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Intuition Engineering

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Abstract
This article capsulizes a doctoral dissertation focused on the relation of intuition and leadership. The study shows a systematic and statistically significant relation of leadership position with the Relational Innovator (RI) and Reactive Stimulator (RS) strategic styles.

The theoretical implications and strong statistical results carry major implications for multiple areas of human capital research. Leadership, creativity, organizational design, training, and career development are among the areas likely to benefit from the discoveries outlined in this article.

Engineering Intuition

Dr. Ashley F. Fields

Introduction

Intuition is one of the more mysterious concepts associated with the study of human capital. Classical theoreticians, from Carl Jung (1934) through Chester Barnard (1938) and Abraham Maslow (1954), have commented on the existence and value of intuition in organizational settings. More recent researchers, such as Harold Leavitt (1975), viewed intuition as a valuable weapon to be used against the heavily analytical practices in vogue at the time, which gave rise to his derisive term "analysis paralysis."

Attempts to define and measure the workings of intuition continue to the present day. The prolific Weston Agor (1997), as well as newly minted students such as C. Brown (1993), continue to offer new research findings and alternative explanatory paradigms. Fascination with the subject of intuition remains alive and well.

One feature common to all of these authors, however, is an inability to articulate a coherent, consistent, and verifiable theory of what underlies the intuitive phenomenon. These researchers unanimously declare that "something" really exists, but they cannot agree on just "what" exists or "why" it works as it does.

Organizational Engineering (OE) offers a new perspective on intuition. It looks at intuition as "a phenomenon arising naturally from an information processing/decision making method and mode employed by individuals." (Fields, 2001, p. iv). Using OE insights lifts the cloak of mystery surrounding intuition, and its mechanisms are made available to anyone with a need for intuitive capacity.

Background

Attempts to define and harness the mechanism of intuition are as old as recorded history. It is embodied in the popular mind as a "sixth sense," while the ancient Chinese "I Ching" used intuition as an interpretive tool. Immanual Kant (1781/1990), one of the great philosophical thinkers of the last 300 years, considered intuition less a concept than part of a process, an essential component of acquiring knowledge.

Intuition is usually defined as "knowing or sensing something without the use of rational processes." (Encarta, 1999). Alternatively, it has been described as a "perception of reality not known to consciousness in which the intuitive knows, but does not know how he knows" (Clark, 1973).

These definitions impose formidable, if not impossible, burdens on a researcher. Essentially, one wishing to study or measure intuition would be attempting to use rational methods to pursue a seemingly non-rational subject. The result of such study is a quagmire of speculation, offered without benefit of a direct, causal theory.

Vaughan (1979) is one of the earliest to research intuition as it applies to human capital. She viewed mental intuition (as differentiated from three other types) as caused by an unconscious (and unspecified) form of pattern recognition. The implication is that intuition is available to anyone who masters the undefined pattern recognition techniques.

Westcott (1968) takes another posture. For him, intuition is a process in which "an individual reaches a conclusion on the basis of less explicit information than is ordinarily required to reach that decision" (p. 100). In other words, Westcott redefined intuition as a rational process, albeit one based on fewer data and a weaker rationale.

Weston Agor, perhaps the most prolific and long-enduring researcher in this field, holds an opposite position from the above two researchers: he relied on Carl Jung's personality-based theory and Hermann's (1981) left- and right-brain theory as bases to guide his research. These psychological theories posit that intuition is a "built-in" capacity that some of us have and some do not.

The literature surrounding intuition and human capital research extends well beyond these main themes to embrace far more speculative viewpoints. For example, ESP has been proposed as accounting for the difference between extraordinary and merely competent managers (Dean, D., Mihalasky, J., Ostrander, S., & Schroeder, L., 1974).

To summarize, this "snapshot" of the literature suggests the diverse range of intuition theory and research. These multiple theories, all stemming from a psychological approach, coexist because no definitive test can be designed to disprove any of them. Such an approach has given birth to an embarrassment of options—all equally viable and all equally sterile.

Although the causal paradigm used by these researchers might be questioned, their academic integrity and scholarship is not. They "see something" but it lies outside the boundaries of ordinary psychology.

Other Research

Much research has attempted to demonstrate the existence of "something" that is correlated to effective management. Isenberg (1984), for example, who studied managers in Fortune 500 firms, found that they combined both rational and intuitive methods in decision-making.

Parikh (1994) studied more than 1300 managers and found that intuition is "cross-national" and contributes to business success. He also found that intuition is especially important in areas like R&D, marketing, and corporate strategy.

Brown's (1993) earlier findings were consistent with Parikh's finding of intuition's value in successful marketing. He found that 43% of subjects would have improved their prediction of consumer response had they relied more on their intuition.

Catford's (1987) study of 57 business professionals demonstrated that intuition was used commonly as a business tool. Further, Catford found that experience did not drive subjects' intuitive abilities, which suggests that intuition is not a learned capacity.

In summary, these and many other researchers have demonstrated that intuition is used regularly in the conduct of business (Fields, 2001); that individuals demonstrating strong intuitive capacity tend to cluster in certain functions; and that their intuitive capacity is cross-national in scope.

Like the psychological theoreticians, the human capital researchers have not shown "what" intuition is or "why" it works as it does. Organizational Engineering can do both.

The Organizational Engineering Solution

Organizational Engineering views intuition as a natural component of a particular information processing strategy. Anyone who adopts that strategy will exhibit behavior that psychologically oriented researchers would attribute to intuition. Psychology is not needed, however, to explain "what" is happening or "why."

The process powering intuition rests in method and mode used by all life forms capable of information processing—including humans. Like all fundamentals of nature, the process is simple. Intuition occurs with an unpatterned processing method, which automatically creates a reservoir of unexpected options. The unpatterned processing method (the input side of the equation) "grabs" whatever information entering consciousness that might be applicable to an issue in question. A portion of these options will represent

new, previously unrecognized relationships—a simple probabilistic outcome. This is the basic "feedstock" for intuitive insights.

Then, a thought-based mode (the output side of the equation) converts the reservoir of possibilities into insights. This conversion involves taking the "feedstock" of ideas and weaving a theory which can be applied to resolve the issue at hand.

Most of the attempts at linking an idea with the issue will fail, but the cost of idea acquisition by the unpatterned process is cheap. Because there are no standards for accepting ideas, the supply is unlimited. The person only has to continue processing—and sooner or later, by the operation of chance alone, a new relationship will be discovered.

A portion of the new relationships will be unexpected and will not be arrived at through "logic". In these cases, an "intuitive" insight will have been created. No magic, no mystery—just simple information processing interacting with the laws of chance.

Those schooled in Organizational Engineering will instantly recognize the unpatterned method and thought mode described above as the strategic style of what OE calls the Relational Innovator (RI). The degree to which an individual favors this style will determine their "intuitive" abilities.

However, just because intuition is available does not mean that it will be demonstrated. Observation requires display. The more frequently an individual displays intuition, the greater the likelihood others will recognize them as "intuitive." Another of the OE strategic styles, the Reactive Stimulator (RS) makes the intuitive process visible to the world.

The RS combines the unpatterned method favored by the RI with an action mode. In other words, one who favors an RS strategy is comfortable dealing with weakly specified ideas. Unlike the RI style (unpatterned method and thought mode), the RS favors an action mode and is inclined to actually apply an idea in an attempt to resolve the issue at hand. Action thus provides visibility for intuition.

The net result is that people who favor the RI/RS information processing strategies will tend to have more intuitive experiences and will be perceived by others as being "intuitive". Because the RI and RS styles are the least represented in the general population, intuition is considered to be a somewhat "rare" phenomenon. Again, however, no magic, no mystery—just simple information processing styles interacting with the laws of probability.

An Example

An example may help illustrate the process. Imagine that you are a consultant who has just lost a client who accounted for 60% of your business' income. You have a payroll to meet, a landlord to pay, and bills are arriving daily. You have an issue to address. How do you do it?

One option is to use a structured approach. Here, you might begin by carefully evaluating exactly where you stand. You might then lay out a choreographed strategy to cut expenses while simultaneously launching a marketing effort among past clients. This con-

sidered and measured approach—if successful—will land you in a known and comfortable place, i.e., restored cash flow and monthly income.

Another option is the unpatterned RI approach. Here, everything around you begins to generate ideas. You glance at a light, which reminds you of Wile E. Coyote chasing the Roadrunner in a cartoon (no reason; it just does). This brings publishing to mind, then an idea to publish a book on rocketry to perhaps generate some income. No logic, just ideas viewed and grabbed or released as they pass by.

If you are also an RS, you might get on the phone and begin calling publishers to see whether you can secure a book advance to buy some time. No plan—just ideas and execution. The bet is that sooner or later, something will work.

If an idea does not work to solve the problem, you discard it and go on to the next idea. Ideas are cheap using this strategy and execution is "fast and dirty." Failures are quickly forgotten because little is invested in either idea creation or execution. An observer sees a flurry of disjointed—and unmemorable—activities.

It is important to note that neither strategy, structured or unpatterned, is "right" or "wrong". Both can fail to solve the problem. The structured approach "bets the house" on a carefully considered approach, and great effort is made to insure that the "bet" wins. The unpatterned strategy has a much greater chance of failure, but is much faster. In the same time period that the structured approach may complete one cycle, the unpatterned alternative may complete ten. Thus, if the unpatterned alternative were only 10% as likely to work as the structured method, it would nonetheless hit a solution within the same time frame as the structured approach.

While both strategies may have the same probability of outcome, the nature of the outcome is markedly different. The structured strategy is rational. If it works, the outcome appears totally plausible and consistent with the actions taken.

The unpatterned strategy, however, is likely to yield unexpected results. For example, if the book publishing option worked, an outside observer might wonder how losing a client led to the problem solving strategy of publishing a book? And why a book about rocketry? You yourself would probably have a hard time explaining the sequence , even if you could remember the light bulb and Wile E. Coyote. You would likely just say, "Don't know. It just came to me." The observer might then correctly conclude that you used intuition to save your business. You will have become an "intuitive."

The point of this example is that "intuition" is a natural attribute of an information-processing style. Anyone adopting that style will display the outcome described as "intuition".

Relation To Management

Researchers have found that managers are likely to use intuition to resolve business issues (Brown, 1993; Catford, 1987; Isenberg, 1984; Parikh, 1994). They suggest that this intuitive ability is "why" these managers are more successful than peers who remain at the lower rungs of the organizational ladder.

OE theory is consistent with these findings, but it goes much farther, explaining "why" intuitive behaviors arise. At higher organizational levels, problems arise which are less

amenable to structured approaches; only unpatterned strategies are suitable to address many of the issues confronting an organization either now or in a still-undefined future.

For example, imagine heading a soon-to-launch dot.com firm. The only numbers to analyze are derived from hypothetical market research. If you believe market research provides "real" answers, talk with Ford Motor Co. about their 1950s Edsel; massive market research was followed by complete failure in the marketplace. No one has any idea what the "real" demand for your offering will be, so how could a structured analytical approach work for problem solving or decision-making in this instance?

Would you be any better off using market research as "the facts" for a structured approach if you were a Marketing VP for a vegetable firm about to introduce a new mix of vegetables using an untried recipe? Again, market research might help, but would provide no absolute answers.

Even in naturally structured areas of an organization, such as engineering or accounting, unpatterned strategies apply, particularly at "the top". At the time of this writing, for example, Allen Greenspan, head of the U.S. Federal Reserve, is attempting to forestall an economic recession. Greenspan's organizational arena is awash with numbers and theories, a situation seemingly ideally suited to structured approaches. So, what is the "right" amount to reduce interest rates? Exactly, how much should the money supply be increased? And why can't these questions be answered simply by crunching the numbers?

The very nature of high-level organizational problem solving, with its frequent emphasis on as-yet-undefined trends, demands use of unpatterned strategies. With these strategies come behaviors attributed to "intuitive" abilities. In other words, the environment of the senior executive favors unpatterned strategies, and in using such strategies, the executive displays intuitive behaviors.

What about researchers' findings that certain organizational functions also seem to attract more "intuitives" than others? The explanation is the same as why "intuitives" rise to the top levels of organizations. The work environment shapes the strategic profile most successful for problem solving and decision-making. Functions like R&D favor unpatterned approaches.

If you are already attuned to an unpatterned strategy, the R&D function will likely attract you. If you favor a structured strategy but find yourself in R&D, your profile will likely change or you will move to another, more comfortable area. A structured approach simply will not work as well as an unpatterned method in R&D, and you will ultimately adapt or leave. Thus, a researcher will find R&D to be heavily populated with "intuitives."

In sum, Organizational Engineering theory "agrees with" the observable findings of psychological researchers, but in addition explains why certain behaviors were found and how those behaviors can be created. In doing so, OE in effect eliminates the mystery; intuition is not "psychological" after all. It is simply a naturally occurring consequence of a particular information processing style.

Testing Organizational Engineering Theory

The doctoral dissertation (Fields, 2001) reported this researcher's test of OE theory using the database of the Organizational Engineering Institute. The study tested five hypothe-

ses covering the inferences for both managerial level and functional environments generated by OE theory.

To test these hypotheses, the OEI database was divided into four levels, from the CEO's of Fortune 50 firms down to entry-level supervisors (Table I).

Table I
Database Population

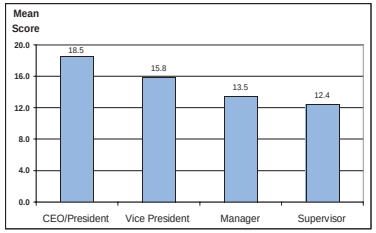
CEO & Presidents	26
Vice Presidents	93
Managers/Directors	276
Supervisors	43
General Population	8596
TOTAL	**9034**

Statistical analyses were then used to see whether expectations held true (See Fields, 2001 for a complete description of the statistical analyses).

The first hypothesis stated that use of the RI strategy (unpatterned method and thought mode) would be found to increase with hierarchical position.

Results of the data analysis are shown in Graphic 1. The RI scores increase in almost stair-step fashion with increases in organizational position. This pattern is statistically significant at greater than the p<. 001 level, which is 50 times higher than the p< .05 level typically accepted as standard in the field of study.

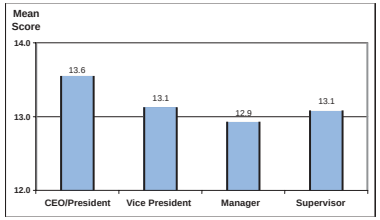
Graphic 1
Relational Innovator Scores By Hierarchical Level



This finding supports the inferences posited by OE. Either executives are being selected at least partially due to their successful use of an RI strategy, or facility with/use of the RI strategy increases as a person migrates up the hierarchical chain. In either case, "intuitive" behaviors would be increasingly evidenced with higher organizational position.

The second hypothesis stated that the action-oriented RS strategy (action mode, unpatterned method) would be found to increase with hierarchical level. This hypothesis was not supported by the data. Graphic 2 shows that the strategy does not appear to be related to hierarchical position. In other words, unlike the RI strategy, as a person rises in an organization, the level of RS strategy use does not increase. This was an unexpected finding. We expected that the RS would be needed to make the "intuitive" behaviors visible.

Graphic 2
Reactive Stimulator Scores By Hierarchical Level



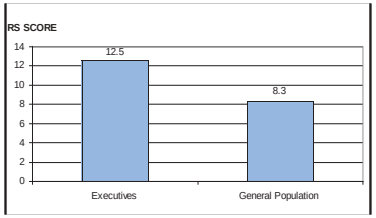
The author then decided to test whether the management population as a whole differed significantly from the non-management population. To accomplish this, the 438 management data points in the OEI database of Fortune 500 firms were compared to the 8,596 people in the general database. The results are shown in Graphic 3.

These results are statistically significant at the p< .001 level. Clearly, executives are more likely to use the "instant action" RS strategy than does the population as a whole. This finding suggests that a threshold process is in operation. In other words, the RS strategy appears to be used by individuals to gain access to leadership ranks, but once leadership status is achieved, the environment does not favor ever-increasing levels of RS strategy usage.

This speculation has intuitive appeal. To attain leadership rank, you must first be noticed. The RS strategy, with its minimal information requirements and quick response, is an ideal way to call attention to oneself. However, once attention is achieved, there appears to be no continuing advantage in taking the risks inherent with this posture.

The third hypothesis is a triangulation of Hypotheses 1 and 2. Those familiar with Organizational Engineering concepts will recognize the RI/RS posture as the Changer Pattern. Hypothesis 3 states that if the Changer Pattern is a favored management strategy, then use of its opposite, the Conservator Pattern, which is a combination of the structured Hypothetical Analyzer (HA) and Logical Processor (LP) strategic styles, should be low for study population managers.

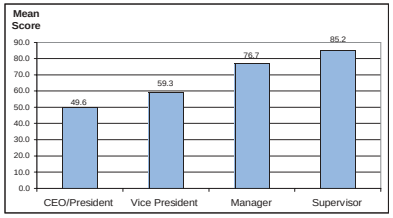
Graphic 3
Reactive Stimulator Scores of Executives vs. General Population



The reason for testing data relationships by triangulation is that high Changer values could mathematically occur with a high Conservator Pattern. All that would be needed would be low Performer and Perfector patterns. If the triangulation holds, (i.e., if Conservator Pattern scores are low), these elements of OE theory can be seen as accurately reflecting organizational dynamics.

The results of the triangulation analysis are shown in Graphic 4. Again, a clear stair-step pattern emerges, and once again, the statistical significance of p< .001 far exceeds the standards of the field. Because the highly structured Conservator Pattern would preclude "intuitive" behavior, this finding provides crucial support for OE theory relative to intuition.

Graphic 4
Conservator Pattern Scores By Hierarchical Level



These findings reproduce the findings of earlier researchers, but reveal "the bones" beneath them. The truly significant contribution of this revelation lies in the theoretical implications and not in the numbers. The OE results show that "intuition" is the simple and necessary outcome of an information-processing pattern. Anyone who adopts the pattern will display the attribute.

This finding also advances the goal Salton expressed in his seminal work (Salton, 1996), that OE theory would provide a "defined process which can be understood and used by everyone for the common good of all." (p. 6)

The fourth hypothesis tests the difference between individuals in Research & Development (R&D) and Information Technology (IT) functions. It states that R&D will have a much higher number of individuals demonstrating a Changer Pattern than will IT. As mentioned earlier, intuition researchers found differences in demonstrated intuition among the various functions within an organization (Brown , 1993; Catford, 1987; Isenberg, 1984; Parikh, 1994). This hypothesis could confirm those findings, while deepening the understanding of "why" and "how."

The reasoning behind this hypothesis is that IT is a heavily structured environment, in which any work done must conform to the demands of the machine, network, and code being used. R&D, in contrast, is an open field in which novelty is rewarded. Thus, R&D favors unpatterned strategies, while IT favors structure.

To test Hypothesis 4, the database was sorted for individuals who were specifically identified as working in one or the other area. The resulting distribution is given in Table II.

Table II
Database Population
IT and R&D Functions

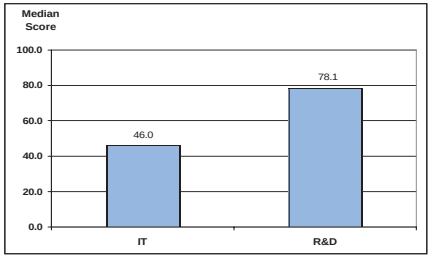
Information Technology	320
Research and Development	93
TOTAL	**413**

A Mann-Whitney test confirmed that the groups were significantly different in their favored information processing styles. Again, a significance level of $p < .001$ exceeded the standards of the field. The results of this analysis are shown in Graphic 5. As predicted, the median Changer Pattern scores for R&D personnel were found to be 70% higher than for those in IT.

This finding confirms the hypothesis that people in different functions display different levels of "intuitive" behavior. Unlike the psychological theories, OE explains this

phenomenon as the simple outcome of working in different functional environments. The same selective attraction and selective retention processes which were shown to operate in the managerial hierarchy cause the differences by function noted here.

Graphic 5
R&D And IT Changer Score Distribution



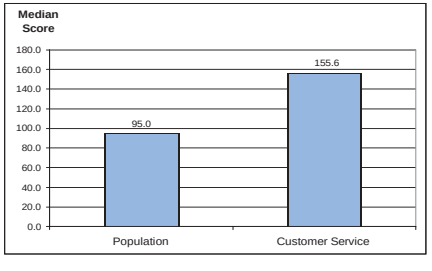
The final hypothesis, Hypothesis 5, triangulates the findings of the R&D and IT test. This hypothesis states that people working in Customer Service will systematically favor the Conservator Pattern to a greater degree than will the general database population. The distribution for the two groups is given in Table III. This triangulation tests whether the differences between R&D and IT Changer Pattern frequencies were unique to those two functions. Testing Customer Service helps gives assurance that the theory covers the spectrum of functions found in organized environments.

Table III
Database Population
Customer Service and General Population

Customer Service	475
General Population	8536
TOTAL	**9011**

Customer Service (CS) is expected to favor the Conservator Pattern, because this function is generally populated by people empowered to satisfy customer claims and demands. To standardize behavior and improve outcomes, firms typically define strict rules and guidelines for customer service representatives. This creates a structured environment that should tend to attract and retain people favoring a disciplined approach to interpersonal activities.

Graphic 6
Conservator Scores for Customer Service and General Database Population



The results of the Mann-Whitney analysis used to test this hypothesis are graphically depicted on Graphic 6.

As predicted, the CS scores for Conservator Pattern are higher than scores in the general database population, again to a statistically significant degree ($p < .001$)

exceeding the standards of the field.

This finding further strengthens the predictive value of OE theory as applied to hierarchical and functional information processing styles. In turn, the finding increases the confidence that other inferences drawn from this theory can be trusted.

Summary of Findings

This article, which summarizes the findings of a recent dissertation, has shown that Organizational Engineering can explain the phemenon of intuition, as can psychologically oriented theories (see Fields, 2001 for detailed comparisons). However, OE's explanation vastly expands both the implications and applications of that phenomenon.

The coherent and comprehensive OE theory is not simply a theory of intuition; it is a theory of human behavior. Intuition is but one behavior among many that are seamlessly, naturally woven into the repertoire of human behaviors which shape social interaction.

The instrumentation of OE offers an unprecedented degree of precision that can be leveled at additional questions on the human condition, i.e., whether, for example, humans are slaves to their heredity or able to adapt their behavioral repertoire to meet changing environmental conditions. Such questions can easily be resolved with longitudinal studies. Validation of the instrumentation and the reliability of methodology (Soltysik, 2000) allows researchers to rely on study results.

The dissertation on which this article is based demonstrated the actual and potential power of the theory. The research was able to demonstrate that intuition is connected through election of an information processing method and mode, the RI strategic style. It also showed that use of this strategy varies by hierarchical rank. These findings not only explain why individuals at higher levels display greater intuitive abilities; they also provide guidance for growing future generations of leaders. Entry to managerial ranks appears dependent on a threshold level of the RS strategic style, a finding which adds further specification to leadership development efforts.

The comparison of functions within organizations demonstrated that different environments exist which require different strategic styles as a path to excellence. The theory can identify these paths and may lead as well to identification of an optimal mix of styles within a given environment or organization to achieve specific goals.

More immediately, the discovery of differences by function demonstrates the value of diversity. "One size fits all" models can be replaced with specific interventions for specific areas with specific probability of the likely outcomes. Just as no one bridge is right for traversing all chasms, no one formula provides optimal management for the diverse functions of modern organizations. OE offers a roadmap for charting the right course in a particular situation.

Implications

Intuition is the subject of the dissertation on which this article was based. However, the implications of the research go far beyond intuition. They suggest, for example, that

leadership development may best be viewed as a staged process. An individual in an entry-level position who exhibits a CEO profile will probably never reach that position. To nurture and harness that innate talent will require a gradual and measured inculcation of RI skills.

The research findings also suggest benefits for organizational design. Demonstrating the differences between functions opens the door for optimal alignment between individuals and organizational objectives. It may be possible to construct entire organizational systems targeted at a specific mission of the firm, thereby optimizing the firm, as well as the functions that comprise it.

On a narrower level, OE theory might be used to improve performance for specific projects. Just as different functions favor different processing styles, the same may be true of problem solving required at different stages of a project. For example, the initial idea generation phase of a project might be seeded with strong RI types, while evaluation and assessment stages might benefit most from the analytical capacities of HA's. Similarly, the final specification and implementation phase of a project could be saturated with LP types, who are able to accurately specify detailed operational steps and execute them with precision. The net result could be project teams that move more efficiently and effectively toward their objectives.

Other areas that might benefit from application of OE theory are limited only by one's imagination. For example, Training and Development might use OE's insights in designing training content. Career developers might use OE to better guide young people toward positions promising greater personal satisfaction. Senior executives might benefit from designing strategies, policies, and cultures which complement, rather than conflict with, the composition of their workforce.

In conclusion, the findings of the dissertation hold considerable promise for both immediate and long-term organizational improvements. The door of the new discipline of Organizational Engineering now has been cracked open. Further research will continue to open that door, shedding even more light on our understanding and maximal use of human capital.

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