Telling Stories About Engineering: Group Dynamics and Resistance to Diversity[1]

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Feminists and other proponents of engineering diversity often encounter resistance to initiatives and programs intended to increase diversity in engineering. Supporters of diversity often suggest both strategies for attracting underrepresented group members and changes to engineering itself. It is less common for proponents of diversity to directly address the stubborn resistance to diversity that frequently prevails in the discipline. This paper addresses resistance to diversity in engineering education using a psychodynamic approach to group social identity. From a group-psychodynamic perspective, resistance to diversity as threatening to the group and to its identity is predictable, although the particular circumstances and culture of the group remain to be analyzed. We give particular attention to the role of engineering "leaders" in influencing group responses to the perceived diversity threat, suggesting a number of practical changes in engineering culture that are likely to mitigate the sense of threat associated with increasing diversification.

Keywords: engineering / diversity / feminism / psychoanalysis / leadership / group identity / language

Naming Diversity

Professions, businesses, and educational institutions increasingly promote the cause of diversity and commit resources to enhancing the success of members of different social groups. This is certainly true of the engineering profession in general and of colleges, departments, and programs throughout the United States that train and educate engineers. At the same time, there remains a great deal of misunderstanding within engineering about "diversity"—what it is, why institutions should be concerned with it, and how to achieve it. In this paper, we apply insights drawn from psychodynamic group theory to engineering and engineering education to investigate some common problems concerning the institutionalization of diversity. In particular, we argue that understanding resistance to diversity is enhanced by a group-psychodynamic perspective and that leaders of in-groups play a key role in conducting group responses—consciously and unconsciously, positively and negatively.[2]

Although concern with diversity has deep historical and philosophical roots (Mill 1994), diversity in the United States is usually identified

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with contemporary feminism and, thus, for many in male-dominated professions, with a host of negative associations of radicalism and misandry. Critics of diversity also may assume that it is anti-individualist, respecting group membership more than individuality and individual achievement. However, for feminist advocates of diversity, there is no inconsistency between respecting individual achievement and carefully nurturing the conditions for wide participation by members of underrepresented groups.

There is some support for this feminist perspective within the engineering profession. Speaking on diversity in the engineering workforce, the president of the National Academy of Engineering, William A. Wulf, explicitly relates the concern with diversity of thought to the diverse contexts and experiences that are legacies of group identity in most cultures. Wulf notes that

> [a]t a fundamental level, men, women, ethnic minorities, racial minorities, and people with handicaps, experience the world differently. Those differences in experience are the "gene pool" from which creativity springs (1999a, 10). . . . Since the products and processes we create are limited by the life experiences of the workforce, the best solution—the elegant solution—may never be considered because of that lack (1999b, 2).

As Wulf suggests, organizations diversified by race, ethnicity, religion, class, and gender are the best hope for problem-solving and creativity.

However, a quick look at current demographics shows that engineering—as a profession and as an educational enterprise—continues to be relatively homogeneous. As Beatriz Clewell and Patricia Campbell note in a recent review of the data on women's progress in science and engineering, "the more things change, the more they stay the same." (2002, 257) In the early 1970s, women comprised a mere 1 percent of engineering undergraduate enrollments. Following the enactment of Title IX, the enrollment of women grew, and presently women represent approximately 19 to 20 percent of engineering undergraduates. During the past 10 years, however, the rate of increase has slowed, and indeed the percentage of women undergraduates has been essentially static for the last five years. The percentage of engineering African American or Native American undergraduates has remained virtually unchanged over the past 10 years, at 6 to 7 percent and less than 1 percent, respectively. The percentage of undergraduates identified as Hispanic has increased slightly over the same period, from about 6 to 8 percent (WEPAN 2002).

In computer science, the situation is even more distressing, as the percentage of women has actually declined since the mid-1980s, when women earned nearly 40 percent of the B.S. degrees, compared to approximately 28 percent currently. The percentage of B.S. degrees in computer science awarded to African Americans and Hispanics has increased over

the last 10 years by about 1 percent, to 10 and 5 percent respectively, while that of Native Americans has remained unchanged at less than 1 percent.[3] Overall, women make up only 9 percent of employed engineers. Just 6.5 percent of engineering faculty are women; among full professors, only 1.4 percent are women (WEPAN 2002).

This astonishing lack of improvement and, in some cases, actual deterioration in the participation of women and minorities in engineering, has occurred during the same time period when women have flocked to medicine, law, business, and veterinary medicine; when corporate America has touted the benefits of diversity and articulated its need for a diverse workforce; and when women in engineering and minorities in engineering programs have been established and maintained at universities across the country. Two questions inescapably come to mind: What is it about engineering that renders it so resistant to diversity in its students, educators, and practitioners? How can feminists and others who work to implement the increasing diversification of engineering understand and respond to resistance to diversity?

A Group-Psychoanalytic Approach to Diversity

There are many fruitful perspectives from which to study diversity and the obstacles to diversification in science and engineering. Feminists have used a variety of methods and conceptual tools to do this kind of work, including social, political, philosophical, and educational theories (see, e.g., Hacker 1989; Harding 1986; Longino 1990; McIlwee and Robinson 1992; Rosser 1992; Spanier 1995; Tuana 1989). Feminists have also used the insights of psychoanalytic theory to theorize about the internalization of gender roles and the implications of gender relations and attributions for identity-construction and gendered subjectivity (Keller 1985). However, although feminist thought has employed psychoanalytic perspectives to theorize about the roots of gender identity and other important topics, feminists have not drawn consistently upon the literature in psychodynamic theories of groups (Burack 1997). Like work on gender development, much of this literature also proceeds from the relational tradition and is influenced by such theorists as Wilfred Bion (1989) and A. K. Rice (1965). Rather than being fundamentally individual and developmental, group psychoanalysis uses clinical and social observation to analyze the ways in which shared defenses and unconscious assumptions influence processes and outcomes in groups, organizations, and larger social collectivities.[4]

Observers often take for granted that organizational efforts toward greater diversity trigger resistance in those who are already present—and whose racial, ethnic, gender, and other identities are already represented—in these diversifying organizations. However, our understanding of the

causes and meanings of this resistance is often sparse and vague, and responses to resistance either hortatory or punitive. For those who value diversity, it is difficult to concede that resistances to it might be predictable, even understandable, and that not all resistance is merely a function of deliberate bias against out-groups (Rustin 1991).

Group life has both conscious and unconscious dimensions. The conscious public agenda of most groups is not difficult to specify. For engineers, this agenda might be described as analogous to medicine: engineers "doctor" to the needs of society. Engineers are problem-solvers, who diagnose situations and apply their training, experience, and common sense to design solutions and produce creative innovations in the service of improving life for all people. Groups also have unconscious emotional processes and agendas, and although this emotional agenda may differ from group to group, many patterns emerge that apply across groups.

Certain shared emotional operations are commonly observed in groups. As many observers have noted, these operations become more entrenched and more difficult to ameliorate in circumstances in which a shared sense of threat bonds group members to each other and to their group identity. Orientation toward us-them thinking, defense of group boundaries, and the tendency to idealize the group characterize many social groups, although these processes may emerge in a wide variety of ways, both in intra-group relations and in relations between a group and outsiders (Volkan 1988). There are many circumstances in which these tendencies of groups are functional for certain purposes, as when identifications with sports teams reinforce "team spirit" and boost team-related sales. It is also common in some venues for leaders to deliberately exaggerate these emotional operations and create, for example, the group dynamics of military life (Segal 1995). However, it is also common for the ordinary group dynamics of professional, religious, and social groups to become socially dysfunctional and to create patterns of thought and behavior that individual group members can neither explain nor justify.

It is of importance that, for psychoanalytic group theorists, group psychology is not only a function of particular gatherings of individuals who can be understood as belonging to a group. Rather, the physical gathering of collectivities *displays* group processes, rather than creating them. As Bion explains, group processes are always present in the life worlds of those who understand themselves as members of a group:

> [I]t is important that the group should come together so that the characteristics of the group and the individual in it should be demonstrable. I attach no intrinsic importance to the coming together of the group . . . Now this congregation of the group in a particular place at a particular time is obviously very important . . . but it has no significance whatsoever in the production of group phenomena (1989, 132).

Bion's attention to the ways in which group phenomena construct the subjectivity of those who identify with groups is at the core of psychodynamic theories of groups. Although they usually describe the collective behaviors associated with various group positions and fantasies, these theories are not merely behavioral. Rather, they attend closely to the fears, fantasies, anxieties, and defenses of those whose group identifications produce the observable phenomena of group psychology.

Besides documenting and analyzing the psychodynamics of groups as a whole, psychoanalytic theories of groups give central attention to leadership and to the often-unconscious dynamics between leaders and other group members. But who are the leaders in classrooms, workplaces or in professions? In terms of the effects of leadership for group members, psychoanalysts of groups would instruct us to employ a broad definition of leadership that, in education, can include administrators, professors, and even students. Such a broad definition makes sense because leadership does not need to be institutionalized to affect the processes and outcomes of groups. Hence, leadership need not be limited to those who teach the overt curriculum. Leadership embraces all those who answer the question "who are we?"—all those who tell the story of the group—in ways that resonate with group members and that influence subsequent group practices.

Leaders of groups "create a story about the world," helping group members to shape and pass down particular versions of the group's ideals and ethos (Alford 1994). This role makes the leader not merely a teacher of cognitive concepts, but a kind of interpreter and historian. Together, leaders and group members engage in the mutual work of crafting and verbalizing a meaningful group memoir, with the leader as the "conductor" who sets the intellectual and emotional agenda (Foulkes 1990).

Leadership and Language

It is important to pay attention to both content and language when leaders relate the group's story because language carries with it unconscious meanings that influence the thinking of group members and, in turn, convey their group dynamics. The language employed by group members both influences and is influenced by perceptions of group attributes. Calling typical uses of language into question interrupts the mutually-constituting relationship between language and perceptions, and creates conceptual space for re-thinking language that underpins in-group attitudes and values. Interrogating language use also gives leaders opportunities to interpret back to group members the multiplicity of unconscious meanings that may be contained within familiar terms and expressions. Two examples of language use in engineering are especially meaningful in the context of the predominance of men in the discipline.

It is common for engineers to counter narrow perceptions of what they do, and the kinds of aptitudes that engineering requires, by pointing out that engineers use two quite different kinds of skills: "hard" and "soft." Hard skills are technical, mathematical, and scientific; soft skills are interpersonal and communicative. The use of the terms hard and soft as modifiers for skills or areas of expertise in engineering and technology is so widespread that their meanings are understood and shared, though left unspoken, by the community.[5]

On the surface, hard refers to that which has mathematical content or involves the use of hands-on skill with technological equipment. Soft refers to what is devoid of mathematical content and does not involve technological equipment. A closer inspection of such usage, however, reveals that there is a hierarchy, with hard skills ranked more highly, despite the recent trend to describe soft skills as just as important and more difficult to learn than hard skills.[6]

These uses of the modifiers hard and soft have no obvious connection to the skills they denote in engineering. There is no strong intuitive connection between mathematics and "hardness" that those outside the science and engineering professions would make and that would affirm the usage as reflecting a common sense parallel. However, connections between masculinity, virility, male sexuality, and hardness are culturally engrained, have unconscious emotional resonance, and are widely and immediately understood. Likewise, the connection of softness with femininity is a cultural signifier with both conscious and unconscious meaning. Neither are hard and soft understood as equivalent terms. Perhaps because of their status as marked with already-gendered meanings, hardness and softness are hierarchically ordered, with what is hard commanding greater respect and recognition than the soft. It is no accident of language that enemy groups frequently express ridicule by describing each other as soft or that groups express anxiety about their own softness or permeability in the face of threat. The unspoken charge is of effeminacy—the de-sexing and degrading of men through metaphorical impotence.[7]

Do engineers intend to express these gendered meanings when they talk of hard and soft skills? Perhaps not consciously, but the reality of our widely-shared and unconscious understandings of these terms works to inflect skills language with gendered meanings. Because of this inflection, it would not be surprising to find male engineers ranking these skills (hard = high, soft = low), resisting proficiency in soft skills, expressing anxiety about the acquisition of soft skills, and—implicitly or explicitly—identifying women with lesser ability to achieve proficiency in the hard skills that denote masculine competence. If we acknowledge these unconscious group identifications, it makes sense that leaders in engineering choose to avoid the embedded gendered connotations of these words

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and select terms for skills that do not reinforce the gendered divisions that already exist in the profession.

A second example is widespread in ordinary usage even though it is the object of sustained criticism in academia, publishing, and other segments of social life: the use of putatively "gender-neutral" language. Certainly there are those who continue to defend the gender-neutrality of "man" and masculine pronouns in the face of criticisms of these usages. However, most use of gender-neutral language is imitative and undeliberated—the effect of overwhelmingly consistent linguistic practices rather than of thoughtful linguistic choices. When leaders in engineering speak of "the engineer" in putatively gender-neutral terms as "he" they reinforce widely held stereotypes of men's and women's competence and foster an immediate and unconscious image of the typical, and perhaps ideal, engineer as male.

Is this image of the ideal engineer an obstacle to diversity? Suzanne Franks was invited recently to conduct a class of first-year and sophomore engineering students on the general topic of gender issues in engineering. Students were separated into four groups. Each group was given a list of 40 adjectives, taken from the Bem (1993) Sex Roles Inventory. Groups were given written instructions to sort the words into two categories. Two of the groups were asked to sort the words into the categories "masculine" and "feminine," while the other two were asked to sort into "engineer" and "non-engineer." Across groups, the sorting into masculine and engineer resulted in virtually the same lists, as did the sorting into feminine and non-engineer, suggesting a common understanding of both gender and of the ideal attributes of engineers. The students, all of whom considered themselves relatively unprejudiced and bias-free, were astonished to find that their groups' understanding of what it means to be an engineer and what it means to be feminine were mutually exclusive. It should be noted that all of the students in the class were members of underrepresented minority groups, and approximately 25 percent of the students were female, unusual for engineering classrooms. Thus, it is not just in-group members who understand and accept the unspoken definition of who "belongs" in the in-group and who does not.

Language that bolsters unconscious images of the group member is particularly pernicious if it is true, as William Wulf (1999b) suggests, that in some cases members of different social groups may actually conceptualize problems, or seek to solve them, in different ways. If the unconscious image of "the engineer" is white and masculine, in-group members are likely to have great difficulty conceptualizing the diverse forms of problems and solutions brought to the group by women and minority men as intellectually legitimate. It is very difficult for an in-group to draw its boundaries, reinforce them unconsciously through language, images, and stereotypes, and then to be able to transcend them through rational evaluation. Taking into account the unconscious emotional valuations

that often are expressed in common forms of language use, we suggest the following alterations in the ways that leaders tell the story of their profession and of their own engineering programs:

- "Engineering meets the needs of society" instead of "Engineering just doesn't appeal to women."
- "Women (and/or minority men) succeed in our program" instead of "Some of our best students are women (and/or minority men)."
- "Successful engineers have strong communication and technical skills" instead of "To succeed, an engineer needs soft skills as well as hard skills."

Such locutions subtly subvert the unconscious group equation of engineering with whiteness and masculinity at the same time that they embrace an inclusive definition of the benefits of engineering to all.

One of the concerns about criticisms of language use in the context of diversity is that such criticisms are wielded by "thought police" who seek to undermine personal freedom in the cause of a political crusade. Indeed, because speech is often idiosyncratic and bodily at the same time that it is shared and profoundly social, criticisms of language use are particularly likely to be construed as attacks on personal identity. However, such reactions are misleading. They personalize critiques of collective phenomena and deflect attention away from the consequences of language use for marginalized or underrepresented group members. What is always at issue in feminist critiques of in-group language is uses of language that, far from being idiosyncratic, are strikingly consistent and widely shared by in-group members at the same time that they are defended as merely expressions of personal belief or individual thought. It is this consistent, shared—indeed, deeply unconscious—quality of group language use that so stubbornly resists examination and reform.

The Values of Diversity

When we encourage diversity we want, at a minimum, to increase the number of people of different groups who choose a particular profession or participate in activities in which those like themselves are not well represented. But inviting in members of underrepresented groups is only one of the values of diversity education and openness. Equally important is the goal of addressing the preconceptions and unconscious images of those members of a profession whose social identities are well represented. It is easier to understand why this second goal is as important as the first if we take group psychodynamics seriously.

Only present engineers, or those currently in training to become engineers, can welcome newcomers and out-group members into the group. Distant administrators, such as university presidents, provosts, recruit-

ment officers, and diversity specialists, cannot. Engineers, including students, make up the everyday psychodynamic environment of the group. Their repertoire of responses shapes the "climate" of the group.

Diversity initiatives must respond to the kinds of questions that are constantly being posed within insular groups: "Why is it necessary to permit entry to these 'others'? If they belonged here with us wouldn't they be here already?" These questions suggest that diversity is not only experienced as an opportunity to group members, but is also—and perhaps in many circumstances primarily—experienced as a threat. In terms of group psychology, the mandate to diversify a group may easily be experienced as a threat to the integrity of the group. This is particularly true because the diversity mandate is, tacitly or explicitly, a kind of criticism undertaken by outsiders and imposed upon an in-group. Regardless of the actual make-up of the in-group, such a criticism is likely to evoke an emotional reaction that is akin to "circling the wagons." When this reaction occurs, what is enacted is an amalgam of us-them thinking, defense of group boundaries, and the tendency to idealize the group *as it is*, not as it might be at some point in the future.

In situations of threat or perceived threat, leaders are torn between representing the "best" of the group's aspirations and reinforcing the "worst" of the group's fears and anxieties. If leaders do not understand the pressures the group is under, they may easily end up doing both: sending group members the message that although they must give lip service to the goals of diversity, leaders and group members tacitly are in solidarity against these goals. One way in which this dynamic occurs in engineering education, often without the deliberate collusion of leaders, is through the emphasis on engineering students and engineers as intellectually superior to those in other fields of endeavor.

It is common for professors and other leaders in engineering education to tell the story of engineering by relating to the next generation of engineers the legacy of intellectual superiority in which they are now implicated. Nor is this narrative about the superiority of engineers exclusive to chauvinistic accounts of the discipline. In a recent article on strategies to recruit and retain more women in science and engineering, Cathy Trower argues that "[s]cientific discovery must not be limited to a select few with homogeneous pedigrees and demographic characteristics" (2002, 1). She notes a National Academy of Sciences (NAS 2000) report which states that science has predominantly been carried out by white males, and that to continue in this way risks alienating citizens from science. However, she quotes from the same report to make a point that underscores the myth of superiority: "Recognizing that 'science must be an elitist enterprise' because 'it needs the very best minds' does not mean that we must discourage or turn away potential scientists because they don't fit a mold to which we have become accustomed" (2002, 1).

The NAS calls for diversity in a way that explicitly reinforces the notion of scientists and engineers as superior and that implicitly conveys the notion that those who do not fit the familiar mold should be welcomed in cautiously to ensure the elitist state of the enterprise. What conversations such as this communicate is that the "very best minds" are already doing science and engineering, and that what the outsiders might have to offer is obtained at great risk to the integrity of the enterprise as a whole. However, the notion of scientists and engineers as an elite, superior group is not supported by data that show that students, both men and women, who leave science and engineering do not differ from those who stay on the basis of GPA or standardized test scores (Seymour and Hewitt 1997). Yet the assumption that engineering students are "the cream of the crop" is embedded even in critical accounts of engineering education where it can pass unnoticed as merely an empirical statement about the relative abilities of engineers and non-engineers (Tonso 1996, 223).

The superiority myth can be both helpful and harmful to women and to men from underrepresented groups struggling to survive and succeed in engineering. While a graduate student, Franks noted of her graduate school education:

> I had convinced myself . . . that I was special because of what I was doing . . . that other women who *weren't* . . . engineers or "hard" scientists were just wimps who weren't trying and weren't as good as me. . . . [But] your status as exceptional is distorted . . . you're not equal [to male classmates]. . . . You really begin to believe that you are different and superior, at the same time that you feel different and inferior. This effectively blocks you from uniting with other women, having any sense of solidarity, and from doing anything to change society (O'Barr and Wyer 1992, 67–8).

This fractured self-conception of engineers is not unusual. During a question and answer session at a seminar Cynthia Burack presented to engineering faculty and students, a female student reported that the idea that engineers were smarter than other students made her feel good and helped her keep going when faced with a long and difficult homework set. This same student, however, reported privately to Suzanne Franks that her belief that engineering students are smarter than other students was often accompanied by the belief that she was not as smart as all the other engineering students and that, as a result, she was not cut out to be an engineer.

Such assertions of superiority as are commonly found in engineering culture side-step contentious debates in psychology about intelligence(s) and the measurements that seek to quantify them (Gould 1996). More important, for attempts to diversify engineering education there is an additional problem that speaks to the importance of minimizing in-group defenses against outsiders. The message of superiority reinforces in-

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group idealization—"we are smarter than those outsiders"; "the kinds of people smart enough to be members of this group are already represented here"—at the same time that diversity seeks to introduce outsiders into the fold. Therefore, we suggest this additional alteration in the way that leaders tell the story of engineering:

- "Engineers work hard and solve problems" instead of "Engineers are the cream of the crop."

From a group-psychodynamics perspective, the mixed message presented by the call for diversity in a culture that holds the superiority myth reinforces durable unconscious convictions about the unfitness of underrepresented group members rather than challenging them. With idealizing convictions reinforced in this manner, hortatory messages about the goods to be derived from diversity are unconvincing. Diversity is likely to be dismissed by those who have received the "real" underlying message: group members must be on the alert to defend the boundaries of their empire of worth against the unworthy interlopers. Once mixed messages of superiority and the mandate toward diversity are broadcast, in-group members can hardly be blamed for believing that their leaders are not serious about diversity. Trusted leaders will not betray and damage the group by insisting on admitting the unqualified, or so the group will believe. And we should not be surprised when group members act in accordance with this belief in a variety of ways that include ridicule, sabotage, scapegoating, and racial or sexual harassment. These strategies are common tools in the arsenal of group conflict. These particular tools have a long history in American social, political, and economic life as ways of marginalizing and controlling disempowered groups such as men and women of color and white women. But the tools may be wielded effectively whenever there are in-groups and out-groups, regardless of the particular identities of those involved. It is actual or perceived power, insider status and/or a sense of threat, and not whiteness, maleness, or any other particular identity formation, that situates groups to employ such strategies effectively.

Diversity: Benefit and Threat

Related to the belief in and expression of intellectual superiority is the threat presented by self-segregating practices such as the establishment of institutionalized programs for women and minority students as well as lectures, classes, and other events directed at out-group students. In her whimsical definition of "womanism," Alice Walker indicates that the womanist is "not a separatist, except periodically, for health" (1984, xi). Walker's concern with the availability of separatism to people of color

"for health" can be generalized to the situation of out-group members in engineering. The unconscious group culture of engineering and its social residues can be difficult for women and minority males to negotiate without the ability to appeal to segregated spaces and the interpretive possibilities they hold. Unfortunately, when minority group members get together even in informal ways, they are likely to be labeled by in-group members as "self-segregating" and to arouse suspicion as to their motives. This happens in a myriad of ways, both small and large, creating a form of "death by a thousand paper cuts" (Knight Higher Education Collaborative 2001, 2). One need not seek far for examples:

- Women are standing in public spaces (hallways, campus sidewalks) engaging in conversation with other women faculty or administrators. Men who know the women comment as they pass by: "Say, no self-segregating here!" "What are you three up to?" "What are you two plotting now?" Groups of two or three men engineers gathered in public spaces for conversation are unlikely to be assailed by similar comments from either men or women.
- An announcement for a pizza party for women engineering students is vandalized, and male students complain to their female classmates about being excluded.
- In a set of office moves on campus, the space for a multicultural student study lounge is eliminated. The story circulates that other space needs had priority and that multicultural students should be encouraged to mingle with white students, not to self-segregate. The need of those students for a place within their very white educational world that they could call their own is not recognized.

In-group members often complain: "we don't have a special lounge (or program, or scholarship) for whites (or men), so why should *they* get one?" These group members are unable to see how all of the institutional structures and spaces they occupy are already their own—this is as invisible and unremarkable to them as the air they breathe. They are unable to see how those structures and spaces exclude and disadvantage out-group members, because they themselves are so very comfortable and welcomed within them. In addition, neither the recipients of these kinds of comments nor leaders of engineering culture consistently address such comments as signs of in-group anxiety. Instead, denigrating discourse about self-segregation or the privileges of out-group members is most often either ignored or read exclusively as hostility. Left uninterpreted, dimensions of anxiety and defensiveness remain unavailable to the group and cannot be integrated into members' understanding of the group and of themselves.

How can leaders in engineering acknowledge the need of minority out-group members for "safe" space while achieving the goals of integration, teamwork, and mutual respect? First, leaders must be persuaded of the benefits to the program, department, or team as a whole of voluntary and

temporary self-segregation. Self-segregation may work to interrupt group processes that marginalize or stereotype those who represent minority social groups. Those who would offer safe spaces and special programs to women and underrepresented-minority men must defend many fronts at once. They must articulate the need for such programs to those who control access to resources, while simultaneously addressing stereotypes about the unsuitability of these groups for engineering. And all leaders—whether of the group as a whole or of those who constitute out-groups—should speak openly and receptively with group members about the anxieties and defenses latent in the explicit goals and institutional practices of engineering.

When someone asks, "why special programs for women?" the answer must be that women and underrepresented minority men do not need special help to be good engineers, but they do benefit from assistance in dealing with engineering culture. Thus, the special programs are not for *them* so much as they are for *engineering*. It is engineering education, as it is currently constituted, that cannot effectively welcome out-group members, and that needs an array of programs to help counteract the conscious and unconscious biases of science and engineering culture, practice, and pedagogy that squelch the interests of those who are different, and ultimately drive them away.

How can leaders acknowledge the discomforts of increasing diversity without betraying the goals of increasing diversification? Peter Skerry argues that "diversity is typically associated with dissent and conflict" and then asks: "Why is this downside of diversity so consistently overlooked?" Under a heading that bluntly announces: "Diversity Brings Conflict," Skerry notes that ethnic and racial diversity is associated with "emotional conflict among co-workers" (2002, 20–2). For psychoanalytic theorists of groups, the kind of resistance to diversity noted by Skerry is ordinary rather than extraordinary, although the form and intensity of resistance in all groups is shaped and conditioned by particular social and historical circumstances.

Some observers of higher education and the professions in the United States note that many formerly homogeneous white and male disciplines have been more successful in diversifying than has engineering. Such a social and historical reality is likely to be determined by many factors, and students of the engineering profession continue to analyze the ways in which engineering identity is constructed out of histories of class, race, and gender participation and foreclosure (Eglash 2002; Florman 1994; Hacker 1989; Oldenziel 1999). Analyzing the particular context of engineering and engineering identity also requires empirical and theoretical examinations of the multiple versions of masculinity—"masculinities"—that different disciplines construct, perpetuate, and defend (Eglash 2002; Faulkner 2000).

In order to construct a full account of resistance to diversity in engineering, it is not sufficient to employ a psychodynamic group analysis that ignores the particular social and relational context of the group under study. However, without a psychodynamic analysis, it is difficult for those who teach the benefits of diversity to acknowledge and understand the resistance of in-group members, including leaders, to diversification. This is particularly true when feminists, diversity experts, and other interested parties accurately represent that the interests of engineering are better served by diversity than by continued group homogeneity and resistance. Like individuals, groups are both rational and irrational, but even the irrationality of groups may be predictable and transparent to analysis.

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Notes

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2. We use the terms "in-group" and "out-group" to refer, respectively, to those who are in a position to defend their group identity against outsiders and to those who, although they may be members of the group in small percentages, may be perceived as outsiders, and whose identities are underrepresented in the in-group.

3. Data available from sources such as the National Science Foundation (NSF) and the Commission on Professionals in Science and Technology(CPST), summarized and made available on the WEPAN web site (2002), have not been disaggregated by both race and gender in the past. Therefore, it is difficult to discuss the situation of women of color separate from that of white women

or men of color. However, it appears from data cited in the review by Clewell and Campbell (2002) that a forthcoming NSF report, *Women, Minorities, and Persons With Disabilities 2002*, will begin to include data disaggregated by both gender and race.

4. The literature in group psychoanalysis is large, but see: Anzieu (1984); Bion (1989); Hinshelwood (1987); Kreeger (1975); Liff (1975); Rice (1965); and Rutan and Stone (2001).

5. Another variation on this theme is the dichotomy of "hard mastery" and "soft mastery." See Mangan (2002) and Turkle (1984). For another perspective on the content of the dichotomy see Faulkner (2000), who presents the distinction between hard and soft technology as one of scale and power. In all versions, the gendered associations of these terms remain intact.

6. See, for example, http://ct.monster.com/articles/whatittakes/: "The core competencies now are the soft skills. These qualifications are accented by hard skills. Most people can learn the hard skills, but communications-intensive soft skills are hard to teach" (Rossheim 2002).

7. The suggestion that the term "hard skills" actually refers to the difficulty associated with engineering curricula and practice is a common resistance strategy to the implications of the connection between "hardness" and masculinity. If "hard" did actually refer to difficulty level in this case, then the expected analogous term would be "easy," not "soft." Because the connection between "hard" and "difficult" does exist, however, it functions to enhance the hierarchical ordering of "hard" versus "soft" skills. Mastery of that which is more difficult is more highly valued in engineering culture.

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