2006-2121: ENTREPRENEURIAL LEADERSHIP, GENDER AND TEAMS IN THE ENGINEERING AND SCIENCE CONTEXT

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Entrepreneurial Leadership, Gender and Teams in the Engineering and Science Context: Men and Women Tell Stories About Leadership

Abstract

Interviews and small focus groups were the methodological tools used for distinguishing leadership and entrepreneurial leadership in an engineering and science context for this preliminary investigation. Emphasis was placed on the gender elements in leadership by using conceptual frameworks from the research on organizational decision-making, socio-psychological fundamentals, and workplace performance. Forces that influence leadership and team behavior were considered through five framing questions: 1) do males and females equally emerge as leaders in engineering and science? 2) what are the key concepts in team leadership that vary in same sex and mixed sex composition of groups? 3) how do senior level managers distinguish leadership and entrepreneurship? 4) what influence do family and background characteristics have on the conception and practice of leadership? 5) how do leaders refer to the role of emotion in their work?

Existing studies suggest that women and men perceive and construct the relationship between self and others in very different ways. Phase I of this study draws parallels from psychological theory to entrepreneurial leadership practice in academia, industry and professional sports. The goals of the work outlined was to both search for a preliminary understanding of the various categories of the influence of and of leadership and potential use for that understanding to prepare entrepreneurial leaders for the challenging global marketplace. Results are interpreted as preliminary findings and evaluated for organizing the methodology for the next phases of research.

1. Introduction

The work reported here began with a fascination for the concept of leadership, and some observations about how conceptions of leadership varied based on the gender composition of a group. Thus, the work presented is an attempt to take a closer look at leadership, gender and teams through a collaborative approach of two disciplines, psychology and engineering, and to utilize the intersection of the two fields to understand the role of leadership in changing organizations.

The assumptions that we see as central to our ideas about leadership are:
a. Leadership definitions and practices are similar across different organizational settings (e.g., academic, political and sport). The exploration of leadership practice will include consideration and suggestions for the use of quantitative, qualitative, projective and action research tools.
b. Subtle but dramatic forms of distinction exist between the definitions of leadership and entrepreneurial leadership.

c. An important challenge exists in the way the research is designed and reported when the concept of gender is included. People have images in their heads about the meaning of the gender terminology--sex, gender-role, male/female, masculine/feminine, but these images are defined by the fact that they reflect an individual's familiar world.

d. Previously dismissed or under-explored psychological factors like character and emotional responses may be very important in understanding complex 21st Century issues of leadership and entrepreneurship.

We begin by briefly discussing how this preliminary investigation came into being— one of the author's personal path into it, the creation of collaborative FIE and ASEE sessions, and how the evolving design of the research methods parallel the key features of an approach to understanding leadership, gender and teams.

The interest in studying leadership began in the teaching of industrial-organizational psychology classes to engineering, design, construction, and management students. At the time, the college began an interdisciplinary engineering program with a unique collaborative committee approach. As the only non-engineer, and later the only woman on the committee, the lead author perceived this situation to be a unique opportunity. She learned by actively participating and observing both the successes of the major, and true team leadership. The challenges of the overall committee began with successfully meeting ABET 2000 criteria, and expanded to include issues of student scholarship on senior design projects, and faculty engaging the local level of politicians and the nearby medical teaching community for support, all within the constraints of modest academic budgets.

During the rigorous preparation for the ABET visits the faculty members of the committee began a series of paper presentations that considered the unique committee structure and collegiality in engineering education[1]. The role of the lead author on that committee turned out to have a lasting impact on her study of leadership, and has resulted in a lively and imaginative chain of collaborative leadership work and research opportunities[2-6]. In addition, immediately after the FIE 2005 special session presentation[7] the lead author received a letter identifying her as the recipient of the Michael T. Anthony five-year departmental professorship, offering her the opportunity to continue research and specifically reflect and consider the links between psychology, leadership and engineering education.

The current research focus began in the fall of 2005 following a special session at FIE where the focus was on particular gender and team themes that influence our definitions of leadership. We wish to utilize the collaborative efforts of our past research, and different disciplines and suggest methodological approaches to uncover more about the meaning of leadership, gender and teams. Our work has become a forum to understand what is happening not only in engineering education but in a larger global perspective, and calls for new ways of thinking—in ways of conceiving leadership and new methodological approaches for understanding leadership.

2. A Brief Review of Leadership and Entrepreneurial Leadership Literature

Intrigued by those who create conditions that motivate others in organizations, researchers have examined interesting questions about leadership. There is an aura that tends to surround the

words "leader" and "entrepreneurial leader" that makes it hard to think clearly. While there are core commonalities in these terms such as basic leadership aspects (motivation, team performance, etc.), there does not seem to be comprehensive articulation of their differences. This issue may create potential problems such as institutional conceptions of leadership, identification of topics that would pertain to student constructs of leadership, and creating effective leadership courses or entrepreneurial leadership programs.

While it appears that every possible angle has been considered in the discussion of leadership, definition is still a major issue. Our expectations, needs and understanding of leadership have grown more sophisticated and complex. Therefore, there is a need to synchronize our vocabulary. Useful in this context, is a brief search that was performed in leading publications in the field for the coverage of various topics that inform the current investigation.

History has changed greatly since early theorizing about leadership. The great-man theory, for example, is little more than a discussion of the effects men had on a particular point in history[8]. Women were absent from this picture of leadership. Dispelling the great-man theory of leadership, researchers (e.g., references 9-10) suggest that the average person, not just presidents of universities and founders of billion dollar companies, exert quiet leadership every day. Later, this image was replaced with the idea that leadership means influencing others to follow the leader's vision. The search for understanding how a leader was remembered or described as influential led to countless trait-approach or personality studies[11-13]. Discussions also focus on the productive and not so productive features of the narcissistic type of individual since many of our definitions of leader fit[14].

Despite numerous studies, researchers and lay-scientists, found the personality approach to leadership unscientific and discounted ideas that an individual's rise to power is based on some amazing combination of personal magnetism, intellectual talents, or physical characteristics. The work on leadership since then can be grouped into an evolution of multiple theoretical models: *situational* leadership, *contingency* theory, *transactional*, *transformational*, and *adaptive* leadership.

Shifting the focus to how influence is gained and maintained, for example, leadership theory expanded into a transactional model where the relationships between the leaders and the followers became the focus[15]. Leaders not only influence others, they are under their influence as well. A leader may specifically earn influence by not only adjusting to the expectations of others but creating safe ways to turn up the heat and staying alive in the face of danger[16-18].

Questions also emerge about the influential distinctions and similarities between leader and entrepreneur. Indeed, there are several books with similar titles such as Leadership and Entrepreneurship: Personal and Organizational Development in Entrepreneurial Ventures[19], Creating Value Through Skill-Based Strategy and Entrepreneurial Leadership[20], and Contemporary Leadership for Entrepreneurial Organizations: Paradigms, Metaphors and Wicked Problems[21]. Then, basic leadership texts were consulted such as texts of leadership courses Leadership: Theory and Practice[22].

Can leadership be taught? Are there aspects of entrepreneurship that can be taught? Controversial conversations continue in the debate, "…what comes first—is it biology or is it culture in leadership or entrepreneurship behavior?" In fact, the biology/culture circle rotates so rapidly it is impossible to identify the beginning. Although entrepreneurship requires an attitude towards risk taking and using one's gut feeling, it is still widely accepted that many aspects of entrepreneurship can be taught[23]. Most entrepreneurship programs aspire to stimulate independent small business ownership or opportunity-seeking behavior in managers within companies. Sexton and Bowman[24], however, suggest that a clear distinction should be made between 'entrepreneurship' and 'small business ownership'. According to them, all entrepreneurs are self-employed but all self-employed are not entrepreneurs, because entrepreneurs are characterized by innovative behavior with the main goal of obtaining profit and growth. Entrepreneurship education has been recognized as one of the crucial factors in fostering entrepreneurial attitude[25-26].

Despite this fact, however, after reviewing entrepreneurship education, Hindle and Cutting[27] state "empirical tests of key propositions are in short supply and badly needed as demonstrations of the efficacy of entrepreneurship education programs." Similarly, Sexton and Bowman[24], Hills[28], McMullan and Long[29] and Vesper[30] found that there is a lack of accepted paradigms or theories of entrepreneurship education. This was later suggested to be due to the lack of a body of well researched and developed knowledge, which might form the basis of entrepreneurship education [31-32]. Nevertheless, from the literature on entrepreneurship education some insights can be gained and used when shaping entrepreneurial programs in an institution. For example, (1) affective socialization element, (2) making decisions with insufficient information, (3) learning style, and (4) adoption of entrepreneurial behavior are important components to consider when developing an entrepreneurial program. These insights are explained below.

- Affective socialization element is defined as a combination of mindsets, values, attitudes, and strategies necessary for an occupation. Affective socialization is seen as an important element for an education program[33]. Curran and Stanworth[33] argue that socialization process of entrepreneurs should reflect the highly isolated and semi-structured entrepreneurial role with few partners in an inherently high level of uncertainty. More extensive research is necessary to explore the role that family and background experiences have on the entrepreneur experience. And, since entrepreneurs often reflect that they feel 'isolated' or 'alone' further research investigations concerning the role of emotion on entrepreneurship practice could be very informative.
- Gibb[31] states that most business-school based entrepreneurship education adversely impacts the entrepreneurial spirit. Perhaps, it is because in these settings, the emphasis is on analysis of large amounts of information, largely in the classroom with information from experts, and with evaluation by written assessments. In contrast, the entrepreneur with limited resources mostly operates with a gut feeling, recognizing the hidden agendas of others' goals, and making decisions on the basis of trust and competence of those involved[23]. Thus, Gibb[31] suggests (1) developing an independence from external sources of information and expert advice, and (2) use of feelings, attitudes and values outside of information as improvements for entrepreneurship education.

Informative in this context, are the few leaders that define themselves as both leader and as entrepreneur. The coaching aspect of leadership is relevant. Trust, creating a trusting atmosphere, and letting the team know that they are trusted has elicited powerful results from company owners and professional and college coaches. The NFL coach of the New England Patriots and the new CEO of Cisco have had tremendous success, in different professional arenas. Both have been described by "team members" with deep respect, suggesting that they, the members of the team, worked harder because they are trusted to produce winning results.

- For effective entrepreneurship education, a medium that employs concrete experience, reflective observation, abstract conceptualization and active experimentation should be present[34]. However, when compared to reflective observation, it is suggested that active experimentation is more natural for stimulating entrepreneurial behavior[23, 35]. Best practices in engineering programs that graduate young entrepreneurs include multiple opportunities for creative, inventive, and successful collaborative design projects[36].

Entrepreneurial behavior is described as the processes, practices, and decision-making activities that lead to entrepreneurship[37]. According to Lumpkin and Dess[37], key entrepreneurial processes include autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness. Autonomy refers to the independent action of a person in carrying an idea or a vision through completion. Innovativeness is the tendency to engage in new ideas, and experimentation that may result in new products. Proactiveness implies acting in anticipation of future problems, needs or changes. Competitive aggressiveness is directly and intensely challenging competitors. An effective entrepreneurial education should provide a medium to practice these entrepreneurial behaviors.

As for content of the entrepreneurship education, Knight[38] suggests opportunity identification, strategy development, resource acquisition and implementation as core parts of the curriculum. McMullan and Long[39] argue that entrepreneurship education should include skill-building courses such as negotiation, leadership and creative thinking and exposure to technological innovation and new product development. Hood and Young[40] propose a framework consisting of four primary areas where successful entrepreneurs must be developed: (1) content, (2) skills and behavior, (3) mentality, and (4) personality. These areas were proposed based on results from a survey of 100 chief executives in entrepreneurial firms. In the survey, the executives indicated that marketing is the most important content area, leadership is the most critical skill, and creativity is the most important cognitive skill (mentality). Additionally, they believed that while specific psychological factors, like personality traits, are difficult to influence, controversy exists over whether the vast majority of the knowledge required by entrepreneurs can be taught.

While the information gained from the literature is valuable in order to design effective teaching curricula on leadership and entrepreneurship, preliminary research in the form of a field study investigated the differences in leadership and entrepreneurial leadership.

3. Method

This section describes the methodology and instruments used in the research for Phase I. It covers information regarding study subjects, procedure and content for the analysis and planning.

a. Preliminary Investigation

The particular mode of inquiry used in this study was based on the need for considering preliminary results and dedicated to combining retrospective studies of the authors own research and consulting best practices with plans to build next phases of study. It was aimed to assure that the methodology captured elements of leadership, gender and teams in the way that was conceptualized. The preliminary data also included extensive discussions about the meaning of questions, interpretations of the preliminary results for the authors and those individuals who provided coding information of the results.

b. Subjects

The participants in the study were senior level managers in academia, science, professional and later NCAA football and hockey, and industry. Their titles included president, chief scientist, director, producer, dean, and coach. Forty participants were drawn from the northeast, the mid-west, the southwest, and west coast institutions. The sample includes ten female subjects and thirty male subjects. Subjects ranged in age from young adult (24-30), adult (31-40), to mid-life adult (41-50), to the more senior, mature adult (51-60), and seasoned adult (61 plus). Four of the ten females were co-founders of companies. Six of the females were in leadership positions. Twelve of the thirty males were founders or co-founders of companies. Fourteen were in positions of leadership.

d. Development of the Instrument

i. Leader interview questions: The personal interview questions were written by one of the authors. 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 of engineering or science. 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 in leadership?*

ii. Story-Telling (TAT) Cue Question: *Imagine that you tell me about the gender element in leadership, what specific examples come to mind?* The methodology used for the story telling question was based on the Thematic Apperception Test (TAT). While the TAT was originally designed to clinically categorize unconscious images with a picture test, Atkinson[41] 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 question offers 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 survey formats. 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 techniques[16]. The authors modified the traditional TAT approach in both directions and coding schemes. Coding techniques for the use of the 'picture test' story replicates validated techniques.

e. Procedure for Data Collection

The personal interview questions and the story cue questions were administered using the Atkinson individual format[41]. In the preliminary study the authors were the experimenters and questions were administered at the college, the company, or pre-determined city location of the college or company. All forty subjects received identical directions prior to the interview and for the story-cue question.

f. Coding Schemes

Both the leader interview questions and the story-telling cue test required clearly defined coding systems so that the results could be interpreted and evaluated. These coding systems are described below:

i. Leader Interview Questions Coding: The primary measure was participants' responses to questions about the idea of leading or entrepreneurial behavior, utilized for building a coding mechanism with any word or word phrase that was used at least once in their discussion. Unscripted comments in the interview-discussion set of questions were content coded. Next, participants' story telling responses to the interview-story telling-discussion question about the gender element in leadership was measured using the TAT type, validated technique.

Leader responses to each of the questions were placed into one of three categories, Leadership Components, Entrepreneurial Components, or Distinctions between Leader and Entrepreneur. Sub-categorizations for each category were based on two separate reviewer analysis of subject responses. One of the reviewers was blind to the goals of the current study.

-Leadership Components-
Influences on the Leader
Leadership Images—indicates words and word-phrases defining the leader, presence, aura, confidence, a productive initiator
Parent or Other Family Memories—indicates parent or other family memory
Technology references—references to ways technology drives leadership

Influences of the Leader
Leader as Role-Model—leading from the front
Leader Setting the Strategic Pace—indicates both maintenance and visionary practices
Leader as the Calming Force—indicates the role of emotion in their successful work
Leader as Coach—gaining and creating trusting team atmospheres
Leader as Teacher— learning and teaching, caring, patient and tolerant of mistakes
Leader as an Inspirational Individual

-Entrepreneurial Components-
Entrepreneur Brings the Money
Establishes relationships with banks, state, private and non-private sector funding

Business goals and sales focus

Entrepreneurial Mindset
Entrepreneur indicates single track mind on defining the new idea and getting the message across
As Responsibility
Finding path from trend to innovative success
Interprets going from vision to tactics
Sales is constantly on their mind

Entrepreneur as Excitable Force
Emotionally charging the atmosphere
Searching for new challenges
Prophetic words of wisdom used
Reflects on trying to find a balance between head/heart in decision-making

-Distinctions between Leader and Entrepreneur-
Business Goals and Sales Mindset
Leader is not as worried about selling
Entrepreneur knows what it feels like to fail at making payroll

Team, Collaboration and Cooperation
Leader vs. entrepreneur differences in collaborating and facilitating team behavior
Leader goes into an existing culture while entrepreneur builds the culture

Family Influences and Cultural References
Identification of family member as an influence
Childhood memories of personal plans for a 'leading' future
References to a strong Cultural background

Differences in Ways They Use their Emotions to Set the Strategic Pace
Differences in emotional comfort level—Sensitive to mistakes and to criticism
Recognition of isolation
Contrasting views of helping and coaching
Dreamer and visionary
Balancing act of work, connection to friends at work, and personal life

Persistent Ways of Finding Innovations
Differences in taking measured risks with an adventuresome edge
Inventive and creative practice variations

ii. Story-Telling Cue Question: What emerged was unconsciously motivated, unscripted and unplanned stories. Each response was coded using story imagery and themes. The following five attributes and sub-categories organize the imagery and themes:

-Gender as a Contextual Influence-

Gender Composition and Predominance of Males—indicates references to few females, cohorts, "only one," an all guy shop

Group Dynamic Distinctions in Same Gender and Mixed-gender Groups—refers to gender perceptions of male and female leader in team collaboration

Team Collaboration Distinction

Subtle or Hostile Forms of Discrimination Against Women

Teams Created by Women

-Variations in Choosing Leadership by Gender-

Emerging or Choosing Leadership or Entrepreneurship

Perceptions of Female Balancing Act

Both genders referenced the difficulties for women balancing work and family

Female balancing act perceived as more difficulty than male balancing

Males referred to friendship loss at work and marriages ending

Females discussed family demands or joked about 'needing a wife'

-Gender as an Expression of Self

Styles of Behavior

References to Family and Background Characteristics

Connecting and Team Collaboration Distinctions—teams for women quoted as the hardest—the culture doesn't always reinforce it, you are either in the in-crowd or not

Character Type and Sexuality—harsh, happy, sad, sexual energy, boy/girl stuff, sexual tension, adversarial, styles of behavior, compatibility, offended or not easily offended, 'back in high school' pressures and references to adolescent regressions

-Gender as an Element in Productive Decision-Making-

When Guys Like to Do Things With Guys and When They Like to Work With Guys

Practical Choices Mean Making Unpopular Gender Distinctions

-Gender, Risk-Taking and Innovations-

The Gender Role in Persisting Through Rejections

Gender referred to as the driving force for persisting through rejection and failure

Creativity and invention referred to occurring more when groups were not compatible

4. Results and Discussion

While detailed compilation of the findings are completed, brief reports presented here for the purposes of this phase of the preliminary investigation. Responses to the four questions concerning definitions of leadership, distinctions in entrepreneurship, thoughts on teams and collaboration, and comments on family are included. The gender element images and themes that emerged in the story-telling cue question are also reported. The focus is on the forces that framed the responses in the leader interviews.

Of the 40 participants involved in the study, all respondents completed the interview portion. Although the "interview" questions and story questions were designed for a 20 minute conversation, 28 respondents continued the conversation for at least 30 minutes, and 12

continued the conversation for 1 hour. With respect to the leader interview results, the data for participants from college/university institutions were combined with participants from industry and the sports arena, because no significant situational factor differences were found.

Five 'pictures' frame the discussion of findings: 1) Gender Distinctions in Leader or Entrepreneur Constructs, 2) Variations in Leader and Entrepreneur Creation of Team, 3)Traditional and Contemporary Ways Women Emerge as Leader, 4) Family Influences on the Leader, and 5) Emotional Balancing Act of Leader. All five pictures include a summarized set of emerging themes and suggestions for best practice during next research steps.

A. Gender Distinctions in Leader or Entrepreneur Constructs
First, while men and women may differ in pre-dominance as senior level managers, they tend to agree in their definitions of leader and entrepreneur. Participants' use of intriguing words and word phrase definitions of leader and entrepreneur were often similar to today's definition of business or academic leader. While men and women have similar conceptions of productive leader behavior, distinctions and similarities between leader and entrepreneur constructs, there is hesitation and confusion about making sense out of some not so subtle hostile environments that discriminate against women. Could this be why women choose to go out on their own and lead?

One women and senior officer in a computer company said, "For women leadership and entrepreneurship are one and the same. The woman entrepreneur goes extra steps and wants to be identified as a talent and in charge and does not like waiting around for other people to perhaps give her that opportunity. They have to go out on their own and make it happen. It's not that they don't want to work with others—it just takes a certain kind of person—whatever she does she is good at it, and has confidence in her opinions and decisions."

Many respondents prefaced comments about being a leader or entrepreneur with, "….all of this is so much harder for a woman—today and yesterday." A senior male engineer and director of a health care organization said, "I hate it because women are treated unfairly in all of this. It's easier for me to lead in my environment than for a woman. Frankly, she has to cope with a context that supports the ordinary male, and discriminates against the very talented female."

A dean at one of the largest engineering schools in the United States referred to wishes for ordinary leaders. He referred to levels of leadership and levels of entrepreneurship in his discussion, "Ordinary females don't differentiate themselves from their male counterparts, yet they have often successfully balanced having children with work, their work cannot be average like other faculty to get tenure, they still are extraordinary. We need more 'ordinary' role models."

Best practice during next research steps would continue to delve into leadership and entrepreneurship theory as it applies to gender by exploring a multiple coder analysis of carefully examined coded categories of leadership and entrepreneurship, depending of the definitions of leader or entrepreneur within a work context, and the gender of the senior level manager participant.

B. Creation of Team

Leaders create and participate in existing cultures where transformation and change is a primary goal. Entrepreneurs creatively persist and invent new products, services while building new cultures. Building a trusting atmosphere, understanding the impact that past history has on expectation, coping with conflicts, modifying the boundaries, and the impact of technology on leadership appeared to be the components that leaders and entrepreneurs discussed.

While men and women may differ in their motivational goals, they had strikingly similar ways of discussing the importance of team. Organizing, delegating and inspiring followers are the foundation components of forming a team. What distinguished the leader and the entrepreneur were the ways they viewed and reflected on their team's response to them. The coaches in the study provide examples. One coach said, "Successful coaches have to be good leaders and know how to get the best out of people. They have to trust you. They trust me—not only because of my technical knowledge, calling the right plays or coaching experience in the pros, there is an emotional bond. They know that I work hard and will sacrifice more for them." Another coach talked about learning to trust and have faith in himself when he referred to the time he was mentored by one very special coach, "…he said that I had a gift, I could see it happening before it did and know the impact that would have on the game. No one every told me that I was a talented coach before, he identified that in me—now I help identify that in the athletes—and we have to make a connection to each other." The coaches talked about the leader side of coaching, and leaders clearly referred to a coaching side to leadership. The entrepreneur, in contrast, talked about not always having patience for the coaching side of the job and often saw it as a burden.

One private, west coast university dean indicated the powerful role that history played on leading in his institution, when he referred to, "….we have so much available to us here, and we are fortunate to work in an historically successful 'culture of expectation." Another dean, leading a public west coast institution referred to working hard to balance the culture of excellence in engineering with the struggle for finding more funding and grant money.

Coping with inevitable conflicts is part of forming a productive team atmosphere in any organization. What emerged in many discussions were the paradoxes of belonging to the group when disagreement occurred. Males and females told stories indicating that when it came to disagreement, being a leader was different for the man than for the woman. "When females fight it seemed personal and like a street-fight brawl vs. the more tactical strategic fighting for the males." This comment came from a science leader who uses his experience as an Olympic coach as a parallel to his observations in the college classroom and at work.

What happens when the leader's plan does not work, fails or is rejected? One production company founder and CEO referred to his, "…futuristic and maverick atmosphere in the company…" that shaped how they learned new approaches or discovered inventive measures for succeeding. The possibility for failure is not what concerns him as an entrepreneur.

Another company founder and innovator discussed the question that is always on his mind, "….how do I find the trends, the new ways to know the trends—it's just a matter of connecting the strategic path to the vision, isn't it?" He wondered if females, due to the nature of the environments that shaped them might be able to be creative and find new paths despite failure and rejection.

When the gender composition of the group was a focus, the leader's discussion references to the different type of team atmosphere when it was an all male contrasted to an all female team. "Males are just different when they are alone with each other than when women work with each other. Frankly, females can't win here…they are called cold if they don't respond or accused of being harsh and tough if they do respond when pushed by men." A young male leader in a leading west coast communications company illuminated further, "…females are pretty obviously at a disadvantage, and they discriminate against themselves." A senior level male leader agreed, "I don't see support among women at the senior level. While they don't necessarily see the gender card, it's always a variable in the situation for them. Do they still feel they have something to prove?"

The leader appears to exist in an environment with firm boundaries that may be modified and changed, yet the entrepreneur has softer boundaries and may have the advantage for productive change. One former coach of a professional team, working as a General Manager of a new team said, "Leadership is knowing how far I can push one guy, what are their limits."

"Technology drives leadership," was a key theme in many discussions about productive teams. Leaders from across many regions of the United States discussed the seductive and powerful nature of new technologies. Technology offered ways to achieving seamless internal and external communication.

Best practice during next research steps would sharpen the exploratory angle of the team issue by modifying the interview questions to include the dependent variables of participants' attitude toward building a trusting atmosphere, cultural expectations, adaptive change during conflict and the impact of new technologies on communication. In addition participants' cognitive responses to the interview questions would be measured using a thought-listing exercise designed to measure the participants' first impressions of the gender-composition of the team.

C. Traditional and Contemporary Woman Leaders
What the contemporary women leader is like and likes about leadership appears to have shifted. Three angles frame the discussion of traditional and contemporary woman leaders: the liking factor in past and present practices, male and female perceptions about productive woman leaders, and resilience in tough conditions.

While women still report that they don't always find many people like them, they like who they are, and they like challenging, changing productive work. Traditional woman leaders talked about being first and the only one. Three different responses illustrate, "During my first year as professor, my dean asked me to start a caucus for women in engineering, I was horrified, and said, "But I am the only woman I know; I don't know any women." "When I started teaching engineering I was the first one and the only one in the department and the entire school of engineering for ten years. At the time there was a rule that women staff could not attend faculty social functions. I guess I was lucky that I was married. Men asked me what I wanted and what I was trying to prove. They and their wives would have thought I was only there to get a man."

The word 'like' appeared multiple times and dominated male and female stories. Like as an emotion defining similarity and like as recognition of praise or collaborative interest emerged in

many cases. A story from a 26 year old woman military lieutenant about her work on the ship before leaving to begin helicopter instruction school is illuminating. "He said that he wanted to have a professional conversation about what bothered him about my telling him what to do….he said you are the 'only one' that I have a problem with and by the way, I don't like you. Sure I went back to my office and cried…but not in front of him. I told him that the only reason he had that conversation with me was so that he could go back and tell all the guys that he put me in my place."

A woman faculty member who worked for many years as engineering chair and dean said, "They don't like me, they don't like the decision….so they don't like it."

Some stories were stunning examples of little contemporary change. One male construction/ contracting entrepreneur referred to why his east coast company was dominated by a 90 male professional workforce as a, "…boy/girl thing." "Guys like to do things with guys, and they like to work with guys." His response was practical, "Would I hire a woman if she applied, sure….would I go searching for a woman, no. I have to look at getting the job done and I have to be practical and put the team together that can do this." Another technical company founder suggested that although it was uncomfortable to admit it he preferred all male teams: "It's easier to manage the all male teams. I have been part of those teams. I know what it is like." One young engineering and science serial entrepreneur referred to his observations of what women were like as an entrepreneurial asset in his 12th company, "The environmental piece shapes them (women) differently. This makes them sensitive and strong in a way that is great practice for an entrepreneur. They fall down and they get up and are able to deal with lots of rejection with lots of convincing and persuasion. This is just what an entrepreneur needs to be able to do—cope with and move on from failure."

Both male and female leaders agreed that being female, and one of a few as leader, combined as a powerful regressive force. One male leader said, on our technical side it's an all guy shop…include a woman in the equation and it's like being back in high school." The adolescent theme emerged again when a founder of a bay area computer company referred to 9 out 10 of the women in his company as 32 going on 15. He said, "They have temper tantrums. They have these daily extremes between home and work…for them work is personal…they cannot distinguish between the two. I don't like it."

Identification and raising the 'liking factor' elements to the surface—finding general similarities, praise and recognition for cooperation and collaboration—protects the leader's interest. People are not so influenced by receiving advice from the people they like but by the knowledge that this person likes them[42]. The leader's job, however, is not to invent or manufacture similarities or cooperative mutual goals, it's to identify where the similarities naturally exist in all relationships. Everyone benefits. We relax at work when we are liked.

Best practice during next research steps would be conducted to replicate the gender-composition of the group component in the team finding (see above section C) and modify the questions and additional research manipulations to uncover the meaning of gender in terms of emotional responses to cooperation or competition. To examine these possibilities, further method planning for investigation is necessary.

D. <u>Family Influences on the Leader and Entrepreneur</u>
Early childhood memories were often framed around when the leader was ten. All the leaders remembered knowing at a very young age that they would do something big or have some kind of business. Some emerged as young leaders at school in athletics or were known for academic talent or unique strengths. Many remembered one family member who existed as a leader role model and recognized their leadership.

Consider the difference between the male entrepreneur and the male leader. In the context of family, all but two of the participants named a mother, father, grandmother or grandfather as an influential force. Interestingly, one dramatic difference contrasted the male entrepreneur from the male leader. The male entrepreneur told stories about dad while male leaders discussed their admiration for a confident and strong mom. Examples illustrate: Middle childhood and pre-teen memories often included references to a close bond to one parent. Interestingly, there appeared to be a variation in parental influence. Male leaders referred to a closeness to mom, while male entrepreneurs discussed dad—mostly by providing examples of a closeness to dad or in a few cases, wishing for a more emotionally present father in three ways:

   1. Men identifying self as an emerging leader referred to their mother. One leading communications company male leader said, "My mom was the strong one. She was outspoken and never afraid. She is the one that made the family what it is."

   2. Men identifying self as entrepreneur either referred to the extraordinary ways that they connected to their dad or they suggested that they wished that dad was more emotionally present or capable of being an influence. Three male entrepreneur comments illuminate:
"I watched my dad lead. He would bring me to his office or let me stay when work continued with his team at the house…he never asked me to leave. I watched him tackle all of these issues and problems."
"I wish I could say that it was my father (who was a key family influence). I felt like he was jealous of me."
"I see male friends of mine who don't have relationships like I do with my dad. I was fortunate. He always led me by listening, encouraging and—well, he believed that I could go far, even be more successful than he was---and he was very successful."

   3. While the sample is small women always referred to both parents. In one case a woman company founder stated, "…there may be a little leader in me, if so, it's not because of any guidance or emotional support from my parents. They were not able to do any of that." A sound production company founder said, "It was both my mom and dad, in different ways. Dad was a strong persistent force and mom was always quietly there for me. I knew that I could count on them both."

Culture and cultural background was frequently mentioned as a driving force for many of the entrepreneurs. International and foreign born parents were discussed across British, Asian, Native American, Italian, Indian, Lebanese and Armenian cultures. Leaders and entrepreneurs also mentioned the relevance of geographic location in their successes. A serial male entrepreneur said, "…this part of the USA (northeast) segregates types, lines don't get crossed as much here, people have firm ideas about who people are based on race, ethnicity, educational background—I don't know if that is both good and bad, but I am always aware of it."

Best practice during next research steps would utilize a validated bio data collecting method

approach in the consideration of family and background factors with a larger participant group that over samples for the female. This would identify whether the male leader, male entrepreneur and female leader findings that identified a parental link were isolated findings.

E. <u>Emotional Balancing Act of Leader</u>
 Some of the most compelling insights with the participants occurred when they began discussing their emotional make-up and character. Stunning and honest reflections suggested insights about differences in work and home connections. In a few cases, the males were forthcoming about having to cope with some not so personally appealing choices that they made.   Suggestions from some males actually indicated a belief system that females were impressively more mature and moral in matters of the heart and soul. "I kind of think that the women show higher morals at work, and maybe are more clear about who they are, " reported a young male communications company director.

The emotional balancing act of the leader is discussed with a focus on the following themes: insights about personality, responses to high-profile jobs where they often received public attention, connections and loss of friends, and ways of coping with combative people and dissent. Every leader and entrepreneur discussed their emotional make-up and referred to a confidence in what they know and do, yet they honestly included examples of when they either felt uncomfortable with their emotions or felt insecure. While an in depth personality analysis or diagnostic interpretations was not a goal of this study, some of the most stunning revelations occurred in discussions concerning emotional response.

Males and females agreed that it wasn't always fun being in the limelight. They wished they had handled some public attention with more grace and wisdom. Others discussed the fun and humor they liked to use to cope with all of the, sometimes not positive, attention. One female senior executive officer said, "The more that you are out there in front of people, the more they can attack you. Sometimes if you don't give them anything bad to say about you, they will make it up. You better have a thick skin."

Another young male company leader indicated that he wanted to deflect the attention away from himself. He indicated that the productive leader or entrepreneur won't succeed if they are in it for the fame or the ego or living the dream. He also referred to how important it was to continue to learn—both about the business and about himself by looking inward.

Males and females indicated a relational way that they made connections. While the current sample includes fewer females than males, there did appear to be a trend towards females understanding more about the ways they connected—at work and at home. One male leader indicated that he had paid a high emotional price for leadership. "When I went from faculty to Chair of the Department I managed to retain all of my friends, when I moved from Chair to Dean, I lost all of them. Sure I gained a few new friends, but I have never forgotten that." In references to his personal ways of coping he suggested, "…I guess I was subconsciously looking for ways of connecting in my personal life with my marriage."

The ways the leader coped with combative people and dissent appeared as a foundation for emotionally leading the group. "I guess what arena you entertain dissent—whether you can

tolerate public dissent or only tolerate challenge and dissent in a controlled environment behind closed doors becomes important. I am convinced that my faculty say that they like me because I tolerate and encourage public dissent."

In a similar context, a male engineer and strategy company director said, "I always want to hire those smarter than me, I want my people to challenge and disagree with me—both one on one and in front of the group. I frequently tell them to please take my job…they know that they won't be punished for making a mistake— they get paid a lot—it would be a very expensive mistake if we don't figure out ways for people to learn."

A female co-founder of a production company said, "I work in a male-dominated field. It's taken me years to take myself emotionally out of the situation. When the males were looking at the challenges and the problems, I internalized and personalized their disagreement."

Anger was a word used by one third of the males reflecting on their responses at work. "I scare the hell out of my men when I get angry." "When I get tired I get angry, when I get angry I have a limited view and angle on the game, I continue to search for ways to get invigorated and exhilarated…otherwise I feel isolated." Women in contrast talked about feeling exhausted by frustration or disappointed. A woman's comment illustrates. "I just felt alone and disappointed when people said that I wasn't very friendly. I just worked so hard."

Although males and females provided multiple examples of emotional generosity, there appeared to be some themes indicating emotional distinctions between the leader and the entrepreneur. A higher emotional comfort level appeared to exist in the leader in contrast to the entrepreneur who referenced feeling impatient and burdened with the emotional requests of his or her team. One company founder said, "I will listen for hours, I have even bailed one of my staff out of jail, I just get exhausted with that part of my job." In contrast a CEO of an engineering strategy firm said, "I can spend days teaching and helping my people learn and tolerate mistakes, I have fun with all of that, it's the bozos in administration that make me impatient."

When it comes to the emotional distinctions between leader and entrepreneur, personality type can be instructive. Perhaps the most intriguing preliminary finding concerned discussions suggesting differing emotional forces of leader and entrepreneur. The calming forces of the leader were discussed while the entrepreneur was considered the excitable force and getting things all stirred up.

Best practice during next research steps concerning emotional responses of the leader would include a socio-psychological diagnostic component to adequately consider personality and character type.

5. Implications for Further Work

The present study provides new insight on the subtle but dramatic distinctions between the reports of leader and entrepreneur, participants' perceptions of the role of gender in leadership, and the impact emotion has on both the construction and practice of leader behavior. Our results suggest that unanswered questions remain and deserve further investigation. What are the

unique features of a woman's life that may shape successful entrepreneurial behavior? How can leaders identify the ways that cooperation and collaboration naturally exist in all relationships? Does a significant past family relationship set a different stage for the leader and the entrepreneur? Is there a 21st Century shift in the personality type or character of a leader?

A number of conclusions can be drawn. First, we argue that there is a need to change and adapt our understanding and focus on leadership in engineering and science. We believe that participants' responses offer some new perspectives on not only defining leadership and entrepreneurship, but also to the role that gender plays in our evolving definition of leadership in the engineering and science classroom.

Second, experimental design needs further consideration. Our next phases of research on the gender phenomenon in leadership and entrepreneurship should be conducted with an empirical approach that goes beyond the present study's preliminary test that utilized the experienced observations of the authors. The tremendous amount of interesting data that emerged utilizing the present approach requires further evaluation.

In addition to the qualitative inquiry and the projective measure, participants' responses to the four interview questions and the interview-story-telling-discussion projective measure, additional research manipulations would include the participants' impressions and attitude toward the issues of leading identified with a scale measure ranging from 1(extremely untrue) to 9(extremely true) on Liking Factor[43] dimensions of favorable response. Another main measure would utilize a thought-listing exercise to further identify participants; impressions of approachable, confident, likable, interesting, friendly, sincere, and warm[44]. These series of additional measures could be used to asses how the participant feels along a series of dimensions during the interviewing process.

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