

AC 2007-2804: ENTREPRENEURIAL LEADERSHIP AND TRANSFORMATIONAL CHANGE

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Entrepreneurial Leadership: A Balancing Act in Engineering and Science

Abstract

Building on previous work, “Entrepreneurial Leadership, Gender and Teams,” multiple participants representative of private, public and academic settings were interviewed to uncover the unique features of the entrepreneurial leader in the engineering and science context. One central question organized the current work. If the entrepreneur gets everyone excited and the leader calms everyone down, does the entrepreneurial leader balance both?

This research explores the construct of entrepreneurial leadership using the following independent elements as a guide: gender as a social experience, past parental relationships, cultural roots, real time strategic risk taking behavior, capacity to predict and create cross-functional teams, and a character type that thrives on the challenge of change. Specific consideration is given to emerging dimensions and attributes influencing survival. Discussion includes: 1) ways that the entrepreneurial leader assesses the audience with precision, 2) acts on the belief that various sectors of technology drives leadership, 3) calculates the growth towards what is authentic and new, 4) expects external confrontation, 5) understands the paradox of expansion, and 6) preserves the past while launching into the future. Story and visual perspectives of the entrepreneurial leader are explored for the purpose of attracting, teaching, and assessing the global 21st Century engineer.

1. Introduction

The work reported here began with a fascination for leadership, and some observations about the characteristics and practices that link the leader and the entrepreneur. Phase I of this study drew parallels from psychological theory to entrepreneurial leadership practice in academia and business. The goals were outlined to both search for understanding ‘entrepreneurial leadership’ and potential use for that understanding to attract, teach, and assess the global 21st Century engineer. Thus the work presented is an attempt to take a closer look at the intersection of leadership and entrepreneurship through a collaborative approach of two disciplines, engineering and psychology, and to utilize the intersections of the fields to understand the role of the entrepreneurial leader in survival.

The author’s original intention in the fall of 2006 was to conduct hypothesis driven research. To do this she created, modified and revised a research design that featured ‘survival’ as the dependent variable. Multiple discussions with professors at engineering institutions that included business or entrepreneurship programs were conducted with two goals: First, she wanted to investigate a central question, “If the entrepreneur gets everyone excited and the leader calm everyone down, does the entrepreneurial leader balance both?” And she wanted to systematically compile previous and new data with a research approach that would both justify an extensive corpus of data and make sense in an innovative way. Inspired by the new approaches of the leaders that were interviewed and recognizing that the research agenda

required another step, the methodological approach shifted to address the research questions in two ways. First, the definition of the term entrepreneurial leadership is explored with an emphasis on the significance in an applied engineering and science context. And, a set of assertions are advanced, using both a psychodynamic and socio-cultural lens, to consider the key features of entrepreneurial leadership that affect the challenges of survival.

A preliminary grounded theory approach is utilized to build a model that frames the emerging attributes that feature common dimensions within descriptive story composites taken from fifty five extensive interviews. The research reported here takes step 1 in a case rather than a variable perspective, although in most examples a distinction is nearly impossible to decipher. The Film Maker, Two Deans, The Vineyard Owner, The Provosts, and the Helicopter Fighter Pilot were chosen as examples of entrepreneurial leaders from the 55 participants in the current study. Three are female and three are male. While all individuals had an engineering or science background, two are currently involved in entrepreneurial activities. Each story illustrates attributes from the 5 assertions that the researcher indicates defines the successful entrepreneurial leader.

Literature Review

The role of entrepreneurship in technological innovation and organizational growth was established early in the last century¹. A growing body of evidence indicates that the definition of leadership effectiveness is evolving and often contained in the phenomenon of entrepreneurship^{2,3,4}. The practice-oriented, popular literature gives considerable attention on how to motivate and lead members of a new business⁵ but a review of academic research suggests a somewhat different angle. The abilities and creative practices of the entrepreneur have been explored^{6,7} along with established and evolving theories of leadership^{8,9,10} yet entrepreneurial leadership has received relatively little attention^{11,12}. Most of the existing work considers leadership issues faced by the founder¹³, the entrepreneur's role in creating and transforming organizational culture to meet changing economic and global demands^{14,15,16,17}, or theories based on the unconscious influence of achievement motivation in entrepreneurial effectiveness^{18,19,20}.

Recent work has an emphasis on the link between individual traits and venture growth motivation. The creation of venture growth, however central to the understanding of entrepreneurship, alone may not be the foundation for the entrepreneurial leader's survival. Character and difficult to measure traits, like passion and vision are considered factors that empower individuals who faced entrepreneur specific challenges²¹. A revival of interest in understanding the entrepreneur's personal characteristics^{22,23} may be as much about a search for modeling the relationship between traits and situational motivation to venture growth as it is a response to a growing societal need for defining career success in engineering and science.

A focus on entrepreneurial leadership in this study contributes to the renewed interest in the effects of the entrepreneurs' personality and background characteristics, specifically communicated vision and a perceived passion for their work. It also extends recent work that

has a focus on fusing the concepts of “entrepreneurship” and “entrepreneurial orientation” and “entrepreneurial management” and “leadership”²⁴.

Although there are many ways that the leader differs from the entrepreneur research and preliminary data suggests a unique blend of both for the 21st Century workplace.

Not so subtle inconsistencies and ambiguity surface in a literature review defining both the entrepreneur and the capabilities of entrepreneur as leader²⁵.

The evidence for this unique blend includes some observable behavioral and attitudinal responses that impact success for the engineering and science student and graduate’s career path. Definitions of leader effectiveness²⁶ and analysis of the entrepreneur²⁷ restrict the possibility and availability of a unique set of dimensions in one individual. While few individuals may exist as entrepreneurial leaders, those few rise as internal organizational advocates and stars.

The author argues that these dimensions extend from observable behaviors and responses in face to face interactions (interviews, workplace meetings, day to day practice) to attitudinal reflections. It is important to note that while research has considered the more general category of the entrepreneur on situational success, research has rarely examined the unique role of the entrepreneurial leader making a contribution to engineering and science in both a real and symbolic sense. While some of the literature on entrepreneurship education sheds some insights on shaping entrepreneur studies in higher education^{28,29}, other studies disagree about the benefits^{30,31} and suggest a cautious approach. Definition of terms, content of curriculum, and controversy between skill-building vs. theory building courses remains^{32,33,34}. Effective 21st Century programs in engineering education should include the meaning of entrepreneurial leadership and explore the impact of such study on attracting, teaching, assessing, and assuring career path success for engineering majors.

The current work is organized around two central research questions: 1) What are the core attributes that illustrate the unique entrepreneurial leader? 2) How does the entrepreneurial leader balance the effective role of entrepreneur and leader?

2. Theory and Assertions

Subtle but dramatic forms of distinction exist between the definitions of leadership, entrepreneurship, and entrepreneurial leadership. What form does entrepreneurial leadership take? On the basis of a review of the literature indicating both the importance and lack of clarity on defining entrepreneurial leadership and extending the revival of a personality and characteristic approach, the author reviewed both “lab study” and “field study” research approaches^{35,36,37} and selected traits and concepts for study that emerged from intuitions and experienced observations. Then, the text of the leader interviews and field notes were read and reread by both the author and other coders post the discovery phase of research to label variables as categories or dimensions. An open coding technique was utilized to identify and describe phenomena found in the textual data. General categories identified in Phase I of this research were used to maintain an inventory of codes. In addition to text and verbatim illustrations that provided descriptions of newly developed codes, extensive notes were added to discuss specific

dimensions of entrepreneurial leadership and linked to established research models for the purpose of building next research agenda steps.

Survival for the entrepreneurial leader is operationally defined as a self-report recognition of an exquisite focus on specific practices and factors that contribute to success during thriving or stagnating business times. But what are these factors? To determine the answer the author compiled a list of multiple factors that define the successful entrepreneurial leader. The list had 4 main sources: 1) A year of discovery interviews with senior level managers in academia and industry, 2) Past and current collaborative experience with professors, 3) Literature from industrial-organizational psychology, engineering education, and entrepreneurial studies, and 4) Compilation of interview categories from 55 Dean, CEO and Founder level responses to questions concerning successful entrepreneurial leaders. To thrive on challenge and survive, the researcher believed that specific factors worked spontaneously and as a plan during changing times. These factors are referred to as assertions in the current work.

The five assertions, listed as a-e, are described through the following dimensions:

a. Sensing Connection

Connection is a mode of self definition and was previously referred to as a goal motivating women not men³⁸. Broadly speaking organizational aesthetics has focused on ways of knowing that comes from our sensory experience^{39, 40, 41}. Distinctions between connected and separate ways of knowing⁴² are well established in the psychological literature. One research investigation explored the links between gender, connection and conception of authority in a college classroom, while another used stories to demonstrate how connection is central to the canvas of leadership^{43, 44}. Recent work indicates that connection is integral for both women and men in the evolving theory of leadership⁴⁵. There is also an approach to organizational aesthetics that is based in the idea that connection⁴⁶ and sensing connection is part of our social/organizational instincts to be part of a collective of some sort⁴⁷. There has been little work exploring the felt sense⁴⁸ of connection. Relevant here is what has not been explored—how the leader senses connection, engages knowingly, and translates that into entrepreneurial success.

A close look at the intersection of leadership and entrepreneurship suggest an entrepreneurial leader that connects uniquely with every audience, customer, and client. They are recognized in the current study for their connective instincts/sense for all levels of organizational decision-making and possess a capacity to predict and create successful cross-functional teams. These ideas suggest that the entrepreneurial leader connects guides and moves quickly to action. Therefore:

Assertion 1a

The role of connection, and the capacity for sensing connection is evidenced in the entrepreneurial leader's unique capacity to engage while making thoughtful observations, predictions and responses to people throughout the entire creative venture process.

Assertion 1 implies that although both the entrepreneur and the leader are concerned with assessing the audience and deciphering the potential to the tactical strategy the entrepreneurial leader is acutely aware of every audience as a customer, client or participant observer.

An important challenge exists is the way that research is designed and theory building reported in the discussion of leadership especially when the concept of gender is included ^{49, 50}. Past work indicates that while women may view positions of leadership vs. entrepreneurship as one and the same, differences in gender emerge as connection, as expression of self, and as key in productive decision making, risk taking and innovations. There appears to be a certainty in the kind of confidence—in opinions, decisions and relating that underlines the role of connection in entrepreneurial leadership. Serial entrepreneurs report that the environmental piece shapes women differently than men and some believe that this fact makes them sensitive and strong in a way that is great practice for any entrepreneur. They fall down, they get back up again and are able to cope with lots of rejection with conviction and persuasion.⁵¹ This is what the entrepreneurial leader needs to be able to do—cope with, move on from failure. Gender plays a role as both a social experience and a psychodynamic presence. Therefore:

Assertion 1 b

The entrepreneurial leader recognizes gender as an element in connection as both a way of knowing and as a social experience and responds accordingly.

b. Vivid imagination communicated in how new technology and design drive innovation

Within their organization and with their student or client—entrepreneurial leaders easily connect, guide, and act with precision as they move quickly to action. They are capable and recognized for their connective instincts for organization decision-making. Perhaps to demonstrate a capacity to almost predict what works best and who will collaborate best with whom they communicate their vivid imagination internally and externally for organizational success. Impressive longitudinal researchers ⁵² theorize that communicated vision is a key attribute in situation specific motivation. Parallel to work that reinforce the presence and impact of vision as a motivational factor ⁵³ the current study suggests that the attributes of the dreamer and the tasks of communicating the dream are direct predictors of entrepreneurial leadership success.

Vision has been well established as a projected image of what a leader desires to achieve. Entrepreneurial leaders continuously learn and utilize new technologies and the relationships of art and design to their interest to motivate internally and have the external competitive edge. They recognize the power of “firsts” and calculate growth around what is authentic and new. The author proposes that there is a parallel to and extension of ground breaking work on communicated vision.

Therefore:

Assertion 2a

The more vivid the imagination of the entrepreneurial leader, the greater the way an authentic and new vision is communicated.

Assertion 2b

Communication of the vision for the entrepreneurial leader begins as projected images and ends in utilizing new technology and design.

c. Family and cultural background encourage an expansive world view

Family background has been referred to in the literature as an interesting piece of bio data but the wrong variable for empirical study⁵⁴. Internalized family and cultural background, however, have recently emerged as an important feature in male identity⁵⁵ and the leader's passion for creative venture. The mind and making of the "technopreneurs" is described as fundamental in the more dominant role of females leading successful entrepreneur firms across cultures⁵⁶. Background forces of family and cultural experience impact the transformation and blend of entrepreneur and leader to entrepreneurial leader.

Therefore:

Assertion 3a Family and cultural background are driving forces for the entrepreneurial leader. Leaders with recognized family ties or generational roots in other than American culture have an expansive world view.

Assertion 3b

The entrepreneurial leader has an expansive world view and is more likely than those without an expansive world view to be successful and adaptive through organizational growth and change.

d. Expect and creatively cope with both internal and external confrontation

Previous work explored the role of personality traits to new resource skills and longitudinal success⁵⁷. Other research proposed but dismissed the impact of a capacity to tolerate internal and external confrontation⁵⁸. Recent works suggest that the successful leader does not tolerate ambiguity and in fact orchestrates the conflict⁵⁹. The author introduces an attribute of 'expectation of and creative coping with confrontation' as a feature that will define the entrepreneurial leader's skill for moving beyond the start-up phase to maintaining growth. Entrepreneurial leaders are highly perceptive about the paradox of expansion and the resulting conflicts. The liking factor, a social psychology construct of influence and persuasion, is informative⁶⁰. The entrepreneurial leader likes many others, yet knows many are not like them. They soothe and mobilize their team during the challenges.

Therefore:

Assertion 4

The greater the entrepreneurial leader's capacity to expect and creatively cope with both internal and external confrontation, the greater will be the entrepreneurial leader's survival.

e. Possess a unique gift of Character

While there is an aura around the words entrepreneur and leader, character has not often been selected as an important element in discussion. Recent literature features a reprint of old articles outlining the advantages and disadvantages of 'character type' on leadership effectiveness⁶¹ but rarely discusses the impact of character on survival. A characterological shift in the 21st Century leader has often been reduced to detailed discussions about ethics and morality. While previous work sets the stage for the difficult to define and even more difficult to measure concept of character, the author proposes that the leader of today, like the 21st Century college student is a different individual from the leader of the past⁶². The current work extends on previous work concerning a character shift in society and proposes that unique character type has an impact on the emerging survival for the entrepreneurial leader. Therefore:

Assertion 5a

The greater the entrepreneurial leader's capacity for care and ethical decision-making, the greater will be the entrepreneurial leader's survival.

Assertion 5b

The greater the entrepreneurial leader's insight about their uniqueness and knowledge that there are not many like them, the greater entrepreneurial leader's survival.

Assertion 5c

The entrepreneurial leader recognizes that they can be emotionally vulnerable and fragile and have a creative capacity to find moments of rejuvenation.

3. Method

Subject Selection

The original forty participants in the study were selected to provide a variety of leader/organization types, cultures and geographic locations. The original sample included ten female subjects and thirty male subjects. Since the preliminary investigation twelve more participants, 5 female and 10 male, were added. The current sample includes 55 academic leaders and business senior level officers and co-founders from the northeast, midwest, southwest, and west coast institutions. The present sample included 15 women and 40 men. The sample high age of the participants was 68 and the sample low was 26.

Entrepreneurial Leader identification and Interview Protocol

The six participants featured in the discussion of results in the study were selected because they: 1) had a background in engineering or science, 2) were successful for at least four subsequent years, 3) recognized challenge, loss or perceived failure in their work.

The Film Maker, the two Deans, the Provost, Vineyard Owner, and the Helicopter Fighter Pilot were chosen with the intent to maximize both the intersection between leadership and entrepreneurship and the opportunity to paint a picture of the individual and illustrate the five defining assertions for entrepreneurial leadership identified in the Theory section.

Interviews were conducted by the author using a two part semi-structured interviewing technique that was consistent across participants. All interview meetings began at the participants' workplace location. The average meeting time for each interview was forty minutes. The longest interview consisted of two hours and forty five minutes and the shortest interview lasted thirty minutes.

The interviewer purposefully and strategically avoided using a digital taping technique. While testing without taping requires careful note taking and rigorous attention to data and immediate follow-up details for coding techniques, interview results reveal more comfortable discussion open story telling. Past practice and experienced observation suggest that the current approach captured sensitive and controversial data that might otherwise have been unlikely to surface. Confidentiality was assured all the participants. With permission and for educational purpose participants' identity and geographic locations were modified in composite descriptions.

Development and Analysis of the Instrument

i. Leader interview questions: The personal interview questions were written by the author. While all five questions required the respondent to provide open-ended discussion responses, one question utilized a cue designed for story-telling (see below).

The subjects were asked to respond to all questions as they might expect them to relate to their current work and past experience in their field. The questions included: *When you hear the word leader what are your first definitions and thoughts? What distinctions do you see between leadership and entrepreneurship? How does the leader construct or work on teams? What role did your family or upbringing have on your views and work as leader?*

ii. Story-Telling (TAT) Cue Questions: *Imagine that you can tell me about the gender element in leadership, what specific examples come to mind. Tell me a story that illustrates a challenge that you experienced in your work.*

The methodology used for the story telling questions was based on the Thematic Apperception Test (TAT). While the TAT was originally designed to clinically categorize unconscious images with a picture test, Atkinson⁶³ successfully utilized it to measure achievement motives. The TAT has been demonstrated as not only a fruitful method for capturing underlying motives, it has more recently been acclaimed for testing compatibility, productivity and leadership in the workplace.

The Story-telling cue questions offer interpretations of actions, styles and symbols that provide useful projective data. The images and themes in the subjects' responses may therefore be a tool in uncovering interpersonal perceptions about self and other not typically found in qualitative or quantitative research tools. Although controversy exists concerning whether the measure reflects how individuals perceive themselves, how they perceive others, how they actually behave, cultural norms, gender-stereotypes, or some combination of these possibilities, researchers agree that it is capable of capturing images not likely to be expressed with other techniques⁶⁴. The author modified the traditional TAT approach in both directions and coding schemes. Coding techniques for the use of the 'picture test' stories replicates validated techniques.

iii. Analysis of Content and Measures

Table I summarizes five independent elements as attributes, assertions as number of measurement items, and associated research models.

Analysis of extensive interviews were coded by the author and reviewed by two other coders: an engineer and a psychologist blind to the assertions of the study. All question responses were compiled and coded (see Table 1). The researcher took notes during the research interviews and wrote the details of the leader stories immediately following each interview.

All story composites were written after completing: an original and extensive interview, multiple opportunities where the author observed the leader within their organization or interacting with team members, and follow-up notes and conversations with the leader.

Table 1
Assertions Model

Independent Element as Attribute	Items	Research model reference
Sensing connection	2	Lyons, 1981; Belenky, 1986; Karanian,1995
Imagination for new and authentic Family and expansive world view	2	Baum & Locke, 2004; Karanian & Okudan, 2006
Expects confrontation	1	Levant, 2001; Foo, Wai, Lang 2006
Unique resilient character	3	Heifetz , 2004; Cialdini,1998
		Maccoby, 2004; Cialdini, 1998

4. Story Composite Results

All six subjects featured in the results were coded for the presence of all entrepreneurial leadership assertions in the proposed model. The first story composite, The Film Maker is the only one that extensively considered multiple attributes of each assertion. Specific attribute examples for sensing connection, imagination, expansive world view, expecting confrontation, and character are briefly featured in mini story composites for the remaining five participants. Table II presents a listing of five story composites by identity, and number of featured attributes described.

Table 2
Story composite dimensions

Identification	No.	Assertions Featured
The Film Maker	5	Extensive illustration of all
The Two Deans	2	Sensing connection, Expecting confrontation
The Provost	2	Sensing connection, Expecting confrontation
The Vineyard Owner	3	Sensing connection, Imagination, Family
The Helicopter Fighter Pilot	3	Sensing connection, Expects confrontation, character

The stories are organized to reflect the perspective that the author takes toward the problem of defining entrepreneurial leadership. Story one, defines the term with an extensive illustration of the Film Maker's vision and approach, outlining the emerging attributes through 5 assertions and sets the stage for the remaining stories. The four remaining story results, presented as mini-composites are utilized for building next research agenda steps.

Story two makes the case for the life cycle and career path challenges of the female leader as a senior level administrator in engineering education with a focus on sensing connection and expecting confrontation, referred to as 'dean' for confidentiality. Story three lays out the creative coping strategies for both internal and external confrontation for the Provost. Story four features a bio dynamic approach and family background theme to the paradoxes of expansion with the Vineyard Owner. The final story, the Helicopter Pilot, explores the unique character of a young military leader. All mini story composites end with a list of associated research assertions.

4. Story One: The Film Maker

Original thoughts, clear, unwavering magnetic focus, and an agile, almost boundless bounce from one place to another are the author's first impressions of Ramy, Founder and C.E.O. of what is hereafter referred to as Hollywood Digital (HD).

a. Sensing Connection

Images emerge immediately after the first few minutes of walking into the multi-level stucco West Hollywood home converted into his futuristic oasis of video, film and documentary making. There is a maze of cubby-holes and paths and stairways to everyone working—individually and connected together—by concrete and symbolic evidence of on-going success. Presents sent in the form of coconuts, tequila, and monkeys indicate a playful and exhilarating promise for fun while people work really hard. The land of Ramy and his very talented group at Hollywood Digital teams with the kind of energy that would motivate every entrepreneurial thinker to wake up early and run to work.

Unexpected twists turn up everywhere. People, who under normal circumstances wouldn't be working together, design, construct and modify everything in the production cycle of film making. "I pick the best..." directs Ramy. The significance of this statement is illustrated by a company culture founded on the principle that people from backgrounds that are diverse based on education, training, and past experience will collaborate exquisitely when innovation is the goal.

The culture created by Ramy is reminiscent of one found in many high achieving but never arrogant academic institutions. Getting the absolutely best individual for the work is the key. Creativity and best practices are so highly valued in the company that Ramy searches for and chooses the top performer with a goal toward seamless communication.

b. Connection and communicated imagination

Comfort matters. There is a paradox of comfort in teams that apparently don't belong together. Yet, ways have emerged at Hollywood Digital for creating collaborative, multi-branching teams that produce films for large unknown audiences. "People that are comfortable here stay and do all this work. If they are not comfortable, they know it and they just leave. No one has to ask them to leave."

When you ask Ramy to describe his first thoughts about leadership, "Humility, conscious and vicarious awareness that you are a leader, clarity and comfortable in front of large audiences," you begin to see his ways of expressing and predicting how he leads from both in front of and behind the lens.

Where many leaders have a primary focus on the client or customer sales, defining and reaching the audience is what is always on Ramy's mind. Consider his visionary communication sense, "There is an ability to assess your audience..." "I directly say what comes to my mind. And, sometimes I have made some decisions that are from left field. It's a spontaneous, gut-feeling thing." There is a unique identification among entrepreneurial leaders, like Ramy, around a sometimes shocking sense of humor. They always get the audience's attention. They get everyone excited and then they calm them down.

Assertion 1a

The role of connection, and the capacity for sensing connection is evidenced in the entrepreneurial leader's unique capacity to engage while making thoughtful observations, predictions and responses to people throughout the entire creative venture process.

Assertion 1 b

The entrepreneurial leader recognizes gender as an element in connection as both a way of knowing and as a social experience and responds accordingly.

Very controversial and often sensational conversation ensues when Ramy is asked about challenges. "My biggest challenge is that when the camera is on you kill the real." No pun was intended in this comment that reflected the foundation and necessity of finding depictions naturally and accurately in his work.

c. Gender and connection

"You rarely if ever see 'girls' behind the camera. But I remember being fascinated as I watched a woman filming on Hollywood Boulevard." "Think about it," he said, "What happens when there is a guy behind the camera? That doesn't happen if it's a girl. I have a goal here—to get women as photographers." Ramy continued to discuss the ease and comfort of that particular solo woman photographer as she persuasively carried her equipment and received responses naturally from passers-by.

As these stories suggest Ramy's focus is not only on identifying the audience, but the new trends. In the case of a woman behind the camera, he sets his sights on finding the tactical, technical, and creative path toward including the female voice and view in his decision-making.

The visionary ways of leaders identify trends and find new things. The visionary approach requires an almost prophetic view of the audience response and an amazing capacity for connection.

Ramy alluded that the female is more likely than the male to elicit real and natural responses from the audience.

Assertion 2a

The more vivid the imagination of the entrepreneurial leader, the greater the way an authentic and new vision is communicated.

Assertion 2b

Communication of the vision for the entrepreneurial leader begins as projected images and ends in utilizing new technology and design.

d.. Internalized family and cultural past

Intense focus on an internalized past is not present for Ramy. When he said that he was, "born into another family..." he recognized his uniqueness with words that were descriptive and non-apologetically clear.

An example of difference occurred when he was ten and a few years later. School is the focus of his memory. While he completed homework with ease, he was apparently not consistently

attending classes. He recalls the surprise in learning that the school asked him to leave and he was forced to attend another school. Striking here is not a family intervention, or how much he cared about changing schools, it is how quickly he learned and adapted to the change.

Ramy is the entrepreneurial leader who respects his family background and cultural roots, yet he doesn't refer to one specific family member who existed as his leader role model. Perhaps the relevance of foreign born ancestors and a Lebanese cultural background is a driving force for an expansive world view for Ramy.

Assertion 3a

Family and cultural background are driving forces for the entrepreneurial leader.

Leaders with recognized generational roots in other than an American culture have an "expansive world view."

Assertion 3b The entrepreneurial leader has an expansive world view and is more likely than those without an expansive world view to be successful and adaptive through organizational growth and change.

e. Authentic expectations and creativity

Every moment with Ramy is filled with stunning and honest personal reflections. While an in depth personality analysis or diagnostic interpretations are not relevant here, some of the most fascinating definitions of leadership emerged when Ramy discussed emotional responses.

"Hours are spent on the phone. Sometimes six hours of non-stop conversations..." Ramy says, will keep him away from his staff. Here presents a time that he is aware of the staff's neediness. And, he confronts and directs the related issues in the moment. From formal documentation to even spending weekends, if necessary, cleaning the company's attic, Ramy leads and participates as a team member.

Recently motivated by a global conference, Ramy decided, "If something was a good idea, write it down, document it all." The results are one of a kind books documenting work in his production company.

When you lead, especially entrepreneurially lead, people don't dislike you or like you. They mostly don't know you. They dislike or like the positions you take on the ways you wish to tackle the work. Everyone didn't like all the documenting requests from Ramy. Some hated it and they complained. But, typical of his calm approach, he didn't organize any formal meeting to communicate. He smiled when he said, "The meetings occurred naturally, people just gather."

He has his own language. The author doesn't mean L.A. street slang...she means words and word phrases that identify him and his work immediately. He says, 'monkey' and 'maverick' and '(I do) dislodge' and you know what he means. More important, even the new people he meets imitate. They use his words immediately in conversation. The interviewer particularly enjoyed the response from a former New York stock-broker who had a few minutes to discuss

wishes for subsidizing an upcoming project with Ramy. It was the author's turn to smile when his follow-up phone call included the Ramy language.

Ramy appears to be cynically patient about being in the limelight. He handles public attention with grace and an impressively mature wisdom. An experienced observer, he is always watching, enjoying the capacity to almost predict which people will connect.

Perhaps it is through connection that Ramy helps us define the concept of creativity. His intense focus and magnetic connections are contained in learning and listening to others. Although not easily impressed, he is enamored by what is authentic and new. Love for his role at work translates from abstract creative theory to the practice of extraordinary movie making.

Before anyone ascribes super human traits to Ramy, consider his responses to combative people or dissent in the processes of work. "I never got the whole anger thing, it just says that you failed."

The author thought about the anger comment for more than three weeks. With clarification as a goal, she measured it against more than 50 other leader responses on how they managed opposition. A useful analysis originated in a female student's presentation on leadership. "I am reminded of the business man who told our professor that he doesn't get mad, that is not to say that he doesn't show it...but because he believes that in showing anger you are admitting defeat. This is a difficult concept for many of us. To not lose our cool and to step back..." A young entrepreneur herself, she convinced the class and helped them understand the importance of distinguishing the work role from the emotional self.

The 22 year old college student continued to talk in that class about the fact that people resist receiving criticism and change in many ways. "If we can teach ourselves to take criticism and conversely praise, and separate ourselves from the role that the feedback, good or bad, is directed towards, only then can we utilize the valuable information that can be derived from the observations and reactions to the people around us."

Observations and thoughtful reactions to people impact Ramy's original connections. The fruits of his Hollywood Digital focus will continue to be captured on film for a very long time.

f. Expects confrontation and pushes through barriers to change

Assertion 4

The greater the entrepreneurial leader's capacity to expect and creatively cope with both internal and external confrontation, the greater will be the entrepreneurial leader's survival.

The role of connection in creativity is evidenced in the entrepreneurial leader's capacity to thoughtfully observe, document, and respond to his reactions to people during changing times.

A high tolerance to combative situations or dissent from others is reflected in low anger or annoyance responses by the leader. So many images frame the entrepreneurial leader, based on the observations and experiences with Ramy at Hollywood Digital, that it's necessary to continue

work in other formats. Future work in discovering something new about leadership and the audience appears to contain a central question about the entrepreneur and the leader: If the entrepreneur gets everyone excited, and the leader calms everyone down, then does the entrepreneurial leader balance both?

The author remembers an evening ‘decompressing’ discussion with Ramy following his decision to expand and move his company. Every minute of the day since he made the decision, Ramy’s focus had expanded to include the internal and external impact on the costly paths towards change. Things that went smoothly prior to the purchase don’t go according to plan. Where there were few problems, problems emerge. While the preparation for some exciting new projects seem to progress more rapidly and without the typical angst or subsidizing constraints the company has climbed to a new level. “It’s a different zone I have entered,” states Ramy. He does not blindly trust that innovation comes from times when things are off balance and new. He gauges the “readiness levels” of his team at HD and is probably the most distracted by the internal response in his organization.

“It’s simultaneously doing the most terrifying thing ever and managing the usual velocity,” is Ramy’s description of the different zone he has entered as he verges on securing a ten thousand square foot building—four times their current space. So what is so different about this zone? Creatively moving the financial barriers appear a significant part of the foundation for the change. But there are other more subtle and not so transparent forces at work.

Moderate and calculated risk-taking behavior is what partially motivates Ramy. The new building purchase, although exciting, presents an opportunity for fear because it includes a bit of the high-roll and gamble. While Ramy has taken risks as the CEO and founder of HD, the growth has an impact on the existing company culture.

Only one example of a combative response towards Ramy is necessary to make the point that people resist change. More will occur and be more easily managed with the practice of Ramy leading the company through change.

The story begins when the visual effects expert, a reliable team member, asked to manage a production task. When things didn’t go smoothly and according to plan, this young guy, ‘just laid down.’ He was passively aggressively combative. While it’s unclear what the specific trigger was, and it’s equally unclear if he was ready to manage the task, HD on the verge of breaking new ground set the stage for him to retreat. As the story continues, and Ramy outlines his concerns, it appears that the visual effect’s guy’s talent has become difficult because he worries that the integrity of his work, and the work of the company won’t be preserved with growth. And, as in the sometimes drama of the gifted, who under pressure regress like a child, he would rather just leave or be pushed out due to company changes, never due to a perceived failure to accomplish.

Ramy understands that the very talented, like his visual effects expert, have a primary goal to be referred to as a creative winner, and their biggest fear is to be labeled a failing loser. While Ramy’s high tolerance to combative situation or dissent from others is reflected in low anger or annoyance responses, that is not the case for many of his team. They will be anxious. Minor

collaborative skirmishes will over heat. The logic of the change makes sense, but the emotion is overwhelming. Some may hear an internal and unknowing voice, “We are growing and changing, does that mean that the way I/we did it before was all wrong?”

g. Has fun with change in sustaining growth

Assertion 5a

The greater the entrepreneurial leader’s capacity for care and ethical decision-making, the greater will be the entrepreneurial leader’s survival.

Assertion 5b

The greater the entrepreneurial leader’s insight about their uniqueness and knowledge that there are not many like them, the greater entrepreneurial leader’s survival.

Assertion 5c

The entrepreneurial leader recognizes that they can be emotionally vulnerable and fragile and have a creative capacity to find moments of rejuvenation.

Like Ramy, the author was amused by the invitation to play a game of fuse ball with his senior team at the end of a hectic Friday. Liking the work and having fun with the process is one of the challenges for Ramy. Although exhilarated by the promise of what is new, and enjoying all the design and technical possibilities with the new building, the process of ‘moving’ is a force that Ramy is never cavalier about. With hours of work in front of him, he takes the break, and enthusiastically and playfully entered the competition.

The author can photographically take herself back to that first day when she walked down Sunset and approached Ramy’s stucco building-- simultaneously entranced and surprised. There was a piece of paper taped to the façade with simple and clear penned words, “Hollywood Digital is Open.” Impressed, she was sure that piece of paper, flapping in what the northeasterner imagined to be the Santa Ana winds, was purposeful and orchestrated. HD is the low-key underdog, no fancy high priced signage is necessary to announce their success.

h. Cares about preserving the past while launching into the future

Venting about all the changes and wondering aloud about how he will cope is not Ramy’s approach. Inside and out he plans for and takes pride in trying to predict the optimal ways to cope with change and recognize the barriers. Maybe Ramy will ask his visual effects expert to tape a piece of paper outside of the ten thousand square foot space that makes the consistent statement, “Hollywood Digital is Open.” More likely, Ramy will cautiously delegate but clearly direct as he pays attention to the cues for internal and external readiness factors.

Many entrepreneurial leaders recognize that caution lights are blinking when there is expansion. There is a tendency to over handle or under handle the changes. It will be very interesting to see what’s next. Will Ramy continue to include the diverse backgrounds and variety of innovators? Will he remember the gender role in persuasion in suggesting that a ‘girl behind the camera’ receives natural and real audience responses and including the female voice in his decision-making are crucial elements to getting past the barriers for change?

“Expect that your low-key and somewhat under dog status will be threatened by your production company’s growth,” is probably the advice that would come from those wishing Ramy a winner.

The longer you achieve at something the more likely you will be attacked. The paradox is that this is when the leader expects to feel less vulnerable because of all of his experience and preparation.

Theorizing aside, Ramy is ready. That is the key ‘readiness factor.’ He is paying attention with a laser focus. He has never forgotten, and won’t let others forget that he is not only in the production company work for the fame of the ego. He is thinking about emotional and company preservation—preserving the integrity of the work and the strength of his entrepreneurial character. Ramy sent the author an email recently that ended with a smile face after he wrote, “There is no turning back now.” Why would he want to? He is embarking on the best work of his life.

5. Story Two: TWO DEANS

Consider two deans originating from different engineering institutions, one on the east coast, one in the west, reflecting back on their careers as engineering professors during the early 1970’s. Both were hired as the first women in an engineering department. Both began their careers as professors at an early point when women entered engineering education, and made an impact on their field at a time in history when women were a minority in engineering, science, law and medicine. Today they entrepreneurially lead 300 miles apart at senior level administrative levels for famous engineering institutions.

First meetings and observations of Dean ‘east’ consistently present a gentle, soft spoken elegance. Over time, it is clear that her steady and consistent confidence is evident whether her interactions are with her faculty or students. When asked about her east coast engineering professor days, she remembered, “My chairman asked me to start a woman’s caucus. I was stunned. So I told him—I know nothing about women, I don’t know any women, I am the only woman I know. At that time,” she added, “you didn’t see role models. And while the future looked good for women, I don’t know why it’s taken more time in engineering vs. law or medicine.”

Dean ‘west’ commands your attention immediately, firmly and with an aura of unflinching confidence. An audience member during a presentation, her student in a class, faculty working with her on a project—all would agree that in every context, she walks tall, and energetically commands your attention.

Sentences punctuated with the words “only” or “like” descriptively accentuated challenges each faced. Dean ‘west’ explains, “I was the first and only woman engineering professor for ten years. While I was received favorably by the students and had an accepting department head, many of the men and women on staff wanted to know what I was trying to prove. There were times when a Dean supported my work, but I would get stabbed in the back.” She added, “One colleague told me to my face that he didn’t like me.”

Assertion 1a

The role of connection, and the capacity for sensing connection is evidenced in the entrepreneurial leader’s unique capacity to engage while making thoughtful observations, predictions and responses to people throughout the entire creative venture process.

Assertion 1 b

The entrepreneurial leader recognizes gender as an element in connection as both a way of knowing and as a social experience and responds accordingly.

Assertion 4

The greater the entrepreneurial leader's capacity to expect and creatively cope with both internal and external confrontation, the greater will be the entrepreneurial leader's survival.

6. Story Three: The Provost

A first meeting with the Provost mixes a welcome, friendly yet expert focus on leading in engineering with an almost cinematic presence. The office was located at the far end of a series of assistant's desks. A visitor is required to walk through a progressively larger set of desks and mini offices to arrive at well organized space packed with folders of reports, bound book projects and a conference table. The sky view is ever changing with some mountains in the mist framed by the imposing brick and stucco department buildings across the street.

While a bigger than life image may be projected by the Provost, he underlines that his work is about advocacy for students and faculty. His interest in the future success of the university includes a search for what he refers to as 'ordinary' leaders. "It's a trade off between leadership and thinking about people as people. Think of them as people, human, and how they fit into the organization. Female leaders have shown me so much. They don't differentiate themselves from their male counterparts—they have ordinary lives but show care about work in extraordinary ways."

I learned a long time ago not to worry about the big issues they can never be solved in an instant." He adds, "Faculty say that they like me because I am willing to entertain reasonably public dissent." Where others are concerned about a public image tainted by challenge, the Provost expects challenge and confrontation.

Compelling in the Provost's reflections is a twinge of regret in missing the deeply personal connections he established in previous positions of less formal leadership and was no longer able to maintain in his current position. He suggests his marriage ended because he wondered if he was "...subconsciously looking for connection at work."

Assertion 1a (see above)

Assertion 1b (see above)

Assertion 4 (see above on expecting confrontation)

7. Story Four: The Vineyard Owner

The science of bio-dynamic engineering and family themes are behind most conversations with Mike. Standing with him in front of a massive and curve-linear agave plant, he states, "Look at that, can you believe that, it looks like it is chiseled by the sun." Proud of every inch of his of vineyard his focus is on learning from his wine grower career aspirations while he "teaches"

every day. He reflects extensively on a conscious decision to hire both formally educated and non formally educated people and inspire them to achieve more than they imagined.

Memorable in the vineyard owner's story is a family theme in the 35 year earlier creation of the vineyard and his late father's place in his heart and the heart of the latest evolution of the business.

It's is clear that an internalized family dream within a family legacy of leadership continues to inspire Mike. His adult age children didn't just inherit a job and the profits, they had to go through "flaming hoops" of education and outside jobs to be welcome for work.

He talks extensively about using new biodynamic technology to create the best wine of his life. Visitors leave the multi acre vineyard convinced that Mike, chiseled by the sun, will do just that.

Assertion 1a (see above on Connection)

Assertion 1b

Assertion 2a (see above on Imagination)

Assertion 2b

Assertion 3a

Family and cultural background are driving forces for the entrepreneurial leader. Leaders with recognized generational roots in other than an American culture have an "expansive world view."

Assertion 3b

The entrepreneurial leader has an expansive world view and is more likely than those without an expansive world view to be successful and adaptive through organizational growth and change.

8. Story Five: The Helicopter Fighter Pilot

Meeting Kerry for the fourth time was as impressive as the first. She, 5' 5" 26 year old, walked into the classroom awaiting her presentation, with one of her direct reports, a 6'6", 32 year old former hockey player—both in military dress whites. An observer could feel the energy and excitement in the audience apparently trying to decipher the uniforms and the nature of their professional relationship. Who was the authority? Both appeared as leaders in this case because prior to formal introductions Kerry clarified that without Jon their ship would not function right.

Kerry fascinated the class with her discussion about a choice for a military calling vs. an ivy education. But two other stories are what captured everyone's attention. One was a gripping account of technology and ocean warfare, and the other was her response to an older officer and subordinate, who repeatedly and with hostility challenged her in front of the other men and women of the military. "He said that I was a woman that was trying to ruin his career," and he added, "...by the way, I don't like you." Kerry clarified that while she was aware that he just wanted to put her down, it still hurt. She clarified that she went down to her officer's quarters

and cried. “Sure, I removed myself and cried, but,” she affirmed, “that didn’t last long, so what, I hurt his ego, you have to have a thick skin in my job.”

Kerry has contacted the author with updates on completing her helicopter training and latest promotion. She is the entrepreneurial leader who follows her calling in a dream job that hopefully does not include the nightmare of war.

Assertion 1a (see above on connection)

Assertion 1b

Assertion 4 (see above on expecting confrontation)

Assertion 5a

The greater the entrepreneurial leader’s capacity for care and ethical decision-making, the greater will be the entrepreneurial leader’s survival.

Assertion 5b

The greater the entrepreneurial leader’s insight about their uniqueness and knowledge that there are not many like them, the greater entrepreneurial leader’s survival.

Assertion 5c

The entrepreneurial leader recognizes that they can be emotionally vulnerable and fragile and have a creative capacity to find moments of rejuvenation.

9. Discussion and implications

There are five theoretical assertions and applied contributions in the present study. Core attributes suggest assertions of connection, vivid imagination, family and cultural background, an expectation for confrontation, and a unique gift of character that define an entrepreneurial leader.

The most important finding of this study is the dimension of sensing connection on the entrepreneurial leader’s capacity to encourage, guide, and create motivating conditions in the creation of new ventures. The concept of connection as an inter-relational force and a motivating goal is fully consistent with previous psychology research^{65,66}. What is new is the introduction of connection as a core attribute in not only defining entrepreneurial leadership but in explaining how the leader gets everyone excited about a new venture and then calms them down to sustain growth. The entrepreneurial leader’s capacity to engage, across groups and cultures, with a vivid imagination appears to be an important part of connecting. Also relevant is the gender impact⁶⁷ on sensing connection and in turn, how that influences successful entrepreneurship.

This study also provides insight on the unique character of the entrepreneurial leader’s as an individual who feels, cares and reflects in ways that suggest an important attribute in a 21st Century society’s characterological shift.

The author believes that the current study offers a new perspective on not only defining entrepreneurial leadership, but also on the impact of that role on attracting, teaching, and assessing in engineering education. In addition, the participants’ responses provide intriguing features that may shape and inspire in the classroom, the lab⁶⁸ or the boardroom.

Limitations exist in the current analysis. Conditions for entrepreneurial leadership and related dimensions need theoretical exploration and operational definition. In addition to the qualitative inquiry, participants' responses to questions, and the projective measures for the stories, however extensive, an additional research agenda is required. A next step would utilize an empirical approach that identifies attributes as latent variables and operationally measures the dependent response of the entrepreneurial leader's survival.

This study confirms the presence of a unique individual—the entrepreneurial leader. Participant stories inspire and hold promise for the 21st Century graduate in engineering and science.

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