity was assessed by comparing the %VE of a factor to its average inter-scale correlation (AVISC). Although there is no significance test using this method, values of .2 and .3 have been used in past studies (Ahire and Devaraj, 2001). We confirmed the results of this approach by using structural equation modeling to test the correlation coefficient between each pair of latent constructs. None of the resulting 95% confidence intervals around those correlations included 1.0 so there was sufficient

evidence suggesting that these constructs are indeed distinct. All of the details, shown in ***Table 1*** demonstrate that the six latent constructs used in this study are reliable and valid.

Table 1: Results of Construct Development						
Construct	# items	Cronbach Alpha	1st Eigen.	2nd Eigen.	% VE	%VE – AVISC^2
Ease of Flow	3	.860	2.4	.361	78.2	.557
Servicescape	7	.877	4.2	.717	59.4	.402
Service Quality	5	.938	4.0	.352	80.1	.573
Perceived Value	3	.909	2.5	.239	84.9	.571
Customer Satisfaction	4	.911	3.2	.425	79.5	.453
Customer Loyalty	3	.930	2.6	.233	87.9	.627

After establishing the measurement model, the structural model can be tested. The RAMONA program embedded in SYSTAT was used to perform the structural equation modeling. Overall fit of the model was assessed using several measures, both incremental fit measures such as non-normed fit index (NNFI) and comparative fit index (CFI), as well as absolute fit measures such as root mean square error of approximation (RMSEA) and root mean square residual (RMR). Values over .90 for NNFI and CFI suggest good fit, an RMR of under .10 suggests good fit, while a value under .08 for RMSEA suggests acceptable fit (Hair et al 1998). The structural equation results are presented in ***Table 2***.

Table 2: Structural Equation Modeling Results			
Path	Coefficient	P-Value	95% Confidence Interval
Design 1 – Wait Time	.107	< .05	(.013, .200)
Design 2 – Wait Time	.033	ns	
Design 3 – Wait Time	.064	ns	
Design 1 – Ease of Flow	.501	< .001	(.468, .534)
Design 2 – Ease of Flow	.678	< .001	(.642, .715)
Design 3 – Ease of Flow	.738	< .001	(.702, .770)
Design 1 – Servicescape	.212	< .001	(.150, .274)
Design 2 – Servicescape	.229	< .001	(.175, .283)
Design 3 - Servicescape	.201	< .001	(.140, .262)
Wait Time – SERVQUAL	-.227	< .001	(-.173, -.281)
Ease of Flow – SERVQUAL	.495	< .001	(.450, .541)
SERVQUAL – Value	.733	< .001	(.683, .783)
Servicescape – Value	.583	< .001	(.547, .619)
Value – Customer Satisfaction	.733	< .001	(.682, .783)
Customer Satisfaction - Loyalty	.762	< .001	(.737, .787)
Fit Indices: RMSEA = .063, RMR = .05, NNFI = .93, CFI = .92			

DISCUSSION

Only one of the three store designs examined, Design #1, showed a significant relationship to wait time. Store Design #1 is unique because the design includes a cosmetic and perfume section. These additional areas make stores built from Design #1 larger, on average, than the other two store designs (4,901 square feet versus 3,942 and 4,236) which can lead to potentially more traffic and longer waits. Subsequently, wait time has a small negative effect on customer perceptions of service quality. Not surprisingly, customers who waited less time in queues generally had more positive service quality impressions.

The structural equation results also demonstrate that store design has an unequivocal direct influence on ease of customer flow. The relationship between store design and ease of flow is a strong one, with the three path estimates at .501, .678 and .738. Looking at the 95% confidence intervals around these estimates it can be concluded that the relationship between store design and ease of flow in Design #1 is significantly weaker than the same relationship in the other two floor designs. Given that stores built from Design #1 are larger, on average, it could make it more cumbersome to navigate from department to department. Moreover, the results suggest that ease of flow has a significant positive effect on customer impressions of service quality. That is, customers who were able to comfortably browse and navigate the stores, while having easy access to desired products, felt they had a very positive service encounter.

Table 2 also suggests that store design has a positive effect on servicescape. This effect, while small (path coefficients range from .201 to .229) appears to be equal across the three layouts, as all their confidence intervals overlap. Consequently, our results suggest that customers' overall impressions of store aesthetics are shaped by the functional design of the stores.

As recent service management literature has suggested, both servicescape and service quality are aspects of the shopping experience customers value. For this particular retailer, service quality has a slightly more positive impact in shaping customer perceptions of value than servicescape does (as their confidence intervals do not overlap). Yet both do have very strong effects as evidenced by their path coefficients (.733 vs. .583). Finally, as the means-end models predict, perceived value increases customer satisfaction, which ultimately increases customer loyalty.

In summary, the findings of the structural equation modeling portion of this work does lend face validity to the proposed, specified service design framework. They show that the framework can be used to help researchers specify a research model, as well as offer ideas on how to measure portions of the framework. This research will also benefit practitioners, as it will highlight the salient links between structural design decisions and business performance.

SUMMARY & FUTURE RESEARCH

Through a review of service quality literature, this paper has identified a lack of research into the antecedents of service quality. More specifically, there seems to be a dearth of examinations into the structural drivers of service quality. To help fill this gap, we have presented a detailed service architecture which hypothesizes linkages between structural design elements and customer outcomes. We have added specificity to the model by incorporating signal theory, blending Grönroos' (1984) and Parasuraman, Zeithaml, and Berry's (1985) service quality models and adding Zeithaml's (1988) means-end model to highlight the consequences of improving service quality. In effect, the final model predicts that design choices affect system capability, which in turn, affects technical outcomes and expectation signals that impact perceived service quality and ultimately, customer outcome measures such as satisfaction and loyalty. The added specificity can serve as a foundation for future empirical work.

Future researchers can continue developing and testing structural design models generated from this architecture. Once more of these models are developed and there is a more comprehensive understanding of how structural elements impact service encounters, researchers could look at the interaction between structural design elements. For example, what type of relationship exists between self-service technologies and the consumer benefit package? And if there is some interaction effect, how does it influence system capability and service delivery? Finally, as we begin to understand better the structural design elements, future research can look for interactive effects between structural elements and infrastructural and/or integration elements.

Other researchers could investigate the generalizability of the service design architecture. For example, how does the environment dictate which design elements are most salient? Other research has demonstrated that industry effects the importance customer place on the dimensions of technical and functional quality. This same approach can be taken in trying to discover if there are any contextual effects on the relative importance of the drivers of technical and functional quality (Marley, Collier and Goldstein, 2004). Do variables such as environment, strategy, customer interaction time, etc, effect the magnitude of the hypothesized linkages? For example, when customer interaction is high, e.g. professional services, are certain dimensions of SERVQUAL more salient predictors of customer satisfaction than other dimensions? Do environments heavy in credence quality attributes lead to a strong relationship between technical quality and customer satisfaction and a weaker relationship between perceived quality and customer satisfaction? Do different design elements combine synergistically to create enhanced system capability? The specificity added by this research paper gives a framework to answer just such important questions.

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APPENDIX A

Ease of Flow

1. The layout of {retailer} stores allows me to take any path I like when browsing
2. There is ample space between displays to browse comfortably
3. All merchandise at {retailer} stores is easily accessible

Wait Time

1. I have to wait in long lines at {retailer} checkouts

Servicescape

1. {Retailer} facilities are always kept neat and attractive
2. I find the décor at {retailer} attractive
3. {Retailer} stores have attractive signs and displays
4. {Retailer} stores have attractive posters and models
5. The lighting at {retailer} is set at a good level
6. The aromas and scents in {retailer} stores are soothing and pleasant
7. I enjoy the background music that {retailer} plays

Service Quality

1. {Retailer} associates have the skills necessary to help me
2. I receive prompt service when I shop at {retailer}
3. {Retailer} associates give caring and individual attention
4. {Retailer} associates are willing to go out of their way to help me
5. {Retailer} associates are consistently courteous and friendly

Perceived Value

1. {Retailer} offers merchandise at good value
2. Given the quality of the merchandise, {retailer} offers good prices
3. {Retailer} offers better value than other stores that sell the same merchandise

Customer Satisfaction

1. I am very satisfied with shopping at {retailer}
2. I am delighted with the shopping experience that {retailer} offers
3. Of all the stores that sell similar types of merchandise, {retailer} is my first choice
4. I have good feelings when shopping at {retailer}

Customer Loyalty

1. I consider myself a loyal customer to {retailer}
2. I recommend {retailer} to my friends and family
3. I buy the largest portion of my {….clothing line…} from {retailer}

GUILTY AS CHARGED OR THROWN UNDER THE BUS?: MAJOR LEAGUE BASEBALL'S CASE AGAINST ROGER CLEMENS

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ABSTRACT

The "steroid era" in Major League Baseball (MLB) has brought into question the validity of the performance of a number of prominent players during this time period. The most notable pitcher implicated has been Roger Clemens, the 7-time Cy Young Winner. The typical response by MLB to allegations of steroid use has been to distance itself from the player in question and to maintain any wrongdoing was solely the responsibility of the player. Individuals are painted as "rogue players" who knowingly made decisions to "cheat" and thereby deserve severe punishment by MLB and the media. In other words, these former players get "thrown under the bus." So is this the corrupt reaping what they sowed or an unfairly treated scapegoat?

Here I use a thought experiment of the potential case MLB might bring against Roger Clemens, were it to be tried in a court of law. I begin with the various legal frameworks under which Clemens could be tried, and what level of proof would be required for conviction. I also clarify what the potential errors are (Type I and II) and how they might occur. Working within the legal framework, I combine attribution theory with management literature linking attribution to organizational actions and effects. The result is an analysis that integrates law, social psychology, and management.

By working through the multi-disciplinary framework, I provide evidence both against and for the defendant. I believe the likely evidence would support a conviction; however, the conviction would be at a much lower case level (civil rather than criminal) which would be inconsistent with the sentence of being "thrown under the bus." Even if Roger Clemens used steroids (which I assume here but he vehemently denies), the punishment does not fit the crime.

INTRODUCTION

Major League Baseball (MLB) has not brought a case against former pitcher Roger Clemens charging him with the use of steroids as a means of "cheating" in a court of law ("steroids" is used throughout this paper as a generic term for all performance-enhancing drugs). The case currently against Clemens charges obstruction of Congress, false statements, and perjury (U.S.A. v. Roger Clemens. August 19, 2010. CR 10 223). While MLB has not brought a case against Clemens, there is no shortage of cases against Clemens in the media and the "court of public opinion" such as *American Icon* (Thompson, Vinton, O'Keeffe, and Red, 2009) and *The*

Rocket that Fell to Earth (Pearlman, 2009). Both the perjury and public opinion cases assume Clemens *did in fact* take steroids while an active pitcher in MLB. With this assumption, presumably backed by verifiable evidence to support the assumption, Clemens has become a vilified man whose career statistics are now considered "tainted." While Clemens' on-field performance is easily worthy of induction into the Baseball Hall of Fame, it seems highly unlikely that will ever occur. So, is this an accurate assessment of and punishment for the "crime" of using steroids?

The purpose of this paper is to develop a theoretical legal case MLB might bring against Roger Clemens, and how a defense team might provide evidence of innocence. To begin, I make the explicit assumption (which Clemens has vehemently denied) that Roger Clemens *did take steroids* as an active pitcher in MLB. I have no direct evidence whatsoever to support or reject this assumption. I am merely using this assumption as a starting point to begin understanding *why* Clemens did so, and whether or not that makes him guilty of a crime.

The inspiration and structure of this paper mirrors the logic and arguments theoretically presented against Patty Hearst by Harvard Social Psychology Professor Daniel Gilbert (1994). While Gilbert took evidence from the actual case against Hearst, I do not have the luxury of history and must make logical assumptions of what prosecution and defense lawyers would likely do. Nevertheless, some parallels between Hearst's and Clemens' cases are fairly easily drawn. First, both were famous. Hearst was heir to newspaper magnate William Randolph Hearst (e.g., *The San Francisco Examiner* and *The New York Journal*). Clemens won more than 300 MLB games and the Cy Young Award 7 times. Second, a preponderance of initial evidence suggested their guilt. Hearst was photographed participating in a bank robbery during which a bystander was killed. Clemens' name appeared 82 times in the "Mitchell Report" on the use of steroids in MLB (Mitchell, 2007). Third, both were "convicted" of their crimes. Hearst in a legal court and Clemens in public opinion. Hence, this paper is intended to theoretically try Roger Clemens by MLB on the charge that he knowingly took steroids to cheat.

In the sections below I integrate legal, social psychology and management literatures into a conceptual framework for pursuing MLB's case against Clemens. I also weave Clemens' likely defense towards the end of each section. A summation section concludes the verdict phase of the trial, followed by a sentencing phase. I end with a discussion section dealing with specific implications for Clemens, as well as a broader discussion about MLB.

THE LEGAL FRAMEWORK

The types of legal cases most appropriate to pursue against Clemens are two types of civil (typical and special) and criminal, for a total of three possible cases. Each of the cases requires a different level of "burden of proof" for conviction. These varying burdens of proof have been compared to different levels of probability values (i.e., p-values) used to assess statistical significance (Stoffelmayr and Diamond, 2000). For the typical civil case, the burden

of proof is a "preponderance of evidence" demonstrating guilt and is akin to a p-value less than 0.05. In a special civil case the burden of proof requires "clear and convincing" evidence of guilt, which corresponds to a p-value of less than 0.01. For the most rigorous case, criminal, the burden of proof is the well known "beyond a reasonable doubt" standard comparable to a p-value less than 0.001. In an effort to ensure clarity to juries in criminal cases, a standard set of instructions have been developed with wording endorsed by Justice Ginsberg (Victor v. Nebraska, 1994). The Federal Justice Center Instruction (Instruction 21) states "Proof beyond a reasonable doubt is proof that leaves you firmly convinced of the defendant's guilt" and that if "you are firmly convinced that the defendant is guilty of the crime charged, you must find him guilty," but that if "you think there is a real possibility that he is not guilty, you must give him the benefit of the doubt and find him not guilty" (Federal Judicial Center, 1987). Although MLB's lawyers would have to determine beforehand (i.e., *a priori*) which case to pursue, I develop the theoretical case and come back in the summation to these levels to determine guilt or innocence (i.e., *post hoc*).

Another issue relevant to the legal framework, which also parallels statistical logic, is the potential outcome of the trial. The two goals of the legal systems are to "reach justice" and "avoid harm," the latter of which is frequently the more important. Our society demands the guilty be convicted and the innocent be acquitted in order for justice to be served. Yet, the possibility exists for real harm when the innocent are convicted and the guilty are acquitted. These latter two situations are referred to as Type I error (the innocent are convicted) and Type II error (the guilty are acquitted). **Figure 1** depicts these four legal outcomes along with statistical hypothesis testing outcomes (in parentheses). Of the two errors, Type I is of much greater importance as convicting the innocent causes much more harm. Few want the guilty to go free, while most abhor the notion that the innocent will be unjustly punished.

Clemens' defense

The primary task will be to provide sufficient evidence that a "real possibility" Clemens is not guilty exists, thereby avoiding a criminal case conviction. Their secondary tasks will be to demonstrate a lack of both "clear and convincing" evidence of guilt and to undermine the "preponderance of evidence" that is alleged to exist against Clemens to avoid both types of civil case convictions. While conceding that Clemens' did use steroids, they must demonstrate how other factors within MLB did not make the use of steroids a "crime," therefore, Clemens cannot be found guilty of a crime that did not occur.

FIGURE 1
Legal (and Statistical) Outcomes

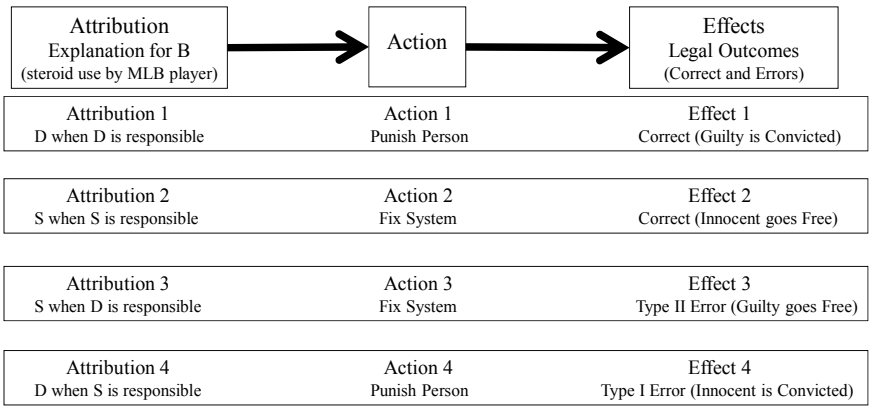
Truth

Conclusion Reached	**Not Guilty** (H_0 is True)	**Guilty** (H_1 is True)
Acquittal (H_0 Not Rejected)	*Correct* The Innocent goes Free (H_0 Accepted when H_0 is True)	*Type II Error* The Guilty goes Free (H_0 Accepted when H_1 True)
Conviction (H_0 Rejected)	*Type I Error* The Innocent is Convicted (H_0 Rejected when H_0 is True)	*Correct* The Guilty is Convicted (H_0 Rejected when H_1 True)

THE MANAGEMENT FRAMEWORK

To understand how a clear violation of the rules of MLB (taking steroids) could possibly be viewed a non-crime, requires considering how our understanding of other's behavior affects our responses towards them and the effects of these responses on these others. This is where the social psychology topic of attribution theory is integrated with attribution-based actions and their effects in the management literature (e.g., Green and Mitchell, 1979; Mitchell, Green & Wood, 1981). The framework posits a linear attribution-action-effects linkage (this linkage is depicted towards the top of **Figure 2**) that has been well supported by empirical research showing that actions are strongly correlated with attributions. In other words, manager's actions follow from their attributions. For this case, the framework means that whatever actions were taken in response to the use of steroids can be used to determine the attribution for the behavior. A more full discussion of **Figure 2** follows in next section of this paper.

FIGURE 2
Attribution-Action-Effects Framework
and Legal Outcomes



* B = behavior; D = dispositional factors (i.e., the person); and S = situational factors (i.e., the situation)

The Role of the Commissioner as Top Manager in MLB

The role of the commissioner is the top manager of MLB, therefore, his responsibility is not merely to make attributions about others' behaviors but to *fix them* if they threaten MLB. Since the creation of the position with the selection of Kennesaw Mountain Landis following the 1919 Black Sox scandal, the Commissioner of MLB's job has been to safeguard the integrity of baseball as a legitimate "competitive" sport. By contrast, professional wrestling (e.g., World Wrestling Entertainment - WWE) is "sports entertainment" because the final outcome is pre-determined prior to the match. WWE matches are wildly popular, drawing high Nielson ratings for weekly cable television broadcasts and large audiences for pay-per-view live events, but they are "competitive" in that the wrestlers do perform entertaining athletic moves. However, the WWE is not competitive in the sense that the "best man wins" because the outcome is scripted beforehand. MLB is supposed to be "true" competition in the sense that the "best team wins" based on their performance on the field of play. Since 8 players of the 1919 White Sox team were accused of taking bribes to intentionally lose the World Series (i.e., to "throw the series"), this put the integrity of MLB's "true competition" in doubt. Landis' severe punishment of the 8 players - banishment for life from MLB - set the tone for future Commissioners' responses.

The use of steroids in MLB represents a threat to the integrity of the game because it provides an "unfair competitive advantage" to the user. While there are clearly negative consequences of steroid use (e.g., injury, heart damage, and episodes of psychological rage), there are substantial positive physiological effects. The two primary beneficial physiological

effects of steroid use are (1) increased muscle growth and strength, and (2) the body is more easily able to recover between sessions of physical exertions (Mitchell, 2007). For an MLB player, the latter benefit means they would be able to more fully recover to their full physical strength from game-to-game. Over the course of a 162 game schedule, this means the "grind" of the season could be lessened allowing the player to perform better on a daily basis and possibly avoid some injuries that might occur when playing at less than full strength. Hence, they could enjoy more playing time opportunities in which their physical strength allowed them to play at their best potential. Both of these, theoretically, could show up in their individual statistics as better numbers. The effects on muscle growth and strength are the most well-known qualities of steroid use. The added strength means batters can hit the ball harder (which often leads to more home runs) and run faster, while pitchers can throw the ball faster (which result in more strikeouts). These physiological effects allow players using steroids to perform at a higher level than non-using players. Therefore, non-using MLB players are at a physiological disadvantage compared to users who gain this competitive advantage with steroids. In short, the use of steroids represents a form of "cheating" that tilts the level of competition in favor of the steroid-using MLB player, and is consistent with MLB's interpretation of Rule 21 (Mitchell, 2007).

Clemens' defense

The evidence on the physiological effects of steroid use on MLB player performance will be severely damaging to their case. MLB's lawyers may claim that with the physiological effects data, the fact that steroids are a controlled substance (Schedule III) under the Anabolic Steroids Control Act of 1990 illegal to use without a physician's prescription, and that Clemens' acknowledgement that he did in fact use steroids provides *ipso facto* evidence of Clemens' guilt; so the case should end. Clemens' lawyers would have to make the argument that, since the use of steroids illegal *and* their use is a threat to the integrity of MLB which requires appropriate responses to these integrity threats that are the job of the Commissioner, then the Commissioner's actions should have clearly been directed towards the elimination of steroid use in MLB. Unfortunately for MLB and fortunately for the Clemens' case, evidence of the Commissioner's *inaction* should be fairly easily demonstrated.

The use of steroids in professional athletics began as far back as the 1960's. Some of the early steroids were used for horse racing (e.g., Winstrol and Dianabol), then became commonplace in bodybuilding. California Governor and 7-time Mr. Olympia, Arnold Schwarzenegger, readily acknowledged using steroids in the past. A watershed was reached in 1985 when *Sports Illustrated* published an article in which Steve Courson, an offensive lineman in the National Football League (NFL) with the Pittsburg Steelers and the Tampa Bay Buccaneers, readily admitted he used steroids in order to perform well enough to keep his job (Johnson, 1985). Courson believed that "Seventy-five percent of the linemen in the NFL are on steroids and 95% have probably tried them." The more recent Bay Area Laboratory Co-

Operative (BALCO) scandal implicated players from the NFL (e.g., Bill Romanowski), the Olympics (e.g., Marion Jones), and MLB (e.g., Barry Bonds) (Fainaru-Wada and Williams, 2006). Part of what made the scandal different was that BALCO had created new steroids - "the cream" and "the clear" - whose chemical properties were not detectable by state-of-the-art steroid testing at the time. Metaphorically, the mouse had learned to avoid the mousetrap.

The key defense issue circles back to management's role in the attribution-action-effects framework. Management's responsibility is to fix problems, especially threats to the integrity of competitive sports. When confronted with the Courson story in *Sports Illustrated*, the NFL moved fairly quickly to implement a system that included both *testing for steroids* (1987) and *progressive discipline* for violators (i.e., warning, suspension, then termination from the league) by 1989. The testing system used by the NFL, though not perfect as BALCO illustrated, was intended to mirror the state-of-the-art system developed by the International Olympic Committee (IOC). As arguably the "purest" of all competitive sports because it is primarily between "amateurs," the Olympic Games have been the world leader in testing and punishing for banned substances such as steroids. Ben Johnson was disqualified and stripped of his 1988 Seoul Olympics 100 meter dash Gold Medal for testing positive. The IOC and NFL systems were used to identify violators and punish them accordingly, thereby, sending the message that "cheaters" will be punished and "honest" athletes not using steroids will be rewarded because they will only be competing against other non-using athletes on a level playing field.

In contrast, the Commissioner of MLB's action in response to steroid use was *inappropriate* because it did not include either testing for steroid use or any progressive discipline to punish users until the early 2000's (Mitchell, 2007). The Commissioner of MLB's action was to simply send out a memo stating that the use of steroids in MLB was prohibited (Vincent, Jr. 1991 and Selig, 1997). The use of steroids was considered "cheating" and thus a violation of Rule 21 of Major League Rules; however, the use of steroids was *implicitly* viewed as a violation of Rule 21 because the prohibition of steroid use was never *explicitly* added to Major League Rules (Mitchell, 2007). Legally this might seem sufficient, but management literature has long known how "backward reward systems" can readily encourage bad behavior and discourage good behavior (Kerr, 1975). When a bad behavior exists, it is essential for it to be punished or it will continue. If the effects of the bad behavior are "rewarded," the bad behavior is encouraged. The effect on the person's motivation is the same whether considered from a reinforcement theory or expectancy theory perspective. In terms of learning, individuals can learn that their bad behavior is in their best interest from both direct experience (via operant conditioning) and indirect observation of other's experience (via social learning theory). When bad behavior is learned via social learning theory, this lesson can quickly spread throughout organizations. The Commissioner of MLB's inappropriate action created a backward reward system whereby "cheaters" were rewarded (better on-field performance, fame, and more money) and "honest" athletes not using steroids were punished because they were competing on a playing field tilted against them. That the use of steroids was personally beneficial and had

spread via social learning theory was observed in another *Sports Illustrated* article in which Ken Caminiti, the now-deceased former 1996 National League Most Valuable Player (MVP), admitted using steroids throughout his MVP season and speculated that "at least half of the guys are using steroids" (Verducci, 2002). The final point here is that reward systems, whether correct or backward, are put in place and maintained by the organization's management. If the reward system is correct, management should be credited. If the reward system is backward, management should be blamed. The backward reward system that encouraged the use of steroids by players is the fault of the Commissioner of MLB.

In summary, the Commissioner's failure to stop the use of steroids in MLB either represents the *complicity* of the Commissioner or the use of steroids in MLB during the steroids era was *no crime whatsoever*. The other prominent sports of the NFL and Olympics had taken strong action to discourage steroid use (these were correct reward systems), while the Commissioner of MLB simply sent out a memo that had the effect of encouraging steroid use (a backward reward system). If the use of steroids in MLB represents a crime (i.e., the attribution), then the Commissioner was complicit in his failure to stop this crime given his power to do so (i.e., the action). Since it is unlikely the Commissioner of MLB would be willing to admit his own behavior was also criminal, the Clemens' defense team should argue that the use of steroids during the steroids era (while a federal crime as illegal use of a Schedule III controlled substance under the Anabolic Steroids Control Act of 1990) was not a crime against MLB. The Commissioner of MLB's failure to discourage the use of steroids (i.e., *inaction*) means the use of steroids was not considered to be a problem worth addressing (i.e., the attribution was the *use of steroids was not bad*), so there can be no crime. Inaction indicates an insignificant attribution.

THE SOCIAL PSYCHOLOGY FRAMEWORK

Understanding *why* other people behave as they do is within the social psychology domain of person perception, namely attribution theory. This section draws heavily on the work of Gilbert (1994) in its logic. To understand other's behavior requires separation of various components: behavior, dispositional factors, and situational factors. This means that a person's behavior may be partly explained by the person (dispositional factors) and partly by the situation (situational factors) according to the *Lewinian Equation* where:

Behavior (B) = Dispositional Factors (D) + Situational Factors (S).

Integrating the Attribution-Action-Effects Framework with Possible Legal Outcomes

By separating attributions into its component parts, it is possible to progress through the attribution-action-effects framework in **Figure 2** to arrive at the four possible legal outcomes in

Figure 1. In doing so, this illustrates how critical making the correct attribution is to achieving the twin legal goals of reaching justice and avoiding harm.

For the first case (Attribution 1), the attribution made is that the person (D) is guilty when person was responsible. The subsequent action is to punish the person, which has the correct effect (the guilty is convicted) and corresponds to the correct legal outcome in the lower right-hand quadrant of **Figure 1**. For the second case (Attribution 2), the attribution made is that the situation (S) is guilty because the situation was responsible. The subsequent action is to fix the system, which has the correct effect (the innocent goes free) and corresponds to the correct legal outcome in the upper left-hand quadrant of **Figure 1**. For the third case (Attribution 3), the attribution made is that S is guilty when D was responsible. The subsequent action is to fix the system, which represents an incorrect effect (the guilty goes free). Unfortunately, this effect corresponds to Type II error in the upper right-hand quadrant of **Figure 1**. For the final case (Attribution 4), the attribution made is that D is guilty when S was responsible. The subsequent action is to punish the person, which represents another incorrect effect (the innocent is convicted) and corresponds to Type I error (lower left-hand quadrant of **Figure 1**). This is the legal outcome of gravest concern, and it is also the one that is an all-too-common attribution.

The Fundamental Attribution Error - Blaming D when S is Responsible

While the Lewinian Equation nicely separates attribution into its component parts, it is not how people actually make attributions of other's behaviors. Rather than adding dispositional factors (what the person did) with situational factors (what the situation did) to determine the behavior, the equation is altered to determine to what extent the person (i.e., dispositional factors) is responsible for the behavior. This is the *discounting principle* where the Lewinian equation of B=D+S is altered by algebraically subtracting S to result in the following:

Dispositional Factors (D) = Behavior (B) - Situational Factors (S).

A key consequence of this process is that there is a very strong tendency to blame the person when the situation is the cause of the behavior, which is known as the *fundamental attribution error* (aka, *correspondence bias*) because it is such a common attributional error (see Ross, 1977; Jones and Harris, 1967). In the legal context, the fundamental attribution error leads to the more serious Type I error where the innocent is convicted (Attribution 4 in **Figure 2**).

Clemens' defense

The twin facts that the fundamental attribution error is so common and that it leads to Type I error (the innocent is convicted) should provide Clemens' lawyers with a clear path to

pursue. They must demonstrate the importance of situational factors contributing to Clemens' use of steroids (the behavior) as the ultimate culprit over dispositional factors.

Gilbert's (1994) Four Reasons for the Fundamental Attribution Error and Roger Clemens

Misunderstanding situations (with Clemens' defense)

Because situations are invisible, persons outside the context consistently underestimate the power situations have on individual's behavior. Gilbert (1994) argued the Patty Hearst jury was incorrect, in part, because they made this error. Patty Hearst was violently kidnapped as a young college student and was repeatedly raped, beaten, and starved for months. Though her Symbionese Liberation Army (SLA) kidnappers videotaped her saying she agreed with their political agenda and participated willingly, Hearst was in constant fear and did whatever she was told in order to avoid "punishments" (e.g., beatings) and strove for the "reward" of survival. The problem is that a people not in the context of that horrible situation would not know how powerful it was.

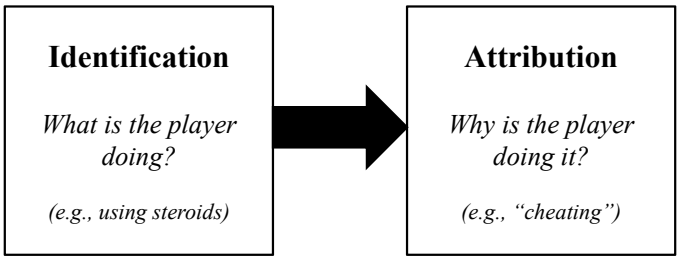
The power of reward systems was discussed in the previous section in relation to ignoring (e.g., MLB) versus punishing (e.g., the NFL) the use of steroids by players. Part of what contributed to the backward reward system of MLB is the relationship between power and money. Conventional baseball wisdom tends to overvalue what is easy to measure (Lewis, 2003). Hitting power is one of the "5 Tools" baseball scouts salivate over, which is mostly measured by home runs. For pitchers, the velocity of their fastball is the easiest to measure and most accepted indicator of power. There were strong personal rewards for possessing power (e.g., substantially larger salaries); so if there was no punishment for using steroids, then a player would be losing money by not taking steroids.

Misperceiving behavior (with Clemens' defense)

While a person's behavior may be outwardly observable by others, what they are *actually doing* and what observers *believe they are doing* may not be the same. Trope (1986) developed a 2-stage model of attribution (**Figure 3**) where "Identification" of a behavior is what we observe ("What is the person doing?") and "Attribution" gives meaning to the behavior by determining "Why the person is doing it?" In the legal context, the Identification stage seems to parallel "evidential evidence" while the Attribution stage similarly seems to parallel "evidential inference" (Tillers and Gottfried, 2006). Like Roger Clemens' lawyers, Patty Hearst's lawyer (F. Lee Bailey) readily acknowledged Patty Hearst participated in the bank robbery (the Identification stage). However, Bailey argued Hearst's holding a gun towards customers on the floor was an act of heroism rather than terrorism. Hearst knew if any customers tried to resist, they would be shot by the SLA robbers (Hearst claimed her weapon was not loaded with bullets)

so by keeping them on the ground she was protecting them. Gilbert (1994) argued the jury's guilty verdict was also wrong, in part, due to this error.

FIGURE 3
Trope's 2-Stage Model of Attribution



From the very beginning, the point that Roger Clemens did in fact take steroids as a MLB player was conceded by his lawyers. But Clemens' steroid use is merely evidential evidence corresponding to the Identification portion of the 2-stage model (**Figure 3**). MLB and the "court of public opinion" immediately made the attribution (i.e., evidential inference) the reason he took steroids was that he was "cheating" (i.e., violating Rule 21). This logic views steroid use as providing a positive physiological effects which results in an unfair competitive advantage (discussed above). Why else would he break the rules?

Obviously taking steroids would have to provide some benefit, otherwise there would be no reason to take them. But there *was* another reason to take them - because taking steroids could "level the playing field" versus steroid-using batters. Clemens' lawyers should argue the attribution/evidential inference of "cheating" is false. The correct attribution is "creating parity" (i.e., leveling the competitive playing field).

The core competition in the game of baseball exists across the 17 inches over home plate. The game is won or lost much of the time based on which player controls those 17 inches: the pitcher or the batter. When the pitcher controls it the batter is less likely to be successful (meaning the batter's team is unlikely to win). When the batter controls it the pitcher is less likely to be successful (meaning the pitcher's team is unlikely to win). When batters take steroids and are able to hit the ball harder, they are more likely to control those 17 inches because pitchers have to be more careful pitching to these power hitters (i.e., they have less control). If the pitcher makes a mistake these "juiced" batters (the title of Jose Canseco's 2005

book), the added strength helps the batter hit more home runs against the pitcher. But even when the pitcher makes a good pitch the added power from steroids can aid the batter have a successful at-bat against the pitcher. No competitive pitcher wants to lose, especially Roger Clemens.

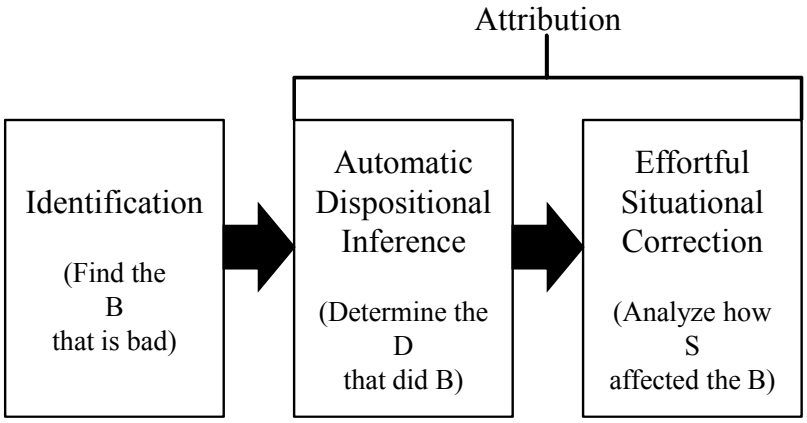
FIGURE 4
Clemens' Prisoner's Dilemma

Batter \ Clemens	Don't Use	Use
Don't Use	*Competitive Parity* Clemens: Natural body Batter: Natural body	*Competitive Advantage* Clemens: Enhanced body Batter: Natural body
Use	*Competitive Disadvantage* Clemens: Natural body Batter: Enhanced body	*Competitive Parity* Clemens: Enhanced body Batter: Enhanced body

Roger Clemens and all other MLB players during the steroid era were placed in a *prisoner's dilemma* (**Figure 4**) due to the Commissioner of MLB's inaction to stop the use of steroids. This was described in the Mitchell Report (2007) based on a report from the National Center on Addiction and Substance Abuse (2000), but was not fully articulated as a prisoner's dilemma as it is here. As a pitcher, Clemens faced batters who were using steroids to enhance their strength and on-field performance in the batter's box (e.g., power-hitting sluggers Jose Canseco and Barry Bonds were both named in the Mitchell Report as steroid users). Had Clemens not used steroids he would have been at a "Competitive Disadvantage" against these batters (the lower left-hand quadrant in **Figure 4**). Because Clemens chose to use steroids, this steroid use created "Competitive Parity" against steroid-using batters (the lower right-hand quadrant in **Figure 4**). In the world of MLB *as it should have been played*, neither batters nor pitchers would have used steroids which would also have been a case of "Competitive Parity" (the upper left-hand quadrant in **Figure 4**). Unfortunately, the powerful effects of the rewards for power in MLB coupled with the failure of the Commissioner to stop steroid use created the non-utopian environment Clemens faced. However, the one situation that poses the gravest challenge to this logic was when Clemens faced non-steroid using batters. This one, even if less than half of the time as Ken Caminiti believed (Verducci, 2002), represents an instance where

Clemens' use of steroids did provide him an unfair "Competitive Advantage" (the upper right-hand quadrant in **Figure 4**). Here the charges of "cheater" ring true.

FIGURE 5
Gilbert et al.'s 3-Stage Model of Attribution



* B = behavior; D = dispositional factors (i.e., the person); and S = situational factors (i.e., the situation)

Fail to use information (with Clemens' defense)

By integrating advances in cognitive psychology showing the mind works in separate automatic and effortful modes, Gilbert, Pelham, and Krull (1988) enlarged Trope's (1986) 2-stage model into a 3-stage model (**Figure 5**). While Identification is the same, Attribution is divided into the sequential stages of "Automatic Dispositional Inference" and "Effortful Situational Correction." As the names imply, the Effortful Situational Correction requires cognitive effort to occur (i.e., one has to "think about it") while the Automatic Dispositional Inference occurs automatically (i.e., without having to think). The Automatic Dispositional Inference occurs first, meaning the person closest to a problem is blamed for it. Then the influence of the situation is *subtracted out* during the Effortful Situational Correction consistent with the discounting principle where D=B-S. Unfortunately, as an effortful cognitive process the Effortful Situational Correction will not occur if the observer does not exert cognitive effort. Hence, the discounting principle contracts from D=B-S to D=B and the person is blamed completely for the behavior when the person does not "think about it."

In order to avoid this cause of the fundamental attribution error, Clemens' lawyers will want jurors to "think about it" so as to complete the Effortful Situational Correction. An attributional framework they may usefully employ for this purpose would be "Kelley's Cube" (Kelley, 1967). Evaluating *consistency* requires considering the behavior in relation to other

behaviors *in the same context over time*. One way to interpret the prisoner's dilemma argument is to view it from Clemens' response to the batter gaining an unfair advantage on him (e.g., "Competitive Disadvantage" - the lower left-hand quadrant in **Figure 4**). George Will (1990) recounted an episode where a batter was "cheating" against Clemens because the batter's teammate on second base was "stealing signs" from the catcher (i.e., the runner at second was signaling the batter what pitch was coming and/or its intended location). Clemens' "stepped off the mound, walked back there and said to the runner, 'If I ever see that again from you or anybody on your team I'm going to bury the guy at the plate'" and after the runner said something back Clemens "next pitch sent the batter sprawling" (i.e., Clemens intentionally hit the batter with the pitch) (p.53). This example demonstrates that when placed in a situation where others were "cheating" such as stealing signs or taking steroids, Clemens would respond by doing whatever was necessary (beanballs or taking steroids) to level the playing field. Therefore, the situation did play a part in Clemens' steroid use. Evaluating *consensus* involves considering the individual's behavior *in relation to the behaviors of others in the same context*. Had Roger Clemens been then only MLB player taking steroids during his career, then he would rightly be considered a "cheater." The Mitchell Report (2007), as the official report on steroid use in MLB, clearly shows that was not the case as the names of 89 players or former players were listed and others speculated that 50% were taking them (Verducci, 2002). Hence, while Clemens' steroid use may have been a minority there were many players also using so the situation did play a part in his behavior. Evaluating *distinctiveness* involves considering behavior in relation to other behaviors *in different contexts*. This is likely to pose a problem for the defense. The consistency-based analysis showed Clemens responded similarly to incidents of "cheating" as a pitcher in MLB. Unfortunately, Clemens' off-the-field behavior is inconsistent with the idea that he is highly competitive to the point he would cheat only after others cheated against him in MLB. During 2008 a number of stories surfaced about Clemens having had extramarital affairs with several women, including country music star Mindy McCready. Though not definitive, that few of the women have flatly denied these stories calls into question Clemens' claim of integrity when he "cheats" on his wife who is the mother of his four sons.

Wanting dispositions (with Clemens' defense)

The most straightforward reason for the fundamental attribution error is that blaming the person makes the solution easy: punish the "bad apple" or "rogue player" and the problem will disappear. By convicting and sentencing a criminal to jail (e.g., Patty Hearst), society can feel vindicated that justice has been served and people can sleep well at night knowing that criminal has been securely removed from the community. There is also a self-serving element to this logic: there is no reason to make any changes to the system because it played no part in the problem, so no effort for systemic reform is required.

Clemens' lawyers would want to seize on this reason as a means to illustrate the Commissioner of MLB's failure to stop steroid use as complicity during the steroid era. Two ways to approach the issue would be detailing how blaming players rather than the system allowed MLB to avoid negative effects, and gain positive effects. By not acknowledging any responsibility MLB would be able to avoid the negative effects of added costs (e.g., for steroids testing and continual monitoring of players) and bad public relations (e.g., acknowledging responsibility could damage the integrity of MLB as a "fair" competitive sport unlike the WWE). By rejecting any complicity, the Commissioner of MLB himself could project the image as a guardian protector of the sport's integrity riding in to save the day. The stronger argument for why MLB wants to blame players is that to do so is likely "good for business" in economic terms. In the same way that the reward system encouraging power and the backward reward system encouraged steroid use for *players*, these reward systems also affected *managers* and MLB franchise *owners*.

From a business perspective, the core competition owners face is for the attention of fans and the money this attention brings in as revenue. MLB is in the entertainment industry so it competes against other forms of athletic entertainment (e.g., the NFL and the WWE), and it also competes for fans' dollars against other leisure entertainment (e.g., movies, television, and the Internet). In order to gain and maintain fan attention, MLB owners must give fans "what they want." Two major drivers of MLB attendance and viewership are (1) putting a winning team on the field of play, and (2) having a roster with star players that hit lots of home runs and strikeout lots of batters (Fort, 2006). Thus, power is as advantageous to owners as it is to players. It is unlikely that managers are unaware of their owner's interest in generating revenue by putting "cheeks in the seats." So by encouraging more power from players, managers could help make their owners happy and increase their own job security.

Owners and managers were also placed in a prisoner's dilemma, with their choice being whether to not allow steroid use or simply ignore it by "looking the other way" (**Figure 6** illustrates this for managers but the argument applies for owners as well). Manager 1 may face teams whose manager (Manager 2) ignores his players' steroid use. If Manager 1 does not allow his players to use steroids his team would be as a "Competitive Disadvantage" (the lower left-hand quadrant in **Figure 6**). If Manager 1 ignored steroid use among his players, this would create "Competitive Parity" (the lower right-hand quadrant in **Figure 6**). In the world of MLB *as it should have been played*, neither Manager 1 nor Manager 2 would have allowed his players to use steroids which would also have been a case of "Competitive Parity" (the upper left-hand quadrant in **Figure 6**). Again, the powerful effects of the rewards for power in MLB coupled with the failure of the Commissioner to stop steroid use created the non-utopian environment faced by coaches during the steroid era. The one situation that presented the greatest opportunity for Manager 1 was by ignoring player's steroid use when Manager 2 did not allow his players to use steroids ("Competitive Advantage" - the upper right-hand quadrant in **Figure 6**). Anecdotal evidence that at least one manager likely ignored steroid use occurred during the "Home Run

Chase" of 1998 in which Mark McGwire hit 70 home runs thereby breaking Roger Maris' single season home run record that had stood for decades (Bissinger, 2005). During the 1998 season a writer spotted "androstenedione," which was not a steroid but was a banned supplement by the NFL and IOC, in McGwire's locker and reported on it. McGwire's 3-time World Series winning manager, Tony LaRussa, was offended by the story and came to the defense of McGwire's privacy. Although highly regarded as an outstanding MLB manager, LaRussa managed McGwire in both St. Louis and in Oakland, where he also managed Jose Canseco. Canseco helped spur MLB's investigation into steroid use that culminated in the Mitchell Report (2007) with the publication of *Juiced* (Canseco, 2005). McGwire denied using steroids throughout his career and early retirement, until finally admitting using them in 2010. Though this does not provide direct evidence that LaRussa ignored steroid use by his players, that two of MLB's more prolific power-hitting sluggers of their time both used while playing for LaRussa does raise questions of what he knew or ignored. That LaRussa chastised the reporter of the androstenedione story during the 1998 home run chase, which was a financial boom for MLB and helped it recover fan support following the disastrous 1994 baseball strike, suggests to this author the latter is more accurate than LaRussa or other managers have acknowledged.

FIGURE 6
Managers' Prisoner's Dilemma

		Manager 1	
		Don't Allow	Ignore Use
Manager 2	Don't Allow	*Competitive Parity* Mgr 1: Natural players Mgr 2: Natural players	*Competitive Advantage* Mgr 1: Enhanced players Mgr 2: Natural players
	Ignore Use	*Competitive Disadvantage* Mgr 1: Natural players Mgr 2: Enhanced players	*Competitive Parity* Mgr 1: Enhanced players Mgr 2: Enhanced players

SUMMATIONS

MLB's Case Against Roger Clemens - A First-Person Dialogue to the Jury

Beyond the fact that Roger Clemens used a controlled substance illegally, Roger Clemens knowingly took steroids as a player in violation of the MLB rule prohibiting their use (Major League Rule 21 as well as the Vincent and Selig memos). This voluntary choice represents *ipso facto* evidence of his guilt. Although the defense's case has sought to undermine this fact, the fact still remains irrefutable. In taking an illegal controlled substance he broke MLB rules.

Even if you accept part of the defense's logic, there are holes in their story. Yes, MLB players with greater power statistics are paid higher salaries. Yet, is *greed* a reasonable justification for knowingly breaking the rules? Even the average salary of a MLB pitcher is many times higher than the average annual income in the United States. So even if the compensation system did reward the power that would increase with steroid use, no one forced Roger Clemens to take them. He could have simply decided to "do his best" with his own God-given talent and let it go with that. Second, the argument that MLB's steroid policy did not match the NFL or IOC, coupled with the prisoner's dilemma argument for players (**Figure 4**) and managers (**Figure 6**), paints the Commissioner of MLB as the ultimate culprit for the steroid era. These are interesting arguments, but they are simply ways of trying to pass the guilt of a bad individual choice onto someone else's shoulders to bear. We ask you to see through this "I didn't do it, he did it" reasoning. The defense conveniently neglected to mention that the Major League Baseball Players Association (a union) included steroid testing as a bargaining chip during labor negotiations of the steroid era. Even if the Commissioner of MLB had wanted to unilaterally implement a policy mirroring the NFL or IOC, he could not do so without union consent which was not given. The Commissioner of MLB's hands were tied until very recently, since the Mitchell Report (2007) and hearings before Congress. One last point on the prisoner's dilemma, when acknowledged steroid-using Roger Clemens pitched against non-steroid using batters he gained a "cheaters" advantage (upper right-hand quadrant in **Figure 4**). Even if you accept the absurdly high speculation that 50% of players used steroids, this means that 50% of the time Mr. Clemens had an unfair competitive advantage. So how can a half-time "cheater" be innocent? Finally, if Roger Clemens is was so opposed to "cheating" on the playing field, then why did this type of supposedly honorable "leveling the playing field" behavior not seem to apply to his off-the-field personal life? Doesn't it seem "cheating" is his overall way of life?

In conclusion, no one wants a "miscarriage of justice" here. We certainly do not. The defense wants you to believe the only real error is when an innocent man is convicted (i.e., Type I error in **Figure 1**). We want to remind the jury that Type II error is also a miscarriage of justice when a guilty man goes free. The defense would have you believe MLB and its Commissioner is totally to blame for Roger Clemens' choice to use steroids. Mr. Clemens could have had a good MLB career without them. Even if without taking steroids Mr. Clemens would have not been

able to reach MLB at all, he could still have had a good life without them. A few hundred men play MLB annually, which is a tiny fraction of the 300 million plus citizens of the United States. Does being one of these few justify "cheating" to avoid being one of the many? If so, what message would an acquittal send to the many? Would it be, "If you don't like your lot in life, cheat to win?" Is that the message you want to send with your verdict? Thank you.

Roger Clemens' Defense - A First-Person Dialogue to the Jury

Ladies and gentlemen of the jury, our client is one of the most highly decorated pitchers in the history of MLB who is also a mortal human being whose use of steroids towards the end of his playing career was an error of judgment that has resulting in him being portrayed as a villain by the media and MLB. That he readily acknowledges having used steroids is not *ipso facto* evidence of his guilt, but merely the first step towards redeeming his reputation in the eyes of his peers and fans. Consider the severity with which Clemens' reputation has been subjected. Painted with the same broad brush as the rest of the steroid era stars as Barry Bonds and Mark McGwire, likely destined with these for the same fate as Pete Rose (MLB's all-time hits leader and 3-time World Series winner) whose on-the-field statistics exclusion from the Baseball Hall of Fame is a disgrace to the mere idea that the hall would only house MLB's "best." How will the exclusion of the only 7-time Cy Young Winner's statistics differ from the exclusion of Charlie Hustle's? There seems to be a special level of Dante's hell for fallen MLB players?

We contend the severity of the fall for our client was intentional to serve two purposes. First, by ruining Roger Clemens' reputation MLB seeks to strap all of the bad stuff associated with the steroid era on his back to go with him as he is cast into the pit. Hence, by gathering all of the garbage of the steroid era and strapping it on the backs of Clemens and the rest of the steroid era fallen as all are cast out, MLB is able to "clean up the game" thereby regaining its integrity. How convenient this is for MLB, as the second purpose of our client's fall is that it allows the game to be cleaned up without the self-serving Commissioner of MLB ever having to get garbage on his hands. His hands are dirty but the prosecution attempts to persuade you otherwise. See through this as the boldface lie that it is. The *ipso facto* evidence argument is MLB's attempt to keep you from spotting this lie by rushing you to judgment.

So your task will be to work through the evidence, sorting fact from fiction, to arrive at a verdict that reaches justice and avoids harm. One of the facts that none disputes here is that Roger Clemens did use steroids as a MLB pitcher. Yet, in order to avoid the Type I error that convicts an innocent man we implore you to avoid the fundamental attribution error. Work through Gilbert's (1994) reasons for the fundamental attribution error. How much would the reward system for power during the steroid era have influenced you were you in our client's shoes? Please don't misunderstand the situation. So is taking steroids "cheating" when your competitors are also taking and MLB is "looking the other way" to line their pockets with more money? Please consider the Commissioner of MLB's inaction on steroids and how this created

the prisoner's dilemma our client faced to avoid misperceiving his behavior. How would you want to be judged by your peers were you in our clients position? Don't rush to judgment to avoid the necessary cognitive effort, "think about it." Weigh our client's consistency and consensus analysis as you probe for the distinction between "cheating" and "parity." Finally, how would you feel being accused by your former employers of committing a "crime" when you know they benefited from your actions and they are lying to deny their own complicity? Heed the advice given to actors Robert Redford and Dustin Hoffman in *All the President's Men*, "Follow the money." Who benefited during the steroid era and why are they trying to hide by throwing our client and many of his contemporaries to a level of Dante's hell? Thank you.

CONCLUSION OF THE VERDICT PHASE

As noted in the Introduction, this thought experiment could not proceed as a real trial would because the type of case brought against the defendant would have been determined *a priori*. This section represents a *post hoc* analysis of the likely outcomes for each of the three case types based on the varying burden of proof levels clarified in The Legal Framework section.

Beginning with the most rigorous case, criminal, the burden of proof is "beyond a reasonable" doubt ($p < 0.001$). To avoid conviction, Clemens' defense would have had to demonstrate a "real possibility" that he was not guilty. The evidence presented showing the difference between MLB's steroid policy and those of the NFL and IOC may not go so far as to show complicity, but it clearly shows MLB did a poor job stopping steroid use. A memo is not sufficient to stop a bad behavior unless testing and progressive discipline processes are included. The laws would affect their athletes as well, but the NFL and IOC tested anyway. Given the financial rewards for strength and the real potential for prisoner's dilemmas, this evidence clearly seems to raise a "reasonable doubt" as to Clemens' guilt (i.e., the situation did contribute to the behavior). It seems highly likely Roger Clemens would easily be acquitted in a criminal case.

Moving down to the special civil case, the burden of proof is "clear and convincing" evidence (i.e., $p < 0.01$). To avoid conviction, Clemens' defense would have had to refute a very strong evidence-based case presented by MLB's lawyers. A boon to Clemens' defense would be MLB's heavy reliance on the *ipso facto* argument. This may be strong legal evidence, but it is ridiculous from a management perspective. Just because an authority figure (e.g., the Commissioner of MLB) says, "Don't do it" does not mean this will stop the bad behavior. Obviously the NFL and IOC didn't think so. Reward systems do not guide behaviors perfectly, but they are powerful so to ignore their influence is absurd. The backward reward system created in MLB during the steroid era coupled with the prisoner's dilemma means the situation encouraged the use of steroids contributing, in part, to the bad behavior. Again given the financial rewards for strength and the potential for prisoner's dilemmas and a lack of "clear and convincing" evidence, it seems likely Roger Clemens would be acquitted in a special civil case.

At the lowest level, the typical civil case, the burden of proof is "preponderance of evidence" (i.e., $p < 0.05$). To avoid conviction in this case would be the most difficult challenge for the Clemens' defense, as they are in give-and-take situation where they have to pick their battles knowing all cannot be won. In order to avoid the most serious criminal case conviction, Clemens admitted he used steroids as an active pitcher in MLB. By acknowledging this behavior the defense could use it to thwart the *ipso facto* argument using the Trope (1986) 2-stage and Gilbert et. al. (1988) 3-stage model of attribution. This was the Identification stage which corresponds with evidential facts, but it was argued that the Attribution of "cheating" was a false evidential inference. This was necessary to raise "reasonable doubt," but this lays the groundwork for demonstrating "preponderance of evidence" for a typical civil case conviction. Further, the Summation of the MLB lawyers does provide persuasive arguments that Clemens' choice was not merely a random event or completely due to the situation. Greed is not a sufficient justification for innocence. Even if the high estimates of steroid use were accurate, Clemens use of steroids did give him a "cheaters" advantage pitching against non-using batters. And the distinctiveness evidence of Clemens alleged extramarital affairs (multiple, and not outright refuted by the women involved) severely damages the defense's argument implying Clemens merely "levels the playing field." It seems highly likely Roger Clemens would be convicted in a typical civil case.

SENTENCING PHASE

So with the conviction in the typical civil case secured, the trial would move to the sentencing phase. This phase is where the "thrown under the bus" portion of the title becomes relevant. Being thrown under the bus is a severe punishment as it crushes the person, which is really the same effect as the Clemens' defense made in the Summation using the Dante's hell metaphor. This could be a punishment fitting conviction in a criminal case, but it seems extreme for a conviction in a typical civil case. The punishment does not fit the crime.

Although the trial in this paper was merely a logical thought experiment, which the author doubts would ever actually occur, Roger Clemens and other steroid era players implicated in the Mitchell Report (2007) and elsewhere (e.g., Canseco, 2005) have been harshly sentenced my MLB and the court of public opinion. Over the last couple of years several former star players have become eligible for the Baseball Hall of Fame, yet the Baseball Writers' Association of America have not elected such potentially worthy candidates as Mark McGwire or other steroid era stars in. Several articles speculated, often with supporting empirical evidence, that these steroid era stars seemed to fair much worse than similar candidates from non-steroid eras (e.g., Lemire, 2011; Verducci, 2011). While never formally convicted of their crimes, these former MLB stars have already been thrown under the bus. So the answer to this paper's title is "yes," Clemens is guilty and has already been thrown under the bus (as have his steroid era contemporaries). That the punishment does not fit the crime seems to bother few

beyond these former MLB stars. This author suspects the fundamental attribution error, especially Wanting Dispositions, because by throwing these "rogue players" under the bus MLB and its fans can sweep clean the blackened past and move forward towards a brighter future. I believe the MLB lawyers in this theoretical case would be very pleased, as would the Commissioner of MLB.

DISCUSSION

Implications for Roger Clemens and other "Tainted" Steroid Era Stars

There is some good news and much bad news for Roger Clemens and colleagues based on this theoretical case. Some of the good news is the argument made using the fundamental attribution error illustrated how backward reward systems, the prisoner's dilemma, and MLB's self-interest provides a theory-based argument that the situation in MLB played a more-than-trivial part during the steroid era. It *might be* possible to rehabilitate their reputations somewhat based on this case. Some of the bad news is that, even with the fundamental attribution error-based argument, these former MLB stars will never be able to fully rehabilitate their reputations because they must bear at least some of the blame for their behavior. More bad news is that the court of public opinion has already found them guilty and thrown them under the bus, even though I argue the punishment does not fit the crime. The really bad news is that MLB has shown a consistent pattern of *not forgiving* transgressors and a *long memory* of these transgressions dating back to the first Commissioner of MLB's Black Sox decision and Pete Rose's continued exclusion. In contrast, the NFL has demonstrated itself as much more forgiving as it has admitted into the Pro Football Hall of Fame former stars caught gambling (e.g., Paul Hornung) and using illegal drugs (e.g., Lawrence Taylor and Michael Irvin). The lesson in MLB is that getting caught or admitting to a transgression is fatal to one's career, so it is not surprising to this author that MLB players would work hard to avoid getting caught and *always deny* any allegations - even in a court of law or in front of Congress.

Implications for MLB - Illustrating How Bad Management is Harmful

The way MLB has dealt with steroid use illustrates how bad management harms its members. As the theoretical case discussed in The Management Framework section, there are positive physiological effects on strength and recovery from the use of steroids. What was not discussed, but was a key part of the Mitchell Report (2007), were the negative physiological and psychological effects of steroid use. By failing to stop steroid use (via testing and progressive discipline) and allowing a prisoner's dilemma to arise, MLB encouraged players to take steroids and risk their long-term health. As the case illustrated, this failure also encouraged players to risk their long-term reputation and legacy. It is appalling to this author when management

encourages bad behavior that risks individual's long-term future because it is financially beneficial to management. This illustrates a lack of care for the people managed. The relationship is strictly transactional: as long as the individual provides value then whatever the individual does to provide that value is okay with management. When management is confronted with questionable methods individuals used to provide said value, then proceeds to claim either ignorance or to actively avoid any responsibility is even more galling. It is this author's fervent opinion that management's responsibility includes not only the long-term health of their organization and their personal wealth, but also those people under management. MLB, specifically Commissioner Bud Selig, is far more responsible for the steroid era than he has been willing to acknowledge. Selig's reign as Commissioner is a disgrace to MLB and America.

MLB's bad management practice related to the steroid issue also illustrates how it harms itself. MLB has been known as the "National Pastime" for decades, but this is wishful thinking. If MLB is the "National Pastime," then football (both the NFL and college) is the "National Obsession." While recent ratings for the World Series have been poor when either the New York Yankees or Boston Red Sox are not involved (e.g., the San Francisco Giants versus the Texas Rangers and the Philadelphia Phillies versus the Tampa Bay Rays), Super Bowl ratings even when small-market teams play (e.g., the New Orleans Saints versus the Indianapolis Colts) dwarf World Series ratings. Though there are several potential explanations for MLB's declining popularity: the fact that MLB tolerated steroid use to reap financial benefit then threw the players that reaped those benefits under the bus sends a very negative message that MLB will "use players up until they are no longer valuable, then will take then out back and shoot them like a horse." This author believes declining interest and other problems with MLB (e.g., the dramatic decline of African-American players in MLB) are at least partly related to this message.

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ENTREPRENEURIAL ECOSYSTEMS: EVOLUTIONARY PATHS OR DIFFERENTIATED SYSTEMS?

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ABSTRACT

This study presents an examination of global entrepreneurship. We posit the existence of entrepreneurial ecosystems, with identifiable entrepreneurial types. In an analysis of advanced and emerging economies, five entrepreneurial ecosystems manifest. These ecosystems appear in two panels of a longitudinal data set. Further, ecosystem affiliation is somewhat static, with most nations remaining in the same cluster across panels.

INTRODUCTION

The study of global entrepreneurship is intriguing at least in part because factors which might be considered a constant (e.g. national culture) within a single national system vary when studied across multiple nations. Such variance allows researchers to expand our understandings of new business creation, survival, innovation and other topics of importance. However, global entrepreneurship matters not merely because of its comparative properties, but because the emergence of new business and innovation matters greatly for the quality of lives for people living within an economic system.

While there are numerous ways to subdivide the various economies in the world, it is common to recognize the structural differences between advanced economies, lesser developed economies and emerging economies. Historically, the advanced economies are the largest economies. They are post-industrial with complex financial systems, possessing substantive social infrastructure supporting the development of human capital, and a regulatory framework governing the emergence and practices of commerce. LDC's by contrast are typically agrarian, have limited financial systems, lack in social infrastructure, and lack (or have prohibitive) regulatory frameworks for commerce. Emerging economies are typically somewhere in the midst with individual countries evidencing some quite advanced characteristics alongside LDC characteristics.

This framework, while conceptually simple, becomes increasingly problematic in a globalized economy. It presupposes an evolutionary path towards a large advanced economy destination. In doing so, it overstates the similarities amongst advanced economies. The framework poorly characterizes the importance of emerging economies such as Brazil, Russia, India, China and South Africa (the BRICS), who are now amongst the world's largest economies.

The framework suffers in its clustering together of disparate types of emerging economies. In such a framework, former eastern bloc European economies are lumped together with Asian and Western hemisphere counterparties who are, in actuality, quite different from each other. We need a more nuanced framework for a global economy.

Global entrepreneurship emerges as a discipline well positioned to offer such insights. We recognize that entrepreneurship occurs in a systems context. Emergence of new businesses and innovations both influences, and is in turn influenced by, the socio-economic climate of a nation. It follows, then, that some national entrepreneurial systems are more alike than others. To the extent that these (dis)similarities are observable and measurable, we should be able to identify entrepreneurial ecosystems. Just as a natural ecosystem contains varying arrangements of biological components, so to do entrepreneurial ecosystems possess differing types and levels of entrepreneurship. As we can identify deserts, farmlands, savanna's and the like, we can likely identify similar entrepreneurial systems.

The purpose of this paper is to search for, and identify, entrepreneurial ecosystems. We explore the interrelationships of the socioeconomic environment and the entrepreneurial system. The remainder of this paper consists of three parts. We begin with an examination of recent global entrepreneurship research, from this we expand and detail three research questions. We then provide details of a study of global entrepreneurship in advanced and emergent economies. From there, we provide a discussion of our findings including potential research directions and implications of an ecosystems approach to global entrepreneurship.

GLOBAL ENTREPRENEURSHIP

The importance of entrepreneurship is widely recognized in the literature. We know that small and midsized enterprises (SME's) are the primary drivers of job growth and innovation outputs (Audretsch, 2003) in advanced economies. For emerging and least-developed economies (LDC's), entrepreneurship of necessity is of significant importance to employment creation (Oladele, Akeke, & Oladunjoye, 2011). Further, entrepreneurship by self-employment plays a role in maintaining productive use of human capital in the increasingly intertwined world of global trade (Hatos & Hatos, 2010).

Given the economic and innovative importance of SME's, it is unsurprising that researchers devote attention to the creation (Cooper, 2003), performance (Voelker & McDowell, 2011) and mortality (Robb, 2002) of such enterprises. We understand that entrepreneurs have different levels of optimism (Hmieleski & Baron, 2009), opportunity awareness (Arenius & Minniti, 2005) and enhanced social networking capabilities (De Carolis, Litky, & Eddleston, 2009) than non-entrepreneurial counterparties.

Besides recognizing differences in entrepreneurs, we know a great deal about the manner in which entrepreneurial systems produce disparate outcomes for their presumptive entrepreneurs. We also recognize that these asymmetries are more pronounced in some systems

than in others. In the United States, for instance, minority groups face difficulties in capital acquisition (Treichel & Scott, 2006) leading to under-representation in many industries (Reardon, Nicosia, & Moore, 2007) and higher firm mortality rates (Robb, 2002). The importance of such research cannot be understated as a valuable aid in developing system specific policy recommendations.

Moving to an international perspective, research explores comparisons between the entrepreneurship systems of two or more countries or regions. Findings here, suggest that determinants for new venture creation differ when examining emerging and advanced economies (Sternberg & Wennekers, 2005). Further, evidence suggests that it is the educational and technological advantage advanced economies have vis-a-vis emerging and LDC that perpetuates differential outcomes for each system (Yiu, ChungMing, & Bruton, 2007). Even amongst advanced economies, certain nations have environments more conducive to new venture creation, providing an advantage in the development of entrepreneurship (De Clercq, Danis, & Dakhli, 2010).

Studies of regional and international systems presuppose a systems theory model (Kamimura, Burani, & França, 2011) in which two entrepreneurship scripts explain the emergence and importance of entrepreneurship within a nation-state system. For advanced and emerging economies, the level of human capital and infrastructural barriers (Rosiello, Avnimelech, & Teubal, 2011) lead to (or inhibit) knowledge creation. Knowledge creation then drives innovation (Goniadis & Goniadis, 2010; Raluca, 2011), innovation stimulates new venture development (Braunerhjelm, Acs, Audretsch, & Carlsson, 2010; Korres, Papanis, Kokkinou, & Giavrimis, 2011), ultimately leading to employment and economic growth (Glinskiene & Petuskiene, 2011). In emerging and LDC's, the weak economic state and lack of employment opportunities (Díez & Ozdagli, 2011) spurs entrepreneurship by necessity (Onaolapo & Oladejo, 2011), leading to either new venture creation or self-employment (Hatos & Hatos, 2010). This form of entrepreneurship often occurs despite significant infrastructural barriers (Álvarez & Urbano, 2011; Nawaser, Sadeq Khaksar, Shakhsian, & Jahanshahi, 2011) and provides some means of economic growth (Oladele et al., 2011).

These two narratives work well if we consider global entrepreneurship as an iterative framework in which LDC's become emergent economies which move on to become advanced economies (Pušnik & Tajnikar, 2010). They coincide with the idea that progress through levels of entrepreneurial systems move along somewhat predictable waves (Davidsson, 2004). It follows that the antecedents and consequences of entrepreneurship within developing and developed systems differ (McMullen, 2011) lending itself well to policy analysis directed at LDC (Onaolapo & Oladejo, 2011) and emerging economies (Delić, Singer, & Alpeza, 2011).

However, these narratives run the risk of treating states within either advanced, emerging or LDC economies as more or less interchangeable units. This seems at odds with research documenting that advanced economies differ notably in their policy approaches to knowledge and innovation (Raluca, 2011). It lends itself to missing important psycho-social contributions

of individual characteristics of entrepreneurs (Álvarez-Herranz, Valencia-De-Lara, & Martínez-Ruiz, 2011) and dilutes the recognized influence of national culture on entrepreneurship (Osman, Asrah, Rashid, & Rajput, 2011). To the extent that the policies, human capital and cultures differ for nations within an economy level, it is quite likely that different entrepreneurial ecosystems exist within or across economy levels. Ultimately, this drives our primary research question. Are the theoretical distinctions between necessity and knowledge type entrepreneurial ecosystems observable in a global entrepreneurship environment? Along related lines, are these the only systems or are their other entrepreneurial ecosystems?

Pre-supposing the existence of multiple entrepreneurial ecosystems, how fitting is the analogy? Are countries bound to an ecosystem type or are they mobile? Is the (lack of) mobility constrained or enabled by cultural factors? That a relationship between culture and manifestation of entrepreneurship is recognized in recent research (Osman et al., 2011). Even so, it merits consideration of why culture should impact entrepreneurial style. Culture represents the deeply seeded norms and values of a society. It determines the behaviors that are rewarded and punished as well as the nature of the punishment or rewards themselves. It shapes how people in a society view their world, which in turn constrains perceptions of opportunity. From an entrepreneurial ecosystem perspective, culture likely interrelates with knowledge creation, innovation, and whether innovation manifests as entrepreneurship or intrapreneurship. It is reasonable to conclude that culture plays a role in the barriers (or lack thereof) to entrepreneurship in the system infrastructure as well as relating to the sense of entrepreneurial spirit (Glinskiene & Petuskiene, 2011) which sets the entrepreneur apart. Thus, our second research question focuses on whether, or not, culture plays a role in entrepreneurial ecosystem type and whether or not culture and ecosystems are deterministic?

If entrepreneurship manifests within an ecosystem, it follows that conditions in the environment shape - and are shaped by - the ecosystem, a thesis well documented in the literature. Emerging and LDC economies are often characterized as entrepreneurship of necessity (Oladele et al., 2011) wherein high unemployment and lack of advanced economy infrastructure leave few options for survival save that of entrepreneurship. In such systems, new venture creation and self-employment are not the result of unique innovations, but rather a manifestation of economic survival. By contrast, the presence of supportive infrastructure (educational systems, advanced financial markets, support for new venture creation, etc.) characterize entrepreneurship in advanced economies. Here we see knowledge and innovation driving economic growth (Raluca, 2011).

An interrelationship between economic and life outcomes does not, in and of itself, suggest an ecosystem model. Indeed, as we illustrate above, an evolutionary model from inferior (LDC) to advanced (developed) economic system characterizes the current narrative. However, if an ecosystem model manifests, different entrepreneurial systems may simply be different and not inherently ordinal. It is quite possible that more than one advanced entrepreneurial model exists. To this end, our third research question again presupposes manifestation of an

entrepreneurial ecosystem. Assuming such, we query what - if any - relationship exists between the quality of life in a system and the manifestation of entrepreneurship in that system?

Having reviewed recent research on global entrepreneurship, we proceed with three research questions. These questions can be restated as follows:

RQ1 *Does entrepreneurship manifest along a continuum or an ecosystem framework?*

RQ2 *Pre-supposing the existence of entrepreneurial ecosystems, are these systems rigid/fluid and culturally deterministic?*

RQ3 *Pre-supposing the existence of entrepreneurial ecosystems, are these associated with different life outcomes?*

MEASURES

All data used in this study is archival and publicly available through several published sources. Data for entrepreneurship indicators are listed in Avanzini's (2009) study on entrepreneurship indices. Hofstede indicators were obtained from Hofstede's website (Hofstede, 2011). The human development index measures were obtained from the United Nations Development program data ("Human Development Reports," 2011). Finally, our economic measures were obtained from the World Bank ("Indicators," 2011).

Avanzini (2009) provides seven scales measuring entrepreneurship for 69 countries. The data is reported for two panels, 1998-2001 and 2002-2005. Avanzini's goal the establishment of a composite index for global entrepreneurship. To this end, he includes measures of direct entrepreneurships (innovation and the creation of new ventures) alongside indicators reflecting the predisposition for (or against) entrepreneurship emergence (knowledge systems, entrepreneurial barriers, and entrepreneurial spirit). Recognizing that entrepreneurship of necessity differs from advanced economy entrepreneurship, he also includes indicators for the economic contributions of entrepreneurship.

Avanzini's (2009) approach uses multiple measures for each indicator and his analysis suggests that the underlying items themselves have little inter-item correlations outside their scale. *Entrepreneurial activity* relates to new venture creation. *Employment* refers to new job creation specifically attributed to entrepreneurial activity. *Economic activity* relates to measures of accounting and market valuation for entrepreneurial firms. *Entrepreneurial spirit* relates to general attitudes of a population predisposing them towards entrepreneurship. *Barriers to entrepreneurship* refers to the abundance of capital and institutions necessary to support entrepreneurship. *Knowledge* relates to overall investment in the creation of new knowledge, such as research and development and published research. Finally, *innovation* represents bringing knowledge to markets in the manifestation of new product launches or new production processes.

We used World Bank data for GINI measures. GINI captures the asymmetry of wealth concentration within a society. The measure ranges from a hypothetical value of 0, which would represent perfectly balanced distribution of wealth across the strata of a society to 100 which would hypothetically indicate that the a single (or few) persons held the entirety of a nations wealth. In our sample of firms, GINI ranges from the very egalitarian 24 (Denmark) and similarly low scores for Northern Scandanavian societies to a maximum of 61 (South Africa).

We tracked life outcomes using the United Nations Human Development Index. The U.N. generates this indicator using the best available measures for a number of life outcomes, such as life expectancy, educational attainment and other quality of life measures. The index is updated each year. For our analysis, we used the average HDI for a country across the entrepreneurial panel of comparison. Therefore, when we are examining clusters for the 1998-2001 Avanzini (2009) measures, we compare the HDI average for 1998-2001 for each country. Similarly, our examination of Avanzini's 2002-2005 entrepreneurship measures uses the average HDI value for each country over the same timeframe. HDI measures have a maximum hypothetical value of 1. In our sample, we find a maximum value of .963 (Norway, 2nd panel) and a minimum of .575 (India, 1st panel).

Our values for Hofstede cultural indicators for each country were largely obtained from Hofstede's website (Hofstede, 2011). In general, long-term orientation is not recorded for many of the countries in our data set, we thus chose to omit LTO from our examination. For the remaining four indicators, power distance, individualism, masculinity and uncertainty avoidance, Hofstede's website provides measures for the vast majority of the countries in our sample. For values not provided, we searched for published studies which had examined one or more Hofstede dimension and countries for which we had missing values. This led to identification of Basabe and Ross (2005) and Ardichvili and Kuchinke (2002) which helped close out missing data. Where no data was recorded we simply left the value empty and did not include that country-variable in subsequent analysis.

ANALYSIS

Data in this study are analyzed using SPSS 19. Means, standard deviations, minimum and maximum values and correlations for data appear in Table 1. As our primary interest in this study involves identification of entrepreneurship ecosystems, we begin with an examination of correlations between Avanzini's (2009) entrepreneurial indicators. We find that a number of the indicators are correlated, although consistent with his analysis none of the correlation rises to a level implying duplicity in meaures. However, consistent with our thesis, a number of the correlations are strong enough to suggest that relationships exist between indicators. For example reasonably strong correlations exist between entrepreneurial activity and entrepreneurial spirit ($r = .32$), entrepreneurial barriers ($r = -.27$), knowledge production ($r = -.21$) and innovation ($r = -.43$). The latter two correlations are interesting in that they are negative and significant.

This implies that a substantive amount of the innovation and knowledge creation occurring in the global economy are not related to the emergence of new business ventures.

Table 1: Means, standard deviations and correlations

		Mean	s.d.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12
1	Entrepreneur Activity	0.00	0.64	-2.81	3.07												
2	Employment	0.00	0.28	-0.80	1.48	.16											
3	Economic Activity	0.00	0.48	-3.92	2.33	-.04	.45***										
4	Entrepreneur Spirit	0.00	0.67	-2.04	3.24	.32***	.17*	.11									
5	Entrepreneur Barriers	0.00	0.50	-0.71	2.02	-.27***	-.08	-.07	-.07								
6	Knowledge Production	0.00	0.75	-2.83	2.69	-.21*	-.17*	-.16	-.43***	-.02							
7	Innovation	0.00	0.81	-1.51	4.16	-.43***	.03	.00	.02	.48***	.07						
8	HDI	0.83	0.10	0.58	0.96	.02	-.09	-.05	-.25**	.00	.42***	.06					
9	GINI	39.59	10.26	24.00	61.40	.09	.07	-.07	.20*	.06	-.35***	.06	-.57***				
10	Power Distance	55.40	23.09	5.00	100.00	.00	.09	.02	.12	.01	-.43***	-.01	-.62***	.41***			
11	Individualism	41.10	23.47	5.00	90.00	-.04	-.11	.11	-.18*	-.03	.39***	.02	.60***	-.64***	-.61***		
12	Masculinity	47.43	21.02	5.00	100.00	.04	-.07	-.14	.16	.07	-.20*	.05	-.09	.02	.18*	.15	
13	Uncertainty Avoidance	64.35	21.64	5.00	100.00	.16	-.01	-.15	.07	-.10	-.15	-.26**	-.22*	.19*	.30***	-.32***	.08

We find a similar seemingly paradoxical relationship between knowledge production and employment (r = -.21). Increased knowledge creation is negatively associated with job gains in entrepreneurial ventures. Taken separately, one might conclude that the factors of knowledge and innovation are inversely related to entrepreneurship – something which seems impossible by definition. Resolving this paradox requires considerations that might explain why new business formation and subsequent job growth in new businesses are opposing factors to knowledge and innovation. Avanzini (2009) himself acknowledges this, recognizing that new ventures and new venture job growth may emerge as a function of "necessity (generally associated with high rate of unemployment in the formal sector)" (pg. 12). This suggests that entrepreneurship in developing economies is different than entrepreneurship in advanced economies, something that is inherently recognized in our literature. We find that the correlations within the entrepreneurship indicators provides support for our premise that definable entrepreneurial ecosystems exist.

Examination of our cultural and economic indicators also identifies a number of correlations. The human development index has strong correlation to several measures. GINI (r = -.57), power distance (r = -.62), individualism (r = .60) and uncertainty avoidance (r = -.22). Collectively, these suggest that the life outcomes for members of a society hinge on risk taking behaviors, empowerment of the individual, and egalitarian distribution of resources in a society. Additionally, we observe that stratified societies are more likely to be collective (r = -.61) and more likely to be risk averse (r = .30).

To the extent that entrepreneurs break away from traditional firms and pursue riskier (e.g. newer) ventures, we might conclude that high power distance and low uncertainty avoidance countries are negatively predisposed to entrepreneurship. Interestingly, this is not born out in the correlations. Indeed the only correlations between power distance and entrepreneurship occur in knowledge production (r = -.43) and uncertainty avoidance only relates to innovation (r = -.26).

Our primary research question asks whether, or not, entrepreneurial ecosystems exist. As an ecosystem would manifest as an environment fermenting specific types of entrepreneurship, an appropriate analytic approach is cluster analysis. Cluster analysis identifies latent groupings within a population. As such, it is a useful tool for identifying groups which share common characteristics that differentiate them from other groups within a larger population (Hair, Anderson, Tatham, & Black, 1997). Cluster analysis has proven useful in cross-country comparison (Akkucuk, 2011; Odehnal, Sedack, & Jaroslav, 2011).

We conducted cluster analysis on each panel of Avanzini's data. We began our cluster analysis using the 69 countries in each panel, beginning with two clusters. We iterated additions to the clusters until we identified a solution which sorted the data into an interpretable manner, and for which adding an additional cluster tended to spin off only a single observation. Results from the 1998-2001 panel appear in Table 2.

Table 2: Cluster Analysis
1998-2001 Data Series

	USA	JPN	New Business	Dreamers	Middle of the Road	Knowledge Centers
Entrepreneurial Activity	-0.47	-1.07	2.29	1.35	0.04	-0.78
Employment	-0.77	-0.79	0.20	0.07	0.00	0.06
Economic Activity	-0.27	-3.92	0.50	-0.07	-0.01	0.26
Entrepreneurship Spirit	0.62	-1.36	0.12	2.73	0.16	-0.98
Barriers to Entrepreneurship	1.31	2.02	0.12	-0.14	-0.16	0.35
Knowledge Creation	0.50	0.45	-0.98	-0.97	-0.15	0.93
Innovation	3.15	2.97	-1.15	-0.38	-0.18	0.52
Number of countries	N/A	N/A	3	2	49	13
Example Countries	N/A	N/A	Italy Portugal Greece	Mexico New Zealand	Argentina Brazil South Korea	Finland France Netherlands

In our first iterations, we observed that both the United States and Japan emerge as singularly unique nations. No other country in the panel approximates their values. They are, in essence, entrepreneurial outliers. While each country benefits from low barriers to entrepreneurship, relatively strong knowledge production and high innovation, they differ notably from each other in their entrepreneurial activity, economic activity and entrepreneurial spirit. Holding these two countries aside, the remaining 67 nations split rather cleanly into four

entrepreneurial clusters. Looking at the clusters, three stand out due to high (or low) scores on a couple of metrics.

We chose to label these as "new businesses" characterized by high entrepreneurial activity and relatively low innovation and knowledge creation, "dreamers" characterized by reasonably high entrepreneurial activity and spirit with relatively low levels of knowledge creation and innovation, and "knowledge centers" with relatively high levels of knowledge creation and innovation but observably low levels of entrepreneurial activity and entrepreneurial spirit. The countries making up each of these three clusters manifest entrepreneurial trade-offs, each cluster has a visible entrepreneurial advantage, but similarly manifests an entrepreneurial weakness.

Our fourth cluster seems most distinctive in its lack of distinctiveness. We have labeled this cluster "middle of the road," in that the results are near zero (neither strong, nor weak) in all seven entrepreneurship indicators. Tellingly, 49 countries land in this entrepreneurial no-man's land. Further, many of these nations are themselves emerging economies. By contrast, our focused clusters have fewer members and exhibit trade-offs. While Avanzini (2009) identifies Mexico and New Zealand as entrepreneurship out of necessity, a cluster examination suggests that they are, in fact, somewhat different from the necessity countries. Mexico and New Zealand stand apart (in this panel) for their high entrepreneurial spirit.

Results for the cluster analysis of the 2002 to 2005 period appear in Table 3. As in our prior analysis, several countries do not cluster well. Once again, Japan emerges as an outlier system. As before, Japan's system produces few new businesses but produces a relatively high amount of innovation.

Table 3: Cluster Analysis
2002-2005 Data Series

	USA	China	Japan	Indonesia	Dreamers	Middle of the Road	New Businesses	Knowledge Centers
Entrepreneurial Activity	0.82	0.02	-1.46	-2.81	-0.05	0.01	0.70	-0.13
Employment	0.84	0.20	-0.24	0.54	0.14	-0.01	0.26	-0.22
Economic Activity	0.59	0.00	-0.24	2.33	0.08	-0.08	0.16	-0.07
Entrepreneurship Spirit	0.02	0.34	-0.24	1.32	1.50	-0.04	-0.21	-0.27
Barriers to Entrepreneurship	0.18	0.29	0.25	1.97	0.33	0.09	-0.30	-0.28
Knowledge Creation	-0.24	-0.55	0.22	-2.83	-0.78	-0.27	0.12	0.91
Innovation	3.01	4.16	1.53	3.66	0.42	-0.20	-0.30	-0.25
Number of countries	N/A	N/A	N/A	N/A	4	36	8	17
Example Countries	N/A	N/A	N/A	N/A	Brazil India Mexico	Argentina Estonia S. Africa	Australia Finland Greece	Belgium Iceland Norway

Interestingly, during this period, Indonesia emerges as a unique entity. The Indonesian system produces few new businesses, but these few businesses generate fairly substantive levels

of economic activity and innovation. Additionally, it appears that Indonesia radically reduced barriers to entrepreneurship in this window changing from a -.60 in the 1998-2001 window to a 1.97 in the 2002-2005 window.

Perhaps the most interesting outlier situation, though, occurs with the United States. While the U.S. system stood alone in the 1998-2001 system, it is paralleled by China in the 2002-2005 panel. Both systems emerge as strong innovators with only modest scores on other entrepreneurship indicators. The story for China, appears to manifest primarily in changes to innovation. China's 1998-2001 and 2002-2005 entrepreneurship measures are reported in Table 4. On balance, China's scores strengthen in the 2002-2005 panel, but in general remain clustered around the zero anchor point on the scales. The notable change is an innovation movement from 1.376 to 4.1623, possibly reflecting China's progression towards western governance models. It is this jump in innovativeness that propels China away from the "knowledge center" cluster in 1998-2001 and towards a U.S. parallel in 2002-2005.

After accounting for the outlying systems, the 2002-2005 panel once again sorts cleanly into a four cluster solution. As before, we see "new businesses" which create businesses and jobs, and modest other outcomes. Once again, this cluster manifests along the European periphery including also Australia and New Zealand.

Table 4: China's Entrepreneurial Shift

	China (1998-2001)	China (2002-2005)
Entrepreneurial Activity	-0.2885	0.0183
Employment	0.1955	0.1987
Economic Activity	0.366	0.0013
Entrepreneurship Spirit	-0.7849	0.3405
Barriers to Entrepreneurship	0.5819	0.2912
Knowledge Creation	0.6333	-0.5541
Innovation	1.376	4.1623

We find "knowledge centers" which tend to produce R&D and research outputs and modest other outcomes. Member states again are primarily western and northern European states along with Canada. Interestingly, both the Czech Republic and Russia join this group in 2002-2005, moving out of the middle of the pack cluster from 1998-2001.

We again see "dreamers" with high entrepreneurial spirit and modest other outcomes. Mexico again appears in the dreamer cluster, but it is joined by Brazil, India and South Korea, all of whom had been in the middle of the road in the prior timeframe. Finally, we once again see a large number of "middle of the road" economies with no real entrepreneurial strengths.

In each of our two panel periods, we identify four entrepreneurial clusters. Nation states within each cluster differ statistically on one or more indicator from nations states in another cluster. This largely confirms our primary research question – whether entrepreneurship manifests as a single overarching concept or whether it manifests in different flavors. Our

analysis suggests the latter, there are several distinct flavors of entrepreneurship and membership in an entrepreneurial ecosystem is sticky. While mobility between clusters manifests, it is not common, nor is there a specific path for mobility.

Our second research question asks whether cluster affiliation for entrepreneurial ecoystems is culturally bound? That is, whether the type of entrepreneurial system emerging in a nation state is a byproduct of the culture of the people. We examined this relationship using a series of ANOVA tests using the Hofstede dimensions of power distance, individualism, masculinity and uncertainty avoidance against the cluster affiliation determined in our previous analysis. The results of these tests appear for the 1998-2001 panel appears in Table 5 while results for the 2002-2005 panel appears in Table 6. Tests for the cultural indicator for masculinity does not reach significance in either panel.

Table 5: Anova Designs – Cultural Differences
1998-2001 Data Series

	F	Levene	Dreamers	New Business	Knowledge Center	Middle of the Road	USA	Japan
PDI	3.887*	n.s.	47.50	53.33	38.08	61.21	35	50
IND	3.769*	n.s.	50.00	40.00	57.69	35.19	90	40
MAS	1.78	n.s.	57.50	46.67	35.38	49.29	60	90
UCA	6.023***	n.s.	60.00	90.00	46.54	68.12	40	90

Power distance manifests significant differences in both the 1998-2001 and 2002-2005 panels. "Knowledge centers," in general, manifest low levels of social stratification while the "middle of the road" countries exhibit the highest levels of social stratification. Individualism performs similarly, achieving significance in both the 1998-2001 and 2002-2005 panels. Similar to our power distance findings, "middle of the road" states exhibit low individualism while "knowledge centers" are quite individualistic.

Uncertainty avoidance reaches significance in the 1998-2001 panel, but does not reach significance in the 2002-2005 panel. In the early panel, "knowledge centers" manifest the lowest level of uncertainty avoidance while "new business" countries manifest the highest level of uncertainty avoidance. This remains true in the second panel, but the differences across ecosystems is quite small.

Finally, variance levels change substantively across panels. In the earliest panel, we found no violations of homogeneity assumptions, suggesting that the variance around the mean for member states within a cluster are reasonably similar across all clusters. This changes, though, in the 2002-2005 panel. In this panel, we observed several movements where a country moves (typically from "middle of the road") from one cluster to another. These movements create clusters with heterogeneous variance in the power distance and uncertainty avoidance cultural indicators. Individualism retains homogeneity of variance assumptions in the later panel.

Table 6: Anova Designs – Cultural Differences 2002-2005 Data Series								
	F	Levene	Dreamers	New Business	Knowledge Center	Middle of the Road	China	Indonesia
PDI	10.617***	n.s.	66.25	36.88	38.82	66.38	80	70
IND	14.468***	sig	27.50	58.13	60.12	29.62	10	10
MAS	1.147	n.s.	47.50	46.25	39.00	50.63	50	40
UCA	0.582	n.s.	66.25	60.63	61.12	68.67	35	40

Collectively, these findings offer mixed support for our second research question. In the 1998-2001 panel there is a reasonably clear culture bound story. The entrepreneurial ecosystem a nation state occupies tends to place it in affiliation with other states having similar levels of power distance, individualism and uncertainty avoidance. This certainly suggests there is some interrelationship between the culture of a people and the specific type of entrepreneurship they initially pursue.

In our 2002-2005 panel, one cultural measure is no longer significant and two of the culture measures exhibit significant changes in homogeneity of variance. Several countries change their entrepreneurial ecosystem. These changes increase the variance present in both the power distance and uncertainty avoidance indicators. While we only have a single cultural score for each nation on each index, it is unlikely that a country's culture would shift substantively in so few years. Our evidence thus suggests that culture explains the origin of entrepreneurial type for a nation. Since nations can, and do, change their entrepreneurial type though, the relationship between culture and entrepreneurship does not appear to be deterministic.

Our third research question explores whether entrepreneurial ecosystem type is related to the life outcomes of a society. We would expect to find some variance with needs based ecoystems having lower levels of life outcomes and more advanced systems coinciding with higher levels of life outcomes. We explored this using ANOVA designs, comparing the human development index level and GINI index against the ecosystem cluster assignment from our first research question. The results of these analyses appear in Table 7.

Life outcomes, as represented by the human development index, differ greatly across entrepreneurial ecosystem. Consistent with expectations, knowledge centers coincide with the highest levels of human development index. Citizens residing in knowledge center entrepreneurial clusters on general have better lifespans, education levels and otherwise enjoy better lives. Further, for citizens in "middle of the road" countries, the opposite is true. Life outcomes are notably lower – indeed, they are on the whole the lowest for the clusters. Countries in the “new business” cluster evidence high levels of HDI, relatively similar to that of their “knowledge center” neighbors.

Table 7: Anova Designs – Economic and Life Outcomes Both Data Series											
	Period	F	Levene	Dreamers	New Bus	Know Center	MotR	USA	China	Japan	Indonesia
HDI	1998-2001	8.962***	n.s.	0.85	0.89	0.91	0.78	0.93	0.72	0.93	0.68
HDI	2002-2005	25.046***	sig	0.78	0.93	0.92	0.79	0.95	0.76	0.95	0.71
GINI	1998-2001	3.412*	n.s.	49.49	35.58	32.44	41.62	42.9	41.5	37.6	37.9
GINI	2002-2005	12.643***	sig	44.21	33.14	30.61	44.97				

Examination of the GINI index leads to similar conclusions. Knowledge center countries are consistently egalitarian, while middle of the road countries exhibit greater disparities in wealth outcomes. Countries in the new business cluster typically manifest egalitarian wealth distribution similar to their knowledge center neighbors, albeit with slightly higher disparities.

Consistent with the 'entrepreneurship by necessity' thesis, dreamers have relatively low HDI levels and higher disparity in wealth distribution. Lacking the social support infrastructure and having greater wealth asymmetries than more advanced economies, citizens in dreamer countries rely on their entrepreneurial spirit as a means of getting by.

Our results here generally support the conclusion that life outcomes and entrepreneurial ecosystem type are intertwined. There is a notable distinction between the entrepreneurship models of advanced economies (generally the "new business" or "knowledge center" models) and that of emerging economies (generally the "dreamers and "middle of the road" states). While life outcomes are typically better for "new business" and "knowledge center" models, there is no clear difference in life outcomes. Both systems are associated with relatively high HDI and low GINI levels respectively. Similarly, while outcomes are typically lower for "dreamers" and "middle of the road" states, there is no clear advantage for one over the other.

DISCUSSION

Three research questions guided us in the creation of this paper. First, does entrepreneurship manifest along a specific evolutionary path or as differentiated ecosystems? Second, assuming differing systems, do the differences intertwine with cultural differences? Finally, assuming differences, do the differences in life outcomes coincide with entrepreneurial ecosystem type? Our findings suggest that different types of entrepreneurial systems exist, that affiliation with entrepreneurial ecosystem has some relationship to national culture, and that entrepreneurial ecosystems coincide with different levels of life outcomes.

We observe several nations that do not cleanly fit into our clusters. Specifically, the United States, Japan, China (2002-2005) and Indonesia (2002-2005) do not load into the clusters identified in our analysis. Interestingly, though, these nations could comprise a fifth cluster "innovators." Indeed, these outlying entries each manifest supernormal innovation levels.

However, these countries exhibit virtually no other commonalities, suggesting that innovators are unique unto themselves.

The remaining nations load to four clusters and these clusters are visibly similar in the 1998-2001 and 2002-2005 panels. Additionally, cluster membership is relatively static across time periods. However, the clusters themselves change somewhat between periods. In the earlier period, cluster affiliation is typically a strength and weakness assignment. For example, in panel 1, knowledge centers are strong at knowledge creation, but weak at new business creation. Conversely, new business centers are strong at new venture creation, but notably weak at knowledge creation.

This strength to weakness trade-off in 1998-2001 changes to a strength to non-strength trade-off in 2002-2005. Here the strength of one system seems to be more of a distinctive competency, while the weaknesses have been largely reduced to the zero middle bound. Knowledge centers in 2002-2005 remain quite good at R&D, but are reasonably better (albeit still weak) at new venture creation than they were in 1998-2001.

That any sort of a trade-off manifests between ecosystem types suggests that it is inadvisable to create aggregate entrepreneurship indicators. Intrapreneurship exists in Norway distinguishing itself from the entrepreneurship in the United Kingdom. That Avanzini (2009) finds a common second order factor may be more a function of the large number of "middle of the road" states than it is some higher order entrepreneurship construct. To that end, force-fitting all entrepreneurial systems into a single measure may lead to inadvertent errors in conclusions. Further, aggregating entrepreneurship may in fact obfuscate origin and mobility discussions for an individual country's entrepreneurial system.

While entrepreneurial ecosystem affiliation is reasonably static, mobility occurs. China, Russia, Brazil, India and Indonesia (among others) change ecosystem affiliation between the 1998-2001 and 2002-2005 panels. This was a movement away from the "middle of the road" cluster, however, the mobile nations travel in completely different directions. This again supports the argument that entrepreneurship isn't an aggregate indicator. Each of these nations moved away from their prior point and they also moved away from each other. This movement was not along a single axis, but rather across at least three dimensions (new business creation, entrepreneurial spirit and knowledge creation). We believe that research would benefit greatly from an understanding of the antecedents and consequences of these movements – a distinction lost without a multi-dimensional conception of entrepreneurship.

One possible antecedent to entrepreneurial ecosystems lies in exploring the relationship between national culture and ecosystem affiliation. Our results suggest that culture plays an important role in ecosystem affiliation. In particular, "middle of the road" countries exhibited little entrepreneurial mobility across time-panels and these countries have a specific cultural profile. Middle of the road countries are typically more socially stratified more collectivist and somewhat more avoiding of uncertainties than other clusters.

Conversely, knowledge centers tend to have low power distance and relatively high individualism. This social egalitarianism coupled with individualism seems quite supportive for knowledge creation activities. Interestingly, though, the relationship to innovation is not so clear cut. Knowledge center countries exhibit modest innovativeness while the innovative countries are themselves all over the map on power distance and individualism.

Masculinity/Feminism has no significant relationship to entrepreneurial cluster in either panel. Uncertainty avoidance had a significant relationship in 1998-2001, but not in 2002-2005. The latter condition likely relates to the ecosystem mobility observed in the 2002-2005 panel. Several nations moved clusters and their destination cluster was not necessarily similar on uncertainty avoidance.

Collectively, our cultural findings suggest that culture helps to explain the origin of an entrepreneurial ecosystem. However, culture is almost certainly not fully deterministic. Several states shift cluster affiliation away from the "middle of the road." Aspects of culture, particularly power distance and individualism may explain mobility directions for entrepreneurial systems. We did not explore that in this paper and, at this time, the data is unavailable to reasonably examine ecosystem mobility.

Our third research question explored the interrelationship between entrepreneurial ecosystem and life outcomes. Past research suggests a potentially causal relationship (e.g. the entrepreneurship by necessity) wherein life outcomes influence entrepreneurial type. Additionally, this conceptually suggests an ordinal relationship for entrepreneurship moving from limited entrepreneurship (for less developed economies) to entrepreneurship by necessity (for emerging economies) to full entrepreneurship (for advanced economies).

While our results indicate that life outcomes vary by entrepreneurial ecosystem, they also reject the idea of a linear ordering for ecosystems. Our results suggest that "new business" and "knowledge creators" are advanced entrepreneurial ecosystems and "middle of the road" and "dreamers" are inferior ecosystems. Countries in the new business and knowledge center clusters exhibit high HDI and low GINI levels than the middle of the road and dreamer clusters. Residents of these advanced systems enjoy better life outcomes and more egalitarian wealth distribution than the inferior systems. However, we cannot conclude that knowledge centers are better than new business creators (or vice versa). Similarly, while we can conclude that the inferior systems produce generally worse life outcomes and more asymmetric wealth distributions, we cannot conclude that "dreamers" are better (or worse) off than "middle of the road" economies. An examination of the four "innovator" countries (USA, Japan, China and Indonesia) suggests that there is no meaningful relationship between life outcomes and innovativeness. Innovators are, once again, unique unto themselves. It appears that there are advantages in moving from the inferior ecosystems (middle of the road and dreamers) to the advanced ecosystems (knowledge creators and new business), but there is no clearly ideal destination. Both ecosystems produce desirable life outcomes.

Our findings suggest promising directions for future research, we explore two of those here. First, how does culture intertwine with ecosystem mobility? A number of countries changed their entrepreneurship profile between the 1998-2001 and the 2002-2005 panels. Some moved from "middle of the road" to the other three archetypes. At least two (Indonesia and China) became an innovator. What role, if any, did culture play in the direction of ecosystem mobility? A number of countries did not move. While this includes countries in the advanced ecosystems, it also includes countries in the inferior ecosystems. What role, if any, did culture play in this ecosystem stickiness? Does culture coincide with policy choices, shaping ecosystem mobility, or did it play out in some other fashion?

Our second research suggestion involves an extension, or perhaps interaction, with our first research direction. What role did life outcomes play in ecosystem mobility? We observed a relationship with high HDI and low GINI for both advanced ecosystems and similarly low HDI and high GINI for both inferior systems. If a nation wishes mobility, should it shift entrepreneurial policy to promote new social outcomes? Alternately, would a shift in social policies lead to a change in entrepreneurship outcomes? Should government interventions occur simultaneously along both fronts?

Extending our second research direction, there appears to be an interaction between culture and affiliation with an advanced ecosystem. Knowledge centers are typically lower in power distance and higher in individualism than their new business creator neighbors. The apparent relationship suggests that culture is associated with either fit or choice in entrepreneurship manifestation (although our results do not suggest which). Is this relationship one of happenstance or significance? If significant, culture may inform the appropriate direction of entrepreneurial ecosystem mobility.

In this paper we have explored the different faces of global entrepreneurship. Our findings suggest that the LDC, developing, to advanced economy model fails to capture the nuance of national entrepreneurial systems. While we did not look at LDC's, our examination of developing and advanced economies suggests that there are four discreet types of entrepreneurial systems and a fifth innovator system. Advanced economies largely split between two of these ecosystems and developing economies split between two other ecosystems. The innovator style has both advanced and developing economy members.

Examining global entrepreneurship by ecosystem type offers several advantages. First, it enables a more accurate modeling of evolutionary paths for a given nation. Second, it opens the door to understanding policy, economic and cultural impacts on entrepreneurship. Extending from this second point, it may provide better policy recommendations for developing and emerging economies.

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AUDITOR INDEPENDENCE AND INTERNAL INFORMATION SYSTEMS AUDIT QUALITY

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ABSTRACT

After Enron, Tyco and other corporate accounting scandals a decade ago, and the ensuing passage of the Sarbanes Oxley law; there has been resurging academic interest in identifying the factors most influencing the quality of information systems (IS) auditing. Yet the empirical literature in this area is inconclusive. This paper presents the results of a new survey of professional internal information systems auditors that asked them to identify the most influential factors affecting their IS audits. The results indicate that a lack of internal audit independence is not widespread and that such a lack of audit independence has less influence on internal audit quality than does either auditor competence or the quality of the written audit objectives. However, our results do suggest that the internal IS audit profession suffers from a self-image problem, resulting from a perceived relative lack of independence.

INTRODUCTION

After the Enron, Tyco, and other corporate accounting scandals a decade ago, and the ensuing passage of the Sarbanes Oxley law in 2002; there has been a resurgent interest in how to positively influence the quality of information systems (IS) auditing. Yet there is no agreement on how to measure such quality, or whether internal audits or external audits produce the highest quality. Exploring how to answer these questions was the purpose of the research presented in this paper, which is organized as follows. We begin with a short economic definition and history of audit independence followed by a review of recent related empirical literature. Then we present the results of our exploratory study of factors mentioned in the literature associated with audit quality. We end with some conclusions and suggestions for future research.

Audit Independence

In classical economic theory, an audit is a market driven monitoring activity that increases the value of the firm by reducing agency costs. Agency costs arise because of conflicts of interest among contracting parties. The central proposition of agency theory is that "rational self-interested people always have incentives to reduce or control conflicts of interest so as to

reduce the losses these conflicts engender. They can then share the gains." (Jensen & Meckling, 1976). To classical economists, a firm is a set of contracts among the factors of production. One such contract is often for independent auditing: thus auditing can be considered an agency cost.

Total agency costs are directly proportional to the market expectation that the auditor will report breaches of contract he/she discovers (Jensen & Meckling, 1976). The probability that the auditor will report such a breach is the classical economic definition of auditor independence. In theory, an audit will reduce total agency costs only if the market expects the auditor to have a nonzero level of independence. Adam Smith was the first academic to call attention to the importance of independence in auditing (Smith, 1776). Smith was pessimistic about the ability of the

> *joint stock company to survive in any but the simplest of activities where management behavior could be easily monitored (*Watts et al, 1983).

The first audits were voluntary and internal -- conducted by directors and/or shareholders (Watts et al., 1983). On the other hand, the genesis of external auditing was by government fiat. Two of the earliest such laws were English: the English Companies Act (1844) and the Registered Companies Act of 1862 (Watts et al., 1983).

The passage in the U.S. of the Sarbanes-Oxley Act of 2002 (SOX) after the Enron, Tyco and other corporate scandals, caused a continuing resurgence of public interest in the quality of corporate governance, which in turn has focused much more attention on internal auditing, especially information systems (IS) auditing. Assurance that the risks associated with IS operation are effectively controlled is necessary for SOX compliance.

Internal Auditing

Internal Auditing, is defined by the Institute of Internal Auditors as follows (IIA 2002a),

> *Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.*

Some research suggests that, because of a relative lack of independence, internal audits are inherently inferior to external audits, and that the internal auditor profession suffers from a resulting self-image problem (Merhout, 2008). On the other hand the best practice framework, COBIT V, published by the Information Technology Governance Institute (ITGI) says that internal auditing is in the "best position to gather intelligence on breaches of contract" (ITGI, 2011). Furthermore, this believed pre-immanence of the internal audit function (IAF) over

external auditing has been recently highlighted by the Public Company Oversight Board (PCAOB) Statements on Accounting Standards (PCAOB, 2007). (See also Sneller & Langendijk, 2007; and Gramling et al., 2004.) Further, external auditors need to form an opinion about the quality of the IAF before deciding the extent to which it can be relied upon in the external audit (Brown, 1983; Schneider, 1984, 1985; Krishnamoorthy, 2002). As yet academics have not shown empirically whether or not internal audits do actually produce superior quality audits; but there is however research suggesting internal audits are better suited to monitor IS development projects than are external audits (Wright & Capps, 2010). (See also IIA, 2002a.)

Information Systems Auditing

To be technically classified as an IS audit, it must involve information technology; either as the specific focus of the examination, or as the means to complete an engagement. An IS audit can be executed by external auditors as part of the annual financial statements audit, with the primary purpose of testing the structure of internal controls surrounding key information systems; or performed by the internal audit function (IAF) for a similar purpose, as part of management's responsibility for corporate governance. IS audits in the U.S. are required to adhere to quality control standards, such as those of the PCAOB, the American Institute of Certified Public Accountants (AICP) and the Institute of Internal Auditors (IIA).

A high quality IS audit can assure that a firm's IS strategy is aligned with the overall firm strategy, and that specific policies are being followed (IIA, 2001a; IIA 2001b; IIA, 2001c; IIA, 2002b; IIA, 2002c; IIA, 2002d). Because of this, IS auditing is recognized as a critical process in the COBIT (ITGI, 2007) and ITIL best practice frameworks ITIL (2011).

In summary, the events of the past decade surrounding corporate governance have spurred interest in how to measure and positively influence the quality of IS auditing, especially internal IS auditing. The need for increased understanding of IAF quality was recently highlighted by the 2007 IIA study (IIA, 2007) which showed a large majority of IAFs worldwide struggling to find qualified internal auditors.

Research on internal audit quality has been guided by professional standards. For example, SAS No. 65 (IIA, 2009) describes IAF quality as comprised of the following three characteristics:

1. "Competence" (e.g., educational level, certification, experience, etc.);
2. "Objectivity" (e.g., reporting relationship, partly responsible for IAF employment decisions); and the
3. "Quality of work performance" (e.g., adequacy of audit programs, clarity of the audit objectives, scope of work to be performed, etc.).

Similarly, IIA standards describe IAF quality as consisting of "proficiency", "due care", "independence", and "objectivity" (IIA, 2009). The PCAOB defines objectivity as the "organizational status of the internal auditor and organizational policies affecting the independence of the internal auditor" (PCAOB, 2007). The IIA defines independence as the foundation and perhaps the most critical factor in establishing the stature of the internal audit function (IIA, 2001a; IIA, 2001b).

RELATED EMPIRICAL RESEARCH

The above professional best practices have spurred academics to empirically validate them and/or use them to ground other types of empirical research. Of paramount importance is identifying a comprehensive set of measurable critical success factors for high quality audits (e.g. See Merhout, 2008; Mutchler, 2003; Gramling, et al. 2004). There has been some limited academic research ranking the importance of the above factors mentioned in the professional best-practice literature. A few studies have suggested that competence is the most influential such factor, followed by objectivity and the quality of the audit objectives (Edge & Farley 1991; Desai, 2010). Others have concluded that objectivity is not as influential as are audit objectives and competence (Brown, 1983; Schneider, 1985a; Margheim, 1986). A few studies have investigated influences on the "objectivity" of internal auditors (e.g., Ahlawat & Lowe, 2004; Brody & Lowe, 2000).

Desai et al. (2010) develops an interesting model for assessing the quality of the IAF that includes interaction effects among competence, independence, and audit objectives (See also Krishnamoorthy, 2002). Another interesting study indicates that the following six constructs are the most important specific measures (Merhout et al., 2008).

1) Audit method;
2) Sufficient time allowed for the audit;
3) Support from the client and management;
4) Client relations;
5) Client organizational stability; and
6) Clear scope and objectives for the IS audit.

That study also provides a useful general categorization of audit quality influencers often discussed in the literature (See Table 1).

Table 1: Categories Of Influences On Audit Quality From Merhout (2008)
IT Audit Personnel Social & Interpersonal Factors
Audit Team Factors
Audit Process &Methodology Factors
Client-Controlled Organizational Factors
IS Audit Personnel Technical Competency Factors
Enterprise & Organizational Environment Factors
IS Audit-Controlled Organizational Factors
Target Process or System Factors
Quality of Overall Governance Factors

RESEARCH METHOD

Because we could find no recent research on the incidence of specific types of negative influences on auditor objectivity, nor empirical research confirming recent general findings; we conducted a survey which asked auditors about their experience with specific cases of negative influences on their audit quality. (See Appendix A for actual survey questions.) In addition it asked auditors to rank factors (mentioned in prior literature) that have influenced their audit objectivity. Our research questions are shown in Table 2.

Table 2: Research Questions	
1.	Is a lack of auditor independence widespread among internal auditors?
2.	Does the internal audit profession suffer from a self-image problem because of a perceived lack of independence?
3.	Are there predominant interests that conflict with auditor objectivity? If so, what are they?
4.	Are instances of internal audit incompetence widespread?
5.	Which of the following has the most influence on internal audit quality?
	a. degree of auditor independence
	b. degree of auditor competence
	c. clarity of audit objectives
	d. time allowed for the audit
	e. degree of cooperation from the client
	f. the particular audit method used
	g. client organization stability

These research questions were operationalized by one or more survey questions with different wordings. To avoid responder fatigue, easier survey questions were interspersed with harder ones. We chose survey as our data collection method because it has been shown the most cost-effective way of collecting data on a large number of projects (Keil et al., 2003). Our survey design was that of Dillman's Total Design Method (Hoddinott & Bass, 1986). Our sample was professional auditors with extensive IS experience. The target pool of responders was the

approximately one thousand members of the Houston ISACA chapter. We designed the survey so it could be completed in less than ten minutes: most questions were simple choices and rankings. It was conducted under the auspices of the ISACA Academic Advocates program, and a link to the survey was posted on the international ISACA research site. The Houston chapter secretary emailed a survey link to the chapter members. Our response rate was 10%.

To increase the reliability of the survey instrument, each research question was operationalized by multiple survey questions. The first survey section defined the following (possibly ambiguous) terms: C-Suite, audit quality, objectivity, and auditor independence. Some demographics of the sample are highlighted in Table 3.

Table 3: Survey Responder Demographics	
More than five years professional auditing experience	100 %
More than five years professional internal auditing	90 %
More than five years professional external auditing experience	20%
More than five years professional information systems auditing	85%
CISA certified	90%
CIA certified	50%
CRISC certified	33%

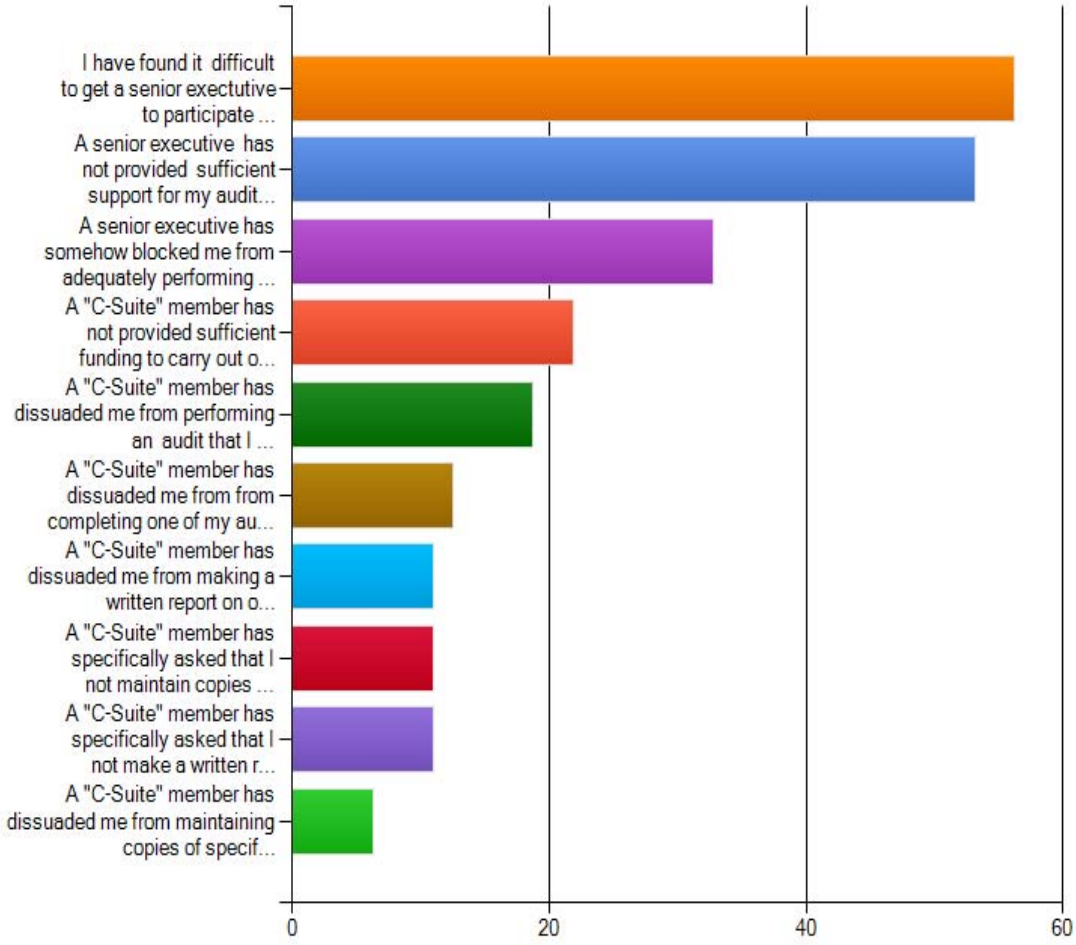
Our responders were about twice as likely to have extensive internal audit experience as they were to have external audit experience.

RESULTS AND DISCUSSION

Internal Auditor Independence

We operationalized the research questions bearing on audit independence with two different survey questions. Question 6 asked if auditors had experienced at least one situation when they were interfered with by their audit client or their chain of command (See Figure 1): our results offer little support for the claim that the internal audit profession suffers from a widespread lack of independence. The situations asked about varied from general behaviors to specific ones. As you can see, the percentages of incidents reported varied from about 5% to 55% depending on the specificity of the behavior asked about. As would be expected, the most general interference behaviors were experienced most often. To gauge the reliability of this finding, Question 18 asked if auditors felt *sufficient independence* more than 50% percent of their career. About 80% reported yes.

Figure 1: Audit Interference Behavior
(by frequency %)
(Survey Question 6)



What can we conclude from these results? They suggest that the likelihood that internal auditors will be interfered with by either their chain of command or their client is less than 55%. However, we can't therefore infer from this that a lack of auditor independence is not more widespread, for the following reason. Most of our respondents were then (or had been) primarily internal auditors. Thus, fearing a possible lack of anonymity in a small sample internet survey, many may have been reluctant to complain about colleagues or their chain of command. Future research is needed to pinpoint how widespread specific incidents of interference with internal audits are. Such research should control for response bias.

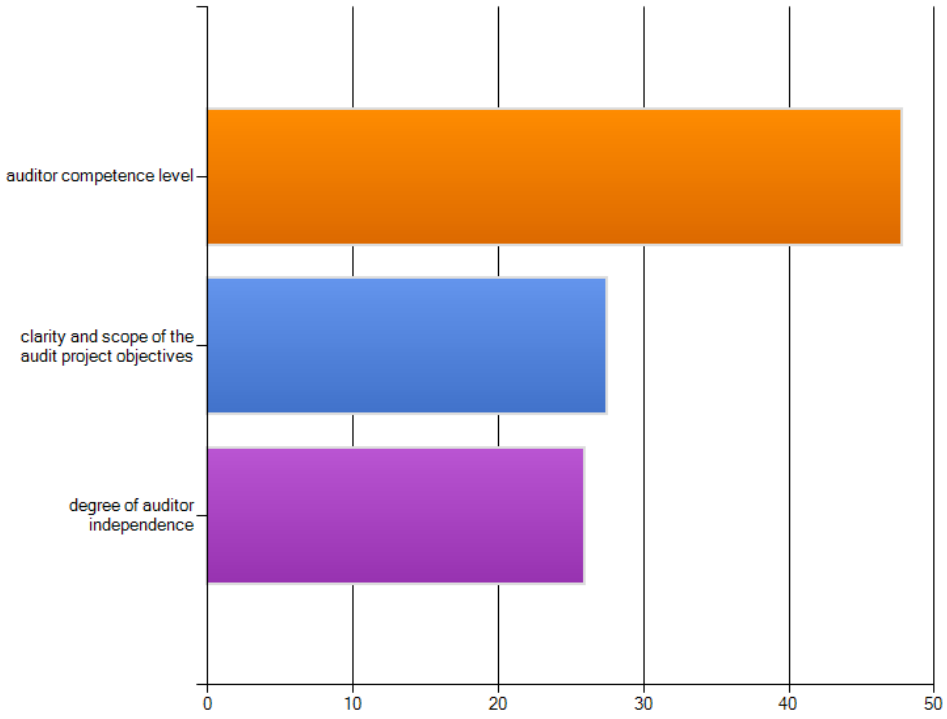
Questions 16 and 20 help confirm prior research suggesting that, due to a perceived relative lack of independence, the internal audit profession does have a self-image problem.

Significantly more responders reported feeling more independence and prestige when performing external as opposed to internal audits.

Most Important General Influences on Audit Quality

Another set of survey questions dealt with auditor rankings of factors we found mentioned in the literature review. Survey Question 22 asked responders to rank competence, audit objectives and independence. They ranked independence significantly less influential than either competence or audit objectives (See Figure 2). Furthermore, they ranked competence significantly more influential than either audit objectives or independence. As a reliability check, Question 17 asked the auditors to rank independence against time, client support, audit objectives, audit method, client stability. Again independence ranked among the least two important factors (See Figure 3).

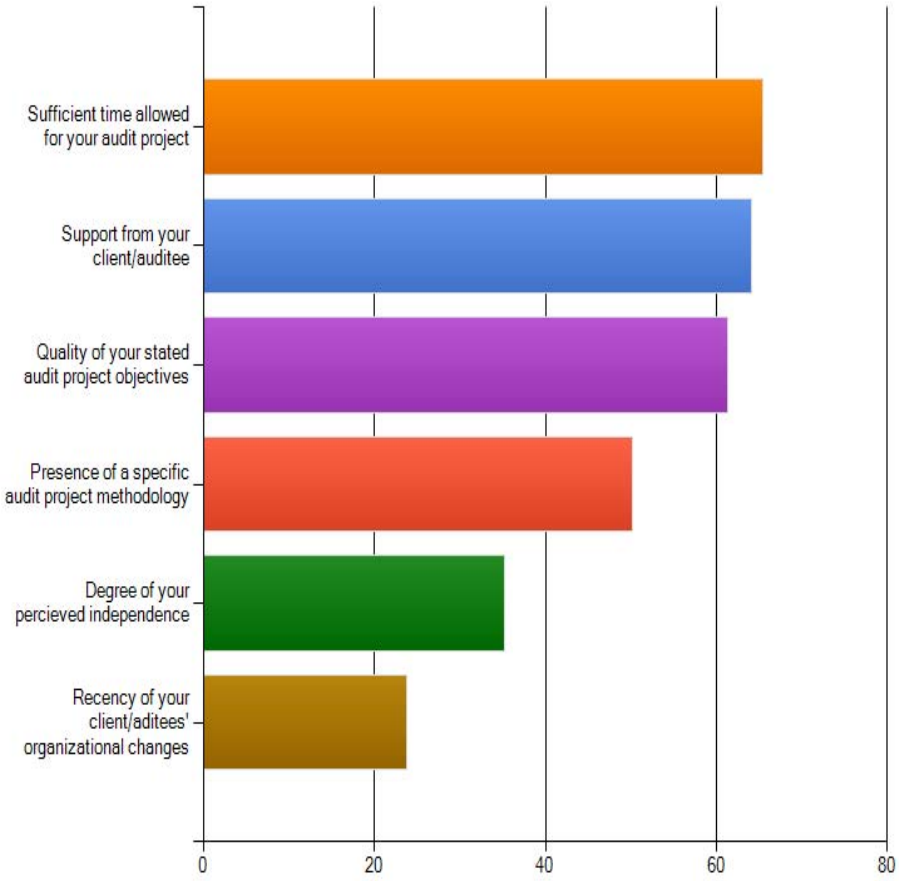
Figure 2: Most Influential Audit Quality Factor
(rank by %)
(Survey Question 22)



However we caution against concluding that independence is not an important influence on audit quality, or that internal auditors in general feel they have sufficient independence. On the other hand, combing our results with previous literature, we can conclude that there are many

other important factors affecting audit quality, including the time allowed for the audit, and cooperation from the audit client.

Figure 3: Other Influences On Audit Quality
(rank by %)
(Survey Question 17)



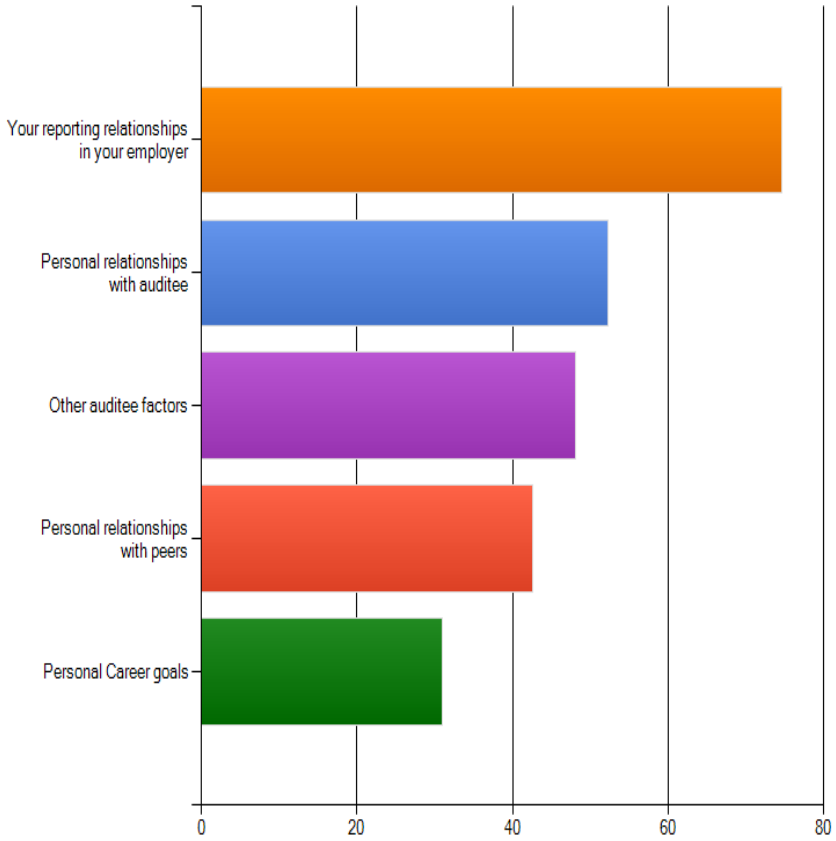
Auditor Competence

Survey question 8 operationalized the research question about auditor competence. To avoid a possible response bias resulting from asking about their own competence, auditors were asked about that of the chain of command. Almost half reported their audit quality had been negatively influenced by an incompetent chain of command. But when asked if they had suffered from this more that 25% of their career, only about 1/5 said they had. Again we must caution against concluding that auditor incompetence is not more widespread than this, because of a possible response bias resulting from the anonymity issue in a small sample Internet survey.

Auditor Conflicts of Interest

Two of the survey questions (7 & 21) dealt with possible conflicts of interest interfering with auditor objectivity. As you can see in Figure 4, responders were significantly more likely to rank reporting relationships to their employer as having the *most influence* on their audit objectivity. However they were also significantly more likely to rank personal career goals as having the *least influence* on objectivity. In addition, they were largely unwilling to admit ever personally putting their employers' interests ahead of their audit objectivity.

Figure 4: Conflicts Of Interest
(rank by %)
(Survey Question 21)



These results are difficult to interpret; possibly indicating the presence of a response bias reflecting reluctance to admit to a "personal" lack of objectivity. However they certainly reflect that the relationship between career goals, reporting relationships and audit objectivity is

psychologically and socially complex. We feel that firm managers should design incentive systems that take these complexities into consideration.

Classical economists viewed incentive systems and audits as the primary vehicles to reduce conflicts of interests *between employees* (Jensen et al., 1976). However many of those leading economists came to believe it was the failure of managers to adequately understand conflicts of interest *within single individuals* that have led to the demise of many of the "crown jewels of corporate America" because of the inadequate internal control systems managers designed (Jensen & Meckling, 1990). However since then economists have broadened their view of rationality to include conflicts of interest within a single individual. The key point is behavior that may be appear irrational to managers may be so only because of their failure to understand conflicts of interests within each employee (Brennan, 1994; Jensen & Meckling, 1990, 1993, 1994, 1995; Jensen, 1995; Schneider et al., 2003; Thaler, 1981).

Jensen and Meckling (1994) provide a nice summary of two modern economic models of human behavior -- REMM (Resourceful, Evaluative and Maximizing) and PAM (Pain Avoidance Model). REMM offers an "economically rational" normative model. On the other hand, PAM is a more descriptive and psychological model, which can account for seemingly irrational behavior. Examples of such behavior include: the tendency of people to overrate themselves in rankings of their peers, the consistent overconfidence people exhibit in their judgment, the common refusal of people to welcome feedback on their errors, and perhaps even the tendency for the auditor response biases we may have seen our study (Argyris, 1990, 1991, 1993; Brenan, 1994; Kahneman et al., 1988; Thaler, 1981).

Clinical psychological records as well as everyday observations abound with other such examples where people frequently reject new ideas and new data to serve better their own conflicting interests (Jensen & Meckling, 1994). The economically rational argument for this non-optimal behavior is that individuals' "current visions of themselves and the world have the power to change, if only temporarily, their perception of *goods*." (Jensen & Meckling, 1994). The common psychological explanation for this type of "irrational" behavior is that peoples' responses under conditions of fear are founded in the brain's "fight or flight" response. This can occur when people are faced with information that threatens to change the paradigm through which they view reality (Argyris, 1990, 1991, 1993).

SUMMARY AND CONCLUSIONS

In summary, since the passage of the Sarbanes-Oxley Act of 2002 (SOX) after the Enron, Tyco, and other corporate scandals; there has been increasing public interest in measuring the quality of corporate governance, which in turn has focused much more attention on the major factors influencing information systems (IS) audit quality. Although there are economic market forces that reward low cost firm monitoring, the main concern about monitoring via internal auditing has always been if it could be sufficiently independent. Since

the passage of SOX there have been few empirical studies investigating the extent of specific instances of internal auditor interference, and the relative influence of other major factors affecting internal audit quality today. Such an investigation was the primary purpose of the research presented in this paper.

Our first research question asked if a lack of audit independence is widespread among internal auditors. Our results show that only 10% to 20% of our responders reported at least one *specific* type of incident where their independence was threatened (See Figure 1). For example: "A C-suite member has dissuaded me from retaining copies of specific audit papers". However about half our responders reported at least one instance of a *general* type of interference, such as for example, "A senior executive has not provided full support for my audit."

Our second research question asked responders to rank factors commonly mentioned as having influence on audit quality. Auditor competence, time allowed for the audit, and clarity of the audit objectives were ranked the most influential. See Table 4.

Table 4: Most Influential Factors Said To Influence Audit Quality
auditor competence
clarity of audit objectives
time allowed for audit
client support

The most interesting result is that audit *independence was not among the most influential* factors on audit quality.

Another of the research questions was if the internal audit function suffers from a self-image problem caused by a perceived lack of independence, as reported in some previous research (Merhout, 2008). The results indicate that yes, that is the case: a significant majority of the auditors reported feeling less independence and less prestige when performing internal as opposed to external audits.

Implications for Practice

This study's primary contribution to the practice of IS auditing is the evidence it provides concerning the relative importance of allowing sufficient time for the audit, and ensuring that stated audit objectives are of high quality. Thus, we feel that audits could benefit from putting them under control of a formal project management system.

The results offer little support for the claim that the internal audit profession suffers from a widespread lack of independence, or that the internal audit industry is not benefitting from the best practices regarding reporting relationships published by the IIA (See IIA, 2002b.). Finally, practitioners could benefit by examining the following list of critical success factors that we

found (See Table 5.) when reviewing the literature prior to conducting our survey (See Sarens et al., 2009).

Implications for Future Research

Future researchers in audit quality should realize the literature is now converging upon the major influences on audit quality collected via auditor surveys (See Table 4). What is now needed are case studies, lab experiments and/or surveys of senior executives, share holders or board members. Research should concentrate on identifying multivariate models that can account for interaction effects among these factors (Desai et al., 2002). In addition, we feel future research should confirm if in fact the internal IS audit profession suffers from a self-image problem, and if so, what precisely is the cause? Our results did not offer strong support that a lack of independence is the cause.

Table 5: Critical Success Factors For Audits (from Sarens et al., 2009)
Does an internal audit operating manual exist?
Does the IAF use a risk-based audit plan?
How frequently does the IAF update the internal audit planning?
Does the IAF facilitate risk and control self-assessments?
Does the IAF conduct client satisfaction surveys?
Does the IAF use computer-assisted audit techniques?
Does the IAF comply with the IIA Standards for the Professional Practice of Internal Auditing?
Does the IAF have a quality assessment and improvement program in place?
More specifically, does a clear and consistent risk management philosophy exist?
Did the organization define its risk tolerance?
Did the organization communicate clear ethical values?
To what extent are the board of directors, audit committee and senior management, both risk and control minded?
Is everyone in the organization aware of the importance of risk management and internal control?
Has the IAF recently been subject to an external quality assessment?

Furthermore, future researchers should realize that the meaning of internal IS auditing has changed significantly since SOX passed, mainly driven by evolutions in corporate governance (Bailey et al., 2003). Because of this evolution, argues G. Sarens, one of the leaders in modern IS audit research, more studies are needed to examine how IAF quality relates to corporate governance quality (Sarens, 2009). (See also Cooper *et al*., 2006; Hass *et al*., 2006; Allegrini *et al*., 2006; Sarens & DeBeelde, 2006a; Paape *et al*., 2003; and Gramling *et al*., 2004.) Interestingly, Christopher *et al*. (2009) argues that too much involvement of senior management in the internal audit planning could have a negative impact on IAF independence, suggesting that perhaps there is some optimum level. Other interesting research questions related to corporate governance quality are issues such as who should have responsibility for the

governance of internal auditing? For example, should it be the CFO, the COO, Board Audit Committee or the CEO? Other related unresolved issues are as follows:

1. Who should approve the audit charter?
2. Who should hire and fire the CAE?
3. Who should set CAE compensation levels
4. What percentage of the internal audit activities should be outsourced?

These questions could be explored well via surveys. Another relatively unexplored area is the effect of corporate risk and control culture on IS audit quality (Sarens *et al*., 2009; Bariff, 2003). Another good research question is whether the use of advanced auditing methods has a positive impact on IAF quality? (See Allegrini & D'Onza, 2003; Melville, 1999).

In conclusion, economists have "broken open the black box called the *firm"* and explained how audits arise from the inherent conflicts of interest among the parties to the firm, which "doesn't maximize in a simple sense" (Jensen & Meckling, 1993). On the other hand, psychologists and psychiatrists have opened the black box called the *individual* and made us aware that self control problems can prevent the *individual* from maximizing the way economists assumed for 200 years (Jensen & Meckling, 1994).

Business scholars must now provide guidance that tailors the institutional structures managers create to increase inter-firm cooperation and the benefits we reap from it. A better understanding of audit quality is one of the most important parts of this effort. We feel this paper has provided some of that, but the generality of its results is limited to some extent.

Limitations of the Study

Because our research used only proxy measurements consisting of self-reported beliefs, the conclusions drawn herein must be interpreted with caution. Admittedly, the method raises the possibility of bias and/or error in the data set. It is conceivable the responders were reluctant to report their own less than admirable work habits, and also reluctant to cast aspersions on the profession and/or colleagues. This study's data may have been more reliable had it been gathered from specifically characterized individual projects, rather than a broad brush survey. However, we did not deem such an approach appropriate or necessary for this type of exploratory study. Furthermore, there is very likely an interaction effect between audit experience level and various auditor perceptions. However the dataset to which our funds limited us was not large enough to draw any such conclusions. Further, as was the case in Keil et al. (2000), our method did not allow us to control for non-response bias. Finally, because the study relied on memory of past events, the results could be affected by subject recall bias. However the same research method has been used in similar research (i.e., Keil et al., 2000) and we know of no effective methods for avoiding this bias. Despite these limitations, we believe the

research presented provides important original contributions to the field of information systems auditing research.

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APPENDIX

This survey should not take more than five minutes. It has about 20 questions. Your progress is indicated by the above bar. It's a national survey of professional auditors like you that examines factors influencing the quality of audit results, especially audit objectivity. This is a very important area of research in discovering means to improve the effectiveness of the information systems audit function, especially internal audits. This is a joint effort of the University of Houston Downtown, and the Houston Texas Chapter of the Information Systems Audit and Control Association. We thank you very much for your help in completing this important survey.

Best regards,
Dr. M. Keith Wright, Associate Professor
Department of Enterprise Information Systems
University of Houston Downtown
Houston ISACA chapter member

Your answers to the survey questions will be recorded and secured anonymously unless you provide your email address. Should you need to exit the survey before completing it, you can do so without losing your completed answers. However, you are allowed only one completed survey entry.

I have read and understood the above ground rules.

I have more than three years of fulltime experience as a professional auditor. (You must have at least this experience level to fully participate in the survey.)

For purposes of this survey please assume the following definition of terms:

"Audit opinion quality" is defined as that which results from a combination of the following three attribute categories:

I. the quality of audit objectives; which is defined as the adequacy of audit programs, the clarity of the audit charter, the scope of work to be performed, etc.

II. auditor competence; which is defined as auditor educational level, experience, certifications, etc.

III. auditor independence; which is defined as the objectivity resulting from an appropriate auditor chain of command.

From IIA Standard 1100:

INDEPENDENCE is the freedom from conditions that threaten the ability of the auditor to carry out audit projects in an unbiased manner. For example, an "independent" internal auditor is one that likely reports to a chief audit executive who has direct and unrestricted access to senior management and the board via a dual reporting relationship.

OBJECTIVITY is an unbiased mental attitude that allows auditors to perform engagements in such a manner that they believe in their work product and that no quality compromises are made. Objectivity requires that auditors do not subordinate their judgment on audit matters to others.

"Senior executives" are defined as those executives not part of the "CSuite". A "CSUITE" member is defined as any of the following:

Board of Directors member; Chief Operating Officer; Chief Financial Officer; Chief Information Officer; Chief Security Officer

I have read and understood the above definitions. (You may return to this page for review.)

1. Please indicate whether or not you have EVER experienced any of the situations listed below.

I have at some time made an audit assessment that was more reflective of my employer's best interest than of my professional objective opinion.

I have at sometime reported to an audit management chain of command whose competency level prevented me from issuing high quality audit opinions.

For more than 25% of my career I reported to an audit management chain of command whose competency level prevented me from issuing high quality audit opinions.

Audit situational characteristics

I have found it difficult to get a senior executive to participate in my audit.

A "CSuite" member has dissuaded me from performing an audit that I recommended.

A "CSuite" member has dissuaded me from completing one of my audits.

A "CSuite" member has dissuaded me from making a written report on one of my audits.

A "CSuite" member has dissuaded me from maintaining copies of specific audit workpapers.

A "CSuite" member has not provided sufficient funding to carry out one of my audit programs.

A senior executive has somehow blocked me from adequately performing an internal audit.

A senior executive has not provided sufficient support for my audit function.

A "CSuite" member has specifically asked that I not maintain copies of specific audit work papers.
A "CSuite" member has specifically asked that I not make a written report on one of my audits.

Please mark one:

Your audit background	< 5 years	5 10 years	10 15 years	> 15 years
Please enter your level of experience as a fulltime professional INTERNAL auditor				
	< 5 years	5 10 years	10 15 years	> 15 years
Please enter your level of experience as a fulltime professional EXTERNAL auditor				
	< 5 years	5 10 years	10 15 years	> 15 years
Please enter your level of experience as a fulltime INFORMATION SYSTEMS auditor				
	< 5 years	5 10 years	10 15 years	> 15 years

Please indicate all your college or university degrees.
University Degree in Accounting
University Degree in Information Systems
University degree in Computer Science
Any university degree

On the following alphabetical list, please select your professional certifications.

CGEIT; CIA; CISA; CISM; CISSP; CPA; CRISC; ITIL; MCSE; PMP; None of these; Other (please specify)

You feel that the quality of information systems audits would be materially reduced should the SarbanesOxley regulations be repealed. Agree Disagree No Opinion

In general, you feel it is more prestigious to perform: Internal Audits External Audits

Please rank in general how strongly you feel the following factors have influenced (negatively or positively) the quality of your resulting audits.

Presence of a specific audit project methodology	Least effect	Most effect
Sufficient time allowed for your audit project	Least effect	Most effect
Support from your client/auditee	Least effect	Most effect
Recency of your client/aditees' organizational changes	Least effect	Most effect
Quality of your stated audit project objectives	Least effect	Most effect
Degree of your perceived independence	Least effect	Most effect

On more than 50% of your INTERNAL audit projects you have felt sufficient independence to issue substantially objective opinions. Agree Disagree I have never performed internal audits

On more than 50% of your EXERNAL audit projects you have felt sufficient independence to issue substantially objective opinions. Agree Disagree I have never performed external audits

In general you have felt more audit independence when performing: External audits Internal audits

Please rank in general how strongly you feel the following factors may have negatively influenced the degree of overall objectivity you have been able to bring to bear on your audit opinions.

Personal Career goals	Least effect	Most effect
Personal relationships with auditee	Least effect	Most effect
Other auditee factors	Least effect	Most effect
Personal relationships with peers	Least effect	Most effect
Your reporting relationships in your employer	Least effect	Most effect

Please rank your perceived importance of the following factors to overall audit quality. (Remember that you are to use the following definitions of terms:)

1. The "quality of audit objectives" is defined as the adequacy of audit programs, the clarity of the audit charter, the scope of work to be performed, etc.
2. "Auditor competence" is defined as auditor educational level, experience, certifications, etc.
3. "Auditor independence is defined as the objectivity resulting from an appropriate auditor chain of command.

auditor competence level	Least important	Most important
clarity and scope of the audit project objectives	Least important	Most important
degree of auditor independence	Least important	Most important

Do you feel that the SarbanesOxley regulations should be repealed? Yes No

Auditors at some time make an audit assessment more reflective of their own best interests than of their professional objective opinion. Yes No

Please enter your level of experience as a fulltime professional INFORMATION SYSEMS Auditor

< 5 years 5 10 years 10 15 years > 15 years

Please mark the primary market sectors you have worked in.

local government; national government; health care; oil; transportation; finance; insurance; Other (please specify)