

Ethics and Computing

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Chapter 2

Critical-Thinking Skills

Genuine moral integrity requires intellectual character, for bona fide moral decisions require thoughtful discrimination between what is ethically justified and what is merely socially approved. ... The mere conscious will to do good neither removes prejudices that shape our perceptions nor eliminates the ongoing drive to form prejudices. To minimize our egocentric drives, we must develop critical thinking in a special direction. We need not only intellectual skills but intellectual character as well.

— Richard Paul, from C.A. Barnes' *Critical Thinking: Educational Imperative*

2.1 Introduction and overview

What does critical thinking have to do with ethics? *Everything!* Ethically difficult situations are difficult precisely because it is hard to reason clearly about them. As discussed in Chapter One, ethically appropriate actions are often in conflict with short-term personal gain. For this reason, it is easy to be led into faulty rationalizations of less-than-ethical behavior. Also as emphasized in Chapter One, real-world ethical dilemmas often leave you no ideal option. In such cases, it is important to be able to weigh alternatives thoughtfully. Strong critical thinking skills can help you to avoid making faulty rationalizations yourself, to detect faulty rationalizations made by others and to think clearly about difficult situations. Strong critical thinking skills can also improve your general ability to communicate clearly and efficiently.

Damer defines critical thinking as “the process of evaluating a claim for the purpose of deciding whether to accept, reject or perhaps suspend judgment about it” [6]. Browne and Keeley present critical thinking as the ability and desire to ask the right questions in analyzing a situation [5]. They suggest a list of critical questions you should ask yourself (I have abbreviated the original questions):

1. What are the issues and the conclusions?
2. What are the reasons?
3. What words or phrases are ambiguous?

4. What are the value conflicts and assumptions?
5. What are the descriptive assumptions?
6. What is the evidence?
7. Are the samples representative and the measurements valid?
8. Are there rival hypotheses?
9. Are there flaws in the statistical reasoning?
10. How relevant are the analogies?
11. Are there errors in reasoning?
12. What significant information is omitted?
13. What conclusions are consistent with the strong reasons?
14. What are my own value preferences in this controversy?

Not all questions on this list necessarily apply in all situations. For example, there is not always a statistical component to the reasoning. But this is a useful list to keep in mind when you reflect over whether or not a situation warrants a particular conclusion.

To better understand the critical thinking process, we will first survey categories of errors that are commonly made in reasoning. Then we will analyze a real incident involving employee privacy as a means of applying and illustrating the critical thinking process.

2.2 Categories of errors commonly made in reasoning

In common use, the word “argument” means a disagreement, often one that is heated and emotional. But in the context of critical thinking, the word has a more specific technical meaning. An *argument* is a line of reasoning presented with the intent to lead to a certain conclusion. As such, an argument can always take the stylized form of one or more premises followed by a conclusion. A *premise* is simply some statement that serves as a (partial) basis for a line of reasoning. Thus, when confronted with a particular argument you could in principle always rewrite it into the following form.

Since	premise 1, and
	premise 2, . . .
Therefore	conclusion.

In fact, when you are confronted with a confusing argument, it can be quite useful to attempt to restate it in this form. This will often cause the problems in an argument to become more apparent, leading to clearer communication and greater ease in isolating the points of true disagreement or logical weakness.

A “good” (or “valid” or “soundly constructed”) argument should have three basic properties: (1) Each premise should be true. (2) Each premise should be relevant to the issue at hand. (3) The collection of premises should be sufficient to establish that the conclusion is true. The reasons for these three properties should be evident. To the extent that a particular argument does not possess these properties, the argument commits some type of *logical fallacy*. Fallacies in reasoning can be categorized in different ways. Here I have summarized nine broadly defined categories of logical fallacies as discussed by Damer [6]:

1. Errors arising from ambiguity.
2. Circular arguments that beg the question.
3. Use of unwarranted assumptions.
4. Fallacies involving missing evidence.
5. Incorrectly identified causation.
6. Premises irrelevant to the stated conclusion.
7. Appeals to emotion/authority/loyalty/
8. Diversion from the main point.
9. Incorrect deductive inference.

Damer provides a complete discussion of these types of fallacies, with common variations of each [6]. Here we need only a short description of some main types in each category to point the way toward clearer thinking.

2.2.1 Errors arising from ambiguity

One type of error occurs when people interpret the meaning of some element of an argument differently. This can happen through the use of ambiguous words, ambiguous syntax, selective placement of emphasis on words, or selective wording. An example of ambiguous wording is

Since computer ABC's speed is 25 megahertz, and
 computer XYZ's speed is 20 megahertz,
Therefore computer ABC will run your program with greater speed than will XYZ.

The problem here is that “speed” has potentially different meanings in different places in the argument. In the premises, it clearly refers to the clock rate of the CPU chip. But in the conclusion, it subtly shifts to a broader reference, the time required to run a program. There are in fact many possible reasons that a higher CPU clock rate might not translate into a faster program execution – different instruction sets in the two CPUs, different possible memory configurations, and unusual instruction-usage patterns in the program are just a

few. So when someone gives you this argument for buying computer ABC, you should realize that the conclusion does not follow automatically from the premises. In a soundly constructed argument, each term has the same meaning in all places, or the use of different meanings at different points is made explicit.

A more subtle example of ambiguity occurs in the following quote from an argument against government ability to wiretap digital communications [2]:

Even if these are real threats, is enhanced wiretapping the best way to combat them? Apparently, it hasn't been in the past. Over the last 10 years, the average total nationwide number of admissible state and Federal wiretaps has numbered less than 800. Wiretaps are not at present major enforcement tools, and are far less efficient than the informants, witnesses, physical evidence and good old fashioned detective work they usually rely on.

The assertion that “wiretaps are not major enforcement tools” seems to be backed up by the fact that the annual number of admissible wiretaps was less than 800. Many people may feel that the number 800 seems relatively small in this context. But the word “major” is used here in a way that implies more than just a numeric quantity. If even a small fraction of those 800 wiretaps led to preventing or solving a serious crime (kidnap, murder, terrorism) that could not have been prevented or solved otherwise, then most people would consider wiretaps a “major” tool.

A somewhat different type of problem can occur when there is a selected emphasis on the wording of a statement that seems to push you toward drawing a conclusion that is not explicitly stated. If there are three computer models sitting on a table and someone points to a particular one and says “I have never seen *that* one fail”, you may infer that the person *has* seen the other two fail. But that was not actually said, nor is it necessarily true.

A related problem occurs when someone uses innuendo to lead you to infer something that was not said. Suppose you are checking the references of a job applicant, Joe Smith, and you ask someone if Joe has any problems regarding the use of alcohol or drugs in the workplace. Perhaps the person giving the reference has some reason to want to hurt Joe Smith, and so replies “Joe Smith was never caught using drugs at work.” It may seem that you have been told that Joe Smith did use drugs but just never got caught. Again, however, the person has not actually said this, and it may or may not be true.

2.2.2 Circular arguments that beg the question

Begging the question is a form of fallacy that occurs when an argument is constructed so that the conclusion is reached by using a premise that is just a disguised form of the conclusion. In essence, the person committing the fallacy is using a *circular argument*. Without the disguise, the argument looks like this:

Since X is true
Therefore X is true.

This argument “begs” that you ask whether the premise (the disguised form of the conclusion) is actually true.

Consider the following argument:

Since The criteria for patentability are originality, novelty,
 utility, and non-obviousness, and
 My invention is original, novel, useful, and non-obvious,
 Therefore My invention deserves to be patented.

Hopefully the problem with this argument is clear, but it is worth dissecting anyway. The first premise is true by the legal definition of patentability. But the second premise is really only an assertion of the conclusion in a thinly disguised form. Thus, if you accept the second premise as true, you have effectively already accepted the conclusion.

Another version of this type of argument occurs when someone asks a question that presumes the answer to another question, which should have been asked first. A common instance of this is the fund raiser who asks – “How much are you contributing to the Fund for X?” By skipping over the question of *whether* you are going to contribute, the fund raiser hopes to have you focus only on the amount.

2.2.3 Use of unwarranted assumptions

An unwarranted assumption is one that is used without explicit justification. One way this can happen is in assuming that some whole composed of a set of parts will automatically have a certain property shared by each part. For example, suppose you are selecting people for a programming team. Would you select people independently solely because they were rated excellent individual programmers? That is, would you accept the following argument?

Since Jane is rated as an excellent programmer, and
 John is rated as an excellent programmer, and
 Mary is rated as an excellent programmer,
 Therefore Jane, John, and Mary would make an excellent programming team.

If you did, you might be disappointed in the outcome. For example, if each person is rated as excellent because of superior coding skills, but no one has superior debugging skills, then they are unlikely to form a superior group. The debugging phase is often crucial and a weakness there is a serious problem. The lesson from this example is that when you are trying to form conclusions about a whole in terms of the properties of its parts, be sure to pay careful attention to interactions among the parts.

An assumption that is in some sense the complement of the one just mentioned is that each part of a whole will naturally possess some property enjoyed by the whole. For example, the best computer company has the best products, the best technical staff, the best sales staff, and the best administrative staff. This is clearly not always the case. The best company may simply be strong in every area, but not the best in any one area.

Another pair of possibly unwarranted assumptions is *what is, ought to be* and *what is new must be better*. An example of the first assumption is the argument against the “look and feel copyrights” (described in detail in a later chapter). In one instance, those against the introduction of these copyrights argue that the software industry has done well for a long time without such a concept and so the concept is not needed. In essence, this argument is

Since The software industry did not have look and feel copyrights before, and
 The software industry has done fine without them,
 Therefore The software industry doesn’t need them.

That the software industry did not have look and feel copyrights previously is not, in and of itself, evidence for or against the use of look and feel copyrights. The second premise of this argument also has problems, as will be pointed out in discussing the next category of fallacy.

The problem with the *what is new must be better* assumption probably needs no explanation. Many new things are definitely not better; in fact, they are sometimes worse. Consider the initial release of any new operating system!

Still another pair of possibly unwarranted assumptions are *either/or* and *split the difference*. The essence of the first assumption is that the alternatives are either-or; no middle ground is possible. The essence of the second assumption is that a compromise position must necessarily be good. But the following example should point out that there are situations in which compromise is the wrong approach.

Since	Jane feels no additional testing of the control software is needed, and John feels another two weeks of testing are required to detect all errors that could potentially lead to catastrophic failures, and Compromise is a good idea,
Therefore	We will do one week of additional testing.

It makes no sense in this situation to average the amounts of time that the two people feel should be spent on additional testing. Lives might depend on making this decision. A rational choice would require examining the technical basis for each estimate.

Another kind of unwarranted assumption is that an accumulation of essentially negligible amounts will still be negligible. You sometimes see this sort of failed logic applied in a budgeting process. Independently, any one of many small additional expenses may not cause the budget to be seriously out of balance, but cumulatively their effect can be disastrous.

The last form of unwarranted assumption we will look at is the poor use of analogies. Many analogies seem appropriate at some superficial level, but the “unwarranted” part of this assumption says that an analogy that seems valid at a superficial level is equally valid at a more detailed level. An extreme example of this occurs in the chapter on Cracking and Computer Security, where Richard Stallman makes an analogy between the unauthorized use of the computer and the unauthorized use of a typewriter. The superficial similarity of the two is that they both have a keyboard. The computer, however, is often in shared use by multiple people at the same time and often contains files that belong to a variety of users, to mention just two fundamental differences.

2.2.4 Fallacies involving missing evidence

This type of fallacy involves drawing a conclusion without sufficient evidence to truly justify the conclusion. A common version of this fallacy is to generalize from experience that is too small or is biased in some way. Consider the following suggestion that might be made by a colleague at work. “We shouldn’t bother interviewing people at State University this year – the person we hired from there last year didn’t know anything about object-oriented programming.” The argument apparently being made is

Since	We need people who know about object-oriented programming, and The person we hired from State University last year didn’t know
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anything about object-oriented programming,
 Therefore We shouldn't consider hiring anyone from State University this year.

A sample of one person is not enough to reliably assert that State University doesn't teach its students about object-oriented programming. Also, this one-person sample may be biased. If the former employee was following the electrical engineering curriculum instead of the computer science / engineering or information systems curriculum, then they shouldn't have been expected to know about object-oriented programming.

Another common form of fallacy is to reason speculatively about what would happen in an alternative reality, a world that in some way departs from the world we have experienced. This is sometimes called the *contrary to fact* fallacy. An element of this fallacy can be found in the same argument cited earlier against the look and feel copyrights.

Since The software industry has never had look and feel copyrights, and
 The software industry has done fine without them,
 Therefore The software industry doesn't need them.

Notice that the second premise implies a comparison between how the software industry developed without look and feel copyrights and how it would have developed with them. The problem, of course, is that the reality in which the software industry developed with look and feel copyrights does not exist, so any claims about it are speculative.

Another common form of this fallacy is to assume that the lack of evidence against (for) some conclusion necessarily means that the conclusion is true (false). Probably all programmers and software users can spot the problem in the following argument:

Since The testing process did not reveal any bugs in this piece of software,
 Therefore There are no bugs in this piece of software.

Another common fallacy is the belief in the validity of numeric values that purport to measure something too vaguely defined to be measurable. Probably every student in computing has heard some variation of the following argument: "If you don't keep up with things, half your technical knowledge will be obsolete in five years." Although everyone might agree with the general sentiment, the concepts involved seem too vaguely defined to allow much belief in the exact numbers used in the argument. What experiment can you imagine that would have been conducted to arrive at the values "half" and "five years"? What exactly does it mean to "keep up"? What exactly is your "technical knowledge" and how is it distinguished from your "nontechnical knowledge"?

2.2.5 Incorrectly identified causation

This type of fallacy mismatches cause and effect. One form is to assume that an earlier event is the cause of a later event simply because the earlier event precedes the later event. Another form is confusing the cause with the effect. A variation of this is to identify one of a group of effects that are all due to some common cause as being the cause of the other effects. Consider the following argument:

Since Jane and John had lunch yesterday, and
 Jane was selecting the new manager of sales, and

John was named the new manager of sales today,
Therefore Jane likes to give promotions to the people with whom she socializes.

The timing of the lunch and the promotion announcement might make you suspect something, but it could be just a confusion of timing with causation. Also, the lunch and the promotion announcement could both be effects of a common cause (promotion decision) that occurred even earlier.

Another form of this type of fallacy is to confuse the necessary and sufficient conditions for something to occur. A *necessary condition* for X is one that must hold for X to be true, but one that does *not* by itself prove that X is true. A *sufficient condition* for X is one that by itself proves X is true.

A third form of this type of fallacy is oversimplifying the cause, or focusing on one among many contributing causes without justifying why it is the predominant cause. You often see an element of this form in the safety-critical system arena, where the failure of some system is attributed to “operator error.” (See Chapter 6 for several examples of this.) In almost all such cases, better system design would have made operator error less likely to occur or easier to recover from.

A fourth form of this type of fallacy is to assume that taking one step in a particular direction must inevitably lead to a sequence of additional steps in the same direction. This is sometimes referred to as the *domino fallacy* or *slippery slope* argument.

Still another form of this type of fallacy is to assume that luck can become a causal factor. This is often referred to as the *gambler’s fallacy* and is often expressed as “my luck has to change soon.” If each of a sequence of N events is random, the chance of the last event turning out a certain way is the same regardless of what happened in the first $N - 1$ events. A variation of this faulty reasoning might be “If we bid on enough projects, one of them has to come through.” The relative quality of the bid in comparison to those submitted by competitors is obviously a far more important factor in whether the bid wins than is the total number of other bids submitted by the firm.

2.2.6 Premises irrelevant to the stated conclusion

This category of fallacy is committed when one or more of the premises in an argument are not directly relevant to the asserted conclusion, even though they may be relevant to some related possible conclusion. Such an argument is said to “miss the point,” though it may in fact have hit some related point. Because the argument may correctly support a related conclusion, this fallacy is sometimes hard to recognize.

The common coping strategy of rationalization is one form of this fallacy type. When something does not turn out as desired, people may attempt to rationalize away the importance of the result by appealing to some collection of reasons that they would not have considered if the event had turned out as desired. Consider the following argument:

Since Winning that contract would have meant hiring new people, and
 It would also have meant a lot of overtime work, and
 We would have been cramped for office space,
Therefore It is really better that we didn’t win the contract.

Clearly, if these factors were known ahead of time and found to be that important, then the bid for the contract should never have been submitted.

Another common form of this fallacy is to attack the motivations of someone making an argument rather than the merits of the merits of their argument. Consider the following argument:

Since Jane proposed the idea of on-site child care, and
 Jane just recently returned from maternity leave, and
 Jane would clearly benefit from the company having on-site child care,
 Therefore The company should not consider having on-site child care.

The implication is that the suggestion of having on-site child care should be disregarded because the person suggesting it (Jane) was motivated by self-interest. Note that the facts do support a conclusion that Jane has some self-interest in on-site child care, a point hit by the first two premises. But using the third premise in conjunction with the first two to reach the conclusion misses the asserted point about the value of on-site child care to the company. The fact that Jane would benefit is, in itself, not evidence either for or against the conclusion that the company should have on-site day care.

Another common form of this fallacy is the *ad hominem* attack on a person. This typically takes the form of attempting to discredit a concept by pointing out personal qualities of someone associated with the concept. Even though the person may have such negative qualities or behavior, they are irrelevant to the value of the concept. Consider the following argument:

Since John proposed a management reorganization, and
 John is often out drinking too late and too much on the weekends,
 Therefore Our company should not consider the management reorganization.

However much John needs to change his personal habits, the company should consider his proposal solely on its own merits.

The *ad hominem* attack on an individual is unfortunately common in professional disagreements. In one case, a debate concerning software patents (which I discuss in more depth in Chapter 8), Paul Heckel states that “a nonprofit Marxist economic system is not optimal in promoting innovation in software.” The wording would seem to imply that anyone who is against software patents must be a Marxist. A more explicit example is taken from a case that appears in Chapter 7. The famous physicist Edward Teller accuses the whistle blowers in a nuclear power plant incident of “being paid by the Soviets to speak out against nuclear power” [8]. It appears that absolutely no proof was ever offered in support of this claim, and that the motivation was purely to attempt to weaken the credibility of the whistle blowers’ technical claims by making false accusations about their motives. Such *ad hominem* attacks on individuals clearly do not speak to the substance of the disagreement at hand, and they often backfire to weaken the argument of the person making the attack. Someone observing an *ad hominem* attack might assume that the side being attacked has the stronger argument and that the side making the attack has the weaker ethics.

Another related form of this fallacy is *you do it, too* (or *two wrongs make a right*). That is, when an argument is made that some action is not the best action to take in a situation, the person wanting to take the action responds by saying “you did something

wrong as well” or “you would do the same if you were me.” An element of this arises in a case detailed in Chapter 7. Chester Walsh’s former company (GE) argued that Walsh, the whistle blower, should not receive an award under the False Claims Act because Walsh had not reported the incident promptly to GE. In essence, the argument advanced against Walsh being compensated was as follows:

Since	GE was guilty of fraud in this case, and The False Claims Act allows people to receive a portion of the recovered funds, and Chester Walsh did not report the fraud internally to GE promptly,
Therefore	Chester Walsh should not receive compensation.

The judge in this case correctly recognized the error in GE’s reasoning and awarded Chester Walsh a substantial amount of money.

2.2.7 Irrelevant appeals to emotion/authority/loyalty/ ...

A good example of this occurs in the argument over cryptography and wiretap. Consider this quote arguing in favor of government ability to wiretap digital communications [11]:

... The law enforcement community views wiretaps as essential. Such surveillance not only provides information not obtainable by other means, it also yields evidence that is considered extremely reliable and probative. According to the FBI, organized crime has had severe setbacks due to the use of wiretap surveillance. The FBI contends the tool is critical for drug cases. Wiretapping is an important investigative technique in cases of governmental corruption and acts of terrorism. ...

One appeal here is to the authority and prestige of the FBI. Another is to the importance of fighting illegal drugs and terrorism. However, what the FBI thinks would make its job easier is not necessarily constitutional. Also, any gains in fighting drugs and terrorism should be weighed against the costs in other areas (increased cost of communications infrastructure, potential loss of privacy, ...).

A variation of this fallacy is an appeal to prevailing opinion among some group of people. An instance of this arises in the arguments against look and feel copyrights. The argument given takes essentially the following form.

Since	A survey was taken at a conference of user interface developers, and User interface developers do not seem to want user interface copyright,
Therefore	User interface copyright should not exist.

Problems with this argument should be clear. First, there is no way to know if the survey was valid and unbiased without having more information about it. Second, user interface developers are just one group of people affected by the decision. The opinion of any one interest group should not form the basis for the conclusion.

Another common version of this fallacy is an appeal based on flattery or group identification. An example of this could be

Since Your company is a small company, and
 Our company is also a small company, and
 You know how difficult it is for small companies to compete,
 Therefore You should buy our company's products instead of the big company's.

Other versions of this fallacy may make the appeal based on intimidation, threat, tradition, or irrelevant or questionable authority.

2.2.8 Diversion from the main point

In this type of fallacy, the argument attempts to bring up an irrelevant point which somehow attracts attention away from the relevant line of reasoning. The *straw person* argument is perhaps the most common form of this fallacy. The “straw person” is an uncharitable representation of an opposing point of view, which is brought up specifically because it is easy to refute. This is typically done with the hope that the process of easily refuting the straw person argument will make the opposing point of view seem weaker in general.

The *red herring* argument is another common form of this fallacy. The term “red herring” comes from fox hunting. A herring, which is a type of fish, is drawn across the trail of the fox to draw the dogs off the fox's scent. The purpose of the red herring in an argument is similar. Some strongly stated or emotional side issue is used to divert attention from the main point. Another technique often used to divert attention from the substance of an issue is to make a joke in response to an argument or to ridicule the way in which the argument is stated.

Another fallacy that falls into this category is the use of trivial objections to an argument. The most effective way to refute an argument is to disprove the strongest claims made in the argument. Attacking only the weaker claims may even be taken as a sign that the strong claims are in fact valid.

2.2.9 Incorrect deductive inference

Incorrect deductive inference occurs when an argument does not have the connecting structure that it needs to be valid. One set of fallacies involving incorrect deductive inference arises in connection with *categorical syllogisms*. A syllogism is an argument in which two simple premises are asserted and a conclusion is drawn. A categorical syllogism involves premises and conclusions about the membership of objects in categories. Its generic form is

Since All members of category X are members of category Y, and
 No member of category Z is a member of category Y,
 Therefore No member of category X is a member of category Z.

This generic example obeys the three rules for a valid syllogism. Failure to observe any one of the three rules leads to a fallacy.

The three rules are fairly simple. Before explaining the rules, several definitions are in order. The first premise in the generic form is called the *major premise*. The second premise is called the *minor premise*. The category term that the two premises have in common (Y

in the example) is called the *middle term*. The other two terms (X and Z) are called the *end terms* [6].

The first rule for a valid syllogism is that the middle term must be “distributed” at least once. The middle term is distributed if a premise asserts that it is true of every member of some category. The major premise in the example distributes the middle term Y over every member of the category X.

The second rule is that an end term distributed in the conclusion must also be distributed in one of the premises. In the above example, both X and Z are end terms that are distributed. (Lack of membership in X is distributed over every member of Z, and lack of membership in Z is distributed over every member of X.) Thus each end term must be distributed in one of the premises. This rule is satisfied because X is distributed in the major premise and Z is distributed in the minor premise.

The third rule is that the number of negative premises must equal the number of negatives in the conclusion. This is also satisfied because there is one negative premise (the minor premise) and one negative conclusion.

Another set of common fallacies involves *hypothetical reasoning*, reasoning about what would be true if something else were true. The generic structure of a valid hypothetical reasoning argument is

Since	If X, then Y, and
	X,
Therefore	Y.

In this form of reasoning, X is the antecedent condition and Y is the consequent condition.

One fallacy that can occur related to hypothetical reasoning is *denying the antecedent*. This logical error presents itself in the following form:

Since	If X, then Y, and
	Not X,
Therefore	not Y.

The conclusion of “not Y” would be valid only if X were known to be the sole possible cause of Y. An example of how this structure for an argument can lead to errors is

Since	If people were using weak passwords,
	Then we would need to be concerned about system security, and
	People are not using weak passwords,
Therefore	We don’t need to be concerned about system security.

The problem should be clear: weak passwords are not the only reason to be concerned about system security.

Another fallacy that can occur in hypothetical reasoning is *affirming the consequent*. The form of this fallacy is

Since	If X, then Y, and
	Y,
Therefore	X.

As with the fallacy of denying the antecedent, the conclusion asserted actually requires another premise not stated in the argument (that X is the only possible cause of Y). Here is an example of how this fallacy can lead to problems:

Since	If company ABC had gotten the contract we were competing for, Then they would need to hire more programmers, and They are currently hiring more programmers,
Therefore	They must have gotten the contract we were competing for.

Again, the problem should be clear: There can be many other reasons the competing company would be hiring programmers.

2.3 A Critical-Thinking Analysis: Workplace Privacy

For a detailed critical-thinking analysis of a real situation, we consider an incident in which a technician discovered pornography on a PC used by the dean of the Harvard School of Divinity [1]. In addition to being a good vehicle for demonstrating the importance of critical thinking, this case study also makes important points about employee privacy in the workplace.

2.3.1 A first conclusion based on incomplete Information

Skimming some of the initial news stories might result in the following understanding of the incident. The Harvard dean of divinity had a collection of *thousands* of pornographic images on the PC in his home office. The pornography was “explicit” but “not illegal.” A technician discovered the pornography while working on the dean’s PC. The existence of the pornography was reported to the Harvard administration. The dean resigned his position as dean, but was able to keep his position as a tenured faculty member.

We will assume that everyone agrees that the dean showed poor judgment, and that a dean of a divinity school really should not have a pornography habit. Setting aside the dean’s role for a moment, let’s consider the role of the technician in this incident – *should the technician report the existence of pornography on the dean’s PC?* From only this superficial description of the incident, most people conclude that the technician has a responsibility to **not** report the pornography. The argument leading to this conclusion might appear as follows.

Since	Techs have a responsibility to keep personal information private, and The dean’s collection of pornography would be embarrassing to him, and The tech discovered the pornography while working on the dean’s PC,
Therefore	The technician should not report the existence of the pornography.

However, the superficial description of the incident omits critical elements of the incident. Knowing all of the important facts leads to a rather different conclusion.

2.3.2 A Conclusion Based on More Information

One important element missing in the superficial description is the overall “Harvardness” of the incident. The home and the PC were perks of the dean position. That is, the “dean’s PC” was actually owned by Harvard, as was the home that the dean lived in. Also, the technician was not just “a technician” but was a Harvard Divinity School technician. The dean had run short of disk space on the PC in his home office, and requested that a technician come and install a higher-capacity disk drive and transfer the files from the old drive to the new drive. Thus the pornography was discovered when one Harvard employee (the dean) requested that another Harvard employee (the technician) upgrade a piece of Harvard equipment (the PC) supposedly being used for Harvard-related business.

A related consideration is the level of privacy that an employee can reasonably expect in the use of an employer-owned computer. In the absence of any explicit agreement or policy to the contrary, the basic rule is that an employee has no legal expectation of privacy in the use of an employer-owned computer. A 1999 American Management Association survey showed that 27% of the responding companies review employee email [4]. In most cases, the review of email is done on a random basis. In addition, 21% of companies review stored computer files; again, mostly on a random basis. One news story quoted a co-chair of the American Bar Association privacy committee as follows [4] – “In this day and age, I would say that an employee is foolish or naive who allows information to be stored in his or her computer that he or she does not want the employer to be aware of.”

Another important consideration is Harvard’s policies on use of its computers. The faculty handbook for the Divinity School prohibits “inappropriate, obscene, bigoted or abusive” material on its computers. Policy also restricts computer use to activities “related to the School’s mission of education, research and public service.” Any “private, commercial, non-Harvard business” use of school computers requires “explicit authorization.”

Yet another consideration is how the technician came to report the pornography. Different news reports disagree on some details. One account is that there was a pornographic image on the PC display when the technician arrived to perform the disk upgrade. The dean’s lawyer denies this. Another account is that the technician noticed a variety of “unusual” file names during the upgrade, and presumably opened one or more either out of curiosity and/or to verify the contents. The upgrade was performed in three steps: (1) transfer contents of the old disk to a central computer, (2) install a new disk on the PC, and (3) transfer contents of the original disk back to the PC. The upgrade took substantially longer than normal, apparently due to the disk being essentially full and containing lots of image data. At some point, a supervisor asked the technician why the upgrade was taking so long. The technician then reluctantly reported the details of the problem.

Based on this more complete description of this incident, let’s revisit the question – *should the technician report the existence of pornography on the dean’s PC?* Based on the additional facts, problems are now apparent with each premise of the earlier argument. Technicians do have a responsibility to maintain the privacy of personal information, but technicians also have a responsibility to their employer to support policies on computer use. The dean’s pornography habit is personal in the sense that public knowledge of it would embarrass him, but he chose to keep it on a non-private PC owned by Harvard and serviced at Harvard’s expense. The technician discovered the porn while working on the “dean’s PC,” but also while acting as a Harvard employee working on Harvard-owned equipment.

The general problem is that the earlier argument was based on the (false) assumption that all relevant facts were considered. With better knowledge of the facts, most people would now reach the opposite conclusion based on a line of reasoning such as the following.

Since	The technician and the dean are both Harvard employees, and
	The “dean’s PC” is a Harvard PC provided as part of his job, and
	The dean has a responsibility to his employer, and
	The porn violates several elements of Harvard computer use policy, and
	The technician has a responsibility to his employer, and
	The technician is asked by a supervisor about the disk upgrade,
Therefore	The technician should report the existence of the pornography.

Let’s also consider a subtle variation of the actual incident – *If not questioned by a supervisor, should the technician still report the pornography?* Based on what we know about the level of privacy that employees can expect in the use of employer-owned computer systems, it is clear that the technician has the right to report the pornography. However, some consideration of the importance of the violation of computer use policy must come into play. For example, an email that contains no mention of any Harvard business would violate the strict letter of the computer use policy. But a technician who looked for and reported all violations of computer use policy, large or small, would have no time left for “real work” and would become a general nuisance. Is the dean’s violation of computer use policy big or small? I believe that it is big enough that the technician should report it. Reasons for this include: (1) the dean spent the cost of a disk upgrade and a day of the technician’s time on a personal habit, (2) the dean violated policy that he was administratively responsible for upholding, and (3) the nature of the violation is potentially embarrassing to the Divinity school as a whole. At the same time, I expect that many technicians confronted with this situation would decide that the “safe” option is to pretend that they saw nothing.

To clarify the critical elements, we should perhaps consider one more “what if” scenario. Imagine that there was no pornography, but that the technician had accidentally seen an email from a clinic that said that the dean had tested HIV positive. Should the technician reveal this to anyone? Absolutely not! It should be clear that this situation is substantially different from the actual incident. While the email might be considered non-Harvard business and so technically a violation of the computer use policy, the contents of the email are not “inappropriate, obscene, bigoted or abusive” material. Also, one email would not be the driving reason for a disk upgrade, and so the requested work is still legitimate. The technician has witnessed no substantial violation of computer use policy and so has nothing to report. The incidentally learned personal information must be kept confidential.

2.3.3 Roles and Responsibilities of Other Stakeholders

A *stake-holder* is simply someone who has a stake, or personal interest, in the outcome. The technician is not the only stake-holder in this incident. Other stake-holders include the dean, the Harvard President and the reporter who wrote the first story about the incident. In ethically difficult situations, it is often valuable to list the various stake-holders and consider the rights and responsibilities of each.

The dean’s primary responsibility to administer his unit of the university to the best of his ability. The dean was generally considered quite successful. One achievement mentioned in

news articles is fundraising; he was able to roughly quadruple the size of the Divinity school endowment. However, the dean's responsibilities also include treating each member of the school with respect, fairly enforcing the policies of the school, and conducting himself in a way that would be supportive of his colleagues and bring credit to the school. Additionally, the dean has personal responsibilities to his wife and two adult daughters. In the specific context of this incident, it is clear that the dean failed in his professional and personal responsibilities.

The Harvard President is a stake-holder because it is his responsibility to handle the report of the dean's misconduct. The president has responsibilities to manage the university as a whole so that it effectively achieves its mission, and to treat each employee fairly and with respect. The president has to consider "higher-level" issues than the technician might consider. One consideration is that of possible future sexual harassment or hostile workplace claims. If the president ignores the incident and some other employee is offended by the dean's pornography in the future, that employee would have a stronger claim that Harvard administration condoned a "hostile workplace." The president also has to consider the effect of the incident on the dean's professional credentials. The dean was an ordained pastor in the Evangelical Lutheran Church (ELC), and the ELC has a policy against pornography. When the bishop of the ELC synod that ordained the dean learned of the incident, he commented that he would have to meet with the dean and that one possibility was that the dean would be removed from the list of ordained pastors. On the other hand, the dean had served Harvard well for over twelve years. Also, public knowledge of his pornography habit would embarrass the dean personally and professionally.

The president met with the dean to discuss the incident, and they "agreed that it would be in the best interests of the Divinity School for the dean to resign" [1]. Official Harvard statements at the time made no mention of the pornography. The dean stated that he was taking a sabbatical "to spend time with my family" and cited personal and private reasons and health concerns. At the end of a one-year sabbatical, the dean would return to a position as a regular full professor at Harvard. The resolution protected the integrity and potential liability of Harvard, and at the same time preserved the privacy and the tenured professorship of the (ex-)dean. It seems that the Harvard president resolved the incident about as well as possible.

The president and the dean reached their resolution of the incident in November of 1998. The incident only made the news in May of 1999. At some point during this time, Boston Globe reporter James Bandler became aware of the complete story behind the dean's resignation.

The reporter would also have a set of professional responsibilities. One would be a responsibility to the subjects of his stories to treat them fairly and with respect. Another would be to society as a whole, to deliver truthful and important news. Yet another would be to his employer, a for-profit entity, to write stories that would sell newspapers. It is clear that having the full story appear in the news would result in personal embarrassment to the dean, to Harvard and possibly also to the ELC. A counter-weight to this consideration is that the public would have a right, and possibly a need, to know the full story. Was public knowledge advanced in some way by this story to an extent that would outweigh the damage to the dean's personal privacy? To me, it seems not. The employee/employer workplace privacy issues are not novel. The resolution reached by the president and the

dean is not extreme or unusual. It seems that it is only the combination of a divinity dean and pornography that makes this story “newsworthy.” And “newsworthy” here seems to be defined primarily in terms of selling newspapers.

2.3.4 Examples of Critical-Thinking Lapses

News coverage of this incident provides a number of examples for critical-thinking analysis. We will consider just three of these in detail here. One article included the following comment by Harvard law professor Alan Dershowitz [10]:

... Back at Harvard, Frankfurter Professor of Law Alan M. Dershowitz said that, though he did not know the details of the case, what [the dean] chooses to do privately is his own business and only becomes the university’s concern if it is illegal. “As long as it’s done in private and doesn’t hurt anyone it is not the school’s business,” he said. “I don’t think it matters that he is the Divinity School dean.”

The argument here appears to be along the following lines.

Since	What the dean does legally and in private is his own business, and the dean’s use of pornography was legal and private,
Therefore	It is none of the university’s business.

This argument exhibits a number of critical-thinking problems. The first premise basically sets up a circular argument. But by definition, what the dean does on his Harvard-owned PC is not “private.” Employers can and do have rules that are more strict than simply “what is legal.” Also, the term “in private” is being used ambiguously. In the first premise, “in private” means something that the dean does by himself that he would like to keep from others. In the second premise, the meaning has subtly shifted to mean something that the dean has a right to keep private.

It seems likely that Dershowitz does not really mean to advance the general principle that the technician should report something only if it is illegal. For example, consider the following “what if” scenario. What if it had been a dean of a law school, and this dean was currently nominated to the Supreme Court, and the technician discovered that the dean had been doing *pro bono* legal work for the Ku Klux Klan for the last ten years? There is nothing illegal here. But most people would hope that the technician’s sense of responsibility to society would require that the information be made public.

Another article included this comment from an ACLU representative [9]:

“The episode raises questions about the right to privacy and questions about punishing people because they have interests in sexual images,” said Sarah Wunsch, an attorney with the American Civil Liberties Union of Massachusetts.

This quote also exhibits several critical thinking problems. The reference to the “right to privacy” can be seen as an irrelevant appeal to authority. The right to privacy has become something of a motherhood-and-apple-pie concept. But, as already pointed out, there basically is no right to privacy in the use of an employer-owned computer. Also, was the real violation of the dean’s privacy done by Harvard or by the Boston Globe? The

comment about “punishing people because they have interests in sexual images” can be seen as an example of mis-identified causation. It leaves out the critical factors that the dean was pursuing his interest in sexual images on a Harvard computer in violation of Harvard policy, and that it could cost the dean his ordination.

Still another article was titled [15] “Do computer docs need a Hippocratic oath?” This title suggests an analogy between the technician in this incident and our general concept of a personal physician. If you accept this analogy, you would tend toward the conclusion that the technician should not report the pornography. But just how valid is the analogy? One way of approaching this question is to diagram the entities and relations involved. Figure 2.1 gives an example of this.

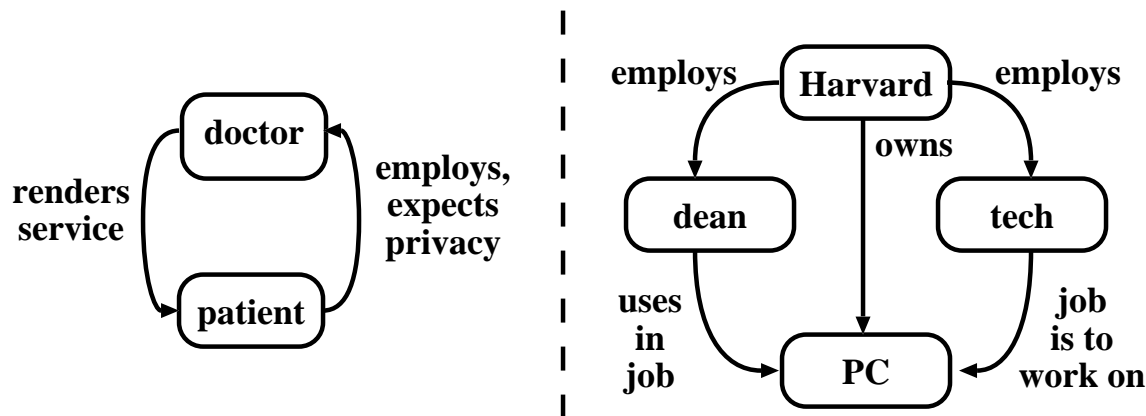


Figure 2.1: Example Diagrams To Assess Validity of an Analogy.

It should be clear that the situation in this incident is really not very similar to the idealized doctor-patient relationship. Good analogies should have diagrams with similar structure and reasonable correspondence between the entities and relations in the diagrams.

2.4 Case study – A BBS for Pirated Software

This case study contains several examples of poor critical thinking. The principal character apparently rationalized to himself that there was nothing really wrong with his actions. His supporters displayed some unusual logic in defending him. This case study also illustrates how the legal system is being pushed to change in response to situations posed by computer technology.

The cast of characters.

At the time of this incident, David LaMacchia was 20 years old and a computer science and electrical engineering major at the Massachusetts Institute of Technology.

The Massachusetts Institute of Technology was the owner of the computers used in this incident. MIT had to deal with the misuse of their computers by one of their students.

The Federal Bureau of Investigation plays a relatively minor role in this story. They were called in to investigate the incident.

Donald K. Stern is a US District Attorney for the region, including Boston. He is the prosecutor.

Judge Richard B. Stearns is a US District Court judge in Boston. He decides on the merits of the criminal case presented by the prosecutor.

Harvey Silvergate is the attorney for David LaMacchia.

Laurence Tribe is a well-known professor of law at Harvard University whose role is simply as a commentator on the incident.

The sequence of events.

David LaMacchia used three computer workstations at MIT to set up and run an Internet bulletin board during the fall of 1993 and the first few months of 1994. The bulletin board was named “cynosure,” a word meaning “a center of attention or interest.” Information about the bulletin board was apparently widely disseminated on the Internet. It became known as a place where you could post or obtain copies of various copyrighted commercial software packages. Reportedly, as many as 180 people used the system over one 16-hour period [14]. It would later be alleged that over \$1 million worth of copies of copyrighted software were made.

MIT discovered that their computers were being used for this purpose and called in the FBI. The FBI investigated. US attorney Donald Stern obtained an indictment from a federal grand jury on April 7, 1994. LaMacchia was charged with one count of conspiring to violate the federal wire-fraud statute [7]. More specifically, he was accused of setting up the bulletin board, advertising its availability as a source of free software, and transmitting the stolen property by interstate and international wire fraud. LaMacchia was not accused of making any personal financial gain. He was also not accused of making any copies of copyrighted software himself. Penalties for the charge against LaMacchia included jail time and up to \$250,000 in fines.

On December 29, 1994, judge Richard B. Stearns ruled that the US Supreme Court decision in *Dowling v. the United States* “precludes LaMacchia’s prosecution for criminal copyright infringement under the wire-fraud statute” [7]. The Dowling case involved bootlegged Elvis Presley records. The Supreme Court ruled in the Dowling case that the copyright violation involved in the bootlegged recordings did not constitute theft of property in the sense of the Stolen Property Act. Judge Stearns suggested that criminal penalties “should probably attach to willful, multiple infringements of copyrighted software even absent a commercial motive on the part of the infringer,” but noted that “it is the legislature, not the court, which is to define a crime and ordain its punishment” [7]. Even in dismissing the charge, Judge Stearns characterized LaMacchia’s actions as “at best heedlessly irresponsible, and at worst nihilistic, self-serving, and lacking in any fundamental sense of values” [7].

US attorney Donald Stern announced that his office would not appeal the judge’s ruling and suggested that new federal legislation was needed. This effectively ended the criminal charges against LaMacchia. It is still conceivable, though unlikely, that some of the companies whose software products were copied could attempt a civil suit against LaMacchia.

Harvey Silvergate, LaMacchia’s lawyer, stated that “It is not at all clear that a systems operator who neither controls what is placed on the system nor profits one cent from any copyrighted software that others upload to and download from the system has committed any crime” [7]. Silvergate also suggested that new legislation was needed to protect bulletin-board operators from “excessively harsh liability for the actions of others” [12].

Laurence Tribe’s quoted comment on the case was “I am not saying that people have a right to steal software, but using the criminal justice system to police the outer boundaries of

property in these gray areas, where it can't be alleged that someone is profiting, is excessive" [13].

Conclusions and questions.

David LaMacchia set up a bulletin board on systems that he did not own to encourage copying of copyrighted software that he did not own. His actions apparently were not quite criminally prosecutable. (That LaMacchia made no personal financial gain and could be characterized as young and idealistic no doubt influenced how hard the US attorney was willing to push the issue of criminal prosecution.) So we have an example of something that is apparently legal but clearly not ethical. Should LaMacchia have been subject to any penalty for his actions? If so, what penalty is appropriate? What sorts of errors in critical thinking must LaMacchia have made to rationalize to himself that his actions were acceptable?

If the story as presented is correct, LaMacchia did none of the copying of copyrighted software. Then there must be a large number of people out there on the Internet who did use the bulletin board as a place to exchange copies of pirated software. Each of these people is more clearly legally liable than LaMacchia. However, it may be essentially impossible to identify any of them.

MIT was presented with the problem of finding that one of their students was using MIT computing equipment to run a bulletin board for pirated software. They chose to call in the FBI. Is it possible that it could have been handled within the university without calling in the FBI? Or would attempting to handle it in this way have been seen as "covering up" and exposed MIT to legal liability?

The district attorney was faced with the problem of trying to find a way to prosecute what appeared to be a massive case of software theft. The route he chose was sufficient to get an indictment from a grand jury but not sufficient for the judge to try the case. Was he trying to "make new law"? Or did he make the best that he could out of an inherently difficult case to prosecute?

The judge ruled that the case could not go forward, but made some disparaging remarks about LaMacchia's actions. Did the judge handle this in the most appropriate manner? Should the judge have let the case go a little further to impress on LaMacchia that he had done something wrong? Or should he have dismissed the case at least as soon as he did and with no comment on LaMacchia's character?

Harvey Silvergate made the observation that "it is not at all clear that LaMacchia has committed any crime." This was actually a fairly trivial observation to make under the circumstances. And it is certainly not a ringing endorsement of his client's morality. Does Silvergate's focus on what is legal, rather than what is right, serve to reinforce negative stereotypes of lawyers?

Professor Laurence Tribe's comments make it sound as if the district attorney was using poor judgment in this case. Tribe's argument appears to be something along the lines of the following.

Since	The property rights in this case are a gray area, and
	It isn't alleged that the person made any personal financial gain,
Therefore	The person should not be prosecuted.

Does Tribe's argument make sense? Is copyright law really a gray area? Should LaMacchia's lack of personal financial gain be a decisive factor?

Consider a possible analogy. Imagine that Laurence Tribe had just completed writing a new book. LaMacchia sets up a copy machine in his garage. A friend gives LaMacchia a copy of Tribe's new book, and LaMacchia leaves in next to the copy machine. LaMacchia advertises this to everyone that he knows who likes legal books. Nothing of Tribe's is damaged and LaMacchia does no copying himself. Is this scenario a reasonable analogy to what really happened? Do you think Tribe would have the same opinion of this scenario?

As a postscript to this story, the Software Publishers Association is suggesting new legislation that will explicitly define actions like LaMacchia's to be a crime. On the other side of the issue, the Electronic Frontier Foundation is interested in protecting bulletin-board system operators from liability for the actions of bulletin-board users [7].

Points To Remember

Good critical-thinking skills are a prerequisite to carrying out the intention to act ethically.

Better critical-thinking skills can lead to clearer thinking, better decision-making and better communication with others.

When confronted with a confusing argument, it can be helpful to attempt to summarize it in the stylized “Since premise, ..., premise; Therefore conclusion” form.

When confronted with an argument by analogy, it can be useful to diagram the entities and relations in the two situations in order to assess the validity of the analogy.

Worksheet – Critical Thinking in the “Porn On the Dean’s PC” Case

Read five or more of the news articles on this case. Rate the articles according to how well they present the critical facts of the incident. Then make your own critical thinking assessment of the following comments offered by different people, plus your favorite other quote from one of the articles that you read.

One student was quoted as saying “the way they forced him to resign and the time he resigned was bad.”

A Harvard divinity graduate was quoted as saying “Is the dean’s computer in his home his own? Or because his home and computer are owned by Harvard, is his whole life owned by the Divinity School?”

A female Harvard student was quoted as saying the incident was “like getting caught with Playboys under the mattress.”

The dean’s lawyer was quoted as saying “After 13 years of unprecedented success serving as dean of the divinity school, there is a strong feeling that he is now being kicked in the stomach when he’s down, while the university continues to protect the privacy of those who have made allegations against the dean.”

A media critic named Dan Kennedy gave Harvard President Rudenstine a “Muzzle Award” as someone who had “undermine[d] free speech.”

Worksheet – Who Should Do What about Cheating?

Read the reprinted editorial from *IEEE Potentials* about cheating. Think carefully about it for a moment and then answer the questions. After you answer the worksheet, read the letters that came in response to this editorial and see if you would modify any of your responses.

What is the conclusion of the argument being made?

What are the reasons offered in support of the conclusion? Rank them, starting with 1, in order of their perceived strength.

What are the critical questions you would want to ask?

What *should* you do when you witness someone cheating on an assignment?

What *do* you do when you witness someone cheating on an assignment? Why?

Worksheet – The Quality of Life in Silicon Valley and Our Society

Carefully read the reprinted article by Lotfi Zadeh at the end of this chapter. Then try to outline and assess the underlying argument in the article.

The essential first step in a critical-thinking analysis of an article is to identify the *conclusion* of the article. The most common error made when first learning critical-thinking skills is to identify one of the premises as the conclusion. Each premise is, after all, a sort of “minor conclusion” along the way to the “overall conclusion.” But the overall conclusion of the article should represent the author’s “take-home message” for the audience. It is typically a belief and/or action that is being recommended to the audience. Often this logical conclusion appears near the physical conclusion of the article. Select a quote from the closing paragraph of the article that you feel reasonably represents the conclusion of the article.

The next step in a critical-thinking analysis is to identify the major premises of the article. Identify a sequence of three to five short quotes from the article that could represent major premises in support of the conclusion. These quotes may not capture the strongest words or the most controversial statements in the address. Also, there may be several alternative quotes that could be selected to represent a particular point in the argument. But the sequence of quotes you select should reasonably represent a line of argument leading to the conclusion.

How would you assess the truth of the individual premises that you identified? How would you assess the collection of premises as “proving” the conclusion?

What sequence of premises, assuming that they were true, would (better) convince you of the conclusion? That is, could you make a better argument for the conclusion?

Worksheet – The Insufficiency of Honesty

Stephen Carter wrote an article titled “The Insufficiency of Honesty,” that appeared in *The Atlantic Monthly* in February of 1996. Locate and read a copy of this article. You may notice that it uses a different style of reasoning than what you are used to. Think it over carefully, and answer the questions.

What is the definition of “integrity” used in the article?

Can two people of integrity (as defined in the article) disagree on an issue? If so, how?

What is the conclusion of the argument made in the article?

What are some of the premises used in support of this conclusion? Which do you agree with? Which do you disagree with? Why?

Carter asserts that “... not all moral obligations stem from consent or from a stated intention.” Do you agree? Why or why not?

Do you agree with the conclusion of the argument made in the article? Why or why not?

Additional Assignments

1. **Appropriateness of analogies.**

Consider the “porn on the dean’s PC” incident at the analogy of the technician to a medical doctor. Try to construct a more suitable analogy that involves a medical doctor and a technician. For example, you might consider a scenario as an airline pilot being examined by a doctor.

2. **Comparison of traditional and “web only” information sources.**

Pick a recent and/or well-known computer system “cracking” incident. Look up several articles from traditional news sources and an equal number of articles from “web only” sources. Read the different articles carefully and compare them. Exercise your critical-thinking skills to analyze the different treatments of the topic. Is one group more or less informative than the other? More or less biased than the other? More or less clear than the other?

3. **Titles, abstracts, and introductions of current literature.**

Locate the current issue of a major technical journal reporting on a topic you are interested in. (If you aren’t sure where to start, try browsing through the selection of “Transactions on ...” titles published by the ACM and the IEEE.) Read and critique the title, abstract, and introduction of each article in the issue. Make a list of possible improvements for each article.

4. **Critique of arguments over intellectual property protection.**

Chapter 8 discusses several articles that deal with intellectual property protection as it relates to computer software. Any of these would make an excellent case study for critical-thinking. Read one of them before reading the chapter itself, then read the chapter and compare the logical errors you have found with those mentioned in the chapter.

5. **Critique of disagreements over CRT safety.**

Chapter 9 discusses several articles dealing with the safety of computer video terminals. Any of these (as well as many of the articles referenced) would make an excellent case study for a critical-thinking review.

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held over from first edition

page 1 of responses to Gaines in next issue of *IEEE Potentials*
new addition to revised edition

page 2 of responses to Gaines in next issue of *IEEE Potentials*
new addition to revised edition

UC Berkeley Commencement Address

Professor Lotfi A. Zadeh

This reprint is the text of a commencement address given by Lotfi Zadeh to the Computer Science graduates of the University of California at Berkeley in May of 1997. Zadeh is a Professor Emeritus of the Department of Electrical Engineering and Computer Science at the UC – Berkeley. Professor Zadeh is truly a major figure in the field of computing. He is recognized as having founded the field of study known as fuzzy logic [16], and has won numerous awards for his career-long contributions in this area. Professor Zadeh takes up difficult and controversial issues that are much more political and social than technical.

On commencement days such as this one, it is customary to avoid touching upon issues which are contentious or in dissonance with majority-held views. I will take the liberty of departing from this tradition because there are contentious issues that have to be addressed and serious structural problems in our society that your generation is likely to be called upon to solve.

To put my views in perspective, I should like to note the obvious – I am not a native-born American, as most of you are. But I consider it a privilege to be a citizen of this great country – a country of vast expanse, immense wealth, great diversity, unmatched power and a world leader in almost every realm of human activity. But to me what matters most is that it is a country in which human rights are taken seriously, governance is ruled by law, and decency, generosity and fairness are national traits.

To say what I said does not mean that all is well. Our society is faced with serious problems that are visible to all: drug addiction, crime, homelessness, extremes of wealth and poverty, alienation and ethnic conflicts. But there are other problems which – though less visible – are likely to cause serious damage to the fabric of our society in the long run. My brief remarks will be focused on two linked problems which fall into this category.

Many of you will be taking jobs in Silicon Valley, the heart of our computer industry, the industry that is the driving force behind the economic boom that we are basking in now.

When I ask our graduates who are working in Silicon Valley if they are happy in their jobs, the usual answer is: the pay is good and the work is interesting. But one important element is missing: the sense of security, dignity and collegiality. In Silicon Valley and, more generally, in the computer industry, the working environment is the environment of cut-throat competition. As they say, "In Silicon Valley if you make the mistake of stopping for lunch, you will be lunch." You are hired today but may be laid off tomorrow, with no farewell parties and no regrets. The bottom line is the stock price and not human welfare.

Something is deeply wrong with our values when elimination of thousands of jobs is greeted with applause by Wall Street, causing the price of stock to go up and, not coincidentally, increasing the value of stock options of company executives. In this climate, executives are not expected to spend sleepless nights when down-sizing leads to massive layoffs. Indeed, any company that puts human welfare above profits and efficiency risks serious damage to its competitive position and, possibly, its demise. It is a sobering thought that profits have become the driving force which shapes the dynamics of our society and that money may become the determinant of values by which we live. Perhaps we should pause and ask ourselves if we are doing the right thing when we exert pressure on other countries to follow our

example and abandon their traditions of protection of social rights in the quest for efficiency and stronger competitive position in the global marketplace.

There is a linkage between this state of affairs and the growing intrusion of advertising and commercialism into all aspects of our lives. A disturbing prospect is that as we move further into the information age and the multimedia, the linkage will become stronger and less amenable to control.

To many, advertising is the pillar of free enterprise. Up to a point, advertising serves an essential purpose, but like any good thing that is overdone, unrestrained advertising, with its high content of half-truths and untruths, is becoming a force which is corroding our culture and distorting our goals. The pervasive influence of advertisers on TV and radio programming substitutes the size of audience for genuine concern for quality of programs. Catering to the least common denominator leads to programming which focuses on violence, sex, sports, scandal and human interest stories. The amount of time devoted to serious news is declining and the media – driven by the quest for higher advertising revenue – are abdicating their responsibility to inform, educate and inspire.

In this climate of media manipulation and commercialism, it is not surprising that our young people have become cynical and materialistic. This calls into question our ability to serve as a positive role model for the young in other countries and other societies. Indeed, it is alarming to observe the degree to which intrusive advertising and commercialism have led to a vulgarization of our culture and an abandonment of moral values that led this country to greatness. The not-so-subtle control of our media by advertisers has led to the emergence of consumerism as the dominant influence shaping our culture, our values and our perceptions.

What is disconcerting to observe is that the pop culture programs which are mass produced by the TV, movie and music industries in the United States are displacing – in the marketplace of other countries – their own products. As in the United States, low-grade programs, intrusive advertising and rampant commercialism have become the norm in TV programming in Europe and other countries as well. It was a prominent TV personality who in addressing a European audience had this to say, "We have succeeded in ruining our culture in the United States, and now we are going to ruin your culture."

I am touching upon these issues because they have a definite impact on the outlook and aspirations of the young in our society. A telling statistic is that despite the rising demand for computer science graduates, the number of undergraduate degrees in computer science has dropped 43% from 42,000 in 1986 to 24,000 in 1994. What this suggests is that a declining number of students are entering those fields in which hard work is required. A visible facet of this trend is that pursuit of knowledge for its own sake is increasingly replaced by a quest for education as a ticket to a better-paying job.

I have used harsh expressions to make my points. The picture I have painted is darker than it should be. I have done this with deliberation to underscore that it is our collective responsibility – and especially the responsibility of your generation – the generation that will shape our future, to do whatever can be done in our democratic society to prevent the corrosive forces of commercialism and consumerism from encroaching on our culture and becoming dominant influences in defining our values, our beliefs and our morals.

