Good Computing

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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.

Moral Exemplars in the Computing Profession

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Digital Object Identifier 10.1109/MTS.2009.934158

1932-4529/09/$26.00©2009IEEE

Explicit attention to computer ethics began with Norbert Weiner's (1950) groundbreaking book, *The Human Use of Human Beings* [33]. The teaching of computer ethics arguably started in the 1970s with the distribution of Walter Maner's *Starter Kit in Computer Ethics* and the publication of Deborah Johnson's seminal text *Computer Ethics* [18], [19] (see Bynum [4] for a short history). Since that time, many excellent scholars have entered the field and much work has been done. Work on the philosophical groundwork for computing ethics [9], [31], the policy difficulties associated with computing [22], [24], [30], and professional ethics in computing [10], [11] has multiplied and borne much fruit.

Yet oddly, we still know very little about how computer professionals manage to be ethical in their everyday lives. What skills and strategies do they use to navigate the normal (and the unusual) stresses, the conflicting demands, and the multiple possibilities and difficulties of their careers? In psychological terms, we are interested in understanding how individuals achieve continued successful performance of ethical behavior in the field of computing. In philosophical terms we might cast the question as how individuals attain and practice the virtues of the computing profession. Certainly if we could learn something about this, it might influence the way we teach computer ethics to those who will become computer professionals.

One way to begin this inquiry is to follow the life stories of computer scientists who are known for their ethical commitment. We have documented 24 of these life stories in a series of interviews with moral exemplars in computing in the United Kingdom and Scandinavia, people who are successfully integrating ethical concern into their practice of computing [17]. This is exploratory work, but it still gives us a multifaceted picture of how moral exemplars in computing structure their lives, make their choices, and implement their plans.

Interviewing Exemplars in Computing

Sampling

We followed the sampling method of one of the classic moral exemplar studies [6]: recruiting a panel of experts, establishing criteria, and then beginning the sample from nominations provided by the panel and asking approved nominees themselves to suggest others. The panel consisted of recognized experts in computer ethics who would also be able to nominate individuals from the cultures we wanted to target:

- Prof. Don Gotterbarn, East Tennessee State University, U.S.
- Dr. Alison Adams, University of Salford, U.K.
- Prof. Goran Collste, Linköping University, Sweden
- Dr. Barbara Begier, Polytechnic University, Poland
- Prof. Barrie Thompson, University of Sunderland, U.K.
- Prof. Jeroen van den Hoven, Erasmus University, The Netherlands.

The selection criteria were based on those used by Colby and Damon [6]. The panel convened to establish criteria at the November, 2002, meeting of ETHICOMP in Lisbon. Several months before, we circulated a white paper among the panel members to propose criteria for selection, and moderated an email discussion of those criteria. The panel dropped Colby and Damon's [6] final criterion requiring "a sense of realistic humility." Several panel members persuasively argued that the necessity for self-promotion in many areas of industry and academia might disallow promising candidates.[1] Thus, the final criteria were:

1) Either a) a sustained commitment to moral ideals or ethical principles in computing that include a generalized respect for humanity, or b) sustained evidence of moral virtue in the practice of computing.
2) A disposition to make computing decisions in accord with one's moral ideals or ethical principles, implying also a consistency between one's actions and intentions and between the means and ends of one's actions.
3) A willingness to risk one's self-interest for the sake of one's moral values.
4) A tendency to be inspiring to other computing professionals and thereby to move them to moral action.

Within a month after the meeting of the panel, panel members had sent in their initial nominations of exemplars. As these accumulated, they were circulated back to the panel for approval. The panel received the names and a short explanatory biographical summary. Significant concern about any nominee from any panel member was cause for removal of the name. Only one nominee was removed for this reason.

This method provides nothing like a random sample of exemplars (an impossible criterion) or of all computer professionals (since we wanted to concentrate on the exemplary). But it does provide a beginning selection of individuals who are likely extraordinary in their ethical commitment in the profession, as judged by the panel and the criteria above. Thus we

[1] A recent qualitative analysis of personality characteristics of the interviewees [1] shows that humility emerges as a theme in the interviews of all the exemplars. Thus the excluded 5th criterion was also fulfilled.

can make conclusions about the similarities and variations that exist among *these* individuals who are exemplars in the profession. Some validation of their exemplar status is provided by the fact that most panel members knew at least some of the nominees of others, and several nominees received more than one nomination (indeed many nominees knew each other, though sometimes as opponents on an issue). We believe this sample provides a good beginning for understanding excellence in ethical commitment in the profession.

We were careful to construct a sample with significant chance for variation based on background. In the end, 36 exemplars were nominated in the U.K., and 27 in Scandinavia. Thirty-five of the 63 were contacted based on our desire for representation in important categories. Half the sample was to be from the U.K. and half from Scandinavia. We included this distinction because of work by Hofstede [12] that suggested these cultures had significantly different workplace environments. We tried to recruit as many women as possible (7 in the U.K. sample and 2 in the Scandinavian sample). We wanted to interview exemplars with experience in academia and industry, and to get perspective from a few government policy exemplars. These categories overlapped, with seven exemplars having significant experience in more than one area. In the end, 13 exemplars had significant experience in academia, 15 had significant experience in industry, and 3 had significant experience in government policy. Given the nature of the criteria, it is not surprising that 11 of the 24 exemplars were in the final decades of their careers and 4 were retired. But we were able to find 4 exemplars in the first decade of their career and 5 exemplars in the middle of their careers.

Of the 35 exemplars chosen from the nomination set, 3 refused after some conversation, 7 never responded to initial contacts, and 1 responded affirmatively, but too late to be included in the sample. Thus we conducted interviews with 24 exemplars out of 35 contacted, a response rate of 71.43%. This is a quite successful response rate for interviewing what Odendahl & Shaw [25] have called "elites," and it is much higher than the 27% rate obtained by Colby & Damon [6]. Representative exemplars include:

- *Simon Rogerson*: The first Professor of Computer Ethics in a university and the founder of EthiCOMP, a premier European conference on ethics and computing (also my collaborator and host during the project).
- *Elizabeth France*: The first Data Protection Registrar in the U.K. Her policies helped set the agenda for European privacy law.
- *James Towell*: Early career private software consultant, with a business profile based in ethical software design.
- *Steve Shirley*: Changed her name from Stephanie to get clients for her software design company, the first company in England to concentrate on software alone. She has been a major force in encouraging women to adopt careers in computing (several of our exemplars cite her influence).
- *Enid Mumford*: A member of the Tavistock social research group in Britain, and an early pioneer in socio-technical systems (her work is extensively cited in Scandinavian user-centered design work).
- *Francis Grundy*: A pioneer in encouraging women in computing who has written several books on gender and computing and lectured widely on the continent.
- *Alan Newell*: A pioneer in developing systems to help the deaf, the blind, and the physically handicapped to interact with computers, but more importantly, to interact with other people. His research team pioneered the word completion spelling system now used on cell phones.
- *Alan Cox*: A LINUX Pioneer, and a pioneer in the open source software movement. He is head of security programming for Red Hat, and an international spokesperson against restrictive intellectual property law.
- *Jan Holvast*: A sociology professor in Amsterdam and a pioneer in privacy advocacy in that country. Now a consultant to companies on privacy law and system design.
- *Ove Ivarsen*: Started his career as a furniture builder in the Swedish blue-collar union, LO. He moved up in the union as a trainer and eventually founded and now administers the influential Swedish USER Award for software that supports workers.

> Different approaches to moral careers are driven by different values, or visions of the good.

Interview and Personality Questionnaire

The 3 hour interview, based on McAdam's life story protocol [21], asked the exemplars to tell stories from their professional lives. There were stories of influential others, of low and high points, from early in their career

and from recent events. The interview was held in two sessions on consecutive days and digitally audio-recorded. The recordings were transcribed and the transcripts sent back to the exemplar for approval. Interviewees made only minor revisions in their transcripts.

Exemplars were also asked to complete a short version of a standard personality inventory, the BFI-44 (Big Five Inventory-44). This is a 44-item self-report instrument [20] with reasonable reliability and cross-cultural validity. It was chosen because of its well-established reliability in research programs and its brevity. In addition, norms for European populations are available from Srivastava *et al.* [29]. The BFI-44 measures five dimensions of personality widely agreed to be important and stable personality dispositions: 1) *introversion-extraversion*, a measure of social vitality and social dominance; 2) *conscientiousness*, a measure of impulse control and achievement orientation; 3) *neuroticism*, a measure of negative emotional reactivity; 4) *agreeableness*, a measure of social adaptability and altruism, and 5) *openness to experience*, a measure of intellectual openness and creativity.

Informal Analysis of Transcripts

The first author read the transcripts closely looking for themes that might emerge from the stories. This informal analysis suggested that most of the exemplars consciously cultivated networks of support for their activities and cited multiple people as positive influences. In common with other work on exemplars, they did not think of themselves as morally extraordinary. However, all were active problem solvers and saw the challenges in their projects as a mix of the moral, technical, and social. In response, they used both social and technical skills in almost all their work, often explicitly claiming that the two were mutually supporting in determining their success.

There appeared to be at least two different approaches to our exemplars' moral careers. This is similar to a finding in other exemplar studies [6] of social service workers, in which some concentrated on direct service (helpers) and others concentrated on reforming social systems (reformers). In the computing context, we have labeled these approaches *craftsperson* and *reformer*. *Craftspersons* tended to focus on their clients or users and to draw on pre-existing values in computing (e.g., user focus, customer need, software quality) to define the goals of their work. Thus, they tended to view themselves as a provider of a service or product (e.g., computing for the handicapped) and to view difficulties or disagreements as problems to be solved. *Reformers* tended to be crusaders who were attempting to change the values in social systems (organizations, professions, national cultures). They tended to view individuals as victims of injustice and to attempt to remedy that injustice.

> Moral exemplars scored higher on extroversion, agreeableness, and openness to experience.

Coding the Transcripts

We designed a coding system based on the informal analysis (the coding manual is available at http://www.stolaf.edu/people/huff/misc/exemplars). Two independent coders coded each story from each exemplar for the presence or absence of 12 items: 1) social support and 2) antagonism, use of 3) technical or 4) social expertise, 5) the description of harm to victims or 6) need for reform, 7) action taken toward reform, 8) design undertaken for users or clients, 9) effectiveness and 10) ineffectiveness of action, and 11) negative and 12) positive emotion. One can compute 288 rater agreement scores (one for each of 12 codings for each of 24 exemplars). The average rater agreement shows substantial agreement among raters: 90.70%, with SD = 8.7. Disagreements between coders were averaged.

Items 3 and 8 were averaged to create an index of a *Craft* theme in each exemplar's stories, and items 5, 6, and 7 were averaged to create an index of a *Reform* theme in the each exemplar's stories.[2]

Results

Correlations from the Codings

As expected, technical and social expertise tended to co-occur in stories ($r = 0.339$, $p = 0.10$),[3] and social expertise predicted effectiveness and positive emotion in exemplars' stories ($r = 0.415$; $r = 0.602$, respectively). Interestingly, those who talked more about technical expertise tended to also mention more instances of ineffectiveness ($r = 0.447$). This may be because stories of difficulties often involved struggles to get technical details right. Thus, this more quantitative analysis substantiates the mixing of social and technical expertise in the work of moral exemplars.

[2]The items for each index were sufficiently related to justify combining them (Cronbach alpha for craft = 0.48 and for Reform = 0.76). Cronbach's alpha here measures how interrelated the multiple measures are that one wants to combine into an index [7].

[3]Significance levels for all correlations are $p < 0.05$ or smaller, unless otherwise noted.

Not surprisingly, exemplars who reported more instances of social support were much more likely to report effectiveness in their stories ($r = 0.553$) and similarly, those who reported social antagonism were more likely to report ineffectiveness ($r = 0.393$). Thus, the profile of moral exemplars as those who depend on their social environment for effective problem solving is replicated with this analysis.

Craft and Reform Results

The most surprising result came from the two indexes of approaches to moral careers: *reform* and *craft*. When these two indexes are plotted against each other (see Fig. 1), one can see that several groups of people clearly emerge. The indexes are transformed into standard scores (a score of 1 means the individual is 1 standard deviation above the mean of the exemplars, a score of −1 means the exemplar is 1 standard deviation below the mean). A clear group of reformers emerges in the plot and though the discontinuity is not so clear, there is still a group of craftspersons who score above average on craft and below on the reform. Two interesting individuals score high on both indexes, each with life stories that make sense of these scores. Simon Rogerson has had two careers, first a quite technical software development career and then a career in academia as a reformer (where he started the EthiCOMP conference series). Stephan Engberg has combined the design of privacy-enhancing technologies with a desire to reform privacy policy and practice in Denmark. Finally, a group of exemplars that is "undifferentiated" on these dimensions emerges, suggesting that there may be more approaches to a moral career in computing than the craft and reform indexes track.

Personality scores add some interesting complexity to this picture. Exemplars who score high on reform, tend also to score high on extraversion ($r = 0.466$). If one remembers that extraversion contains a component of social dominance (a desire to influence others) in addition to gregariousness, it makes sense that those high in extraversion might be attracted to reform. Alternatively, those who score high on craft, tend also to score high on openness to experience ($r = 0.393$, $p = 0.057$). Again, the connection of openness to creativity makes this association reasonable.

Other Personality Results

Can the exemplars be collectively characterized as having a particular kind of personality? In short, moral exemplars score higher than their country's norm on extroversion, agreeableness, and openness to experience. They score, on average, lower on neuroticism (less negative emotional reactivity) than their country's norm. And they seem not to differ from the norm on conscientiousness.

Table I provides five one sample, 2-tailed, t-tests, each testing the hypothesis that the exemplars are different from their respective country norms on the relevant personality dimension. Scores on each dimension are difference scores, where the difference is for the relevant country norm *for each exemplar*. Thus, the *Norwegian* norm for extroversion is subtracted from each *Norwegian's* extroversion score to get the amount their scores are higher (a positive

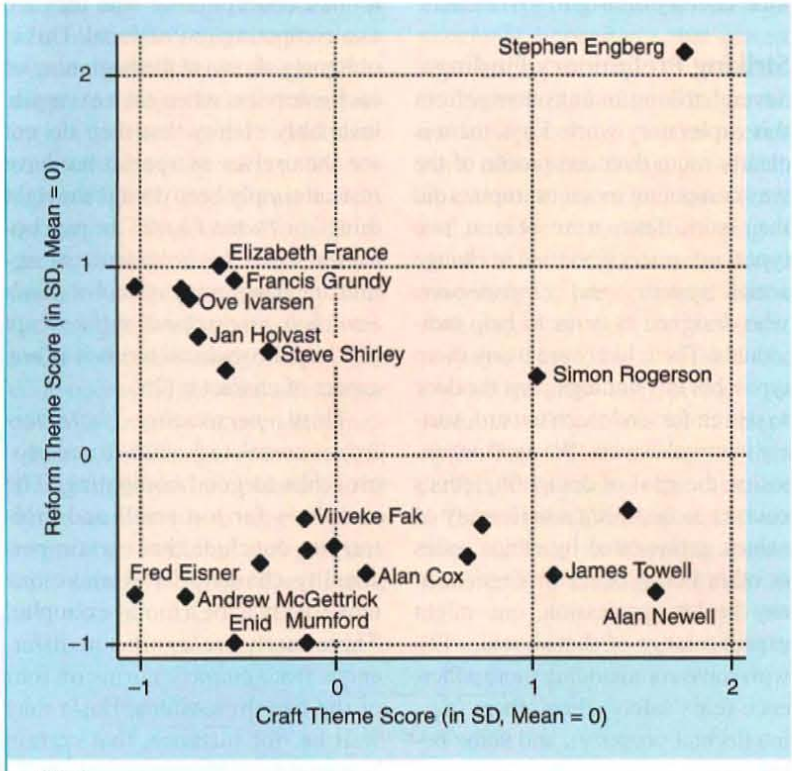

Fig. 1.

Table I

Personality Dimension	Mean	T (df = 23)	p
Extroversion	.530	2.893	.008
Agreeableness	.670	5.226	.000
Conscientiousness	.224	1.162	.257
Neuroticism	−.778	−4.647	.000
Openness to Experience	.457	2.784	.011

> Craftspersons tended to focus on their clients or users and to draw on pre-existing values.

number) or lower (a negative number) than the *Norwegian* norm. Before being averaged, the scores were expressed in z-scores based on the population means and standard deviations for each exemplar's country (provided by Sam Gosling, based on data from [29]). Thus, the 0.53 mean for extroversion can be interpreted as the exemplars scoring about 1/2 of a standard deviation higher on extroversion (or more extroverted than 67% of individuals in their country of origin).

Striking Preliminary Findings

Several striking findings emerge from this exploratory work. First, there is clearly more than one profile of the way computing moral exemplars did their work. There were, at least, two types: *reformers* who tried to change social systems and *craftspersons* who designed systems to help individuals. There likely are many more types, but this finding opens the door to search for, and teach toward, variety in moral careers. We need not envision the goal of computing ethics courses as imposing a uniformity of values, represented by ethics codes or other norms of the profession. In any healthy profession, one might expect a range of shared values [2], with some commanding more adherence (e.g., safety) than others (e.g., intellectual property), and some being topics of lively debate (e.g., privacy vs. national security tradeoffs). This value-pluralism [27], [32] is a natural state of affairs and allows the sort of moral diversity that can produce craftspersons and reformers pursuing different goals, all with the betterment of the profession and society in mind. We do not have to adopt philosophical relativism to recognize that different individuals will emphasize and care about different aspects of the many values that are shared among computing professionals. Indeed moral diversity may be a good thing, with individuals devoting time to the values that are the most important to them.

Second, different approaches to moral careers are driven by different values, or visions of the good, that are central to the individuals who adopt them. Each of the exemplars is attempting to achieve goods that are central to them and central to their conception of who they are as a computing professional. This is obliquely shown at the beginning of each interview when each exemplar invariably claims that they do not see themselves as special but have instead simply been doing "the right thing" or "what I love." In psychological terms this is evidence of significant *integration of moral goals into their professional self-concept* [3]. In philosophical terms it is one aspect of character [28].

Third, *personality characteristics* correlated with these approaches to good computing. The sample is far too small and arbitrary to conclude that certain personality characteristics make one more likely to be a moral exemplar. There surely are significant differences from country norms on four of the five dimensions. But it may well be, for instance, that certain personality characteristics (e.g., extroversion) make a moral exemplar more likely to be sampled by our particular method. Our sample arguably consists of moral exemplars, but there are certainly many more that we may have overlooked because they were so retiring. It makes much more sense to say that personality might well shape *the way one is a moral exemplar* in computing. Extraversion and social dominance fit with the social requirements for a career of trying to bring about reform in a profession or in the larger society. It is likely that personality influences choices in a moral career and that choices made in a moral career influence personality in return [26]. As professionals play to their strengths, it is likely that their strengths increase. To understand the variety of ways in which computer professionals chart their moral careers, we will clearly need to take into account personality characteristics.

Fourth, exemplars consistently spoke of both *social skills* (e.g., understanding people, navigating organizations) and *technical skills* (e.g., understanding database structures and software processes) as influential in successful moral action in computing, and as crucial even for good design. For many of the craftspersons, the center of their craft was recognizing the organizational or personal needs of users and using their technical expertise to reframe those needs into things that computing could help them do. But for all the exemplars the skills of constructing functioning, committed work groups, navigating organizations, and influencing others were part of their success.

This centrality of skills is good news to educators, for this is one contributor to moral action in computing that can surely be taught. It also integrates well with recent work in moral psychology that treats moral action as a kind of expertise [23] with skill sets and competencies that can be learned. An implication of this finding is that it is the combination of social and technical skills that leads to the successful performance of the virtues in computing, and that it would be more effective to teach this combination than to teach the two in isolation (or to only teach the technical). To do this will require some understanding of the complex social and technical skill and knowledge base

our exemplars used to solve the problems that confronted them and to achieve the goals they set.

Finally, the *social ecology* within which moral action occurred clearly shaped the ability of exemplars to do good work. The effects of social support or antagonism and the importance of social skills to success are markers of this importance. Compared to those just beginning their careers, senior-level exemplars told strikingly different tales of their freedom to make moral choices, based in part on their power in and value to their organizations. Almost all the exemplars told stories of building networks of support within and across organizations to facilitate the achievement of their goals. Exemplars also recognized that some organizations made moral action more a part of the job, rather than isolating such concerns. The importance of variation in organizational climate is also attested to in work by Michael Davis [8] who in extensive interviews found organizations to differ in predictable ways that affected the ability of engineers to pursue ethical goals in their design work. The powerful influence of social ecology speaks to the need for education in the social skills required to navigate these ecologies.

These preliminary results suggest four components of a model of successful moral action in computing: 1) *personality*, which shapes but does not determine choices in moral careers, 2) moral commitment, or *integration of morality into the self*, which influences the moral goals the computer professional attempts to achieve, 3) morally relevant *skills and knowledge* that provide the competency to actually perform the good that is envisioned, and 4) a *moral ecology* that either supports or hinders (sometimes both) the computer professional. These components will likely interact with each other (e.g., some skills will be more relevant in some moral ecologies). We provide a detailed review of this model and its implications for pedagogy in computer ethics in a recent two-part theoretical paper [15], [16].

The model allows us to arrange the components along two dimensions. One is that of *malleability*. Because of individual differences, Moral Skill Sets are not perfectly malleable, but they are the most teachable component. Moral Ecology and the Integration of Morality into the Self System are both somewhat malleable, while core Personality is the least likely to change. Since the personal appropriation of morality is a decision the individual alone can make, the Integration of Morality 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 Moral Ecology. None of the components are placed at an extreme end of a dimension: even core personality can change over time [26] 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.

Thus, as Fig. 2 suggests and work by Narvaez & Lapsley [23] documents, one can teach the skills and knowledge associated with moral expertise, though it requires considerable practice to reach expert levels. As our work suggests, these skills and knowledge are both about technical matters (e.g., data structures for privacy) and social matters (e.g., the business and organizational imperatives that govern concern for privacy). As we identify these skills and knowledge, this model suggests that courses in computer ethics should engage students in extensive use of the knowledge and practice of the skills. Doing so would make the class more like a laboratory or project-based course with extensive work on cases and projects. These kinds of skill and knowledge also help prepare the student for the various Moral Ecologies they will encounter in their career. Recognizing that there are different moral ecologies [8] can help students in choosing career paths and in reacting skillfully to

> Reformers tended to be crusaders who were attempting to change the values in social systems.

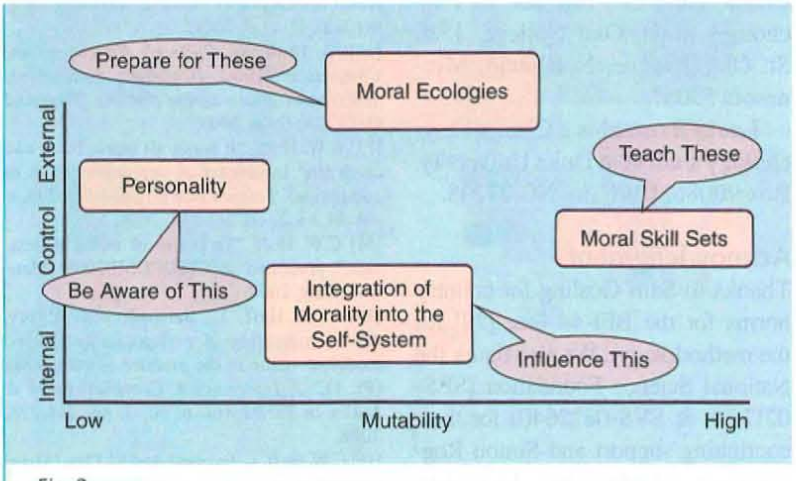

Fig. 2.

the Moral Ecologies in which they find themselves [13]. Influencing moral commitment is already listed as one of the *Hastings Center* goals of a course in ethics [5], but rethinking it as Integration of Morality into the Self System helps us both better to measure it (see the suggestions in [15]) and to see how aspiring computing professionals might welcome guidance that allows them to construct their ethical commitments [14]. Finally, recognizing the variety of ways of being ethical that computer professionals might adopt (e.g., craft or reform) gives us room to allow for individual expression of Personality in moral careers.

Identifying these components allows us to begin to construct or adapt measures that would allow us to track them and their interactions across the careers of computer professionals. Understanding how these components influence computer professional's choices, successes, and failures in moral careers, and how they are integrated into the everyday projects of computer professionals, will take us a long way to being able to better prepare them to construct their moral careers.

This understanding, admittedly a monumental undertaking, would still only be one aspect of the field of computer ethics. But it is a crucial aspect, and one we may well be ready to undertake.

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Acknowledgment

Thanks to Sam Gosling for country norms for the BFI-44 (see [29] for the methodology). We also thank the National Science Foundation (SES-0217298 & SVS-0822640) for their continuing support and Simon Rogerson and DeMontfort University for support during the planning and data collection. Thanks to students Kristyn Aasen, Craig Enlund, Jenny Ingebritsen, Joe Stewart, and Nicole Gilbertsen for their heroic work in designing and implementing the coding system. Finally, thanks to the exemplars who selflessly gave significant time to this project so we could learn something from them.

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