

ON OPERATIONS RESEARCH, ETHICS AND VALUE CONFLICTS

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Abstract: The paper addresses the question of how Operations Research ought to handle decision problems that involve value conflicts. First, we note that early OR was essentially value free with a mechanistic systems perspective, although some voiced concern that an analyst should not detach herself from the consequences of her work. Then we propose a value conflict scale, which we use to assess the conflict levels in a small sample of OR applications. We then turn to value identification. In practise, organizational value statements include many kinds of values, and we discuss how values can be sorted out according to ethical categories, which helps in identifying consequentialistic decision criteria. The next question is how values can be enacted in a decision process. We review findings in neuroscience, which indicate that intra-personal decision-making takes place in a field of tension between deliberation and affect, the implication being that low level conflicts leave decision-makers too coldly rational and therefore want infusion of emotion, while emotions in high-level conflicts need to be tempered. Emotions can be tempered through two strategies: focus on consequences rather than virtues and rules, and discourse ethics, which are the subjects of the two last parts. We conclude by proposing five ethical rules for OR analysis of value conflicts. An analyst should: Not regard herself as being detached from the decision that are made; be conscious that good decision-making requires temperate emotions that balance affect and deliberation; promote focus on consequences; promote the view that stakeholders have intrinsic value, they should not be treated instrumentally; encourage fair processes to identify stakeholder values.

Keywords: Ethics, value conflict, emotion, decision-making, discourse

1. Introduction

How can Operations Research (OR) handle ethical questions? Or more precisely: what role can OR play in the analysis of decision problems that involve conflicts of value, and can OR contribute to a more ethical approach to such problems? These are the general questions we want to address, and we will approach them through a somewhat winding pathway that touches on the nature of OR as well as essential issues in ethics. We hope this may contribute to the development of an ethical paradigm for OR approaches to value conflicts.

Two current, but separate developments prompt our discussion: i) value statements on the web[1], and ii) the emerging field of neuroeconomics[2]. For a start, let us note that *value* is a central concept in OR; one might indeed argue that it is *the* central concept since OR is dedicated to maximising value in one form or other – be it one-dimensional maximisation or multi-dimensional value trade-off. Specific ethical issues in OR are therefore to identify what is of value, and to help enact the values in decision-making processes. Our basic tenet is that value statements and neuroeconomics are important pieces in a picture of an OR paradigm that incorporates ethics.

Organizations today make increasing efforts at stating values on their web-based home pages.[1, 3] Stated values are most frequently *core values* that describe the code of conduct. Examples are *integrity*, *honesty* and *respect*. But value statements contain other types of value as well, for instance values that are *created* by the organization and thus *consequences* of operations, such as return on investment (ROI). Value statements may also include values they want to protect, such as environmental values. Value statements in practise tend to be quite entangled, however; a better structure would make them better suited for decision making purposes.

The other phenomenon is the emerging field of moral cognitive neuroscience[4] and its offshoot neuroeconomics[2] that provides us with new knowledge of intrapersonal decision processes, illuminating the roles of deliberation, affect and emotion. The classical Cartesian view of decision-making as an entirely reasoned process free of emotional interference, where the decision-maker deliberates over the consequences of alternative actions and chooses the one that looks best, is now under attack, and the evidence points in the direction that intra-personal decision-making takes place in a field of tension between the competing forces of affect and deliberation, where emotions play a central role and therefore must be included in any paradigm of ethical decision-making.

The paper is structured as follows:

1. *Original value paradigm of OR*: We review the position of values in an early version of the OR paradigm, and note that it was essentially value free with a mechanistic systems perspective, although some voiced concern that an analyst should not detach herself from the consequences of her work.
2. *A value conflict scale*: We propose a value conflict scale that benchmarks conflict level potential according to how intrinsic the values are and degree of stakeholder involvement.
3. *Values in contemporary OR*: We examine recent issues of the journal *Omega* and notes that the value conflicts that are analysed are generally, but not exclusively, low level.
4. *Value structuring*: Organizational values can be classified into three categories – core values, created values, and protected values – that parallel the classical ethical categories of virtue, consequence and duty.
5. *Enactment of values*: Findings in neuroscience indicate that intra-personal decision-making takes place in a field of tension between deliberation and affect. The implication is that low level conflicts leave decision-makers too coldly rational and therefore want infusion of emotion, while emotions in high-level conflicts need to be tempered.
6. *OR, consequentialism and ethics*: We propose that OR ought to promote consequentialism with infusion of emotion as an ethical approach to decision problems.
7. *Discourse ethics*: We describe discourse ethics as a recommendable approach under strong value conflicts.
8. *Conclusion*: Finally, we propose a list of rules as elements of an ethical paradigm for OR analysis of value conflicts.

2. The original value paradigm of OR

In his seminal work *Principles of Operations Research* [5], Harvey Wagner (1969) defines OR as “a scientific approach to problem-solving for executive management” that involves “Constructing mathematical, economic, and statistical descriptions or

models of decision and control problems to treat situations of complexity and uncertainty” and “Analyzing the relationships that determine the probable future consequences of decision choices, and devising appropriate measures of effectiveness in order to evaluate the relative merit of alternative actions.” Its distinguishing features are according to Wagner (p.5-6):

- A primary focus on Decision Making
- An appraisal resting on Economic Effectiveness Criteria. A comparison of the various feasible actions must be based on measurable values that unequivocally reflect the future well-being of the organization. In a commercial firm, these measured quantities typically include variable cost, revenues, cash flow, and rate of return on incremental investment. A recommended solution must have evaluated the trade-offs and have struck an optimum balance among these sometimes conflicting factors.
- Reliance on a Formal Mathematical Model. The procedures for manipulating the data should be so explicit that they can be described to another analyst, who in turn would derive the same results from the same data.

Thus, the principles of OR appear from the beginning to emphasize pure, objective deliberation; emotion and feeling are at best not mentioned, at worst externalized. The fact that Wagner explicitly states that OR needs to take different objectives into account, does not amount to a call for incorporation of subjective judgment, since he implicitly assumes that the objectives can be traded off in an objective way as elements in a corporate “well-being” function. If an organization has only one goal, i.e. to maximize profit, and it is possible to develop a causal model that leads from decision to goal attainment, then obviously the computation of an optimal decision can be left to machines, and there is neither place, nor need for emotions. The point is that the economic effectiveness criteria that Wagner mentions are not in true value conflict in a moral sense: they are all means to one goal and do not represent intrinsic values; if the mechanisms were known, the problem would be one of mathematics. Thus, Wagner’s concept of OR is apparently that of a science for development of mathematical methods that ultimately maximize one-dimensional value. His decision criteria (economic effectiveness criteria) are only instruments that are valuable insofar as they contribute to the main goal.

The philosopher C. West Churchman stands in opposition to this cold view of OR, however. This is from his plenary talk at the MCDM conference in 1969:

“The researcher would like to remain apart, to observe and analyze objectively. The moral question is whether he has any right to do so...When research comes to the point of making a conclusion, it does so in a cold phlegmatic manner, devoid of any of the joys, angers, hopes and fears that may have occurred during the research process. The phlegmatic might be called the mood apperception of the research reporting style. But morality always exists outside the phlegmatic. It is choleric joyful, sad, indignant, furious. Morality’s mood apperception is therefore quite different from research’s. ..Research needs to become more general in its moods if it intends to study morality. Instead of asking the phlegmatic question, how many people agree with such and such a moral prescription, the researcher should ask himself about a certain act from a moral point of view. Does it anger him to realize that a group of people are being exploited by someone? I am appealing to your moral indignation...”[6]

Accordingly, OR has increasingly been addressing decision problems with truer value conflicts – such as moral conflicts and stakeholder conflicts, where in principle it is

impossible to reduce the maximization problem to a one-dimensional value function without subjective judgment of the values at stake. We will return to the current status of values in OR when we have looked at how value conflicts can be benchmarked.

3. *A value conflicts scale*

Value conflict potential is easier to discuss if we have a scale, and we propose to benchmark conflict potential according to two dimensions: The degree to which the decision criteria represent intrinsic rather than instrumental values, and the extent of stakeholder involvement. The assumption is that if the decision criteria are only technical means to further ends, they are probably less likely to create conflicts than if they represent ends that people easily attach value to. Further, it makes a difference whether the decision is made on behalf of people – such as in a board room, or whether they participate in the process, which we presume makes the conflict potential higher. Figure 1 illustrates the resulting levels, which are explained in the text.

Figure 1: Conflict level potential as a function of stakeholder involvement and the degree to which the decision criteria represent intrinsic rather than instrumental values.

- *Level 0*: At this lowest level, there is no true value conflict. There is only one stakeholder goal, and it is possible to derive an objective functional relationship between the goal and the decision criteria, which are technical instruments. Any apparent conflict between decision criteria can therefore be solved with mathematical means, and there is no occasion for emotions or feelings – nor indeed for a DM. This is Wagner’s original concept of OR.
- *Level 1*: We have only one stakeholder goal, and the decision criteria are instrumental in nature. The functional relationship from the criteria to the goal is not objectively known, however, making it necessary for a DM to decide on appropriate trade-offs among conflicting criteria based on tacit knowledge or intuition. Thus, in order to decide the DM has to lean this way or other, the leaning probably being prompted by emotions. But since the decision problem is technical and not moral in nature, we would not expect emotions to be strong. Although different *analysts* in principle would agree on the same consequence model, different *DMs* might still arrive at different decisions. Applications of the *balanced scorecard* approach fit in this category.[7]
- *Level 2*: We have several stakeholders that do not participate actively in the decision process and the decision criteria are of instrumental nature. Such decision problems are quite common in environmental management.[8] Suppose for instance that a DM must decide on a fuel tax system for cars that will benefit either diesel oil or gasoline. There are two decision criteria: emission of particulates and emission of CO₂, which are in conflict since diesel oil is the culprit with regard to particulates and gasoline with regard to CO₂. These decision criteria are only instrumental, however; the intrinsic values lie further down the impact pathway and have to do with health, aesthetics and global temperature. Emotions may run high in such cases, but not as high as they might if intrinsic values were used as decision criteria. One is more likely to be emotionally aroused by a sickly child than by a ton of CO₂.

- *Level 3*: We have several stakeholder goals and the decision criteria are of intrinsic value but the stakeholders do not participate actively in the decision process. For instance, the board of directors must decide on dividends for shareholders as well as salary rise for employees. Emotions will usually run high in such clear value conflicts, and decision may be termed morally good or bad. An OR example is reported in [9] where alternative HIV strategies in Norway were studied with a System Dynamics consequence model, followed up by a multi-criteria analysis with a panel consisting of the three top national DMs. The stakeholders were immigrants, prostitutes, male homosexuals, future AIDS victims, etc. Although their values were included in the decision criteria, none of them participated actively.
- *Level 4*: We have several stakeholder goals and the decision criteria represent intrinsic values, with stakeholders participating actively in the decision process. The lawsuit ‘Anderson et al v Pacific Gas & Electric’ is a memorable example of that kind of conflict. The case alleged contamination of drinking water with hexavalent chromium in a town in southern California. At stake was company profit versus local inhabitants’ health. It was settled in 1996 for \$333 million, the largest settlement ever paid in a direct action lawsuit in US history, and made memorable by the emotional film “Erin Brockovich”. Negotiation is a typical example of conflict resolution with intrinsic values and participating stakeholders, but negotiations are usually governed by rules that reduce the conflict level. We will return to that in part 8.

4. Values in contemporary OR

The field of MCDA [10] is a branch of OR and dedicated to decision problems with several conflicting decision criteria. Judging from the nature of contributions to its main outlet, the *Journal of Multi-Criteria Decision Analysis*, MCDA practitioners share to some degree the heart and mind of OR-people with their preference for mathematical modeling, but there is also a noticeable softer touch that hangs together with an explicit concern for values.[11] MCDA papers are published in traditional OR journals such as *Omega* as well. We have reviewed the most recent issues (1-5) of volume 35 (2007) of that journal, and found that eight papers out of a total of 41 addressed multi-criteria decision problems. The 33 “one-dimensional” papers do not discuss what value to optimize – it is taken as given, and the value conflict level may safely be assumed to be zero. But what of the MCDA papers? – What is the nature of the values that enter those analyses, and what can be said about the value conflict levels? The eight papers from our convenience sample are of course not representative in a statistical sense, but they may serve to convey the flair of what MCDA applications in OR journals are like. Let us therefore have a brief look at them.

The decision context in [12] is for a firm to select the best supplier, and the decision criteria are: technical level, number of defects, reliability, on-time delivery, supply capacity, repair turnaround-time, and warranty period. In [13] the decision context is selection of tool steel material, and the criteria are: nondeforming properties, safety in hardening, toughness, resistance to softening, wear resistance for materials, machinability and cost. In these two applications we have one goal, and the decision criteria are instrumental, which should correspond to value conflict level 1.

Paper [14] studies choice of country for global manufacturing, and uses a large number of criteria: costs, high school enrolment, attitude of unionization, supplier reliability, people speaking English, political stability, GDP growth rate, currency

issuer credit rating, inflation rate, corruption perceptions, unemployment level, membership FTA, infrastructure quality, and regional vehicle production. Here, we may discern several stakeholders, but the criteria appear to more instrumental than intrinsic, which points in direction of value conflict level 2.

Selection of business partnership is the topic of [15], and the criteria are: price of the product; quality of the product; financial stability and quality of customer service. The next [16] is another selection problem, this time of a global supplier, and the criteria are: cost, quality, service performance, supplier's profile and risk factor. Paper [17] studies aggregate production planning, and the criteria are: profit, number of late orders, and work force level changes, which are all clear intrinsic stakeholder values. Locating facilities strategically is the topic of [18], and the criteria are: price, quality, delivery, flexibility. In all these papers, there is an emphasis on stakeholders, but they do not participate in the process, and the value conflict potential is on level 3.

All the papers mentioned above employ rather sophisticated quantitative methods, and it is fair to say that there is seldom moral conflict among the criteria. But there are examples of stakeholder conflicts that may amount to moral conflicts, such as between customer service and financial stability in [15], and profit and work force level changes in [17]. In all of them, the DM has to provide some kind of opinion or information regarding the importance of the criteria, as they contribute to the well-being of the firm, or perhaps as loci of intrinsic value in the case of stakeholders. The underlying assumption is that the mechanisms of instrumental criteria are not precisely known – otherwise it would be no need for a DM – but the DM is supposed to have a cognitive grasp of them, which enables her to lean one way or other in choice situations. We shall in the section on neuroeconomics argue that emotions are key elements in the internal processes that prompt the DM to act, and if they are altogether absent, decisions will be literary senseless. In the studies cited above, it is perhaps reasonable to expect DM emotions to be feeble in cases that involve instrumental criteria, and stronger when intrinsic values are at stake.

Let us then turn to the last of the eight papers, which is rather different from the ones above. The title is “Voices and values: Linking values with participation in OR/MS in public policy making” and it deals with hospital planning [19]. They used a problem structuring method (PSM)[20], which is softer and more process oriented than more conventional OR methods. DMs, politicians as well as local people were engaged in a process to bring forth values and trade-offs. The following values were identified: for service providers to be *democratic*, to have an *inclusive* but also *efficient* process. The group discussed the need for a trade-off between being *open* and *inclusive*, and minimizing the *length of time* for conducting the process. This OR application differ from the ones above, and indeed in most of the OR literature: whereas most applications use decision criteria that describe *consequences* of decisions, this one focuses on the decision-making process itself and uses as decision criteria virtues like democratic, open, inclusive and efficient – but also length of time, which is a consequence of the chosen process. The study reports active and emotional engagement by the stakeholders, which puts it at level 4 on the value conflict scale. The general picture is that OR has a preference for decision problems without value conflicts; and if there are value conflicts, low conflict levels are preferred. This underscores the urgency of our original question about what role OR can play regarding conflicts of value, and whether can OR contribute to a more ethical approach to such problems?

5. Structuring value statements

We want to propose a generic value structure that is helpful for organizing organizational value statements on the Web as well as useful for OR-assisted decision-making. Let us start by seeing what classical ethical theories have to offer, and then look at the OR concept of value before we proceed to web-based value statements.

5.1 *Classical ethical theories*

The three classical ethical theories: consequentialism, duty ethics, and virtue ethics espouse different sorts of value; and these may prove useful as a basis for structuring value statements.

According to consequentialism[21], an action is morally good if the intended *consequences* are good. Consequentialism makes the good prior to the right, and it defines right operation in terms of promoting the good. If the good is defined as pleasure, this is hedonism, if as happiness, eudemonism.[22] Thus, a consequentialist looks neither at the nature of the action itself, nor at the character or attitude of the DM: only consequences count. So a consequentialistic conception of duty is inclined to identify duty as an action to promote the good, and further classify virtuous dispositions as those with good consequences.[23] This contrasts with Kantian duty ethics that defines the right prior to the good. The principle of morality according to Immanuel Kant is to act only on that maxim through which you at the same time will that I should become a universal law. It considers whether the DM has obeyed the right principles, and thereby fulfilled her duty or obligations. Finally, virtue ethics is only concerned with the character and attitude of the DM: an action is morally right if the relevant virtues have been displayed, such as courage, loyalty etc. To be principled is also a virtue, and this provides a link between duty and virtue ethics: to fail at duty ethics is to fail at virtue ethics.

Classical ethical theories, then, provide us with three different categories for moral judgment of actions: consequences, principles and virtues: Do we expect good consequences from the action? Are our principles observed? Is the action virtuous? In our survey, almost all decision criteria were consequences. For instance ‘product price’, ‘product quality’, ‘financial stability’ and ‘quality of customer service’ are all supposedly consequences of operations, but they are not values in a moral sense. As Keeney has pointed out, consequences are in a sense value free, they are not good or bad in themselves. It is the DM that gives them direction by specifying whether they are to be minimized or maximized [24]. Whether the price is to be minimized or maximized depends on whose value it represents. Virtues are different: being democratic, open and inclusive is good. From an organizational point of view, principles would be standards, rules and regulations that the organization has chosen to follow, such as safety procedures, environmental standards etc.

5.2 *Morals versus ethics*

The terms “morals” and “ethics” are often blended instead of being defined exclusively. We think a distinction between the two terms is elucidating and useful. If “morals” is defined at group level and “ethics” at a higher level, both terms are still oriented about right and wrong, but moral is seen as privatized. Like many groups there are many morals and many subcultures, and in a pluralistic society one cannot find common values within morals. A group may claim that with few privileges and low salaries they also need some advantages within society – a few compared to

privileged groups – and therefore hold it for reasonable to dodge on public transportation. Yet, when each stakeholder holds a privatized moral, this creates conflict rather than consensus. Though members respect one another within the group by providing support and defense against conflicting values, this demonstrates a fundamental difference between in-group and out-group morality. Ethics may be seen as a decision-making procedure that is accepted by the stakeholders[25]. This ties ethics to dialogue, and to arguments. Further ethics is not guided by money or power, and finally reason and action is inclusive, rather than exclusive. This precludes that parties do not reject each other, and at the same time do not lean back when knowing what the other party wants. A dialogue presumes that none of the parties insist on one's own values or a break through by money or power. It is presumed that each party listen to the arguments of the other party and respond to them, in a way that replaces one's private morality with shared ethics. On this background we find a perspective with ethics and OR of interest rather than OR and morals.

5.3 *The OR concept of value*

One will probably not find a simple unanimous concept of value in the OR literature. But Keeney's influential book[24] on value focused thinking is a natural place to start. He considers values as "principles used for evaluation" – something we use to evaluate consequences of actions. According to Keeney, values are indicated by:

- Ethics: "Do not exploit the misfortunes of others."
- Traits: "It is important to be trustworthy, loyal and dependable."
- Characteristics: "Any proposed national energy policy should be appraised in terms of national security, economic cost, environmental impacts, and health and safety."
- Guidelines: "It is better to try and fail than not try at all."
- Priorities: Safety is more important than economy when purchasing a car.
- Value trade-offs
- Attitudes towards risk

We see that Keeney has reserved a rather small place for ethics as value. To have compassion for the suffering of others is an Aristotelian virtue, and so are trustworthiness, loyalty and dependability. If you are courageous, you will try even if you may fail. Thus the values Keeney lists as *ethics*, *traits* and *guidelines* can all be subsumed under virtues.

With *priorities*, Keeney means attitudes where one concern goes before another, no matter what. Such concerns can be linked to values that Baron and Spranca have called *protected* values[26], where analysts usually fail at trying to cajole their decision-makers into making value trade-offs. Fairness, rights issues and environmental concerns are typical areas where this happens.

Keeney's *characteristics* are *consequences* of actions, not necessarily intended, but everything we normally would list concerning values that would be *created* or destroyed by the action. The consequences represent the objectives for the decision problem; what motivates the decision-making in the first place, but also conflicting values that should be taken into account. The consequences are what you would look at if after the decision was made and the actions taken and the dust settled, you were to assess whether it had indeed been a good decision. Keeney recommends that we create the list of values through development of a goal hierarchy, and it is interesting to note almost all examples of goal hierarchies in his book have values that are neither virtues, nor protected values.

So far we have classified Keeney's values as virtues, protected values and consequences or created values, but what of *value trade-offs* and *attitudes towards risk*? They are in a sense different; they certainly play a key role in the decision-making process, but instead of having to do with *what is* of value, they pertain to *how valuable* the objectives are. This depends on the attitude and, yes – values of the DM, but we now talk about value *strength*, not *what* to attribute value to. The same can to some extent be said about attitudes towards risk, although such concerns can also be described in terms of consequences (like beta in finance) of virtues like carefulness. Organizational value statements are about what the organization value, and therefore virtues, protected values as well as created values should be included, but to state *how* to allocate value in decision contexts would be difficult and in most cases put undue restrictions on the DM.

Tsoukiàs[27] accepts the three classes of values above, using the slightly different terminology of 'norms, values and rules'. But he insists that all reasons for choice should be included in the decision process and that it is the task of any decision-aiding methodology to facilitate that: "A decision aiding methodology cannot limit itself in considering a certain type of reasoning (deontic, value based, heuristic or normative). It has to be able to consider any reason."

However, when we look at the OR literature, even a glimpse like the one above reveals that it is overwhelmingly focused on consequences. Brugha[28] thinks that Keeney and Raiffa set this pattern in their seminal work from 1976 on multi-criteria decision-making[10], where they deliberately used the term *attribute* instead of decision criterion. However, an attribute is a quality or feature and therefore more restricted than *decision criterion*, which again is more restricted than *reason*. To use Brugha's words, "restricting oneself to attributes tends to highlight the obvious and tangible, and marginalize the vague and speculative. So, if only one of the alternatives was a cause of some ethical doubts, such an attribute might not get into the list that would be used in the measurement phase." Keeney sticks to this terminology in his 1992 book on value focused thinking[24], although he admits that there different traditions and that the term *decision criterion* is quite widely used as well. A glance through his book reveals that attributes measure *consequences* of decisions, neither features of the decision *process*, nor conflicts with laws or regulations. The decision criteria of the first seven *Omega* papers cited above are all attributes or consequences of the decisions. The exception is the eight, which uses other reasons as well.

To sum up, the OR concept of value is in disarray. It encompasses our three value categories virtues, created values and protected values, and probably more. And although forceful voices argue that decision analysts should help include all reasons for the decision, OR in practice seems to emphasize consequences, and even further restrict itself to attributes that are measurable features of the alternatives.

5.4 Value statements on the Web

There is a striking difference between the OR concept of value and values that are stated on the Web-pages. While OR concentrates on created values, the first that meets the eye if one searches for 'value' on home-pages is a code of conduct or something to that effect, which emphasizes core values or virtues. One has to refine the search to find other values. Wenstøp and Myrmed[1] have made a survey of American companies listed on NYSE to find out to which degree companies state values on their web pages, and what kind of values are emphasized. The web pages were searched with keywords such as 'corporate governance', 'ethics', 'values', 'goals', 'social responsibility', 'community involvement', 'procedures',

‘environmental involvement’, ‘stakeholder’, ‘shareholder’, ‘who we are’, ‘commitment’ and ‘purpose’. This led usually to value oriented sections that could be investigated more thoroughly. Value statements were often found at different sites in the web pages depending on the topic, e.g. financial goals, social responsibility and certification. Virtues were usually found in a section called codex, code of conduct, or core values. Created values were found by searching for statements focusing on the outcome of actions with keywords like ‘maximizing’, ‘profitability’ and ‘creating value’. Finally, protected values were looked for with keywords like ‘legal’, ‘ISO standards’, ‘safety’, ‘health’ and ‘certification’.

It turned out that 77% of the companies stated created values, 54 % stated protected values and 67 % stated core values. The top six core values were integrity, honesty, respect, diversity, openness and fairness, in that order.

5.5 *A generic value structure*

Core values, created values and protected values are linked to the three classical ethical categories: virtues, consequences and principles. While it is fairly easy to allocate stated values to one of the three categories, Web-based value statements do not in general betray an awareness that they are of different kind and that they may play different roles in decision-making. We therefore think it is useful to structure them as shown in figure 2.

Figure 2. Generic structure for organizational value statements on the Web. Adapted from Wenstøp and Myrnel [1]

Core values, then, are virtues like integrity, honesty, respect, diversity, openness and fairness. Core values are the central element in a code of conduct that describes attitudes and how people should interact and is primarily a leadership tool that aims to create an organizational spirit to make it special. Core values are not natural parts of analytic decision-making models, but they certainly play important roles in real decision processes.

Created values are the *raison d’être* of the organization – why the organization exist. These are typically values that are created for its stakeholders, like dividends for shareholders, salary for employees, workplaces for the local community, etc. In an OR context, it is natural to organize created values as a strategic goal hierarchy with a general objective on top, like ‘maximize the long term value of the firm’. For specific decision problems, one would then develop context a dependent goal hierarchy with decision criteria that are subject to value trade-offs. An important issue in this context is whether the stakeholders should be seen as loci of intrinsic value, or merely instruments for higher purposes. We support the Kantian position, which has strong support in the corporate responsibility literature, that people should not be treated as instruments.[29]

Protected values are values that are protected by standards, rules and procedures. They are not subject to value trade-off. Health, environment and safety are the areas where the most typical examples are found.

Are some values left out? Yes, in actual decision-making processes the values in the value system must be somehow enacted. They must be given valence or power to influence the decision. We do not think it is possible to prescribe the valence of values; that will depend on the decision context and the participants in the decision-making process, and the main mechanisms to make that happen are emotions.

6. *Enactment of values: affect and deliberation*

The emerging field of neuroeconomics study neural correlates of economic decision-making. Camerer, Loewenstein and Prelec [2] have made an extensive review of the field, which builds on neuroscience. Different techniques monitor the location and pattern of neural activity in the brain when decisions are made. Brain imaging with the help of positron emission topography (PET) scanning and functional magnetic resonance imaging (fMRI) is currently much used, and has established firmly that there are two kinds of neural processes involved in all kinds of decision-making: cognitive and affective. This is hardly a surprise: already Plato described people as driving a chariot drawn by two horses, reason and passion. The field of economics, however, has traditionally concentrated on reason, keeping the passions at arm's length. Neuroeconomics seeks to bring the passions back into the economic models to build more complete models of human decision processes, and we think this provides us with important pieces in a puzzle where affect, emotions, deliberation and reason all work together to shape ethics in decision-making.

Affective states are emotional, meaning that they have somatic correlates; and all affective states have valence – being either positive or negative. Emotions need not be felt, however. In most normal situations, we are probably unconscious about our emotions, but they still convey action tendencies. Almost all actions seem to be prompted by emotions; they work to improve our affective state by giving the body signals of whether to approach or avoid. Neural processes without valence are not regarded as affects, and some of these – like reflexes – produce action as well. The interplay between affective processes in our brain and emotions in our body is massively parallel, with many pathways working simultaneously, and working fast. We may act before we have time to think. Examples of affective states are emotions such as anger, fear, and jealousy, as well as drive states such as hunger, thirst and sexual desire, and motivational states such as physical pain, and discomfort.

While the affective system appears similar in humans and animals, the cognitive system sets us apart: cognitive processes are used in deliberate reasoning. They answer logical questions; predict consequences of actions, etc. One of the most compelling evidence for the existence of the two systems is reported by Sanfey et al. who monitored the brain activity of people that were considering offers in the ultimatum game.[30] In this game a person (A) is provided with an amount of money – usually \$10 – that she is supposed to share with another (B) by making an offer of a part of it. If the B rejects the offer, neither will get anything. If B accepts the offer, the money will be split accordingly. Classical economic theory predicts low offers, say \$1, which in turn will be accepted – B's reasoning being that it is better to accept something than getting nothing. But this is not what happens. Most offers lie around \$4 and are accepted; unfair offers – \$2 or lower – are usually turned down. Moreover, fMRI scans of B's brain activity show that people react differently to fair and unfair offers. The dorsolateral prefrontal cortex – which is involved in planning – is active in both cases, but when unfair offers are made, the insula cortex is active as well. It is known to be active in connection with negative emotions like pain and disgust, and one interpretation is that unfair offers are turned down because people are disgusted by them – thus overriding deliberate value maximization in the cognitive system. However, the current view in neuroscience is that cognitive processes cannot produce action themselves. To achieve that, the cognitive system must work through the affective system.[2] The picture is therefore that the cognitive system is necessary for searching for options and predicting consequences, but it cannot evaluate those

consequences. That must be done by the affective system. Damasio[31] made early on notable empirical observations in neuroscience when he discovered that people with damage to the prefrontal lobes, were emotionally flat when they contemplated future consequences of decisions, and as a result were very poor decision-makers. He developed the so-called “somatic marker” theory where the brain is assumed to attach valence to the scenarios by comparing them to ‘markers’. This triggers a somatic reaction, which is felt, and the feeling then prompts action. In the words of Camerer et al.: “It is not enough to “know” what should be done; it is also necessary to “feel” it.” Figure 3 shows a model of the processes involved in decision making between affect and deliberation.

Figure 3: A model of decision-making between affect and deliberation, adapted from Loewenstein and Lerner[32]. Path a: all decisions are prompted by immediate emotions. The pathway a-b-c-d is employed in deliberation, which involves prediction of consequences of alternative decisions and how good they will be. The expected emotions influence immediate emotions, which in turn may prompt action. Path e represents affect caused for instance by fear or disgust which may affect immediate emotions more strongly than expected emotions.

For our purpose, this means that even at level 1 on our conflict scale, where we have only one stakeholder and instrumental decision criteria, elicitation of emotions is required (path c). If the decision-maker has not developed feelings for the expected consequences of the various options, her decisions are senseless and therefore arbitrary. Aside from conflict level zero where no real decision-making take place, level 1 is the most common conflict level in OR applications, and we see that even these – or rather especially these applications – require adequate attention to emotions, or else decisions will be irresponsible and therefore unethical.

What is the current practice then in OR applications to value conflicts? In our sample, none of the papers appears to pay attention to this side of the decision process, and this is cause for concern. To make it possible for decision-makers to enact values, OR needs to become more conscious about producing vivid scenarios of consequences to elicit emotions.[33]

While emotions are needed in all decision situations, what happens when we move up the conflict level scale? Greene et al. [34] have used fMRI scanning to investigate brain activity when people responded to dilemmas that were either non-moral, moral-impersonal or moral-personal. Examples of non-moral dilemmas were whether to travel by bus or train given certain time constraints; a moral impersonal question was whether to keep money found in a lost wallet, and a moral-personal question was whether to throw people off a sinking life boat, i.e. to sacrifice one in order to save many. The results showed that the activity in brain areas associated with emotion was much higher for the moral-personal dilemmas than for moral-impersonal dilemmas, which again was somewhat higher than for non-moral ones. Areas associated with working memory, on the other hand, had little activity for moral-personal dilemmas, and considerable and similar activity for the two other types. This supports the conclusion that the brain works in different modes depending on the degree of emotionality of the questions; its activity seems to exhibit quite different patterns whether it is dealing with virtue-oriented dilemmas – which would correspond to path e in figure 3 – or consequentialistic problems, where pathway b-c-d would be active. Koenigs et al. [35] have followed this up by investigating how patients with focal bilateral damage to the ventromedial prefrontal cortex (VMPC) react to similar moral dilemmas. The VMPC is a brain region necessary for the normal generation of emotions and, in particular, social emotions. It turned out, for example, that they were

more willing to throw people off a life-boat than ordinary people. They revealed a pattern of abnormally high degree of consequential judgements on moral dilemmas when aggregate welfare was pitted against highly emotionally aversive behaviours, indicating that path e in figure 3 was disconnected.

These findings lead us to expect that affect and emotions play important roles on conflict levels higher than level 1. On level 2 there are several stakeholders and instrumental decision criteria, which is reminiscent of moral impersonal situations (keeping money in a lost wallet). Could pure deliberation (pathway b-c-d-e) lead to an ethical result in this case? That depends on whether the DM would expect to feel better by restoring the wallet than not. That is possible, but shame (path e) would probably be more decisive. Conflict levels 3 and 4 have decision criteria that represent intrinsic values. The stakeholders do not take part in the decision process at level 3; they take part at level 4. These are akin to moral-personal dilemmas – we could think of resolving the question in secret of whether to throw somebody off the life-boat, or whether to negotiate with that person about being thrown overboard. From a consequentialistic point of view, somebody should be thrown overboard to save the others, but that may not happen. In many cases, virtue ethics enacted through affect would prevail – and this many would consider the most ethical outcome. Turning back to organizational decision-making, then, there is a risk for affect to play too great a role on conflict level 3, and the challenge is to apply reason to temper it. The risk is even higher on level 4, but since the stakeholders are participating in the process, it is possible to temper emotions through rules, as is commonly done in negotiations. In part eight, we will discuss discourse ethics as one promising avenue.

7. OR, consequentialism and ethics

It appears to be in the nature of OR analysts to seek to frame decision problems in terms of consequences that are to be optimized. Virtues and principles are seldom focused, and the applications tend to take place at low levels of conflict with correspondingly low levels of emotion. Is this good or is it bad?

Consequentialism is different from the two other ethical platforms: While virtues are good, and principles we apply to protect important values are good by construction, consequences are value free. Consequentialist ethical theories agree on focusing on consequences. They differ with regard to what sort of good consequences they promote; in our context that would be stakeholder values created by the organizations. What in our opinion makes consequentialism an ethical theory is simply that it is good to be concerned about the consequences of actions. But that requires that one reflects on what sort of consequences count as good ones. And this begs the questions: Who is the primary beneficiary of moral action, and how are the consequences judged and who judges them? OR has something to offer here. It has expertise regarding development of value trees or goal hierarchies[24] and a bundle of techniques for enacting values in the decision process. But the underlying weakness is of course that subjective judgment, and thus tempered emotions, is necessary in all conflicts above level 0.

To focus on consequences implies that one tries to steer issues away from conflicts that cause strong affect (path e) and towards deliberation (path a-b-c-d-e), thereby increasing the rationality of the process. This may sometimes even solve deadlocked situations where principles clash. It is important to note, however, that this still requires emotions, which is not commonly associated with consequentialism.[36] Thus, our concept of consequentialism entails tempered emotions.

Here are two well known ethical dilemmas that may serve to illustrate what it would entail to focus on consequences rather than virtues and principles. It is for the reader to judge whether this makes the approach more or less ethical.

Abortion: a struggle is going on in many countries between pro-life and pro-choice forces. Pro-life people maintain that that abortion of live fetuses is a sin that must be avoided at all costs. The problem then arises of whether it is possible to specify exactly when life arises in the womb. This turns out to be a quite intractable problem, and the battle is instead heated by emotional pictures of fetuses, impelling pro-choice people to warn against mistaking feelings for ethics. A consequentialistic approach might be to attach a value to the fetus, representing its future potential. This would help turn the process from affect towards deliberation. But perhaps Billy Clinton had an even better idea when he coined the formulae that abortion should be “safe, legal and rare”. [37] These are three decision criteria that cater to three of the main stakeholders: pregnant women, the judiciary, and religious/moralist people. OR might assist at predicting the consequences of alternative laws, and weight the criteria through appropriate processes. Perhaps such an approach could break the deadlock in some countries.

HIV containment: How to contain the spread of HIV is another problem that elicits strong emotions in stakeholders in many countries. One approach is to direct measures against especially contagious subgroups of the population, such as IV drug addicts, prostitutes, male homosexuals, and immigrant groups. For one thing, such measures would run against the rights of these people. A value focused MCDA was carried out in Norway that involved eliciting weights from a decision panel consisting of the three top national decision-makers to identify balanced measures against the spread of the virus. The two main opposing decision criteria were to avoid stigmatizing subgroups, and to prevent as many future AIDS cases as possible. The study ended up by considering immigrant from south of Sahara as a viable target group. This was later followed up by an official call to avoid sexual relations with this group. Although the decision panel found the consequential approach compelling, the resulting policy became highly controversial. To stigmatize a group of people like this is probably a violation of the article 12 of the 1948 United Nations’ Universal Declaration of Human Rights saying that “No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honor and reputation”. Articles in the prestigious journal *the Lancet* accused Norway for racism [38], and Norwegian health authorities answered back, defending the policy [39]. The intention was after all to save lives – so judgment of whether the policy was ethical or not, will depend on whether it is based on principles or consequences. But OR no doubt has the potential of enhancing the merits of a consequentialistic approach.

We do not think that the question about the ethicality of consequentialism is simple, however. For one thing, consequentialism entails essentially that the ends sanctify the means, and this is a deeply discomfoting principle for most people.

8. Discourse ethics

The term ‘discourse ethics’ derives from Latin *discurro*, which means running to and fro. In a dialogue, arguments go from one party to the other. When several participate in a discourse, it cannot rely on good will alone, by agreeing on disagreement among those involved. A practical discourse depends on certain abilities at the individual level, such as knowledgeable and responsible participants who respect each others

freedom and refrain from coercion, arguing rationally and finally focussing on a comprehensive solution, rather than privatized morals.

According to Habermas discourse ethics must obey two principles, both in line with Kantian duty ethics. The first is the principle of universalization, a version of consequence-oriented reformulation of Kant's categorical imperative:

A norm is valid when the foreseeable consequences and side effects of its general observance for the interest and value-orientation of each individual could be jointly accepted by all concerned without coercion[40]

The second is a specific principle for discourse ethics:

Only those norms can claim validity that could meet with the acceptance of all concerned in practical discourse.

Discourse ethics can be seen as a formalized concept, because it provides how a discourse should be accomplished – a practical discourse. Several standards have been developed that regulate discourse processes and ethical accounting, particularly for multinational corporations. A notable example is Social Accountability 8000 (SA 8000). Decisive is that the premises for the “ideal speech situation” is normative and followed in a maximized extent, like truthful, without coercion, following the force of the best argument. As Gilbert et al. [40] remark, if practical discourse has been well performed, then failure to reach agreement on a conflicting norm means that the norm is not valid. This might be operationalized for OR like this: Only those decisions can claim validity that could meet with the acceptance of all concerned in practical discourse.

Discourse ethics do not lead however, to decision-making in a literal sense, like *decido*, that means cutting through. DM in the sense of cutting through the Gordian knot, seems to be necessary, based on the ideological roots of modern management and its engineering foundations[41]. Yet, discourse ethics indicates that problems that comes from Greek *pro-ballō* – meaning cast before, project or to urge forward – do not mainly demand *homo faber*'s technical tools such as axes, but rather humanistic methods that we associate with solving a problem – and again from Latin, *solvere* means unloose. Discourse ethics solves problems by loosing up disagreement between the parties, rather than cutting through and thus hinder a discourse between involved parties. On the other hand, there is a balance between too far-reaching processes between involved stakeholders before DM, and no process at all.

9. Concluding reflections: Ethical rules for OR analysis of value conflicts

A belief is that an OR analyst is detached from a) emotions and b) personal and organizational responsibility.

a) Emotions: In western Cartesian thought, science is about systematized rational knowledge, including moral philosophy, and that includes refraining from and suppressing emotions. The Kantian moral philosopher Robert Nozick claims that even if Darwin and Freud meant that human beings are not always guided by rational or even consciously known motives, humanity has a special status in the universe, based on its capacity for rationality. As a Kantian though, Nozick holds that instrumental rationality is insufficient. According to this concept of humanity, rationality is intent on noticing biases, including its own, by controlling and correcting these permanently

(Nozick 1993 xi). In Cartesian thought we find a “traditional suspicion of human emotion as something dark and dangerous, opposed to the objectivity sustaining power of reason.”[42]

According to our discussion in part 6, we think, however, that an equilibrium between rationality and emotion is advisable, though always arbitrary, volatile or capricious. Emotion plays an important role in morals and ethics, including discourse ethics. Awareness and attention are important faculties for discourse ethics to reach solutions being accepted by all concerned without coercion or manipulation. Indeed, we do not think any moral philosophy is possible without embracing emotions. A pure rational decision maker without emotions like Damasio’s patient with a broken *corpus callosum* – connecting the left and right hemisphere of the brain[43] – seems to be even impeded from taking decisions. Further, persons with brain damage and reduced emotional capacity seem to have reduced capacity for ethical decision-making. E.g. persons with damage in prefrontal cortex and thereby reduced capacity for social emotions and resolving ethical conflicts seem to have increased tendency to consequentialistic decision-making and utilitarian moral judgments[35]. And impairment of social and moral behaviour is closely related to damage in human prefrontal cortex.[44]. Even a normal brain will not act adequately if looking at big numbers of an ongoing genocide through the media, although a small polar bear in a zoo, named Knut, might easily get empathy and support. Affect or lack of affect is decisive for action or lack of action. Therefore some will reject subjectivity in the name of science, claiming that emotions are a dark and dangerous power and therefore have nothing to do with moral philosophy and ethics. We claim that a fruitful balance between rationality/deliberation and emotion/affect is possible and desirable, even though fragile.

b) Personal and organizational responsibility: At organizational level procedures may be established to compensate for rational and emotional weaknesses, but not as replacement for individual responsibility. A balance between individual and organizational responsibility is one side of the coin of ethical practical discourse. On the other side there is symmetry between emotional and rational abilities at individual level. Instead of pretending as if emotions are a non-existing part of humanity, emotionality is a faculty for improved *fingerspitzengefühl* in complicated processes between several disagreeing parties that have knowledge about each others preferences. Empathy enhances potentiality to reach valid norms during a process of ethical discourse – norms that could be accepted by all stakeholders. In a practical discourse emotional engagement is more commodious and felicitous than “pure” rational engagement.

If the target though is to secure own moral group interests at the cost of others, we find it less advantageous to be emotional and empathetic, since emotionality might disturb group member’s ability to be focused exclusively on own interests. The other way around: Finding common ground when different parties contradict and have words on values will be facilitated if participants arouse emotional faculties, rather than suppressing them. If however emotional arousal bite off more than one can chew in a practical discourse, procedural mechanisms at organizational level will be necessitated.

A difference between moral engagement for us and against them, and ethical engagement to find solutions accepted by all concerned, implies different challenges at individual and organizational level. In the first place, organizational level is remote and challenges at individual level are not so different from animals fighting about scarce resources, like food and water, acclaimed as survival of the fittest. In the

second place, Habermas' principle of universalization and the principle of discourse ethics represent a huge challenge for individuals as well as organizations. This brings us to the following norms 1-5, which we see as valid for OR, according to practical discourse. An OR analyst who deals with decision problems that involve value conflicts should:

1. Not regard herself as being detached from the decision that are made; she is ethically responsible. (Part 2)
2. Promote the view that stakeholders have intrinsic value; they should not be treated instrumentally. (Part 5)
3. Be conscious that good decision-making requires temperate emotions that balance affect and deliberation. (Part 6)
4. Promote focus on consequences rather than virtues and rules. (Part 7)
5. Encourage fair processes to identify stakeholder values. (Part 8)

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