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FORMALIZING THINKING FOR MORALLY RESPONSIVE ADMINISTRATION

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An Introduction to Decision Theory

Education by nature harbors idealistic elements not necessarily a part of other organizations (Lucas, 1972: Wagner, 1992). For example, education seldom settles for the status quo. Rather, education is nearly continuous in its proactive efforts to bring students and other stakeholders together to embrace generally conceived moral preferences (Boyd, Crowson & Geel, 1984; Gronn, 2002). These preferences include the objective pursuit of truth and respect for all who share in the quest (Lynch, 2004) to avoid error, prejudice, bias of all sorts and other mindless ways of thinking (Smith, 2003).

Identifying proper moral preferences should not be something that administrators have to deliberately think about before decision-making. Ideally, the identification of operative moral principles should persist throughout the decision-making process itself. To this end, contemporary decision theory addresses preference making – including the making of moral preferences– by identifying values as phenomena that can be proportionally weighted every bit as much as monetary currency. Furthermore, currency of all kinds, economic, aesthetic, moral and so on, may be converted into a system of utils calibrated to the decision task at hand (Broome, 1991). In the argument which follows the claim will be that modern decision theory can show how moral preferences can be properly calculated within the decision process itself and not left to some well-meaning prelude to actual calculations (Heath, 2008). Thus the entailment of moral preferences within the decision-process itself ensures moral preferences remain operative throughout planning and other decision-making practices.

Contemporary decision theory has increasingly become more effective in showing how moral considerations can be proportionately and comparatively weighted and then configured into the mechanics of actual decision making. By configuring moral considerations into the process itself, rather than left to preliminary consideration prior to decision-making, the expected utility of various decisions, plans and actions can be more readily pursued.

Hence, mathematician Ken Binmore (2007c; 6-7) can rightly observe that, "Modern decision theory is to managerial theory what quantum theory is to physics." Where moral reasoning was once commonly construed as at best a special but inaccessibly vague type of practical reasoning, decision theory makes the obvious point that once the brain begins cogitating all thinking is the same. This is to say that all thinking is a form of calculation within the brain whereby data is processed through an electrical and biochemical 'wetware' system. The plasticity of the brain allows for learned patterns of calculation more likely to produce gratifying results. The proportionately weighted preferences that are prepared for eventual calculation may depend initially on emotional and empathetic responsiveness of various sorts, introspective preparation, and so on but, once the proportionately weighted values of preferences are assigned, the wetware is presumably no more aware of the elements of calculation in moral matters than it is aware of the proper name of the master of the calculation and personal owner of the results.

In short, as will be illustrated shortly, moral reasoning in the context of formal decision theory focuses attention on the facts associated with the administrator's moral and other preferences as efficiently as it focuses attention on the details of the outcome. Once decisions regarding proportional weighting of preferences have been made, there are available calculi that can be utilized for driving the decision forward in an optimally systematic fashion.

Moreover, despite pursuit of various and often contradictory preferences, these calculi are capable of recognizing a negotiated option, which tolerates difference but avoids genuine disadvantage to any one person thereby optimizing the general value to all of a strategically-balanced outcome. In modern decision theory, such optimized outcomes are referred to as Nash equilibria. Such decision theory is about mental calculation. It is not about finding the worthiness of preferences. Yet once preferences are determined decision theory shows how their inclusion in subsequent calculations can be guaranteed.

From the viewpoint of decision theory, each person, in part, defines himself or herself by accruing individuating preferences. These preferences constitute their specifically bounded rationality. In addition, by identifying other peoples' preferences and the material facts of a situation, the person secures a far more exhaustive framing of the problem context than if he or she had relied solely on personal desires and the material facts themselves. By taking the moral and other preferences of all stakeholders into consideration, equilibria can be identified ensuring at least minimal satisfaction for all including the accommodation of variant moral commitments among players (Nash, 1950; 1951).

Strategies for identifying these equilibria are typically referred to as 'minimax' or 'saticficing' strategies. Such strategies sacrifice optimality of expected utility for some if it leads to better odds for at least minimal satisfaction on the part of all (Axelrod, 1994; Aumann & Maschler, 1972). Indeed, very recent empirical research shows that even where lingering paradoxes remain because of sudden changes in a person's desires (Binmore & Samuelson, 1995; Nau & McCardle, 1990; Kreps, et.al., 1982), they still act in a predictable fashion and in accordance with the previously mentioned mathematical parameters (Roth & Kagel, 2003).

Illustrating the Benefits of Decision Theory

To illustrate the perceived limitations of conventional decision-making theory, it is instructive to begin by reference to the classical paradox derived from game theory, namely, the "prisoner's dilemma" (Gibbons, 1992)). The person's ultimate decision within a prisoner's dilemma scenario cannot be resolved without recourse to their preferences. While there are multitudinous examples of prisoner's dilemma problems in real life (Luce & Raiffa, 1987; Myerson, 1991), the variant illustrated here will utilize a public school example. The reader should not make too much of the limited range of motivations described herein since the purpose is simply to illustrate, through a manageable set of facts and a simplified four cell decision matrix, a process for seeking the most favorable outcome given a particular player's preference and knowledge of the other player and their preferences. Obviously as other factors are considered in real life situations, the scoring and matrix employed is expanded and becomes far more complex. Such expansion here, however, would be

an injudicious use of journal space in what is intended only as a paradigmatic illustration.

Kerry is a teacher and Kim is a married assistant principal. They are having an affair outside of school. The principal and a visiting board member come across the two embracing one another in a moment of indiscretion during school hours. They are immediately sent to separate rooms wherein an option is proposed to each. If either one agrees to accuse the other of sexual harassment, the accuser will be portrayed as a victim and the other will be charged with harassment and dismissed. (Arbitrarily consider dismissal to be worth 10 utils of displeasure and keeping one's job as 0 utils of displeasure) If both accuse the other of harrassment then each will be required to resign or face dismissal since their imprudent behavior was observed by school authorities (5 utils of displeasure each). If each refuses to betray the other then each will be able to complete the year, as long as no further incidents occur, but their contracts for the following year will not be renewed, there will be no positive letters of recommendation, and a permanent record of the incident will be kept in the principal's files (2 utils of displeasure each). The resultant payoffs for the dilemma are shown below in figure 1 with the outcome for Kim to the left of the comma and the outcome for Kerry to the right of the comma for each possible decision.

		Kerry	
		Betray	**Protect Kim & Remain Silent**
Kim	**Betray**	**5, 5**	**0, 10**
	Protect Kerry & Remain Silent	**0, 10**	**2, 2**

Neither Kim nor Kerry know what the other will do. Stipulating that both are rational and self-interested and each must make a decision before leaving the room in which each is being interviewed there is no optimizing strategy evident to either as things currently stand. This is precisely what makes such situations prisoner dilemmas (Frank, 1988). Given the limiting stipulation of only considering human nature as rational and self-interested, and ignoring other factors, there appears no logically evident superior course of action. The paradox is impregnable (Slote, 1989). Clearly any problem solving theory ought to offer a more comprehensive way of determining what courses of action are available (Wakker, 1989).

Empirical research on prisoner dilemma problems demonstrates that in actual practice people are not solely driven by rationality and self-interest (Lo, 1996). The grounds for further consideration may be suggestive evidence of what education or the normative idea of becoming more *civilized* can produce in humans. Specifically, humans acquire a range of personal preferences which play determining roles in how people like Kerry and Kim decide matters (Binmore, 2005). The apparent paradox is impregnable only as a matter of formal logic and with the limiting stipulations. In actual prisoner dilemma-like situations, people typically act on reasons beyond mere self-interest. The reasoning employed by real people in situations like that of Kerry and Kim's is not wholly transparent and produces no guarantees of deductive certainty or paradox. By its very layout, some of the key elements of the problem must remain inaccessible and so there are no grounds for declaring deductive inclusiveness. Seeking Nash equilibria in such cases requires knowing as many of the preferences of the other player as possible as well as being mindful of one's own constitutive preferences for cooperation or betrayal in such cases. In the absence of such knowledge, the decision becomes one made under uncertainty and in real life this is almost always the case. Since the uncertainty cannot be removed, probabilistic tools described as subjective probabilities, or Bayesian statistical decision-making, can be employed to increase the expected utility of each player albeit with less certainty than when all relevant knowledge is wholly evident (Brams, 1978).

The reason that further information about the other person's belief state is relevant is that there may be more unarticulated preferences involved beyond solely displeasure for either person. For example, Kim may know it is highly probable that Kerry is likely to betray but Kim has a strong commitment to being a loyal person. Moreover, Kim may prefer sustaining this self image regardless of the outcome. Of course, if Kerry knows this about Kim's moral character and Kerry is driven primarily by mainly self interest then knowledge of Kim's strong commitment to loyalty would likely strengthen Kerry's self-interested behaviour. However, in addition to a commitment to loyalty Kim may also have a strong aversion to being deliberately neglected. If Kim becomes nearly certain that Kerry's knowledge of Kim's character will increase the likelihood that Kerry will betray Kim, Kim may find this latter probability as reason to override any personal preference for loyalty.

What this shows is that the existence of a personal moral image and any commitment to another person must be proportionally weighted prior to calculating the right action. When calculating the right action, what each knows about the other's preferences, and what each knows about one's own preferences, represent values which determine the expected utility of the two actions open to each player. Once such likelihoods are calculated by each, a stochastic distribution of possible preferences is defined for each player. Each preference is associated with a given action contextualized by the desirability of material consequences and the doxastic conditions of mind of each person.

To illustrate, for any person making a decision, every potential choice is usually clouded by conditions of uncertainty. Consequently, the expected utility of each outcome must be represented in such a way that the stochastic distribution of facts is reflected in the calculation of a preferred outcome. Here is where decision theory moves forward from a matrix of material consequence to considerations under uncertainty and the stochastic distribution of possible outcomes to one outcome preferred over another. Such preferences are often effectively illustrated in a decision tree beginning with the current state of affairs, identifying the likelihood of other people's preferences, and the action that will lead to specific outcomes at each step along the way. At each subsequent step, reassessment is possible from that new vantage point until a final outcome is realized. Each considered action is mapped as a branch representing the calculated costs of moving along one open branch as opposed to another. At the end of each branch is the value of the intended consequences. The cost of each branch proportionally weighted against the possible outcomes can then be represented as the expected utility of following that branch. Since preferences are calculated in this fashion there is no reason that this decision process must be described as self-interested.

Contemporary decision theory has recognized that preferences constitute a vast landscape extending well beyond any classical economic model of human nature restricted by rational self-interest. An individual's preferences may be highly moralistic or reflective of genetically or socially inherited dispositions to act in one way or another. Contemporary decision theory is in this regard value neutral. However, the value neutral character of contemporary decision theory does not relegate it to assessing human action at arm's length (Binmore, 2009). Indeed one can argue that the opposite is true. By its very value-neutral management of relevant data, contemporary decision theory indirectly exhibits unimpeachable respect for human autonomy (Mailath & Samuelson, 2006). Also, decision theory's value neutral management of relevant data keeps it from exhibiting any judgment on human psychology such as aversion to risk or sense of social commitment (Epstein, 1999; Kahneman et.al., 2006).

This does not mean that decision theorists, themselves, do not care about moral matters. Rather it means that decision theory, itself, is simply an effective tool of calculation even in moral contexts. As a tool of calculation it can empower well-meaning educational administrators to sustain morally admirable commitments throughout their calculations.

As noted above, the term "preferences" covers a great deal of territory extending far beyond the moral. Anything valued is in some respect an individual's preference. People value much they never intended to choose but seem simply instead destined to choose. The Minnesota Multiphasic Personality Inventory (Telleggen et.al., 2003) for example, identifies many unarticulated preferences a person may have even to him or her-self. One way of appreciating the range of the term, preferences, in decision theory is to recognize that it entails both desires and motivations.

Desires represent wants: things, attitudes, characteristics and possessions of every imaginable sort that a person may wish to possess (Binmore, 2007b). By contrast, motivations are something already possessed that animate a person forward in some sense (Binmore, 2007b; Slote, 1989; Zagzebski, 2004). Desires and motivations often look like they cover the same territory but in fact they are quite different. A person may desire better grades but remain unmotivated in the pursuit of better grades. Analogously, a person may be motivated to learn but care less what grades they receive or, again, be motivated but unskilled in learning certain disciplinary techniques and hence be compromised or even precluded from learning in certain technically-defined areas. Also, a motivation may lead to a desire to learn but that underscores how different the two experiences are. Motivation is always animating. Desire on the other hand may not be. Desires may be active or passive but they represent nothing more than something valued.

Also, desires must accommodate motivations but motivations need not accommodate desires. Motivations are, to varying degrees, always in play

inasmuch as they are inherent in whom one is. Desires are more transient. Desires sometimes pass out of existence altogether in a given context or even disappear from the mind's eye indefinitely (Kahnemann et.al., 2006). In the case of Kim and Kerry above, if Kim is motivated to be a loyal person, Kim's desire to get the best deal possible must accommodate Kim's motivation as well. The very action itself of being a loyal person is a preference for Kim. On the other hand, if Kim also has a desire to be seen as a loyal person, then it is pretty much a straight forward matter of determining the weight of fulfilling that desire commensurate with the accompanying motivation. In any case, desires and motivations are each equally preferenced and, as such, to the extent that any is especially relevant to the doxastic state of mind of a decision-maker facing a current problem space, each must be configured into an actual calculation summing grounds for a decision.

Further Exploration of the Nature of Preferences

By placing preferences into the actual calculation of a decision, rather than leaving it to the prelude stage wherein one may merely be thinking about what should matter, it becomes obvious that preferences are not to be treated as transitive evaluations. Preferences, in contrast to mere ordinal numbering, are intransitive. In ordinal numbering, if $12 \geq 10$ and $10 \geq 8$, then it is immediately possible to deduce that $12 \geq 8$; ordinal numbers are transitive. But in preferencing there are no such deductive guarantees. Preferences carry no guarantee of transitivity such that any elimination or movement of one preference requires reviewing the entire list of preferences holistically (Camerer, 2003).

For example, imagine a planning session for the preferred distribution of school funds for the following year. The outcome from this planning might prioritize the school's funding preferences as follows:

1. Materials and dedication of a room for the debating team (DT)
2. Funds for a exercising room for use after school (WR)
3. A small school bus (V)
4. A part time specialist to help develop literacy skills for particular students (S)

Applying a transitive perspective on this planning would suggest that D $T \geq$ WR; WR $\geq$ V; V $\geq$ SA. However, if the school's only capable debating teacher left the school before the start of the new school year the school's funding preferences would change. If this planning process followed ordering transitive preferences then in this case the highest ordered preference would disappear with every other preference moving up one. But clearly preferences are not transitive. The school may now opt for a full time specialist to teach literacy skills throughout the school and there might be less reason for a small bus because the school debating team has disbanded. The relative importance of each preference has to be completely reassessed. In other words, human preferences are intransitive.

Decision theory analyses all relevant weighted preferences, including the end product to be sought and the actions valued within the process, by means of a Bayesian probability strategy. This Bayesian probability strategy aggregates the beliefs that are deemed to be determining the decision-makers sense of the facts including the constraints limiting both the direct (the mathematicized tally of all calculations undertaken to achieve an end product) and the indirect utility functions (the mathematicized tally of all unintended consequences accompanying the action) for each alternative. This aggregation produces a solution likely to optimize the decision-makers expected utility.

Calculating Moral Preferences

In decision theory, the very best decision, especially when trying to negotiate stakeholder consensus, is labeled, "Pareto optimality". Pareto optimality is a singularly unique state of equilibrium wherein no further improvement can make things any better. Pareto optimality is difficult to come by and, in most cases, it is clearly a more demanding standard than merely securing the saticficing advantages of a Nash equilibrium. In any given context there may be more than one Nash equilibrium and any one of these may equally be a satisficing solution (Binmore, 2007b).

There are many mathematical models one can choose from to illustrate how logical rigor can illuminate and distinguish between effective and ineffective decision-making. This is not because such procedures are relative to the subjective choice of the thinker but because some models fit some contexts better than others (Ohm, 1968). The importance of rigor is simply that it increases the odds that decision makers will avoid error in their decision making (Gintis, 2009). The quest for rigor in no way diminishes the suppleness required to secure a model responsive to contextual fit. Contextual fit may be driven by many considerations but of most importance is the function of stakeholder proportionately weighted preferences

in defining the intended outcome (Gintis, 2009; Heath, 2008).

Obviously not all things can be considered in every case. Administrator experience is generally adequate for determining the range of relevancy in each of the aforementioned categories (Simon, 1993). The decision model selected below (Heath, 2008), accommodates deontological concerns for individual human value and well-being as key preferences. Heath's model is chosen here for two reasons. First, it is sufficiently paradigmatic of decision-models to illustrate much that has been discussed above. Second, the Heath model offers special emphasis to the preferences associated with respect and well-being, which is particularly relevant in the educational administrator's moral decision making processes.

Heath's equation (2008) below shows how moral preferences can be rigorously organized and then made available for inclusion in some larger formal calculation of expected utility.

$$v(a) = n(a) + \sum_{o} p(o\mathrm{I}a)u(o)$$

Here *v* is the value of action *a* whose expected utility is greater than that of every other competing action. In other words, *a* has the maximum utility. The appropriateness of the moral principles relied upon are entailed by *a*. The *o* represents the various outcomes. For the expected utility prior to configuration for the deontic constraints the administrator may impose; for every outcome, *o*, multiply the utility of *o* by the probability of *o* given *a*, then add these together. Clearly here the utility of an action is revealed as simply a function associated with the preference satisfaction associated with its possible outcomes. In this model, the appropriateness of principles (in this case regulating motivations) and desires are arbitrarily scaled and weighted as a function of doxastically pruning those actions which are considered relevant alternatives. The equation does not, itself, establish expected utility but rather sorts through and identifies relevant preferred alternatives without yet calculating the possibility of physical constraints and the possibility of realizing in fact various possible outcomes. Subsequent to such discernment, however, factoring in Bayesian measures of states of the outcomes, and the effects various actions may have on those states, completes the modeling of thinking leading to precise expected utility measures. While this sounds simple enough, fleshing out the additional mathematical calculations would take considerably more space in a discussion already pressed for space. More importantly, such an exercise is unnecessary here since the point is simply to show how moral preferences can be made part of the formal calculating process in active decision-making.

For those unfamiliar with contemporary decision theory, Heath's equation, and its embedding in a larger mathematical calculation, can be illustrated through creation of a decision tree. The beginning point is nature (the facts of the world as they currently exist). From there each path is sorted out by mathematical weighting to a subsequent node. Each node represents proportional constraints from that point forward in the direction of some set of circumstances commensurate with the possible outcome the decision-maker is aiming to achieve. The respective paths from nature to fulfillment of desires and motivations illustrate the costs involved in pursuit of a utility satisfaction and the risks undertaken to achieve that same expected utility. In this manner the decision-maker can choose a best solution defined in terms of highest expected utility (Heath, 2008).

Conclusion

In summary, the point of this model is to show three principles. First, normative concerns can be built into an algorithmic decision process. Second, since there are particular normative elements in educational administration, it is essential that the benefits of decision theory are widely recognized by educational administrators. Third, formal models secure directed decision-making. If a model is defective it quickly becomes evident. In short, decision theory, as mathematician Ken Binmore (2007; vi) claims "….really does work when applied by people who know what they are doing".

Once upon a time, educational administration was largely a matter of eye-balling a situation and then going with one's feel for things (Gronn, 2000; Wagner, 1986). This isn't necessarily a bad thing always. After all, evolution prepared humans to work cooperatively together and experience endows alert administrators with heuristical strategies for getting a job done when time is of the essence (Young, 1998). Nonetheless, the educational leader needs every tool modern research can make available for decision-making and community building (Cohen & Rhenman, 1961). Heuristics serve their purpose and so too can more formal calculations once they become more generally accepted.

By showing where in the decision making calculation proportional weight is given each moral preference, the moral commitments of the profession can be automatically built into the decision process and are no longer a mere advisory prelude to practitioner and policy theorists. Things such as a commitment to social justice can be nested in a calculation revealing the proportional weight given it in relation to other preferences when seeking Nash equilibrium or better yet the ever elusive Pareto optimality. Hidden agendas are far less likely to drive decision-making under more formal approaches. Formal calculations are transparent. Consequently, each stakeholder is guaranteed the opportunity to see where and exactly how preferences affecting them are proportionately assessed and calculated. Such procedures should make the acceptance of satisficing solutions a bit more palatable.

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