



Good computing: a pedagogically focused model of virtue in the practice of computing (part 1)

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Abstract

Purpose – The purpose of this paper is to present a four component model of ethical behavior (PRIMES) that integrates literature in moral psychology, computing ethics, and virtue ethics as informed by research on moral exemplars in computing. This is part 1 of a two-part contribution.

Design/methodology/approach – This psychologically based and philosophically informed model argues that moral action is: grounded in relatively stable PeRsonality characteristics (PR); guided by integration of morality into the self-system; shaped by the context of the surrounding moral ecology; and facilitated by morally relevant skills and knowledge (S).

Findings – The model seeks to explain the daily successful (and unsuccessful) performance of moral action by computing professionals and to provide groundwork for a pedagogy that emphasizes ethically effective performance.

Practical implications – The model has significant implications for how ethical action might be taught to computer professionals and other design professionals. It also makes recommendations about what is needed to measure to construct a complete picture of sustained ethical action in a profession.

Originality/value – Most accepted models of ethical behavior are unidimensional, emphasizing either principled reasoning or a simplistic model of integrity/character. This model brings together a variety of disparate literatures in the light of its emphasis on sustained moral action in the profession. It thereby provides researchers and educators with a picture of what is needed to construct a complete understanding of moral action in the profession.

Keywords Computers, Ethics, Professional ethics, Individual psychology, Personality

Paper type Conceptual paper



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[...] we are inquiring not in order to know what virtue is, but in order to become good, since otherwise our inquiry would have been of no use (Aristotle, *Nicomachean Ethics*, Book II, Section 2).

In the summer of 1987, Nathaniel Borenstein received a call from Lt. Commander David Blower asking him to consult with NATO on the design of embedded training and help modules for battlefield weapons systems, including those that target and launch theatre nuclear weapons. A lifelong pacifist, Nathaniel's first reaction was to politely decline; he had made it a habit, based on his principles, to avoid military work.

But after some conversation, Nathaniel decided to change his longstanding practice and accept this particular invitation. The alternative, he felt, was too risky. Embedded systems are training or help modules that run on actual battlefield weapons. Other military consultants were recommending that NATO adopt this approach to training and help systems. It had proven effective in many commercial and academic systems (some of which Nathaniel had designed himself).

The problem, as Nathaniel saw it, was one of "Oops, I was sure that nuclear missile launcher was in simulation mode..." Even help systems that suggest how commands might be completed (as in the popular TOPS-20 system of the time) can be dangerous. There has always been resistance to taking the human completely out of the loop in important military decisions such as a missile launching. But under pressure, when the embedded expert system for help says "Push the red button" we come closer to doing just that, and the possibility of unintentional nuclear war. Nathaniel knew that simulation and help systems are rarely written to the reliability standards of actual battlefield systems, and that allowing them into the battlefield by this back door would create a multitude of possible hazards (e.g. perhaps a malfunction fails to erase the words "simulation mode" from the screen, leaving the operator to think a live weapon is still in simulation). In a similar incident in 1979, jet fighters were "scrambled" to protect against an illusory nuclear attack in the United States when a simulation tape of an attack had been accidentally loaded into the monitoring systems.

Nathaniel decided to consult with NATO in order to convince them of the dangers of such systems. He was pleasantly surprised by the intelligence, seriousness and ethical concern of the military officials. And he was equally astonished by the lack of such concern on the part of business contractors and some researchers whose livelihoods depended on getting NATO money to design embedded systems. He thus found himself a pacifist in the halls of a NATO working group in Berchtesgarden, helping to design systems that kill people (Borenstein, 1989).

A pedagogical model of virtue in computing

How are we to understand Borenstein's change of heart? It is clearly not a simple or an isolated decision, and perhaps not even a change of heart. Nathaniel had a long history of concern for ethical principles, and he continued this concern after his stint as a NATO consultant. Nathaniel's actions can best be understood in terms of his development over time into a professional who had acquired the imagination, creativity, commitment, and skills to respond flexibly to the demands of his profession.

Understanding this development, in all its complexity, is one central task for an adequate ethics of computing (or of any profession). It is central because it is these complex sequences of coordinated action over time that are at the heart of ethical behavior. It is also central because understanding the development of the professional's

ability to plan and guide these sequences is crucial to understanding how to foster that development, that is, how to teach ethical computing (Cunningham, 2005; Davidson, 2005; Kupperman, 2005). Thus, we are proposing a model that helps us understand how computer professionals sustain ethical action in their careers, with the aim that this model will help us to think through the pedagogy of professional ethics. It will do so by focussing our pedagogy and curriculum on those things that will most support our students' quest to be thoughtful, ethical professionals in their careers. We are not interested in entering the foundationalist battles about whether consequentialist, deontological, virtue, or some other form of ethical argument is the best decision model for the computing professions. In fact, in terms of both values and method we are unabashedly pluralist. There are multiple ways to be an ethical computer professional and multiple methods that converge to support this goal. We are interested in constructing a model that accurately reflects the reality of the moral careers of computer professionals and that consequently can serve as a guide to pedagogy aimed at preparing students for moral careers.

With these goals in mind, we propose a psychologically informed and philosophically aware model of ethical computing. This model is based on the most recent work in moral psychology (Haidt, 2008; Huff and Frey, 2005; Lapsley and Narvaez, 2005; Narvaez and Lapsley, 2005) and on an analysis of extensive interviews with moral exemplars in computing (Huff and Rogerson, 2005). The model is not narrowly focused on how Nathaniel Borenstein might have made the right decision in this particular story. Instead, it is focused on how he became the sort of person who was able to recognize an opportunity for moral action, to make a good decision, and then able to carry it out in the competitive discussion forum he encountered at NATO. In psychological terms, we are interested in how individuals achieve sustained excellence in ethical behavior in the field of computing. In philosophical terms, we are interested in how individuals attain the virtues needed to achieve the virtuous practice of computing. Our approach is intentionally pedagogical, partly because virtue theory lends itself to this goal, but also because we are interested in more than simply describing ethical behavior; we hope to provide a theoretical groundwork to support the training of individuals to achieve ethical behavior.

Models of ethical behavior

The recent literatures in moral psychology and in philosophical ethics converge on a model of ethical behavior that casts a wider net than older decision-based approaches (Pincoffs, 1971, 1986) that view Borenstein's behavior as a series of decisions joined by commitment to principle. The philosophical turn to virtue theory has resulted in a model that treats Borenstein's behavior as stemming from his character. This approach has helpfully broadened the field of view to characteristic ways of behaving (including the necessary practical knowledge and skill to perceive moral opportunity, choose well, and then enact those choices). But, it has usually left the notion of character or moral commitment unanalyzed, and thus suffered at the hands of critics (Doris, 2002) who use the social psychology literature to point out the seeming lack of coherence in principled action that the character model presupposes. In turn, the moral psychology literature has moved from a model of principled reasoning (Kohlberg and Kramer, 1969), to a recognition of the importance of situational influence (Zimbardo, 2007), moral emotion (Haidt, 2001), skills and knowledge (Narvaez and Lapsley, 2005), and the integration of

moral goals into the self concept (Blasi, 1980). But, this literature has remained fragmented, and with a few exceptions (Doris, 2002; Appiah, 2008) not integrated into the burgeoning virtue theory literature. Our intention here is to bring these literatures together, in light of recent work on morally exemplary computing professionals (Huff and Rogerson, 2005; Huff and Barnard, n.d.), and to use them to inform a model of sustained moral action in computing that can guide our attempts to teach.

The turn to virtue

The resurgence of virtue ethics (Harmon, 1998/1999; Crisp and Slote, 1997; Solomon, 2003) provides a model that looks more long term at sequences of behavior and characteristic ways of behaving. By viewing virtue as a character trait, it provides the necessary unity of action over time that we see as a part of Borenstein's life story. And by identifying particular virtues that support action (e.g. patience, charity, and empathy; Davis *et al.*, 2004), and that support consistency (e.g. integrity; Blasi, 2005) virtue theories attempt to link character to action.

This resurgence is conventionally dated to Anscombe's (1958) call to set aside the foundationalist debates of modern ethics (e.g. what is the best ethical system?) and instead re-appropriate the notion of virtue. Even at this early date, Anscombe linked the turn to virtue to the need for an adequate moral psychology (see Appiah, 2008, for a helpful discussion of the role of moral psychology in the history of virtue ethics). In a more thorough critique of moral theory since the enlightenment, MacIntyre (1981/2007) attempted a review of the multiple lists of virtues that were emerging. He proposed that differences in the lists were a function of differences in the moral communities that called for and supported them. After MacIntyre (1981/2007), numerous systems of virtue theory were developed (see Crisp and Slote, 1997 for a selection).

Still, much of the renaissance of virtue theory did not articulate the unanalyzed conceptual unit of "character" more than to cast it as a disposition to act in a virtuous way (Doris and Stich, 2005). The appeal to character provides the much-needed unity of action over time that is essential to virtue approaches. Bradey (1876/1962) presents responsibility in terms of the metaphor of answering a moral tribunal for our actions. He outlines three presuppositions for attributing responsibility: self-sameness, moral sense, and action-ownership (= absence of ignorance or compulsion). Self-sameness is the metaphysical condition that there be something sufficiently enduring to serve as the target of responsibility attributions. In the context of this discussion, Bradley proposes two criteria for an adequate account of character in the context of responsibility attributions:

- (1) character must be robust enough to satisfy the self sameness requirement; but
- (2) it must not be so fixed as to render impossible character change (character cannot be compulsion).

This balance of permanence and change has become the central bone of contention in recent claims about the role of character in virtuous action.

The insistence on character as unity of action, in particular, tends to require superhuman consistency of a virtuous person, since the "characteristic way" of acting is supposed to be situationally invariant; rarely if ever bowing to pressure, always manifesting itself, with any inconsistency thought of as failure of will or of virtue. Thus, most of these simplistic virtue approaches fall prey to the radical situationalist

critiques of philosophers like Harmon (1998/1999) and Doris (Doris and Stich, 2005; Doris, 2002). Using classic work from social psychology (Milgram, 1974; Ross and Nibsbett, 1991), they make it clear that simple cross-situational consistency is a chimera. Still, the conclusion that there is no character, or that we must construct virtue without it, is premature.

Solomon (2003, 2005) is one contemporary philosopher who provides us with a more flexible and adaptive approach to virtue and character, perhaps because it is focused on the real problems, situational fluidity, and pressures for compromise of the practical field of business ethics. For Solomon, the virtuous businessperson develops over time, responds flexibly to changing situations, makes judgments about when particular virtues are relevant or appropriate, and thereby exhibits so much flexibility in behavior that the simplistic expectation of consistency is bound to be disappointed. The virtuous businessperson even constructs situations that constrain him or her to behave in a virtuous manner. Thus, Solomon recognizes that virtue need not spring solely from character. As he says, “circumstances and character cannot be pried apart and should not be used competitively as alternative explanations of virtuous or vicious behavior” (Solomon, 2003, p. 56). In a similar manner, Appiah (2008) draws from much of the same social science literature as Doris (2002), but emerges with a picture of character in the middle ground between adamant continuity and aimless situational drifting. For both Solomon (2005) and Appiah (2008), character mediates between the goals and desires of the individual and the situational demands of the moment.

In constructing our model, we take several core ideas from the emerging discussion on virtue. First, we take its focus on long sequences of planned action considered in the context of a continuous narrative of the moral career as the central issue in our discussion of ethics. In Aristotle’s terms, this is because the discussion is about making the enquiry of use to us so that we and our students can become good (and not merely make a good decision). We also take the notion that virtue is something that is developed over time, as the result of practice, and that it is thus in many ways like a skill. And again, this is because the goal of the enquiry, for us and for our students, is to become good, rather than simply to know what virtue is. And we adopt the insistence of many virtue theorists (MacIntyre, 1981/2007; Doris, 2002) that virtue is embedded within a community also leads us to take seriously the situationalist challenge and to recognize the interactions among personal characteristics and enduring (and ephemeral) characteristics of the social surround. Finally, while rejecting the notion of character as a permanent, underlying, changeless substance, we preserve a dynamic notion of character that lives between the extremes of changeless substrate and radical dissolution. The psychological literature converges on the idea that character can best be approached as emerging from the interaction of core personality traits, the self system, skill and knowledge sets, and the moral ecology (ME) within which the individual operates.

The renaissance of moral psychology

After initial enquiries into moral character in children (Hartshorne and May, 1930) showed remarkably little consistency in character, work in moral psychology languished until the cognitive revolution made possible Lawrence Kohlberg’s (Kohlberg and Kramer, 1969) groundbreaking work in moral development. Kohlberg’s work is rooted in models of cognitive development (Piaget, 1965) and

thus constructs the moral task as a phenomenalist (Kohlberg and Kramer, 1969; Narvaez, 2005; Lapsley and Narvaez, 2005), assuming the centrality of conscious, effortful cognition that generates decisions and intentions that then guide behavior. Kohlberg (1971) was aware of the philosophical work of his time and attempted to integrate philosophical concerns into his system. Thus, most of his empirical and theoretical work focused on the moral reasoning associated with moral justification.

The advantage of this approach was that it made morality something one could study with cognitive methods and something one could train. There is now a large literature of Kohlberg-based research that supports the central role cognition plays in moral life and makes clear the effect of training on moral reasoning (Rest, 1979, 1986; Rest and Narvaez, 1994; Narvaez and Lapsley, 2005; Bebeau and Brabeck, 1994; Logan, 1985; Burson *et al.*, 2006). But, there are also substantive critiques of this approach as explaining only a small portion of ethical behavior, leading to a narrow and sterile understanding that excludes the richness of ethical life as it is actually lived (Flanagan, 1991; Pritchard, 1991, 1996; Blasi, 2005; Marnburg, 2000; Gorman *et al.*, 2000).

In recent work, Lapsley and Narvaez (2005) and Huff and Frey (2005) now explicitly claim that moral psychology is “post-Kohlberg.” Both use the familiar “paradigm shift” language (Kuhn, 1962) to emphasize the foundational importance of Kohlberg’s work and to recognize that the most current work in the field is no longer occupied with the phenomena, problems, and structure of moral psychology as conceived in Kohlberg’s terms. Many are still doing the exciting work of character education that was pioneered by Kohlberg (Lapsley and Narvaez, 2006), but the meaning of character, the language used to describe it, and its relation to moral behavior are cast in quite different terms.

Rest (1979, 1986) was one of the first people to attempt to design a model that would use Kohlberg’s approach to relate character, virtues, and moral action to one another in meaningful ways. Rest proposed a four-component model and emphasized that each component interacted with the others. Within Rest’s (1979, 1986) model were the components moral judgment, moral sensitivity, moral motivation, and moral character. The component of moral judgment involves recognizing the many courses of action that are available and the competing demands upon oneself. In the midst of a situation with many choices, the skill is in being able to recognize which option is the most just, ethical, and responsible. This aspect of the model is where Kohlberg began and ended his consideration of the skills and cognitions that lead to moral behavior (Narvaez, 2005; Bebeau and Thoma, 1999) and there is clear evidence that students can improve in this area with training.

However, Rest’s (1979, 1986) model extends beyond moral judgment to incorporate affective and behavioral components. Skill in moral sensitivity is the ability to interpret situations as having potential for ethical responses. Second, moral motivation involves marshalling the variety of available motivators, in the face of competing concerns, to choose and maintain moral action. Moral character is the ability to plan and carry out actions that support the moral choice. In his descriptions of these components, Rest (1979, 1986) mentions a few concrete skills (e.g. moral character involves the skill of avoiding distraction) but the only component with any real detail that might guide pedagogy is the Kohlberg driven component of moral judgment. The model remains abstract (though Narvaez *et al.* (2004) provide significant specificity in their list of skills). Thus, while Rest (1979) was revolutionary in terms of bringing the cognitive, behavioral, and affective components of morality together, what has been sorely

needed since are adaptations of the model to make it specific so that it may inform ethics education (Bebeau and Thoma, 1999; Narvaez *et al.*, 2004). In addition, even the neo-Kohlbergian approaches derived from Rest's model (Narvaez, 2005) do not take seriously the strong challenge from the situationalists (Doris, 2002) and do not systematically incorporate the influences of the situation on moral action.

Still, recent psychological work on conscious and automatic processing has given psychologists new language to describe the different ways that thought and emotion influence action (and vice versa; Haidt, 2001). New work on values (Roccas *et al.*, 2002; Schwartz and Bilsky, 1990), on PeRsonality characteristics (John and Srivastava, 1999; McCrae and Costa, 1999) and their expression in behavior (Shoda and Mischel, 1998; Mischel *et al.*, 2002), on expertise (Hogarth, 2001; Pritchard, 1998; Pritchard, 2006), on how personal projects are expressed in action (Little, 1983) and on the structure of the self (Blasi, 2005; Sheilds and Bredemeier, 2005) have all made possible a more variegated understanding of how character might be formed and expressed in action.

Thus, we take inspiration from the explosion of psychological work relevant to morality to create a model of virtue that incorporates recent understandings of both internal and situational influences on sustained moral action.

The PRIMES model of successful moral action

This model arises from our study of moral exemplars in expertise (Huff and Rogerson, 2005; Huff and Barnard, n.d.). In this research, we did extensive interviews with individuals in the UK and Scandinavia who had been nominated as moral exemplars in the field of computing. Several striking findings from that work have shaped the theoretical position we outline here. First, we found that there was not a unitary profile of the way moral exemplars went about their work. There were, at least, two types: reformers who tried to change social systems and craftspersons who designed systems to help individuals. A significant number of the exemplars did not cleanly fit into either category, leaving the likelihood that there are more types or forms of good computing. This is empirical verification of the philosophical speculation by Flanagan (1991) who uses the example of Christian saints to make the point that there are multiple (perhaps infinite) ways of achieving "the good" and thus multiple "good lives" for which one might strive. This insight suggests that we might be better served by teaching the things these multiple paths have in common rather than teaching particular goods. Second, we found that PeRsonality characteristics correlated strongly with the two approaches to good computing. Reformers were much more likely to be extraverted (socially dominant, outgoing) and craftspersons were much more likely to be open to experience (welcoming new ideas, creative). This suggests that the developmental path to multiple ways of doing good computing is influenced by more than historical circumstance or individual choice. Third, we found that both social skills (e.g. understanding other people) and technical skills (e.g. understanding database structures) were associated with successful moral action in computing. Exemplars consistently spoke of both skill sets as related to their success. This suggests that both kinds of skill should be taught as a part of the curriculum for computer professionals. Finally, we documented the importance of the social surround within which moral action occurs. Together, these findings have suggested the model of good computing we present here.

What emerges is a four-component model of sustained moral action in social context (PRIMES). The model we present here grounds moral action in relatively stable PeRsonality characteristics, guides moral action based on the integration of morality (IM) into the self-system, shapes moral action by the context of the surrounding ME, and facilitates moral action with morally relevant Skills and knowledge (thus the PRIMES acronym). The model seeks to explain the daily performance of moral action of computing professionals and to illuminate ways that computing professionals might be trained to be more active, ethically committed, and ethically effective in their daily performance, across the lifespan of their careers.

Personality. In the *Nicomachean Ethics*, Aristotle (1942) proposes a ship metaphor for the influence of personal inclination. If a ship has a natural inclination to one side, the wise pilot will steer a bit towards the other to correct. New work in personality theory (Roberts *et al.*, 2006) suggests that this kind of steering, particularly when reinforced by social roles (that is, ME), can actually produce changes in PeRsonality characteristics in early adulthood and later. Thus, though we treat personality as an anchoring point for moral inclination, it can be influenced by appropriate life experiences. Thus, personality grounds, but does not solely determine moral character and action.

Integration of morality into the self. Much has been made of the centrality of moral commitment. Psychologists (Blasi, 2005) and philosophers (Flanagan, 1991; Kierkegaard, 1845/1958) treat moral commitment, or moral integrity (May, 1996; Flanagan, 1991; Pritchard, 2006; Taylor, 1985), or moral will (Kant, 1965; Nietzsche, 1954), as the critical determinant of moral action. But, though moral commitment has played this central role, few theorists have spoken carefully about the components of moral commitment, how it is cultivated and achieved, and the ways that it influences moral action. Again, recent work in psychology can help us build a multi-faceted view of moral commitment as one component that guides moral action, but still is not solely determinative of it.

Moral ecology. Moral action is embedded in a social surround that can either support or thwart it. We call this social surround a ME (Donnelley, 1995; Alavi *et al.*, 2006; Harrington, 1996; Victor and Cullen, 1988; Berkowitz and Bier, 2005), or more accurately, a system of interlinked moral ecologies. Countries, cultures, industries, companies, divisions, workgroups, mentorship networks, and professional organizations all have morally relevant expectations and pressures that constrain and sometimes support moral action. Individuals can enter and leave moral ecologies, can influence them, and can even act in defiance of them (Greene and Latting, 2004; van Es and Smit, 2003; Marnburg, 2000; Treviño, 1986). Thus, knowing how to navigate in the relevant moral ecologies is a crucial skill for computer professionals. Moral ecologies thus constrain and support, but do not solely determine moral action.

Moral skills and knowledge. The literature on virtues has usually portrayed them as dispositions that one can improve by practice (Muraven and Baumeister, 2000; Wood *et al.*, 2005; Webb and Sheeran, 2006). But just what is it that is strengthened by practice? Is a virtue like a muscle that gets stronger with use (Wood, 2005; Neal *et al.*, 2006; Webb and Sheeran, 2006)? Or is it like a skill that gets better with appropriate coaching and practice? Again, current literature in moral psychology can help untangle this question. There are aspects of willpower that are like muscle (Muraven and Baumeister, 2000; Neal *et al.*, 2006; Wood *et al.*, 2005; Webb and Sheeran, 2006),

but much of what we call virtue is based in skills and knowledge of how to act in particular worlds (Lapsley and Narvaez, 2005). Skills can be practiced to the level of expertise and automaticity, and knowledge can be learned even to the level of implicit use without conscious reflection. Together, these shape the form of, but do not solely determine, moral action.

A significant advantage of this model is that it focuses on four identifiable domains that influence the performance of good computing. As we will show in the rest of this paper, these domains are not independent, but consistently interact with each other. But, identifying each domain allows us to begin to investigate its independent and mediated effects on the performance of moral action in computing. The model also allows us to arrange the components along two dimensions (Figure 1). One is that of malleability. Because of individual differences, skills and knowledge are not perfectly malleable, but they are the most teachable, or coachable, component. ME and the IM into the self are both somewhat malleable, while core personality is the least likely to change. In the section on the self, we argue that the appropriation of morality is ultimately a decision that the individual alone can make (though the decision can be influenced by ME). Thus, the IM into the self system is most under the control of the self. We have arranged the other components on this second dimension accordingly, with the individual having the least control over ME. None of the components are placed at an extreme end of a dimension: even core personality can change over time (Roberts *et al.*, 2006). The components are placed on the dimensions mostly to suggest where instruction, coaching, and guidance will be most effective. Their actual places on the dimensions are matters for empirical inquiries.

As we review each domain in this paper, we will also make suggestions about how one might teach in the domain and measure characteristics or performance in the domain. An adequate model of teaching good computing will require measurement in at least three of the domains (personality can also be measured, but more to be aware of its influence rather than to guide and assess instruction in it). Cunningham (2005) writes that because we have no measures for moral development, we tend to teach it less in school than we should. Thus, he states, “a better model of the self and human development is crucial for character education.” We hope in this paper to provide an

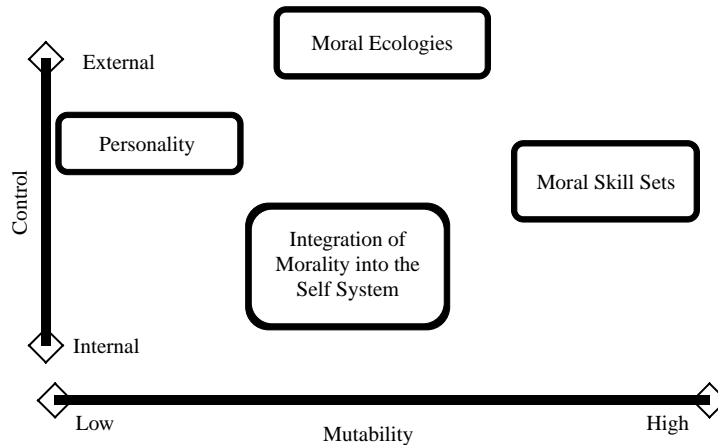


Figure 1.
The four components
arranged on dimensions
of malleability and
personal control

outline of a model that can guide both research and pedagogy. The model uses extant research and theory in the four domains to explain the nature and structure of the influences on successful performance of moral action in computing. But, it can also guide a pedagogy that attempts to cultivate development in each of the domains and provide suggestions for the valid measurement of those domains.

Personality

Our exemplars often spoke of the personality traits that influenced their approach to life projects (Aasen and Huff, 2007). By this, they meant something very like what personality theorists call traits (e.g. extroversion, curiosity, and humility) that they saw as fundamental aspects of their approach to life. In this paper, we will be using the term personality to denote primarily the core traits that underlie the characteristic ways that an individual approaches life tasks. Among the four components of the PRIMES model, these are least likely to change over time (though as we show below, they are subject to development). In the three-level system proposed by McAdams and Emmons (1995) and LeVine (1973) these are core traits that are at least in part heritable (John and Srivastava, 1999 for heritability coefficients in personality). We treat the higher levels of personality in this model (self-conception and life meanings) in the IM into the self component that is discussed in another section. Thus, for now we are talking about standard personality traits as they influence the successful expression of the virtues.

This short review will concentrate primarily on what are called the Big 5 personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism; see Baumgarten, 1933; Allport and Odbert, 1936; John and Srivastava, 1999). We do this in part because we have data on these traits in the exemplar study (Huff and Rogerson, 2005; Huff and Barnard, n.d.), in part because these traits, and their component facets, have been shown to do a remarkably good job of covering the broadest span of applicable personality traits (John and Srivastava, 1999; Roccas *et al.*, 2002), and because they have been shown to be related to values and the performance of life tasks (Little, 1983; Christiansen *et al.*, 1998; Schwartz and Bilsky, 1990). There is of course, continuing conversation about their comprehensiveness, their causal and ontological status, and their structure (John and Srivastava, 1999; Block, 1995). But, the Big 5 personality model is now widely accepted as at least one important aspect of personality (McCrae and Costa, 1999; John and Srivastava, 1999). The dimensions have been shown to replicate quite well in Western cultures (McCrae and Costa, 1999) and reasonably well (with informative exceptions) in non-western cultures (McCrae *et al.*, 1998). The component facets of each dimension might themselves be thought of as traits, and some represent areas (e.g. assertiveness and achievement striving) that have a significant literature devoted to them.

- *Extraversion*. Introversion-extraversion has been called variously confident self-expression, surgency, assertiveness, social extraversion, and power. These names tend to emphasize either a social vitality orientation or a tendency to exert social dominance (two related aspects of the dimension). We found that those moral exemplars who spoke most about, saw the need for, and took action toward reform, were more likely to score high on extraversion (Huff and Barnard, n.d.). According to Roccas *et al.* (2002), those high in extraversion tend to value achievement and stimulation and to place less value on tradition.

Thus, extraversion might help to support a particular kind of moral excellence that involves leadership and facilitating change in society.

- *Conscientiousness*. Individuals who score high on this dimension tend to endorse the values of achievement and conformity (John and Srivastava, 1999). High scores on this dimension are reliably related to success in work environment and career, to impulse control and delay of gratification, and to school and college grades (John and Srivastava, 1999). In the professional context, this dimension and its associated values would seem to underlie successful and careful work performance (Hurtz and Donovan, 2000). Conscientiousness is the dimension that one might think most reliably related to virtue, or at least virtue in an achievement-oriented society. In our research however, it was the one dimension on which our exemplars did not differ from the norm in their countries (Huff and Barnard, n.d.).
- *Neuroticism*. Emotional stability is a measure of negative emotional reactivity. There is little correlation of this dimension with the endorsement of any values (Roccas *et al.*, 2002). In terms of life outcomes, it is correlated with less effective coping and depression (John and Srivastava, 1999). High neuroticism can lead to shutting down information search and to subsequent short-sighted responses (John and Srivastava, 1999) and it seems reasonable that this might interfere with many of the moral skills (moral imagination (MI) and creativity, reasonableness (RE), perseverance (PE)) in the model. Our moral exemplars scored significantly lower on this dimension than their country norms (Huff and Barnard, n.d.).
- *Agreeableness*. This has variously been called social adaptability, likeability, friendly compliance, and love (John and Srivastava, 1999). It is another dimension that seems readily adapted to supporting virtue, as it correlates positively with endorsement of the values of benevolence and tradition and negatively with endorsement of valuing power. Furthermore, high scorers on this dimension tend to donate to charities more and to help others and tend to work better in groups (John and Srivastava, 1999). On the other hand, one can readily bring to mind famously grumpy saints (see Flanagan, 1991, for a discussion of saints and virtue) or rights activists. Though not as extreme as grumpy, Walker and Frimer (2007) found that the brave moral exemplars they identified were less nurturant, generative, and optimistic than those exemplars of the caring type (a somewhat similar distinction to our craft vs reform dimension). As with the other dimensions, rather than determine one's inclusion or exclusion from the circle of virtuous, except at the extremes this dimension shapes the characteristic way one expresses virtue.
- *Openness*. Openness to experience may initially not seem relevant to supporting virtue, but we found (Huff and Rogerson, 2005; Huff and Barnard, n.d.) that exemplars who are craftspersons (those who use their craft to help users and clients) were more likely to score highly on openness to experience than were reformers (who attempt to change the discipline or society). The causal structure is unclear here: perhaps those with higher trait scores for openness (and the other relevant commitments) are drawn to helping others in this way, but it may also be that those who value and participate in computing design come to value and reflect openness to experience. Given that all the personality traits are open to environmental influence, we expect some of both kinds of influence to occur.

Other personality influences on virtue

There are certainly other ways of characterizing the influence of personality on virtue (and vice versa). Optimism, for instance, has been linked to PE and also to flexibility in response to challenges (Roccas *et al.*, 2002). Tangney (2002) suggests that humility (a characteristic often found in moral exemplars) is related to openness to experience, and is independent of self-efficacy, since it involves accurate, rather than motivated, self-assessment. Impulse and constraint (Carver, 2005) can also shape moral action by encouraging impulsive action (either selfish or selfless). We are not trying here to create a detailed theory of the influence of personality traits on virtue (or even to catalogue all the possible influences). We are more simply making the point that any attempt to understand how virtue is developed over the career of a computing professional will need to take into account, in some way, the influence and interaction of personality traits.

There is no single “moral personality”

It is crucial to underline the point that personality traits are unlikely to converge to produce a single type of “moral personality.” Flanagan (1991) uses the example of saints in the church to make this point. There is little in common among the personalities of such diverse saints as Thomas Aquinas, Teresa of Avila, Ignatius Loyola, Francis of Assisi, Joan of Arc, and Martin of Tours. All are exemplars for those who revere the saints, but all are exemplary in very different manners. Work on contingency theories of leadership (Vroom and Jago, 2007) makes a similar point. There is not a single type of good leader, but leaders with different profiles match with situations that make them effective or ineffective, for those followers and for that situation. Recent work (Wood, 2005) views leadership as expressed within a particular ME (in our model’s terms). In this view, leadership occurs in the interaction of individuals (with particular characteristics) with situations, and leadership is less a property of the leader than it is of the particular interaction.

Our interviews of moral exemplars in computing (Aasen and Huff, 2007; Huff and Rogerson, 2005) provide stories of personality traits interacting with particular organizational skills, moral ecologies, and differing moral commitments. Many of our moral exemplars talked about the match (or mismatch) of their personalities and skills to the particular requirements of the situations that confronted them.

Our discovery of two types of moral exemplars (Huff and Rogerson, 2005; Huff and Barnard, n.d.) suggests that different personalities may fit one for different “moral careers.” But we do not think that there are only two kinds of moral career in computing (or any other professional career). There are a multiplicity of goods (Taylor, 1985) and thus likely a multiplicity of moral careers in pursuit of these goals. Cruz and Frey (2003) and Frey and O’Neill-Carillo (2008) have data from case generation exercises with engineers from the Caribbean context that suggest that in countries where corruption is a regular price of business, moral exemplars may need to become reformers in order to maintain their integrity. If so, they may also be better equipped for this task if they have the PeRsonality characteristics typical of other reformers.

Pedagogy

Personality is not set in concrete in the way popular imagination constructs it. Roberts *et al.* (2006) have documented the changes in each of the Big 5 personality dimensions

across the life span. Not surprisingly, conscientiousness increases at the time when many people are getting married and having children. Other life events (e.g. retirement, ageing, and college attendance) also have effects on personality (e.g. college attendance seems to increase openness to experience). It makes sense that, in addition to the overall developmental trajectory, life events can change one's personality. These can include both traumatic events and self-initiated attempts to change (Roberts *et al.*, 2006). One can, to a limited extent, learn social skills, become more conscientious, learn to love one's neighbor, and become more accepting of change (Roberts *et al.*, 2006). Thus, though heritability sets an anchor, there is still significant latitude for movement on every dimension. Within limits, our core personalities can change, develop, or regress.

It is difficult to stage in the classroom the sort of life events that might help students become, for example, more conscientious. Certainly one can begin to introduce students to the pressures of the real workplace (with consulting projects, etc.) so that they can get some coaching in how to deal with the demands of the workplace they will soon be entering. But, we cannot expect this coaching to produce much change in core personality.

Aristotle's ship metaphor helps here. We might better use our time helping students to become aware of their characteristic ways of approaching their work and their profession so that they can prepare to take advantage of or to counter their proclivities. But to do this, we will need good measurement of personality, and ways to track it over time and relate it to other aspects of the model.

Measurement

There is an embarrassment of riches when it comes to measuring personality traits. Large compendia of different personality measures are a regular feature on psychology library shelves (Robinson *et al.*, 1991; Pervin and John, 1999). Given the exploratory nature of these relationships at the time, we think it best to begin with broad-based personality inventories like the NEO-PRI (McCrae and Costa, 1999) or the BFI-44 (John and Srivastava, 1999). Unless there are specific expectations about PeRsonality characteristics (e.g. impulsiveness, optimism), these broad-based inventories offer the best coverage of what are likely to be the relevant traits. We think more comprehensive instruments like the NEO-PRI will be more useful than short versions (e.g. the BFI-44), since these provide facet scores that allow one to see what parts of a dimension (e.g. the social dominance aspect of extroversion) are the most important factors. We now know enough to expect that personality traits are likely to shape the ways that individuals are moral. This suggests assessment of ethical commitment, skill, or action should be informed by knowledge of PeRsonality characteristics.

Conclusions

Continuing the marine metaphor, we might best think of core personality as an anchor that shapes the resources each computer professional can bring to bear on the task of constructing a moral career. On every dimension of personality, the individual can, through effort or exposure to life events, change the anchor point some, to provide for more resources in one area (e.g. to increase conscientiousness, or to become more gregarious). The professional can also recognize these anchors as things that can shape

the sort of projects and aspirations he or she might take on. One can view the constraints of personality as limiting choice, but also as supporting achievement. Good computing

IM into the self-system

Moral commitment is often spoken of as the central component that motivates the moral life of the professional. Blasi (1980) recognized “integration of morality into the self” as the critical component that was missing from Kohlberg’s (Kohlberg and Kramer, 1969) moral development scheme. Work by Colby and Damon (1992) on moral exemplars also places the moral self-concept at the center of exemplars’ motivations.

Instead of “the self,” current psychology speaks more of a “self-system,” recognizing that how one thinks of oneself is contextually influenced (McKinnon, 2005; Blasi, 2005; Higgins-D’Alessandro and Power, 2005; Sheilds and Bredemeier, 2005; Schwartz and Bilsky, 1990; Horowitz *et al.*, 2006; Locke, 2000). Thus, it is standard to talk about domain-specific self-confidence (Burson *et al.*, 2006; Christiansen *et al.*, 1998), and to recognize the multiple roles (Little, 1983; Christiansen *et al.*, 1999) and contexts (Little, 1983) that produce multiple aspects of the self. In this section, we will primarily be addressing the “professional-self-concept” (Bebeau *et al.*, 1993), though we will draw widely from the literature on the self, more broadly considered. “Professional self-concept” is the individual practitioner’s understanding of who they are as a computer scientist, software engineer, supervisor, or teacher. The computing moral exemplars we interviewed (Huff and Rogerson, 2005) occasionally spoke of “the kind of engineer I am,” and this picture is what we mean by the professional self-concept.

What does this integration consist of and how is it achieved? In a recent statement, Blasi (2005) uses the word integration to mean “consistent moral commitment across situations.” But cross-situational consistency is problematic even for the moral exemplars that Colby and Damon (1992) studied. Many of their moral exemplars neglected some aspects of their obligations precisely in order to concentrate on others. Similarly, Oliner and Oliner (1988) found that the moral exemplars who rescued Jews during the Holocaust were not primarily motivated by the sort of cross-situational, principled commitments this conception of character invokes. They were more often motivated by reference-group commitments, or the empathy they felt for particular, individual sufferers. Nathaniel Borenstein’s story of consulting for NATO, in clear violation of his anti-war principles, should serve as a caution to those who emphasize principled consistency as the primary criterion.

Shoda and Mischel (1998) have comprehensively documented the inconsistencies in behavior that challenge the simple expectation that personality will be reflected in rigid cross-situational consistency. This manifest cross-situational inconsistency, shown even by moral exemplars, has become the basis of a strong critique of disposition-based virtue-theoretical approaches (Doris, 2002). If even moral exemplars, those who express the virtues *par excellence*, do not show in a simple way Doris’ required consistent moral commitment across situations, then how can this be the basis for recommendations about how to be ethical?

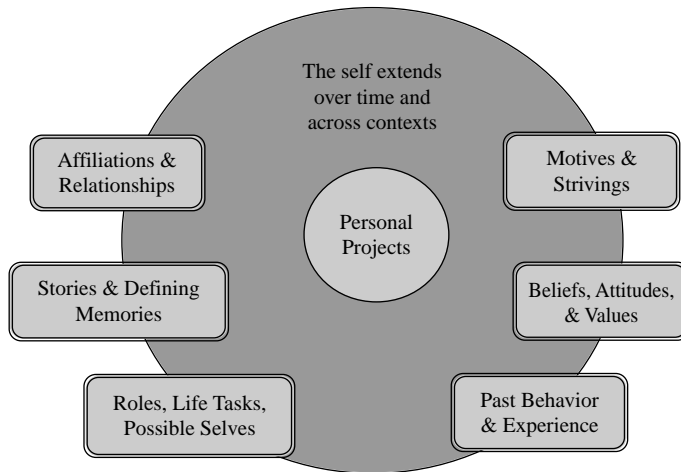
Work by Shoda and Mischel (1998) and Mischel *et al.* (2002) provides one way out of this quandary. Appropriate moral commitment does not produce a foolish consistency, but is located instead in a discriminative facility – the ability to make fine-grained distinctions among situations and to respond to these situations with appropriate kinds of appraisals, expectations and beliefs, emotions, goals, and behavioral scripts,

given one's larger moral commitments (Mischel, 2004). In this light, a more detailed and careful understanding of Borenstein's decision allows us to see the coherence behind the surface inconsistency in his behavior.

Thus, we can expect moral commitment to be sensitive to subtle differences in situations (Solomon, 2003). Correspondingly, the expected "integration of morality into the self" (Blasi, 2005; Colby and Damon, 1992) will need to be of the sort that reflects and produces this kind of subtlety. It will need to recognize the multiple markers, dimensions, and processes by which commitments are incorporated into the self. Oliner and Oliner (1988) recognize this multiplicity when they speak of three reasons that people might become rescuers: obligation to a valued social reference group (the primary motivation for 52 percent), empathic orientation triggered by a specific person or incident (the motivation for 37 percent) and principled commitment (the smallest group, 11 percent). These different motivations are not simply based on different principles or values, but are of qualitatively different kinds: social reference groups, emotional attachments, and commitment to particular values or principles. Thus, if we are to understand the IM into the self-system, we need a model of the self that provides for this kind of complexity in moral motivation.

McGregor and Little (1998) provide such a model of the self. They propose a model of the self that is both temporally extended and contextually distributed. It is temporally extended in two ways: it reaches into the past in stories, memories, and established relationships and it reaches into the future in projections of possible selves, life tasks, and the goals of personal projects. Thus, meaning (and moral commitment as a kind of meaning) can be, indeed must be, part of an ongoing self that is anchored in time. The self is also contextually extended. It is influenced by personal context, friendships, and group memberships. There are cultural differences in the extent to which the self is conceived as contextually influenced, but even the most individualistic cultures acknowledge and celebrate the role of interpersonal connections (Hofstede, 2003).

This temporally extended and contextually distributed self, with multiple avenues for the integration of meaning, can create the kind of complex personality that responds subtly and creatively (and sometimes self-deceptively) to perceived differences in situations. Figure 2 shows a schematic of seven of the avenues through which moral commitment might be integrated into this complexity. Most of the concepts presented here are not depth-psychological constructs, but instead what McGregor and Little (1998) call "Personal Action Constructs" (PACs) that exist at the middle level between behavior descriptions (at the most concrete) and deeper personality trait approaches. The concepts are drawn from a multifarious and expanding literature on motivation, values, meaning, and the planning and execution of action. They often overlap each other (e.g. life tasks and personal projects are often similar). The point here is not to offer a comprehensive and systematic listing of ways of integrating meaning and morality into the self-system. It is, instead to give some idea of the large diversity of ways that exist. It will be the task of later empirical work to determine the extent and nature of the influences each avenue exercises in the moral life of professionals. As suggested by the work of Murray (1938) and Oliner and Oliner (1988), variability may indeed be the key to this: some persons may integrate morality into the self-primarily in terms of relationships and roles (what would my mentor think?), while others may do so via articulated principles and values



Source: McGregor and Little (1998)

Figure 2.
The IM in the self system

(X violates privacy rights). Both ways may be equally effective in supporting moral action (or, perhaps, differentially effective, depending on the person and the ME). For now, we will review the list of approaches in Figure 2 as a somewhat systematic sampling of the way morality can become important to the self.

Affiliations and relationships. Psychologists have long recognized that relations to others are primary constituents of the self. Bowlby (1969) and Ainsworth (1968) created an influential depth model of attachment styles based on schemas structured by early relationship experience. But our schemas and expectations based on past relationships are not the only way, or even the primary way that our social connections influence our sense of self, and thereby our IM into the self. Cross *et al.* (2000) have documented the way that, even in the extremely individualistic US, people differ in the extent to which they integrate current others into the sense of self. Those who do integrate others into their self-system think and behave differently in terms of their obligations to those others (Cross and Vick, 2001). Markus and Kitayama (1991) have concentrated on the variation among cultures in what has been called individualism-collectivism. This cultural variation is, in part, defined by the extent to which culturally defined relations to others are integrated into the self.

Morality can be integrated into the social self to the extent that the relationships entail obligations to close others and to the outsider. People in collectivist cultures often view their obligations to close others differently than to outsiders (Li *et al.*, 2006). Social connection is not the only dimension, and obligations based on tribal status are often mitigated and modified by principled claims from religion. In the work of Gregg (2005), these are the contrasting claims of the honor-modesty system and the claims of Islam. Only one of these systems (Islam) is an “ethic” in the classical sense, with principles and rules of application (though Islam too, differs widely across cultures). The obligations of the honor-modesty system are neither systematic nor rule-based, and are comprised of the widely varying and subjective personal connections established in different groups (Gregg, 2005).

In terms of the social constituents of the professional self-concept, the computing moral exemplars we interviewed often talked about the differences in the way they viewed “the users” from the way many other computer scientists and engineers viewed them. Thus, to them, users were less often an “other” to be handled but the primary target of their moral concern (either in the design of computing systems or the attempt to change social systems). This connection to their users influenced their design of technology, even in some cases influenced the direction of their careers.

Stories and memories. Work begun by Murray (1938), and continued by McAdams (1993; McAdams and Emmons, 1995) has documented the extent to which life meaning is often embedded (and elicited) in autobiographical stories. In particular, stories about “turning points” in individuals’ lives often serve as organizing units in the way a personal life history is constructed and given meaning. Stories do not have to be autobiographical. They can take the form of cautionary tales (Broderick, 1995) remembered to make particular points.

Simply calling tales cautionary suggests how morality can be embedded in important stories. The moral exemplar interviews we did were patterned after McAdams’ (1993) Life Story interviews, and they proved particularly effective in eliciting connections of morality to the professional self. The method of teaching ethical decision making by case analysis takes advantage of this embedding of moral lessons in stories, and the cases can then serve as cautionary tales for students.

Roles, life tasks, possible selves. The self can also be structured and given meaning by conceptions about who I am or might become: the roles one plays, one’s larger life goals, and the possible selves one might become. Possible selves are ideas about what one might become in the future (Markus and Nurius, 1986). These can be negative or positive, and, to the extent they are integrated into the self and deemed possible (Oyserman *et al.*, 2006), they can provide consistent motivation to achieve instrumental goals that approach or avoid the possible self. Life tasks (Cantor and Harlow, 1994) are larger scale commitments to achieve some goal.

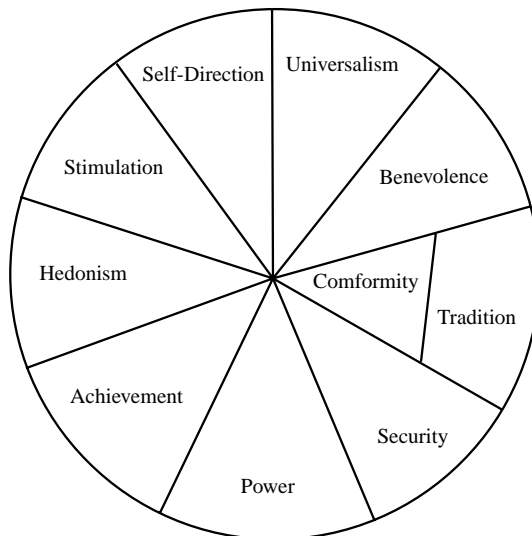
Roles, life tasks, and possible selves all contain implicit or explicit expectations about behavior. Many of these expectations take the form of moral judgments about appropriate or inappropriate behavior. They are not necessarily freely chosen – they may be imposed by employment, family, or societal requirements. But, they can also serve as important motivators of moral behavior like conscientiousness (Oyserman *et al.*, 2006). We asked our moral exemplars about negative and positive possible selves, and received answers in terms of both environmental constraint (the economy and health) and personal moral choice (decisions to change jobs, to pursue careers).

Motives and strivings. Motives and strivings are the most basic, or most broadly based, constructs in this conception of the self. Motive language comes from Murray’s (1938) work that is based on narrative as a window to the self (e.g. the thematic apperception test in which people tell a story about a picture). Motives, for Murray, were basic needs for intimacy, power, achievement, autonomy, cognition, etc. These needs underlay a characteristic desire of the person across many situations, and could be assessed by looking at the themes in the stories that people told. Diversity of needs (both within and across people) is the rule (Murray, 1938). Personal strivings (Emmons, 1986; McAdams and Emmons, 1995) are recurring goals that a person is attempting to accomplish across times and situations.

These needs and strivings are characteristic ways of approaching problems, and may carry moral loading. But, the moral meaning of needs will be specific to the moral status of the goals inherent in particular strivings (or projects, or life tasks). Thus, someone low in “need for power” still may acquire power in order to reform society (see the link between extroversion and reform in our moral exemplars).

Beliefs, attitudes, and values. There is an extensive literature on the relation of beliefs, attitudes and values to moral behavior. Initial work emphasized the difficulty of finding a connection between moral values and behavior (Feather, 1990). But, more recent work like that of Mischel *et al.* (2002), has converged on an understanding of the complex linkages between personal values, the interpretations of situations, and resulting behavior in those situations.

There is an additional level of complexity that is documented in the works of Schwartz (1994) Schwartz and Bilsky (1990) and Schwartz and Boehnke (2004) on values. Figure 3 shows Schwartz’ circumplex of values – an empirically validated model of the relationships among what appear to be a cross-culturally valid listing of values (Schwartz and Bilsky, 1990). The circumplex presents what Schwartz and colleagues have shown to be relationships of opposition and similarity among the values. Individuals who endorse a value on one side of the circumplex (e.g. stimulation) are less likely to endorse the value on the opposite side of the circle (e.g. tradition). This negative correlation in value endorsements sets up a tension among values that we have seen foreshadowed in earlier statements about the complexity of moral commitment. It makes a desire for a “unity of the virtues” problematic, and lays the groundwork for understanding some of the “diversity of goods” that philosophers like Taylor (1985) describe. In addition, this diversity of values suggests that there might be advantage in “moral diversity” in a ME, in that different individuals may become advocates for different values in a community.



Source: Schwartz and Boehnke (2004)

Figure 3.
The theoretical circumplex structure of values

We asked our computing moral exemplars to list the three most important values for systems design (Table I). Most of the values they articulated can be classified in one or more of Schwartz and Bilsky's (1990) circumplex (Figure 3). In addition, some of the tension between values can be found in exemplar's responses. For instance, values of universal access (universalism) compete and must be balanced with values of system security (safety).

When talking about values, we must take into account the cautions that Rohan (2000) outlines in this complex area. Historically, we have used the word value to mean many different things, from the personal goals of individuals to the overarching ideologies that sustain societies. In this context, we are referring to those goals or guiding principles that individuals adopt. In the section on ME we will consider the ways in which values are embodied by organizations and societies.

Past behavior and experience. Dissonance research (Festinger, 1957) provides a powerful argument for the importance of past behavior in establishing current meaning. Most of this research has shown the effect of behavioral commitment on directly expressed attitudes, opinions, or values (Festinger, 1957; Jonas *et al.*, 2001), but this is primarily because of the ease of measurement of changes on these dimensions. The foot in the door effect (Cialdini, 1987) can be interpreted as prior behavioral commitment affecting commitment to new personal projects. Behavior and experience can shape memories and stories as well. In addition, work on habits (Wood *et al.*, 2005; Neal *et al.*, 2006) suggests that there is a complex relationship between planned, intentional action and the maintenance of good (and bad) habits. Thus, habits can maintain goal-directed action even when it is not under intentional control. In this way, habits contribute to "the kind of person I am."

Pritchard (2006) has interviewed moral exemplars in engineering about the virtues associated with good engineering. It is interesting to note that one of the virtues is "a habit of documenting work." In this way, repeated past behavior, based initially on intentional action, becomes habitual, perhaps even automatic (Haidt, 2001), and becomes a part of the professional self.

Personal projects. Personal projects are another mid-level construct that psychologists have used to track the course of meaning in people's lives (Little, 1983, 1999; McGregor and Little, 1998; Little *et al.*, 1992). One's personal projects are the set of things one is doing at the time. These can be somewhat extended in time (e.g. raising my children well) or relatively short-term (finishing a paper). The important point is that a list of the projects one is engaged in allows one to see the individual's life as he or she parses it, with relevance to current action plans and motivations. Research on personal projects has shown them to be relevant to how meaningful people find life, how stressful their life is, and how fractured it feels. By dividing projects into their stages of completion (inception, planning, action, and termination) researchers have been able to show that different goals become salient at different stages. For instance, deliberative goals (what is the best path) have more salience earlier in a project, while implemental goals (finishing the project) supercede during the action stages (Henderson *et al.*, 2007). Deliberative goals are more likely to take into account a broader array of contingencies (and more likely to be realistic) while implemental goals often suffer from self-serving biases (Henderson *et al.*, 2007).

McGregor and Little (1998) include two other items in their model that we emphasize by moving them to other sections in this paper. We move "traits and

Exemplar	Most important value	Second important value	Third important value
C1102	Take responsibility because there are no neutral technologies... values are inherent in technology MI	Create usable systems that make the world transparent for the users and place them in control MI	N/A
C1103	Satisfy all the stakeholders MI, RE, MC	It depends – could be ease of use or safety or simplicity RE	Ability to recognize for specific projects which values are most important MI
C5105	Taking account of the people (users) MI, MC	N/A	N/A
C1101	To understand the problem right and to understand the right problem and to understand its consequences MI, RE	To take different kinds of users into consideration... You have to put (the design) in context of their knowledge and what makes sense to them when they are doing their work MI	N/A
C2102	Honesty and responsibility... should realize what the consequences are of what you are doing RE	Transparency... everything should be open. Opposes copyright MI	N/A
C4101	...systematic and continuous interactions with the people that are going to use the system MI, RE	N/A	N/A
C3102	Keep in mind that systems are for human beings... they are for users... build them so they are simple to use MI	You must work systematically, following a project design RE, PE	N/A
C3101	That is actually giving power to the user... empowerment MI, MC	Do not jeopardize the health of people, and make products user-friendly MI	Design software that increases the knowledge and skill of its users MI, MC
C4104	To look for the needs that people and organizations have... Those needs that we should satisfy MI	Bring positive values to all users. help (users) learn and develop MI, MC	Respect the people that use the system MI

(continued)

Table I. Computing exemplar's design values and the skill sets they intersect

Exemplar	Most important value	Second important value	Third important value
C4102	Openness... Transparency MI	You should also have that in mind when you are... developing your product, you should have an open mind to those who in the end will use what you are doing MI	<i>Equality.</i> Keeping in mind that programmers, designers, planners, and users are equal and that systems should increase human resources (skills) MI, RE, MC
C4103	The system should have a purpose... needs to take into account the complexity of its purpose RE	<i>Transparency.</i> A system should be transparent to the user so that they can predict what will happen MI	Flexibility. Computer systems tend to stay around for a long time... should be able to be flexible to changing needs/times RE, MC, PE
C5109	Quality: fitness for purpose... what the user wants the system to do RE, PE	To satisfy what the user really wants MI	Risk assessment and security. Anticipating that things will go wrong and having good disaster plans RE, PE
C5108	The most important thing has to be knowing what your customer is going to do with it... if it is useful MI	Knowing how the customer will use the system, set it up, configure it, and administer it MI	Asking self how the system fits within the portfolio of my companies products? RE
C5112	Integrity... that the user is protected. The person that is designing the system has to think of the user MI	To give the user capabilities MI, MC Simplicity RE, PE	N/A
C5111	Structure and organization are key RE, PE		User-friendliness MI, MC
C5110	Understand why people think what they do. Have to satisfy mathematicians... engineers... government... and customers will be changing their minds MI	Compromise... get totally conflicting views and work out which bits of each one you can take away MI, MC	Build tasteful systems that can be maintained in the future because they are clean, logical, and done in ways that allows for the future RE, PE
C5107	Systems should do what the user wants them to do in a way that is easy for the user MI, MC	Take into account the variability of users MI	Reliability and avoiding unnecessary functionality RE, PE

Notes: ^aThe initials indicate the four moral skill sets of MI, RE, moral creativity (MC), and PE. These indicate which of the skills aid the expression of these professed important values in system design

competencies” to the personality component and the skills and knowledge component, respectively. And we move “personal contexts” to the ME component. We do not deny that these items are also integrated into the self-system, but we want to explore these particular items in more depth (see the discussions in those sections). The heuristic value of separating items to concentrate on their differences should not lead us to assume that all four components of the model are unconnected to each other and operate independently. Indeed, Johnson (1999) has argued that it is logically incoherent to speak of the influence of the situation (in our terms, the ME) independent of its effect on a person with particular personality dispositions.

In most of the discussion here, we have spoken in terms of how morality is integrated into the self through these various avenues. As Colby and Damon (1992) and Blasi (2005) suggest, morality is deeply integrated in the self-system for some individuals. But for other people, different kinds of meaning are integrated. There are other meaning-structures that can be integrated into this complex self (McGregor and Little, 1998). These include fun/hedonism, communion/social connectedness, achievement, and agency/power accumulation. McGregor and Little (1998) call these identity themes and base their list on a factor analytic approach to people’s ratings of their personal projects. One can easily list other likely identity themes (e.g. moral commitment, religious commitment, etc.) that would be less likely to show up in factor analytic approaches simply because of their relative rarity or the nature of the ratings provided. Certainly, some of these identity themes have elements that are related to moral principles, moral stories, possible moral selves, and morality-based projects, etc. But one might expect exemplars to show a more thorough IM into these various aspects of the self and, indeed to have morality in some form as a central identity theme.

Two final cautions before we move to issues of pedagogy and measurement. First, the values our computing exemplars list (Table I) have an unmistakable “characteristic of the ultimate” (Taylor, 1985) that moral claims appear to share. We emphasize this point to discourage the easy conclusion that this model requires an ethical relativism that any values (e.g. hedonism, or bare power assertion) can be integrated into the “moral self.” The model is certainly consistent with a reasonably thoughtful ethical relativism, but it does not require it. It only requires a recognition of what Taylor has called the “diversity of goods” that we claim as moral values. The internal logic of what Taylor calls the “contrastive language” of values like RE, tradition, and happiness still allows for, and even requires, praise and blame for those who excel or fail on the relevant dimensions. Additionally, this contrastive language may be most evident in the declarative structure of values and attitudes, but we expect that it can also be found in stories, personal projects, possible selves, and most of the other avenues we list above for integrating morality into the self-system.

Secondly, the influence of the morally committed self on behavior is not simply a one-way determinism. People actively construct the self (Little, 1983, 1999; McGregor and Little, 1998; Little *et al.*, 1992; Christiansen *et al.*, 1998; Wood *et al.*, 2005). We choose moral ecologies that are congenial to our self-goals (Little, 1983; Little *et al.*, 1992) and these ecologies in turn shape our sense of who we are.

Pedagogy

There is little real objection to teaching skills and knowledge, or to helping students become more aware of the influences of personality and ME on their professional

actions. The issue becomes more difficult when we talk about influencing the self. Here, we tread perilously close to accusations of “indoctrination” and “coercion.” So, ought ethics be taught using the targeted approach we suggest here of influencing the professional self-concept?

One answer comes from looking at other professions. Nurses and social workers (Council on Social Work Education Inc., 2004) are explicit in their desire to train new members of their professions so that they have integrated ethical commitments into their professional self-concepts. There is explicit work in nursing showing that changes in the ME that result in patients being treated more as commodities have produced a feeling of a “loss of identity” among nurses (Weiss *et al.*, 2002). This evidence of identity loss shows that these nurses, at least, had integrated into their professional self-concept a commitment to treating patients as humans. We find parallel comments among moral exemplars in computing about the negative influences of the moral ecologies in which they work (Huff and Rogerson, 2005).

If we do want to educate professional character, Lapsley and Narvaez (2005) claim that we cannot do so by simply teaching knowledge and skills. We must instead give students the opportunity, and encourage them, to integrate moral commitments into their identity (in our focus here, into their professional self-concept). Other work on exemplars (Colby and Damon, 1992; Oliner and Oliner, 1988) makes the point that this IM into the self-concept helps to explain the immediate sense of “the right thing to do” that exemplars often feel. When “the right thing to do” becomes difficult or impossible (as in the case of the nurses in the Weiss *et al.* (2002) study), then a loss of meaning is felt.

Pritchard (1998, 2006) asserts that this moral commitment can and must be taught. In fact, the engineering professions (including software engineering) see moral action as inseparable to good professional performance (Huff and Rogerson, 2005). These internal goods of the profession (Taylor, 1985) are what enable the “craftsperson” moral exemplars in our research to make claims on and influence others to better practice (Weaver *et al.*, 2005). As the “reformer” moral exemplars show, there are also goods that are external to the profession that some professionals will campaign for as important goods that the profession should adopt. This constant negotiation of what counts as a good for the profession is in fact part of what we mean by the dynamic nature of the ME of a profession. This dynamic negotiation means that people of goodwill will disagree about some of the goods that ought to be taught in the classroom and about some of the moral commitments that students should be encouraged to adopt as part of their professional self-concept. Indeed, one should doubt whether an identifiable profession exists to the extent that there is no agreement about internal goods (Ladd, 1991).

The process for teaching these goods, for encouraging the adoption of moral commitments into the professional self-concept, was outlined long ago by Aristotle (1942). One learns a virtue, according to Aristotle, by enacting it, by practicing it. Lapsley and Narvaez (2005) use the literature on expertise to help us understand the process that moves the student from novice in ethical action to expertise, by way of guided practice. It involves extensive practice of appropriate actions, under conditions of explicit and clear feedback, with the concomitant provision of explicit theory about the structure, nature, and planning of the performance. These conditions can be met from extensive work with cases (Huff and Frey, 2005) or with project-based education (Huff, 1996). Extensive practice provides students with the knowledge and skills they

need to actually perform the virtue. But, it can also provide students with the opportunity to enjoy the fruits of ethical action, encourage them to recognize the centrality of the internal goods to their work, and to adopt the goods into their professional self-concept.

It is important to note one danger here: that of technique-driven morality. The techniques we suggest here for encouraging the construction of a professional self-concept do not guarantee that a student, given the opportunity, will become the moral clone of the instructor. The appropriate metaphor here, and one used by Aristotle, is that of coaching. The coach can guide and influence, and often has significant influence that can be misused. But in the end, it is the athlete who must practice and who must internalize the instruction.

There is, then, a gap that technique cannot bridge, and that the student must cross with a personal act of appropriation. And because of the diversity of goods (Taylor, 1985), and the likely opposition of some values with others (Schwartz and Bilsky, 1990; Taylor, 1985; Mannix and Neale, 2005; Bartels and Medin, 2007) any meaningful appropriation of some values also entails loss, or at least tension, with others. Adopting the techniques (e.g. skills and knowledge) without this personal act of appropriation will result in something short of virtuous action in the profession (and possibly even vicious action in the profession). Finally, this act of appropriation is not a one-time commitment, but a process that continues as the student becomes a professional and the professional becomes more mature across the lifespan (see Colby and Damon, 1992 for a description of this process in moral exemplars in social service).

Measurement

One of the significant advantages of the model of IM into the professional self that we propose is that it makes this integration amenable to measurement. Little and Gee (2007) have done extensive work on measuring the properties of PACs and provide useful methodological guidance.

The measurement method consists of eliciting a set of PACs (personal projects, life tasks, possible selves, etc.) that are of personal relevance to the individual. On average, people list about 15 personal projects at any given time, some of which are long-term strivings (e.g. maintain my expertise in database structures) and some that are short-term goals that will be replaced upon completion with new short-term goals (e.g. prepare the team report for Friday). The PACs the person lists then become the basis for a series of ratings of each PAC. Interesting research has been done rating PACs on a number of dimensions including:

- *Meaning*. How enjoyable, important, value congruent, and expressive of identity each PAC is.
- *Structure*. Whether the individual initiated the PAC, their perceived control over its success, whether the person has enough time to devote to the PAC, and the PAC's congruence with other PACs the individual has.
- *Community*. Whether the PAC is supported or valued (or thwarted) by significant others or the organizational climate. This assessment can be done at different levels of the ME – the immediate group or micro-climate, the larger organization, the profession, etc.
- *Efficacy*. Whether the PAC is likely to be successful.

- *Stress*. Whether the PAC produces stress in the person's life, because of incongruity with the self, with others, or with other projects.

This is a wealth of information. Surely one cannot ask all of it in a single sitting, but the method provides a way to ask structured, statistically tractable questions about the extent to which moral commitments are integrated into those projects that are most important to the self. Research teams (Christiansen *et al.*, 1998, 1999; McGregor and Little, 1998; Little, 1983, 1999) have shown that these data can be analyzed across projects, within a single person, to get indexes of meaning, structure, etc. that predict important outcome variables such as depression, job satisfaction, meaning in life, and happiness. PAC measurement is likely to be able to track, in pre- and post-measurement designs, changes in moral commitments that are the result of education or other interventions.

We have also mentioned another useful measurement instrument here, the circumplex scale of interpersonal values (Schwartz and Bilsky, 1990). This scale has been extensively validated across cultures (Schwartz and Bilsky, 1990; Schwartz, 1994; Schwartz and Boehnke, 2004) and though there is ongoing discussion of the nature of the circumplex relationships among the values (Perrinjaquet *et al.*, 2007) (as there is about the Big 5 trait scales), the scale would be very useful to track changes in endorsement of values across time.

This general measurement of value structure will be useful in itself, but perhaps more useful as a baseline or model for constructing similar value scales that are based on the internal goods (and goods under debate) within the profession. Initial work by philosophers such as Pritchard (1998, 2006) can provide a basis for constructing these profession-specific scales. And the methods used by Schwartz and Bilsky (1990) can provide models.

Finally, Bebeau *et al.* (1993) have developed a measurement instrument (the professional role orientation inventory) tailored to the specific values of the profession of dentistry. This involves rating a series of items about the role obligations of dentists. They have shown that an ethics curriculum can produce improvements on this inventory (Bebeau, 1994). It is important to note that this scale is not unidimensional – one does not simply adopt more “professional role orientation” as a result of training. There are two dimensions underlying this instrument, adoption of responsibility (how much is the professional responsible for others?) and authority (How much should decisions rest with the profession alone?). This produces four combinations, low on both responsibility and authority (a sort of hired gun model), high on both (a professional guild model), high authority and low responsibility (a commercial model), and low authority and high responsibility (a kind of service model). Training moves professional away from the hired gun model. Bebeau (1994) supplement this instrument with an essay that is scored for the presence of six obligations that supposedly distinguish occupations from professions.

These suggestions for measurement of this component provide sufficient evidence that we are likely to be able to measure increases in IM into the professional self. It may well be that inventories and methods will need to be established for every profession of interest.

Conclusions

The IM into the professional self-concept is the one influence on sustained moral action in the profession that is most under the control of the individual computer scientist.

Teachers, mentors, and coaches can invite and instruct, but the individual must, in the end, adopt a professional self-image of his or her own. Since it is constructed by the individual, out of stories, histories, roles, goals, values, and commitments, each self-concept can be quite different from others across the profession. This pluralism in the most individual part of the model need not be a bad thing, as it leaves room for individuals to specialize in different visions of the good for the profession, its clients, and society. If we can begin to measure this component, we can then begin to understand the range of visions of the good that make up the profession of computing.

Concluding comments for part 1

We have presented here the first two components of the PRIMES model of ethical behavior in the field of computing, discussing the ways in which personality (PR) and the IM into the professional self-shape moral action. In the second part of the paper, we will present the final two components of the model, the ME within which a moral career is constructed and the skills and knowledge (S) required to sustain moral action in the profession successfully.

This model can help us rethink our pedagogy of computing ethics (and perhaps of other engineering disciplines too) and help us to track that pedagogy by suggesting the variety of measurement techniques that will be needed to encompass a full picture of moral action in the profession of computing.

References

- Aasen, K. and Huff, C. (2007), *Personality Characteristics in the Life Stories of Moral Exemplars in Computing*, St Olaf College, Northfield, MN (unpublished manuscript).
- Ainsworth, M.D.S. (1968), "Object relations, dependency, and attachment: a theoretical review of the infant mother relationship", *Child Development*, Vol. 40, pp. 969-1025.
- Alavi, M., Kayworth, T. and Leidner, D.E. (2006), "An empirical examination of the influence of organizational culture on knowledge management practices", *Journal of Management Information Systems*, Vol. 22, pp. 191-224.
- Allport, G.W. and Odbert, H.S. (1936), "Traitnames: a psycho-lexical study", *Psychological Monographs*, Vol. 47, p. 171.
- Anscombe, G.E.M. (1958), "Modern moral philosophy", *Philosophy*, Vol. 33, pp. 1-19.
- Appiah, K.A. (2008), *Experiments in Ethics*, Harvard University Press, Cambridge, MA.
- Aristotle (1942), *The Nicomachean Ethics*, translated by Ross, W.D., Random House, New York, NY.
- Bartels, D.M. and Medin, D.L. (2007), "Are morally motivated decision makers insensitive to the consequences of their choices?", *Psychological Science*, Vol. 18, pp. 24-8.
- Baumgarten, F. (1933), "Character traits", *Beitraege zur Charakter – und Personlick – Keitsforschung*, Vol. 1, p. 81.
- Bebeau, M.J. (1994), "Influencing the moral dimensions of dental practice", in Rest, J. and Narvaez, D. (Eds), *Moral Development in the Professions: Psychology and Applied Ethics*, Lawrence Erlbaum, Hillsdale, NJ, pp. 121-46.
- Bebeau, M.J. and Brabeck, M. (1994), "Ethical sensitivity and moral reasoning among men and women in the professions", in Puka, B. (Ed.), *Caring Voices and Women's Moral Frames*, Garland Publishing, New York, NY, pp. 240-59.

- Bebeau, M.J. and Thoma, S.J. (1999), "Intermediate' concepts and the connection to moral education", *Educational Psychology Review*, Vol. 11, pp. 343-60.
- Bebeau, M.J., Born, D.O. and Ozar, D.T. (1993), "Development of a professional role orientation inventory", *The Journal of the American College of Dentists*, Vol. 60, pp. 27-33.
- Berkowitz, M.W. and Bier, M. (2005), "The interpersonal roots of character education", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 1-17.
- Blasi, A. (1980), "Bridging moral cognition and moral action: a critical review of the literature", *Psychological Bulletin*, Vol. 88, pp. 1-45.
- Blasi, A. (2005), "Moral character: a psychological approach", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 67-100.
- Block, J. (1995), "A contrarian view of the five-factor approach to personality description", *Psychological Bulletin*, Vol. 117, pp. 187-215.
- Borenstein, N. (1989), "My life as a NATO collaborator", *Bulletin of the Atomic Scientists*, April, pp. 14-20.
- Bowlby, J. (1969), *Attachment and Loss, Vol. 1: Attachment*, Basic Books, New York, NY.
- Bradey, F.H. (1876/1962), *Ethical Studies*, 2nd ed., Oxford University Press, Oxford.
- Broderick, C.B. (1995), "'That reminds me of a story...': the therapeutic use of cautionary tales", *Contemporary Family Therapy: An International Journal*, Vol. 17 No. 1, pp. 17-26.
- Burson, K.A., Larrick, R.P. and Klayman, J. (2006), "Skilled or unskilled, but still unaware of it: how perceptions of difficulty drive miscalibration in relative comparisons", *Journal of Personality and Social Psychology*, Vol. 90, pp. 60-77.
- Cantor, N. and Harlow, R.E. (1994), "Personality, strategic behavior, and daily-life problem solving", *Current Directions in Psychological Science*, Vol. 3, pp. 169-72.
- Carver, C.S. (2005), "Impulse and constraint: perspectives from personality psychology, convergence with theory in other areas, and potential for integration", *Personality and Social Psychology Review*, Vol. 9 No. 4, pp. 312-33.
- Christiansen, C.H., Little, B.R. and Backman, C. (1998), "Personal projects: a useful approach to the study of occupation", *The American Journal of Occupational Therapy*, Vol. 52, pp. 439-46.
- Christiansen, C.H., Backman, C., Little, B.R. and Nguyen, A. (1999), "Occupations and well-being: a study of personal projects", *The American Journal of Occupational Therapy*, Vol. 53, pp. 91-100.
- Cialdini, R.B. (1987), "Compliance principles of compliance professionals: psychologists of necessity", in Anna, M., Olson, J.M. and Herman, C.P. (Eds), *Social Influence: The Ontario Symposium*, Vol. 5, Erlbaum, Hillsdale, NJ.
- Colby, A. and Damon, W. (1992), *Some do Care: Contemporary Lives of Moral Commitment*, Free Press, New York, NY.
- Council on Social Work Education Inc. (2004), *Educational Policy Standards*, available at: <http://socialwork.iu.edu/media/EPAS.htm> (accessed August 8, 2007).
- Crisp, R. and Slote, M. (Eds) (1997), *Virtue Ethics: Oxford Readings in Philosophy*, Oxford University Press, Oxford.
- Cross, S.E. and Vick, N. (2001), "The interdependent self-construal and social support: the case of persistence in engineering", *Personality and Social Psychology Bulletin*, Vol. 27, pp. 820-32.

-
- Cross, S.E., Bacon, P. and Morris, M. (2000), "The relational interdependent self-construal and relationships", *Journal of Personality and Social Psychology*, Vol. 78, pp. 791-808.
- Cruz, J.A. and Frey, W.J. (2003), "An effective strategy for integrating ethics across the curriculum in engineering: an ABET 2000 challenge", *Science and Engineering Ethics*, Vol. 9 No. 4, pp. 543-68.
- Cunningham, C.A. (2005), "A certain reasoned art: the rise and fall of character education in America", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 166-200.
- Davidson, M.L. (2005), "Harness the sun, channel the wind: the art and science of effective character education", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 218-44.
- Davis, M.H., Soderlund, T., Cole, J., Gadol, E., Kute, M. and Myers, M. *et al.* (2004), "Cognitions associated with attempts to empathize: how do we imagine the perspective of another?", *Personality and Social Psychology Bulletin*, Vol. 30, pp. 1625-35.
- Donnelley, S. (1995), "The art of moral ecology", *Ecosystem Health*, Vol. 1, pp. 170-6.
- Doris, J.M. (2002), *Lack of Character: Personality and Moral Behavior*, Cambridge University Press, Cambridge.
- Doris, J.M. and Stich, S.P. (2005), "As a matter of fact: empirical perspectives on ethics", in Jackson, F. and Smith, M. (Eds), *The Oxford Handbook of Contemporary Analytic Philosophy*, Oxford University Press, Oxford, pp. 114-52.
- Emmons, R.A. (1986), "Personal strivings: an approach to personality and subjective well-being", *Journal of Personality and Social Psychology*, Vol. 51, pp. 1058-68.
- Feather, N. (1990), "Bridging the gap between values and actions: recent applications of the expectancy-value model", *The Handbook of Motivation and Cognition: Foundations of Social Behavior*, Vol. 2, pp. 151-92.
- Festinger, L. (1957), *A Theory of Cognitive Dissonance*, Stanford University Press, Stanford, CA.
- Flanagan, O. (1991), *Varieties of Moral Personality: Ethics and Psychological Realism*, Harvard University Press, Cambridge, MA.
- Frey, W. and O'Neill-Carillo, E. (2008), "Engineering ethics in Puerto Rico: issues and narratives", *Science and Engineering Ethics*, Vol. 14 No. 3, pp. 417-31.
- Gorman, M.E., Mehalik, M.M. and Werhane, P.H. (2000), *Ethical and Environmental Challenges to Engineering*, Prentice-Hall, Englewood Cliffs, NJ.
- Greene, A.D. and Latting, J.K. (2004), "Whistleblowing as a form of advocacy: guidelines for the practitioner and organization", *Social Work*, Vol. 49, pp. 219-30.
- Gregg, G.S. (2005), *The Middle East: A Cultural Psychology*, Oxford University Press, New York, NY.
- Haidt, J. (2001), "The emotional dog and its rational tail: a social intuitionist approach to moral judgment", *Psychological Review*, Vol. 108, pp. 814-34.
- Haidt, J. (2008), "Morality", *Perspectives on Psychological Science*, Vol. 3 No. 1, pp. 65-72.
- Harmon, G. (1998/1999), "Moral philosophy meets social psychology: virtue ethics and the fundamental attribution error", *Proceedings of the Aristotelian Society*, Vol. 99, pp. 315-31.
- Harrington, S.J. (1996), "The effects of codes of ethics and personal denial of responsibility on computer abuse judgments and intentions", *MIS Quarterly*, Vol. 20, pp. 257-78.
- Hartshorne, H. and May, M.A. (1930), "A summary of the work of the character education enquiry", *Religious Education*, Vol. 25, pp. 607-19.

- Henderson, M.D., Gollwitzer, P.M. and Oettingen, G. (2007), "Implementation intentions and disengagement from a failing course of action", *Journal of Behavioral Decision Making*, Vol. 20, pp. 81-102.
- Higgins-D'Alessandro and Power, C.F. (2005), "Character, responsibility, and the moral self", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 101-20.
- Hofstede, G. (2003), *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*, Sage, Thousand Oaks, CA.
- Hogarth, R.M. (2001), *Educating Intuition*, University of Chicago Press, Chicago, IL.
- Horowitz, L.M., Wilson, K.R. and Turan, B. (2006), "How interpersonal motives clarify the meaning of interpersonal behavior: a revised circumplex model", *Personality and Social Psychology Review*, Vol. 10 No. 1, pp. 67-86.
- Huff, C.W. (1996), "Practical guidance for teaching the social impact statement", in Huff, C.W. (Ed.), *Proceedings of the 1996 Symposium on Computers and the Quality of Life*, ACM Press, New York, NY, pp. 86-90.
- Huff, C.W. and Barnard, L. (n.d.), "Good computing: life stories of moral exemplars in the computing profession", *IEEE Computers and Society* (in press).
- Huff, C.W. and Frey, W. (2005), "Moral pedagogy and practical ethics", *Science and Engineering Ethics*, Vol. 11, pp. 1-20.
- Huff, C.W. and Rogerson, S. (2005), "Craft and reform in moral exemplars in computing", paper presented at ETHICOMP 2005, Linköping, September.
- Hurtz, G.M. and Donovan, J.J. (2000), "Personality and job performance: the Big Five revisited", *Journal of Applied Psychology*, Vol. 85, pp. 869-79.
- John, O.P. and Srivastava, S. (1999), "The big five trait taxonomy: history, measurement, and theoretical perspectives", in Pervin, L.A. and John, O.P. (Eds), *Handbook of Personality: Theory and Research*, Guilford, New York, NY, pp. 139-53.
- Johnson, J.A. (1999), "Persons in situations: distinguishing new wine from old wine in new bottles", *European Journal of Personality*, Vol. 13, pp. 443-53.
- Jonas, E., Schulz-Hardt, S., Frey, D. and Thelen, N. (2001), "Confirmation bias in sequential information search after primary decisions: an expansion of dissonance theoretical research on selective exposure to information", *Journal of Personality and Social Psychology*, Vol. 80, pp. 557-71.
- Kant, I. (1965), *Fundamental Principles of the Metaphysics of Ethics*, Longmans, London.
- Kierkegaard (1845/1958), *Edifying Discourses, A Selection*, Harper & Brothers, New York, NY.
- Kohlberg, L. (1971), "From is to ought: how to commit the naturalist fallacy and get away with it in the study of moral development", in Mischel, T. (Ed.), *Cognitive Development and Epistemology*, Academic Press, New York, NY.
- Kohlberg, L. and Kramer, R. (1969), "Continuities and discontinuities in childhood and adult moral development", *Human Development*, Vol. 12, pp. 93-120.
- Kuhn, T. (1962), *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago, IL.
- Kupperman, J.J. (2005), "How not to educate character", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 1-17.
- Ladd, J. (1991), "The quest for a code of professional ethics: an intellectual and moral confusion", in Johnson, D. (Ed.), *Ethical Issues in Engineering*, Prentice-Hall, Englewood Cliffs, NJ, pp. 130-6.

-
- Lapsley, D.K. and Narvaez, D. (2005), "Moral psychology at the crossroads", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 18-35.
- Lapsley, D.K. and Narvaez, D. (2006), "Character education", in Renninger, A. and Siegel, I. (Eds), *Handbook of Child Psychology*, Vol. 4, Wiley, New York, NY, pp. 248-96.
- LeVine, R. (1973), *Culture, Behavior, and Personality*, Aldine, Chicago, IL.
- Li, S., Triandis, H.C. and Yu, Y. (2006), "Cultural orientation and corruption", *Ethics & Behavior*, Vol. 16 No. 3, pp. 199-215.
- Little, B.R. (1983), "Personal projects: a rationale and method for investigation", *Environment & Behavior*, Vol. 15 No. 3, pp. 273-309.
- Little, B.R. (1999), "Personal projects and social ecology: themes and variations across the life span", in Brandtstädter, J. and Lerner, R.M. (Eds), *Action & Self-development: Theory and Research through the Life Span*, Sage, Thousand Oaks, CA, pp. 197-221.
- Little, B.R. and Gee, T.L. (2007), "The methodology of personal projects analysis: four modules and a funnel", in Little, B.R., Salmela-Aro, K. and Phillips, S.D. (Eds), *Personal Project Pursuit: Goals, Action, and Human Flourishing*, Lawrence Erlbaum, Mahwah, NJ, pp. 51-94.
- Little, B.R., Lecci, L. and Watkinson, B. (1992), "Personality and personal projects: linking big five and PAC Units of analysis", *Journal of Personality*, Vol. 60, pp. 501-24.
- Locke, K.D. (2000), "Circumplex scales of interpersonal values: reliability, validity, and applicability to interpersonal problems and personality disorders", *Journal of Personality Assessment*, Vol. 75, pp. 249-67.
- Logan, G.D. (1985), "Skill and automaticity: relations, implications, and future directions", *Canadian Journal of Psychology*, Vol. 39, pp. 367-86.
- McAdams, D.P. (1993), *The Stories We Live by: Personal Myths and the Making of the Self*, W. Morrow, New York, NY.
- McAdams, D.P. and Emmons, R.A. (1995), "Levels and domains in personality", *Journal of Personality*, Vol. 63, pp. 341-727.
- McCrae, R.R. and Costa, P.T. (1999), "A five-factor theory of personality", in Pervin, L.A. and John, O.P. (Eds), *Handbook of Personality: Theory and Research*, Guilford, New York, NY.
- McCrae, R.R., Costa, P.T. Jr, del Pilar, G.H., Rolland, J.P. and Parker, W.D. (1998), "Cross-cultural assessment of the five-factor model: the revised NEO personality inventory", *Journal of Cross-cultural Psychology*, Vol. 29, pp. 171-88.
- McGregor, I. and Little, B.R. (1998), "Personal projects, happiness, and meaning: on doing well and being yourself", *Journal of Personality and Social Psychology*, Vol. 74 No. 2, pp. 494-512.
- McKinnon, C. (2005), "Character possession and human flourishing", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 36-66.
- MacIntyre, A. (1981/2007), *After Virtue: A Study in Moral Theory*, 3rd ed., University of Notre Dame Press, Notre Dame, IN.
- Mannix, E. and Neale, M.A. (2005), "What differences make a difference? The promise and reality of diverse teams in organizations", *Psychological Science in the Public Interest*, Vol. 6, pp. 31-54.
- Markus, H. and Kitayama, S. (1991), "Culture and the self: Implications for cognition, emotion, and motivation", *Psychological Review*, Vol. 98, pp. 224-53.
- Markus, H. and Nurius, P. (1986), "Possible selves", *American Psychologist*, Vol. 41, pp. 954-69.

- Marnburg, E. (2000), "The behavioural effects of corporate ethical codes: empirical findings and discussion", *Business Ethics: A European Review*, Vol. 9, pp. 200-10.
- May, L. (1996), *The Socially Responsive Self: Moral Theory and Professional Ethics*, University of Chicago Press, Chicago, IL.
- Milgram, S. (1974), *Obedience to Authority*, Harper & Row, New York, NY.
- Mischel, W. (2004), "Toward an integrative science of the person", *Annual Review of Psychology*, Vol. 55, pp. 1-22.
- Mischel, W., Shoda, Y. and Mendoza-Denton, R. (2002), "Situation-behavior profiles as a locus of consistency in personality", *Current Directions in Psychological Science*, Vol. 11, pp. 50-4.
- Muraven, M. and Baumeister, R.F. (2000), "Self-regulation and depletion of limited resources: does self-control resemble a muscle?", *Psychological Bulletin*, Vol. 126, pp. 247-59.
- Murray, H.A. (1938), *Explorations in Personality: A Clinical and Experimental Study of Fifty Men of College Age*, Oxford University Press, New York, NY.
- Narvaez, D. (2005), "The Neo-Kohlbergian tradition and beyond: schemas, expertise and character", in Pope-Edwards, C. and Carlo, G. (Eds), *Nebraska Symposium on Motivation, Vol. 51: Moral Motivation through the Lifespan*, University of Nebraska Press, Lincoln, NE, pp. 119-63.
- Narvaez, D. and Lapsley, D. (2005), "The psychological foundations of everyday morality and moral expertise", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 140-65.
- Narvaez, D., Bock, T., Endicott, L. and Lies, J. (2004), "Minnesota's community voices and character education project", *Journal of Research in Character Education*, Vol. 2, pp. 89-112.
- Neal, D.T., Wood, W. and Quinn, J.M. (2006), "Habits – a repeat performance", *Current Directions in Psychological Science*, Vol. 15, pp. 198-202.
- Nietzsche, F.W. (1954), *The Philosophy of Nietzsche*, Modern Library, New York, NY.
- Oliner, S.P. and Oliner, P. (1988), *The Altruistic Personality: Rescuers of Jews in Nazi Europe*, Collier Macmillan, New York, NY.
- Oyserman, D., Bybee, D. and Terry, K. (2006), "Possible selves and academic outcomes: how and when possible selves impel action", *Journal of Personality and Social Psychology*, Vol. 91, pp. 188-204.
- Perrinjaquet, A., Furrer, O., Usunier, J.C., Cestre, G. and Valette-Florence, P. (2007), "A test of the quasi-circumplex structure of human values", *Journal of Research in Personality*, Vol. 41, pp. 820-40.
- Pervin, L.A. and John, O.P. (Eds) (1999), *Handbook of Personality: Theory and Research*, Guilford, New York, NY.
- Piaget, J. (1965), *The Moral Judgment of the Child*, Free Press, New York, NY.
- Pincoffs, E.L. (1971), "Quandary ethics", *Mind*, Vol. 80, pp. 552-71.
- Pincoffs, E.L. (1986), *Quandaries and Virtues: Against Reductivism in Ethics*, University of Kansas Press, Lawrence, KS.
- Pritchard, M. (1991), *On Becoming Responsible*, University of Kansas Press, Lawrence, KS.
- Pritchard, M. (1996), *Reasonable Children: Moral Education and Moral Learning*, University of Kansas Press, Lawrence, KS.
- Pritchard, M. (1998), "Professional responsibility: focusing on the exemplary", *Science and Engineering Ethics*, Vol. 4, pp. 215-34.

-
- Pritchard, M.S. (2006), *Professional Integrity: Thinking Ethically*, University of Kansas Press, Lawrence, KS.
- Rest, J.R. (1979), *Development in Judging Moral Issues*, University of Minnesota Press, Minneapolis, MN.
- Rest, J.R. (1986), *Moral Development: Advances in Research and Theory*, Praeger, New York, NY.
- Rest, J.R. and Narvaez, D. (Eds) (1994), *Moral Development in the Professions: Psychology and Applied Ethics*, Erlbaum, Hillsdale, NJ.
- Roberts, B.W., Walton, K. and Viechtbauer, W. (2006), "Patterns of mean-level change in personality traits across the life course: a meta-analysis of longitudinal studies", *Psychological Bulletin*, Vol. 132, pp. 1-25.
- Robinson, J.P., Shaver, P.R. and Wrightsman, L.S. (Eds) (1991), *Measures of Personality and Social Psychological Attitudes*, Academic Press, San Diego, CA.
- Roccas, S., Sagiv, L., Schwartz, S.H. and Knafo, A. (2002), "The big five personality factors and personal values", *Personality and Social Psychology Bulletin*, Vol. 28 No. 6, pp. 789-801.
- Rohan, M.J. (2000), "A rose by any name? The values construct", *Journal of Personality and Social Psychology*, Vol. 4 No. 3, pp. 255-77.
- Ross, L. and Nisbett, R.E. (1991), *The Person and the Situation: Perspectives of Social Psychology*, McGraw-Hill, New York, NY.
- Schwartz, S.H. (1994), "Are there universal aspects in the structure and contents of human values?", *Journal of Social Issues*, Vol. 50, pp. 19-45.
- Schwartz, S.H. and Bilsky, W. (1990), "Toward a theory of the universal content and structure of values: extensions and cross-cultural replications", *Journal of Personality and Social Psychology*, Vol. 58 No. 5, pp. 878-91.
- Schwartz, S.H. and Boehnke, K. (2004), "Evaluating the structure of human values with confirmatory factor analysis", *Journal of Research in Personality*, Vol. 38, pp. 230-55.
- Sheilds, D.L. and Bredemeier, B.L. (2005), "Can sports build character?", in Lapsley, D.K. and Power, F.C. (Eds), *Character Psychology and Character Education*, University of Notre Dame, Notre Dame, IN, pp. 121-39.
- Shoda, Y. and Mischel, W. (1998), "Personality as a stable cognitive-affective activation network: characteristic patterns of behavior variation emerge from a stable personality structure", in Miller, S.J. and Lynn, C. (Eds), *Connectionist Models of Social Reasoning and Social Behavior*, Lawrence Erlbaum Associates Publishers, Mahwah, NJ.
- Solomon, R.C. (2003), "Victims of circumstances? A defense of virtue ethics in business", *Business Ethics Quarterly*, Vol. 13, pp. 43-62.
- Solomon, R.C. (2005), "What's character got to do with it?", *Philosophy and Phenomenological Research*, Vol. 71 No. 3, pp. 648-55.
- Tangney, J.P. (2002), "Humility", in Snyder, C.R. and Lopez, S.J. (Eds), *Handbook of Positive Psychology*, Oxford University Press, New York, NY, pp. 411-9.
- Taylor, C. (1985), *Philosophy and the Human Sciences. Philosophical Papers 2*, Cambridge University Press, New York, NY.
- Treviño, L.K. (1986), "Ethical decision making in organizations: a person-situation interactionist model", *The Academy of Management Review*, Vol. 11, pp. 601-17.
- van Es, R. and Smit, G. (2003), "Whistleblowing and media logic: a case study", *Business Ethics: A European Review*, Vol. 12, pp. 144-50.
- Victor, B. and Cullen, J. (1988), "The organizational bases of ethical work climate", *Administrative Science Quarterly*, Vol. 33, pp. 101-25.

- Vroom, V. and Jago, A. (2007), "The role of the situation in leadership", *American Psychologist. Special Issue: Leadership*, Vol. 62 No. 1, pp. 17-24.
- Walker, L.J. and Frimer, J.A. (2007), "Moral personality of brave and caring exemplars", *Journal of Personality and Social Psychology*, Vol. 93 No. 5, pp. 845-60.
- Weaver, G.R., Treviño, L.K. and Agle, B. (2005), "'Somebody I look up to': ethical role models in organizations", *Organizational Dynamics*, Vol. 34, pp. 313-30.
- Webb, T.L. and Sheeran, P. (2006), "Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence", *Psychological Bulletin*, Vol. 132, pp. 249-68.
- Weiss, S.M., Malone, R.E., Merighi, J.R. and Benner, P. (2002), "Economism, efficiency, and the moral ecology of good nursing practice", *The Canadian Journal of Nursing Research*, Vol. 34, pp. 95-119.
- Wood, M. (2005), "The fallacy of misplaced leadership", *Journal of Management Studies*, Vol. 42 No. 6, pp. 1101-21.
- Wood, W., Tam, L. and Witt, M.G. (2005), "Changing circumstances, disrupting habits", *Journal of Personality and Social Psychology*, Vol. 88, pp. 918-33.
- Zimbardo, P. (2007), *The Lucifer Effect: Understanding How Good People Turn Evil*, Random House, New York, NY.

Further reading

- Bandura, A. (1999), "Moral disengagement in the perpetration of inhumanities", *Personality and Social Psychology Review*, Vol. 3.
- Costa, P.T. Jr and McCrae, R.R. (1998), "Six approaches to the explication of facet level traits: examples from conscientiousness", *European Journal of Personality*, Vol. 12, pp. 17-134.
- Huff, C.W. and Barnard, L. (2007), "A performance model of virtue", poster presented at the Innovations in the Scholarship of Teaching and Learning Conference, Northfield, MN, February.
- Walzer, M. (1994), *Thick and Thin*, University of Notre Dame Press, Notre Dame, IN.

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