the definition of truth associated with the hard sciences.

However much I may agree with many of the authors participating in the Hastings Center discussions on ethics in society that a stronger presence of the humanities in nonacademic settings is desirable, I must also express disquiet. The humanities are deeply flawed, which is precisely why advocates always pluck from an unmanageable corpus of thought, institutions, and values those virtues in agreement with their predispositions and remedies. The reader forewarned, I can now say that I myself am most comfortable with humanistic teaching that singles out those productions of history, philosophy, art, and literature that illuminate or ennoble the human condition but am not very comfortable with activities that further the well-being of particular disciplines because they rank as humanities in an inherited taxonomy. No subject is inherently humanistic. That label must be earned by engagement in circumstances involving difficult moral roles, impossible choices, and dilemmas. The sense of quiet struggle that elevates life and lends it dignity cannot be acquired on the cheap.

Seen in this way, it appears as if the "applied humanities" may be a leg up on the academicians.

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Engineers in the Social Order

Mechanics of the Middle Class. Work and Politics among American Engineers. ROBERT ZUSSMAN. University of California Press, Berkeley, 1985. viii, 269 pp. $27.50.

This book analyzes the work, the career paths, the social position, and the political potential of American engineers, an occupational group that the author sees as prototypical of the middle levels both of industry and of our society. The book is based on six months of fieldwork in two companies, one a metalworking firm representative of "old" industry and the other the electronics division of a "new" high-tech business. The author observed engineers at work and interviewed 40 of them in each firm.

The argument of the book is unsurprising. The author frames a great deal of his discussion in refutation of earlier theories and speculations about the role of engineers in our social order. Although he signals early on his own suspicion of such ideas, he returns repeatedly to two notions. He argues that engineers, contrary to some fantasies of the political left, have not become "proletarianized," that is suffered such a devaluation of skills or economic position that they identify with labor. Nor have they, as some social scientists have predicted, become "professionalized," that is developed a solidarity based on shared, self-conscious guardianship of applied science. Rather, the author finds engineers principally concerned with their own careers; whether in old industries or new, they have no particular loyalties either to specific organizations or to engineering itself. They respond, as do most other groups in big organizations, to the premiums that bureaucracy places on administrative skills. In short, most engineers want to become managers; as it happens, this is an ambition more likely to be fulfilled in positions requiring technical supervision rather than executive leadership. Thus, as a group, engineers are a poor bet to become the core of a "new working class" that might transform the American class structure; they are even less likely to emerge as the defenders of some sort of "higher rationality" of technological efficiency that might challenge the irrationalities of the profit-maximizing business ethos.

However, the author believes that engineers might represent a different, still emergent social phenomenon. Engineers try to compartmentalize work from life, adopting a nine-to-five orientation toward their jobs; yet they are distinctly middle-class, locked into generally stable, orderly careers. Zussman thus sees engineers as examples of a "working middle class." In such a view, the social consciousness and eventual political action of engineers and other middle-level groups is shaped not by their work but by particular interests that touch their lives through their families or places of residence—like the quality of schools or property taxes. In closing, he suggests therefore a "moratorium on industrial anthropology" for those concerned with the "broader issues" of stratification and its social and political consequences. He feels that the "bounded world" of the plant cannot give us insight into the multiple social identities that the working class and, in particular, the middle levels form in their residential communities.

In my own view, few people seem able to escape "the long arm of the job," as Martin Meissner once put it, whatever public claims they make to the contrary. Bureaucratic work, in fact, shapes consciousness in decisive ways. Among other things, it regularizes people's experiences of time by engaging them on a daily basis in rational, socially approved purposive action; it brings them into daily proximity with and subordination to authority; it shapes their measures of prestige and overall social status; and, in the case of engineers and particularly of the managers they hope to become, it places a premium on a pervasively pragmatic habit of mind. Such aspects of consciousness seem scarcely unimportant for an understanding of social stratification, social integration, or eventual political action or passivity. Instead of fewer studies, we need, I think, more detailed, better-framed, and especially more imaginative analyses of how work shapes consciousness and the social world.

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Processes of Persuasion

Psychology and Deterrence. ROBERT JERVIS, RICHARD NED LEBOW, and JANICE GROSS STEIN, with PATRICK M. MORGAN and JACK L. SNYDER. Johns Hopkins University Press, Baltimore, 1986. xii, 271 pp. $27.50. Perspectives on Security.

After 40 years of nuclear peace, it may be tempting to take deterrence for granted. Such optimism may be misplaced, despite the success we have enjoyed thus far and the deductive elegance of the "theory" that explains it. In this collection of essays, three political scientists marry psychology and history to argue that the standard version of deterrence theory is far too simple to be of much use as a predictive theory or policy tool. Worse still, their study suggests that the traditional explanation for "how deterrence works" may be dangerously misleading if political leaders do not recognize its limitations.

As their title implies, the authors view deterrence as a psychological process; it is the act of persuading opponents not to take a specified action by threatening to punish them if they do. According to the classic deterrence model, the decision to challenge a deterrent threat is the result of a rational calculation: do the prospective gains outweigh the likely costs? Jervis begins by noting the obvious flaw in this conception: political leaders rarely make "rational" calculations. Information is usually ambiguous, decision makers lack the time necessary to survey all their options completely, and the

trade-offs between different options are often impossible to weigh. Moreover, a leader's choices will be affected by the various emotional pressures and cognitive distortions to which we are all susceptible. Even with perfect information, imperfect decisions will be made.

As a result, the attempt to deter a potential adversary can go awry rather easily. Leaders may underestimate either how bad the punishment will be or how likely it is to be carried out. In either case, deterrence may fail because the risks will be seen as small. To make matters worse, a defender's efforts to make its threats more credible or dangerous may be no help at all: the adversary may simply conclude that war is inevitable and begin searching for a favorable opportunity to strike.

These misperceptions can be traced to several common psychological phenomena. Human beings interpret reality through a variety of cognitive images; we try to fit new information into familiar concepts and categories. Thus deterrence can fail if policymakers interpret ambiguous warnings incorrectly, by forcing new evidence to fit with powerfully held but inappropriate beliefs. Alternatively, we tend to ignore information that raises psychologically difficult choices while welcoming evidence that suggests that earlier decisions are correct. As a result, policymakers may ignore warnings no matter how clear they are if accepting them would force painful decisions or would challenge important values. In either case, deterrence can fail despite a defender's repeated warnings and obvious military capability. And because policymakers on both sides will be subject to these psychological distortions both are likely to be surprised when it does.

A major strength of this work is the effort devoted to stating these hypotheses clearly and evaluating them through a number of interesting case studies. Given the plethora of abstract models and dubious statistical manipulations that now abound in this field, the creative use of history is always refreshing. Stein's examination of the War of Attrition and the 1973 Yom Kippur War shows how the Israelis consistently exaggerated their ability to deter Egypt because the Egyptians either exaggerated their own military prospects or were willing to suffer considerable losses to achieve small political gains. According to Lebow's account of decision making in the Falklands War, similar misperceptions plagued both Argentina and Great Britain. Despite abundant evidence, the British failed to realize that Argentina was preparing to attack the islands. At the same time, the Argentinians were so confident that Britain would not fight that they gave little or no thought to what they would do if they were wrong. Given how completely both sides misread the other's intentions, the Falklands War seems as inevitable in retrospect as it was unexpected at the time.

Despite these strengths, the effort to blend theory and history is not entirely successful. First, as the authors acknowledge, many of their criticisms of deterrence theory have been made before (for example, in their own earlier work and in a seminal study by George and Smoke). Second, their reliance on psychological theories of misperception to explain the failure of deterrence ignores a number of alternative hypotheses that may be equally (or more) persuasive in some cases. For example, leaders may misperceive a situation not because they have misunderstood the information available to them but because they have been given misleading information by self-interested bureaucratic players. In other words, misperceptions rooted in the organizational structure of the modern state may play as great a role in failures of deterrence as the psychological quirks of individual leaders. Lebow's earlier study of crisis behavior explored this issue in some detail, and Snyder's contribution to this volume points out the understandable tendency of military organizations to exaggerate the efficacy of force as a means of enhancing deterrence. By focusing primarily on psychological sources of failures of deterrence, however, this study does not come to grips with the complementary but distinct explanations provided by organization theory.

A more significant problem is the inherent difficulty of identifying if and when psychology is the real villain in a given failure of deterrence. The claim that a given decision was the product of an irrational choice inevitably reflects the analyst's own evaluation of what a "rational" response to the situation would have been. Thus Stein argues that Israeli deterrence failed in 1969–70 because "Egyptian calculations were so flawed that they defeated deterrence." She attributes these flaws to wishful thinking and other cognitive distortions. But this ignores the fact that both the War of Attrition and the Yom Kippur War made a great deal of sense from Egypt's point of view, even if Egyptian calculations were incomplete and optimistic. Indeed, a good argument can be made that Egypt "won" both wars, in terms of its larger political objectives. As Stein admits, Egypt faced "an intolerable dilemma" by remaining at peace, given Israel's continued occupation of the Sinai. Going to war was less an "irrational choice" than a costly necessity.

This raises a final issue. How much can we really learn about nuclear deterrence by examining the behavior of leaders in conventional conflicts? For the nuclear powers, no political objectives could be worth a nuclear exchange. Even if policymakers do not calculate perfectly, one does not have to be all that smart, well-informed, or rational to figure this out. But in a purely conventional conflict, choosing to "roll the iron dice" is occasionally the best option available. The authors are quite right to emphasize how myopic the vision of leaders can be, but we should recognize that they have drawn their data from events where miscalculation is both easier and less severely penalized.

This shifts the focus of the deterrence problem away from psychology and back toward the political imperatives that decision makers always face in weighing a decision for war. To their credit, the authors recognize the paramount importance of political factors. As Lebow points out in his conclusion, decision makers (and scholars) should pay far more attention to the question of how they can avoid placing adversaries in the position where they perceive no choice other than to go to war, irrespective of the apparent cost of doing so. Because leaders backed into a corner will be even more prone to miscalculation, credible reassurances may be just as important as credible threats in making deterrence work. Unfortunately, as Lebow reminds us, the art of reassuring others has received much less attention than the art of making threats. That insight alone is something that both decision makers and scholars might well ponder further.

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A Plea for Applied Science

Lost at the Frontier. U.S. Science and Technology Policy Adrift. DEBORAH SHAPLEY and RUSTUM ROY. ISI Press, Philadelphia, 1985. x, 223 pp., illus. $19.95; paper, $13.95.

The concern of this book is with a major issue in national science and technology policy, the place of applied science. "In our view," the authors declare, "today's declining high-technology trade balance, the fragility of U.S. industries, and the serious lack of public understanding of science show that the United States has not exploited the frontier of science as well as it might have" (p. 2).

The authors, one a journalist and the