

Practical Reasoning and Rationality

by

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## **Author's Declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions as required by my examiners.

I understand that my thesis may be made electronically available to the public.

## Abstract

Theories of practical reasoning and rationality have been expounded at least as far back as the Greeks. Beginning with several historical perspectives, I attempt to answer the descriptive and normative questions of practical reasoning and rationality. I then turn to a popular modern attempt, *expected utility theory*. I conclude that this approach cannot be sustained because of inherent inconsistencies and its inability to generate advice for a class of problems that other decision procedures can handle. I conclude by offering support for a new model of practical reasoning, the *practical argument model*. I explain the three dimensions of normative assessment for this model: logical, inferential and epistemic. I then show how an expected utility decision-procedure is encompassed by the practical argument model and, therefore, subject to these three levels of assessment. I conclude by offering some directions for future research.

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# Dedication

To Emma (the carrot and the stick)

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# 1. Introduction

Describing how we make deliberate decisions is a project that has a long history, deep applications and a wide academic scope. On the other hand, articulating what constitutes a *good* decision has been somewhat more distinctly the office of philosophy. It is no small thing that both the descriptive and normative problems have pervaded philosophy from the Greeks onward. It seems that humans have long held an interest in figuring out how we can be both effective and efficient in the world.

My purpose, presently, is to explore these issues in the form of practical reasoning and rationality. In addition to helping to clarify what practical reasoning *is*, I hope to show what practical reasoning ought to be. Being clear on both counts has the potential for several advantageous implications. Most notably, it may aid in the effective self-evaluation of the way each of us uses practical reasoning, helping us to become better decision makers. Moreover, whether or not there is a personal, practical advantage, there is certainly an intellectual one. The theories that I explore in the following chapters have served as a launching point for empirical investigations in psychology, economics and the cognitive sciences. A new model of practical reasoning with greater explanatory power and validity, while articulated in philosophy, can have theoretical implications across a range of disciplines.

It is with these purposes that I put forward my argument. At the outset, however, I must offer one point of distinction. Though they are sometimes used interchangeably, I take practical reasoning and practical rationality to be conceptually distinct. When I refer to practical reasoning, I am referring to a *process* by which we deliberate about decisions. On the other hand, by rationality I refer to a *standard* of behaviour. Hence, I could

employ practical reasoning without being practically rational. Explaining exactly what practical reasoning and practical rationality *are* is, in part, part of the current project. I have organized the discussion as follows: I begin with several influential historical perspectives on the nature of practical reasoning and rationality. These theories are important for two reasons. First, each theory constitutes an attempt to address both the descriptive and normative problems that I mentioned above. These attempts have each proved vital to the theoretical evolution of the models of practical reasoning and rationality that still invoke discussion today. By addressing the historical perspective, I sketch a backdrop against which the modern approaches can be compared and understood. The second reason to articulate these influential approaches is that there are a number of commonalities that emerge among them; in the model that I advance (in Chapter 5), I encompass this common ground. Any new model ought to refer to what people mean when they talk about “practical reasoning” and “practical rationality”. It is for this reason that enunciating and embracing the shared features of theories of practical reasoning and rationality is an important part of the present project.

In the following chapter I articulate a theory that has become among the most pervasive in debates on practical rationality: expected utility theory. The model emerged from the groundwork laid by one of the historical accounts (David Hume’s instrumental reasoning) and now reaches in scope throughout the social sciences. Expected utility theory cannot be ignored in any serious discussion of the modern debates on practical rationality. I briefly trace the development of the model including its ties to probability theory and Bayesianism.

In the fourth chapter I identify some of these challenges to expected utility axioms as well as to the theory's explanatory power. I argue that the various objections raise valid concerns in terms of the model's consistency and applicability. Specifically, as a normative standard the model conflicts with other decision procedures, leaving us in want of a way to determine if one or the other procedure is better. Further, I identify a scenario that expected utility is uniquely unable to handle. I argue that because this decision problem is not outside of practical reasoning, it raises concerns regarding expected utility's explanatory and normative range.

I argue that these challenges warrant the consideration of an alternative model of practical reasoning and rationality. I advance the practical argument model for a number of reasons. First, it encompasses several common elements of theories of practical reasoning. As I mentioned previously, these commonalities help to clarify what people mean when they say, "practical reasoning" and hence, have a descriptive force. Also, there have been various criticisms levied against each of the theories that I highlight in Chapters 2 and 3. I argue that the practical argument model can serve to adjudicate between competing decision strategies and thus, serve to navigate these criticisms. The practical argument model provides clear, non-circular, normative criteria that can both serve to evaluate an individual's practical reasoning and advise towards a particular decision procedure given the available information and the agent's computational resources.

To arrive at the practical argument model, however, I first identify some of the conceptions of practical reasoning and rationality that have proven to have influence throughout history. It is these theories to which I turn next.

## 2. Historical Perspectives

In this chapter, I offer three historically influential accounts of practical reasoning: that of the Ancient Greeks, Hume and Kant. These perspectives are vital to grasp if we are to understand the differences in modern attempts to understand practical reasoning. The differences between them still delineate orientations toward practical reasoning to which by contemporary theorists subscribe. I begin this brief survey with the Ancient Greeks.

### The Ancient Greeks and Practical Reasoning

In this section, I will begin with an interpretation of the Homeric notion of reason and then explore, Socrates, Plato, the Stoics and Aristotle in turn. It is important to note that ‘reason’ was anything but a clear and conventional notion among the Greeks, let alone one that included an acute distinction between theoretical and practical dimensions. Thus, in order to capture Ancient Greek conceptions of practical reasoning, their respective aspects of theoretical reason must be acknowledged as well.

One of the foremost problems in deciphering Greek conceptions of reason is that of translation. Consider the following passage of Homer’s *Iliad*:

Your heart is tireless, like a wood-chopping axe  
wielded by a craftsman cutting timber for a ship.  
The axe makes his force stronger. Your mind is like that—  
the spirit in your chest is fearless. (*Il* 3.63).

Note that the translator used the term “spirit” for the Greek word *nous*, which is commonly translated as *intellect*. Subsequent commentators have acknowledged the difficulty in making a straightforward translation of Homer. Is he using a literary device

here, or is his notion of intellect actually equated with courage? The point is that it is a mistake to assume that we can capture or comprehend the Greek meaning of a term, like ‘reason’ or ‘intellect’, by applying our modern conceptions. In fact, Michael Frede offers an account of Homeric reason that is certainly different from the modern conception:

But though *nous* is the word which later philosophers like Aristotle will use to refer to the intellect or even, more generally, to reason, it is clear that in Homer the word refers to a rather specific ability, namely the ability to, for instance, quickly get an overview and an understanding of a situation. Homer does refer to a number of, in a large sense, cognitive abilities, but there is no notion of an integrated system of abilities which roughly plays the role of reason in explaining how we come to have beliefs about things and how these come to guide, or fail to guide, our actions” (Frede, 1996, p. 4).

The fact that we see instances of Homer’s characters making inferences and judgments in a way that might warrant the ascription of the modern conception of reason does not show that he had a grasp of a construct that matches any modern one.

However, part of the difficulty in interpreting Homer (and indeed, the Ancients generally) is that he did not treat concepts with the same philosophical rigour that has become standard. I now turn to four famous Greek positions on the nature of reason and practical reason and argue for certain commonalities that I believe emerge from these Greek views.

To begin, consider Socrates as he was presented by Plato in *Protagoras*.

‘Then it must follow that no one willingly goes to meet evil or what he thinks to be evil. To make for what one believes to be evil, instead of making for the good, is not, it seems, in human nature; and when faced

with the choice of two evils no one will choose the greater when he might choose the less...

'Now you recognize the emotion of fear or terror... Whether you call it fear or terror, I define it as expectation of evil' (*Protagoras 358d*)

At the end of this passage, Socrates weds emotion (and desire) to belief in such a way that for him, emotion is reduced to specific sorts of beliefs (e.g. fear is the belief that evil / pain will ensue). He makes another point here that we cannot act willingly against our beliefs. This point, if we accept it, avoids a long-standing problem in philosophy: *akrasia* or weakness of the will. Roughly, the problem is concerned with how we can act against what we know (or believe) to be best. I will return to this issue later, as it pervades theories of practical reasoning. For Socrates, however, the problem is evaded since we *cannot* act contrary to our beliefs.

The Stoics, generally<sup>1</sup>, seem to line up with Socrates' position but they see desire as a process of ascribing the predicates 'good' or 'bad' to the particular features of the universe while the universe itself is value-neutral. The ascription process requires making a *judgment* about which predicate is appropriate for a given phenomenon. This would seem to be an instance of theoretical reasoning. In fact, Aristotle contended that practical syllogisms consisted of judgments because they allow for predication: The inference, "All humans are mortal; therefore, Socrates is human" allows us to predicate Socrates with 'is human'.

Right action, for the Stoics, begins with right thought, requiring a correct judgment about the universe and one's place in it. This means that we ought to refrain from ascribing 'good' and 'bad' to the features of life and instead be interested in

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<sup>1</sup> Posidonius and Galen are exceptions as they were sceptical about the very existence of 'reason'.

ascribing 'true' and false' or at least recognizing falsity when we cannot be fully certain of truth.

Plato did not subscribe to the conjoining of belief and emotion. Rather, his theory divided the soul into parts that can each have independent desires. In this way, he seems to avoid the problem of *akrasia*. Consider this passage from the *Republic*, where it appears that he is aware of the problem:

'Now, can we say that men are sometimes unwilling to drink even though they are thirsty?'

'Oh yes; that is often true of many people,' he said.

'Then how are we to describe such cases?' I asked. 'Must we not say that there is one element in their minds which bids them drink, and a second which prevents them and masters the first?'

'So it seems.'

'And isn't the element of prevention, when present, due to our reason, while the urges and impulses are due to our feelings and unhealthy cravings?' (Republic 4, 439c-d)

His recognition of conflicting desires is presented in his theory of the tripartite soul. The rational part is governed by reason and desires wisdom and virtue. The irrational part of the soul desires carnal pleasures like food, sex, and bodily comfort. Finally, the spirited part of the soul desires to overcome adversity and experience victory. When the rational part of the soul is able to take primacy over the other parts, and individual may come to know 'the good', which means that he will know both what is best for him and what is best for the society in which he lives. This means that coming to know what to do in a given situation requires that an individual has grasped a bigger picture: he knows himself and what he is good at, and he knows the benefit that he can

have to his society. The desires of the irrational and spirited part of the soul do not necessarily need to be ignored, but they must be subordinate to the understanding of the rational part of the soul. This understanding is reached by pursuit the pursuit of reason and wisdom.

Plato is able to account for *akratic* action as the result of a soul that is governed by its irrational part. While reason may direct an individual in one direction, his passions may have a more forceful pull. When this is so, then the individual may act against his reason.

Aristotle retained the idea that there are different types of desire: *boulesis* is characterized as a desire of reason, for it is the desire for something good. In *Rhetoric*, Aristotle writes:

All actions that *are* due to a man himself and caused by himself are due either to habit or to rational or irrational craving. Rational craving [*boulesis*] is a craving for good, i.e. a *wish* -- nobody wishes for anything unless he thinks it good. Irrational craving is twofold, viz. anger and appetite. Thus every action must be due to one or other of seven causes: chance, nature, compulsion, habit, reasoning, anger, or appetite. (*Rhetoric* 1369a).

Aristotle's position is that all self-caused action is due to either habit or desire. Within desire, he allows for a value-based distinction such that all desires that are good are *boulesis* desires. This category of desire is linked with reason because it requires an understanding of what is 'good'. Aristotle, like Plato, allows for non-rational desires: *thymos*, which desires love and friendship and *epithymia*, which desires pleasure. For him, a desire can be classified as both *thymos* or *epithymia* and *boulesis*. An example is a

desire to be with a friend who satisfies both a need for companionship and can convey an accurate understanding of what is good for the individual.

There is a commonality that has emerged from Socrates through Aristotle: each theoretical perspective links, in some way, reason with desire. Michael Frede (1996) makes the point that each of these schools conceives reason as *having the desire* for truth itself. Reason for these thinkers then, has a motivational pull and is not merely ascribed an instrumental status. A second common feature of reason for these Greek schools is that knowledge (or at least beliefs or assumptions) exist as constitutive parts of reason.

Most directly, Plato's theory of the Forms holds that our eternal souls have full knowledge before they are united to our bodies. It is, in part, the job of reason to get us back to the understanding that we had in our pre-embodied existence. Socrates also took the position that we have inherent knowledge, which can be discovered by appealing to our reason. The Socratic method would seem to rely on this assumption since it guides people into knowledge without giving them any information that they did not already know.

Aristotle and the Stoics differ on the matter, as they subscribe to the *tabula rasa* viewpoint. However, as Frede puts it, "... they assume that it is constitutive of reason to have a fundamental knowledge of things, they argue that reason only emerges in the course of our development precisely to the degree that we acquire this grasp on, and knowledge of, things which make thinking and reasoning, properly speaking, possible in the first place" (1996, p. 11). For Aristotle, reason only comes about as we begin to grasp universal concepts and principles. For the Stoics, an individual's intellectual

development involves the soul being converted into reason itself, by discarding its natal irrationality and understanding the neutrality of the universe.

A third commonality among these schools is their commitment to the *practical* nature of reason. Specifically, it is being guided by reason that allows us to live well. In acquiring theoretical knowledge (or at least shedding false beliefs) about ourselves, our society and the nature of the universe, we have the potential to live well.

For Socrates, this means that we need to rid ourselves of false beliefs and recognize our epistemic limits. While for the Stoics we are to understand the universe, which will facilitate our separation from the irrational experiences of pain and pleasure. Plato tells us that we must be led by the reason-governed rational part of our souls, which will allow us to understand and adhere to the role that we ought to play in society.

Aristotle distinguished between practical and theoretical reason, but acknowledged that both are necessary for a person to live well. Through theoretical understanding, we can come to know universal concepts and principles, which in part will give us cognitive tools to interact with our environment. However, the primary focus of theoretical knowledge is its aim at truth. For instance, as he describes in *Categories*, we can gain knowledge through judgment by drawing intellectual associations that correspond with reality. He sets out logical principles that serve to underpin these judgments.<sup>2</sup> Though his principles are grasped at a theoretical level, they are employed in practical experience.

On the other hand, Aristotle posits another kind of knowledge that is not aimed at knowing or understanding the truth, but at understanding what needs to be done, and knowing how to do it. This practical knowledge can inform our theoretical knowledge as

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<sup>2</sup> Perhaps most famously, the law of non-contradiction [ $\neg (p \wedge \neg p)$ ] and the law of identity ( $p = p$ ).

we experiment and manipulate our environment. Its aim, however, is that we complete our practical goal (whether building a bridge, or eating a meal). Famously, Aristotle used the practical syllogism to formalize practical reasoning. It takes the form<sup>3</sup>:

Universal premise (e.g. dry food is good for every man).

Particular premise (I am a man).

Practical conclusion (therefore, eat dry food).

However, it would be a mistake to take this as Aristotle's only comment on practical reasoning. In *Nicomachean Ethics* he presents us with an argument for the best sort of life. It is a life spent pursuing *eudaimonia*, the end of all ends, which requires both living a full life (i.e. one of many pursuits) and pursuing theoretical knowledge. For him, this 'practical' guide to life allows us to fulfill our potential as human beings. Insofar as practical reasoning is reasoning about what to do, Aristotle's theory of *eudaimonia* encompasses both theoretical and practical dimensions. We have, then, a standard of good practical reasoning: good practical reasoning will lead us towards *eudaimonia*. Of course, this is much harder to evaluate than the practical syllogism but insofar as we can posit a definition of *eudaimonia*, we can evaluate practical reasoning.

An additional point regarding Aristotle's theory was that the life pursuing *eudaimonia* is only available to relatively affluent males. On the Stoic view, however, the good life was available to anyone regardless of station in society. The Stoics contended that living well required that we live in accordance with Nature. This allows us to be content with circumstances.

Though the middle ages, conceptions of reasoning, including practical reasoning, were generally expositions or modifications of the Stoic, Platonic or Aristotelian

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<sup>3</sup> He presents the example to follow in *Nicomachean Ethics*, VII, 3.

positions. It was with David Hume's writings in the middle third of the eighteenth century that theories of practical reasoning took a decidedly different direction. Indeed, a great deal of contemporary thought in practical reasoning and rationality can be traced back to the theoretical course that Hume began to plot. I will outline some of his theory below beginning with his broader theory of reasoning.

### **David Hume**

Hume made a distinction between two kinds of reasoning: The relating of ideas and the relating of matters-of-fact. The first type has since been termed *demonstrative reasoning* while the second has been called *probable reasoning*. Demonstrative reasoning is concerned with the abstract relations of ideas, such as in mathematics: "There remain, therefore, algebra and arithmetic as the only sciences, in which we can carry on a chain of reasoning to any degree of intricacy, and yet preserve a perfect exactness of certainty" (Treatise of Human Nature, 1.3.1, p. 51). While important to these discipline, probable reasoning is far more pervasive in human life.

Hume's probable reason is the associating of ideas based on their probable conjoining, determined inductively.<sup>4</sup> As he puts it, "All kinds of reasoning consist in nothing but... a discovery of those relations, either constant or inconstant, which two or more objects bear to each other" (Ibid 1.3.2, p. 52). The "relations" that he speaks of are of seven types: "resemblance, identity, relations of time and place, proportion in quantity or number, degrees in any quality, contrariety, and causation" (Ibid 1.3.1, p. 50). Of

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<sup>4</sup> Hume articulates different types of probable reasoning: *probability of cause*, which relates to the idea of the cause-effect relation; *probability of chance*, in which the outcome of a scenario is not known, but there are a limited number of possibilities (as in gambling); *analogy* in which we draw inferences because of similarities between different events and outcomes; *unphilosophical* where other factors (like desire) affect the mind's certainty of belief.

these, he holds that the only relation that is ‘discovered’ by associating ideas is that of causation, the others are observed in experience.

For Hume, the discovery of causal relations always depends on experience and specifically on the repetitive observation of contiguity and succession between two states of affairs. Reasoning of this sort requires a *probable inference*, which Hume says is not reasoning, but rather results in the presumptive belief that the laws of nature continue uniformly. Hume cannot call this transition from inference to the uniformity of nature ‘reasoning’ because he requires some sort of foundation on which reasoning can operate. It simply exists as a sort of base-line cognitive function, from which probable reasoning can proceed. Thus, Hume encounters a pervasive problem in philosophy: the problem of induction. In this case, the problem is apparent in examining the epistemic justification for this type of inductive reasoning.

In terms of practical reasoning, Hume makes two significant departures from the Greeks. First, he argues that reason has no motivational power. Second, he argues that we cannot make moral conclusions from reasoning alone, which means that we cannot engage in reasoning which brings us to conclude which of our ends are ‘good’. His perspective on these matters still garners a great deal of attention and I will briefly discuss each argument.

Hume’s classification of reason into relations of ideas (demonstrative) and matters of fact (probable) provides the major premise in his argument that all reasoning is motivationally inert. Demonstrative reasoning involves abstract ideas (such as mathematics), and does not in any way connect to an agent’s volition. Similarly, probable reasoning only results in the projection of a cause-effect relation, which does

not contain any inherently motivational constituents. Hume acknowledges that motivation would seem to accompany reason, but he explains this feature as follows:

...when we have the prospect of pain or pleasure from any object, we feel a consequent emotion of aversion or propensity... this emotion rests not here, but making us cast our view on every side, comprehends whatever objects are connected with its original one by the relation of cause and effect. *Here then reasoning takes place to discover this relation... But 'tis evident in this case, that the impulse arises not from reason, but is only directed by it.* 'Tis from the prospect of pain or pleasure that the aversion or propensity arises towards any object: And these emotions extend themselves to the causes and effects of that object, as they are pointed out by reason and experience. (Treatise 2.3.3 p. 266. Italics added).

So the 'illusion' (as Hume would see it) that we are motivated by reason, is born out of the way in which we attribute (through reason and experience) the effect of a particular stimulus to produce emotions of aversion or propensity. From here it follows that reason cannot *oppose* volition, for this would require a contrary motivation (produced by reason). He famously concludes, "Reason is, and ought only to be the slave of the passions..." (Ibid, 2.3.3, p. 266).

Hume makes a further point by adding that passions (i.e. desire and aversion), have no representational quality and therefore cannot be opposed to the truth-evaluable conclusions reached by reasoning. This, of course, is directly contrary to the Platonic and Aristotelian conceptions of a divided soul, whereby our irrational desires can be contrary to the rational desires of reason.

Hume does allow for reason to guide passion in two ways: when passion is based on a false supposition, or when it has incorrect means to be satiated:

“...a passion can never, in any sense, be called unreasonable, but when founded on a false supposition, or when it chooses means insufficient for the design’d end... The moment we perceive the falsehood of any supposition, or the insufficiency of any means our passions yield to our reason without any opposition... I may desire any fruit as of an excellent relish; but whenever you convince me of my mistake, my longing ceases”

In Book 3 of the Treatise, Hume makes a further move away from the Greeks by arguing that we cannot reach conclusions regarding virtue and vice by reasoning. Hence, reason alone is no help in our pursuit of the ‘good life’ insofar as the good life is the pursuit of virtue(s). He draws this conclusion from his argument that morals have an effect on motivation and volition, so necessarily cannot be associated to reason:

Since morals, therefore, have an influence on the actions and affections, it follows, that they cannot be deriv’d from reason; and that because reason alone, as we have already prov’d, can never have any such influence. Morals excite passions, and produce or prevent actions. Reason of itself is utterly impotent in this particular. The rules of morality. therefore, are not conclusions of our reason. (3.1.1).

Later, Hume’s view of practical reasoning was termed ‘instrumental’, because its only justified concern is with the means of attaining pre-existing ends. Clearly this is a radical departure from the Greek view on which reason was both a motivating force within each of us, and an instrument with which we could investigate how to live a good

life. In the next section, I discuss the work of Immanuel Kant, whose writings brought another shift in theories of practical reasoning.

### **Immanuel Kant**

Like Hume, Kant offered an account of means-end reasoning. However, Kant's account of practical reasoning is much more ambitious than Hume's. Kant disputed the view that we ought to pursue an ultimate 'good' (like happiness or Aristotle's eudaimonia), because it cannot be, in principle, established by reason or experience. Such 'goods' are ideals of the imagination only. Moreover, on his view, there is no basis for claiming that practical (or ethical) reasoning is solely a matter of means-end reasoning. However, he does give an account of means-end reasoning in terms of his *principle of hypothetical imperatives*. These principles do not oblige us towards a certain action, at most they can be considered "counsels of prudence".

Kant's more profound theory is found in his attempt to lay down fundamental principles of action that serve to guide our behaviour. For him, practical reasoning is a matter of the application of (and adherence to) these principles. This project permeated a great deal of his work but his position remained constant throughout (e.g. *Groundwork of the Metaphysic of Morals*, 1785; *Critique of Practical Reason*, 1788; and *The Metaphysics of Morals*, 1797).

To begin, consider the conception of reason that Kant is trying to vindicate in the *Critique of Pure Reason*. Onora O'Neill puts it this way<sup>5</sup>: "throughout the *Critique of Pure Reason* reason is depicted as an *active* capacity that both *generates and may resolve problems*. *Reflexive structure* is part of the key to understanding Kant's conception of

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<sup>5</sup> The terminology in the subsequent passage is O'Neill's. Though Kant's theory does entail a 'reflexive structure', he never used the term.

vindicating reason” (1992, p.288). Reason is proposed as generating constraints to both knowledge and action. However, reason is certainly autonomous in that it does not submit to any “alien” authority. Thus reasonable thought and action is that which is constrained by law-like precepts.

If reason will not subject itself to the law it gives itself, it will have to bow under the yoke of the law which others impose on it, for without any law whatsoever, not even the greatest nonsense, can play its hand for very long. *Orientation*, 8:145

The notion of reason that, for Kant, retains tenability is certainly modest. However, it is from this place that he sets out the law-giving principles of reason. He seeks a fundamental principle of reason that is fit for universal use (O’Neill, 2004). In terms of *practical* reasoning, this takes the form of *Categorical Imperative* (CI)

In its first formulation, Kant states: “Act only according to that maxim whereby you can at the same time will that it should become a universal law” (G. 4:421). This formulation has been taken by subsequent commentators (e.g. O’Neill, 1989; Rawls, 1989) to be the principle underpinning a decision procedure that involves the following steps: (1) articulate the reason for my action (a maxim); (2) imagine this maxim as a law governing all rational agents such that they are legislated to act as I would in these (or similar) circumstances; (3) is the maxim conceivable in a world governed by the law (is it free from incoherence and contradiction)<sup>6</sup>? (4) If yes, can I *will* to act on the maxim<sup>7</sup>. (5) If yes, the action is *permissible*. Note that we are not bound to perform actions that are merely permissible. The CI, in this formulation constrains our *reasons for action*. Of

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<sup>6</sup> This is Kant’s *contradiction in conception*. An example is the maxim “it is permissible to steal”, since stealing presupposes property, but if it were universalized then there could be no property.

<sup>7</sup> This is the *contradiction in the will*. An that would fail this test would be the maxim that we should not develop our skills or help each other. Failures here prescribe ‘imperfect duties’.

course, we are still psychologically free to act counter to the CI, but Kant's position is that we cannot rationally defend our behaviour when we do so.

Through to contemporary theory, the influence of Kant's ambitious account of practical reasoning has had its greatest impact on debates in ethics and morality. Hume's influence, however, was decidedly different. The notion that all practical reasoning is instrumental garnered favour with other empiricists because it allows for an observable evaluation of the effectiveness with which a person reasons: I have practically reasoned well insofar as I am able to attain my ends. An observer need only know my ends and whether they have been satisfied in order to assess my (practical) reasoning. On the other hand, Kant acknowledged that an individual's adherence to the categorical imperative was inaccessible. He states in *Groundwork* that two individuals may behave in the same manner, but with different motivations. He evaluated practical reason at the level of *intent*, while those following Hume are able to evaluate at the level of action. The spread of the Logical Positivist movement in the first half of the twentieth century meant that a Humean version of practical reasoning was much more attractive to many theorists.

In the next chapter I will discuss a theory of practical reasoning that purports to take the Humean, instrumental conception as foundational. On this account, practical reasoning is assessed quantitatively, by its success at fulfilling an agent's goals. It has become a tremendously influential perspective in a number of fields, so warrants consideration presently.

### 3. Expected Utility as Practical Reasoning

One of the more recent theories of practical reasoning that has gained both the support of empirically-oriented philosophers and a great prominence in the literature of a variety of discipline is *Expected Utility Theory* (EU). The theory has been attributed by some (e.g. Hampton, 1994) as the most popular theory of practical rationality since the mid-twentieth century. In this chapter, I discuss the origins of this theory, its main features and some of the popular forms that it takes.

#### **The Development of Expected Utility**

Philosophers are familiar with the term ‘utility’ as Jeremy Bentham and subsequent utilitarians have used it: generally equating it to pleasure or happiness. The term has a slightly different meaning in EU theory, however, as it is defined mathematically in terms of an agent’s preferences. Nevertheless, both the Benthamite notion of utility and that used in EU theory are relative to the agent.

Central to the mathematics of EU are the use of probabilities. The work of a number of Early Modern thinkers is relevant to the developments in probability theory and subsequently on notions of normativity in practical reasoning and rationality. Hume’s ‘probable reasoning’, for example, was discussed in the previous chapter. However, nearly a century before Hume, Antoine Arnauld (1662) made a significant contribution to what would become EU. He agreed with the commonsense notion that when considering a course of action, we should consider the probability of the possible outcomes; but Arnauld argued that a second feature ought to be weighed in our decisions as well: the probability of the gains or losses that would accompany these outcomes.

Given these criteria for making a decision, the normative standard was equated with maximizing monetary gain. However, Arnauld's formalization allows for what became known as the St. Petersburg paradox<sup>8</sup>. The St. Petersburg problem is similar to another that I will mention in Chapter 4 (the Pasadena Paradox), so it warrants a brief treatment here. Consider a gamble that involves betting on coin flips such that a payoff is given that is  $2^n$  the number of tails flipped in a row ( $n$ ) before a head appears. For instance, four tails in a row would yield sixteen dollars. Since there is a possibility of flipping an infinite number of tails in a row, the gambler is obliged, by Arnauld's standard (maximizing monetary reward) to bet any stake. Even though a long string of tails occurs very rarely, when it does the large payoff creates the rational obligation to place the high bet. However, this 'obligation' runs counter to both commonsense and experience.

The problem led to Daniel Bernoulli's modification (1738/1954) to move away from the monetary payoff of the gamble, to the *utility* that money has for the gambler. Five dollars, for instance, might have more value to the man who is hungry and homeless than to the well-fed real-estate tycoon. Moreover, the five dollars might not even have the same value to the hungry man once he has eaten. Bernoulli argued that we ought to maximize a logarithmic function of money, to reflect its diminishing utility as wealth increases. Thus, the gambler in the St. Petersburg paradox example is only willing to pay a finite stake, since the fair price reflects the utility derived from monetary value.

With the logarithmic utility in place, the results seem more inline with commonsense. Using Bernoulli's formula, a millionaire should pay no more than \$10.94

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<sup>8</sup> The earliest document identifying this problem (and giving it its name) is a letter written by Nicolas Bernoulli, the cousin of Daniel Bernoulli, in 1713.

to enter the gamble, someone with \$1000 should only pay \$5.94 and a person with \$2 should bet the entire \$2. However, there have been a number of criticisms of Bernoulli's solution. Using his formula a payoff of \$1024 is only valued as having ten times greater utility than \$2. This result would seem to run counter to most people's intuitions. A further problem is that a modification can be made to the St. Petersburg problem that stipulates that the payoff is made in terms of utility, rather than money; so the payoff is  $2^n$  'utilities' instead of dollars (Weirich, 1984). This modification retains the paradox.

Notwithstanding the criticisms, Bernoulli's solution is heralded as the first substantive mathematical statement of EU (e.g. Bicchieri, 1998 makes this claim). The modern accounts of EU have become more refined. One area of refinement has been attempts at articulating the normative standards of how an agent employs probabilities. These 'laws' of probability because are foundational to modern accounts of EU. However, as I will discuss in Chapter 4, the manner in which probabilities are employed may present problems to EU construed whether descriptively or normatively.

The probabilistic account of practical reasoning and rationality parallels the probabilistic account of epistemic rationality (Bayesianism). *Probabilistic consistency* is a standard of action or of belief. Simply put, probabilistic consistency is the adherence to the laws of probability as articulated in the Bayesian project. The argument in support of probabilistic consistency was developed most famously by Frank Ramsey (1931) and Bruno de Finetti (1937). The following sketch of their argument shows how probability theory is tied to the EU standard of practical rationality: (p1) practical rationality requires that an agent performs the action that will produce the best result, leaving him better off in all circumstances; (p2) practical rationality requires that an agent perform the action

believed to best satisfy his desires; (p3) practical rationality requires that the agent's estimation of the best action for desire-satisfaction maximizes expected utility; (p4) trying to maximize expected utility by using beliefs that violate the laws of probability will not leave the agent better off in *all* circumstances. (C) Therefore, practical rationality requires that the agent's beliefs do not violate the laws of probability. The Dutch Book Argument<sup>9</sup> is heralded as an example of why our beliefs and subsequent actions must adhere to probabilistic consistency (thereby supporting p4).

Ramsey and de Finetti's work was tremendously influential to two economists, John von Neumann and Oscar Morgenstern, who authored what is now regarded as the classic statement on EU, *Theories of Games and Economic Behavior* (1944/1947). The work uses a series of axioms regarding an agent's preferences to determine a utility value for given outcomes, which is represented by a mathematical function. Their proof allows for the fact that we rarely make decision with certainty regarding the outcome<sup>10</sup>. However, they require that a probability be *objectively* assigned to each possible outcome.

Many of the criticisms of von Neumann and Morgenstern's work target the axioms of their theory. There have been several restatements of the axioms using equivalence proofs (for example, see Bicchieri, 1998). However, whatever the particular articulation of their axioms, von Neumann and Morgenstern regard rational

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<sup>9</sup> An example of a Dutch Book problem is as follows: The 'law' of *additivity* states that an agent's degrees of belief cannot sum to a number greater than 100. I cannot, that is, believe with 55% certainty that it will rain and 55% certainty that it will not rain or I might enter a series of gambles that would leave me broke.

<sup>10</sup> However, von Neumann and Morgenstern's axioms require that utility values be ascribed by an agent to outcomes that are certain. These are termed, *riskless prizes*.

behaviour as that which satisfies an agent's preferences according to the axioms<sup>11</sup>. This is maximizing expected utility.

A second class of problems with the von Neumann and Morgenstern result is born with its requirement that probabilities be objectively assigned. In 'real-life' decision making, we are rarely privy to the probabilities of various outcomes. Further, in any complex decision (one with numerous factors affecting a variety of outcomes) even observers would have a great deal of difficulty pinning down the probabilities to use. This difficulty is a problem with the *access* to requisite information for von Neumann and Morgenstern EU-reasoning. The theory might be unattractive as a normative standard of rationality, because it is impossible to implement in all but a small range of circumstances. Further, the lack of the necessary information makes it problematic to construe EU as a normative theory of practical reasoning. Is it possible to hold an agent accountable for the manner in which he uses information that he does not have? If I base an action on the outcome of having performed (correctly) all the relevant calculations stipulated by von Neumann and Morgenstern, but have used an incorrect probability (because I estimated), have I *reasoned* poorly? In Chapter 5 I will revisit this issue as I present an alternative set of criteria on which practical reasoning can be evaluated.

One solution to this issue, for EU supporters, is to use agent-defined probabilities such that the normative standard is tied to the information that the agent has available. Because the agent has all the relevant information, EU might be used not only as a standard of practical rationality (or rational action) but of practical reasoning as well.

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<sup>11</sup> For example, the *transitivity* axiom can be stated as: If X is preferred to Y, and Y is preferred to Z, then X is preferred to Z is implied.

In 1954 Leonard Savage, offered a representation theorem that allowed for the use of subjective probabilities. He used the terms *states*, *consequences*, and *acts*, in such a way that each act/state pair produces a unique consequence. For Savage, the agent does not believe that he can causally affect a state, only that it brings about a unique outcome when coupled with an act. For instance, my choice (act) that tails will be flipped (state) does not affect the outcome (consequence).

Joyce (2004) summarizes Savage's contribution on subjective probabilities as follows: "There must be at least one probability  $P$  defined on states and one utility  $u$  for consequences that represent the agent's preferences in the sense that, for any acts  $A$  and  $B$ , she strictly (weakly) prefers  $A$  to  $B$  only if  $Exp_{p,u}(A)$  is greater than (as great as)  $Exp_{p,u}(B)$ " (p. 138). The axioms which Savage lays out allow him to guarantee that there is a unique probability and utility, that are unique to an arbitrary choice and zero-point. The expectation of the probability, utility pair represents the agent's preference. So for Savage, it is the individual's expectation of outcome (and utility) that is used in the theory, not the objectively assigned probabilities of von Neumann and Morgenstern. This means that by Savage's formulation, an individual's (subjective) expectations are relative to him and not evaluable in terms of practical rationality. Two individuals with the same preferences can rationally choose to perform different acts, if they have a different expectation regarding the consequence. On von Neumann and Morgenstern's account, however, at least one of them has made an irrational choice, since the expectations (i.e. probabilities) are objectively determined.

One further point on Savage's theory: A significant axiom in the proof is called  $P4$ . This allows Savage to 'define' beliefs in terms of preferences. Again, I use Joyce's

(2004) succinct formulation of the axiom for which X and Y are states and O is a consequence:

If the agent prefers  $[O_1 \text{ if } X, O_2, \text{ else}]$  to  $[O_q \text{ if } Y, O_2, \text{ else}]$  when  $O_1$  is more desirable than  $O_2$ , then she will also prefer  $[O_1' \text{ if } X, O_2', \text{ else}]$  to  $[O_1' \text{ if } Y, O_2', \text{ else}]$  for any other outcomes such that  $O_1'$  is more desirable than  $O_2'$ ... [Therefore,] A practically rational agent *believes X more strongly than she believes Y* if and only if she strictly prefers  $[O_1 \text{ if } X, O_2, \text{ else}]$  to  $[O_q \text{ if } Y, O_2, \text{ else}]$  for some (hence *any*, by P4) outcomes with  $O_1$  more desirable than  $O_2$  (p. 138).

This is reminiscent of the Bayesian project, mentioned above, to have the standard of *theoretical* rationality be informed by the standard of *practical* rationality. This debate has earned a great deal of attention. Of present concern, is Savage's position regarding the normativity of his axioms. He holds that if an individual violates his axioms, he will not maximize his expected utility. This failure is an indication that the individual is not behaving rationally. If his action is assessed as irrational, and given that his action is based on information that is available to him (according to the axioms), then we can infer that either the agent is not using the information well (i.e. has a practical reasoning problem), or he has a problem with his willpower (i.e. *akrasia*).

In the next chapter, I will examine several of the paradoxes allowed by the EU axioms. I will also discuss its applicability as a theory of practical reasoning (rather than a predictive / normative theory of behaviour).

## 4. Challenges to Expected Utility

In this chapter I argue that EU is inadequate as a theory of practical reason. I will juxtapose EU against a rival theory, dominance reasoning, across four problems: the prisoner's dilemma, Allais's paradox, Newcomb's problem and the Pasadena paradox. In the first three instances dominance reasoning and EU offer conflicting solutions, while in the Pasadena paradox only dominance reasoning offers a solution; EU cannot. This result, at a minimum, shows that EU is *incomplete* as a theory of reasoning and rationality and that it is in need of a complement.

### The Prisoner's Dilemma

The Prisoner's Dilemma (PD) was famously developed by Merrill Flood and Melvin Dresher while working at the RAND corporation in 1950 (Albert W. Tucker later added prisoners in his version). The problem presents a serious challenge to consequentialist accounts of practical reasoning because, in its basic form, it yields sub-optimal outcomes for individuals who make decisions rationally aiming at individual optimality.

To begin, consider Tucker's illustration: You and an accomplice are charged with a crime. The prosecutor offers both of you the same deal, but the outcome that you will face depends both on your response and on that of your accomplice. The outcomes are represented in the following matrix:

	Other prisoner <i>does not</i> confess	Other prisoner <i>does</i> confess
You <i>don't</i> confess	One year in prison	Ten years in prison
You <i>do</i> confess	No jail-time	Nine years in prison

There are several additional assumptions in the basic formulation of PD: The only goal for each criminal is the least amount of jail-time (e.g. compassion, revenge, and morality are not relevant factors in either criminal's decision). Also, each criminal believes that the prosecutor will not renege on the deal and is aware that the same deal is being offered to the other.

Now, consider the deductive argument derived from the dilemma (Campbell, 1985, p. 5-6).

- (1) Either the other prisoner will confess or he will not.
- (2) If he will confess, then confessing is better for you than not confessing.
- (3) If he will not, then confessing is better for you than not confessing.
- (4) Therefore: confessing is better than not confessing.<sup>12</sup>

There is no problem with the truth of the premises, yet if both prisoners follow this reasoning, they will each end up with the second-worst outcome. By reasoning in this way, the agent acts according to his preference for each possible outcome (i.e. cohort's choice). This type of argument has been called *dominance reasoning*; Nozick (1969) states the principle as follows:

*Dominance Principle:* If there is a partition of states of the world such that relative to it, action *A* weakly dominates action *B*, then *A* should be performed rather than *B*.

Action *A* weakly dominates action *B* for person *P*, if and only if, for each state of the world, *P* either prefers the consequence of *A* to the consequence of *B* or is indifferent

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<sup>12</sup> The logical form of the argument is:

- (1) P or Q
- (2) If P, then R
- (3) If Q, then R
- (4) Therefore, R.

between the two consequences, and for some state of the world,  $P$  prefers the consequence of  $A$  to the consequence of  $B$  (p. 111).

In the basic version of PD, employing an EU function as a decision procedure produces the same result and advises each prisoner to confess. However, the structure of the PD can support countless scenarios in which the ‘jail-time’ outcomes are replaced. But it is not the utility values that are assigned to the various outcomes that are important but the ordinal preference ranking of the potential results. For instance, if  $X$ ’s preferences ranking is A-B-C-D, then  $Y$ ’s is (symmetrically) D-C-B-A. There have been a number of variations to the dilemma which maintain this symmetry but modify other contextual assumptions. Of these, scenarios in which the prisoners’ decisions are not mutually independent provide cases for which different reasoning models generate different advice. In these *causally dependent* scenarios one prisoner’s choice *can* have an effect on his partner’s decision and EU and dominance reasoning pull in different directions.

Consider a scenario in which you and your accomplice have agreed before the arrest to cooperate with each other and avoid confessing “no matter what!”. You are aware that your partner is completely honourable, and will not deviate from the plan unless he has reason to do so. After being caught, the prosecutor lays out the possible outcomes and, knowing that your partner will hear about your decision when the prosecutor leaves, you deliberate on what to do. After a short time, you decide to employ dominance reasoning: because confessing to the crime provides the best outcome regardless of your accomplice’s choice, you confess to the crime. The prosecutor then approaches your accomplice and informs him of your confession. The broken trust

influences him to defect from the plan as well and he confesses. You are each awarded 9-year sentences.<sup>13</sup>

However, if during your deliberations you decide to use EU equations to guide your choice, a different outcome would be reached. Consider the method that you would employ: Because of your partner's past reliability and trustworthiness in similar circumstances, you discern the probability that he will stick with the plan (avoid confessing) is 0.9. You use the jail-times as utility-values and work out the following equations:

$$EU(\text{you do not confess}) = (-1)(0.9) + (-10)(0.1) = -1.9$$

$$EU(\text{you confess}) = (0)(0.1) + (-9)(0.9) = -8.1$$

$$EU(\text{he does not confess}) = (-1)(0.9) + (-10)(0.1) = -1.9$$

$$EU(\text{he confesses}) = (0)(0.1) + (-9)(0.9) = -8.1$$

Since  $-1.9$  is greater than  $-8.1$ , EU advises that you do not confess. Obviously, this is a different prescription than that obtained from dominance reasoning. Intuitively, the EU strategy seems better because it leaves both parties with their second preference rather than their third. However, the implicit dominance argument is not clearly unsound so the question is left open regarding which reasoning strategy we ought to use. If an appeal is to be made to the intuitive attraction of one strategy or another, consider the following case in which EU and dominance reasoning again pull in different directions but no clear winner emerges in terms of intuitive appeal.

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<sup>13</sup> Bar-Hillel and Margalit (1972) used the Israel – Egypt conflict to illustrate this point. Israel was faced with either withdrawing or remaining in its occupied territories, which would result in either a peaceful response or an attack from the Egyptians. The dominant strategy was to continue the occupation. However, Egypt's response was not causally independent from Israel's strategy, so dominance reasoning was not appropriate.

## Newcomb's Problem

Developed by physicist William Newcomb, and made famous by Robert Nozick (1969), Newcomb's problem presents another instance for which dominance reasoning and EU prescribe different choices. Like PD, the problem has been presented a number of different ways, and the underlying assumptions are regularly tinkered with. The version to which I will be referring runs as follows: Suppose that there is a being with the ability to make predictions with considerable accuracy. He has predicted your choices with flawless accuracy in the past. One day he presents you with two boxes, one which is transparent and (as you can see) contains \$1000 (represented by  $B\$$ ). You are told that the other, which is opaque, contains either \$1,000,000 or nothing (hereafter  $B?$ ). You are asked to choose either both boxes or only  $B?$ . If the being has predicted that you will choose both boxes, he has put nothing in  $B?$ . However, if he has predicted that you will take only  $B?$ , then he has put the \$1,000,000 inside.

The game requires that you intentionally choose the boxes. Nozick notes that if the being predicts that you will consciously randomize your choice, then he has put nothing in  $B?$ . The choice that is made differs whether you employ dominance reasoning or EU maximization.

First, consider an outcome matrix that illustrates dominance reasoning.

	<i>Being predicts One Box</i>	<i>Being predicts both boxes</i>
<i>Choose one box</i>	\$1,000,000	0
<i>Choose both boxes</i>	\$1,000,000 + \$1,000	0 + \$1,000

Clearly, choosing both boxes is preferred whichever state of affairs obtains (i.e. whether or not the money is in  $B?$ ). The opaque box already has one million dollars or it does not, the choice that you make is assumed to be causally independent from what is

inside. There is no backward causality in this version of the problem so you might as well take both boxes and have an extra \$1,000 instead of leaving it in the clear box. In addition to seeming logically sound, there is some intuitive force to this line of reasoning.

On the other hand, in order to make your decision you could articulate the dollar amounts as utilities and assign a value for the probability that the being has made a correct prediction and perform the corresponding calculations:

$$EU(\text{choose one box}) = (1,000,000)(1.0) + (0)(0) = 1,000,000$$

$$EU(\text{choose two boxes}) = (1,000,000 + 1,000)(0) + (1,000)(1.0) = 1,000$$

Thus, choosing one box would be the appropriate choice by EU. Further, there is an element of intuitive appeal to this line of reasoning as well. Many people may feel that choosing one box improves their chance of receiving the big prize despite the fact that  $B?$  is already either empty or full. While this assumption is not supported by the scenario (the reliability of the being is not influenced by the agent's choice), it is difficult to criticize using the EU approach here. How can we support dominance reasoning over EU if only the latter leads us to the million-dollar prize? While the dominance reasoning *process* is attractive, so too is the *result* that is achieved by EU reasoning.

In the next section I will discuss a case which seems to undermine EU theory, but is easily handled by dominance reasoning. This particular case highlights a weakness in the EU independence axiom but it also indicates that EU cannot deal with the entire breadth of scenarios to which practical reasoning (generally construed) applies.

### **Allais's Paradox**

Developed by Maurice Allais (1953), the problem presents a challenge to one of the von Neumann and Morgenstern axioms, known as the independence axiom. The independence axiom states, roughly, that if an agent is indifferent between outcomes  $a$

and  $b$  then he will be indifferent between two lotteries that are identical except Lottery 1 has outcome  $a$  and Lottery 2 has outcome  $b$  (see Chapter 3). Now consider the following example where the probability of each outcome is denoted in a pair:

*Gamble 1* – choose either Lottery A or Lottery B

Lottery A = (1.0, \$1,000,000)

Lottery B = (.89, \$1,000,000) (.01, \$0) (.10, \$5,000,000).

*Gamble 2* – choose either Lottery C or Lottery D

Lottery C = (.89, \$0) (.11, \$1,000,000)

Lottery D = (.9, \$0) (.1, \$5,000,000).

The majority of people would choose to enter Lottery A in the first gamble and Lottery D in the second gamble. However, Allais demonstrated that these choices are made inconsistent by the independence axiom. This becomes clear if the gambles are restated.

Take *Gamble 1*, by breaking down Lottery A, it can be expressed as two probabilities instead of one: (.89, \$1,000,000) (.11, \$1,000,000). Hence, both Lottery A and B have a probability .89 of outcome \$1,000,000. By the independence axiom (which eliminates redundancies), the .89 outcome is irrelevant in determining preference and can be discarded. We are left with a choice between Lottery A (.11, \$1,000,000) and Lottery B (.01, \$0) (.1, \$5,000,000).

A similar re-framing can be carried out for *Gamble 2*. First, express Lottery D as three possibilities: (.89, \$0) (.01, \$0) (.1, \$5,000,000). Then the .89 outcomes for C and D can be discarded because they are both \$0. So the choice is now expressed as: Lottery C (.11, \$1,000,000) or Lottery D (.01, \$0) (.1, \$5,000,000).

Thus, in the new presentation Lottery *A* is identical to Lottery *C*: (.11, \$1,000,000); and Lottery *B* is identical to Lottery *D* (.01, \$0) (.1, \$5,000,000). Choosing *A* and *D* or *B* and *C* is, therefore, inconsistent. However, intuitions and experimental evidence suggest that people will choose *A* with *D*. There are a number of experiments in which subjects are presented with various versions of this problem. In one small prizes were considered (Weber, 2008). In another, subjects were presented the outcomes in terms of the chance that they would make a healthy recovery following surgery (Oliver, 2003). It seems that whatever manipulations are made, people still prefer to make ‘inconsistent’ choices, yet these choices seem rational.

Unlike the second formulation of the PD, EU pulls *away* from our intuitions here. An argument from intuition in support of EU cannot, therefore, be sustained across the board.<sup>14</sup> On the other hand, dominance reasoning conforms to our intuitions in this case. Because it is not bound by the independence axiom, dominance reasoning holds that we select our preferred option for each ‘state of the world’, in this case each gamble. There is nothing inconsistent, by dominance reasoning, in selecting both Lottery *A* with Lottery *D*. In fact, if we prefer these lotteries, dominance reasoning prescribes these choices. Moreover, it does not appear that anything pejorative can be said about using this method of reasoning unless one has already made an alternative theoretical commitment, such as taking EU to be normative. Of course, there must be grounds for doing so but even if such grounds are admitted, a scenario in which it fails completely to advise our choices would weaken its normative pull.

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<sup>14</sup> There have been attempts to salvage EU from the independence axiom. For instance, Tversky and Kahneman (1990) proposed *prospect theory*, which allows for a two-stage decision procedure to aid in alleviating ‘framing effects’. While this may answer Allias’ problem, it does not salvage EU from the other concerns that I raise.

## The Pasadena Paradox

Perhaps the most recent challenge to EU was put forward by Nover and Hajek (2004) who called it the Pasadena paradox. Their problem shares some similarities with the St. Petersburg paradox (see Chapter 3) but has quite different implications. Nover and Hajek illustrate a scenario in which a potential player is left unable to decide (by EU) whether or not he should enter a particular lottery. This is despite the lottery's well-defined probabilities and prizes for each of the relevant outcomes.

The Pasadena paradox, like the St. Petersburg offers game players an opportunity to flip a coin in which the number of heads flipped in a row will determine the reward. However, the payoff structure has been modified for the Pasadena game. If the payoffs have been written on cards identifying the conditional outcomes, they would read as follows:

(Top card)	If the first head is on toss #1, we pay you \$2.
(2 <sup>nd</sup> top card)	If the first head is on toss #2, you pay us \$2.
(3 <sup>rd</sup> top card)	If the first head is on toss #4, you pay us \$4.
(4 <sup>th</sup> top card)	If the first head is on toss #6, you pay us \$64/6
(5 <sup>th</sup> top card)	If the first head is on toss #8, you pay us \$32.
(6 <sup>th</sup> top card)	If the first head is on toss #10, you pay us \$1024/10
(7 <sup>th</sup> top card)	If the first head is on toss #3, we pay you \$8/3.
(8 <sup>th</sup> top card)	If the first head is on toss #12, you pay us \$4096-12.
	⋮

(Nover and Hajek, 2004, p. 238)

This payoff structure can thus be summarized as  $\$(-1)^{n-1} 2^n/n$  where  $n$  is the number of tosses on which the first head appears and a negative sign indicates that the

player is obligated to pay. Also, given the ordering of the cards (each positive-outcome card is followed by five negatives), EU can be calculated using the series:

$$EU = 1 + (-1/2 - 1/4 - 1/6 - 1/8 - 1/10) + 1/3 + (-1/12 - 1/14 - 1/16 - 1/18 - 1/20) + 1/5 + (-1/22 - \dots)$$

Nover and Hajek show that an approximate utility calculation can be made for this harmonic series because it converges to  $\ln 2 + 1/2 \ln(1/5) \approx -0.11$ . The EU is apparently negative.

However, there is more to the story. In their scenario a gust of wind blows the cards off the table and their order gets accidentally re-arranged and now appears as:

- (Top card) If the first head is on toss #1, we pay you \$2.
- (2<sup>nd</sup> top card) If the first head is on toss #3, we pay you \$8/3.
- (3<sup>rd</sup> top card) If the first head is on toss #5, we pay you \$32/5.
- ⋮
- (21<sup>st</sup> top card) If the first head is on toss #41, we pay you \$241/41.
- (22<sup>nd</sup> top card) If the first head is on toss #2, you pay us \$2.
- (23<sup>rd</sup> top card) If the first head is on toss #43, we pay you \$243/25.
- ⋮

If the run of cards with positive payoffs between negative payoff cards continually increases (which is a possibility), our expected payoff from the game will be infinity<sup>15</sup>.

Obviously, the problem hinges on the arrangement of the cards *but the order of the cards is not specified by the game*. Moreover, EU theory does not pose a constraint that requires that the terms in a series be naturally ordered. So Nover and Hajek use the

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<sup>15</sup> They express the mathematical property as follows:  
 $EU(\text{game}) = (1) + (1/3 + 1/5 + \dots + 1/41 - 1/2) + (1/43 + \dots - 1/4) + \dots$   
 Since each bracket contains will sum to at least 1 and since the pattern is perpetual, it can be expressed as  $1 + 1 + 1 + \dots$ , so EU is infinite.

Riemann Rearrangement Theorem to prove that the expected utilities can converge to any finite value, or to diverge to either positive or negative infinity<sup>16</sup>. This means that the expected payoff for the Pasadena game can fall anywhere on the interval  $(-\infty, +\infty)$ .

The problem is that even if we are offered an entry for free, we have no way (by EU) to decide whether or not to enter the gamble. Moreover, if we are offered the choice of entering the St. Petersburg game for free or the Pasadena game, we will be unable to make a decision if we use EU. Similarly, we cannot choose to enter a game identical to the Pasadena game except \$1 is added to each payoff (Nover and Hajek call this the *Altadena* game). They point out that the situation is analogous to comparing  $1/0$  to  $3/0$ . We might want to say that  $3/0$  is larger, since both fractions have the same denominator but such a comparison is unintelligible as both  $1/0$  and  $3/0$  are undefined. In their words, EU ‘remains silent’ regarding any decision involving the Pasadena problem.

Mark Colyvan (2006), however, showed that dominance reasoning is not at all ‘silent’ in gambles involving the Pasadena problem because it is not paralysed by undefined expectations. For instance, the Altadena game has a preferable outcome for each possible state (i.e. card drawn), since it is one dollar more. We can then, choose the Altadena game over the Pasadena game by using dominance reasoning.

Proponents of EU might try to counter that well-defined expectations need to be possible for a choice to be legitimately called an instance of practical reasoning. This

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<sup>16</sup> The expected utility calculation involves a conditionally convergent series (one series is convergent but the related absolute series is divergent).

$$\text{i.e. } \sum_{j=1}^{\infty} 1/2^j (-1)^{j-1} 2^j / j = \sum_{j=1}^{\infty} (-1)^{j-1} / j = 1 - 1/2 + 1/3 - 1/4 + \dots$$

converges to  $\ln 2$ , but its related series,

$$\sum_{j=1}^{\infty} \left| (-1)^{j-1} / j \right| = 1 + 1/2 + 1/3 + 1/4 + \dots$$

is divergent (Colyvan, 2006, p. 459).

defence would disallow the Pasadena paradox as a genuine example since it employs ambiguous expectations (e.g. the order of the payoff cards is not defined). However, this approach leaves EU supporters in want of an argument as to why making decisions in cases where expectations are ill-defined ought not to count as instances of practical reasoning nor be considered as either practically rational or irrational. Further, there is an intuitive element to the Pasadena game: we can recognize that a potential payoff of  $(-\infty)$  is something that should be avoided by any means necessary yet EU cannot offer this advice. On another note, it is difficult to argue that the choice between the Pasadena game and the Altadena game is *outside* of any sort of acknowledgment by rational criteria, especially since a decision on the matter can be made by using dominance reasoning, which is a logically sound procedure.

### **Can there be Harmony?**

One solution to the inadequacy of EU might be to ascribe dominance reasoning and EU complementary normative domains. EU might be given normative status over any case for which well-defined expectations are available, while dominance reasoning is given normative status when there is causal independence between action and consequence<sup>17</sup> (as in the first formulation of PD). However, an extra axiom would be required to govern such cases.

The problem is that critics will be left questioning the rationale for making such a distinction. To give such a basis, another question must first be answered: What is practical reasoning *supposed to do*? It cannot be that the success or failure of practical reasoning is only measured by its success or failure in desire satisfaction; the views

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<sup>17</sup> Nozick himself stated, “The dominance principle is legitimately applicable to situations in which the states are probabilistically independent of the actions” (p. 119).

considered so far maintain that what we *believe* or *expect* will satisfy our desires is the accountable element in practical reasoning. But the inherent rationale for supporting EU or dominance reasoning is not one of belief, but one which shows that one or the other leads to the best result. There is a danger of circularity here: I satisfied my desire because I have reasoned well. I know that I have reasoned because my desire is satisfied. What if an error in reasoning like ‘affirming the consequent’ allows us to satisfy our desire, should we count this as good practical reasoning?

In the next chapter, I will offer one last model of practical reasoning that articulates a normative role for belief. In so doing, the account offered will provide both normative criteria and a model of practical reasoning wherein both EU and dominance reasoning can be properly understood as varieties of practical reason.

## 5. The Practical Reasoning as a Practical Argument

In this chapter, I wish to step away from EU and examine another way of conceptualizing practical reason: as a practical argument. This formulation has (at least) two benefits: it captures a broader range of cases to which practical reasoning might apply than EU and it avoids the potential circularity in defending EU by its propensity to advise towards desired results. I then want to show how the EU formulation fits with this notion of practical reason.

### Practical Reason as a Practical Argument

Since Aristotle's practical syllogism (see Chapter 2), a popular method of formalizing practical reasoning is by drawing an analogy to a formal argument. The character of this formalization has been varied. Consider the following examples, beginning with a schema offered by Paul Churchland:

I want  $\phi$ .

A-ing is a way for me to bring about  $\phi$  under these circumstances.

There is no other way to bring about  $\phi$  now which is as preferable to me as, or more preferable to me than, A-ing  $\phi$ .

There is no sufficient reason for me not to bring about  $\phi$  under these circumstances.

Therefore, let me do A. (1970, p. 28).

A second type of schema incorporates the application of a rule in reasoning:

I'm in circumstances C.

If I'm in C, then I ought to do A.

So, I ought to do A.

Therefore, I shall A. (Castaneda, 1975, p. 15).

An alternative model, proposed by Donald Davidson, uses a ‘prima facie’ (*pf*) operator that acts on pairs of sentences (moral judgment, and ground). The prima facie qualifications lead to the acceptance of the respective conclusions because the agent presupposes that the prima facie qualification is not overridden.

Davidson adapts an example from Aquinas:

*Pf* (*x* is better than *y*, *x* is a refraining from fornication and *y* is an act of fornication)

*a* is a refraining from fornication and *b* is an act of fornication

Therefore, *pf* (*a* is better than *b*) (Davidson, 1969 p. 38).

Each of these schemata<sup>18</sup> represents the argument as logically valid since the truth of the premises entails the respective conclusions. Of course, mere validity is not enough to confirm that any or all of these schemata should be considered as models of practical reasoning. There are countless valid arguments that we would not say are instances or representations of practical reasoning. To address this issue, however, we must come to terms with the key elements of practical reasoning. I began this project in Chapter 2; now I would like to review some of the features that emerged in that chapter as well as add some additional considerations with the hope of highlighting the definitive elements of practical reasoning.

The first point of historical agreement that we saw in Chapter 2 was that practical reasoning is some sort of mental act which underpins action. For the Greeks, this act was

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<sup>18</sup> It should be noted that there is another way to conceptualize practical reason. This has been termed a *functionalist* view. This perspective holds that practical reasoning is the process by which intentions are formed from beliefs and desires. This view does not require that the agent consciously draws a practical conclusion (i.e. leading to an intention) from a number of premises. Examples of this perspective are offered by Gilbert Harman (1976) and Myles Brand (1984). However, this view does not exclude any of the schemata mentioned above. The functionalist perspective leaves the questions of if, when and how such models are used by individuals in the domain of empirical study. So even on the functionalist view, pursuing the analogy between practical reasoning and a practical argument is permitted insofar as it is (or might be) supported empirically.

clearly distinguished from carnal impulses. For Hume, it involved the relating of ideas enabling us to achieve our ends. For Kant, it is the (mental) application of rules in a given context to guide our action. To summarize this first theoretical confluence:

*practical reason has a cognitive element.*

A second historical point of agreement is that *practical reason incorporates some sort of motivational element*. The Greeks attributed desire to reason itself. Later, Hume's famous assertion that 'reason is the slave of the passions' implies that we employ reason to satisfy our desires. Kant, on the other hand, conceived practical reasoning in terms of the categorical imperative as generating constraints over our motivations (reasons for action). As conceived in the hypothetical imperative, however, practical reasoning is similar to Hume's account. Hypothetical imperatives act as 'counsels of prudence' to help us satisfy our desire in a given situation. Either way, for Kant, practical reason is connected to motivation.

The final commonality that emerges from the historical perspectives is that *practical reason is intimately related to action*. This is the primary point of differentiation between practical and theoretical reason. The nature of the relation between reasoning and action is controversial, to be sure, but it is certainly not controversial to say that qualifying reason as 'practical' entails some crucial relation to action or the potential for action.

To be considered a descriptive model of practical reasoning, any theory should incorporate each of these three elements. Robert Audi (1989) suggests a model that articulates each feature as a premise in the 'practical argument'. His representation is as follows:

Major Premise – the motivational premise: I want  $\phi$

Minor Premise – the cognitive premise: My *A*-ing would contribute to realizing  $\phi$ ;

Conclusion – the practical judgment: I should *A*. (Audi, 1989, p. 99).

Note that the motivational premise represents the agent's end, while the cognitive premise is instrumental. Also, the conclusion (practical judgment) is not an overt behaviour or action but rather, it is a *judgment* regarding taking an action. Audi's account is reminiscent of Aristotle's practical syllogism but it is only offered as an elementary model of practical reasoning. That is, it represents the key features of practical reasoning as placeholders over which much more complex arguments can be instantiated.

However, for there to be any real value in formalizing practical reasoning as a practical argument, an adequate account needs to be made of the connection between the practical argument and what we do when we employ practical reasoning. Audi's solution is to suggest that the premises of a practical argument are *tokened* in practical reasoning. This does not require that the particular sentences of the practical argument be tokened (there are countless ways that a premise could be expressed in, for example, English). Further, he does not require that all of the premises of a practical argument be consciously tokened. This allows for arguments containing tacit premises to still be considered instances of practical reasoning (i.e. the argument is represented *enthymematically*)<sup>19</sup>. Generally however, the conscious, linguistic tokening of a practical argument is (for Audi) an instance of practical reasoning.

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<sup>19</sup> A tacit premise could have an *unconscious* mental corollary. Perhaps an underlying belief or desire, that is un-tokened at the time the agent reasons. For instance: "I hear the dinner bell"; "Therefore, dinner is ready" requires the suppressed premise: "The dinner bell means that dinner is ready", though it is not consciously tokened.

Audi leaves open the question of whether or not mental events other than linguistic tokenings ought to count as practical reasoning. For my part, it seems overly prescriptive to limit practical reasoning to entities with a linguistic faculty. There does not seem to be anything inconsistent between a process with the three features of practical reasoning mentioned above, and an inability to use language. However, I am inclined to say that genuine instances of practical reasoning are mental acts that, potentially, can be represented as practical arguments. In other words, practical reasoning must have enough linguistic quality (syntax and semantics) such that a translation to a practical argument is at least possible.

In support of this claim, consider some conscious, mental acts without linguistic quality to see how they are missing one or more key elements of practical reasoning. Experiments in classical conditioning show that we do not necessarily need to ‘think through’ a way to satisfy our motivation in order to carry out the rewarding behaviour. In effect, the practical argument analogue is reduced to a motivational premise, which is followed by an action. Cases of aversive conditioning are particularly poignant. For instance, an alcoholic who desires to change his destructive behaviour may consent to take a mild toxin along with his gin and tonic (which causes him to become violently ill). The next time he encounters a gin and tonic, he feels a wave of nausea and refrains from drinking. Granted, agreeing to ingest the toxin in the first place in order to facilitate his sobriety was likely the result of practical reasoning. The nausea, however, is a nervous system response: it removes the immediate *cognitive element* from his ‘decision’ regarding the gin and tonic. It is because there was no cognitive element that the process whereby he abstained from drinking cannot be properly called practical reasoning.

We can find a similar absence of practical reasoning in cases of habit. For instance, in the morning and half-asleep, I reach for the glasses on my bedside table. On this occasion I do not have any desire (conscious or otherwise) to retrieve them, nor am I thinking about their location, or my bodily movements. My body simply performs the action that it does every morning, with minimal cognitive effort. Here, my behaviour is lacking both motivational and cognitive elements.

A simple example will highlight my point: If my nervous system reacts to a stimuli (e.g. hot stove), by motivating a response (remove hand), then there need not be a cognitive premise<sup>20</sup>. But without a corresponding cognition, there is no way that we can call the process reasoning. Moreover, without a cognitive mediator, the process is not necessarily intelligible linguistically. On the other hand, for mental acts that are legitimate instances of practical reasoning, the cognitive component allows, in principle, for the process to be accurately represented linguistically.

Thus far, I have been defending the practical argument's descriptive validity. There are, of course, normative implications as well and I address those in the next section.

### **Normativity for Practical Reasoning**

Given the analogy to the practical argument, Audi (2004) showed that there are three dimensions on which practical reasoning can be evaluated. A *logical* assessment can be made in terms of the relations between the premises and conclusions. If the argument is deductive, then this dimension is relatively straightforward to evaluate. It

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<sup>20</sup> It is important to note that the same act *could* have incorporated a cognitive element. For instance: “‘Ouch!’ / ‘my hand is on the stove’ / therefore, ‘remove hand’” represents both the motivational and cognitive elements.

The cognitive involvement here is different from the reaction of what occurs in a simple nervous system reaction, even though the respective action may appear to be exactly the same.

becomes more complicated when the argument is inductive, such as in arguments with probabilistic cognitive (instrumental) premises<sup>21</sup>. Inductive arguments can, in principle, be evaluated according to their conformity to the standards of inductive logic. For instance, degrees of support and strength (criterion of adequacy) for holding a conclusion based on the premises are subject to evaluation.

The second dimension of assessing practical reasoning is *inferential*. The concern, on this point, is that the practical conclusion is actually derived from (and justified by) the premises. An individual can make a practical judgment *J* without tokening a practical argument that concludes with *J*. His reason for making *J* could come from any number of motivational sources, such as a habitual response or a desire for *J* itself<sup>22</sup>. The inferential criterion prohibits an agent from *rationalizing* his practical judgment (or action) by coming up with reasons that are unrelated to the process by which he actually arrived at it. When my friend asks me why I went swimming, I can report that I felt hot, and swimming always cools me down. There is nothing wrong, logically, with the underlying argument<sup>23</sup>. However, my actual motivation was that swimming allowed me a reprieve from my annoyingly ever-present, non-swimming friend. Rationalization is a matter of espousing practical arguments that have not really entailed the conclusion (i.e. the practical judgment), though they may appear to do so.

It is for this purpose that the inferential standard is in place: its use avoids the possibility of rationalized practical arguments being confounded with practical arguments that actually have resulted in reasoned judgments regarding actions. Note that there is

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<sup>21</sup> An argument of this type could be: I want a drink; the fridge has contained drinks before; therefore, look in the fridge.

<sup>22</sup> I could, for instance, have a desire to open fridge doors.

<sup>23</sup> I desire to be cool / swimming will provide cool / therefore, go swimming.

also a temporal directionality to this criterion: the conclusion both *follows* and *follows from* the premises. A practical argument is not an instance of good practical reasoning if it is constructed after the process that has led to the practical judgment. In short, practical reason does not allow us to act first and reason later.

The third dimension of assessment that Audi advocates is *epistemic*. This means that practical reasoning can be evaluated in terms of the agent's justification for believing the premises in the practical argument. Further, the justification for belief in the premises must be transferred to the conclusion in the appropriate way<sup>24</sup>. For instance, we are epistemically criticisable if we have a stronger belief (or confidence) in the conclusion 'A & B', than we do in the sum of the premises 'A' and 'B'.

The epistemic dimension is not necessarily concerned with the truth or falsity of the premises. An agent can be justified in believing a false premise and may transmit this belief to a practical conclusion without being reproached on epistemic grounds. I may have very good reasons for believing that Europe is south of Africa: I might have seen this represented in atlases, been taught this fact by geography teachers whom I had grounds to consider reputable, and have heard a variety of people who had travelled to Europe tell me about how they flew "up to Africa". So were I to find myself in a place that I take to be Africa, and needing to orient myself toward the south, I could simply ask someone to point in the direction of Europe. My error here would not be a result of bad practical reasoning, since I would have used the information available to me correctly and would I have solid grounds for believing the information accurate.

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<sup>24</sup> Granted, there is overlap between the inferential and epistemic dimensions of assessment, since the justification of a premise or conclusion may be an inferential connection.

Central to this dimension, then, is the notion of *justification*. Of course, this is an area of philosophical debate in itself. Admittedly, discoveries in the field will influence the grounds by which the epistemic dimension of practical reason is evaluated. This ongoing debate, however, does not detract from the need to hold practical reasoning agents accountable epistemically. Consider the following example: waking up one morning I form (spontaneously) the belief that ‘milk is found by looking in the cupboard’. The belief runs counter to the evidence that I have procured throughout my life: on each previous morning I found milk by looking in the fridge, I have seen many people retrieve milk from their respective refrigerators, watched countless milk commercials, seen where milk is stored at various grocery stores etc. Yet I still retain the belief that milk will be found by looking in the fridge and I am either unaware of, or simply do not care about, any apparent inconsistencies between my existing beliefs and the new belief that milk is found by looking in the cupboard. I employ the following bit of reasoning (represented using Audi’s schema):

Major Premise – the motivational premise: I want milk

Minor Premise – the cognitive premise: Milk is found by looking in the cupboard

Conclusion – the practical judgment: Therefore, I should look in the cupboard

There is nothing wrong with the logical form of the argument, nor is there a violation of the inferential criterion (given that this particular practical argument resulted in the judgment that I ought to look in the cupboard to find milk). The error here then, is in my belief that ‘milk is found by looking in the cupboard’. I cannot provide any solid

justification for the belief<sup>25</sup> because it was formed spontaneously rather than as the result of some conscious process (like reasoning) or sensory event. Further, the belief runs counter to at least one of my existing beliefs, that ‘milk is found by looking in the fridge’. The mere fact that the belief was formed spontaneously does not necessarily translate to an epistemic error if and when it is included in a piece of practical reasoning. The epistemic criterion does not *require* us to introspect on belief-formation as a necessary component of good practical reasoning. However, it is problematic when an unwarranted belief displaces one with a stronger degree of justification or we go about reasoning without mediating between relevant inconsistencies.

If a practical argument contains irrelevant or superfluous premises, then this is an inferential matter. However, if an irrelevant premise enunciates an epistemically reproachable belief, then its inclusion in the practical argument makes the reasoning epistemically criticisable. For example:

Major Premise – the motivational premise: I want milk

Minor Premise – the cognitive premise: Milk is found by looking in the cupboard

Irrelevant Premise – All dogs are cats

Conclusion – the practical judgment: Therefore, I should look in the cupboard

The argument is epistemically criticisable (insofar as there is no grounds to believe that ‘all dogs are cats’), even though it generates a good judgment and there is nothing wrong with its logical structure. However, it also violates the inferential criterion

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<sup>25</sup> The only *potential* justification that might be offered is that I feel warranted in believing that ‘milk is found by looking the cupboard’ by virtue of the fact that I have the belief ‘milk is found by looking in the cupboard’. However, should the basis for my belief be questioned, I would not be able to provide any other reason for retaining the belief.

because the conclusion is not connected to all of the premises. On the other hand, the same argument that omits the premise “all dogs are cats” is not at all reproachable, even though the same result is generated.

The stipulation that the inferential criterion require that all of the premises be relevant was not specifically articulated by Audi, but it has two benefits. First, it encourages a compactness and efficiency to the practical argument that would otherwise be absent. This means that the inclusion of a superfluous premise in a practical argument entails an inferior evaluation than would have been given had the premise been absent. Though this benefit may be merely aesthetic, the second reason to include the stipulation is more substantive: it disallows the explosion of superfluous premises in a practical argument. Without the barring of irrelevant premises, a practical argument might include an infinite number of irrelevant premises. Even if each superfluous premise is justifiedly believed, there needs to be a constraint preventing an endless chain of reasoning caused by the inclusion of an infinite number of irrelevant premises. The inferential criterion provides a normative constraint preventing the explosion, but this is not an epistemic matter nor a logical one provided the reasoning agent has grounds for believing each premise, and the argument is logically valid.

One further point on the epistemic criterion is that the entire practical argument is subject to evaluation on this ground. This means that in addition to whatever linguistic propositions are present, logical operators, conditionals, connectives, etc., are all epistemically evaluable. If an agent believes  $p \rightarrow q$ , then his evaluation must address his warrant for believing the material conditional between  $p$  and  $q$ . There is nothing, in principle, that impugns an agent for reasoning in accordance with an argument with the

form  $p \rightarrow (q \rightarrow p)$ , and ending with the practical judgment  $q$ . However, he is epistemically accountable for his believing that ‘if  $p$  is true, then (if  $q$  is true, then  $p$  is true)’. In other words, he needs to have warrant for believing the statement in its entirety, not solely the propositions  $p$  and/or  $q$ . This highlights an important debate in philosophical logic: whether the classical validity of  $p \rightarrow (q \rightarrow p)$  is sufficient warrant to believe it for any case to which it is applicable or whether its warrant ought to require a contextual justification in terms of relevance for a premise of that form. My aim, however, is not to resolve this debate here but to indicate that it will leave an impression on how the epistemic criterion is understood.

By this practical argument model, it is the *process* by which we arrive at an action (or judgment regarding an action) that is open to evaluation, rather than the result of the process. Moreover, the process can be represented linguistically as a practical argument with at least one motivational premise, at least one cognitive premise, and a practical conclusion. The evaluation is made on the logical, inferential and epistemic dimensions. In the next two sections, I will revisit EU, then show how it fits into the practical argument model.

### **EU and Epistemic Warrant**

For the remainder of this chapter I want to consider whether or not an EU-driven theory is intelligible as a practical argument. If so, then EU reasoning can be viewed as a species of practical reasoning, through it has already been shown inadequate to cover the range of cases that a wider model of practical reasoning is able to tackle (see Chapter 4, the Pasadena paradox).

Recall that the practical argument contains three basic elements: the motivational premise, the cognitive premise and the conclusion. Each of these are addressed by the EU model as it attempts to quantify them. The motivational component is captured by the value given to desire-satisfaction (in Savage's formulation this was denoted by  $u(A, S)$ ), while the value representing the probabilistic estimate of satisfying (given an act) the desire ( $Exp_{pu}(A)$ ) captures the cognitive, instrumental component. If the agent is trying to decide between a second course of action ( $B$ ) and his desires (or preferences) adhere to the six axioms outlined in Chapter 3, then he can make a decision based on the values he obtains (i.e. he will choose the larger of  $Exp_{pu}(A)$  and  $Exp_{pu}(B)$ ).

I have shown in Chapter 4 that there is reason to be sceptical of the use of EU since it is inadequate to cover the entire range of cases for which practical reason seems to be applicable (e.g. deciding between the Pasadena and Altadena games). The next point should serve to further delineate the boundaries for proper EU usage. If I am right in supporting the three-dimensional normative assessment of practical reasoning, then using EU, in most circumstances, will fail the epistemic criterion. In those limited cases in which EU can pass the epistemic criterion, its use may be warranted.

The epistemic weakness of EU occurs on at least two grounds. First, there is a wide body of research in cognitive psychology, which reveals that our predictions, estimations, and expectations are notoriously inaccurate<sup>26</sup>. Granted, this appears to be a descriptive point, but as a practical reasoning agent if I am aware that I have a propensity to make mistakes when attempting to prognosticate probabilistic outcomes, then epistemically this information must be brought to bear. In effect, I am epistemically

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<sup>26</sup> Thomas Gilovich, Dale W Griffin and Daniel Kaneman (2002) Daniel Kahneman, for instance, compiled a survey of many of the relevant studies in psychology. The studies show that humans have a propensity to commit specific errors in information processing.

accountable if I use information that I know is likely to be unreliable or inaccurate. If I have a second, logically valid decision procedure which is suited to my context, and which does not require the unreliable information, then I ought to use it in order to avoid epistemic criticism. This point is not unique to EU<sup>27</sup>, but to practical reasoning generally. I should be held accountable for knowingly using unreliable information whatever model of reasoning I am employing. It would seem obvious to criticize someone who, while explaining his practical argument, indicated that he used a premise which he knew to be unreliable.

Granted, there are many cases in which we use information that we know to be unreliable because there is no other source available. For example, police searching for an abducted child may follow every lead generated by people who call their ‘hotline’ even though they know that there is an overwhelming probability that the public assistance will not lead them to the child. Using bad information in practical reasoning becomes reprehensible when there is an unproblematic alternative. For example, should the police abandon their solid leads to follow a telephone tip given by a specific individual who calls with ‘information’ every time they solicit the public’s help (information that is consistently bad), they would be rightly subject to criticism.

The second problem, epistemically, for EU is that it generally requires more processing power than we are presumably capable of. Any decision requires the use of mathematical functions like average, product and sum. Generally, our working memory is only able to contain seven units of information, which is woefully insufficient for carrying out the calculations of a utility equation. While it may be the case that practical

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<sup>27</sup> However, it is particularly salient in EU. Recall the von Neumann and Morgenstern formulation required the assignment of objective probabilities.

reasoning can involve the use of external implements (like a calculator or spreadsheet), it ought not to *require* the use of external tools. Moreover, to attempt to make a decision by comparing EU values, while believing that a bad calculation was likely made in arriving at those values, is epistemically reproachable for the same reason just mentioned (it makes use of information that is probably inaccurate).

However, articulating these two limitations invites the question: What if an individual is able to reason by the EU model *and* pass the epistemic test? In circumstances in which this is possible, I will argue that the use of EU is permissible. The issues of available information and processing power raise a capacity of the practical argument, when it is taken as normative: it can aid in the adjudication between competing decision strategies. In the next section I will revisit the problems from Chapter 4, which provide salient examples of problems whereby different reasoning strategies generate competing advice.

### **Adjudicating Between Decision Strategies**

To show how the normative standards of the practical argument model can advise towards one or another decision strategy I will begin with a brief look back to the version of the PD in which causal dependence was assumed. Using the practical argument model, the basic form of the PD can be construed as follows:

Motivational Premise – I desire the least amount of jail-time

Cognitive Premise – Choosing  $x$  will bring about the least amount of jail time

Practical Judgment – Therefore, I ought to choose  $x$

Recall that in a casual dependence scenario, the agent's beliefs regarding his partner's expected choices are relevant to the EU result but not to the dominance reasoning strategy. In terms of the practical argument model, the diversion occurs at the

cognitive premise. In the dominance reasoning the premise (and conclusion) can be articulated as:

choosing to confess will lead to less jail time if my partner does not confess  
*and* choosing to confess will lead to less jail time if my partner does confess.  
Conclusion: Therefore, I ought to choose to confess.

On the other hand, the cognitive premise for EU reasoning might be:

I believe each year in prison will cost me 1 utility.  
I am 90% certain that my partner will not confess if I do not confess.  
I am 90% certain that my partner will confess if I do confess.  
Therefore (given the sentences mention in Chapter 4), I calculate my expected utility as:  
Do not confess =  $(-1)(0.9) + (-10)(0.1) = -1.9$   
Confess =  $(0)(0.1) + (-9)(0.9) = -8.1$   
Conclusion: Therefore, (since  $-1.9 > -8.1$ ) I ought to confess

Note that practical argument model does not stipulate that the EU strategy is better than the dominance reasoning because it leads to a more attractive result. In fact, choosing the EU strategy requires more questions be answered should the reasoning be criticized: Why did I believe that 1 year in prison costs 1 utility? What support did I have for believing, with 90% certainty that your partner's decision will follow yours? Why did I believe that my calculations are correct?

However, the dominance strategy also raises an epistemic problem: If I was 90% confident that my partner's answer will mirror my own, then omitting this fact from my reasoning (i.e. it is not addressed in any way in the practical argument) commits an epistemically criticisable over-simplification of the dilemma. On the other hand, if I include the belief 'I am 90% certain that my partner's answer will follow my own', then

the dominant strategy is no longer to confess. This is because confessing does not bring about the best result across each possible outcome. The decision matrix would actually be construed as:

	Other prisoner <i>does not</i> confess	Other prisoner <i>does</i> confess
You <i>don't</i> confess	90% chance of one year in prison	10% chance of 10 years in prison
You <i>do</i> confess	90% chance of nine years in prison	10% chance of no time in prison

Essentially the dominance strategy requires the prisoner to select one gamble over the other (confessing, or not confessing). It does not advise on which is the better gamble (as EU does), but only requires him to select the gamble that he *prefers*. This result highlights the importance of including relevant beliefs in whatever reasoning strategy an agent undertakes. In fact this requirement is implied by the epistemic dimension of assessment<sup>28</sup>.

This highlights an important point: the practical argument does not, itself, adjudicate between so-called paradoxes of rationality, including those highlighted in Chapter 4. Instead, it is by considering the criteria on which the practical argument is evaluated that can lead towards one decision strategy or another. Knowing that reasoning is evaluated on logical, inferential, and epistemic grounds, an agent deciding on a decision procedure can ask three questions: (1) Do I have the information I need to use this strategy? (2) Do I have warrant to believe this information? (3) Will I be able to use the information correctly in the way the strategy requires? As I discussed in the previous section, an agent who is aware of his propensity to make terribly inaccurate probabilistic judgments in terms of expected outcomes, or knows that he nearly always makes errors in arithmetic, would be justified in his reluctance to use an EU procedure.

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<sup>28</sup> I should expect, for example, my reasoning to be criticized epistemically when I am looking for the milk, but do not instantiate my belief 'I left the milk in the cupboard' in my practical argument.

The result of using the three dimensions of assessment for choosing which decision procedure is best for an agent in PD is paralleled in Newcomb's problem. Notably, if the epistemic criterion is to be passed, the agent must admit relevant beliefs into his practical argument. In Nozick's version of the problem, the player is told that his choice does not affect whether or not the prize will appear when the opaque box is open. If the player does not form any further beliefs, then his choice to use EU or dominance reasoning as his decision procedure will depend on how he answers the three questions listed above. If the questions do not direct him to one decision strategy over the other, then he is free to choose either. Note that the outcome of the decision is not used as a measure of the 'correct' strategy.

However, as in the PD, a player who holds beliefs that are relevant to the problem (other than those stipulated in the Nozick version), is compelled by the epistemic standard to articulate them in his practical argument. Examples of beliefs that could influence the outcome of the decision might include: 'there must be some relationship with my choice and the final outcome that I don't understand', or 'this might be a trick'. Of course, any 'additional' beliefs are also subject to epistemic evaluation. It is not the outcome of the agent's reasoning that provides the normative standard (i.e. did he get the \$1,000,000) but it is the *process* at which he arrives at the decision. In the same way, the decision strategy that an individual chooses to address a problem is not subject to evaluation based on the final outcome of that strategy, but rather on how well it fits the information available, the agent's warrant for accepting (or rejecting) the information, and the agent's computational facility.

The three deliberative questions also apply to Allais's paradox. Recall that the problem hinges on the independence axiom. An evaluation of an agent's reasoning whereby he chooses an EU strategy would ask why he believes in the independence axiom, since it is the retention of the axiom that constrains the agent's choices to the counter-intuitive lottery in Gamble 2<sup>29</sup>. That is, it is only by this axiom that the agent must assent to the inconsistency of choosing what appear to be the most attractive lotteries in each gamble. Since the independence axiom was thus present in his practical reasoning, it is subject to epistemic evaluation. The three deliberative questions might restrict the use of an EU strategy in the Allais scenario since giving an account of one's justification for believing the independence axiom would presumably prove difficult. Especially since the independence constraint is not, itself, supported by mathematical or logical proof, but rather is laid down as an axiom in the EU proofs (for both von Neumann and Morgenstern and Savage).

Finally, the three questions evoked by the practical argument's normative dimensions apply to a player in the Pasadena game as well. An agent would not be able to answer affirmatively to the question regarding the availability of information necessary to use an EU strategy. The Pasadena problem was designed without well-defined expectations, which are required to employ an EU procedure. Thus, an agent deciding on a decision strategy can easily eliminate the possibility of using EU.

Note that the three deliberative questions on information, warrant for belief, and processing power only serve to highlight, to the reasoning agent, the grounds on which

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<sup>29</sup> Recall from Chapter 4, the independence axiom construes Lottery A (100% chance of winning \$1,000,000) as identical to Lottery C (89% chance of winning \$0 and 11% chance of winning \$1,000,000) and Lottery B (89% chance of winning 1,000,000 and 1% chance of winning \$0 and 10% chance of winning \$5,000,000) to Lottery D (90% Chance of winning \$0, 10% chance of winning \$5,000,000). Gamble 1 requires the choice between Lotteries A and B and Gamble 2 between Lotteries C and D.

his reasoning can be evaluated. They do not prevent him from making an error in reasoning, nor do they necessarily prevent him from retaining an unwarranted belief. In terms of selecting a reasoning strategy, these questions are helpful since they will dissuade the agent from using a strategy for which there is a lack of information or cognitive capability or for ignoring information that might be relevant to the outcome of the decision. An agent who is aware of the standards against which his reasoning will be judged is better able to determine which decision procedure he will use. This is especially relevant if the different procedures might pull in different directions as in the cases I have highlighted Chapter 4 and again here.

I have argued in this chapter that the practical argument model has several benefits. First, it provides a normative standard for practical reasoning that is not based on the behavioural outcome of the reasoning and, therefore, can avoid the circularity of measuring good reasoning by its outcome. Second, it is able to encompass EU reasoning as well as other decision procedures (like dominance reasoning) that ought to count as genuine instances of practical reasoning. Third, the practical argument's evaluative criteria can help an agent decide which decision procedure he ought to use, since they inform of how his reasoning will be evaluated.

## 6. Conclusion

In this final chapter I highlight several of the key points that I have made. I then conclude by offering support for the extension of the practical argument model into other disciplines.

Recall, I began this discussion with the purpose of being clear on both the descriptive and normative questions of practical reasoning and rationality. I have shown how theories of practical reasoning have evolved from the Greeks onward. As I noted, two problems are almost always encountered in descriptive accounts: *akrasia* (weakness of the will) and the nature of the relation between practical reasoning and action. As I noted in the previous chapter, the practical argument model handles these problems by articulating its conclusion as a judgment. Whether one behaviourally follows through with the practical judgment or is swayed by competing motivations allows for the possibility of *akrasia*. Further, I have shown that there are many behaviours that *are not* rooted in reasoning. The relation between practical reasoning and action is symptomatic of a wider problem in philosophy of mind: identifying the relation between mental acts and behavioural acts. I have left this question aside but answering it should not affect the validity of the practical argument model. However the relation (or absence of relation) between mental acts and behavioural acts is put forward, the practical argument model only speaks to the ‘mental side’. Thus, the project of being clear on the mental-physical relation can move forward without affecting the description of practical reasoning that I am advancing.

As for the normative question, I have shown how the popular modern conception of practical rationality, EU, has been undermined and why it is questionable as a

normative standard. On the other hand, the practical argument model seems to serve the normative role well. It has three dimensions of assessment: logical, inferential and epistemic. These dimensions capture the elements of practical reasoning that emerged from the various historical accounts that I considered. Further, (unlike EU) this three-dimensional assessment allows for a non-circular determination of rationality. With this in mind, an EU decision procedure can be employed, but it is subject to each of these aspects of assessment and, thus, will not necessarily generate rational advice. Also, an agent who is aware of the three dimensions of assessment can use them as a guide to which decision strategy is best suited to a particular problem. The guide incorporates both the information available to the agent (his beliefs) and an understanding of how that information will be used (what computations are required). I construed the guide in terms of three deliberative questions: (1) What information is available and relevant to this problem? (2) What is my justification for believing this information? (3) Am I able to use the information correctly (as required by the decision strategy I am considering)?

To conclude, I discuss the potential for the extension of the practical argument model into other areas of research. Any theoretical model ought to have some key features. It should have construct validity: the model should actually refer to (and explain) the relevant concept. In this case, the model of practical reasoning that is espoused ought to actually refer to practical reasoning and not be confounded with some other concept. Also, for the model to have relevance in an empirical discipline, it ought to generate some testable hypotheses.

We have seen that EU easily generates testable hypotheses. By acquiring an agent's preference ranking and expectations, an observer can determine what he ought to

do. However, as a theory of practical reasoning, the EU model fails to have construct validity. Not only do we lack the cognitive and information-gathering capacities requisite for the effective implementation of EU in all but a limited number of cases, but the model does not extend to cases for which other models of practical reasoning can be applied. Nor should EU be employed as a model of practical rationality. The theory is unable to generate a rational standard, for instance, in the Pasadena game, yet decisions regarding the game are still within the realm of practical rationality.

The question left is whether or not the practical argument model possesses construct validity and can generate testable hypotheses. I have used the historical perspectives, in part, to show that the practical argument model encompasses the common elements of practical reasoning. The practical argument contains these features, to which people seem to refer when they talk about practical reasoning. Also, the practical argument model is able to cover cases for which EU remains silent (e.g. the Pasadena game). This serves as evidence that the practical argument model has a more appropriate scope (than EU) in terms of practical reasoning.

As for testable hypotheses, the practical argument model does not make any metaphysical claims that would disqualify it from empirical investigation. To assert that there are such things as ‘linguistic mental events’ is generally uncontested in the psychological research community (though their terminology may vary). The testability of the practical argument model may be possible through a well designed self-report metric. This should be relatively uncontroversial, even to EU supporters, since their EU theory could require subjects to indicate their preferences and beliefs (i.e. expectations) through similar measures.

In addition to research psychology, the neurosciences also could provide another level of explanation, though I do not intend to offer this as more than an open-ended conjecture. What areas of the brain are active when making a deliberative decision? If the practical argument model is valid, then we might expect memory as well as motivational and linguistic areas to be involved when working through a practical argument. How do these sections of the brain work together? Is there an order to the neuron firings? Other experiments might determine the depth of information-processing required to reason through a decision and whether or not we can perform concurrent mental tasks while reasoning.

Finally, throughout the preceding chapters I have alluded to some of the debates in philosophy that will have an impact on how the practical argument model is refined. Discoveries in epistemology, for instance, could help to articulate the way in which the epistemic dimension is evaluated. Also, the articulation of the relation between a mental act and a behavioural act might help the conceptual bridge between practical conclusion (judgment) and behaviour. There may be other areas of philosophy which can comment on the practical argument model as well. One question from ethics, for instance, is how do our moral beliefs interact with practical argument decision-making?

Having an understanding of how to make a good decision is vital to the Greek pursuit: living the good life. The practical argument provides a model of deliberative, practical decision-making and offers criteria with which we can make an assessment of the process. However, the onus is on each of us to reflect on our own beliefs, biases and motivations to evaluate whether we are making good decisions.

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