JUDGEMENTS, DECISIONS AND PROBLEM SOLVING BY PEOPLE AND MACHINES

Peter Robinson
University of Texas in El Paso

One of the problems with problem solving has been that its conceptual foundations lie in contemporary cognitive psychology and gestalt psychology. This has been fine for tests and measurements and for the practice of problem solving in quanitative study skills courses, but for the philosopher teaching problem solving it provides nothing more than a little depth to the heuristics of formal or informal logic courses and lacks any intrinsic theoretical interest.

Instead of trying to drive back to the theoretical commitments of cognitive and gestalt psychology, which are often disavowed by psychologists who have followed the lead of anti-realists in physical theory, I would like to begin with Kant and bring the richness of his conceptual constructions forward, hopefully to distinguish and illuminate some features of problem solving.

Kant's Critique of Practical Reason, distinguishes between hypothetical imperatives which underlie practical precepts and pure practical reason which is the foundation for moral laws. The former is only the structure of prudential ethics. The structure is of the form: If you want x do y or obtain y. All constructions of this kind concern means--ends relationships and depend on knowledge of the ends that satisfy the desires and on factual knowledge of their connections with the means. Decision procedures can be developed for prudential ethics by having a hierarchical ordering among ends and probabilistic knowledge of the availability of means and of the truth of propositions relating means to ends plus probabilistic knowledge of the availability of such propositions themselves, as additional means. Then, supposedly, the whole of prudential ethics could be calculated by man or by machine. If machines did not have any ends of their own, they could spend their time in helping people calculate how to get theirs, either individually or for the greatest number. Kant is not interested in prudential decision making either by people or machines whether it is to calculate for one's individual ends or for the political ends of the community. What Kant is interested in, in the Critique of Practical Reason, are moral laws. Those maxims which can be universalized and which treat all persons as ends-in-themselves. However, while Kant believes the distinction between prudential precepts and moral laws is the most important distinction for ethics, the formal criteria for the decisions of practical reason are not more complex and Kant believes he has laid them down himself. Thus, if we take any rule of action if it can be generalized for all persons, it can qualify for

being a moral law. This criterion is not sufficient. Brush your teeth before bedtime can be so generalized. All people should brush their teeth before bedtime. But it is not particularly moral. However, welching and lying cannot be so generalized and must be discarded as rules of moral behavior. Hidden existential quantifiers must also be exposed. All people should maximize my pleasure' is universal but probably not fair. Only maxims of action that can apply even-handedly and universally are assured of being fair. Both a person or a machine could decide on fairness in these cases equally well, if they applied Kant's criteria.

Kant's second criterion of treating people as ends rather than as means only would require careful checking. First one would have to distinguish a person (a rational agent) from animals and automata. This will lead us into unresolvable difficulties for Kant's rational criterion alone will include intelligent machines and his criterion of free agent will not be empirically distinguishable. Secondly all rules for action will have to be checked to see if they bode harm for persons, particularly for their rationality and integrity and to see if persons who turn up as means in one hypothetical imperative, turn up treated as ends in other hypothetical imperatives which are activated as causal consequences of the first. This is a difficult checking process for man or machine. One can never be sure that a person treated as a means with no regard for him or her as an end in themself will not turn up as end-in-themself and that the action was not performed with that in mind. However, with a proper hierarchy of human values with rational agents as absolute ends-in-themselves and the substituting of one person for another and seeing if while the one initiating the action is better off while the one being used as a means is no worse off, perhaps a method for making moral decisions that live up to Kant's moral laws could be worked out and the decision procedure be carried out by either man or machine. In any case these are supposed to be the easy cases those which have formal schemata and so ought to be mechanizable.

A more difficult class of decisions would be those concerning taste which are made by the faculty of judgement. Kant limits his inquiry, in the Critique of Judgement, to aesthetic judgements but what he says about how we judge something to be beautiful could be extended to how we judge something to be a particular kind of thing at all. If this is done, what Kant says in The Critique of Judgement will underlie all ethical decision procedures including the moral laws, for the recognition of ethical situations, of value and of moral agents themselves will be the result of their and of moral agents themselves will be the result of their conformity to schematia provided by the imagination. (Critique of Pure Reason. A 137 to 142) Even if we take an essentialist view of values and rational agents still, as Kant pointed out:

"If it (general logic) sought to give general instructions how we are to subsume under these rules, that is, to distinguish whether something does or does not come under them, that could only be by means of another rule. This in turn, for the very reason that it is a rule, again demands guidance from judgement and thus, it appears that, though understanding is capable of being instructed, and of being equipped with rules, judgement is a peculiar talent which can be practiced only, and cannot be taught. It is the specific quality of so-called mother-wit; and its lack no school can make good. For although an abundance of rules borrowed from the insight of others may indeed be preferred to, and as it were grafted upon, a limited understanding, the power of rightly employing them must belong to the learner himself; and in the absence of such a natural gift no rule that may be prescribed to him for this purpose can ensure against misuse. A physician, a judge or a ruler may have at command many excellent pathological, legal, or political rules, even to the degree that he may become a profound teacher of them, and yet, none the less, may easily stumble in their application. For, although admirable in understanding, he may be wanting in natural power of judgement. He may comprehend the universal in abstracto, and yet not be able to distinguish whether a case in concreto comes under it. Or the error may be due to his not having received, through examples and actual practice, adequate training for this particular act of judgement. Such sharpening of the judgement is indeed the one great benefit of examples." (Critique of Pure Reason, A 133-A 134).

Aesthetic judgements are judgements of particulars. The particulars are represented in the mind by the faculty of imagination. The sensations are private. Of the sensations only those of sound and sight are capable of being represented, so that only those can be objectified, placed at aesthetic distance and be vehicles of art, rather than private enjoyment or disgust. I disagree with Kant on this but in any case, in the representation of a particular in the imagination it is required that it fall within a concept and be communicable, thus providing a foothold for the objectivity and universality of aesthetic judgements. However, placing a particular under a concept, seeing it as an example of a particular

kind is an excercise of judgement which is a talent taught, if at all, by example and where the exemplars are provided through the imagination. Further, the commonality and communicability of aesthetic objects depends upon a common human world. An enlarged, more universal vision from the social world can be attained by discarding the prejudices of one's own situation (or those of another's point of view, if one were to assume another's view exclusively) and by assuming a common human standpoint in this world. (The Critique of Judgement, sec. 40)

Aesthetic judgement results from raising a private reaction to level of an object of reflective judgement in this way comparing the objects of the same kind and judging them in accordance with additional aesthetic criteria in terms of comparative beauty or ugliness. Kant suggests that a criterion for comparison is an exemplar in The Critique of Pure Reason and for natural objects in The Critique of Judgement a purposeful design.

While I do not wish to pursue human decision making and problem solving into a method of calculating aesthetic judgments, it should be noted that a machine could not make these judgements for us unless it was human. That is that it had our sensory modalities, our concerns and also lived in our common sensory world. It is the case, however, that some of Kant's analysis is applicable to any account of social, political and ethical judgments, decision making and problem solving by people or machines.

The two important features of Kant's Crtique of Judgement for problem solving and decision making are Kant's insistence that it is particulars that are judged even if they are particulars that are recognized as belonging to a particular kind. Kant distinguishes between determinant judgement in which the mind moves from general rules to particulars and reflective judgement in which the mind moves in the other direction. It is in reflective judgement that the mind operates in question of taste. (Critique of Judgement, Introduction IV. Judgement as a faculty by which laws are prescribed a priori.)

Secondly, sensory manifestations are ambiguous and must be given an interpretative representation in the imagination as an object of aesthetic judgement. The judgement of particulars as particulars short-circuits models of judgment that rely on traditional logical deduction since logical deductions require universal premises. What it does rely on is direct sensory appeal, seeing as seeing-as, and an affirmation of a common human point of view. Thinking machines in order to make aesthetic judgements that are valid for people would have to embody a common human point of view, a human typology of natural kinds and human sensory modalities. While no one is much interested in computer art critics. Kant has made judgement the arbiter of medical, legal and political affairs as well. If this were so and these were at times reflective judgements,

computer expert programs could at best mimic human judgements in these areas in a partial and unreliable way.

The indeterminateness of direct experience which is interpreted by a representation in the imagination is a forerunner of gestalt psychology and the thesis that observation is theory laden. Kant's common human understanding in which we raise ourselves above the level of the senses to that of the higher faculties cognition and his typology of natural kinds in the world provide objectivity and universality of judgement but human taste and pragmatic concerns provide their human limits. It is emphasis on these limits that underlies the subjectivity of contemporary interpretations of imaginative representation. Before problem solving and decision making can occur human situations must be represented as problems or situations with avenues of choice. For Kant this initial step is taken by educated judgement. Not every human situation can be represented as a problem nor is it likely that there is only one kind of problem that it can be represented as or that choices can be distinguished univocally.

It is a judgemental step to see a particular situation as a problem to be solved and then to see it as a particular type of problem. Not every cognized situation is a problem. It is a particular interpretative representation in the imagination that galvanizes a collection of vaguely troubling thoughts or a felt predicament into a problem. Not all human situations are problems, some are too vague, large, complex or irrational to be problems. The factors of a problem must be interrelated. Some of them must be in conflict or discord to create a problem. This implies some sort of goal, direction or outcome. Only goal-directed objects could have problems or recognize them. People and animals have problems, a computer can only recognize or have a problem if it has a high level program directed toward some end with alternative means of achieving the end and separate criteria to meet if the end is to be successfully attained. Problems usually have additional considerations such as additional information, techniques or other factors which may be brought to bear on them so that while they may not be solvable as they stand, they may be solved. Not all problem type situations can be solved but a problem with no potential solution is lacking an essential criterion for being a problem and is falsely seen as a problem rather than a troubling situation or inextricable predicament. In fact, representing situations as problems implies their solvability and may be done for ideological ends such as calling the Vietnam war a problem or psychological problems as problems. A lone traffic policeman in the middle of a race riot may have problems but they are not traffic problems or even problem of restoring order. Similiarly Freud did not propose psychoanalysis for the psychoses, for a situation to be a problem it must be limited and objectified

potentially solvable. There must be techniques to deal with it and a hope of a solution. The factors involved in it must be a limited number, articulatable, able to be kept track of. The factors must be able to be rearranged or re-ordered and where others might be introduced along with additional information and techniques of manipulation so that it can be altered and a desired outcome produced. Finally, not all problems are like mathematical problems with one best technique and only one right answer.

Having been given the elements of a problem, the techniques for solving some kinds of problems and the criteria for what counts as a solution, both human beings and machines could solve problems. Whether machines could recognize problems is another matter. Given the criteria for matching, I see no reason why a machine could not pick out and isolate a problem, but for it to be a genuine human or animal problem, rather than a formal or mathematical problem, the machine would have to have human sensory modalities, human typologies and human concerns. Social, medical, legal and political problem solving requires recognizing human values in accordance with in-built criteria and having an established set of relationships among them in mind. All the problems of axiology would have to be solved for any effective, ethical problem solving.

The questions that I have intended to raise with regard to decision making and problem solving by people and machines are as follows:

First, can a state of affairs of the world be resolved into a mere description of a situation without an interpretation of the situation into a human or other animal point of view and being completely colored by the appropriate species concerns and goals? Perhaps a machine could be programmed with human values and human sensory modalities for recognizing them and then be able at least mimic a human way of looking at the world. Perhaps also, a machine could more easily attain the common human view of the enlarged mentality required for objective judgment in Kant because it would not have to overcome deep seated, unconscious ideologies, prejudices, gnawing guilts, inferiorities and drives for revenge.

Secondly, can a situation once described be left as it is or must it be searched for problems and further organized into problems to be solved? If goals are already implicity interpreted into situations, it seems that all descriptive knowledge must be potentially utilizable in goal realization. But perhaps machines and contemplatives would be able to break with this further carrying out of problem solving, remaining at least at the organizational thinking level and out of active life.

Thirdly, if situations meet the criteria to be resolvable into problem situations, must they be unambiguously seen as a certain sort of problem? Although Kant tried to attain the criteria for universal agreement both in moral and aesthetic matters, the ambiguity of sensory objects for interpretation in addition to the variety of human concern allows for the same situation to be interpreted into differing problems. The resolution of situations into problems or collections of problems with their possible conflicts, will depend upon the individual projects and hierarchies of values. Can a machine incorporate a proper set of values for problem solving? This question can be answered with another question: Can a person? The fear of decision making by a machine that only maximizes profit, military advantages, winning in armed conflict or maximizing managerial effieciency is matched by the fear of persons doing the same compounded by the fear of their unconsious motives, their desire to acquire power, or how they will appear to others and finally the radical freedom to do something totally inappropriate to the problem.

The first step in the resolution of problems by both people and machines is goal selection and prioritization. This is prior to the description of a situation. The organization and identification of problems follows that, then the search for possibly applicable techniques and information, after that the possible stages of solution and the assessment of the existence of a solution or alternative solutions, finally the assessment of solvability which is carried on in interaction with the employment of problem solving techniques with alternative techniques employed in the pursuit of alternative solution goals. This may appear to be, and in fact is, a poor, elementary sketch for a vague programming flow-chart, but the problem with the literature on problem solving is the ontological priority given to problems as objective entities combined with the fear of machines as inhuman problem solvers. What is needed is a companion fear of people as problem solvers and more especially as problem creators.