Incorporating a *Critical Reasoning* Component into the ICT–Ethics Methodological Framework

A Case Study

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**Abstract**

Is the standard/classic applied–ethics model used by philosophers adequate for analyzing issues in information and communication technology (ICT) ethics? A number of critics have argued that it is not, claiming instead that we need to revise and possibly also expand upon that model. In the various proposals advanced so far, however, no one has questioned whether we need to include an explicit critical reasoning (CR) component as part of an adequate ICT–ethics methodological framework. The purpose of the present study is to show why having such a component is not only useful but perhaps critical to ICT–ethics analysis. After defining what I mean by CR, and describing how it differs significantly from both formal logic and critical thinking, I show why incorporating a CR component can help us to achieve four of our key objectives as ICT–ethics professionals/instructors. First, CR provides us with a clear and systematic method for spotting logical fallacies, some of which might not initially seem either obvious or intuitive, in the various arguments that have been advanced to influence social policies affecting ICT. Second, CR provides us with techniques for testing our own arguments to ensure that they do not contain any logical fallacies. Third, CR provides us with a clear and fairly rigorous methodology for not only avoiding fallacies but also for constructing strong arguments to defend the views we advance. Finally, infusing a CR component into ICT–ethics courses will aid instructors in teaching their students how to detect and avoid logical fallacies, as well as teaching them how to construct strong arguments to defend their own positions on issues.

**Keywords:** Critical Reasoning, Applied Ethics, Informal Logic, ICT–Ethics Methodology, Logical Fallacies

**Introduction: A Methodological Framework for ICT Ethics**

Various proposals have been put forth to establish an adequate methodology for information and communication technology (ICT) ethics. Some philosophers seem to have assumed that the “standard/classic” applied–ethics model is adequate, while others working in the field of ICT ethics have argued that we need to refine or tweak, and possibly even expand upon, that classic methodological
As Brey (2000) and others have pointed out, the standard model/framework in applied ethics has three basic steps:

1. Identify a controversial issue or controversial practice as a problem that is ethical in nature;
2. Describe and analyze the problem by clarifying concepts and identifying the factual data associated with that problem;
3. Apply moral theories and principles in the deliberative process in order to reach a position about the particular issue.¹

The ICT–ethics model that many currently use includes some additional sub–categories or steps, which either expand or elaborate on the standard applied–ethics framework. I will briefly mention four of these. First, some philosophers have incorporated James Moor’s insights regarding the need to identify policy vacuums and elucidate conceptual muddles (Moor 1985). Second, some have also incorporated Philip Brey’s insights with regard to disclosing “morally opaque/hidden features” in computer technology and the practices affecting it, as articulated in his framework of “disclosive computer ethics” (Brey 2000). Third, some CS professionals have incorporated insights by Huff (2004) and Friedman and Nissenbaum (1996) that address bias and embedded values in software design, while Friedman, Kahn, and Borning (2006) have developed a full–blown framework called “Value Sensitive Design” (VSD) to respond to these kinds of concerns. Fourth, other CS professionals have incorporated key elements of professional codes of ethics/conduct, such as the IEEE–CS/ACM Software Engineering Code of Ethics and Professional Practice (SECEPP), described by Gotterbarn, Miller, and Rogerson (1999).

It is also worth noting that some new/alternative theoretical frameworks have been introduced as well. Again, I will briefly mention only four of these. First, Moor’s Just–Consequentialism theory is notable in that it combines key elements of utilitarian and deontological ethical theories, with a focus on examples involving ICT (Moor 1999). Another theoretical scheme has been advanced in Luciano Floridi’s Information Ethics (IE) — a (macro–level) meta–ethical framework (Floridi 1999), which has been influential as well as controversial. Two additional theoretical–ethics frameworks put forth in recent years are Terrell Bynum’s “Flourishing Ethics” (Bynum 2006) and Shannon Vallor’s “Techno–Moral Virtue Ethics” (Vallor 2016).

Finally, I think that it is worth noting that some influential methodological frameworks specifically aimed at addressing ethical challenges posed by new and emerging technologies have also been advanced in recent years. I briefly mention two of these. One is Moor’s “Dynamic Ethics” model (Moor 2005), which he and John Weckert have illustrated with examples of controversies affecting nanotechnology (Moor and Weckert 2004). Another framework that has been influential is Brey’s “Anticipatory Technology Ethics” (ATE) model, which addresses ethical issues arising at the research-and-development stage of emerging technologies and which also examines some specific nanotechnology–related issues (Brey 2012).

¹ An earlier version of this paper was presented as a keynote address at the 2017 CEPE/Ethicomp Conference, Turin Italy, June 5–8, 2017. I am grateful to the INSEIT Board of Directors for inviting me to present the CEPE 2017 keynote talk, and I am grateful to conference participants for some helpful comments they provided on the version of this paper presented at the CEPE/Ethicomp conference. I am also grateful to Maria Bottis, Jeff Buechner, Lloyd Carr, Massimo Durante, and Fran Grodzinsky for some very helpful suggestions on an earlier draft of this paper.

² This formulation of Brey’s description of the “standard” applied–ethics model is adapted from my analysis of it in Tavani (2016). Using the example of euthanasia to illustrate how this model works, Brey notes that variations of the model have also been used by many philosophers who engage in what he refers to as “mainstream computer ethics.”
So if we incorporate some of the methodological–based insights provided by influential thinkers in the field of ICT ethics during the past thirty or so years, an expanded/revised version of the “standard” applied–ethics model in the context of ICT might look something like the following:

1. **Identify** a practice or technological feature involving ICT that is controversial from a moral perspective.
   
   1a. Disclose any hidden or opaque features that have moral import (Brey);

2. **Analyze** the ethical issue(s) by clarifying concepts and differentiating between the factual/descriptive and normative components.
   
   2a. Identify any “policy vacuums” and clear up any “conceptual muddles” that arise (Moor).

3. **Deliberate** on the ethical issue(s).
   
   3a. Determine whether any professional codes of ethics/conduct can apply in the case of any professional-ethics issues that arise (Gotterbarn, et al.).

   3b. Apply one or more standard ethical theories — such as deontology, utilitarianism, etc. — or a new/revised ethical theories (e.g., Moor’s Just Consequentialism, Vallor’s Techno–Moral Virtue Ethics, and so forth) to the moral issue(s).

Are any additional steps/phases also needed in this framework? I believe that one is — viz., a step to **evaluate** (critically) the arguments that we examine at the “analysis phase” (Step 2), as well as the arguments we put forth in the “deliberation phase” (Step 3).

### Expanding on the ICT–Ethics Methodological Framework by Incorporating a Critical–Reasoning Component

In my view, one area that has been neglected — or at least has not been given sufficient attention — in attempts made to frame an adequate ICT–ethics methodology has to do with an important role that critical reasoning (CR) should play in our analysis of arguments affecting ICT–ethics issues. One notable exception to this oversight can be found in two papers authored by Johnny Hartz Søraker (2006, 2010). Despite his key insights, however, I believe that we need to apply CR in our analysis of ICT–ethics issues in a way that is much more systematic and deliberative.

Many philosophers, including the present author, approach ICT ethics as a branch of (the broader field of) applied ethics. However, many also believe that while ICT ethics is better understood in terms of applied or practical ethics, as opposed to theoretical ethics, the kinds of issues that need examining are broader in scope than those typically examined in the field of “professional ethics” per se. As ICT–ethics...
professionals, regardless of our diverse academic disciplines, our focus has correctly been on applied (or “practical”) ethical issues, rather than on theoretical ethics concerns (even though ICT–ethicists, as we noted, have also contributed to the latter).

I believe that we can extend the analogy involving theory–versus–practice in ethics to the field of logic. For example, in the same way that philosophers distinguish between theoretical and applied (or practical) ethics, many philosophers also draw a somewhat analogous distinction between formal and informal (or practical) logic. I think that this analogy can be useful in helping us to understand the role that CR, as a branch of practical (as well as informal) logic can play in the practical (versus theoretical) field of ICT ethics.

What, Exactly, Is Critical Reasoning?

Critical reasoning (CR) is generally viewed as a branch of informal logic. CR is different from both “formal logic” and “critical thinking.” It differs from formal logic in the following key respect. Unlike formal logic, which evaluates arguments (comprising symbols and logical “operators”) via formal rules, CR analyzes and evaluates arguments that occur in everyday discourse (i.e., in “ordinary language” as opposed to the “artificial language” and mere syntax of formal logic). CR also differs from critical thinking, which focuses more on rhetoric and how to persuade people than on a rigorous analysis of arguments. CR, unlike critical thinking, is mainly concerned with analyzing and evaluating various “reasoning forms” (especially arguments).

Although some academic disciplines have been influenced by what could be described as a “critical thinking movement/trend” in recent years, critics of this trend have pointed out that many of the textbooks/resources in the field of critical thinking are not particularly rigorous. In addition, I believe that critical–thinking resources are far less useful than CR resources in the context of ICT ethics, for two reasons. First, while critical–thinking resources identify many of the common informal fallacies that occur in ordinary language, they do not typically provide a systematic method (as CR resources do) for analyzing and evaluating arguments to expose (additional) fallacies that have not already been identified and labeled. Second, unlike CR resources, critical–thinking texts do not generally provide us with methods or techniques for constructing strong arguments (e.g., strong inductive arguments).

What do we mean by reasoning, in the context of CR? While “reasoning” is an ambiguous term, it has a more precise meaning and use in CR, which focuses on analyzing and evaluating certain “forms” or structures of reasoning (e.g., arguments). Whereas some forms/structures illustrate good reasoning, others illustrate bad (or “weak”) reasoning. An example of good reasoning is:

Maria is now logged into her Facebook account.  
So, someone is now logged into Maria’s Facebook account.

An example of bad reasoning, on the contrary, is:

Someone is now logged into Maria’s Facebook account.  
So, Maria is now logged into her Facebook account.

CR provides us with a methodology for showing why, exactly, these two examples illustrate each kind of reasoning.
Two Important Roles that CR Plays in ICT–Ethics Analysis?

Why is CR important in analyzing ICT–Ethics issues? I believe that there at least two reasons, both affecting two of our key responsibilities as ICT-ethics professionals: (1) instructing our students; and (2) evaluating and (to the extent that we can) influencing social policies affecting ICT. With regard to (1), our students need to acquire good reasoning skills in order to: (a) identify any fallacious reasoning contained in the arguments they examine, analyze, and evaluate; and (b) construct strong arguments to support their positions on controversial ethical and professional-ethical issues. Most applied–ethics resources provide students with the skills/techniques they need for analyzing a particular ethical issue, \( X \), from the perspective(s) of one or more standard ethical theories (consequentialism, deontology, virtue ethics, etc.). But few applied–ethics resources also provide the skills students need to identify fallacies contained in the works they examine or in the arguments they put forth to defend their own positions. Some recent ethics textbooks — e.g., Vaughn (2010), Waller (2010), and Ruggerio (2012) — have tried to show why it is important for students to incorporate critical–thinking skills into their moral deliberations. Consider that we can no longer assume that our students will have already acquired these skills, or that they will even have been exposed to them, from required (introductory) logic or philosophy courses that were once part of a university’s general education requirements. So I believe that our ICT–ethics students would benefit from learning CR skills.

Regarding (2), i.e., our roles and responsibilities as ICT–ethics professionals, we need good reasoning skills both to: (a) identify logical flaws (that might not initially seem so obvious or intuitive) in social policies established by lawmakers, so that we can more effectively challenge bad policies and laws; and (b) evaluate the arguments used to support their own positions to ensure that those arguments do not contain any logical fallacies (or fallacious reasoning). From personal experience, I have found that it is much easier to spot the logical flaws in others’ arguments than in the arguments included in my own work. So before I formally submit a work for publication, I typically ask a colleague to critically review it for any potential logical fallacies that might be included in my arguments often, I am relieved and thankful that I chose that option.

Logical Fallacies (in the Context of ICT Ethics)

What do we mean by logical fallacy? Contrary to what many people assume, “fallacy” does not mean “false statement”; rather, it means faulty reasoning. Consider that it is possible for an argument to contain all true statements and yet still be fallacious (in its reasoning). Conversely, an argument can contain all false statements and still be valid, solely by virtue of its logical form. Because some logical fallacies appear frequently in everyday discourse, philosophers have given them labels that make it convenient for us to identify and categorize those fallacies. These kinds of fallacious arguments are also sometimes referred to as informal logical fallacies.

Many are already familiar with some logical fallacies that commonly occur in everyday discourse, such as the Ad Hominem, False Cause (Post Hoc; Ergo, Propter Hoc), and Slippery Slope Fallacies. Examples of each of these fallacies are included below. Thus far, a few fallacies have also been identified/labeled within the context of ICT Ethics. These include the Virtuality Fallacy (Moor 2001), the Privacy vs. Security

7 It is worth noting that Ruggerio’s entire textbook is dedicated to showing the importance of applying critical–thinking skills in ethical analysis. On a slightly different but related note, it is perhaps also worth pointing out that at least two ICT–ethics textbooks have devoted complete chapters to discussing the importance of these skills in the context of analyzing ethical issues affecting ICT: Bowyer (2001) Chap. 2; and Tavani (2016) Chap. 3.
Fallacy (Solove 2011), and the Computer–Ethics–Is–Unique (CEIU) Fallacy (Tavani 2002; 2016). Moor notes that some have fallaciously reasoned along the following lines: “X exists in cyberspace; cyberspace is not real; therefore the effects of X are not real.” Solove’s insight is based on a variation of the False Dichotomy Fallacy, used by those who reason that in order to have security, we must be willing to give up privacy (and vice versa). Tavani describes a fallacy involved by those who make the following kind of argument: “Cybertechnology has unique technological features (i.e., it is uniquely malleable, uniquely fast, etc.); cybertechnology has raised some ethical issues; therefore, (at least) some of the ethical issues raised by cybertechnology are unique ethical issues.” One can easily see, especially after closer examination, the logically fallacious reasoning underlying each of these arguments.

It is worth noting that some logical fallacies can be very seductive, as well as misleading, in their appeal in everyday discourse. Consider a logical fallacy contained in many of the arguments that were effectively used during the 2016 U.S. presidential election — a variation of the “False Analogy” fallacy, which some now refer to as the Fallacy of False Equivalency:

Candidate A may be flawed; but candidate B is also flawed. So candidates A and B are both (equally) flawed.

Unfortunately, this kind of faulty reasoning was used to influence many U.S. voters in their “deliberations” in the 2016 presidential elections.

Also, variations of the False Cause Fallacy have been used in arguments by some who have attempted to explain the outcome of the 2016 presidential election in the U.S. For example, some have advanced arguments along the following lines:

Hilary Clinton was ahead in most polls before the WikiLeaks revelations were reported by the press. Her lead began to evaporate after the WikiLeaks revelations began. Therefore, her loss in 2016 was due to the WikiLeaks revelations.

The fallacy in this argument is fairly obvious — i.e., many other factors could have caused, or at least contributed significantly to, Clinton’s drop in the polls, which also may have contributed to her eventual loss in the presidential election. Consider, for example, the FBI (re)investigation targeting Clinton’s email server, or Clinton’s description of (half of) Donald Trump’s supporters as a “basket full of deplorables.” Of course, other incidents during that contentious political campaign might also have led to Clinton’s eventual defeat. So we could easily produce some plausible alternative arguments for why Clinton lost the election. But that is not the aim of this paper, since we are not concerned with identifying and analyzing

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9 It is important to note that Solove does not himself use the expression “Privacy vs. Security Fallacy” in describing the fallacious reasoning underlying many of the arguments that have been advanced so far on both sides of this debate. However, I have attributed that fallacy name to Solove in my description of his insight regarding the false dichotomy that many believe exists between privacy and security (see Tavani 2016).

10 The outline of this fallacy was initially formulated in Tavani (2002), in response to a claim put forth by Maner (1996) that some computer ethics issues are either new or unique ethical issues (and would not have been possible without the advent of computers). My analysis of the CEIU Fallacy is more fully developed in Tavani (2016).

11 For an interesting argument as to why many of us commit “systematic fallacies,” see the account in Khemlani and Johnson-Laird (2017).
failacies that occur in arguments affecting political elections; nor, for that matter, are we interested in examining logical fallacies in general. As noted above, my main objective is to describe some key roles that CR can play in the context of ICT–ethics analysis and to show why it is important to incorporate a CR component into the ICT–ethics framework.

Fallacious Arguments Affecting Two ICT–Ethics-Related Controversies

In recent years, I have been struck by the number of logical flaws, including the frequency of some now “traditional/classic” logical fallacies, which have appeared in arguments put forth by some very competent professionals writing in the area of ICT ethics. Two very different kinds of debates in the past few years that illustrate striking examples of arguments that contain fallacious reasoning are: (i) the (Eric) Snowden controversy, and (ii) the “Right to Be Forgotten” dispute. We briefly examine each, beginning with an analysis of (i).

Two Kinds of Fallacious Arguments Put Forth in the Snowden Controversy

At least two kinds of logical fallacies have appeared so far in the arguments advanced in the Snowden controversy: the Ad Hominem Fallacy; the Either/Or Fallacy. Both were prominent in arguments advanced in an ACM–SIGCAS forum on the Snowden controversy (in 2014). I suspect that other kinds of fallacious arguments may also have appeared in the Snowden debate, but I focus my analysis on these two fallacies. Consider one example of an Ad Hominem attack used in an argument involving the Snowden dispute:

Snowden was a self-serving narcissist who was more interested in promoting himself than in exposing any wrong doing; so we should not regard what he did as a morally justifiable example of whistle blowing.

Why is the personal (ad hominem) attack on Snowden irrelevant to whether his act of whistle blowing was morally justified? Even if Snowden is a narcissist (as alleged) and even if he had acted from purely selfish motives, is that relevant to the question of whether his act of blowing the whistle on the NSA was either morally permissible or morally impermissible? We can certainly conceive of a scenario where it is true that both (a) Snowden is a narcissist and (b) he was morally justified in blowing the whistle.

As already noted, the Either/Or Fallacy also appears in arguments used in the Snowden controversy: for example, some of Snowden’s critics have argued:

Snowden was not a whistle-blower (or a hero); he was a traitor.

12 In this section, I draw from some examples of fallacious reasoning in arguments originally described in two works: Tavani (in press) and Tavani and Grodzinsky (2014).

13 The main thrust of this passage is originally included in Tavani and Grodzinsky (2014, p. 9). Basically, the argument described here is a composite of views expressed by participants in the 2014 ACM–SIGCAS Forum on the Snowden case (mentioned above) who were opposed to Snowden’s actions. Other kinds of personal (Ad Hominem) attacks leveled against Snowden have included arguments to the effect that since Snowden lied to his girlfriend, we should not trust him to be telling the truth with regard to any of the claims he put has forth in defending his actions.

14 For a fuller discussion of this point, see Tavani and Grodzinski (2014, pp. 8–9).
But some of Snowden’s supporters have made the opposite claim:

_Snowden was not a traitor (and not a criminal); he was a whistle-blower (and a hero)._ 

Both claims, which have the form “Not-P but Q”, assume an _either/or_ (i.e., a “P or Q”) position regarding Snowden and whistle blowing. But why can’t both “P & Q” be true? For example, one could assert:

_Snowden was both a whistle blower AND a traitor._

This assertion is not inconsistent in a logical sense, because an act of whistle blowing can also be viewed as betraying the trust given one by his/her employer, organization, etc.  

**Some Fallacious Arguments Advanced in the Right to Be Forgotten Controversy**

A wide range of arguments have been put forth on both sides of the debate about the _Right to Be Forgotten_ (RTBF), also called the Right to Erasure. Unfortunately, a number of logical fallacies also appear in many of the arguments advanced so far in the RTBF debate. We briefly examine some fallacious arguments on each side of this controversy. The following argument, which opposes RTBF legislation, is a variation of the Slippery Slope Fallacy, mentioned above.

_Requiring journalists and publishers to comply with user requests to remove information currently available online would threaten the free flow of information and would be a first step toward Internet censorship; so RTBF should not be enacted into law._

This kind of argument has been used both by journalists and representatives of the publishing industry. It employs the kind of fallacious reasoning involving a “slippery slope” because it suggests that if we allow some online information to be selectively removed, we open the door to arbitrarily censoring all kinds of online information. However, in the off–line world, journalists and publishers have often been legally required either to remove or retract some kinds of information that has appeared in print. Yet, this practice has not led to censorship in print media.

Another argument opposing RTBF has appealed to the following kind of rationale:

_RTFB would make the Internet “less robust” and would “degrade” the Internet’s overall quality; so RTBF should not be enacted into law._

Why is the reasoning in this argument fallacious? For one thing, we could ask why a law aimed at removing “irrelevant” (and inaccurate) information from the Internet would necessarily “degrade,” or in any way lessen the quality of, information available online. On the contrary, one could just as reasonably argue that an RTBF law might actually enhance the quality of that available information, i.e., in so far that

_15 Ibid._

_16 Elsewhere (Tavani, in press), I have referred to this kind of rationale as the “Path to Online Censorship Argument.”_

_17 Ibid. In that work, I refer to this kind of reasoning as the “Internet Degradation Argument.”_
such a law would help to reduce the amount of inaccurate and irrelevant information that now undermines the overall quality of the Internet.

Consider another kind of fallacious argument opposing RTBF legislation, which has been put forth by representatives of major search engine companies such as Google:

_Requiring search engine companies to respond to all user requests to remove, or to de–index, online personal information pertaining to them would be unduly burdensome and impractical, if not impossible; so RTBF should not be enacted into law._

Is this argument plausible? Should RTBF legislation be rejected merely because such a law would be difficult to enforce? Opposing any kind of legislation simply on the grounds that it is difficult to enforce is not a particularly strong rationale. As Bottis (2014) points out, even though some Internet–pornography and digital–copyright laws have been very difficult to enforce, we typically don’t oppose or to de–legislate laws that could reduce those kinds of online crimes.

So, all three of the above arguments fail to establish their conclusions. Even if these and all of the other arguments opposing RTBF fail, however, it doesn’t necessarily follow that RTBF should be enacted into law. If we were to draw such an inference, we would unwittingly embrace another logical fallacy: the Argument from Ignorance. That fallacy mistakenly concludes that _if we cannot prove X, then not–X must be true, and vice versa_. So we would need to come up with one or more plausible arguments for why RTBF should be enacted into law to defend that position. Unfortunately, however, many arguments put forth for that view also include some fallacious reasoning.

Consider one kind of argument that has been used to support RTBF:

_People are at risk of being psychologically harmed by irrelevant and inaccurate personal information about them that is available online; so RTBF should be enacted into law._

Is this argument convincing? On the one hand, some people may indeed be at “risk” of being harmed psychologically — e.g., being humiliated or defamed — because of the various kinds of online information about them that is potentially available and so easily accessible. Consider, for instance, the case of “revenge porn” victims, who have experienced psychological harm because of the controversial kinds of photos of them that have been posted online, without their consent, by ex–spouses, ex–romantic partners, and others. Most people would likely agree that this kind of online behavior should not be encouraged or even tolerated. But should _every_ online post that is deemed by someone to be either derogatory or humiliating also be subject to removal or deletion? Based on the reasoning used in the above argument, RTBF could easily be interpreted to support such a view and would thus likely require that _all_ user requests for either removing or de-indexing certain information be given serious consideration. So,
again, we see that at least one argument put forth in support of, as in the case of those opposing, RTBF is fallacious.\footnote{Ibid. In that work, I also describe two additional kinds of fallacious arguments that have been used to support RTBF legislation, which I refer to as the “Entailment Argument” and the “Privacy/Identity/Autonomy Argument.”}

The Role of the Counterexample Strategy in Exposing Logical Fallacies

How do we know when an argument is fallacious? What do all logical fallacies have in common, regardless of the name given to specific “fallacy types”? All fallacious arguments contain “weak inferences” — they lack a strong logical connection between the evidence given in their premise(s) and the conclusion drawn from the premise(s). A very useful technique for locating fallacies (or fallacious reasoning) in arguments is the counterexample strategy. A counterexample is:

a (logically) possible case where the premise(s) in an argument are assumed to be true while, at the same time, the conclusion could be coherently imagined to be false, i.e., without committing a logical contradiction (see, for example, Nolt 2002).

If we can produce (at least) one counterexample to an argument, we can show that it is invalid. And if we can produce multiple counterexamples to an argument, we can show that the argument is not only invalid but also fallacious. In testing for fallacious reasoning, we can also ask how likely the conclusion would follow from the premises. More specifically, an argument is fallacious when:

\textit{the argument’s conclusion would not likely follow from its premises, i.e., would not likely be true, even when all of the premises are assumed true.} (e.g., Nolt 2002).\footnote{While I have closely followed Nolt in many of the definitions I use throughout this paper, it is important to note that some might find the definitions put forth in other CR texts useful for their purposes. Those interested in some alternative sources may wish to examine the following four CR textbooks: Boyd (2003); Cederblom and Paulsen (2012); Munson and Black (2012); and Thomson (2009). For the sake of consistency, however, I use terminology and definitions that are similar to Nolt’s in advancing and defending some key claims made in this paper.}

Consider the following argument, which is presented in “standard form” (i.e., where the argument’s premises precede its conclusion):

Many ICT–ethics authors have written on the topic of privacy.
Jim Moor has written on the topic of privacy.
Jim Moor is an ICT–ethics author.

This argument is clearly invalid; we can easily produce a counterexample. Note that the argument’s conclusion does not follow from its premises, even when they are assumed true (or, even in this case, where all of the argument’s premises happen to be empirically true). The argument is also fallacious, because we can produce multiple counterexamples to it.

Variations of the following kind of argument, also presented in” standard” argument form, have been used by some representatives of the music industry:
The musical group Italica recently released an album, which can be downloaded legally for 10 EUR (€10) per copy. Last month, 4,000 copies were illegally downloaded. So, the music industry lost 40,000 EUR in revenue last month on Italica's latest album.\(^23\)

While this argument might initially seem persuasive to some, it is nonetheless logically fallacious. Based merely on the evidence explicitly provided in the argument’s two premises, we can produce multiple counterexamples to show why the premises could be true while the conclusion is false.

In our analysis of ICT–Ethics issues, we should aim not only to be able to identify fallacious arguments put forth by others, but also to avoid using fallacious reasoning in our own arguments. We can do this in a more deliberate way by incorporating a component on CR into the ICT–ethics methodological framework. So it is worth expanding on the conventional model currently used by many in the field of ICT ethics.

**Adding a Fourth Step to the ICT–Ethics Methodological Framework**

Recall the classic/standard applied–ethics model, described in Section 1 of this paper, which included three steps:

1. Identify a controversial issue or controversial practice (involving ICT) as a problem that is ethical in nature;
2. Describe and analyze the problem by clarifying concepts and identifying the factual data associated with that problem;
3. Apply moral theories and principles in the deliberate process in order to reach a position about the particular issue.

In light of the various ICT–ethics-related fallacies examined in Section 5, I propose adding a fourth step to the standard model:

4. Evaluate the arguments that we encounter, as well as those we advance to defend our own views, to determine whether they include any fallacious reasoning (by using the counter–example technique or a comparable strategy).

But does this step, as articulated here, go far enough? Consider the following analogy. A common refrain, or mantra, in ethics is: “At minimum, do no harm”; ideally, however, most people believe we should also aim to “do good.” An analogous expression when applying CR to ethics might be: “At minimum, avoid composing fallacious arguments”; ideally, however, we should aim at constructing “strong arguments.” Expanding further on (the newly proposed) Step 4 of the ICT–Ethics framework can help us to achieve this objective as well.

**Constructing Strong Arguments to Support our Own Positions**

Which kinds of arguments qualify as strong arguments? Some might assume that valid (or deductive) arguments are always strong arguments. But that assumption is incorrect. “Valid” (or “deductive”) refers only to an argument’s reasoning form (or strength of reasoning); it does not take into account an argument’s overall strength.

\(^{23}\) This argument is a variation of an example of a fallacious argument included in Tavani (2016).
Valid (or Deductive) Arguments

An argument is either valid (or invalid) solely in virtue of its logical form. (Note that some logicians refer to what I call a “valid argument” as a deductive argument.) An example of an argument with a valid logical form is:

\[
\text{Every } A \text{ is a } B. \\
\text{Some } c \text{ is an } A. \\
\text{Some } c \text{ is a } B.
\]

No matter which values we substitute for A, B, and C — e.g., apples, bananas, carrots, etc. — this argument’s reasoning form will always be valid. So, it is not (logically) possible to produce a counterexample to this or any other valid argument.

While the form of an argument is either valid or invalid, the statements (or claims) comprising it are either true or false. Whereas an argument’s validity/invalidity is determined (solely) by its form of reasoning, as noted above, a statement’s truth/falsity is determined by the accuracy of its content, i.e., independently of the argument’s form (or strength of reasoning). An argument’s overall strength depends on the combination of its form and content; so we need to separate these two notions in our evaluation.

Consider the following argument:

\[
\text{Italy is an EU nation.} \\
\text{April 25th is a public holiday in all EU nations.} \\
\text{So, April 25th is a public holiday in Italy.}
\]

This argument is valid in virtue of its form; if we assume that all of the above premises are true, the conclusion must be also true (i.e., no counterexample to this argument is possible). Although its form is valid, we see on further analysis that one of the argument’s premises is, in fact, false in the empirical world. So even though the argument’s reasoning form is (and remains) valid, and even though its conclusion happens to be true, the argument’s overall strength is weak (i.e., it is not sound).

Sound vs. Unsound Arguments

Valid arguments will always be either sound or unsound. For a valid argument to be sound, all of its premises must be true in the actual world (and not simply assumed to be true, as in the case where we test to see if an argument’s form is valid or invalid, via the counterexample method). So, if at least one premise in a valid argument can be shown to be false in the empirical world, the argument is unsound.

Consider the following argument, which is a variation of one that has been used by some in the software industry:

\[
\text{Making an unauthorized copy of a proprietary software program is identical to stealing a tangible object.} \\
\text{Stealing a tangible object is morally wrong.} \\
\text{So, making an unauthorized copy of a proprietary software program is morally wrong.}^{24}
\]

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24 A variation of this example of a fallacious argument is included in Tavani (2016).
Many have found arguments along the lines of the reasoning presented in the above argument to be persuasive. But is this argument sound? Even though the argument is valid, i.e., in virtue of its logical form, it is also unsound because Premise 1 is (empirically) false. Note that making unauthorized copies of software programs and stealing physical objects are not literally identical acts.

Consider another argument — one recently put forth by recording artist/entertainer Taylor Swift to defend her decision not to permit her music to be streamed:

Music is art, and art is important and rare. Important, rare things are valuable. Valuable things should be paid for. It's my opinion that music should not be free…

If we convert Swift’s remarks in this passage into “standard argument form,” it would read:

Music is art.
Art is important and rare.
Important, rare things are valuable.
Valuable things should be paid for. [So] music should not be free [but instead should be paid for].

Is the reasoning in this argument sound? Is it even valid? If we assume that all four premises comprising Swift’s argument are true statements, the conclusion would seem to follow. Let us assume that this argument’s form is valid (even though one might object that the phrases “should be paid for” and “should not be free” are not semantically identical). Next, we ask whether it is necessarily true that all “valuable things” should indeed “be paid for.” This claim, which is not empirical but is instead normative in nature, would seem to be at best “indeterminate,” if not false. So Swift’s argument is unsound, even if the argument’s form is valid (and even if her conclusion could be true for reasons other than those provided in the premises of her original argument).

We have already noted that (“non–trivial”) sound arguments are rare. Fortunately, however, we do not need to construct a sound argument to put forth a strong argument (e.g., some inductive arguments are strong).

Inductive Arguments

We saw that we only need to produce one counterexample to show that an argument is invalid. But it turns out that not all invalid arguments necessarily fail; i.e., not all are fallacious. For example, some invalid arguments are inductive. Inductive arguments can be strong arguments (i.e., when the statements comprising them are all true). Nolt (2002) notes that the number (and frequency) of counterexamples that we are able to generate will help us to determine whether a particular invalid argument is also either inductive or fallacious.
An argument is inductive when:

*the conclusion would likely be true whenever the premises of the argument are assumed to be true* (see, for example, Nolt 2002).

Even though it is possible to produce a counterexample to an inductive argument, its conclusion would still likely be true in the majority of cases where the premises are assumed true; so an inductive argument can be a strong argument (despite the fact that its form is invalid). As Bergmann, Moor, and Nelson (2013) also note, inductive arguments have a high probability of their conclusion being true and thus are “useful” arguments.

Consider the following argument:

Football (*calcio*) is the most popular sport in Italy.
Approximately 60% of Italian citizens identify football as their favorite sport.
Massimo is an Italian citizen.
So, Massimo’s favorite sport is football.

This argument’s form is invalid because we can easily produce a counterexample to it. But it is also inductive because in six out of ten cases where the premises are true, the conclusion will likely be true. And if all of the premises in this (inductive) argument are true in the actual world, it is also a fairly strong argument.

Even though all inductive arguments are invalid, we have seen that some can nevertheless be strong arguments. An inductive argument whose statements are all (empirically) true is much stronger than an unsound argument (whose form is valid, but which also contains one or more empirically false statements). Ideally, we should aim at constructing strong inductive arguments, i.e., with (all) true statements (since it is difficult to construct sound arguments that are non–trivial). But at minimum, we should avoid composing fallacious arguments, as well as unsound (valid) arguments.

We can now expand on the (newly proposed) Step 4 in the ICT–ethics framework by adding to it an additional sub-step (4b). So Step 4 will now consist of two component elements:

4a. Evaluate the arguments we encounter, as well as those we advance to defend our own views, to determine whether they include any fallacious reasoning (by using the counterexample technique or a comparable strategy in our analysis).

4b. Construct strong arguments (to defend our positions) that not only avoid fallacious reasoning but also avoid unsound reasoning, by composing arguments that are either: (i) sound (which are rare or trivial), or (ii) inductive with (all) true statements.

**Concluding Remarks**

I believe that there are at least three advantages in incorporating CR techniques and tools (including the counterexample method) into our analysis of ICT–ethics issues. First, we can identify (many different kinds of) fallacious arguments in the works that we analyze, and can avoid introducing fallacies in our own

27 Building on Nolt's insights, Buechner (2011) has developed a (non–technical) method for measuring the amount of information/evidence in an arbitrary set of premises (relative to the conclusion of an argument). Unfortunately, however, we cannot examine Buechner’s method here, since that is beyond the scope of the present paper.
arguments. Second, we can construct strong arguments to support our views (i.e., the positions we defend). Third, we can teach our students how to recognize logical fallacies and how to compose strong arguments to support their positions.

It is also important to note, however, we face two key challenges in our objective of incorporating a CR component into the ICT–ethics methodological framework. First, we should note that in most cases, arguments do not appear in standard form (i.e., where the premises precede the conclusion); so we will often need to locate arguments and convert them to standard form before we can analyze and evaluate them. Second, when evaluating the overall strength of some arguments, it may be difficult to determine if one or more premises are actually true (or false) in the empirical world (e.g., some statements/claims could be indeterminate).

On balance, however, I believe that the advantages far outweigh the difficulties posed by the two main challenges. Consider, for example, that we can always determine the strength of an argument’s reasoning form — in other words, we can determine whether the argument is valid, inductive, or fallacious — via the counterexample technique (even if we can’t always determine the overall strength of some arguments); so, we can always identify fallacious arguments and can avoid constructing them in defending our own positions (even if we unable to determine the actual truth of the statements comprising the argument’s premises). Also consider that in many cases, we will also be able to determine the overall strength of the arguments we advance, including inductive arguments which have a good chance of being strong.

References


Tavani, H.T. (in press). “Should We Have a Right to Be Forgotten? An Analysis of Some Key Arguments Addressing this Question.” *Journal of Information Ethics*.


