The Ethical Cycle

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ABSTRACT. Arriving at a moral judgment is not a straightforward or linear process in which ethical theories are simply applied to cases. Instead it is a process in which the formulation of the moral problem, the formulation of possible "solutions", and the ethical judging of these solutions go hand in hand. This messy character of moral problems, however, does not rule out a systematic approach. In this article, we describe a systematic approach to problem solving that does justice to the complex nature of moral problems and ethical judgment: the ethical cycle. Our goal is to provide a structured and disciplined method of addressing moral problems, which helps to guide a sound analysis of these problems. We will illustrate the usefulness of this cycle with an example. Further, we will discuss two general issues in applied ethics in relation to the proposed ethical cycle: the role of ethical theories and the place of individual judgment versus collective deliberation.

KEY WORDS: ethics, engineering, moral problems, designing, deliberation

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Introduction

Making an ethical decision is a complex process that applied ethicists have organized in a series of 'steps' (see e.g. Harris et al., 2000; Mitcham and Duvall, 2000). These steps have proven useful both in teaching ethical concepts (see e.g. van der Burg and van de Poel, 2005), and in analyzing ethical issues in real-life situations. In this article, we will propose an ethical cycle for moral problem-solving. The ethical cycle has been primarily developed for teaching purposes. We think, however, that it might also be useful for ethical problem solving in situations in professional practices because it helps to deal with moral problems in a more structured and thorough way.

The proposal for a systematic approach to moral problem-solving consisting of a number of steps might suggest a commitment to the belief that moral problems are given beforehand and that solving them is just a matter of applying different ethical theories to select the best option. There is, however, not such a commitment. In fact, we believe that moral problem-solving is a much more messy and complex process. There are a number of reasons for this.

Like many other practical problems, moral problems are ill–structured problems. Moral problems cannot be thoroughly described beforehand; the problem will unfold itself during the process of solving (cf. Whitbeck, 1998). In cases of other ill-structured problems, such as design problems, thinking about possible solutions will further clarify the problem and possibly lead to a reformulation of the problem (Cross, 1989).

Like other ill-structured problems, moral problems usually do not have one best solution, but a range of more or less acceptable solutions (Whitbeck, 1998). This is due to the fact that for ill-structurted problems, no single criterion exists to order uniformly the possible solutions from best to worst (Simon, 1973).

Another characteristic which moral problems share with other ill-structured problems is that it is

usually not possible to make a definitive list of all possible alternative options for action (Simon, 1973). This means that solutions are in some sense always provisional.

Apart from these characteristics which moral problems share with other ill-structured problems, moral problems have their own peculiarities that make them even more messy and complex. One of them is that in identifying a moral problem one needs a conception of what morality is. Such a conception is partly theory-dependent as different ethical theories emphasize different part of reality as morally relevant. Nevertheless, despite such differences, there is much common ground in ethical theories on what are moral concerns or problems. We therefore believe that as a first approximation it will often be possible to define a problem based on common sense and one's own theoretical commitments. This formulation may later be refined during the process of moral problem-solving.

A second peculiarity of moral problems is related to the first one. The different ethical theories are not only relevant in identifying and formulating moral problems but also in judging them. We believe that the diversity of theories also reveals a diversity of reasonable moral opinions among different people on moral issues. This does, however, not mean that any solution to a moral issue will do. Solutions are better if they are based on systematic reasoning about the moral problem, on taking into account different viewpoints and theories, and on the exercise of a critical and reflective attitude.

Moral problem-solving is thus a messy and complex process. This does, however, not preclude the possibility of a systematic approach to the identification, analysis and solution of moral problems. In fact, we believe that the messiness and complexity of moral problem solving calls for a systematic approach, at least in teaching contexts, because otherwise moral judgment is often reduced to mere gut-feeling without any attempt to understand the moral problem or justify one's actions. For similar reasons, we do not believe that a systematic approach should just mimic how people now actually make moral decisions. It should take this into account of course. But, the approach we propose, the ethical cycle, aims at an improvement of ethical decision-making or at least it tries to avoid certain shortcuts. Such shortcuts, for example, consist in neglecting certain relevant fea-

tures of the problem or in just stating an opinion without any justification. Such shortcuts are a serious problem especially in teaching contexts (van de Poel et al., 2001; van der Burg and van de Poel, 2005).

This article is structured as follows. We start with clarifying our position with respect to applied ethics. In particular, we will discuss which role ethical theories can play in a moral problem-solving process, one of the most contentious issues in applied ethics. We then turn to the description of the ethical cycle. In section next we will illustrate the use of the ethical cycle with an example. In the final section, we will discuss how the ethical cycle, which is mainly aimed at individual moral judgment, can be integrated into collective deliberations on ethical issues.

Applied ethics and the role of ethical theories

Some philosophers believe that applied ethics is essentially the application of general moral principles or theories to particular situations (cf. Gert, 1984; Hare, 1988; Smart, 1973). This view is, however, problematic for a number of reasons (cf. Beauchamp, 1984; McIntyre, 1984). One is that a generally accepted ethical theory or moral framework that could be applied does not exist. Different theories might yield different judgments about a particular case. But even if there would be one generally accepted theory, framework or set of principles, it is doubtful whether they can be straightforwardly applied to a particular case. Take a principle such as fairness. In many concrete situations, it is not clear what fairness exactly amounts to. What does, for example, a fair distribution of technological risks mean? Should everybody be equally safe?; should everybody have the same minimum level of safety?; or does someone's right to safety depend on the amount of taxes he or she pays? All these can be considered as an application of the principle of fairness to the distribution of risks, but clearly these answers reveal different moral outlooks. Without doubt, part of this confusion could be solved on the theoretical level, i.e., by further elaborating the notion ''fairness'' by developing an ethical theory about it. It seems doubtful, however, whether this would solve all application issues. This brings us to a third point. Theory development in ethics in general does not take place independent from judging particular cases.

Rather, theory development is an attempt to systematize judgments over particular cases and to provide a rational justification for these. So if we encounter a new case, we can of course try to apply the ethical theory we have developed until then to that case, but we should also be open to the possibility that the new case might sometimes reveal a flaw in the theory we have developed until yet.

If ethical theories do not provide moral principles that can be straightforwardly applied to get the right answer, what then is their role, if any, in applied ethics? Their role is merely heuristic, both in formulating the moral problem in the first place and, secondly, in coming to a judgment on the moral issue.

With respect to problem formulation, ethical theories may be instrumental in discovering the ethical aspects of a problem or situation. Different ethical theories stress different aspects of a situation; consequentialism for example draws attention to how consequences of actions may be morally relevant; deontological theories might draw attention to the moral importance of promises, rights and obligations. And virtue ethics may remind us that certain character traits can be morally relevant.

With respect to moral judgment, ethical theories have an even more explicit role. Many ethical theories provide a framework for judging moral problems and in justifying, or criticizing, certain responses to such problems. While we advocate the "application" of various ethical theories to a moral problem, we do not believe that one theory will provide the one and only right answer. Rather ethical theories have merely a heuristic role, by suggesting certain arguments or reasons that can play a role in our final judgments and in reflection. Apart from ethical theories, also intuitions, triggered for example by emotions, on moral issues can play a heuristic role in judging moral cases.

One might wonder whether ethical theories are to be treated on par with intuitive judgments or emotions as providers for possible reasons or arguments for our final judgment. We would suggest that ethical theories have a different and in a sense broader role than ethical intuitions or emotions. The role we see for ethical theories is inspired by Normal Daniels' discussion of *wide reflective equilibrium* (Daniels, 1979, 1996).

According to Daniels, the method of wide reflective equilibrium is an attempt to make cohere three types of beliefs: (1) considered moral judgments, (2) moral principles and (3) background theories. The background theories include ethical theories, but also relevant other theories like psychological and sociological theories about the person. The third set is important because:

> We do not simply settle for the best fit of principles to judgments (....), which would give a narrow equilibrium. Instead, we advance philosophical arguments intended to bring out the relative strengths and weaknesses of the alternative sets of principles (or competing moral conceptions). These arguments can be construed as inferences from some set of relevant background theories. (Daniels, 1979, p. 258)

The inclusion of theories is important because they block the possibility of simply choosing those principles that fit our (considered) judgment. In that case, reflective equilibrium would add little to making an intuitive judgment – it would still add something because looking for principles that fit our judgment introduces a critical moment that might invite us to revise our initial judgment. Achieving wide equilibrium, however, forces us to bring our judgments not only into coherence with principles but also with background theories. According to Daniels, these theories should have a scope that reaches further than the considered judgments we are interested in. In particular, they are connected to a set of considered moral judgments that is disjoint from the set of judgments we are making about the case at hand.[1]

The important thing is that by trying to achieve a wide reflective equilibrium the decision-maker is forced to engage in a broader and more systematic theoretical consideration of the case, including a range of arguments and reasons. It is precisely because this reflection involves *theories*, that such reflection becomes broader and more encompassing. This suggests that theories have an important role to play in reflection and making moral judgments. However, this role is far more complex than simply applying the theory to the case at hand.

The ethical cycle

We will now present the ethical cycle, a model for moral problem solving. This model is not intended
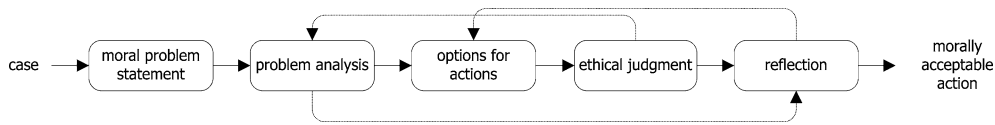
Figure 1. Ethical cycle.

as a model of how people actually make moral decisions. Interestingly as that may be, our purpose is different. We want to develop a model that is a helpful tool in structuring and improving moral decisions, especially in the context of teaching practical ethics. With improving moral decision-making, we aim at a situation in which the decision-maker makes at least a systematic and thorough analysis of the moral problem and is able to justify his final decisions in moral terms. Ultimately, moral problem solving is directed at finding the morally best, or at least a morally acceptable, action in a given situation in which a moral problem arises. It is, however, hard to guarantee that the ethical cycle indeed delivers such a solution, albeit because people may reasonably disagree about what is the morally best, or a morally acceptable, solution. We will discuss this further in the final section.

The ethical cycle consists of a number of phases (Figure 1). It is important to stress that by distinguishing these phases we do not want to suggest that moral problem–solving is a linear process. Rather, it is an iterative process, as the feedback loops in Figure 1 already suggest. The cycle, for example, starts with formulating a moral problem. In many actual cases, the moral problem only becomes clear after further delving into the facts of the situation, by distinguishing stakeholders, looking at ethical theories, et cetera. In other words, formulating a good problem statement is an iterative process that continues during the other phases. Nevertheless, it is important to start with formulating a moral problem to get the process going.

Moral problem statement

The start of ethical cycle is the formulation of a moral problem. Characteristic of a moral problem is that there are two or more positive moral values or norms that cannot be fully realized at the same time. In order to apply the ethical cycle successfully, it is important that the moral problem is stated as precisely and clearly as possible. This can best be

done by formulating a moral question. A good moral question meets three conditions: (1) it must clearly state what the problem is, (2) it must state for whom it is a problem and, finally, (3) the moral nature of the problem need to be articulated. Sometimes, the second condition is not relevant; for example when we ask a general question about the moral acceptability of a particular course of action or a technology. An example of such a question is: Is cloning morally acceptable?, or, more precisely, under what conditions – if any – is cloning morally acceptable?

Often it will not be possible to formulate the moral problem precisely when the ethical cycle is started. One can then start with a somewhat vaguer notion of the moral problem and try to make the formulation of the moral problem clearer and more precise after some of the other phases have been carried out.

Problem analysis

During the problem analysis phase, the relevant elements of the moral problem are described. Three important elements can be distinguished: the stakeholders and their interests, the moral values that are relevant in the situation and the relevant facts. These elements are to be described during this phase because they give a good impression of the current situation with respect to the moral problem; moreover, they are indispensable for the carrying out of the later phases of the ethical cycle. In practice, the distinction between facts and values may not always be that easy to make in this phase. Nevertheless, we think that using analytical categories like facts and values to understand the case in this phase is often very useful because it leads to a more systematic analysis of the case.

Stakeholders are both the people who can influence the options for actions being chosen and the eventual consequences of this action as well as those people suffering or profiting from those consequences. Stakeholders can be individuals, like colleagues, groups, like the design team, organizations like a company or society, as far as it concerns the

common interest. For each of the stakeholders, it is to be indicated what interests it has.

About the facts, disagreement between the stakeholders may exist. Usually, not all facts are undisputed in a moral problem situation. Facts can also be uncertain or unknown. Disputed, uncertain or unknown facts are certainly not irrelevant for the analysis of the moral problem. In later phases, they can make a distinct difference. One way to deal with such facts is to make explicit presuppositions about them. Naturally, different people will often make different suppositions. Since the final option chosen at the end of the ethical cycle can depend on the made suppositions with respect to facts, it is advisable to formulate the moral standpoint sometimes in a hypothetical form: 'If x is the case, than option for action A is morally acceptable; but if it turns out that y is the case then option B is morally acceptable'.

Options for actions

After the analytic phase in which the moral problem is formulated, a synthetic phase follows in which possible solutions for action are generated in the light of the formulated problem analysis. Often a moral problem is formulated in terms whether it is acceptable to engage in a certain action or nor. In this black–and–white–strategy only two options for actions are considered, doing the action or not, other actions are simply not considered. While this strategy may be helpful in better understanding and formulating the moral problem, in many more complex situations it is too simplistic.

During this stage creativity is of major importance. It can invite us to find options for actions that bridge seemingly opposed moral values playing a role in the moral problem. A good example is the design of the flood barrier in the Oosterschelde, the Netherlands, where the moral values of safety and care for nature were at stake.

For employees working in a business context, the strategy of cooperation can be helpful in thinking out possible options for action. This strategy is directed at finding alternatives that can help to solve the moral problem by consulting other stakeholders. Sometimes, such cooperation and consultation can lead to win–win situations, i.e., solutions which make nobody worse off. Often such win–win situations are not self-evident and one should creatively look for new options for action.

Whistle-blowing, i.e., speaking out to the media or the public on an undesirable situation against the

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CASE: The design of the storm surge barrier in the Oosterschelde

After the flood disaster in 1953, in which a large number of dikes in the province of Zeeland, the Netherlands, gave way and more than 1800 people were killed, the Delta Plan was drawn up. Part of this Delta Plan was to close off the Oosterschelde. From the end of the sixties, however, there was growing societal opposition to closing off the Oosterschelde. Environmentalists, who feared the loss of an ecologically valuable area because of the desalination of the Oosterschelde and the lack of tides, started to resist its closure. Fishermen also were opposed to its closure because of the negative consequences for the fishing industry. As an alternative they suggested raising the dikes around the Oosterschelde to sufficiently guarantee the safety of the area.

In June 1972, a group of students launched an alternative plan for the closure of the Oosterschelde. It was a plan that had been worked out as a study assignment by students of the School of Civil Engineering and the School of Architecture of the Technical University of Delft and the School of Landscape Architecture of the Agricultural University of Wageningen. The aspects the students focused on were safety and the environment. On the basis of these considerations, they proposed a storm surge barrier, i.e. a barrier that would normally be open and allow water to pass through, but that could be closed if a flood threatened the hinterland. The flood barrier was a creative compromise to balance the two moral values, safety and the environment, that were at stake.

At first the Rijkswaterstaat, the governmental body responsible for waterways in the Netherlands, discarded the idea because it was not considered feasible technically. However, pressure from political developments – parliament too started to resist the notion of closing off the Oosterschelde – made the Rijkswaterstaat take the option more seriously and after some time it was decided to build a storm surge barrier. Though the storm surge barrier turned out to be much more expensive than the original solution – and also exceeded the original budget – many still consider the design to be a creative and acceptable compromise between safety and the environment.

desire of the employer, is a last resort strategy because it usually brings large costs both to the individual employee and to the organization. Nevertheless, some situations may require whistle-blowing; for example, if human safety or health is at stake and there are no other options of actions available.

Ethical judgment

In this phase, the moral acceptability of the various options for action is judged. This can be done on the basis of both formal and informal moral frameworks. Formal moral frameworks are based on the main theories of ethical thought: consequentialism, including utilitarianism, deontology and virtue ethics. These ethical theories have been developed for a variety of reasons, including such reasons as providing a (rational) foundation for normative ethics and criticizing other ethical theories or common-sense morality. Given this variety of reasons for developing ethical theories, it is not amazing that most theories do not provide easy or ready-to-use tools or tests for ethical judgment. Nevertheless, it is not so difficult to develop a numbers of tests on the basis of these ethical theories (see e.g. Harris et al., 2000; Royakkers et al., 2004; van der Burg and van de Poel, 2005). We will not list all these possible tests here, but show how they can be used by providing an example in the next section.

Ethical judgment is not only to be based on formal ethical theories but also on more informal ethical frameworks. We distinguish two such frameworks here: intuitions and the dominant-value method. The intuitivist framework is rather straightforward: indicate which option of action in your view is intuitively most acceptable and formulate arguments for this statement. The dominant-value method is based on either an individually or a collectively preferred value in a specific case.[2] The idea behind the method is that in many actual cases, one value is predominant. In a specific case, it might, for example, be possible to argue that although making a profit is important, the value that is really at stake is public safety. In determining which value is dominant, certain guidelines can be followed, such as, 'dominant values are usually intrinsic values and not merely instrumental values', and 'if more people find a value important, it is more likely that it is a dominant value'. Once the dominant

value has been selected, the option can be chosen that best meets the dominant value.

The fourth phase results in moral judgments about the various options for action. These judgments need not be the same because different frameworks can result in different preferred options for action in a given situation.

Reflection

Since the different ethical frameworks, including the informal frameworks, do not necessarily lead to the same conclusion, a further reflection on the outcomes of the previous step is usually required. The goal of this reflection is to come to a well-argued choice among the various options for actions, using the outcomes of the earlier phases.

Reflection should primarily be based on the outcomes of the ethical judgment in the previous phase. Of course, the ethical frameworks are not the final word on what is morally allowable or required, but especially the formal framework are the result of moral scrutiny and theoretical development. Ethical theories have moreover been refined in response to criticism. The theoretical frameworks should therefore not too easily be disregarded. On the other hand, intuitive judgment and common-sense are also important; one reason to include them might be that they might often be more suitable for the taking into account of specific peculiarities of the situation that are important for coming to a moral judgment.

The approach to reflection that we propose is similar to the method of "reflective equilibrium" that we already described in some detail earlier. The basic idea is that in a process of reflection different ethical judgments on a case are weighed against each other and brought into equilibrium. As we see it, this process is not so much about achieving equilibrium as such, but about arguing for and against different frameworks and so achieving a conclusion that might not be covered by one of the frameworks in isolation.

Central to the reflection phase is thus argumentation. Arguments for or against ethical frameworks can be positioned at two levels. One level is the general criticism of the ethical frameworks. Consequentialism can, for example, be criticized for neglecting duties or moral rights, while deontological theories might be criticized for not taking into account the

consequences of actions. Such criticisms are well-known in moral philosophy and might be helpful for the reflection in this phase. The second level of criticism is the concrete situation in which a certain option for action has to be chosen. It might for example be the case that a certain general objection to an ethical theory is not so relevant in a particular case. For example, a general objection against the maxim ''the greatest happiness for the greatest number'' of classical utilitarianism is that it neglects distributional issues, but it might be that in the particular situation different options for actions hardly have different distributional effects, so that in that situation this objection is not relevant. In general, we suggest two types of questions for reflection on this second level:

- Does an ethical framework provide reasons that support my intuitive opinion? If not, do I have other reasons that support my intuitive opinion? If I have other reasons are they strong enough to override the reasons within the ethical framework? If not, do I have to revise my intuitive opinion and in what way?
- Does an ethical framework succeed in selecting those features of a situation that are morally relevant? Are there any other moral relevant features that are not covered? Why are these relevant and how could they be accounted for?

The result of the fifth phase is the choice for one of the options of action; a choice that can be argued in relation to the different ethical frameworks.

An example

We will now apply the ethical cycle to a concrete example. As an example, we take a case presented by Harris et al. (2000) in their book *Engineering Ethics. Concepts and Cases*. The detailed case description is given in an appendix. The main facts of the case are as follows. David, an engineer, has to choose between two highway safety improvements. Both consider the placement of traffic lights, but at two different locations, one in the city, and one in a rural area. Both locations are characterized by different number of vehicles approaching the intersection and differences in current fatalities, injuries and property damage only (PD) accidents and in expected reductions in fatalities

injuries and property damage only accidents. Roughly speaking, the rural location is currently the most dangerous per vehicle approaching the intersection, while the total expected reduction of fatalities, injuries and property damage only accidents is highest at the location in the city.

This description of this example is, we must admit, rather stylized. We have chosen, however, to leave out certain complexities and uncertainties as to be able to show more clearly and straightforwardly how the ethical cycle would proceed in a case like this. In particular, we show that the ethical cycle by including a reflection step moves beyond the simple opposition between a consequentialist and a deontological ethical approach for which this case description was originally devised.

Moral problem statement

In the original case, the moral problem statement is already given: ''Which of the two improvements do you think David should recommend?'' (Harris et al., 2000, p. 318). It is worth noting that this is not the only possible moral problem statement in this case. One might for example wonder whether making this decision is actually David's responsibility. The case concerns spending of public funds and it might be argued that such a decision is to be made by the relevant city council or state council. So one might formulate as problem statement: ''Is it David's (moral) responsibility to make this decision?'' We will, however, restrict ourselves here to the problem statement formulated by Harris et al. This problem statement meets two of the three earlier mentioned conditions for a good problem statement: it is clear what the problem is (which option to choose) and it is clear for whom it is a problem (David). It is not clear from the statement itself, however, why it is a *moral* problem. Maybe this is simply a practical decision about what to do or an economic decision about how to spend public funds most efficiently. We think, however, that there are good reasons to argue that this decision has a moral dimension because at least two different moral values are at stake. One is safety and the other distributive justice. Moreover, these values at least *prima facie* suggest different options: location A in the metropolitan area seems to imply a larger improvement in terms of

safety while location B in the rural area seems preferable from the viewpoint of distributive justice.

Many engineering students, in our experience, do not recognize this case as a moral problem. They simply think that location A is best because more human lives are saved and the reduction in injuries is larger. Considering the case from a deontological or right ethics framework might help them to realize that there is a potential moral problem here. Theoretical frameworks may thus help in recognizing the moral relevant characteristics of a situation and in formulating the moral problem. This is not to say that anybody following the ethical cycle will immediately recognize such morally relevant features. It might well be that someone only recognizes the issues in phase 4 of the cycle (see Figure 1). He or she might then go back to phase 1 and reformulate the moral problem and redo phases 2 and 3.

Problem analysis

Now, we have to state the relevant facts, stakeholders and interests and values. The main facts are already listed in the detailed case description in the appendix. Some facts are uncertain. It is, for example, not known whether the general reduction factors for municipal and rural intersections be applicable to the specific case. There are no indications to the contrary, but this does not guarantee that these factors do apply. Such uncertainties could make a difference for the final judgment on the case.

Apart from David, drivers and their passengers, tax payers and the relevant city or state council could be distinguished as relevant stakeholders. As a first approximation, one could say that the main interests of these stakeholders are safety (drivers and their passengers), minimal costs (tax payers) and highest safety for lowest cost (city or state council). On closer examination, these stakeholders are not really uniform. Some drivers will use only the city intersection, some – but probably less – only the rural, some will use both, some will use neither; which might result in different preferences about where to place traffic lights. Moreover, some drivers will prefer speeding above safety and will maybe prefer that no traffic lights are placed at all! Most drivers will, as tax payers, prefer minimal costs, which may conflict in this case with increasing safety. To

determine which option of action is the 'best', it is necessary to make compromises concerning the various values: you trade off a certain level of safety for a certain level of costs.

Although it is difficult to draw up a definitive list of stakeholders and interests, the above analysis is helpful in distinguishing relevant values. In the formulation of the problem, we already distinguished two relevant values: safety and distributive justice. We might now add a third one, which is related to the interest of keeping costs low. Low cost is, however, hardly a moral value as such. The moral value at stake here seems to be something as "public utility", which in this particular case implies that higher costs, ultimately resulting in higher taxes, may pay themselves back in higher public utility through higher safety.

Options for actions

In this case, the options for action are already given in the problem formulation. One might, however, wonder whether these two options are really the only ones. Whitbeck, for example, comments on this case:

> "Notice ... that the problem is presented as a forced choice between spending all the remaining resources on one intersection and spending it all on the other. In fact, there would likely be many other choices. For example, putting up traffic signs at both intersections may be an alternative to installing traffic lights at either one." (Whitbeck, 1998, p. 65)

So, it might be useful to think of other options in the light of the relevant values. In subsection 'Options for actions', we suggested a number of strategies that could be helpful in devising options. The black-and-white-strategy has been chosen in the original formulation of the problem (see appendix). This has probably been done for didactic considerations, i.e., illustrating the difference between a consequentialistic – in particular a utilitarian ethical – framework and a more deontological or right-ethics based framework. While this may be illuminating, it might also give the wrong impression that the actual problem is best solved by a black-and-white strategy, which is usually not the case. Another strategy, for example, could be the cooperation strategy, which is directed at

finding alternatives that can help solve the moral problem by consulting other stakeholders. In this case, it might be useful for example to consult drivers and people who live in the neighborhood of the intersections because they may have more specific knowledge about why what accidents occur at the intersections, or may have creative solutions. Whistle-blowing is not really relevant here because there is not a hidden abuse that needs to be uncovered.

Ethical judgment

At last two formal ethical frameworks can be applied to the case. One is the utilitarian framework that selects the option that brings the greatest good for the greatest number. Using the data that are given in the case description (see appendix), the expected social utility can be calculated using the different ''pricing schemes'' suggested in the case description. For the sake of simplicity, we leave out the effect of uncertainty in making these calculations, but it is important to recognize that such uncertainties might affect our final judgment.

As Table I shows, the available data suggest that location A in the metropolitan area is to be chosen. The data moreover suggest that this choice has an overall positive social utility, i.e., the costs are worth the increase in safety.

The other formal ethical framework that can be applied is based on the notion of fairness, or more specifically distributive justice. According to some authors, such fairness considerations are best understood as part of a deontological theoretical framework (e.g. Rawls, 1999 [1971]). They might, however, also

TABLE I

Net benefit of placing traffic lights at the two sites using different 'pricing schemes'

	Site A	Site B
NSC	$15,400	−$21,720
NHTSTA	$223,600	$79,440
Neighboring state	30 PD	12.1 PD

PD refers to property damage only. The numbers in the table indicate the expected reduction expressed in the unity ''property damage only'' according to the pricing scheme of the neighboring state mentioned in the case description.

TABLE II

Current risk of fatality and of injury for individuals approaching the intersection (under the assumption that there is one person in each vehicle)

	Site A	Site B
Fatalities	2.3 E–07	4.6 E–07
Injuries	6.8 E–07	9.1 E–07

be construed in terms of right ethics. One could argue that everybody has a same right to protection, so that the same maximum risk factor applies to everyone. As Table II shows, intersection B in the rural area is now more risky. Fairness considerations thus seem to suggest a choice for location B.

Other frameworks could be applied to the case as well. One could for example look at the case from a virtue ethics points of view. One might try to formulate a list of virtues that are relevant for engineers (cf. Pritchard, 1998). One may then ask how a virtuous engineer, employing the relevant virtues, would act in this situation. This might reveal new relevant moral considerations, or might even lead to a reformulation of the moral problem (phase 1 of the ethical cycle). One might, for example, begin to wonder whether it is desirable that David makes this choice himself or whether he should merely inform the public authorities who then make the decision.

Reflection

Since the applied ethical frameworks provide different outcomes, further reflection is required. First of all, in this case, one could reflect internally on the frameworks. For the moment, we will leave aside the virtual ethical framework, and focus on the utilitarian and fairness framework. With respect to the utilitarian framework, one could for example question whether the provided data on the monetary value of a human life, injuries and property damage only accidents are adequate. Nevertheless, the various monetary schemes and the weighing scheme of the neighboring state all suggest the choice of site A over site B. In fact, it is not possible to devise a monetary scheme in which site B would score better unless one's weights human lives negatively and/or

injuries and property damage positively. So the outcome that the utilitarian test selects site A is rather robust.

This is less so for the fairness test. The rural intersection is more dangerous in terms of the probability of a fatality or injury per vehicle approaching the intersection. However, we do not know the average number of people in a car and whether this number is the same for the rural and urban intersection. Moreover, it might be that the same people use the urban intersection more frequently or the other way around. The data, therefore, do not rule out that the individual risk of a car driver or passenger in expected fatalities *per year* is actually higher on site A than on site B, contrary to what Table II suggests.

There are also other reasons to doubt whether fairness considerations necessarily suggest the choice for section B. If fairness is understood in terms of a right to protection, this is perhaps best understood in terms of an equal level of minimal safety for everyone. It might well be that that level is already met at both intersections. Alternatively, one could understand fairness or distributive justice in terms of equal absolute safety. This would mean that everybody has a right to the same absolute level of risk. This would have rather absurd consequences, however. It would, for example, imply that if someone would be very safe off, for example due to chance, everybody would have the right to that level of safety, even if that would be very hard, if not impossible, to realize. It would even imply that it would be desirable to make the safest person less safe off, even if that would increase the safety of nobody else, because in this way a more equal distribution of risks is achieved.

The last remarks already make clear that applying only distributional considerations without considerations of overall safety or public utility does not make much sense. Conversely, one might argue that public utility or overall safety considerations alone are also not enough, which would mean that the utilitarian framework alone is too narrow to judge this case. What seems required then is a certain balancing of the various moral frameworks or considerations, including possibly also one's intuitive opinion and common-sense considerations; the latter could be made more explicit by using the relevant moral values that were distinguished earlier (subsection 'Problem analysis'). As explained before, the approach that we advocate here is that of wide reflective equilibrium.

A wide reflective equilibrium becomes broader and more encompassing when it explicitly takes into account ethical theories. Suppose that someone has the considered judgment that location A is best (belief a). This judgment can for example be triggered by his emotional feeling about the situation. He or she might defend this choice by referring to the principle ''the greatest happiness for the greatest number'' (belief b). This principle in turn might be justified on basis of the ethical theory of utilitarianism (belief c). Utilitarianism is not only a theory about where to place traffic light but a much broader theory that is related to a whole range of moral judgments, including the judgment that – for the sake of comparison – we can express human lives in a common value, like money (belief d). Now the same person judging that location A is best (belief a) might reject the moral judgment that we can express the value of human lives one way or the other (belief d). Now, the set of beliefs a, b, c and not d is incoherent.

There are of course several ways our decision-maker can solve the incoherence between a, b, c and not d. We name some:

- The person could give up the belief not d. After all, he might come to the conclusion that human life is not priceless, even if he intuitively thought so. So he might choose to adopt the belief d.
- The person could also look for another ethical theory (c) or another ethical theory with moral principles (b and c), which would still justify a, but would not imply other moral judgments like d that he considers dubious.
- The person might also try to look for a theory that better fits his judgments about valuing human life. He might, for example, have the considered moral judgment that since we cannot put a price on human lives, we should treat humans equally and respect their freedom. On the basis of such a belief he might embrace – at least for the moment – a deontological ethical theory and some principle of fairness. On that basis, he might revise his initial belief a about the case, and now choose location B.

This list does not exhaust the possibilities. One could also try to combine utility and fairness considerations in several ways. One could for example argue that fairness considerations imply that all drivers and passengers have a right to a minimal level of safety. One might then argue that this level is actually met at both intersections, so that one can choose without scruples the option with the highest public utility, i.e., option A.

The important point about this example, however, is not how the decision-maker solves the incoherence between his different beliefs. The important thing is that by trying to achieve a wide reflective equilibrium the decision-maker is forced to engage in a broader and more systematic theoretical consideration of the case, including a range of arguments and reasons.

Moral deliberation

The emphasis in the ethical cycle is on individual judgment. However, in many, if not most, situations in real life, other people will be involved in and affected by moral choices made by other individuals. One might doubt whether in such situations, individually achieving a conclusion how to act is very useful.

From a moral and philosophical point of view, one might wonder why others, especially people affected by one's actions, should accept one's conclusion on how to act. Of course, if somebody has used the ethical cycle, he or she is able to give reasons for his choice, but given the nature of moral reflection and the diversity of ethical frameworks that might give conflicting advices, it seems doubtful that any person using the ethical cycle would always come to the same conclusion as any other person. The natural inclination of many ethicists would be to look for a better, overarching moral framework. Even if one would believe that such an endeavor is worthwhile, it certainly does not solve the problem for the individual that is to act here and now. We therefore propose a more practical solution, i.e., engaging in a moral deliberation with other people involved and possibly affected.

Engaging in a deliberation is also useful for other reasons. People who are confronted with moral problems often have to act in a situation in which they depend on others to achieve certain options for action. A certain support from others is therefore required to be able to act morally in an effective way. This is certainly true for people who are working in corporations. Also for such reasons, deliberation and discussion with others are important additions to the ethical cycle.

The final step in the ethical cycle is reflection, leading to a well-argued choice for an option of action. This choice, however, need not be a final choice; it can also be seen as a provisional choice that can be revised in a discussion with others. The objective of such a deliberation is to make public your reasons for a certain choice and to expose them to criticism by others. Such discussion and criticism can result in a revision of one's choice, for example because the arguments turn out not to be adequate after all, or because certain arguments have been overlooked.

So conceived, deliberation is mainly a tool to improve one's moral judgment. However, as already suggested above, one could also argue that moral deliberation is essential for more fundamental reasons. Discourse ethicists like Habermas (1981) have argued that moral judgments are legitimized by them being the result of a moral deliberation that meets certain standards. This includes the standard that the discussion should not be decided on the basis of authority or power, but on the basis of arguments. Other requirements for rational discussion or deliberation are that people should be honest and sincere, and should argue their point of view. The idea is that if deliberation meets such requirements, we have good reason to believe that the outcomes are valid.

One need not embrace all claims of discourse ethicists to recognize the importance of deliberation in moral issues. Discourse ethicists tend to stress procedural criteria for arriving at a moral judgment, while in the ethical cycle we have discussed various substantive formal frameworks play an important part. We think that this need not be seen as incompatible, however. To engage in a moral deliberation, it is desirable that the participants have a well-argued moral opinion. Of course, they should be willing to revise their opinion, but in order to have a debate at all, people should have a well-argued opinion of their own. For this purpose, the ethical cycle including the use of substantive ethical frameworks to arrive at a moral opinion is very useful.

Appendix

The case below is presented in (Harris et al., 2000, pp. 317–318).

Case Highway safety

David Weber, age 23, is a civil engineer in charge of safety improvements for District 7 (an eight-county area within a Midwestern state). Near the end of the fiscal year, the district engineer informs David that delivery of a new snow plow has been delayed, and as a consequence the district has $50,000 in uncommitted funds. He asks David to suggest a safety project (or projects) that can be put under contract within the current fiscal year.

After a careful consideration of potential projects, David narrows his choice to two possible safety improvements. Site A is the intersection of Main and Oak Streets in the major city within the district. Site B is the intersection of Grape and Fir Roads in a rural area.

Pertinent data for the two intersections are as follows:

	Site A	Site B
Main road traffic (vehicles/day)	20,000	5,000
Minor road traffic (vehicles/day)	4,000	1,000
Fatalities per year (3 year average)	2	1
Injuries per year (3 year average)	6	2
PD* (3 year average)	40	12
Proposed improvement	New signals	New signals
Improvement cost	$50,000	$50,000

*PD refers to property damage only accidents.

A highway engineering textbook includes a table of average reductions in accidents resulting from the installation of the types of signal improvements David proposes. The tables are based on studies of intersections in urban and rural areas throughout the United States, over the past 20 years.

	Urban	Rural
% Reduction in fatalities	50	50
% Reduction in injuries	50	60
% Reduction in PD	25	− 25*

*Property damage only accidents are expected to increase because of the increase in rear-end accidents due to the stopping of high-speed traffic in rural areas.

David recognizes that these reduction factors represent averages from intersections with a wide range of physical characteristics (number of approach lanes, angle of intersection, etc.); in all climates; with various mixes of trucks and passenger vehicles; various approach speeds; various driving habits; and so on. However, he has no special data about Sites A and B that suggest relying on these tables is likely to misrepresent the circumstances at these sites.

Finally, here is some additional information that David knows about.

(1) In 1975, the National Safety Council and the National Highway Traffic Safety Administration both published dollar scales for comparing accident outcomes, as shown below:

	NSC	NHSTA
Fatality	$52,000	$235,000
Injury	$3,000	$11,200
PD	$440	$500

A neighboring state uses the following weighting scheme:
  Fatality 9.5 PD
  Injury 3.5 PD

(2) Individuals within the two groups pay roughly the same transportation taxes (licenses, gasoline taxes, etc.).

Which of the two site improvements do you think David should recommend? What is your rationale for this recommendation?

Notes

[1] In our case, we are primarily interested in judgments about the case at hand. Daniels seems to think of a somewhat broader range of primary moral judgments, but that does not make a real difference for the discussion.

[2] This method is based on (Brady, 1990, p. 95).

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