*Science and Engineering Ethics (2004)* ***10****, 225-233*

# American Pragmatism as a Guide for Professional Ethical Conduct for Engineers*

**Gerald Andrews Emison**
*Department of Political Science, Mississippi State University, USA*

**Keywords**: engineering ethics, pragmatism, professionalism

**ABSTRACT**: *The ethical choices faced by engineers today are increasingly complex. Competing and conflicting ethical demands from clients, communities, employees, and personal objectives combine to suggest that engineers employ ethical approaches that are adaptive yet grounded in three concrete professional circumstances: first, that engineers apply unique professional skills in the service of a client, subject to protecting the public interest; second, that engineers advance the state of knowledge of their professional field through reflection, research, and sharing experience in journals and conferences, and third, that they develop new professionals by active mentoring. This paper examines five features of American pragmatism and suggests that its emphasis on specific, context-based ethical decision making can assist engineers in a postmodern setting. In particular, it considers the venues of interpersonal ethical choices, institutional ethical conflicts, and social choices that have ethical components. Pragmatism suggests that in such a complex ethical climate, there is a need for the co-evolution of judgment and action, for individual reflective judgment in particular situations, and for ceasing to search for a single, immutable principle for ethical choice.*

## Introduction

Engineers today face ethical challenges of substantial and growing complexity. Multiple claimants demand these professionals' attentions, and often these claimants do so with conflicting interests. While clients and employers still demand attention, employees, regulatory agencies, public interest groups, and news media have established claims on the exercise of professional engineering. At the same time,

* An earlier version of this paper was presented at the "Ethics and Social Responsibility in Engineering and Technology" meeting, New Orleans, 2003.

**Address for correspondence**: Gerald A. Emison, Associate Professor, Department of Political Science, Mississippi State University, PO Box PC, Mississippi State, MS 39762, USA; email: emison@ps.msstate.edu.

engineers find themselves practicing in novel settings, often ones that are substantially different from those for which their engineering education prepared them or which they faced earlier in their career. Rather than being able to concentrate solely on the relatively straightforward, but challenging, technical design for economic performance, engineers today must accommodate such issues as environmental concerns, equal employment issues, and homeland security. The skills required to effectively operate in such complex settings reflect dynamic and nuanced professional responsibilities. Success in engineering today requires the ability to function across disciplines; technical mastery is important, but so are economic, political, and interpersonal skills. The interaction of these multiple claimants, novel situations, and increasingly complicated professional responsibilities create the ethical circumstances in which engineers must operate. Engineers' ethical responsibilities have moved from the modern requirement of scientific virtuosity to the postmodern requirement of addressing simultaneously a mixture of demands.

This paper examines the sources of this complexity and the potential for American pragmatism to provide an effective way to engage it. More specifically, this paper suggests that engineers' ethical choices should be guided by an overarching responsibility to improve the particular situations they face. Generalized *a priori* approaches are unhelpful in today's complex, dynamic ethical climate. The application of ethical judgment depends on the specific circumstances of the unique situation at hand. As a result, this specific engagement should be conducted as a dialogue between circumstance and action in order to promote adaptive individual, institutional, and societal learning. This dialogue should be carried out simultaneously within three areas of professional responsibility: application of technical skills, advancement of relevant professional knowledge, and mentoring of developing professionals.

## The Postmodern Need for a Flexible and Adaptive Model for Engineering Ethics

The need for a flexible and adaptive model for engineering ethics springs from the heightened complexity of ethical decisions in engineering. Engineers confront this condition across the range of their professional practice. This complexity stems from unprecedented variety of interests as well as from the novelty of new aspects engineers confront in their daily practice decisions. It also stems from the fact that such interests and novel circumstances interact to create unfamiliar ethical circumstances. Simply put, engineers are less able to look to previous experience for templates on how to address ethical choices. They increasingly face unique circumstances and must fashion ethical responses that attend to these circumstances.

Clients form the first source of claimant complexity. Today's clients have an expanding set of interests. These take the shape of multiple objectives rather than a single objective. While earlier engineering decisions could reliably depend on technical solutions that satisfy economic constraints, today's clients also insist that environmental and social welfare concerns be taken into consideration. This stems in part from clients' expanding understanding of their own self-interest. It also is driven by society, acting through regulations and social mores, imposing extended requirements with regard to clients' behaviors. Professional technical requirements that adhere to the best science and engineering practice continue to command attention. Economic concerns, while always present, have expanded from simple least-cost concerns to cost-benefit and cost-effectiveness concerns that often must consider the viewpoint of society as well as that of the individual client. For example, environmental protection has become a standard interest of today's clients; an engineer who ignores environmental concerns may rightly be viewed as inadequately protecting the client's long-term interests. What is also new about environmental concerns is the emphasis on life-cycle environmental analysis, which addresses these interests not simply through treatment but through product and process design. Homeland security concerns have added an extra dimension for consideration. Social considerations have increased design complexity concerning the client's interests; for example, the requirements for handicapped access are more detailed and extensive under the Americans with Disabilities Act[1] than under earlier regulations.

Engineers must consider not only their clients, but also the interests of their employees. Engineering is a knowledge business, and the personal satisfaction of employees is an important feature of maintaining employees' engineering productivity. Engineering managers lead employees who have personal objectives of heightened relevance to the workplace. These managers must direct employees who are not only more skilled but more demanding than previous employees. Work success in economic terms is being replaced with personal fulfillment, stress reduction, and quality of life in addition to wages, benefits and job security. Engineering management symposia, conferences and journals routinely include topics on motivation and balancing life demands as well as traditional engineering optimization and economic rationality articles. There is more today for engineering managers to consider and more opportunities for conflicts to arise.

Communities, both geographic and professional, demand that engineers' behaviors attend to an expanding set of multiple objectives. We have moved from an either-or society to a multiple choice society.[2] Engineers may be recruited to serve on civic boards such as planning and zoning, but may find their decisions on these boards criticized for their legal or political considerations rather than engineering aspects. Like it or not, engineers' ethical choices often can involve the collision among such multiple objectives.

Even at the personal level, engineers are vulnerable as members of our society. From both family and self-actualization viewpoints, engineers reflect the circumstances faced by employees they supervise. The growing complexity of multiple objectives, constrained resources and unceasing demands intrude into personal life and can affect how engineers address their professional responsibilities. The crucial role that both parents play in successful child rearing accompanied by the emergence of two income families as the norm provides a ready-made foundation for conflicts in decisions. When these are combined with a shift in the traditional roles of gender in our society, predetermined decisions fall short. There is a growing realization that more is involved than career and economic success for professionals to develop a fulfilling and rich life.

This inevitably leads to conflicts. How to resolve these conflicts in such a complex matrix of circumstances defies easy resolution.

## Engineering Professionalism in a Post-Modern Ethical World

The previous section discussed how engineers face multiple demands from their ethical settings in the postmodern world. At the same time as demands have increased, so have engineers' professional responsibilities multiplied. Professional requirements are richer, more diverse and generating novelty at an unprecedented pace. This calls for professionals who can consider the changing nature of professional demands that impact ethical arenas by examining three requirements. While no engineer faces all three simultaneously with the same intensity, it is safe to say that over the course of a career, most practicing engineers will confront engagements in each of the arenas. And often they will have to balance more than a single requirement concurrently.

The first postmodern professional requirement is an old friend. Engineers must apply their unique knowledge for the benefit of clients subject to protecting the public interest. In one form or another, this has been the touchstone of professionalism for engineers since the nineteenth century when engineering became a distinct profession. This is the traditional home of engineers, applying knowledge of science and mathematics to add value to a client, public or private. And attached to this has been the need to attend to the public interest. The extensive interconnections that must be considered are what has changed. Technical advances brought to bear on engineering problems are accelerating. Also, of special importance has been the growth in emphasis on what constitutes the public interest. Heightened legal and political accountability associated with engineering efforts has characterized an expanding public interest. Simply being sure that a design is failure-proof is not adequate within contemporary standards of protecting the public interest. Economics, interest group participation, as well as other stakeholder involvement now characterize the definition of protecting the public interest.

Such unfolding conditions require engineers to stay current in their respective evolving fields while staying abreast of the interests of clients and the public. When interests multiply, so do their interactions. These interactions produce heightened opportunities for conflict. Even in the arena of traditional engineering expertise, we see potential conflicts increasing in number and in character that previous times simply did not experience.

The second requirement for postmodern professionals is not so much a new feature as acquiring important new emphasis. Engineers must continuously advance the knowledge base of the profession. Use of remote sensing, bioremediation, smart materials and computationally complex analyses are examples of how the practice of engineering has moved from concept to application in remarkably quick order. In doing so, these new technical methods relied upon field validation as an integral aspect of development of the new technology. This previously was left frequently to the scholarly community with some participation by practitioners. Today we are finding that new issues require practitioners who face such evolving circumstances not to wait for academics but to innovate and share new approaches as soon as possible. Academic journals and conferences have always had cutting edge knowledge as a primary emphasis. What has changed is that building the knowledge base in such complicated circumstances has become the domain of practitioners as well as engineers from academia.

Such heightened and extended professional participation in developing the knowledge base of the field brings unique conflicts. How much should proprietary knowledge gained from dealing with practical problems be shared? Certainly innovations would benefit the field, but what is the balance between responsibility to the general profession's body of knowledge and the interests of the client or the engineer? How do we strike a responsible balance between protecting the basis for a competitive advantage in this fast-paced world and the public interest that comes from learning new and successful approaches?

The third professional responsibility in this multiple responsibility world concerns coaching new professionals. With so much knowledge dependent, not upon textbooks, but upon experience, new professionals can contribute to the field best if they develop insight into how to adjust to dynamically evolving conflicts. It is important to accelerate learning and knowledge in such a dynamic world. Doing so often requires experienced professionals to mentor less experienced professionals. This has not only an altruistic component, but a self-interest component for engineers. If engineers are to assure that their organizations continue to compete successfully in a multiple option, multiple requirement world, they must assure their younger colleagues rapidly gain the insight to adapt to such dynamic conditions.

This situation makes mentoring an essential aspect of a professional's job description. It also suggests that for practicing professionals to fulfill their responsibilities, they will actively seek opportunities to guest lecture, teach in an adjunct capacity and in general more closely connect the early academic training of engineers with practice in its fullest manifestation. If the profession is to see young professionals develop success mechanisms, those who have done so already will need to reach back and convey the adaptation necessary for sustained accomplishments. Assuring professional relevance in the future is an important aspect of professionalism. With the dynamic world in which engineering is practiced today, active and ongoing mentoring and teaching is a vital part of a well-developed professional.

## Specifying a Model for Responsible Action

The conditions engineers face today involve an extensive number of demands, a complicated interaction among these demands and professional responsibilities of intricate proportions. These conditions resist a predetermined ethical response. So much is at play in any single decision that if we resort to simple responses we likely will neglect important considerations. To leave these considerations out of an ethical decision, we risk unnecessary errors. The profession needs a model for ethical choice that is flexible and adaptive, yet one that provides a reliably stable platform to stand upon in the midst of such change. William Bergquist identified constructivism and chaos.[3] Constructivism holds that reality is constructed from the interaction of phenomena, while chaos theory looks to interaction among simple events over time to produce complicated outcomes. Both suggest that understanding and action must be built upon multiple and often conflicting roles during ongoing ethical choices. For such an approach to assist in engineering ethical choices, we need to test it in three complementary settings.

A valid ethical approach must provide guidance about conduct in the interpersonal venue. Many ethical choices concern acting responsibly with other individuals, so we need to attend to the micro-scale of honorable treatment of others we encounter. Our individual relations must also enable us to maintain an affirmative interaction with others while advancing adaptability and effectiveness. Adaptability permits enduring success, and effectiveness measures the individual's contribution to larger settings. In all cases, an effective ethical framework should enable conflict resolution from ethical dilemmas. This resolution should leave functioning and affirming individual relations as an ongoing feature.

Much of our work as engineers is lodged in large organizations. Guiding institutional behavior must assure ethical choices are made by these large organizations. Peter Drucker captures the importance of institutional action: "Modern society depends for its functioning, if not for its survival, on the effectiveness of large-scale organizations, on their performance and results, on their values, standards, and self-demands."[4] Engaging ethical questions within institutions involves both methods and outcomes that can reasonably be viewed as quite complex. When institutions are viewed as legitimate, in part by making ethical choices, this reinforces both their effectiveness and their value embodiment. How to act ethically given the conflicts that are likely to arise between and within institutions is a major requirement for an ethical approach. We must attend to both legitimacy and effectiveness in order to meet post-modern ethical choices.

The last setting in which engineers function concerns ethical choices from the community or society-at-large's viewpoint. This is the question of rightness of action as seen by the community of shared interests. This requires we seek to advance the interests, individual and shared, of the members of the general public while acknowledging and honoring the interdependency of such community.

With these as specifications for a satisfactory approach to engineering ethics, let us turn now to a candidate, American pragmatism.

## American Pragmatism and Engineering Ethics Decisions

Pragmatism as a distinct philosophy was developed by Dewey, James, Holmes, Peirce and others in the late nineteenth and early twentieth century in response to the extensive changes pressing on America and the need to address the dissonant sources of epistemology of the period.[5] Rorty,[6] Blanco[7] and West[8] have updated pragmatism as a straightforward means of addressing the postmodern world's conflicting circumstances. At its core pragmatism emphasizes the value, importance and essentiality of dealing with specific, actual conditions as a requisite for a responsible, informed and fulfilled life. Knowledge and practice, theory and expression, the conceptual and the tangible co-evolve and exist simultaneously. It is impossible to have one without the other. "Knowledge is a by-product of activity."[5 (p.322)] According to William James "(p)ragmatism favors the nominalist's preference for particulars, the utilitarian's stress on what is useful and the positivist's dislike of metaphysical speculation and merely verbal solutions to problems."[9]

Bernstein[10] identified five properties of pragmatism: 1) Anti-foundationalism: No unchanging conditions or principles exist to guide human choices; 2) Fallibilism: Under the proper circumstances it is likely that any choice may be in error; 3) The Social Character of Self: Human choices and decisions depend upon and are informed by individuals embedded in a social matrix from which these choices and decisions draw meaning; 4) Contingency: Any choice depends upon the particular circumstances of the setting in which the choice is made; 5) Pluralism: Divergent views and values provide the ground from which the flower of knowledge and experience grows. In short, "(p)ragmatism whether of the paleo- or the neovariety, stands for a progressively more emphatic rejection of Enlightenment dualism as subject and object, mind and body, perception and reality, form and substance, these dualities being regarded as the props of a conservative social, political and legal order."[11]

For engineers facing ethical choices in the postmodern world, pragmatism presents a number of characteristics that can assist in engaging decisions. Pragmatism stresses the interdependence and contingent nature of choices. A proper course of action given one set of facts may not be the proper course of action under a different set of facts. The circumstance must inform the choice, with the practical consequences of the particular situation guiding. As a result, knowledge derives from experience and the reflection based upon this experience. Knowledge that is not grounded in actual experience is judged false and misleading. Such a context-based philosophy views effects of choices rather than intentions as mattering most. By grounding judgment in reality, pragmatism acknowledges the importance of knowledge as being social in that knowledge is dependent upon the specific, society-based circumstances and not some theoretical, conceptual abstraction.

These characteristics can inform ethical choices of engineers in a number of ways. First, choices would be guided by the specific, actual consequences as the gauge of ethical measure. It is the importance of uniqueness of the choice that draws our attention first. "Morals are ways of acting invented to meet specific situations."[12 (p. 522)] Second, it is the attention to consequences that devolve from the specific situation that inform the ethical decision: "To act morally is to act in the best or wisest way. Such a course of action requires deliberation."[12 (p. 524)] The emphasis on using the practical to inform the ethical also plays to engineers' strong suit: "Values have to do with resolution of problems, the adaptation of means to ends, the securing of enjoyments that emerge in the course of experiences reflectively controlled."[12 (p. 522)] Such emphasis on the practical also draws from relational experience that places choices in a specific consequence: "Value judgments, then, like their counterparts in science, are relational in nature. They, too, are instrumental and never final and are thus corrigible."[13]

Pragmatism may be contrasted with the traditional forms of rationality. Instrumental rationality requires a transcendent and stable value framework under all circumstances and depends upon optimization as a stable choice criterion. In procedural and administrative rationality, stability is also necessary, however it is stability to specific procedures regardless of circumstances. Communicative rationality requires constantly clear communication irrespective of the unique fact situation. Across these other forms of modern rationality, the imperative of constancy of a dominant aspect is challenged by pragmatism. Pragmatism looks to human action and will as the motivating feature, with all else appropriately in play: "Everything James and Dewey wrote on pragmatism boils down to a single claim: people are the agents of their own destinies."[5 (p. 371)]

For engineers facing the choices of a postmodern world, pragmatism can help by suggesting that judgment and action co-evolve. They are inextricable; hence one must inform the other, and there is no substitute for individual judgment in the particular decision circumstance. Engineers must use action and reflection. "What a man really believes is what he would be ready to act upon and to risk much upon."[14] Engineers need to stop looking for a single, immutable principle and jump in, think, then act. "The actual dilemma is what, in the particular case staring you in the face, the right thing to do or the honest thing to say really is."[5 (p. 351)]

American pragmatism responds well to the three venues of individual, institutional and community for specification of an ethical framework. Pragmatism directs professionals to face ethical choices through the intent and the action of improving a situation based on extant specific conditions. By grounding ethical choice in improving a unique situation, pragmatism provides both a general template and a practical orientation to unique choices. It directs ethical decisions concerning individual conduct to be based upon a criterion of advancing the individual participants' opportunities to improve their conditions and circumstances as understood at that time. When issues concern ethical choices in institutional circumstances, pragmatism emphasizes decisions that permit institutional enhancement as defined by the specific circumstances at hand. For decisions concerning community implications, pragmatism stresses advancing democratic governance so all participants' interests can be considered. In other words, pragmatism addresses the three venues of individual, institutional and community choice by suggesting the professional engineer ask in the context of each particular situation:

1. Individual: What choice allows the individuals concerned the best opportunities to pursue their own values? These values must be examined in the circumstances of the situation under consideration.
2. Institutional: What choices permit the firm, agency or non-governmental organization the best chance of meeting today's and tomorrow's obligations? If circumstances change, how would the choices advance or retard the institution's adaptive response?
3. Community: What choice incorporates and advances democratic governance of the group?

Conversely, the unethical would be actions that inhibit knowledge, adaptation and development at the level of venue under the existing conditions. This requires we keep constantly before ourselves that "Modern societies do not simply repeat and extend themselves; they change in unforeseeable directions. . . ."[5 (p. 399)]

Of course, few situations permit venues to be isolated from each other. Ethical choices present themselves in each of the three venues simultaneously. However, by considering the separate venues in light of the special conditions of the instant situation, pragmatism stresses both a practical aspect of what is right at the time and the more general aspect of preserving future opportunities for adaptation and growth.

Professionals, especially engineers, must constantly consider professional responsibilities in the actual interplay of practice, knowledge advancement and mentoring so that specific circumstances guide the ethical choices they are required to make. Managing this interplay and directing the profession's response is the substantive ethical challenge engineers face for such complex situations. American pragmatism offers an experience based, outcome oriented approach for deciding effectively ethical choices amid complexity.

## REFERENCES


1. Americans with Disabilities Act. 1990. 42 United States Code 12112.
2. Naisbitt, J. (1982) *Megatrends: Ten New Directions Transforming Our Lives*, Warner Books, New York.
3. Bergquist, W. (1993) *The Postmodern Organization: Mastering the Art of Irreversible Change*, Jossey-Bass, San Francisco, CA: 15-36.
4. Drucker, P. (1966) *The Effective Executive*, Harper Row, New York: 170-171.
5. Menand, L. (2001) *The Metaphysical Club: A Story of Ideas in America*, Farrar, Straus and Giroux, New York.
6. Rorty, R. (1982) *Consequences of Pragmatism*, University of Minnesota Press, Minneapolis.
7. Blanco, H. (1994) *How To Think About Social Problems: American Pragmatism and the Idea of Planning*, Greenwood Press, Westport, CT.
8. West, C. (1989) *The American Evasion of Philosophy: A Genealogy of Pragmatism*, University of Wisconsin Press, Madison: 211-239.
9. James, William. (1990) Pragmatism in: Magill, F.N. ed. *Masterpieces of World Philosophy*, Harper Collins, New York: 495.
10. Bernstein, R.J. (1992) *The New Constellation: The Ethical-Political Horizons of Modernity/Postmodernity*, MIT Press, Cambridge, MA: 323-329.
11. Posner, R. (1997) A pragmatist manifesto in: Menand, L. ed. *Pragmatism*, Vintage, New York: 428.
12. Dewey, J. (1990) Human nature and conduct in: Magill, F.N. ed. *Masterpieces of World Philosophy*, Harper Collins, New York: 522.
13. Dewey, J. (1990) The quest for certainty in: Magill, F.N. ed. *Masterpieces of World Philosophy*, Harper Collins, New York: 551.
14. Peirce, C.S. (1990) Collected papers in: Magill, F.N. ed. *Masterpieces of World Philosophy*, Harper Collins, New York: 226.