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Humanizing Modern Medicine

An Introductory Philosophy of Medicine

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Part I
Metaphysics

Metaphysics, as a distinct subject within the western intellectual tradition, has its origins in Aristotle (384–322 BC). Although he did not coin the term, ancient editors of his works did and his treatise by that title is one of the first systematic explorations of the subject. For Aristotle (2001), metaphysics, which literally means "after or beyond physics," is actually prior logically to physics or the natural sciences. In contemporary philosophy, metaphysics deals "with questions that in some ways lie deeper than physics and most other branches of human enquiry: questions concerning the fundamental assumptions and theoretical foundations of these other inquiries" (Horner and Westacott, 2000, p. 1).

As western philosophy developed metaphysicians became concerned with the nature of objects that make up the world, whether natural or social, real or constructed. The topics covered in contemporary metaphysics range from the notion of God to that of time and space (Crane and Farkas, 2004). For example, what constitutes a person or the self is a vibrant area of metaphysical inquiry. Metaphysics is also concerned with the fundamental or universal properties or features of objects or, more technically, with ontology. Finally it is involved with the relationship among these properties, especially in terms of causation.

In this part, the metaphysical boundaries of the biomedical and humanistic or humane models of modern medicine are examined through an analysis of the larger cultural and scientific worldviews in which they are embedded. For our distinct views of the social and natural worlds shape the biomedical and humanistic or humane models. These worldviews often allow practitioners of the biomedical and humanistic models to practice in different worlds. In an initial chapter, I investigate the medical worldviews of the biomedical and humane models in terms of their metaphysical positions or stances, metaphysical presuppositions or assumptions, and ontological commitments. In the next chapter, the notions of causation and realism are examined, especially as they relate to medical knowledge and practice. Then I finally explore in the remaining chapters the specific metaphysical and ontological issues of the biomedical and humane models, including the nature of the patient, disease and health, illness and wellbeing, and diagnosis and therapeutics.

Chapter 4
Disease or Illness and Health or Wellbeing

The precise nature and role in medical practice of disease, health, illness, wellbeing, and associated notions such as sickness and wholeness, are fervently debated in the current medical literature (Boyd, 2000). For example, Germund Hesslow (1993) claims that the distinction between health and disease is "irrelevant" for medical practice, since a disease is not required for soliciting medical attention.[1] The purpose of the following chapter is not to provide a definitive answer or solution to the debate but rather to explore the possibilities of an answer or a solution in order to clarify further the debate. As Lawrie Reznek contends, philosophy is germane to the discussion concerning the nature of disease: "Philosophy cannot cure disease, but it certainly can cure inappropriate disease attribution" (1987, p. 11). It is in this spirit that I undertake a discussion of the notions of illness and wellbeing.

The participants in the debate can be divided into two camps: the naturalists and the normativists. According to naturalists, disease and health are descriptive concepts that can be used to define the objective and real state or condition of a person. These concepts are strictly neutral to any personal or social values. According to the normativists, however, these concepts depend upon personal and social values. Reflecting these values, normativists often utilize terms like "illness" and "wellbeing" to define a person's subjective or constructed state or condition. In general, biomedical practitioners champion naturalistic notions of disease and health, while humanistic or humane practitioners advocate normativist notions of illness and wellbeing.

The biomedical model is responsible for the predominant conceptions of disease and health that inform the practice of medicine in the industrialized west. Disease is consigned to dysfunction or lost of a body part, while health is defined with respect to the (absence of the) disease state. A person is healthful if no palpable disease is present or requires treatment. Health, then, is a default state and is what

[1] As Hesslow writes: "although we may sometimes talk imprecisely as if having a disease was a sufficient reason for seeking medical treatment, it is not really the presence of a disease that is crucial, but the fact that some medical intervention may be beneficial and that it is within the physician's power to help the patient" (1993, p. 7). He concludes that mature medical practitioners would be better off abandoning the notion of disease altogether.

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keeps one from enlisting a physician's services. These notions of disease and health have certainly contributed to the quality-of-care crisis. By reducing the patient to a diseased body part, the patient's suffering and existential concerns are often ignored and go unaddressed by the biomedical practitioner.

Humanistic or humane modifications of the biomedical model attempt to include the patient's suffering and existential concerns as part of the illness experience and to address them through therapeutic procedures. For humanistic models, health is not a default state but is defined in positive terms, often with respect to a person's wellbeing or wholeness. The humane practitioner's concern is not just the absence of disease in the patient but adoption of a lifestyle that promotes being well both physically and mentally (and, at times, spiritually). In addition the distinction between the biomedical and humanistic or humane models *vis-à-vis* mental health and illness is explored, when appropriate.

4.1 Disease or Illness

According to the biomedical model, the nature of disease, as well as health, can be defined in terms of the material and physical. "There is an objectivity about disease," according to Marshall Marinker, "which doctors must be able to see, touch, measure, smell" (1975, p. 82). Disease, whose cause can be identified by scientific investigation and clinical diagnosis, is an objective and real state that is reduced to a material or physical entity or condition.

This reductive notion of disease is evident in medical dictionaries. For example, in the twenty-sixth edition of *Stedman's Medical Dictionary*, the first definition of disease reads: "An interruption, cessation, or disorder of body functions, systems, or organs" (Stedman, 1995, p. 492). Even mental or behavioral disease is reduced to the biochemical and physiological operations of the brain. "Biomedical dogma," according to Engel, "requires that all disease, including 'mental' disease, be conceptualized in terms of derangement of underlying physical mechanisms" (1977, p. 130). This notion of disease is predominate in the biomedical model and influences its conception of health. As noted already, health, even mental health, is simply a default state that represents the absence of disease.

While the biomedical physician is concerned with the patient's disease state, the humane physician is solicitant for or empathetic over the patient's illness and the suffering associated with it. Cassell distinguishes between disease and illness, accordingly: "Diseases…are specific entities characterized by disturbances in structure or function of any part, organ, or system of the body. Illnesses…afflict whole persons and are the set of disordered functions, bodily sensations, and feelings by which persons know themselves to be unwell" (1991, p. 49). Physicians should not deal exclusively with disease as an objective entity but with the sick person: "the object of the physician's search, the disease entity, does not exist in concrete reality but is merely an abstraction without independent existence. The only thing the clinician can work on (a paradox for medical science) is *this* sick person" (Cassell, 1991, p. 108).

In the remainder of this section, the various conceptions of disease, including the ontological, physiological, evolutionary, and genetic conceptions, are discussed first, followed by a discussion of the humanistic or humane model's conception of illness.

4.1.1 Disease

Traditionally, there are two conceptions of disease: the ontological and the physiological. The ontological conception is concerned with disease causing entities, while the physiological conception involves deviation from functional norms. Christopher Boorse furnishes the best known, if not the most recognized and controversial, physiological conception of disease based on the notion of "species design." Two additional conceptions of disease have recently been championed in the literature—the evolutionary and genetic—with the genetic conception taking center stage, especially with the inception of the human genome project. Although no one conception captures completely the nature of disease, these conceptions provide, according to biomedical practitioners, a means for distinguishing disease states from defects, deformities, and disabilities.

4.1.1.1 Ontological Conception

According to the ontological conception, "diseases are *things*, entities with a separate existence from the person who has them" (Cassell, 1991, p. 77). But, as Engelhardt argues, the ontological conception is ambiguous in terms of referring either to a thing (*ens*) or to a logical type: "Medical ontology in the strong sense refers to views in which disease is conceived of as a thing, a parasite, in contrast with 'Platonic' views of disease entities in which diseases are understood as unchanging conceptual structures" (1975, p. 128).

In the strong sense, a disease entity is an infectious agent that invades a host or patient and directly causes the disease condition. These agents may be, for example, a pathogen, virus, parasite, or bacterium. According to Rudolf Virchow (1821–1902), however, a distinction must be made between the disease entity itself (*ens morbi*) and the entity as cause of a disease (*causa morbi*)—for the disease entity may be present without disease symptoms (Virchow, 1958). In the weak sense, there are disease patterns, in terms of symptoms, which "are interpreted as enduring disease types often without an immediate connection to a particular theory of material disease entities" (Engelhardt, 1975, p. 129).

The best known example of the ontological conception is the germ theory of disease. The germ theory was first proposed at the end of the nineteenth century and was instrumental in explaining many deadly infectious diseases that no longer plague the industrial west because of the discovery of antibiotics. Recently, however, bacteria that cause infectious diseases are becoming resistant to antibiotics (Le Fanu, 2002).

According to the germ theory, disease, especially infectious disease, is the result of a microorganism that is able to overcome the body's immunological defense system and thereby damage the patient's tissues and organs. For example, septicemia, which was called the putrid disease, was shown to be due to a "septic vibrio" (an oxidase-positive, gram-negative bacillus) from infected organisms (Pasteur, 1996). Of course, the discovery of penicillin and its first clinical use on a forty-three year old policeman in 1941 revolutionized medicine in that infected patients could be successfully cured with antibiotics (Le Fanu, 2002).

4.1.1.2 Physiological Conception

Traditionally, the physiological conception of disease is contrasted with the ontological conception. From the physiological point of view, disease, which is an abstract concept, should not be confused with a concrete object. According to the physiological conception, disease is deviation from a functional norm or general regularity. The laws of physiology are essential for understanding the pathological nature of a diseased state. Thus, diseases are "more contextual than substantial, more the result of individual constitutions, the laws of physiology and the peculiarities of environment, than the result of disease entities" (Engelhardt, 1975, p. 131).

The basis of the physiological theory of disease is the notion of normality. Edmond Murphy has identified several of kinds for normality, especially in terms of statistical variation. The first is "a metrical variate with a particular probability density function that is conveniently described by some such term as 'Gaussian' " (Murphy, 1997, p. 145). The next two kinds involve a class representative such as an average or a mode and the frequently experienced in a class such as the ordinary. Many physiological processes vary within a normal range of measured values. For example, normal blood pressure ranges from 90–140 mmHg for systolic pressure and from 60–90 mmHg for diastolic pressure. Depending on one's physical activity, the pressure varies within this range and returns to normal under resting conditions. If the pressure is outside the normal range under resting conditions, then it may indicate a disease or pathological state. The laws governing these physiological processes are part of the homeostatic mechanisms that ensure stable bodily functions (Cannon, 1939).

In the mid 1970s Christopher Boorse proposed a physiological notion of disease, in which he initially made a distinction between disease and illness. Disease, according to Boorse, interrupts specific functions performed by members of a species and is a value-free concept. Illness, however, involves personal or individual and social or cultural values in that disease is generally "undesirable" (Boorse, 1975, p. 61). In other words, disease is a natural concept and therefore theoretical while illness is a normative concept and therefore practical. The normative conception of disease among philosophers of medicine, according to Boorse, reflects a "psychiatric turn" that misrepresents the "physiological" basis of disease.

Boorse ultimately refined the above conception of disease in terms of normal function: "A *disease* is a type of internal state which is either an impairment of

normal functional ability, i.e., a reduction of one or more functional abilities below typical efficiency, or a limitation on functional ability caused by environmental agents" (1977, p. 567). This conception hinges on the meaning of "normal functional ability." This refers to members of a "reference class," i.e. "a natural class of organisms of uniform functional design," who contribute in a typically statistical way to the survival and reproduction of the species (Boorse, 1977, p. 562). Functionality depends not on the function's causal history, as advocated by Larry Wright, but on its contribution to a goal (Boorse, 1976).

Boorse (1987) later recasts the conception of disease in terms of a normal-pathological distinction, especially in terms of function. Again, the distinction is a naturalistic one and the pathological is defined in terms of statistically suboptimal functioning of a part. "A condition of a part or process in an organism is *pathological*," according to Boorse, "when the ability of the part or process to perform one or more of its species-typical functions falls below some central range of the statistical distribution for that ability in corresponding parts or processes in members of an appropriate reference class of the species" (1987, p. 370).

Boorse eventually called his naturalistic conception of disease (and health) the "biostatistical theory" (BST), "a name emphasizing that the analysis rests on concepts of biological function and statistical normality" (1997, p. 4). Disease is an inability of species members to conform to the notion of "species design." Species design involves

> the internal functional organization typical of species members, which (as regards somatic medicine) forms the subject matter of physiology: the interlocking hierarchy of functional processes, at every level from organelle to cell to tissue to organ to gross behavior, by which organisms of a given species maintain and renew their life
>
> (Boorse, 1997, p. 7).

A disease or pathological state, then, is disruption of a part-function at some level of the above hierarchy.

Although Boorse's notion of disease has been criticized from a variety of perspectives, critics are particularly adverse—from an evolutionary perspective—to his notion of "species design."[2] For example, József Kovács (1998) insists that Boorse's notion does not take into consideration the change of species design over geological time. In fact, there is a substantial "time lag" between the design of a species and the changing environment, such that "species design does not always mean health, but it can represent—by the dramatic changes of the environment—disease and death" (Kovács, 1998, p. 32). In other words, current species design is usually out of step with changes in the environment. Moreover, there is never an ideal species design to which individuals comport but rather a significant variability that maintains adaptability *vis-à-vis* changing environments (van der Steen and Thung, 1988).

[2] Boorse's notion of disease engendered a fair amount of criticism; see Boorse (1997) for his response to it. For more recent criticism, see Cooper (2002).

4.1.1.3 Evolutionary Conception

Evolutionary biology provides another approach to defining abnormality and disease. According to Randolph Nesse, a statistical approach is inadequate to determine what is normal; rather, what is required is "nothing less than a complete knowledge of what the body is for, how it works, and, especially, how it came to have its current form" (2001, p. 38). The design and function of the body are the result of evolutionary processes, especially by means of adaptation though natural selection. Over the course of the species evolution *vis-à-vis* the body, specific adaptive mechanisms evolved to defend the body against, for example, microorganisms that would compromise the body's integrity and thereby reduce the organism's fitness, especially in terms of reproductive capacity.

According to the evolutionary conception of disease, disease is defined in terms of adaptive mechanisms. In other words, disease is the result of maladaptation, e.g. to ward off a microorganism that would cause the body serious harm or even death. "Failure to express a defense in response to a challenge," for Nesse, "results in a disease" (2001, p. 38). Consequently, evolutionary mechanisms shape normality and its maintenance; and, disease is then defined as "a disadvantageous difference from the normal" (Nesse, 2001, p. 41).

The evolutionary conception of disease has important ramifications for understanding the nature of disease, especially in terms of the body's defenses to disease-producing conditions and agents. According to Nesse, evolutionary processes like natural selection "should shape mechanisms that regulate defenses to give optimal benefit" (2001, p. 39). For example, fever is a symptom of many diseases that biomedical practitioners often treat. However, fever is an adaptive mechanism to defend the body against infectious agents like bacteria and viruses. "Medications that block fever," contend Nesse and George Williams, "apparently interfere with the normal mechanisms that regulate the body's responses to infection, with results that may be fatal" (1996, p. 28). Moreover, studies demonstrate that blocking fever in adult rabbits increases their mortality rate. However, Nesse and Williams acknowledge that there are conditions in which blocking fever is necessary.

Although Nesse recognizes that no single definition is adequate, he defines disease in terms of biological or evolutionary function: "An individual has a disease when a bodily mechanism is defective, damaged, or incapable of performing its function" (2001, p. 45). Critics of evolutionary medicine challenge the appropriateness of relying on biological function to determine the disease or health of a person. For example, Anne Gammelgaard argues that biological function derived from evolutionary theory is inadequate to determine function in terms of medical significance: "What is functional from an evolutionary perspective is not necessarily functional from the perspective of the patient. This is primarily due to a difference in the perspective from which doctors and evolutionary biologists consider bodily functions" (2000, p. 112). In other words, healthcare professionals are concerned with the welfare of the individual patient while the evolutionary biologists investigate the biological fitness of a unit of selection, which may not necessarily be important to any particular organism's health.

4.1.1.4 Genetic Conception

With the inception of the genetic revolution in the twentieth century a "geneticisation" of the conceptual basis of medicine occurred, with the rise of a new field of medicine—genomic medicine (Guttmacher and Collins, 2002). One of its chief notions is the genetic conception of disease (Hall, 2005). This conception involves the explanation of disease in terms of mutation in or absence of a gene(s), especially in terms of its products being either defective or missing. "One of the opportunities provided by modern genetic techniques," according to John Bell, "is that it should be possible to clarify the pathogenic basis of many of these disorders, and thereby more clearly define most diseases by mechanism" (1997, p. 1052). Genetic diseases are usually the result of loss of function such as in diabetes; however, there are situations in which it leads to gain of function such as in cancer. Gene mutation may be either sporadic, i.e. the result of changes in the genome of patients' somatic cells during their lifetimes, or hereditary, i.e. inherited from one or both of the patient's parents.

If a single defective gene is responsible and if inherited, then it is a Mendelian disease and follows Mendelian inheritance patterns. These patterns include autosomal dominant or recessive, X-linked dominant or recessive, and Y-linked. There are roughly 5,000 Mendelian traits in humans, with hundreds of Mendelian diseases (McKusick, 1998). The classic Mendelian disease, and the first disease described as "molecular," is sickle cell anemia (Feldman and Tauber, 1997). Sickle cell anemia is due to defective hemoglobin in erythrocytes (Stuart and Nagel, 2004). In 1956, Vernon Ingram and J. Hunt demonstrated that sickle hemoglobin's sequence contains a valine in place of normal hemoglobin's glutamic acid (Ingram, 2004).

If there is more than one gene involved then it is a non-Mendelian or polygenetic disease (Williamson, 1988). Most polygenetic diseases are also multifactorial in that the environment plays a critical role in the disease's expression. In other words, part of the disease's origins may be due to inheritance while the remainder may be the result of environmental factors. Thus, many common diseases, such as cancer, diabetes, hypertension, and atherosclerosis, involve the interaction between the genes and the environment. The inherited genes predispose a patient to a given disease but are only expressed under certain environmental conditions. For example, lung cancer has a familial component that can be realized by cigarette smoking (Kiyohara et al., 2002).

Cancer is a prime example of a polygenetic or multifactorial disease. A combination of oncogene activation and tumor suppressor gene inactivation is required for tumorigenesis. However, Robert Weinberg, from the Whitehead Institute at MIT, and Douglas Hanahan, from the University of California at San Francisco, after reviewing the current literature concerning carcinogenesis, proposed a new paradigm to guide research in the twenty-first century. Rather than explaining cancer with just a few mutated genes, they argued that it is a complex and multifaceted disease that exhibits at least six different "hallmarks" (Hanahan and Weinberg, 2000). These include self-sufficiency in growth signals, insensitivity to antigrowth or growth-inhibitory signals, tissue invasion and metastasis, limitless

replicative potential, sustained angiogenesis, and evading apoptosis or programmed cell death. Hanahan and Weinberg (2000) advocate a heterotypic cell biology, in which cancer cells recruit normal cells to form a mature tumor. Recently, defects in the extracellular matrix have also been proposed as etiological factors in carcinogenesis (Marcum, 2005c).

Finally, a class of genetic diseases that represent mutations to genes located on the circular pieces of DNA in mitochondria has been investigated intensely over the past decade (Taylor and Turnbull, 2005). Mitochondria are organelles found in eukaryotic cells that are responsible for aerobic respiration or oxidative phosphorylation. They are maternal in origin, since paternal mitochondria are destroyed during fertilization. The inheritance of mitochondrial genes exhibits a non-Mendelian pattern. The mitochondrial genes encode for over a dozen proteins and associated RNA machinery involved in cellular respiration. Mitochondrial diseases include a form of dementia called MELAS, which stands for mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes, and a form of epilepsy called MERRF, which stands for myoclonus epilepsy with ragged red fibers. In addition, the eye disease, Leber's hereditary optic atrophy, results from mutations to mitochondrial genes, which is also the case for Pearson's syndrome—an inherited bone marrow failure syndrome. Although progress is being made with respect to understanding mitochondrial diseases, there are few if any therapeutic modalities to treat them.

4.1.2 Illness

Humanistic or humane practitioners reject the abstract notion of disease for a concrete notion of illness. For example, Cassell (1991) points out two problems with biomedical conceptions of disease. The first is that biomedical practitioners look at each disease as the result of a single, unique cause. Although infectious diseases are often the result of a single microorganism, however, many diseases—such as cancer and heart disease—have multiple causes. There is certainly no single cause that is responsible for many chronic diseases. In addition, the etiology of many diseases is embedded in a society's cultural fabric. According to Cassell, illness cannot "be completely understood apart from personal lifestyle and the social setting in which it occurred" (1991, p. 14). For example, the sharp rise in lung cancer after the First and Second World Wars reflected the socially accepted practice of a previous generation's habit of cigarette smoking.

The second problem, according to Cassell, is that function, for the biomedical model, is simply a result of structure, such that a change in function or a dysfunction reflects a change in structure. The issue is that structure is an artificial construct or a moment in time, while illness is dynamic in which the pathophysiology unfolds over time.

Cassell (1991) contrasts the ontological view of disease with a physiological or process-oriented view and claims that there is no adequate system for understanding the nature of disease. He goes on to challenge the reader: "I think you will be

unable to come up with any definition that is not so vague as to be useless as a practical guide to action" (1991, p. 92). Kenneth Boyd (2000) agrees that notions such as disease and illness are ambiguous but contends that this is because they are based on values. Lester King (1954) also agrees that the nature of disease is imprecise, although he contends that the imprecision is based on the fact that disease conditions generally follow a range. For example, what constitutes the normal blood hemoglobin is not a precise number but rather a range.[3]

According to King, disease is a purely artificial notion. What makes something a disease is not only the biology but also our social values: "Disease is the aggregate of those conditions which, judged by the prevailing culture, are deemed painful, or disabling, and which, at the same time, deviate from either the statistical norm or from some idealized status" (King, 1954, p. 197). Ultimately, diseases are not "*things* in the same sense as rocks, or trees, or rivers. Diseases represent patterns or relationships" (King, 1954, p. 199). Of course, this position raises the ontological issue of a pattern's or a relationship's reality, which King resolves by embedding it within a cognitive framework.

George Agich also rejects a value-neutral theory of disease, especially Boorse's functional theory of disease. Agich claims that freedom is the main value by which to evaluate the notion of disease: "Underlying all criteria of disease is the view that what is proper to human beings is bound up with freedom or rational free agency since pain, deformity and dysfunction of various kinds all restrict the individual's capacity to act. The reference to freedom" he continues, "has an interesting and important implication in connection with the problem of disease language, for it implies that *many goals* are possible not simply those typical at any given time" (1983, p. 37). The possibility of these goals is not strictly biological but also social.

Agich next applies the value of freedom as a hermeneutical principle to interpreting Boorse's theory: "On Boorse's view, 'disease' is a description of a deficiency in typical species functions where 'function' means 'a standard causal contribution to a goal actually pursued by the organism'; my suggestion is that if the phrase 'goals actually pursued by the organism' is understood in social terms and in terms of freedom rather than biologically (since medicine concerns *human* disease), then the breadth of possibilities regarding disease as well as the value-laden character of disease judgments will become apparent" (1983, p. 37). Agich concludes that Boorse's theory is too simple and fails to capture the complexity of disease and its personal and social dimensions.

Caroline Whitbeck also subscribes to a value-laden notion of disease and bases her notion on psycho-physiological processes. To that end she defines disease, in general terms, as "an instance of the *sort* of psycho-physiological process that people *wish to be able* to prevent or terminate" (Whitbeck, 1978, p. 211). Moreover, this notion of disease is relative to a cultural context, with respect to what people want and expect to be able to do. "Thus," concludes Whitbeck, "the judgment as to

[3] King claims "that trying to be too precise is actually misleading, inaccurate, stultifying to thought, and philosophically very unsound" (1954, p. 195).

what types of processes constitute a disease depends on a value judgment of the societal group, *rather than* upon either the judgment of the person afflicted, or simply upon the judgment of the professional whom the society has charged with developing and applying preventive and therapeutic measures" (1978, p. 211). Finally, she cites with approval Mervyn Susser's distinction between disease as organic or mental dysfunction and illness as the subjective or conscious awareness of the dysfunction. What makes the awareness possible are the social values that dictate appropriate behavior.

In addition, K.W.M. Fulford (1989) proposes a value-laden notion of disease, since conceptually medicine is fundamentally evaluative and not factual in nature. Fulford contrasts a "reverse" view of the relationship between disease and illness with the "conventional" view. In the latter view, a value-free concept of disease is primary to a value-laden notion of illness, of which it is a subclass. In the reverse view, illness is primary to disease. "In medicine," argues Fulford, "just as illness—the patient's direct experience of something wrong—normally precedes a clinical diagnosis of *what* is wrong in terms of particular diseases, so, in the logic of medicine it is 'illness' which comes first" (1989, pp. 262–263).

What makes illness logically prior to disease, according to Fulford, is that the former is based on the notion of action failure, while the latter is based on a notion of dysfunction. Action failure involves an inability of persons to carry out their "intentional doings." For example, Fulford claims that delusions are not cognitive dysfunctions in which the patient believes what is factually false but that delusions result from an inability of the patient to provide satisfactory justification for an action.

Finally, the phenomenological model of the body has important implications for the patient's experience of illness. Illness is not so much the dysfunction of a mechanized body or body part within a machine-world, as it is the disruption of an embodied subject's lifeworld: "illness must be understood not simply as the physical dysfunction of the mechanistic, biological body but as the disorder of body, self and world (of one's being-in-the-world)" (Toombs, 1993, p. 81). Illness, then, results in an awareness of the body as separate and foreign that stands out over and against (ek-stasis) the normal course of life.[4]

No longer, claim phenomenologists, does the suffering patient go about everyday life without conscious awareness of the body's constraints and limitations. That constrained body, in terms of its spatial and temporal dimensions, imposes itself upon a patient who is ill. Illness often expands the temporal scale and collapses the spatial domain in which the sick body is lived (Toombs, 1993). For example, a routine activity, such as combing one's hair, which normally takes little time, takes much longer, when an arm is broken.

As a broken tool thwarts the builder's plans so to the ill body disrupts the patient's plans. This is not to say that the body is a tool in a strict sense and that the ill body consequently is a broken tool, but the analogy of the ill body as a broken

[4] See Leder (1990, pp. 11–35), for additional discussion on the "ecstatic body."

tool does capture the impact illness has on the patient's experience of the body: "it would be wrong to call the body parts tools since they are also part of *Dasein* as self. They are not only a part of the totality of tools, but also, as lived (*leibliche*), they belong to the projective power of the self" (Svenaeus, 2000, p. 109).[5] The objectification of the phenomenological body, however, differs from the objectification of the biomechanical body. In the former the patient is an object but one that is situated in a unique lifeworld as an embodied subject, while in the latter the patient is an object located in a common machine-world as a disembodied person.

4.2 Health or Wellbeing

Part of the problem with the biomedical model's definition of disease and health is that medicine is more often a practical rather than a theoretical discipline: "medicine and its concepts of 'disease' and 'health' are bound up with medical practice and the interests of doctors and patients as well as with advances in science" (Brown, 1985, p. 326). Humanistic or humane practitioners criticize the biomedical model because it brackets the patient's existential concerns associated with the illness experience, which are often critical for a patient's recovery. "Illness," according to Marinker, "is a feeling, an experience of unhealthy which is entirely personal, interior to the person of the patient" (1975, p. 82).[6] Illness then is a more expansive concept than disease, in that the patient may not present with the symptoms of a disease but still be ill.

So too health is not simply a default state with respect to a disease state, for humanistic or humane practitioners. Rather, it is defined in positive terms of wellbeing. Finally, the interests and values of the patient and the physician are critical for defining health as wellbeing, just as they were needed to define illness by humane practitioners. In the remainder of this section, the biomedical notion of health is discussed followed by an examination of the humanistic notion of wellbeing.

4.2.1 Health

Biomedical practitioners often explicate the notion of health in negative terms as the absence of disease, in terms of either the expression of the disease entity or the conditions of the diseased state. This negative definition of health is evident in many

[5] "Heidegger uses *Dasein*," notes Inwood, "to refer both to the (concrete) human being and to its (abstract) being human" (1997, p. 123).

[6] Marinker also distinguishes sickness from disease and illness: "Sickness is a social role, a status, a negotiated position in the world, a bargain struck between the person henceforward called 'sick', and a society which is prepared to recognize and sustain him" (1975, p. 83).

medical dictionaries. For example, in the twenty-sixth edition of *Stedman's Medical Dictionary*, the first definition of health reads: "The state of the organism when it functions without evidence of disease or abnormality" (Stedman, 1995, p. 764).

Stedman's dictionary and other medical dictionaries also include mental health as part of their overall definition of health. For example, the thirty-seventh edition of *Black's Medical Dictionary* claims that "good health may be defined as the attainment and maintenance of the highest state of mental and bodily vigor of which any given individual is capable" (Macpherson, 1992, p. 265). Moreover, even mental health is reducible in terms of material, physical entities and conditions and is explicated in terms of the absence of mental disease. Thus, the notion of health—whether physical or mental—is defined traditionally and predominantly as the absence of a disease—a material state—and thus represents a default state.

Boorse distinguishes between two notions of health. The first is a theoretical notion, in traditional terms, as the absence of disease. He develops this traditional notion with respect to the notion that disease is sub par functioning *vis-à-vis* optimal species design: "health is normal functioning, where the normality is statistical and the functions biological" (Boorse, 1977, p. 542). The theoretical notion is a value-free concept, because it is based on biological facts.[7] The second notion of health is practical and is defined as "roughly the absence of any treatable illness" (1977, p. 542). This notion is not as ideal as the theoretical notion and is therefore inadequate for developing a robust conception of health.[8]

Boorse develops his functional account of health based on the Aristotelian notion of teleology and the modern notion of goal-directedness. The intuition he uses to frame this account is that "the normal is the natural" (1977, p. 554). Importantly, health is not based on personal or social values and therefore is not a normative concept. To that end, Boorse defines health accordingly: "*Health* in a member of the reference class is *normal functional ability*: the readiness of each internal part to perform all its normal functions on typical occasions with at least

[7] Although Boorse (1987) considers health a value-free concept in terms of "core" medicine, he concedes that social values play an important role in "peripheral" medicine—such as cosmetic surgery.

[8] Boorse (1977) also makes a distinction between intrinsic and instrumental health. Intrinsic health refers to a state inherent to the general condition of the organism, while instrumental health refers to that secured by the organism's behavior—particularly the notion of positive health. Boorse (1977) identifies two notions of positive health, which envision health as more than the absence of disease. Examples of the first notion are prevention of disease and health maintenance. Boorse argues, however, that the shift from cure to prevention or maintenance is a shift from an intrinsic to an instrumental notion of health and does not differ fundamentally from health as absence of disease, since what is prevented is a disease or what is maintained is the absence of disease. According to a second notion of positive health, "physicians and mental health workers should actively aid individuals, or communities, in maximizing their quality of life and developing their full human potential" (Boorse, 1977, p. 568). For Boorse, this notion is a genuinely positive notion of health since it entails an enhancement of function or "functional excellence," which the medical community does not necessarily discover but does advocate.

typical efficiency" (1977, p. 555). The reference class again refers to the species, while function refers to contributing to a goal. Health is a species related notion in that it is an ability of species members to conform to species design: "We have supposed that the basic notion is 'X is a healthy Y'—that it is by comparing X with its reference class Y that one distinguished the way X does function from the way it ought to" (Boorse, 1977, p. 562). It then is the absence of disease, which is the inability to conform to such design.

For Boorse health is the organism's normal functioning, especially in terms of its physiology or the function of its parts. He further develops his notion of health in terms of "grades of health." The base upon which these grades are founded is the distinction between being dead or alive. From there he makes further distinctions between well and ill, therapeutically abnormal and normal, diagnostically abnormal and normal, pathological and theoretically normal, and finally suboptimal and positive health. Positive health he now defines as "superhealth beyond the already utopian goal of complete normality" (Boorse, 1987, p. 366). Such health would be one to two standard deviations from the normal, as the right-hand tail of a distribution graph for the efficiency of a part's function. However, health is normal functioning *vis-à-vis* species design and, therefore, the definition of health as the absence of disease is a truism.

4.2.2 Wellbeing

Wellbeing is the normative conception of health and reflects the values of a particular culture and, therefore, includes the peripheral dimensions of medical practice (Boorse, 1987). For example, cosmetic surgery may not be required for maintenance of a part's efficient functioning but may reflect social values of beauty that enhance the overall wellbeing of a person. Engelhardt also defines health as a normative concept but distinguishes it from a moral sense of right and wrong: "Though health is good, and though it may be morally praiseworthy to try to be healthy and to advance the health of others, still, all things being equal, it is a misfortune, not a misdeed, to lack health" (1975, p. 125). Thus, health or wellbeing is a metaphysical notion, such as beauty or goodness and not necessarily a moral or factual state of being. One does not blame another for loss of good health but sympathizes with him or her for the misfortune. The notion of health is also descriptive, according to Engelhardt, and it is this dual nature of health as normative and descriptive that often results in ambiguous definitions of health and wellbeing.

The World Health Organization provides the standard and oft-quoted definition of health, in terms of wellbeing: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (1948, p. 35). Engelhardt (1975), however, finds this definition of health or wellbeing problematic because of its ambiguity. The issue is how to define the norms that constitute a person's wellbeing. Moreover, the term "complete" is also problematic: "if health is a state of complete physical, mental and social well-being, can anyone ever be

healthy?" (Engelhardt, 1975, p. 126). Ultimately, health is "a regulative ideal of autonomy directing the physician to the patient as person, the sufferer of illness, and the reason for all the concern and activity" (Engelhardt, 1977, p. 139).

The ambiguous nature of health—especially in terms of wellbeing—is to be expected, since health depends upon our values of what constitutes wellbeing (King, 1954). For King, health is "the state of well-being conforming to the ideals of the culture, or to the statistical norm" (1954, p. 197). Since wellbeing is a value judgment, besides being a biological state, it is only partly derived from the statistical norm. Thus, the correspondence between health and wellbeing is not one to one: "The sense of well-being frequently correlates with what we mean by health, but the correlation is not high. Certainly a sense of well-being does not preclude the presence of disease, while the absence of such subjective feelings does not indicate disease" (King, 1954, p. 196).

Whitbeck also subscribes to a notion of health as value-laden and as positive in terms of a person's wellbeing: "health, rather being something that happens or fails to happen to a person in the way that diseases and injuries do, is the ability to act or participate autonomously and effectively in a wide range of activities" (1981, p. 616). This ability to act, however, involves more than functional capacities but also involves the integration of intentional capabilities to attain the goals and interests of the individual person. There are then several components that make up Whitbeck's notion of health or wellbeing. The first is the physical fitness of the functional capacities, especially in terms of avoiding disease. The second is wholeness, in which intentional capabilities are integrated with physical fitness. The final two components include "having a generally realistic view of situations, and having the ability to discharge negative feelings" (Whitbeck, 1981, p. 620).

Carol Ryff and Burton Singer (1998a) champion a notion of wellbeing in terms of positive health. They base their notion on three principles. The first is that positive health is fundamentally a philosophical and not a medical issue. To that end, they examine "the goods" required for living a healthful life. The next principle is that the mind and body are intimately connected and influence each other, especially in terms of health and wellbeing. The final principle is that "positive human health is best constructed as a multidimensional dynamic process rather than a discrete end state. That is, human well-being is ultimately," Ryff and Singer conclude, "an issue of engagement in living, involving expression of a broad range of human potentialities: intellectual, social, emotional, and physical" (1998a, p. 2).

Ryff and Singer (1998b) also identify four essential features of positive human health: "(a) leading a life of purpose, embodied by projects and pursuits that give dignity and meaning to daily existence, and allow for the realization of one's potential; (b) having quality connection to others, such as having warm, trusting, and loving interpersonal relations and a sense of belongingness; (c) possessing self-regard, characterized by such qualities as self-acceptance and self-respect; and (d) experiencing mastery, such as feelings of efficiency and control" (1998b, p. 69).

Finally, Lennart Nordenfelt (1993, 1995) proposes a notion of health in contrast to Boorse's notion, which he calls "the welfare theory of health." He establishes the notion on action theory, in which a person's health is defined in terms of an ability

to achieve specific goals that are tantamount to good health. These goals include "the vital goals of man" and they are not reducible to a person's basic needs or to specific personal goals. Rather, Nordenfelt defines a vital goal as "a state of affairs that is necessary for the realization of this person's state of minimal long-term happiness" (1995, p. 213). Happiness is not a singular concept that pertains just to a person's emotional state but is a multifaceted one that also includes the intention and object of those emotions.

Nordenfelt then defines the welfare notion of health in terms of a person's vital goals *vis-à-vis* happiness: "*A* is completely healthy, if and only if *A* is in a bodily and mental state which is such that *A* is able to realize all his or her *vital* goals, given accepted circumstances" (1995, p. 212). Health is an evaluative notion or an "ideological judgment" that depends on a person's notion or judgment of what constitutes a healthful, happy life. However, the welfare notion of health is not relative, since the "accepted circumstances" do not reflect only a person's judgment but also include social judgment as well. "It is a challenge to health care and to traditional medical education in general," according to Nordenfelt, "to incorporate insights about existential states and their role as determinants and constituents of health" (1993, p. 284).

4.3 Summary

The nature of disease and health or of illness and wellbeing depends on the metaphysical position ascribed to by the medical practitioner and, often by default, by the patient. If the patient is a body-machine made up of or reducible to various parts, then disease is an entity or a condition that results from a malfunctioning body part and thereby hinders the efficient running of the body-machine. Health is the absence of any such malfunctioning, although once a year the body-machine may need a check-up.

However, if the patient is a person, who strives to find meaning in the world, then, besides biological malfunction, the patient experiences the "ev-ill" effects of or the existential angst associated with the "dis-eased" state. Health involves more than the absence of a malfunctioning part or body. It also includes the overall well-being of the person.

Finally, it is not surprising that there is a quality-of-care crisis in modern medicine, given its understanding of disease and health. Patients are not simply body-machines but persons with concerns and fears about their physical and mental (and for some spiritual) being-in-the-world. The humanistic or humane notions of illness and wellbeing certainly take into consideration these concerns and fears.

Chapter 5
Diagnosis and Therapeutics

In this chapter, I examine from a metaphysical perspective entities that compose the medical worldviews involved with diagnosis and therapeutics, i.e. the diagnostic and therapeutic "stuff" that makes up the biomedical and humanistic or humane models. For example, knowing the cause of a disease is critical for being able to identify and treat it intelligibly, and forms the rational basis for diagnosis and therapeutics (see Chapters 9 and 10). For the biomedical model because disease is a physical state and the result of mechanistic causation, diagnosis and therapeutics is physical and mechanistic as well. A biomedical practitioner uses physical means by which to gather the clinical data and information necessary to determine a patient's disease state and its cause.

The diagnostic procedure for the biomedical or technomedical model depends upon an outside-in approach (Davis-Floyd and St. John, 1998). The standard outside-in approach is the differential diagnostic method. Through this method, a physician uses the data generated from laboratory tests and physical examinations to eliminate the different hypotheses not causally responsible for a patient's disease state. Once the proper diagnosis is made and the nature of the diseased state determined, the role of a biomedical practitioner is to intervene in the disease process. Just like the diagnostic procedure, this intervention is also often outside-in (Davis-Floyd and St. John, 1998).

This outside-in approach to disease led to a therapeutic revolution in the twentieth century, following on the heel of advances made in understanding and treating infectious disease at the end of the nineteenth century. The revolution, however, was slow in coming during the first half of the twentieth century, and physicians during this time still had little in the way of effective therapeutics to offer patients: "Comfort was what the scientific physician could offer as recently as 1933!" (Golub, 1997, p. 179). Even blood letting was still practiced up to the First World War.

After the Second World War, however, the technological revolution in medicine took off at a staggering pace with the successful development of vaccines, antibiotics, and other pharmaceutical drugs, including designer drugs and surgical procedures and their associated technology. Comparing the revolution to the technical feats of the space program, James Le Fanu claims that "the post-war therapeutic revolution was the most momentous of all, a multitude of discoveries in diverse scientific

J.A. Marcum, *Humanizing Modern Medicine: An Introductory Philosophy of Medicine,*

disciplines stretching over a period of three decades" (2002, pp. 159–160). The twentieth century culminated in the genetic revolution, especially with the introduction of gene therapy (Clark, 1997; Marcum, 2005b).

Although the biomedical model sponsored these "miracles" of modern medicine, many patients today are dissatisfied with the quality-of-care provided by biomedical practitioners and their outside-in approach. Commenting on the limitation of this approach, Davis-Floyd and St. John claim that "it renders invisible the personality and the experiences of the patient who must live and perhaps die with the disease" (1998, p. 28). Humanistic or humane practitioners certainly avail themselves to the technological advances made in diagnostic and therapeutic procedures; but, they attempt to instill a human touch into medical practice. Moreover, since disease causation is more than simply mechanistic causation—rather it is multifactorial and must include the patient's lifestyle—therapeutics is more than simply intervening in the physical causes responsible for a disease state or an illness experience. Rather, healing, which is meant to reinstate a patient's wholeness, must include lifestyle factors. It must involve more than external intervention.

Humanistic or humane practitioners add to biomedicine's outside-in approach an inside-out approach (Davis-Floyd and St. John, 1998). According to this approach, given the patient's attunement to changes within the body the role of the physician is to obtain, especially through patient-physician communication, the needed information for making a more accurate and holistic diagnosis. "The physician-patient communication [that the humanistic model] emphasizes allows the physician to elicit information from deep within the patient and combine it with objective findings" (Davis-Floyd and St. John, 1998, p. 97). Finally, the body is often able to heal itself such that the humanistic or humane physician rather than simply imposing a therapeutic modality is to assist the natural ability of the body to heal itself.

5.1 Diagnosis

Medical diagnosis is the means by which physicians and other healthcare professions determine a patient's disease state, and it represents an important component of modern medicine's worldview and metaphysics. Advances in technology, especially imaging technology, certainly enhance the ability of physicians and medical technicians to gaze into the interior of the patient's body in order to determine with accuracy its disease state. These techniques range from the low tech and noninvasive to the high tech and invasive and include technical devices, from stethoscopes to MRI scanners. The biomedical model depends upon two broad means for determining the patient's disease state: the medical interview and the physical examination, which generally includes follow up laboratory tests and procedures. In this section, the metaphysics of the cognitive and technical devices developed to aid biomedical practitioners in diagnosis are examined, in terms of the medical interview, physical examination, and laboratory tests and procedures. I then discuss the humanization of these diagnostic procedures.

5.1.1 Medical Interview

People seek a physician because they know something is physically or mentally wrong with them (Black, 1968). In order to determine a patient's problem, the physician asks the patient a series of questions. This process is known as the medical interview (Aldrich, 1999; Cole and Bird, 2000; Coulehan and Block, 2001). Although the medical interview predates the twentieth century, it was not until Felix Deutch and William Murphy published *The Clinical Interview* in 1954, that it became a subject for systematic analysis (Billings and Stoeckle, 1999). Moreover, pedagogical texts began to appear that addressed the steps associated with an effective medical interview. The purpose of the interview for the biomedical practitioner is to collect all the relevant and objective information and data concerning the patient's disease. The questions range from information concerning the patient's present illness and past medical history to the patient's social situation and personal habits.

The medical interview forms the initial component of the patient's medical record, which is "a repository of the information collected about patients, of how the data were interpreted, and of what medical acts were carried out" (Billings and Stoeckle, 1999, p. 271). In other words, a medical record is a comprehensive documentation of a patient's health history and medical care. In the early 1970s, Lawrence Weed (1971) introduced a problem-oriented medical record to structure record keeping. According to this approach, a patient's medical problems are enumerated on a list that provides the information on the actions taken or on those that are planned, in terms of assessing the problem and of developing therapeutic protocols. Besides the list of problems, a medical record also includes a list of the medications administered to the patient. The medical record is a confidential chronicle that aids those in patient care and must be respected as such (Siegler, 1982).

5.1.1.1 Technique

The technique for conducting the medical interview varies but includes a number of essential elements, including the initial or chief complaint, history of present illness, past medical history, family history, social history, and review of the symptoms (Greenberger and Hinthorn, 1993). The chief complaint is technically called the "presenting symptom." When conducting the medical interview, or medical history as it was known previously, the physician should "begin the history with a detailed analysis of the presenting symptom, for this is the thing in which the patient is most interested, the thing which has made him take the trouble to consult his doctor" (Black, 1968, p. 31).

Symptoms are the subjective description of the disease as experienced by the patient, such as depression, dizziness, fatigue, pain, or shortness of breath. The description of symptoms are important, since they assist the physician in forming initial diagnostic hypotheses, i.e. they "are the experiences that suggest disease or

physical dysfunction" (Greenberger and Hinthorn, 1993, p. 3). Finally, the physician must be cautious when there is more than one initial complaint since there may be more than one disease.

After establishing the presenting symptom, the next part of the medical history consists of the present illness history. "The [history of the] **present illness**," according to Coulehan and Block, "is a thorough elaboration of the chief complaint and other current symptoms starting from the time the patient last felt well until the present" (2001, p. 45). Whereas the first part of the medical history depends upon the patient's voluntary information, the present illness history depends upon the questions the physician asks the patient concerning the present illness. Of course, the questions the physician asks depend on the patient's initial description of the presenting symptom. The general strategy is to begin with open-ended questions and move to more specific questions. For example, the physician may seek general descriptive information about the chief complaint and then focus on its specific details in terms of location, time of onset, or intensity. The purpose is to obtain information about additional symptoms not mentioned with the presenting symptom.

In the next component of the medical interview, the physician continues to gather information and data on a patient's present illness by examining the patient's previous medical problems and diseases. This component is known as the past medical history. "The past medical history," according to Steven Cole and Julian Bird, "is the record of the patient's past experiences with illnesses and medical treatments" (1991, p. 87). Here the physician asks specific questions about the patient's previous medical problems that are germane to the present illness. This part of the medical interview should be comprehensive and sufficiently detailed to assist the physician to begin the process of forming a valid differential diagnosis. The topics that make up the past medical history include previous hospitalizations, operations, injuries, serious physical and mental illnesses, allergies, past and current medications and any allergic reactions to them, immunizations, pregnancies, dietary constraints, exercise, and sleeping patterns. As in the history of the present illness, the strategy is to begin with open-ended questions and then to focus on specific questions when needed.

The family history constitutes the next section of the medical interview, in which the physician inquires about blood or genetic relatives and their "illnesses, state of health or cause of death, age, where they live, and who they depend on for support" (Greenberger and Hinthorn, 1993, p. 13). The illnesses of special concern are hereditary diseases. Although classical Mendelian diseases are uncommon, there are many diseases that have a genetic basis such as cancer, heart disease, depression, epilepsy, and type II diabetes. The family history is important for providing trends of these genetic diseases within a family in order to access the risk of the disease for the individual patient. To that end, a family tree is constructed. Certain diseases such as breast cancer and coronary heart disease have genetic markers such as BRCA I and II or high serum cholesterol, respectively, that permit prophylactic surgery and dietary restrictions to prevent the disease's occurrence.

The penultimate step in the medical interview is the social history, in which the physician asks questions about the patient's personal history or biography and

habits, employment, and sexual activity and orientation. The patient's personal history includes place of birth, life-style choices, family background, education, leisure activity, residence, and religious beliefs, which are important factors in terms of diagnosing and treating a disease. For example, Jehovah Witnesses do not permit blood transfusion. Personal habits, such as smoking, alcohol consumption, and non-prescription or illicit drug use, are important risk factors for certain diseases. Cigarette smoking, for example, is a risk factor for a number of diseases including heart disease and lung cancer. Moreover, since denial or distortion of certain habits such as alcohol consumption is common, special interviewing techniques are available to obtain the requisite information. Employment is also important in determining possible environmental carcinogens or toxins the patient may be exposed to, such as asbestos. Another serious risk factor associated with many occupations is stress. Sexual activity and orientation are important for determining the risk of sexually transmitted diseases, such as syphilis and gonorrhea.

The final step in the medical interview is the review of systems, in which the physician asks questions systematically about each part of the body to compile an inventory of symptoms. "The purpose of this inventory," according to Billings and Stoeckle, "is to screen for disease processes that have not as yet been discovered in the history. A systematic and thorough review, organized to scan for common complaints referable to each system of the body," they claim, "will jog the patient's memory about symptoms and diseases that have not already been mentioned, and will remind the interviewer about topics that may have been overlooked" (1999, p. 57). The questions generally begin with the skin and then proceed to the head and downwards, inquiring about symptoms for each of the major organs and organ systems. Although this step is considered as the last one pedagogically, it is generally conducted during other parts of the medical interview or during the physical examination. Through this step the physician hopefully compiles a complete and comprehensive medical picture of the patient.

5.1.1.2 Humanistic Modifications

Of course, humanistic or humane practitioners also rely upon the medical interview but modify it to address issues concerning the illness experience other than a patient's somatic condition(s). "The medical interview," according to Knight Aldrich, "is the procedure through which the doctor, while establishing a relationship with the patient and enlisting the patient's collaboration in treatment, seeks to understand the patient's *illness* as the first step in making a diagnosis of *disease*" (1999, p. 1). The modifications include asking questions about existential and emotional issues concerning the patient's medical history. For example, Cassell claims that biomedical practitioners are not necessarily interested in why the patient suffers but in what causes the patient's disease: "It is frequently troubling to patients to discover that most doctors are not primarily interested in finding out what is the matter with them but are concerned instead with discovering what disease is the source of their illness" (1991, p. 95).

The place to allay the existential and emotional concerns of the patient is in taking the medical history. Through interviewing the patient, the physician can address these concerns, which are often the source of the patient's suffering. The goal of the medical interview for the humane practitioner is more expansive than that for the biomedical practitioner: "to understand the patient's view of the illness and its significance, and to understand the patients…as people whose psychological, sociological, cultural, developmental, and personality characteristics have influenced their illnesses and their responses to illness, to disease, and to medical care" (Aldrich, 1993, p. 23).[1]

In *Talking with Patients* Cassell (1985) asserts that a physician obtains, through the standard medical history, only a portion of the information concerning the patient's illness experience. He adds three additional sections, which he calls the "personal history," in order to acquire a more comprehensive account of the illness and its meaning and impact on the patient's daily life. In the first section, the physician inquires about "the kind of person the patient is, along with how he or she behaves, interacts with the pathophysiology to produce this specific illness" (1985, p. 85). The next section involves personal, familial, social, and cultural factors associated with the patient's illness experience. The final section is concerned with how the patient interprets the illness experience, especially the expectations the patient has for healing. The stance of a physician should be to place herself within the shoes of a patient: "We should constantly be asking ourselves how we would have thought, felt, reacted, or acted if such an event had happened to us" (Cassell, 1985, p. 109).

Finally, Tauber (2005) recommends the addition of an ethics section to the medical interview and record, which would address the ethical issues of the patient's illness. As he points out the current medical record, which dates to the 1960s, reflects the scientific emphasis of medical care. By adding an ethics section, the healthcare team is given an opportunity to tackle the ethical concerns for that particular patient before they become problematic. However, the more important benefit is to help the physician realize that at root the medical profession is a moral enterprise that requires physicians to reflect on the ethical and moral implications of their actions

[1] For Cole and Bird (2000), the chief function of the medical interview for traditional medical practitioners is to gather the objective information concerning the patient's chief complaint. They developed a "three function" approach to the medical interview, in which one of the functions is to evaluate the patient's emotions in terms of the illness experience. Knight Aldrich (1993) also claims that the medical interview should be structured to help the patient deal with the emotions associated with the patient's losses in life. He gives the example of an elderly female patient who gave up independent living because she could no longer keep a flower garden. During a "sensitive" interview the patient began to cry and the physician could not think of a consoling comment. Aldrich claims that the physician's silence was probably better than a trite reassuring comment that all would be well. But he also claims that an "empathic" comment, such as recognizing that by having to live in a nursing home meant that the patient gave up not just a flower garden but also independent living, would have helped the patient to grieve the loss of both the flower garden and independent living and to move onto the next phase of life.

with patients: “clinical medicine is governed by its ethics, and when mentors and students better recognize the complex moral reality in which they live, the more likely their craft will be transformed from its technocratic and bureaucratic obsessions to a more humanized life form” (Tauber, 2005, p. 239).

5.1.2 Physical Examination and Laboratory Tests

Once the medical interview is complete the physician then conducts, if necessary, a physical or clinical examination. It is the procedure in which a physician physically examines the patient for signs of disease (Greenberger and Hinthorn, 1993; Kassirer and Kopelman, 1991b). The exam usually begins with the head, moves to the torso, and concludes with the extremities. The physical examination involves a variety of techniques to access the organ systems, including inspection, palpation, percussion and auscultation. The information obtained from the examination includes the patient’s basic vital signs, including body temperature, respiratory rate, and blood pressure, general biometrical data, such as the patient’s weight and height, and the general condition of each of the organ systems. Besides the general examination, especially for asymptomatic persons usually undergoing an annual check-up, each specialty has its own specific examination for symptomatic patients, which allows the specialist to determine the exact nature of the disease for the pertinent organ system, such as the circulatory, neural, or respiratory system.

Whereas symptoms are the expressions from the patient’s subjective experience of the disease, clinical signs are the objective expression of the disease, which the physician observes upon examining the patient (Cole and Bird, 2000; Coulehan and Block, 1992). Signs are often the result of diagnostic intervention and may include a lump discovered on the liver though palpation or a heart murmur through auscultation. Many signs are named after physicians who first described them, such as Boston’s or Graefe’s sign in which the eye protrudes from the socket and is indicative Graves-Basedow disease, a form of hyperthyroidism.

Advances in laboratory tests and procedures over the last several decades are simply staggering. These advances include, for example, a host of imaging devices such as ultrasound and magnetic resonance imaging, as well as scanning devices such as computerized (axial) tomography and proton emission tomography (Konofagou, 2004; McGoron and Franquiz, 2004). Besides high-tech machines, there is also a host of laboratory protocols that can be used to measure a variety of bodily substances, such as cholesterol, creatinine, bilirubin, and serum albumin. Finally, the development of the endoscope has allowed physicians and surgeons to invade the body with minimal damage to the patient (Wang and Triadafilopoulos, 2004). However, magnetic resonance imaging (MRI) probably best illustrates the advances in medical technology.

Raymond Damadian and colleagues performed the first MRI exam of a patient in 1977 (Gore, 2003). Although the results were crude, the development of MRI over the next several decades was astounding. To date, over a dozen Nobel Prizes

have been awarded to those involved directly or indirectly in its development (Boesch, 2004). The basic principle upon which MRI works involves the absorption of energy by hydrogen atoms from a radio frequency pulse, within a strong magnetic field (Roberts and Macgowan, 2004). The magnetic field forces the hydrogen atoms into a particular alignment. Once the pulse ends, the coil, through which the pulse was generated, detects a signal from the hydrogen atoms and converts it into a signal that is then transformed into an image. The image depends on the type of tissue and whether it is normal or not. MRI is used to diagnose a variety of disease states, including herniated discs in the spine, tumors and infections in brain and other parts of the body, strokes, and multiple sclerosis. This technology has also been adapted for examining the circulatory system.

An important humanistic modification of laboratory testing is to invite the patient into the process by explaining what the results of the tests mean. Often patients are left dangling in terms of the massive amount of information collected on them and only given the relevant facts that seem just that, facts. When in reality, there exists a lot of uncertainty in the laboratory tests in that the data must be interpreted as facts. By exposing the patient to the interpretative process that is part of the testing procedure, the physician allows the patient to comprehend more fully the diagnostic experience. No longer is the patient just a spectator in the "game" of medicine—as Tauber (2005) calls it—but an active participant. Thus, the patient is empowered with authentic knowledge rather than patronized with facts from on high. Of course, the physician must be sensitive to the patient and not simply present the laboratory data without guidance. After all, the physician undergoes years of training to understand the game of medicine but it is the patient who best understands the illness experience.

5.1.3 Differential Diagnosis

From the clinical evidence gathered from the medical history and the physical exam, including laboratory tests, a physician constructs a differential diagnosis. The exact nature of this diagnosis is ambiguous, since clinicians use it quite differently. For example, Jerome Kassirer and Richard Kopelman (1990) have identified five uses for differential diagnosis. The first is an exhaustive list of possible diseases to account for the clinical evidence. Importantly, the list is not ranked probabilistically. The next use is also a long list of possible diseases for each of the significant clinical datum. The third use is also an exhaustive list but ordered probabilistically. The fourth use is a short list that is supported by a large amount of clinical data.

Finally, a use preferred by Kassirer and Kopelman is "a flexible, ever-changing set of hypotheses driven by probabilistic reasoning, causal reasoning, and concern for the patient's welfare" (1990, p. 27). Although they admit that each use has its advantages, they support their preferred use of evolving set of hypotheses and defend it with a case study demonstrating the development of a differential diagnosis by a clinician examining a patient who was ultimately diagnosed with disseminated histoplasmosis.

5.2 Therapeutics

Medical therapeutics is the means by which physicians and other healthcare professions treat a patient's disease state. Over the last fifty years, advances in therapeutic technology revolutionized medicine and its worldview. These advances include kidney dialysis, cancer chemotherapy, antibiotics, gene therapy, and the heart-lung machine, which made possible one of the most outstanding advances in twentieth century medicine—open heart surgery. In this section, therapeutic advances made possible by biomedical technology are discussed in terms of pharmaceutical drugs, surgical procedures, and gene therapy. In addition, I discuss the notion of the physician as a therapeutic device.

5.2.1 Pharmaceutical Drugs

The rise of the biomedical model certainly depended on the discovery and development of pharmaceutical drugs during the late nineteenth century and the twentieth century. These drugs afforded medicine an ability to treat diseases, especially infectious diseases, which were responsible for the majority of premature deaths. Probably the most miraculous of the drugs were the antibiotics (Hoel and Williams, 1997; Wainwright, 1990). With their discovery and development in the early to mid twentieth century, antibiotics were used to eradicate infectious diseases, like diarrhea and enteritis, pneumonia, and tuberculosis, which plagued western society. Recently, however, a crisis has arisen over the abuse of antibiotics as bacteria became resistant to these medicinals (Casadevall, 1996; Walsh, 2003). Although vaccines are not drugs to treat diseases, they are important for disease prevention (Fletcher et al., 2004; Plotkin, 2005). Finally, "designer" drugs like monoclonal antibodies are part of the future for the pharmaceutical industry (Feig, 2002; Richards, 1994; Rifkind and Rossouw, 1998). In this section, I look at three important drugs, penicillin, insulin, and heparin, to illustrate the advances made in pharmaceutical medicine.

5.2.1.1 Penicillin

One of the first antibiotics to be discovered and developed for clinical use was penicillin (Hoel and Williams, 1997; Lax, 2004). Traditionally Alexander Fleming is credited with penicillin's discovery, although there were others that had observed the *Penicillium* mold's antibiotic effects prior to Fleming (Goldsworthy and McFarlane, 2002). Howard Florey and his assistant Ernst Chain are credited with the isolation and development of penicillin as an antibiotic, although it was the Americans who devised the first commercial protocol of its isolation for clinical use (Brown, 2004).

Chemically penicillin is part of a group of β-lactam antibiotics, with narrow specificity for Gram-positive bacteria (Kucers et al., 1997). It can be modified to broaden its specificity to treat a wide range of bacterial diseases. It functions primarily by inhibiting peptidoglycan cross-linking within the bacterial cell wall, resulting in cell lysis. Penicillin has been used to treat a wide variety of diseases, including syphilis, bacterial endocarditis, septicaemia, pneumonia, and meningitis.

5.2.1.2 Insulin

There are many other important pharmaceutical drugs discovered and developed during the twenty century, including insulin and heparin, which helped to treat deadly disease like diabetes and to develop spectacular surgical procedures like open-heart surgery (Sneader, 2005). The clinical use of insulin resulted in dramatic outcomes for treating diabetes. Leonard Thompson at age fourteen was about to slip into a diabetic comma, when he received one of the first injections of bovine insulin on 23 January 1922 (Bliss, 1984). His blood sugar eventually returned to normal levels and he lived another thirteen years.

Insulin is a pancreatic hormone produced by β-cells in the Islets of Langerhans (Federwisch et al., 2002). It is a protein with a molecular weight of 5,808 Da and was the first protein ever sequenced, by Fred Sanger in 1955. It functions by binding to cell membrane receptors and by increasing the uptake of glucose and glycogen synthesis. The insulin gene is located on chromosome 11p15.5; and cloned human insulin is now used to treat diabetic patients. Gene therapy is on the horizon (Chan et al., 2003).

5.2.1.3 Heparin

Heparin is a blood thinner or anticoagulant discovered in William Howell's laboratory at the Johns Hopkins medical school, during the first half of the twentieth century (Marcum, 1990, 2000). Although Howell attracted the interest of an American drug company, Hynson, Westcott and Dunning, the company did not sufficiently purify it for use in humans. The development of heparin as a drug was due to the work of Charles Best, of insulin fame (Marcum, 1997). Heparin does not directly inhibit blood coagulation but acts as a cofactor, which binds antithrombin III and potentiates its inactivation of clotting factors such as thrombin and factor Xa (Rosenberg et al., 1985).

One of the chief problems with heparin is regulating its *in vivo* activity when injected into patients, i.e. there is a substantial risk of bleeding or hemorrhage. Protamine sulfate is the standard means of regulating the anticoagulant's activity. However, clinicians discovered that the oligosaccharide containing fewer than 18 monosaccharides represents a safer form of the anticoagulant for inhibiting blood coagulation. Several pharmaceutical companies, including Aventis, Novartis, Pfizer, Wyeth-Ayerst, among others, developed preparations of low molecular weight

heparin (LMWH). LMWH was aggressively developed clinically and is used today to treat not only blood clotting disorders but also inflammatory and malignant diseases (Messmore et al., 2004).

Howell was certainly interested in the physiological function of heparin and incorporated the inhibitor into his theory of blood coagulation, a theory that dominated an entire generation's understanding of blood coagulation (Marcum, 1992). However, with the rejection of Howell's theory by a subsequent generation the inhibitor's physiological role faded in comparison to its clinical role in managing blood clotting. Moreover, the cells that make heparin, mast cells, are not generally located strategically with respect to the vascular system and heparin is only found in the blood under pathologic conditions. Research during the 1980s demonstrated that another complex carbohydrate, heparin sulfate, that is comparable to heparin is synthesized by vascular endothelial cells and is involved in the regulation of hemostasis (Marcum and Rosenberg, 1991).

5.2.2 Surgical Procedures

The development of surgical procedures and its associated technology was also staggering during the twentieth century and was intimately linked often with the discovery and development of the above pharmaceutical drugs, including surgical procedures such as organ transplants.[2] For example, the development of vascular surgery procedures was not possible until the discovery of a safe and an effective blood anticoagulant or thinner. The discovery and development of heparin made possible not only vascular surgery techniques but also high profile surgical procedures, such as open heart surgery, and its associated technology, such as the heart-lung machine (Bigelow, 1990; Le Fanu, 2002). This case study is used to illustrate the advances made in surgical procedures during the mid twentieth century.

Fallot's tetralogy or the "blue baby" syndrome is a condition in which a hole between the two main chambers of the heart does not close off during development (Bigelow, 1990; Le Fanu, 2002). The result is that that both oxygenated blood (red in color) and deoxygenated blood (blue in color) mingle in the heart and is pumped to the rest of the body, which accounts for the baby's blue appearance. The life expectancy of untreated blue babies is around ten years. In 1944, the Johns Hopkins surgeon Alfred Blalock, along with his associates pediatric cardiologist Helen Taussig and medical scientist Vivien Thomas, developed a surgical procedure, known as the Blalock-Taussig shunt operation, in which a non-essential blood vessel from the patient is used to redirect blood to the lungs. Although the procedure does not cure the patient, the life expectancy and the quality of life are dramatically

[2] The discovery and development of immunosuppressant drugs such as azathioprine and cyclosporine were critical for the development of surgical procedures for organ transplantation (Le Fanu, 2002).

increased. This procedure was not possible without heparin to regulate blood clotting (Bigelow, 1990).

Heparin was critical for the development of the heart-lung machine and for the development of open-heart surgery (Bigelow, 1990). Again, the anticoagulant keeps blood from clotting within the machine's tubing and in the patient's blood vessels. Beginning in the 1930s the surgeon John Gibbon and his wife Maly (née) Hopkins developed a machine that pumps blood away from the heart to a set of coils that then oxygenate the blood, after which it is returned to the heart. By 1953 Gibbon performed several heart operations but with limited success, only one of the five patients survived. After this failure, he stopped using the heat-lung machine in operations. Others, however, modified the Gibbon heart-lung machine. For example, the Mayo Clinic surgeon John Kirklin convinced the clinic to refine the Gibbon pump. By 1958 he successfully performed open-heart surgery on over 200 patients, which "became a gold standard for cardiac surgical teams" (Bigelow, 1990, p. 164).

5.2.3 Gene Therapy

If genes are the wave of the future for modern medicine, then gene therapy is the approach for treating genetic disease. During the 1990s gene therapy became a recognized professional specialty, with the founding of journals and societies. For example, the first professional journal, *Human Gene Therapy*, was published in 1990 under W. French Anderson's editorship. Today there are around half dozen journals devoted to gene therapy. A few years later, a group of European scientists took the first steps towards founding the European Society of Gene Therapy. Its first international meeting was held in 1993 in Baveno-Stresa. In 1996 the American Society for Gene Therapy was founded, with its first annual meeting held in Seattle a few years later. Other countries have also founded societies for promoting gene therapy.

The types of genetic diseases treated in clinical trials by gene therapy include various forms of cancer, cystic fibrosis, hemophilia, among other diseases (Marcum, 2005b). For example, during the second half of the 1980s Anderson and other researchers succeeded in inserting a gene for adenosine deaminase (ADA) into T cells from patients suffering from severe combined immunodeficiency disease (SCID), commonly known as the "bubble-baby" syndrome. The engineered cells expressed adequate levels of enzyme activity to encourage a try at gene therapy. In September 1990 Anderson and colleagues at the NIH conducted the first Recombinant DNA Advisory Committee (RAC) approved human gene therapy trial, on a young girl suffering from ADA-SCID (Anderson, 1995). A second girl was treated four months later. Although the procedure did not fully cure the girls, it did significantly reduce the amount of the drug PEG-ADA used to treat them.

As the 1990s progressed, investigators received RAC approval for gene therapy protocols and conducted additional studies using animal models to determine the efficacy and safety of gene therapy for human diseases. By mid decade gene therapy clinical trials included patients suffering from over a dozen genetic diseases

such as cancer, cystic fibrosis, familial hypercholerolemia, hemophilia, and rheumatoid arthritis. However, towards the end of the decade the first death due directly to gene therapy was reported. A person suffering from brain cancer died a few days after receiving an antivirus drug to attack a brain tumor treated earlier with a genetically engineered virus (Johnston and Baylis, 2004).

In a highly publicized case in 1999, an eighteen year-old boy with a defective gene for ornithine transcarboxylase, an enzyme involved in ammonia catabolism, was given an adenovirus containing the normal gene as part of clinical trails. The teenager died several days later, apparently from a severe allergic reaction to the vector that led to the failure of multiple organs (Lehrman, 1999; Verma, 2000). Although the deaths are tragic and had repercussions for gene therapy trials, the impetus for conducting further trials was not diminished.

At the end of the twentieth century, Alain Fischer and Marina Cavazzana-Calvo, along with colleagues, from the Necker Hospital in Paris treated two baby boys for X-linked SCID (Cavazzana-Calvo et al., 2005). The disease is caused by a defective gene for the γ-chain of the interleukin-2 receptor involved the maturation of T cells and natural killer cells. Importantly, X-linked SCID represents an attractive disease for gene therapy since the bone marrow cells receiving the normal gene would have a growth advantage over those cells with the defective gene. The team infused engineered autologous bone marrow cells containing the normal gene into the two baby boys and within the year their immunological systems were normal. The team then went on to treat almost a dozen baby boys with the procedure, with the majority being cured. However, in 2002, two of the boys developed a rare form of leukemia. Examination of their genomes revealed that the retrovirus had inserted into a gene, *LMO-2*, known to be associated with childhood leukemia. In early 2005, the French team reported yet another boy from its study had developed cancer. In reaction several months later, the FDA suspended several gene therapy trials (Weiss, 2005).

5.2.4 Physician as Therapeutic Agent

According to humanistic or humane practitioners, the physician is a therapeutic instrument or agent in the patient's healing. The role of the physician in the therapeutic process is invaluable: "In acute illness, chronic illness, or terminal illness, the active presence of the physician is a part of the treatment. I believe," Cassell continues, "that it is accurate to put it even more strongly: *The physician is the treatment*" (1991, p. 126). All other elements of therapy are ancillary to the physician *vis-à-vis* the patient's illness. The physician is the guide that helps the patient to negotiate the technology of modern medicine.

According to Cassell, "the *ideal* of scientific knowledge will not work for *this* sick person without the aid of *this* doctor" (1991, p. 133). Moreover, he identifies the source of healing not only within the patient but also within the physician and through the physician's self-control and not through control over the patient: "healing powers consist not only in…those things or forces for getting better (whatever they

may be) that already exist in the patient…[but] virtually all a doctor's healing power flows not from control over the patient, but from the doctor's self-mastery" (Cassell, 1991, p. 234).

Cassell justifies the notion of physician as a therapeutic agent by claiming that clinical information, to be optimally therapeutic, must also include the emotional or subjective dimension of the patient's illness experience: "Information about the patient that is being acquired, evaluated, and utilized and which enters into value and aesthetic assessments may also include feelings, body sensations, and even the spiritual (transcendent)" (1991, p. 226). The physician as an authentic person can access this information and knowledge as genuine, only by relying on personal experience.

Rather than tainting objective knowledge, personal information allows the physician to draw compassionately along side the patient's suffering. "Only the physician as a person," according to Cassell, "can empathetically experience the experience of a sick person" (1991, p. 227). This bond of human experience does not make the physician's knowledge subjective, since the physician must learn to manage such knowledge appropriately. This is a skill that cannot be transmitted in a textbook but only in the clinic under the tutelage of a skilled and empathic instructor, who understands the role of the physician as therapeutic agent.

Paul Freeling (1983) provides a striking example of a physician as healing instrument. A female patient was unable to face a certain social situation that was making her ill. Her physician realized she needed to sever a particular social relationship, based on an intimacy between the physician and patient that had developed over years. The physician told her in no uncertain terms to break off the relationship. The patient was grateful to the physician for the advice that she in fact was hoping to hear and complied with the physician's counsel.

Although Freeling recognizes that the physician's actions are certainly open to criticism, he interprets the physician in this situation as a "therapeutic agent." "Nevertheless the case history illustrates the use of the doctor-patient relationship in diagnosis and treatment," he maintains, "the treatment lying in the category of interfering with the mechanisms linking symptom and cause" (Freeling, 1983, p. 171). Indeed, the close relationship between a physician and a patient often places the physician in the position of being a healing instrument.

5.3 Summary

The metaphysics of diagnosis and therapeutics are important for framing medical knowledge and practice. During the twentieth century, a number of diagnostic and therapeutic procedures and technologies were developed to define medical worldviews. Determining the nature of the patient's disease and its cause is important not only for the diagnosis of a disease but also for therapeutic intervention. For the biomedical model, diagnosis is a technique that depends upon obtaining objective

evidence of the patient's disease state through both the medical interview and physical examination.

Although diagnostic procedures and technology provide biomedical practitioners with rational means to determine the precise nature of the disease and thereby to make an accurate diagnosis and to prescribe safe and effective pharmaceutical drugs and surgical procedures to cure the patient's disease state, patients are often dissatisfied with the quality-of-care they receive. In response, humanistic or humane practitioners incorporate techniques to obtain information concerning the personal and existential dimensions of the patient's illness experience. Of course, humane practitioners do not shun the diagnostic and therapeutic procedures discovered and developed by the biomedical sciences. Their aim, however, is to reinsert the physician *qua* person as a diagnostic and especially as a therapeutic factor into the modern medical worldview.

Part II
Epistemology

Epistemology is the philosophical discipline concerned with the nature of knowledge, including its sources, acquisition, and justification. Philosophers recognize several types of knowledge (Pojman, 1998). One type is acquaintance knowledge, in which someone is familiar with an object or idea such as a house plan, an organism's anatomy, or even one's own thoughts. The next type is competence knowledge, which "involves an ability to perform a skill and can be done consciously or unconsciously" (Pojman, 1998, p. 130). Driving a car or performing a surgical procedure would be an example of such know-how or practical knowledge. Finally, there is propositional knowledge. This type of knowledge has truth value, and its traditional definition, since the time of the Greeks, is "justified true belief." Although an individual person is the subject who thinks and acts in terms of such knowledge, a community of professionals or lay people is also important for sanctioning it.

In Part II, I examine the epistemological issues associated with the humanization of the biomedical model. To that end, in Chapter 6 I discuss medical thinking, in terms of objective or impersonal and subjective or personal ways of knowing or reasoning. Biomedical practitioners often base medical knowledge on objective means of reasoning or knowing, while humanistic or humane practitioners generally include subjective ways. In the next chapter, clinical judging and decision making are investigated both in terms of the biomedical and the humanistic models. In Chapter 8, I examine the epistemological issue of explanation, especially with respect to how biomedical and humane practitioners account for disease and illness. In the next chapter, the establishment of diagnostic knowledge is discussed in terms of the patient's story of disease and illness through the technical means utilized by biomedical practitioners and through the narrative means utilized by humane practitioners. In the final chapter, I explore the role of medical research and its associated technology in discovering and justifying therapeutic knowledge, with respect to clinical trails. I conclude with a discussion of narrative therapeutics.

Chapter 6
Medical Thinking

How doctors think is an important issue for many healthcare professionals, especially in terms of cognitive mistakes and errors, and is a title of two recent books (Montgomery, 2006; Groopman, 2007). Biomedical practitioners generally subscribe to an objective way of thinking or reasoning that takes science as its example of how best to obtain and substantiate knowledge. Such knowledge is impersonal and has been described as "the view from nowhere" (Nagel, 1989).[1] In other words, this knowledge is applicable and valid for all times and places, regardless of one's particular values or biases or cultural context. Objective thinking brackets the emotions and intuitions, which proponents claim distort our knowledge of the world. "Intuitive thinking, brainstorming, creative option generation, and open-ended questions," for the biomedical practitioner according to Davis-Floyd and St. John, "are usually taboo" (1998, p. 33).

Humanistic or humane practitioners, although recognizing the significance and value of objective knowledge for medical practice, subscribe to a subjective way of thinking and reasoning that includes the intuitions, values, and virtues of the knower. Importantly, this type of thinking, especially in medicine, is based on the patient's narrative of the illness experience, as well on the physician's personal narrative of what it means to be a healer. In this chapter, I discuss objective thinking and reasoning in terms of the debate over the empirical and rational justification of knowledge and with respect to the logical nature of knowing. The subjective way of thinking and reasoning is discussed in terms of intuitions, values, and virtues, as well as narrative. In this way of thinking, humane practitioners address the quality-of-care crisis.

[1] Nagel (1989) also claims that each of us has a personal view of the world. The issue is how to integrate these two often irreconcilable views. He proposes that integration is not always possible and that the two views must coincide with one another, especially without reducing the personal view to the impersonal view.

J.A. Marcum, *Humanizing Modern Medicine: An Introductory Philosophy of Medicine,*

6.1 Objective Thinking

Objective, or scientific or impersonal, ways of thinking or reasoning are concerned with generating knowledge that is universally true about the world. This knowledge is taken to be factual and the facts that make it up are thought to be value-free, i.e. facts that are not distorted by predetermined conceptions of how the world is.[2] "Facts," according to Cassell, "can be verified—empirically demonstrated; everything that is not a fact is unavoidably doubtful and uncertain" (1991, p. 176). The justification of facts is not only empirical but also involves the rational or logical. These two approaches to the justification of factual or propositional knowledge gave rise to a debate between rationalists and empiricists (Pojman, 1998).[3] In this section I examine the debate between them, especially its relationship to the justification of biomedical knowledge. Although the empirical is the means by which biomedical scientists justify medical knowledge, objective knowledge is often considered to be rational or logical. However, before engaging the material of this section, I need to discuss first the epistemic conditions for knowing.

According to the traditional definition of propositional knowledge, someone (S) knows a proposition (P) if and only if: (1) S believes P, (2) P is true, and (3) S is justified in believing P (Pojman, 1998). There are three conditions, then, which must be met for knowledge to be propositional. The first is the belief condition, which states that if something is known then a person—or more importantly an epistemic community—must believe it to be the case.[4] It is a necessary condition that if something is the case, then it must be believed that it is the case. For it would be unusual for a person or an epistemic community to claim knowledge of something but not believe it. However, this condition is not sufficient since something can be believed but not known. Thus, belief pertains to propositions upon which one is willing to place one's or a community's faith that it is the case. That faith is often founded on the metaphysical presuppositions that a person or an epistemic community agrees upon for investigating the world (Collingwood, 1998). Finally, belief is generally contrasted with opinion, which is often based not on evidence but simply on intuition.

The second condition for knowing is the truth condition, which states that if a person or an epistemic community genuinely knows something then it must be true.

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[2] Another important feature of objective knowing is measurement of natural phenomena. Measuring allows scientists to make factual statements untainted by biases and values, of course what is done with these quantitative facts can often lead to distortion and bias.

[3] For a more detailed introduction to the debate between empiricists and rationalists, see Kenny (1986). In contrast to the empiricist and rationalist approach to the epistemological question concerning knowledge justification, Bruce Aune (1970) provides a pragmatic approach. Finally, in contemporary epistemology the debate is articulated in terms of internalism and externalism. An internalist justification is something internal to the individual or community, while an externalist justification is the result of something external to the individual or community.

[4] An epistemic community is composed of individual epistemic agents, whether professional or lay, who are concerned with the production, justification, and consumption of knowledge.

The consequence of this condition is that something cannot be known that is false. Although belief can be false, knowledge cannot be. In other words, knowledge is necessarily true. Of course, the question arises as to what is meant by truth. Philosophers subscribe to various notions of truth. The most common is the correspondence notion of truth. Proponents of this notion claim that truth pertains to propositions that correspond to the facts. In other words, a belief matches one-to-one with the way the world or reality is. Another popular notion is the coherence notion of truth. This notion states that a proposition is true if it coheres with other well known and accepted true propositions. Whether a proposition is true depends on whether it fits in with other known truths or facts. Next, the pragmatic notion of truth states that a proposition is true if it is practical or useful to believe it is true. Truth, according to pragmatists, is what works, especially in terms of ultimately satisfying the knower in a practical manner.

Finally, the emotive notion of truth claims that truth depends upon our emotions or attitudes. This notion of truth may give the impression that all truth is relative, in that a proposition may be true for me but not for you. In other words, there is no consensus as to the criteria for determining a true belief in an absolute sense. There are two problems with this notion. First, truth is not really relative but subjective, i.e. I believe this proposition because I want to. This leads to the second problem: for a person or an epistemic community to know something there must be some type of evidence or warrant for making the claim that a proposition is a true belief. This, in turn, leads us to our final condition for knowing.

The last condition for knowing is the justification condition. Having a true belief is inadequate for saying a person or an epistemic community knows something. The most important epistemological question for any person or epistemic community is: how does a person or a community know that what is known is really the case? This question is about the justification or the proof of what a person or an epistemic community knows. It is the central epistemological question, particularly in the philosophy of science, since Hans Reichenbach (1938) separated, in the first part of the twentieth century, the context of discovery from the context of justification. The answer to this question among philosophers of science has evolved considerably since Reichenbach separated the two contexts.[5]

The epistemological question is also, of course, an important one for the biomedical sciences: “How can therapeutic claims be justified? What means should be used to instill firm belief in a therapeutic claim?” (Christensen and Hansen, 2004, p. 73). Of course, there is an equal concern over the justification of diagnostic knowledge: how does a clinician know that a patient is suffering from this and not another disease? Traditionally, there are two approaches to justification of propositional knowledge: rationalism and empiricism, to which we now turn especially in terms of medical knowledge’s justification.

[5] For further discussion on the justification of scientific theories, including Kuhn’s role for subjective values, see Brown (1979).

6.1.1 Rationalism and Empiricism

6.1.1.1 Foundations

Rationalists, such as Plato and Descartes, argue that knowledge, especially analytic or *a priori* knowledge, is known innately or intuitively through the mind's action, although it may never be directly experienced (Pojman, 1998). In fact, rationalists avoid sensate knowledge since it is easily corrupted and the senses are easily deceived. According to Plato, for example, knowledge is achieved by overcoming the world of becoming and the particular in order to grasp the ideal and universal. This innate or intuitive knowledge can then be used as first principles by which additional knowledge can be deduced. Such knowledge is absolute or certain and universal in a sense of being true for all places and for all times, as well as for all people. The propositions that make up this fount of knowledge are often self-evident. As Descartes argued, such knowledge must be clear and distinct and the human mind must have the capacity to know it. Thus, the justification of knowledge for rationalists is strictly a rational or logical affair.

As noted above there are several types of rational knowledge, including intuitive and innate knowledge. Intuitive knowledge depends on rational insight into the phenomenal nature of reality. In other words, it depends upon human capacity to grasp knowledge, especially mathematical knowledge, simply by rational means. Innate knowledge, on the other hand, is constitutive of human nature. Such knowledge is there at birth and is elicited by experiences. This is not to say, however, that the content of the experience is responsible for the knowledge. Both intuited and innate knowledge depend on an epistemic foundationalism in which truth can be directly intuited or is innate to the human condition and thereby forms the basis of additional certain knowledge through deduction.

Empiricists, on the other hand, such as Hume and Locke, argue that knowledge—synthetic or *a posteriori* knowledge, that is—is obtained only through sense experience. For example, Locke viewed the mind as a *tabula rasa* or an empty slate upon which knowledge is written through experience. Thus, sense experience provides the justification for knowledge. In the mid twentieth century, Cornelius Benjamin (1897–1968) provided an insightful working definition for empiricism: "*Empiricism is that theory of knowledge which holds that descriptive symbols (1) are meaningful, (2) are defined ostensively in terms of hard data, (3) and refer to hard data*" (1942, p. 498). "Hard data," a phrase borrowed from Russell, refers to "the clarity with which a datum is given" (Benjamin, 1942, p. 497). For example, a "red spot" immediately sensed or clearly evident is a "hard" datum while myself or a universal represents a "soft" datum. Using the above definition, Benjamin divided empiricism into three types: positivism, factionalism or constructivism, and realism.

According to Benjamin, positivism—especially a "pure" variety—adds two further propositions to the above definition: "(I) *All other symbols (e.g., suppositional symbols) are meaningless;* (II) *Soft data cannot be known to exist*" (1942, p. 498). Although the logical positivists and empiricists are certainly positivists to some

extent, their position is not a "pure" positivism *vis-à-vis* the two additional propositions. Fictionalism or constructivism, which Benjamin attributes to Mach and Pearson, adds the following propositions: "(I) *Suppositional symbols (1) are meaningful, (2) are defined by operations of construction on hard data, and (3) refer to nothing;* (II) *Soft data cannot be known to exist*" (1942, p. 499). Finally, realism, which Benjamin designates "realistic empiricism" and attributes it to Russell, Whitehead, and Meyerson, adds the following propositions: "(I) *Suppositional symbols (1) are meaningful, (2) are defined by operations of inference upon hard data, and (3) refer to soft data;* (II) *Soft data can be known to exist*" (1942, p. 499).

Empiricism is also supported by the "new experimentalism" that arose over the last several decades, from work by historians and philosophers of science. Traditionally scientists depend on experiments and the evidence obtained from them to justify scientific theories. In a review of the early work in the new experimentalism, which focuses primarily on Allan Franklin's *The Neglect of Experiment* as well as Peter Galison's *How Experiments End*, Robert Ackermann (1989) drew attention to the "experimental sequences" that these authors rely upon to examine experimental practices in physics. In a critique of the new experimentalism, Deborah Mayo claimed that its proponents ignore or devalue the role of statistical methods in experimentation and she proposed to combine "a standard error statistical tool (significant tests) together with an experimental narrative [provided by the new experimentalists]…to articulate the procedure for distinguishing artifacts in an important class of cases [e.g. Galison's notion of how experiments end]" (1994, pp. 277–278). Mayo (1996) then developed an "error statistical" philosophy in which hypotheses are linked to evidence through a piecemeal testing that is ultimately ampliative.

Recently, Marcum (2007) has proposed a notion of experimental series that shares certain features with Mayo's philosophy of experimentation: the piecemeal approach to testing, reduction of error by increasing severity of testing, and an ampliative nature of inductive inference. However, the notion of experimental series is not focused on statistical methods of experimental practice *per se* but on the *connection* of experimental evidence and not just its conglomeration for justifying a theory.

6.1.1.2 Medicine

The debate between rationalists and empiricists also has a long tradition within medicine. For example, the issue of modern theory (rationalism) and conventional practice (empiricism) for medicine was vigorously debated among physicians in the seventeenth century (King, 1978). Giorgio Baglivi, in the face of contemporary rational medicine called for an empirical medicine:

> The two chief Pillars of Physick are *Reason* and *Observation*: But Observation is the Thread to which Reason must point. Every Disease has, not a fictitious, but a certain and particular Nature, as well as certain and peculiar Principles, Increase, State and Declination. Now, as all these are brought about independently of the Mind, so in tracing their Nature we have no occasion for a subtile and disguis'd way of Disputing, but only for a repeated

> and diligent Observation of what happens to the several sick Persons, and such an acuteness of Mind as is conformable and obedient to Nature's Measures (1723, p. 9).

It took several centuries after Baglivi until empirical medicine became the standard for medical practice. However, rationalism is also an important epistemological component of the biomedical model; but, "rational therapy can only claim to be true if the theory encompasses all the relevant elements of the disease in question" (Christensen and Hansen, 2004, p. 74). Given this restriction, much of modern medicine's epistemology is driven by empiricism and its attendant technology.

The epistemology of the biomedical model, then, is one of empiricism, not only in terms of methodology but also with respect to the technology that supports an experimental method—for medical knowledge and practice within the biomedical model rely on the technological developments in the natural sciences, especially the physical sciences.[6] The acquisition and implementation of medical knowledge reflects the techniques and procedures of these sciences. Moreover, the randomized, double-blind, placebo-controlled clinical trial is considered the "gold standard" for determining the efficacy of a pharmaceutical drug or of a surgical procedure.[7] "The development and increasing acceptance of randomly allocated controlled clinical trials represents," according to Tobias and colleagues, "…the greatest advance this century in medical technology…we all stand to gain from improvements in treatment validation that cannot reliably be obtained by any other methodology" (Tobias et al., 2000, p. 1371). Such clinical trails and other testing procedures became the foundation for evidence-based medicine (Sackett et al., 1996).[8] These scientific practices define acceptable medical knowledge and practice within the biomedical model.

The debate between empiricists and rationalists, however, did not led to a resolution of the problems associated with justifying biomedical knowledge. As Baglivi pointed out centuries ago, both approaches to knowing are critical for the practicing physician:

> Those who oppose Reason to Experience, whether Empiricks or Rational Physicians, seem to be all Mad: For how can we make Reason to act all the Parts of Science, that, as all wise Men ought to acknowledge, is acquir'd by Tryal and Use continu'd thro' a long progress of Time? And, on the other hand, why should Experience be only regarded, and Reason turn'd out of doors?…I understand that Queen Reason, that is plac'd above all the rest, by which a Physician looks into the Principles and Causes of Diseases, foretells their progress and event, and gathers Futurities from what's present (1723, pp. 7–8).

The issue arises whether there is a possible synthesis between the two epistemic positions.

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[6] For a detailed study of the rise of scientific medicine *vis-à-vis* technology, see Reiser (1978).

[7] According to Sackett and colleagues: "Because the randomized trial, and especially the systematic review of several randomized trials, is so much more likely to inform us and so much less likely to mislead us, it has become the 'gold standard' for judging whether a treatment does more good than harm" (Sackett et al., 1996, p. 72). Cartwright (2007) challenges the "gold standard" status of these trials, claiming that they exhibit weak "external validity" in terms of extrapolation from the test population to the larger population.

[8] For further discussion of biomedical research, see Thagard (1999).

Jan van Gijn has proposed an "empirical cycle" for the generation and justification of medical knowledge. "Pathophysiological reasoning leads to hypotheses," according to van Gijn, "while the content of the rational process is to a large extent driven by the results of the laboratory experiments. The hypotheses should lead to clinical trials and the results of these trials, added to newly gained insights in pathophysiology," he concludes, "give rise to new hypotheses for clinical reasoning" (2005, p. 75). In other words, the generation of medical knowledge is the continuous process in which empirical results give rise to theoretical insights that are then subjected to further experimental testing, and so on.

The synthesis may also be articulated in terms of inductive and deductive logic. For example, biomedical investigators propose different theories to account for various medical phenomena. These theories are always undergoing tests as investigators conduct experiments. In other words, a prediction is deduced from a given theory and if the prediction is verified, then the theory continues to be used to guide investigations. However, if anomalies, i.e. observations not predicted by the theory, are observed, then a new or modified theory may be formulated based on the anomalous observations. This new or modified theory is then tested experimentally, and if successful may replace the older theory.

The rationalist-empiricist synthesis may also be articulated in terms of sensory or experiential and theoretical activities connected through cognitional processes. As the empiricists claim, sensory data and observations are the key, if not the beginning, of knowing. But as the rationalists claim, such evidence does not constitute knowing but only evidence. A cognitional process must intervene, in which the relationship among the various data and observations yield an insight into the meaning of the evidence. Based on this insight a theory is then formulated, in order to explain the phenomenon that yields the evidence. Of course, all evidence is theory-laden but to varying degrees—from anomalous evidence to evidence to test a prediction.

Although the biomedical model provides important methodological tools for obtaining medical knowledge and for practicing medicine, there is still much work required empirically and rationally, as well as philosophically, to resolve the epistemological issues facing it. "A lot remains to be done," according to Liberati and Vineis, "in order to create a better understanding of the nature of proof, evidence, and uncertainty; a more balanced research agenda; more coherent mechanisms to improve quality of care; and more substantial cultural efforts to empower patients and consumers" (2004, p. 121). From a rational perspective, a lot of the development depends on what Edmond Murphy calls the "logic of medicine," the topic of the next section.

6.1.2 Logical Reasoning

Although empirical, especially experimental, procedures are the predominant means for justifying medical knowledge in terms of the biomedical model, rationalism in medical epistemology is not completely without importance or impact. Epistemic claims in the biomedical model depend or should depend, especially for their

validity and soundness, on the logical relationship of propositional statements obtained from laboratory experiments and clinical trials. For example, diagnosis and treatment of a patient's disease state depend upon step-by-step, coherent (inductive and deductive) reasoning, from assessing the patient's symptoms to determining the appropriate therapeutic modality. Moreover, logical reasoning in medicine helps to fill in the gaps left by empiricism (van Gijn, 2005). For example, in *The Logic of Medicine* Murphy provides a procedure "for manipulating ideas in Medicine, systematic in the sense that they can be stated formally and subjected to cogent criticism" (1997, p. 9). The logic of medicine, then, is concerned with the analysis of medical data and observations and not just with the relationship of propositional statements.

Logical reasoning is particularly important for interpreting empirical facts. "Reasoning," according to van Gijn, "is required even in the interpretation of clinical trials. Facts cannot always speak for themselves" (2005, p. 74). Indeed, facts are not equivalent to empirical data or observations; rather, they are interpreted experimental data and observations (Lonergan, 1992). In other words, the researcher must have an insight into the relationship among the empirical data as to their intelligibility. That intelligibility is not an empirical object that can simply be grasped by empirical means. For Murphy (1997), "rules of evidence" are critical in the interpretative process for generating factual, objective knowledge. These rules form not only a logical or rational canon for manipulating the relationship of propositional statements and facts but also a hermeneutical canon required for assigning meaning and significance to medical data and observations.

Rationalism, in terms of the logic of medicine, is also important in terms of planning new experiments in order to test theories or hypotheses (van Gijn, 2005). A new trial is expensive and must first make sense in terms of previous biomedical theories and facts. The type of logic associated with the generation of new experiments is deductive.[9] A new hypothesis or theory is used to predict an observation, which is subsequently tested experimentally. This approach is called the hypothetico-deductive method. If the theory or hypothesis passes the test, i.e. the predicted observation occurs, then the theory or hypothesis is said to be verified (logical positivists), confirmed (logical empiricists), or corroborated (Popperians). However, if the theory fails the test, i.e. the predicted observation does not occur, then the theory is falsified or more often modified.

Unfortunately, the process of verification or falsification is not so straightforward since neither can be absolute; for the theory being investigated cannot be tested directly, because the assumptions behind it form an interconnecting "web of beliefs" (Quine and Ullian, 1978). Moreover, falsification is not so straightforward since scientists may formulate *ad hoc* hypotheses to rescue an embattled theory (Lakatos, 1970).

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[9] In contrast, inductive logic involves generalization from a limited set of observations to formulate a theory or hypothesis. The problem with induction is the inability to prove conclusively that a verifying observation will not falsify the theory or hypothesis under different conditions. For example, no guarantee is available to predict that the same result will be obtained consistently.

6.1.2.1 Frequentist Statistics

In the biomedical sciences the fit between a hypothesis and an experimental or a clinical observation is often not quite as straightforward as in the natural sciences, even with the above problems, due to error on the part of the investigator or variability of the natural phenomena. In the biomedical sciences, the significance of the fit is generally determined through statistical testing and analysis. Murphy defines statistics as the "[s]tudy of inferences from finite samples about random processes and their specifications" (1997, p. 468).

Statistical testing can be either descriptive or inferential (O'Brien et al., 1989). In descriptive statistics the researcher describes a population's characteristics, while in inferential statistics the researcher designs a study in which observations are made from a sample of the population under study. Traditional or frequentist statistical tests, such as the Student's *t*-test or the χ^2-test, allow the researcher to determine whether the inferred conclusion is warranted. Statistical reasoning, then, represents a potent means by which to justify conclusions concerning medical knowledge.

The frequentist approach to statistical analysis involves the comparison of two groups, especially in terms of a pharmaceutical drug or a surgical procedure, with one group representing the experimental group and the other the control group.[10] The question is whether the difference between them is real or significant or simply due to chance, in terms of experimental manipulation. To determine whether the difference is significant or not, medical researchers conduct statistical tests to obtain a probability value (P value), which gives them confidence about the difference.

The first step in this process is to form a null hypothesis, along with an alternative hypothesis. A null hypothesis states that there is no significant difference, while the alternative hypothesis states that there is. For example, if medical scientists are testing the efficacy of a drug the null hypothesis claims that there will be no difference between treated and untreated groups *vis-à-vis* the drug, while the alternative hypothesis claims that the treated group will fair better because of the drug, e.g. cancer remission, than the control group. Once the data is collected, the researchers run a statistical test to determine whether the results are statistically significant, i.e. whether the null hypothesis is rejected.[11] If the null hypothesis is rejected then the alternative hypothesis, i.e. the difference between the two groups is real or significant and the drug is efficacious, is accepted by default.

In frequentist statistical analysis, the medical scientist or clinician is concerned with removing error that can influence the interpretation of results, from null hypothesis testing. There are two types of error. In Type I error, the null hypothesis should be accepted, i.e. there is no difference between the two groups, but the

[10] Lewis and Wears define the frequentist approach accordingly: "the probability of an event represents the rate or frequency at which the event would occur if the situation in which it might occur was reproduced an infinite number of times" (1993, p. 1329).

[11] A $P < 0.05$, for example, is considered adequate to claim a difference is significant. However, there is considerable debate over the appropriateness of using P values (Matthews, 2000).

statistical test misleads the research into rejecting it. This type of error represents a false positive in that the difference between the treated and untreated groups is not really statistically significant. In Type II error, the null hypothesis is in fact false but the statistical test misleads the research into thinking it is true. This is a false negative in that the difference between the treated and untreated groups is really statistically significant. Type I error is more egregious than Type II error in that the former type of error can result in harm to a patient, e.g. treating with a drug that is not efficacious, while in the later type of error the researcher has missed the effect.

There are several problems with the frequentist approach to statistical analysis of clinical results. First, frequentists do not provide direct proof that the alternative hypothesis is true. "Unfortunately," according to Lewis and Wears, "there may be many alternate hypotheses different from the original one that might have been accepted based on this evidence had they been proposed" (1993, p. 1330). Thus, a P value pertains not to the truth of an alternative hypothesis but only to the null hypothesis. In other words, because there are many alternative hypotheses one cannot be certain that the stated or tested hypothesis is true since it is considered true only by default.

Another problem is that frequentist statistical analysis is concerned with a population and not with an individual, whereas a physician is often concerned with an individual patient. This statistical approach "denies meaning to the assignment of probabilities to single events or hypotheses. Probability assignments are to classes, not to individuals. Thus," conclude Daniel Albert and colleagues, "questions such as 'What is the probability that this patient will die tonight?' and 'How likely is that diagnosis?' do not make any scientific sense in this view. We can only legitimately ask, 'What proportion of the class of patients like this one will die tonight?' " (Albert et al., 1988, p. 64). Although frequentist statistics are very helpful for interpreting research results from large clinical trials, they are for the individual patient "profoundly unsatisfying" (Montgomery, 2006).

6.1.2.2 Bayesian Statistics

Besides frequentist statistical analysis, many biomedical scientists utilize Bayesian statistical analysis to determine the significance and meaning of experimental and clinical results (Broemeling, 2007; Kadane, 2005; Tan, 2001). This analysis is based upon a theorem named after its originator, Thomas Bayes, an eighteenth century nonconformist cleric (Dale, 2003). Lewis and Wears identify two important differences between frequentist and Bayesian statistical analyses: "the nature of the probabilities that we are trying to estimate from the data and the way in which we use the data to modify our estimates of those probabilities" (1993, p. 1329).

Bayesians take probabilities to be an estimate of an event's certainty rather than its frequency. Instead of relying on large numbers or sampling of an event to obtain a rate at which it occurs, the Bayesian estimates the event's occurrence on prior experience. For example, whether a patient responds to a particular treatment is initially based on a researcher or clinician's subjective estimate and experience.

Bayesian use of data is conditional rather than unconditional, in terms of determining the truth of the hypothesis. "Bayesians deal with the probabilities of hypothesis, given a set of data," according to Lewis and Wears, "whereas frequentists deal with the probabilities of data sets, given a hypothesis" (1993, p. 1329).

Bayesian analysis is concerned with the relationship of present data with past data, i.e. "how new evidence can be systematically combined with old to maintain coherently the current state of the evidence" (Murphy, 1997, p. 204). In other words, besides present evidence prior evidence is taken into account to determine the probability of a future event. The first step in Bayesian analysis is to assign a probability distribution to an event's occurrence based on prior data. Next, data are collected on the event's occurrence, and these are used to revise the prior probability distribution. For the Bayes theorem allows the combination of a prior probability distribution with present data to generate a posterior probability distribution, which is then used to estimate the probability of a future event's occurrence and to determine its meaning or significance.[12]

An example in terms of diagnosis may help to clarify the principles of Bayesian analysis (Sahai, 1992). An attending physician wishes to diagnose patients entering an emergency ward in terms of the probability of acute appendicitis (AA), acute pancreatic (AP), or non-specified abdominal pain (NSAP). The prevalence rates for these conditions are as follows: 30% for AA, 5% for AP, and 65% for NSAP. A rebound tenderness test can be used to demarcate between the three conditions. The test consists of pressing down slowly on the patient's abdomen and releasing quickly, which may be accompanied by sharp pain at the site of peritoneal irritation. Previous studies reveal that 80% of AA patients, 15% of AP patients, and 20% of NSAP patients, exhibit rebound tenderness. The posterior probabilities are easily calculated for each condition: 0.64 for AA patients, 0.02 for AP patients, and 0.34 for NSAP patients.[13] Consequently, AA is the most probable or likely diagnosis for a patient exhibiting rebound tenderness.

Bayesian analysis provides several advantages over frequentist statistical analysis. First, it is more consistent with the practical reasoning conducted by clinicians: "the

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[12] Peter Congdon puts it rather succinctly: "The learning process involved in Bayesian inference is one of modifying one's initial probability statements about the parameters prior to observing the data to updated or posterior knowledge incorporating both prior knowledge and the data at hand" (2001, p. 3).

[13] The posterior probabilities are calculated as follows (Sahai, 1992). Let D1, D2, and D3, stand for AA, AP, and NSAP, and S for rebound tenderness. The probabilities based on the data in the text are: P(D1) = 0.3, P(D2) = 0.05, P(D3) = 0.65, P(S | D1) = 0.80, P(S | D2) = 0.15, P(S | D3) = 0.20. The probabilities are then determined using Bayes theorem.

$$P(D1 \mid S) = P(S \mid D1)P(D1) / \sum_{i=3}^{3} P(S \mid Di)P(Di)$$

$$= (0.8)(0.3) / [(0.8)(0.3) + (0.15)(0.05) + (0.2)(0.65)$$

$$= 0.241 / 0.3775$$

$$= 0.64$$

$$P(D2 \mid S) = (0.15)(0.05) / 0.3775$$

$$= 0.02$$

$$P(D3 \mid S) = (0.2)(0.65) / 0.3775$$

$$= 0.34$$

Bayes method provides confidence intervals on parameters and P-values on hypotheses which are more in line with commonsense interpretations" (Congdon, 2001, p. 1). Moreover, its prediction of a future event is more precise since it incorporates past information into the determination of that event. Frequentist statistics rarely include such information. Bayesian analysis affords a more dynamic and adjustable statistics. Another advantage is that it provides important information for the practicing clinician concerning the efficacy of a treatment *vis-à-vis* another competing treatment.

In addition, Bayesian analysis permits an investigator in a research trial to examine the data without subjecting the trial to an increased error rate, as in a frequentist trial. "This is a strong argument for its use in clinical trials," according to Lewis and Wears, "because it may be possible to terminate the trials earlier, thus exposing fewer patients to ineffective or harmful therapy" (1993, p. 1335). Finally, another advantage is that Bayesian analysis incorporates the plausibility of a particular event, e.g. of a therapeutic procedure. The likelihood that a drug or surgical protocol is successful must cohere with other successes or failures of other similar therapeutic procedures, current biological and medical knowledge, and the experience of the individual clinician.

6.2 Subjective Thinking

Although biomedical knowledge, especially in terms of laboratory data and clinical observations, is an important and even a necessary component in medical practice, it is not sufficient, according to humanistic or humane practitioners. What is needed is personal knowledge of the patient. According to Cassell, for example, "when we are sick we do not need impersonal knowledge; we require *personalized* knowledge" (1991, p. 133). For Cassell and other humane practitioners, the exclusive pursuit of impersonal knowledge hinders the physician from obtaining the personal knowledge that is critical for treating *this* patient.

Personalized or subjective knowledge is often the information that is ignored or bracketed in scientific medicine; however, it is critical for the patient's healing. The humanistic models of medicine permit "physicians to elicit information from deep within the patient and combine it with objective findings" (Davis-Floyd and St. John, 1998, p. 97). Such information goes beyond the laboratory data to include what Robert Smith calls "human data." Such data involve "information that the patient communicates in words or through nonverbal but uniquely human modes of expression" (Smith, 1996, p. 98).

The problem with the biomedical model, for humane practitioners, is that the physician no longer interacts with an individual patient or that patient's unique circumstances but with the abstract generalities of a patient's disease obtained from statistical analysis of other patients with a similar disease. To reverse this trend these practitioners seek information that is not limited to just a patient's disease state but that also includes information about the person who is suffering

from a specific illness. In the biomedical model both laboratory and clinical techniques generate the necessary data needed to identify the disease and to treat it, whereas in humanistic or humane medicine information about the patient as person is also required to treat successfully the illness and to alleviate the suffering associated with it.[14]

According to Cassell, "three kinds of information about sick persons—brute facts, moral, and aesthetic—are necessary to the work of the clinician" (1991, p. 178). While brute facts about a patient's disease state are required for practicing medicine, they alone are inadequate for the patient's healing. Both the patient's moral values and aesthetic sensibilities are required to understand and treat a patient's illness and to relieve the suffering associated with it. Only when a physician is informed about these values and sensibilities, can he or she genuinely care for a patient and assist that patient on the road to healing. "Information about the patient that is being acquired, evaluated, and utilized and which enters into the value and aesthetic assessments may also include," for Cassell, "feelings, body sensations, and even the spiritual (transcendent)" (2004, p. 226). It is this information that cannot be bracketed from the objective clinical data and observations, which is needed to heal *this* sick person. Such information is obtained through subjective thinking.

Subjective or personal reasoning or knowing is shunned in science because it is thought to distort universal and objective knowledge, which is considered the only true knowledge. However, that knowledge is personal, according to Michael Polanyi (1962), because its acquisition and justification depend on our unique perspectives, which include, e.g. our intuitions, values, and aesthetics. Polanyi's notion of personal knowledge depends on what he called the "tacit component" of intelligence, a prelogical phase of knowing that is not necessarily articulatible. It is this component that not only allows for the acquisition of knowledge but also the means to determine its meaning, especially for the human knower.

Objective knowledge is only part of the story for understanding the world, the other part is what that information means for a particular knower. Polanyi rejected the fact/value dichotomy and provided the necessary scaffolding for the current development of emotional intelligence (Tauber, 2008). His personal knowledge prepared the way for other epistemological projects, especially humanistic or humane medicine. Two of these projects—conducted by Foss and Tauber—are briefly discussed below, after which several components of personal or subjective knowledge—including intuitions, values, and virtues—are examined in further detail, followed by a discussion of narrative reasoning.

Laurence Foss (2002) proposes an "infomedical" model in which information, especially in terms of the psychoneurological, can be incorporated into medical practice. His main thesis is that the self as body and mind must be reintegrated as a unit into medical practice. He uses the infomedical model to argue for a "holistic science of self-referentiality" (Foss, 2002, p. 70). Instead of viewing matter as *res extensa* and causation as strictly upward, he argues for viewing matter as *res autopoietica*

[14] For further discussion, see Cassell (1991, p. 23).

and causation as mutually upward-and-downward. According to the infomedical model, the mind and body are connected by information. To adapt this model to the clinic requires a mind-body dictionary based on "intersemiotic transduction," in which, for example, information is sent from the mind (sender) to immune cells (receiver) *via* neurohumors (channel). Thus, the mind—whether conscious or unconscious—can influence a patient's health.

Foss also put forward a mechanism for information transfer among parts of the organism, as well as between the organism and its environment. By infusing matter with conscious properties he reformulates the second law of thermodynamics as the second law of psychothermodynamics, in which "the universal dynamic is vitalistic and autopoietic" (Foss, 2002, p. 233). Finally, Foss converts objectivity to a subjectified objectivity: "the object is a *subject*, the patient is an agent, each possessing some limited degree of autonomy" (2002, p. 242).

With these changes in place Foss attempts to revolutionize or humanize medicine through a relational model of biology, in which additional information about a body part is determined from that part's context within the organism and its environmental context. It is this information that allows an organism to reform itself in response to external challenges, such as disease. Foss' infomedical strategy is that "the organism as a whole exhibits mindful self-regulating behavior" (2002, p. 269). Thus, for humane practitioners subjective knowledge—of how the patient interprets the experience of illness and provides meaning for it—affects how the patient responds to the illness and its treatment.

Tauber proposes a model for medical knowing that joins together the objective and subjective ways of knowing, through the knowing subject. His proposal is based on a study of Henry David Thoreau's attempt to correct the objectification of knowledge in the nineteenth century, due to the rise of positivism. "Radical objectivity fails because," according to Tauber, "the view from nowhere leaves Man out of the picture, and with no perspective there is no significance, no meaning, no order, and ultimately no self" (2001, p. 21). In the quest for objectivity, the self or subjectivity in terms of the knowing subject is abandoned along with important moral characteristics and values that guide knowing. This has a major impact on modern medicine, which exchanged its empathic character for a dispassionate one. For Tauber, "the glue holding together the various epistemological strands of contemporary medicine is of a *personal* moral character" (2005, p. 10). In other words, what he is seeking is a rejoining of fact and value that the positivists tore asunder.

Tauber's calls his proposal "moral epistemology—moral, because clinical evaluation and care are value-laden, and epistemological, because medicine expresses and employs the form of knowledge" (2005, p. 9). Facts are always given within a context of values and are thus products of interpretation; for values influence and guide knowing. By salvaging facts from positivist objectification, Tauber opens up a space in which to incorporate a patient's values with those of the medical profession. The moral imperative of medicine, then, is to identify a patient's subjective values in order to situate a patient's objective clinical facts. Physicians must become more self-reflective morally and must integrate this moral reflectivity into the technical demands of medicine. Tauber makes several recommendations to that end, such as

including an ethical section in the medical record. Such subjective ethical and moral knowledge would complement the objective and scientific knowledge to yield a more comprehensive picture of the patient.

6.2.1 Intuition

Although humanistic or humane models share many epistemological features with the biomedical model, e.g. the assumption that logic is important for practicing medicine, they also rely to some extent on the humanistic practitioner's intuitions. "Intuition in medicine," according to Irvine Page, "is crucial" (1978, p. 218). It is a critical skill of a "good" physician.[15] Intuitions are not necessarily impediments to sound medical judgment and practice; but when judiciously utilized and constrained by the epistemic and empirical boundaries of the biomedical model, they enable a physician to evaluate information about a patient's illness that may surpass quantified data, e.g. laboratory test results. This information obtained from a practitioner's use of intuitional, unconscious resources is not just objective or quantifiable but also human—for behind such information is the face of the "Other" (Tauber, 1999). Such information is important for practicing the art of humane medicine.

What is intuition? William Davidson has provided two definitions. The first is an etymological definition: "the apprehension or discerning of a thing actually presented to the eye" (Davidson, 1882, p. 304). It is based on the literal meaning of the word from its Latin root. The second is philosophical in nature: "an *immediate* perception of the external object seen" (Davidson, 1882, p. 305). Intuition pertains not only to objects in the world but also to ethical qualities and cognitive principles. Moreover, besides the criterion of immediacy, which can be either independent or temporal in nature, two other criteria of intuition include the universal and the irresistible. Intuition is universal in terms of "*not admitting of exception*," while irresistible refers to the power of attraction (Davidson, 1882, p. 308).

In contemporary philosophy, intuition is a way of knowing in which a person *qua* mind immediately apprehends an object, a phenomenon, a decision, or a solution to a problem, without any intervening conscious, cognitive processes.[16] Trisha Greenhalgh lists several features of intuition, including "rapid, unconscious process, context-sensitive, comes with practice, involves selective attention to small details, cannot be reduced to cause-and-effect logic…, [and] addresses, integrates, and makes sense of, multiple complex pieces of data" (2002, p. 396). Intuition is a tacit process that matures, as the practitioner gains more experience. It is also a very creative process that defies simple reduction to an algorithm or set of operational rules, such as inference rules in deductive logic. Finally, intuition is a mental habit of hunches.

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[15] Page (1978) also acknowledges that basic research is a key ingredient to medical practice.

[16] As noted earlier, intuition is also thought to provide *a priori* knowledge. Such knowledge is considered to be self-evident, e.g. the law of non-contradiction.

Historically, intuition is often contrasted with reason as a competing method of knowing. Reason or reflection is a mediated activity (Davidson, 1882). A conclusion to a syllogism, for instance, is immediately obtained not upon inspection of the major premise but through mediation of the middle term. Intuition, on the other hand, is not mediated by any such process. Moreover, reason is considered a superior way of knowing compared to intuition. According to Davidson, "intuition, standing alone, gives us only 'an obscure and indistinct consciousness'; for a consciousness 'clear and distinct,' Reflection is required" (1882, p. 309).[17]

Miranda Fricker (1995), however, argues that such a contrast is based upon a rather "thin" notion of reason, in which reason is based on a set of criteria or rules. She contends for a "rich" notion that includes intuition in thought processes. Based on Kuhn's use of intuition to account for paradigm changes, Fricker defines intuition "as a non-inferential, typically subconscious mode of hypothesis formation. It constitutes," she continues, "a sub-personal level of cognitive operation that is crucial to rational enquiry, since it is primarily the intuitive mode which enables us to solve new problems in light of the old" (1995, p. 184). In other words, intuition is a skill of the reasoning process needed to formulate possible solutions (hypotheses) to problems. Intuition is reasonable, then, since these solutions or hypotheses are generated not randomly but selectively. Moreover, it is often involved in determining the acceptability of cognitive conclusions. Consequently, Fricker's "rich" notion of reason includes a reciprocal relationship between intuition and "thin" reason, especially with respect to the generation of hypotheses and their acceptance.

According to Greenhalgh, most physicians acknowledge the importance of intuition in clinical reasoning and practice. She illustrates its use from her own practice. After examining an elderly male patient, whose chief symptom was abdominal pain, and finding no unusual clinical signs, Greenhalgh "went home that night and told [her] husband that [she] had seen a man who was going to die" (2002, p. 395). Indeed, the man died four days later from a strangulated volvulus. She interprets her hunch in terms of intuition. "When I predicted his impending death," Greenhalgh concludes, "I was not consciously aware of the intermediate steps that led me to my hypothesis, but when I learnt," she adds, "the outcome and sought a debriefing with his regular GP, the pieces of the jigsaw were revealed to both of us" (2002, p. 399). Other physicians also point to the importance of intuition. For example, Tauber notes that "the science of medicine is so often guided by intuition" (1999, p. 7).

6.2.2 Values

During the first half of the twentieth century, logical positivists claimed natural science to be a value-free enterprise, in order to guarantee the objectivity of scientific knowledge. However, during the latter half of the twentieth century, especially after

[17] Davidson (1882) acknowledged that in terms of thought processes at large, intuition and thinking share common feature such as perception, memory, and imagination.

the historiographic revolution in the philosophy of science, values emerged as important factors in the scientific enterprise. For example, Kuhn (1977) claimed that the justification of scientific knowledge requires the transformation of the objective criteria of accuracy, consistency, fruitfulness, scope, and simplicity, into similarly denoted subjective values, values that influence the justification of scientific knowledge but do not determine it. Justification, then, "requires a decision process which permits rational men to disagree, and such disagreement would be barred by the shared algorithm [objective criteria] which philosophers have greatly sought" (Kuhn, 1977, p. 332).

After Kuhn, science is now viewed as a value-ladened enterprise and its knowledge as value-dependent. For example, Robert Proctor (1991) argues that scientific knowledge is not neutral but rather driven by political and societal values. Again, Tauber (2007) claims that the fact/value separation in science is specious and that science is imbued with values that serve an epistemological function. Humanistic practitioners also acknowledge the importance of values for medical knowledge and practice. Indeed, Cassell claims that "a value-free medicine is a contradiction in terms" (1991, p. 185).

But, what is a value and how is it used epistemologically? The notion of value is not easily defined and there are several approaches to its definition within the philosophical literature. Values are also used in a variety of fashions. Tauber (2005), for instance, distinguishes three uses based on Najder's analysis: quantitatively, in terms of the value of something, attributively, in terms of something being conferred value, and axiologically, in terms of a principle which one uses to assign value. Although the axiological use of values is examined in Chapter 11, in the remainder of this section their use is explored not only in the justification of scientific and medical knowledge but also in its acquisition. Finally, William Stempsey warns about the difference between value and personal preference, especially for medicine: "Personal preferences do play an important role in our ideas about the value of health and disease, but I will argue that there are other objective values that ought to be recognized as values by any person, whether or not that person has a preference for them" (2000, p. 42).

Ernan McMullin (1982) divides the use of values in science into two categories: epistemic and non-epistemic.[18] Epistemic values are those that are used to advance the veracity of scientific claims. They are important for assessing a "fit" between scientific theories and the natural world and include, e.g. external consistency, fertility, internal coherence, predictive accuracy, simplicity, and unifying power. Non-epistemic values are those values that can be used, when epistemic values fail to distinguish between empirically equivalent theories. They do not enhance a theory's "epistemic status" but reflect specific cultural, social, political, and religious

[18] McMullin (1982) also discusses briefly two additional "construals" of values: truth and ethical; but dismisses their immediate importance in theory choice. Laudan also is not concerned with ethical or moral values but only with "the role of cognitive values in the shaping of rationality" (1984, p. xii).

beliefs. Although these values are influential in the short run within a community of practitioners, they are eventually replaced by epistemic considerations. In a study on the development of evolutionary science during the nineteenth and twentieth centuries, for example, Michael Ruse (1999) demonstrates a shift from non-epistemic to epistemic values in its practice.[19]

Besides the categorization of values as epistemic or non-epistemic, they can also be divided into factual or ethical in terms of the pursuit of scientific and other kinds of knowledge (McMullin, 1982). A factual value is not limited simply to the absolute correspondence of the world to scientific theories but also to the corrigibility of scientific theories in light of additional evidence. Ethical values are important to a professional community and its proper moral function. Certainly scientists and theologians, for example, share a genuine desire to know the facts and to conform to ethical values that ensure them. For instance, honesty is the disposition to tell not only the truth but also to avoid telling a lie. Moreover, honesty involves uprightness and reliability of character.[20] These values are essential for the acquisition of knowledge in most disciplines. Although scientists are often portrayed as being more objective than those in other disciplines, postmodern studies have deflated that caricature.

Values in medicine serve epistemic and non-epistemic, as well as factual and ethical, functions in the acquisition and justification of medical knowledge, especially for humanistic or humane practitioners. For example, Cassell advocates the need for knowing a patient's values in order to obtain the patient's "personal knowledge" (1991, p. 172). Values, then, are critical for gaining a comprehensive picture of the patient, which is needed for adequately treating a patient: "applying medical science to particular patients mandates thinking in terms of values as much as in terms of the objective facts of the body" (Cassell, 1991, p. 107). Moreover, values are also critical for determining the nature of health and disease.

Cassell (1991) identifies five sources of values needed for medical knowledge and practice. These include the values society places on health and illness, the goals of medical care in general, physicians' personal and professional values, people's individual values, and the values that under gird the operations of a system as a complex unity or whole. "Values, then, like scientific facts, are essential," according to Cassell, "to the clinician's knowledge of sick persons" (1991, p. 184).

Tauber also argues for the importance of values in medical knowledge and practice: "values structure all facts so that their meaning and significance only take form when they are sorted, organized, prioritized, and acted on as determined by the rules governing the value-based choices optimizing patient care" (2005, p. 240). The traditional distinction then between facts and values is a false dichotomy and Tauber proposes to collapse facts and values in terms of a moral (values) epistemology (facts).

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[19] Ruse (1999) also contends that non-epistemic values can still operate as metaphors in even the most robust science.

[20] For a discussion of the relationship between virtues and epistemology, see Zagaebski (1996).

To support a moral epistemology, Tauber (2005) divides values into positivist and nonpositivist categories. Positivist values are objective and neutral and guarantee medical knowing as scientific knowing. Although medical knowledge can profit from incorporating these values, exclusive use, however, as in the biomedical model robs medical practice of its humane dimension. That dimension requires nonpositivist values, which are subjective and reflect the personal goals of the patient and healthcare provider. In other words, positivist values are necessary for the physician's knowledge of the patient but are not sufficient, "for the glue holding together the various epistemological strands of contemporary medicine is of a *personal* moral character" (2005, p. 19). This moral dimension of medicine based on these nonpositivist values is what makes medicine the humane practice that it should be.

6.2.3 Virtues

Recently the role of virtues in the acquisition and justification of knowledge has gained prominence in philosophy, in a sub-discipline called "virtue epistemology." "The name 'virtue epistemology'," according to Linda Zagzebski and Abrol Fairweather, "has come to designate a class of recent theories that focus epistemic evaluation on properties of persons rather than properties of beliefs or propositions" (2001, p. 3). Virtue epistemology is based on virtue ethics, in which actions of persons are analyzed in terms of the normative characteristics of the person rather than of the acts themselves. In like manner, virtue epistemologists are interested in the normative characteristics of the person than in the knowledge itself. As noted above, traditional objective epistemology focuses on knowledge production and justification in terms of the evidence or methods used to produce it, while virtue epistemology focuses on the intellectual virtues of the epistemic agent.

Intellectual virtues are divided into two types (Greco, 2000). The first pertains to the reliable or sound cognitive faculties or capacities, including the senses, especially vision, memory, intuition, inferential reasoning, and introspection, necessary for obtaining and ensuring knowledge. This kind of virtue epistemology is called "reliable virtue epistemology," since knowledge as justified true belief is based on the reliability of cognitive faculties and processes (Sosa, 1991; Greco, 2002). The second type of intellectual virtues pertains to the virtuous features of the epistemic agent, such as honesty, open-mindedness, humility, fairness, curiosity, tenacity, and integrity. This kind of virtue epistemology is called "responsible virtue epistemology," since knowledge is based on the epistemic agent's responsible and conscientious activities (Zagzebski, 1996; Roberts and Wood, 2007).

Although virtue epistemology is not fully utilized in contemporary medical epistemology, the virtues of the physician, whether reliable or responsible, are important both for the acquisition and substantiation of medical knowledge for clinical practice. Not only must the physician's cognitive faculties and capacities function properly, but his or her disposition must be sufficiently responsible to

warrant an accurate diagnosis and appropriate therapeutic modality. For example, a physician must be honest in terms of evaluating the clinical data and observations and not allow biases and prejudices to distort their interpretation.

6.2.4 Narrative Reasoning

"Biomedical reasoning may be sufficient to explain the bounded realm of microscopic events and abstract principles, but other kinds of reasoning are necessary," according to Linda Hunt and Cheryl Mattingly, "when those principles are applied to the unbounded universe of the real world of physical, phenomenological, and social lives" (1998, p. 270). One of the more prevalent alternative forms of reasoning to biomedical reasoning is narrative reasoning. In contrast to the objective facts and to their logical analysis associated with objective, biomedical reasoning, the humanistic or humane models incorporate the patient's narrative of the illness experience into medical practice that utilizes subjective and personal reasoning.

Narrative reasoning, for Barbara Schell, "involves thinking in story form" (2003, p. 136). This type of reasoning allows the humane practitioner to access personal information concerning illness' disruption of the patient's life. Its main function is to make sense of the confusion and anxiety illness introduces into the patient's life-world. Whereas logical biomedical reasoning is concerned with the validity and soundness of the arguments and the truth of medical statements, narrative reasoning is concerned with the meaning and significance of the patient's illness story. Practitioners of narrative medicine ask questions about the nature of a patient's illness experience, while biomedical practitioners ask questions about the nature of the disease itself.

Kathryn Montgomery also maintains that medical practice should be grounded in narrative reasoning: "Physicians use both the scientific or hypothetico-deductive and the practical or interpretative and narrative, but it is the latter that makes them clinicians" (2006, p. 45). Narrative reasoning is a case-based rationality and involves the interpretation of a patient's illness experience. It is not reducible to a set of inference rules, but requires a hermeneutical canon for interpreting a patient's story. Rather than banning anecdotal knowledge, narrative reasoning depends upon it for making the best possible clinical judgment and decision.

Narrative rationality, according to Montgomery (2006), is akin to Peirce's notion of abduction. Clinicians begin with a particular patient before them and based on the presenting symptom(s) collect preliminary evidence, which they interpret in terms of the patient's narration of the illness experience. Clinicians then continue to collect further evidence based on the patient's story, until the cause of the patient's illness is determined. The process is a "circular, interpretive process" and the information clinicians gather is not a set of isolated abstract facts but rather facts connected through an intricate narrative, both on the part of the patient and the clinician (Montgomery, 2006, p. 47).

Mattingly (1998) identifies three features of narrative reasoning in medicine. The first involves the motives that animate a patient's story, especially in terms of a patient's actions and the consequences of those actions. "In narrative reasoning," according to Mattingly, "an 'inner world' of motive and desires is seen as the significant underlying cause of events" (1998, p. 284). For Montgomery (2006), medical causation is best explicated in terms of narrative reasoning rather than in biomedical statistical analysis. Although medicine strives for simplicity in terms of causation as an ideal, the practice of medicine reveals that causation includes, besides the pathophysiological, the psychological and cultural—for illness is expressed at these various levels.

Striving for the ideal of scientific causation misrepresents the true nature of clinical causation. "Because clinical reasoning is retrospective," argues Montgomery, "it needs to be represented in a way that allows a larger, looser concept of cause than linear cause and effect. What is needed," she insists, "is representation that can accommodate time and chance. Narrative," she concludes, "provides for the circumstantiality or (probably) noncontributory detail and leaves room for contingency, conjunction, and multiplicative causes that unfold over time" (2006, p. 80). Although the statistical approach to clinical causation is necessary for a secure foundation to medical practice *vis-à-vis* biomedical facts, narrative provides access to subtler dimensions of it.

The next feature of narrative reasoning involves the construction of a patient's social world. Narrative reasoning allows a physician to enter into a patient's social world in order to better understand the impact illness has on a patient's lifeworld. "Narrative provides a wonderful vehicle for making sense of actions, because," explains Mattingly, "it seeks to make actions comprehensible by showing how they are *responsible* from the agent's perspective" (1998, p. 285). It is that perspective that provides a physician with the critical information for addressing a patient's existential concerns, which are an important component of a patient's illness experience and require addressing in order to heal a patient fully. "To know what patients endure at the hands of illness and therefore to be of clinical help," argues Rita Charon, "requires that doctors *enter* the worlds of their patients, if only imaginatively, and to see and interpret these worlds from the patient's point of view" (2006, p. 9). This type of knowing distinguishes between a biomedical practitioner and a genuine healer (Davis-Floyd and St. John, 1998).

The final feature of narrative reasoning involves the probable and possible rather than the determinant and necessary, as in logical, biomedical reasoning. "Narrative is needed," according to Mattingly, "to contemplate the world in its complexities and to decipher how one should navigate one's way in it, for narrative is built on surprise, chance, contingency, [and] the anomalous event" (1998, p. 289). Narrative reasoning is able to assist a person in navigating life's exigencies and in making sense of them, because it is grounded in the practical or phronetic (Charon, 2006; Mattingly, 1998; Montgomery, 2006). As practical reasoning, it is concerned with the good; and, for medicine, the good is defined in what is best for the patient. Patient care then "requires practical reasoning, or *phronesis*, which Aristotle described as the flexible, interpretative capacity that enables moral reasoners

(and the physicians and navigators he compares with them) to determine the best action to take when knowledge depends on circumstance" (Montgomery, 2006, p. 5).

Montgomery (2006) examines the process of narrative reasoning in terms of maxims, beginning with various rules-of-thumb. She contrasts these informal rules with formal decision analysis prevalent in current academic medical circles. Although these decision procedures are aids to clinical practice, she warns that they are no substitute for it. Moreover, the informal rules or maxims are generally expressed as contradictory pairs. For example, in history taking a physician must balance the maxim that a patient's articulation of the presenting symptom is key to diagnosis with the maxim that one must be wary of whether a patient's articulation of that symptom is accurate or truthful. Although the reliance on contradictory maxims appears undignified for a profession that celebrates its reliance on science, Montgomery insists that the general nature of medical practice demands it. These rules "were never meant for universal application; they are situational wisdom that have arisen out of (and proven useful in) circumstances very like those identified in a particular case" (Montgomery, 2006, pp. 117–118).

Montgomery (2006) also examines maxims that guide a clinical encounter to those that guide a clinical mindset with respect to clinical thinking and judgment. These maxims are metarules or phronesiological maxims, which function at a broader interpretative level. One of the most important ones, according to Montgomery, is the "When you hear hoofbeats, don't think zebras" maxim. This maxim "reminds clinicians that the presence of signs and symptoms shared by a number of diagnoses is not likely to indicate the rare one on the list" (Montgomery, 2006, p. 122). However, a clinician must also be aware that a patient's symptoms may point to a rare disease. Moreover, there are other maxims that govern clinical thinking and judgment. For example, in terms of the goals of medicine the contradictory pair is to do everything possible and to do no harm. She identifies several lessons from this phronetic approach to clinical reasoning, especially the lesson that one should learn from one's elders but question what they teach you.

6.3 Summary

The biomedical model is patterned after objective, scientific thinking and reasoning. It is concerned with the logical validity of its arguments and the truth or veracity of its propositional knowledge. In contrast, humanistic or humane models are patterned after subjective ways of thinking and reasoning that include intuitions, values, virtues, and the illness story. Moreover, subjective ways of thinking deal with issues that are often not addressed by objective ways of thinking but nonetheless are important for a patient's wellbeing. As such, these subjective ways of thinking are championed as means to address the alienation and objectification patients feel when treated by biomedical practitioners, and consequently serve to address the quality-of-care crisis.

Finally, Hunt and Mattingly (1998) claim that objective and subjective thinking or reasoning are not contrary to one another, but rather they are complementary. In other

words, subjective thinking or reasoning instantiates objective thinking or reasoning. As Lonergan articulates the resolution of the relationship between objectivity and subjectivity from a larger perspective: “Genuine objectivity is the fruit of authentic subjectivity” (1979, p. 292).

Chapter 7
Clinical Judging and Decision Making

How do physicians make the necessary judgments and decisions when faced with diagnostic and therapeutic uncertainty and choices? Are there rules or algorithms by which clinical judgments and decisions are made? Certainly how a physician reasons has an impact on the types of judgments and decisions he or she makes. Beginning in the late eighteenth and early nineteenth centuries, clinical practitioners endeavored to make medical judgments and decisions more rational (Engelhardt, 1979). Their endeavors did produce fruit, especially in the twentieth century.

For the biomedical practitioner, clinical judgments and decisions are objective and modeled after the judging and decision making processes of the natural sciences. "The assumption that clinical reasoning is applied scientific reasoning," claims Mattingly, "underlies nearly all research on clinical reasoning in medical fields, and the informal perceptions of practicing health professionals" (1998, p. 275). For humanistic practitioners, clinical judgments and decisions reflect a subjective reasoning process, which includes the patient's personal information and values and which also involves the patient's narration of the illness experience.

Although there are profound differences between biomedical and humanistic or humane practitioners, the general outline of the process for clinical judgments and decisions are to some extent similar. That process, or "journey" as Engelhardt (1979) calls it, begins with collecting data and making observations and is followed by hypotheses formation and testing, after which judgments and decisions concerning the patient's disease state and the best way to proceed therapeutically must be made by both the physician and patient. The difference between biomedical and humane practitioners concerns the role, if any, of logic or intuition in the process of judging and deciding the best course of action, as detailed in the previous chapter. Often the debate revolves around whether the physician must adhere to strict guidelines or can utilize gut feelings. But as some commentators note, clinical judgments and decision making are complex notions and "in their rich and full sense are freighted with values, including ethical and moral values" (Engelhardt, 1979, p. xxii). In this chapter, the nature of clinical judgment, which is often considered informal in nature, is examined first, followed by the clinical decision making, which is generally modeled formally.

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7.1 Clinical Judging

What is meant by judging and judgment, especially from an epistemological perspective? And specifically, what is a clinical or medical judgment? Generally, judgment involves an evaluation or assessment of evidence, data, or observations, in order to discern or decide a path of action, which is discussed in terms of decision making in the next section. According to Bernard Lonergan (1992), judgment is embedded in a cognitional scheme and is an answer to a reflective question, which results from a reflective insight.

In Lonergan's original cognitional scheme there are three levels of operations. The first is the level of presentations or experience. It is concerned with the data and observations of experience, i.e. with the given. The next level is that of intelligence or understanding, in which one has an insight into the intelligibility of the data and observations. This level involves the events associated with thinking and reasoning, as discussed in the last chapter. At this level, one answers questions of fact, e.g. who, what, when, etc. The final level is that of reflection on the insights into the intelligibility of data and observations. At this level, the reflective question, "Is it so?," is addressed. To answer that question, requires a reflective insight into the truth or falsity of the questions of fact. According to Lonergan, "judgment is the last act in the series that begins from presentations and advances through understandings and formulations ultimately to reach reflection and affirmation or denial" (1992, p. 301).

Between the question for reflection and the judgment that represents its answer is reflective understanding and insight. That reflective understanding or insight is the result of "marshalling and weighing the evidence," i.e. one comes to grasp "the sufficiency of the evidence." For Lonergan, "to pronounce judgment without that reflective grasp is merely to guess" (1992, p. 304). But how does one know when one grasps the evidence sufficiently to make a judgment. Lonergan proposes several possibilities (Tekippe, 1996).

The first is that there are no further relevant questions to be answered. Once sufficient insight into understanding is grasped, one is justified to make the appropriate judgment. Akin to this is one's expert knowledge into the problem at hand. As one continues to learn about the problem, one becomes more informed as to what constitutes proper and sufficient evidence to answer the question for reflection. Next, there is the satisfaction of one's intellectual curiosity. Humans are, by nature, creatures who, in principle, have an unrestricted or a pure desire to know. When such desire is sated, to pronounce judgment is then generally warranted. Finally, humans display a capacity (unless otherwise impaired) to determine wisely when the evidence is sufficient to justify a judgment.

Although Lonergan provides a precise and unambiguous analysis of general judgment, Engelhardt (1979) claims that the notion of clinical judgment is ambiguous. It can either refer (1) to the "capacity" to make judgments or discernments or to draw conclusions concerning the patient's disease state and to determine what steps must be taken therapeutically or (2) to the "experiential origins" of that

capacity. For biomedical practitioners, the origins of clinical judgment are logical and include scientific reasoning. Generally the capacity for such judgments is based on rules and algorithms. Such is not the case for humanistic practitioners. "One finds physicians asserting," claims Engelhardt, "that one can make adequate clinical judgments only on the basis of actual experience, not simply on the basis of general principles of physiology, pharmacology, pathology, or even on the basis of a reconstruction of past clinical judgments" (1979, p. xii). In other words, the capacity for clinical judgment is not simply reducible to rules or algorithms. Rather, it depends upon a tacit or an intuitive dimension.

Consequently, there is a sharp divide between biomedical practitioners and humanistic or humane practitioners over on the origins of clinical judgment and the capacity by which judgment is made. On the one hand judgment reflects the outcome of objective scientific reasoning, while on the other hand it reflects the subjective outcome of intuitive reasoning. In this section, clinical judging is examined in terms of the objective and subjective dichotomy and the art and science dichotomy, as well as with respect to its tacit dimension and the role of phronetic and narrative reasoning. Finally, I discuss the notion of a good clinical judgment.

7.1.1 Objective or Subjective?

In a piercing analysis of the intuitive or subjective dimension of clinical judgment, Paul Meehl (1954) demonstrated that in terms of clinical prediction statistical or actuarial methods outperform intuitive or clinical methods. The statistical method involves comparing the aggregate of clinical data to an actuarial table to determine how best the patient responds to therapy. The clinical method forgoes any use of such tables. "Clinicians," observed Meehl, "often hold the view that no equation or table could possibly duplicate the rich experience of the sensitive worker" (1954, p. 26).

Meehl's analysis of the empirical data, however, revealed that "special powers" like intuition do not function effectively in the clinic. Only through statistical analysis could the efficacy or "clinical usefulness" of a therapeutic procedure be determined accurately. "Out of the welter of diverse cases, with mixed data and complex judgments, you simply cannot tell," according to Meehl, "whether your use of a procedure is paying off or not" (1954, p. 136). Most clinicians have interpreted Meehl's assessment as a crippling blow to subjective clinical judgment and as a clarion call to replace it with the objectivity of actuarial tables and other mathematical models (Baron, 1988; Katsikopoulos et al., 2007).[1]

The reaction to Meehl's critique, as well as to research on judgment by others, such as Egon Brunswick, Kenneth Hammond, and P.J. Hoffman, involved attempts

[1] Although Meehl bristled at the notion of subjective clinical judgment, he "never abandoned his belief in clinical expertise despite its vulnerabilities to all manner of mental shenanigans" (Westen and Weinberger, 2005, p. 1269). Rather, such clinical judgment plays a limited role in the production of clinical knowledge.

to model clinical judgment and efforts to test the validity of those models empirically (Goldstein and Hogarth, 1997). Most models are based on a notion of human judgment as "a matter of combining pieces of information that are weighed according to their importance" (Doherty and Brehmer, 1997, p. 547). The simplest model to account for the combining and weighing of information and evidence is a linear one. This model also performs the best in terms of predicting a practitioner's diagnostic judgment. For example, Lewis Goldberg (1971), in a controlled study, demonstrated that the linear model accounts for Meehl's data on clinician's judgment for assessing patients' psychotic or neurotic states, as compared to other nonlinear models such as conjunctive, disjunctive, exponential, and logarithmic.

What makes the linear model so powerful is that it captures the "vicarious" nature of a patient's communication of symptoms and of the clinician's use of them in diagnostic judgment (Hammond, 1955).[2] Although linear models are powerful, they are severely limited. Borrowing a term from mineralogy, Hammond (1955) claimed that such models are "paramorphic." According to Hoffman, "the mathematical description of judgment is inevitably incomplete, for there are other properties of judgment still undescribed, and it is not known how completely or how accurately the underlying process has been represented" (1960, p. 125). But, the paramorphic nature of models is not all bad since models do aid in "describing, predicting, and understanding human judgment" (Doherty and Brehmer, 1997, p. 546).

In an attempt to simulate clinical judgment, in order to enlist the aids of computers in medical practice, John Gedye embedded it in the clinical encounter between the patient and the physician. "A clinical encounter," according to Gedye, "is thus an occasion for the exercise of clinical judgment, and since it is generally accepted that this utilizes a clinician's finest sensitivities, it might seem that any attempt to formalize such an activity would be a move back into a world of inflexible concepts" (1979, p. 95). However, he recognized that inflexible concepts are often needed to provide a patient with an unambiguous assessment of his or her illness, as long as these concepts are "appropriate" for a patient's specific needs.

Gedye also argued that clinical judgments are to be made from arguments that are "hypergnostic," i.e. arguments in which the conclusions extend "beyond" the clinical data and observations.[3] What grounds this hypergnostic leap is the similarity between two cases that share a variety of features: "the solubility of the hypergnostic problem may depend on having, or finding, an appropriate representation of the data, appropriate in the sense that it manifests pertinent criteria of nearness" (1979, p. 110). Gedye warned, however, that not all clinical judgments are hypergnostic in nature and may require further analysis and research.

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[2] For further discussion, see Brehmer (1994).

[3] Ernan McMullin (1979) pointed out that Gedye's term "hypergnostic" is commonly referred to as "ampliative inference" in the philosophy of science literature.

7.1.2 Art or Science?

The discussion over clinical judgment often takes the form of a debate over the art or science of clinical judgment. Eliot Sober criticized the debate over whether clinical judgment is an art or a science, by distinguishing four dichotomies in the debate that he claims are fictitious. The first is advocated by clinicians who view clinical judgment as an art: "The skilled clinician is capable of achieving an intuitive insight that is inherently non-logical" (1979, p. 30). Sober rejected this assertion, claiming that clinical judgment involves the same non-mysterious problem solving skills as any other professional discipline. The next dichotomy is that artful clinical judgment takes into consideration the patient's unique personal information and not simply the generalized features of the disease state. Again, Sober rejected this position. He contended that the patient's uniqueness is overplayed but that science, although abstracting from the unique, cannot represent the concrete world completely with its abstractions.

The third dichotomy is that the art of clinical judgment takes into consideration the patient's emotional state. Sober, however, argued that emotions can also function cognitively as a source of important information concerning the patient's illness. The final dichotomy is the distinction between art of clinical judgment concerned with the qualitative and its science with the quantitative. Again, he rejected this dichotomy. "Inferences [derived from clinical judgments] using purely qualitative concepts," according to Sober, "can be just as precise as the most finely honed mathematics" (1979, p. 36).

Sober advocates an informational approach to clinical judgment, composed of both logical and psychological features. "Clinical judgment," for Sober, "is to be understood as occurring within an information-processing system, which has as its input a specification of observed characteristics of the patient and perhaps some laboratory data, and has as output a differential diagnosis" (1979, p. 32). Clinical judgment, then, is a skill that involves both art and science.

Alvan Feinstein also advocated a moderate position with respect to the dichotomy of art and science, concerning clinical judgment. Although traditional attempts to define clinical judgment in terms of scientific rationality have failed because of the complexity of human observations and data and attendant decisions, Feinstein attempted to overcome this failure by distinguishing between the various kinds of observations and cognitive activities involved in clinical judgment. "By dividing the observational data into descriptions of disease, illness, and host, and by analyzing the therapeutic and the environmental decisions separately," claimed Feinstein, "clinicians can discern the ingredients of clinical judgment" (1967, p. 28).

The artful dimension of clinical data, according to Feinstein, is relegated to those observations pertaining to the description of the illness and the host and to environmental decisions. However, the scientific dimension of clinical judgment is consigned to those observations concerning the disease and to therapeutic decisions. "This aspect of clinical judgment," opined Feinstein, "is a product of the clinician's mind, of his cultivated intellect and knowledge" (1967, p. 29). Thus, he challenged

clinicians to incorporate scientific methodology into clinical judgment. "Clinical medicine, therefore, like most other human activities" concluded Feinstein, "is an indivisible mixture of both art and science" (1967, p. 295).[4]

7.1.3 Tacit Dimension

Gilbert Goldman provided a robust defense of the tacit dimension for clinical judgment. To that end, Goldman defined clinical judgment as "the mental processes involved in all stages at which the clinician collects and interprets data; formulates a problem statement, confirms and refutes diagnostic hypotheses; considers, plans, and implements possible diagnostic and therapeutic options, tests, and interventions; and evaluates likelihoods and outcomes" (1990, p. 48). According to Goldman, the dominant view of clinical judgment is that it is based exclusively upon an explicit form of knowledge that can be reduced to rules, formal models, and computer simulation. However, he argued that this view has failed (Goldman, 1991). The reason is that there is a tacit dimension to clinical judgment. This dimension consists of "knowledge which is possessed and utilized on an implicit, or subsidiary, level without conscious awareness" (Goldman, 1990, p. 50).

Goldman gave the example for the tacit dimension of clinical judgment in terms of a surgeon who knows exactly how much force to exert when suturing. The tacit dimension of clinical judgment involves skills, which may be physical in nature, as with the example of the surgeon, or cognitive or mental in nature, as in clinical judgments. Importantly, the tacit dimension is complementary to the explicit dimension, in that it represents the "knowing how" that grounds the explicit dimension of "knowing what" (Goldman, 1990). According to Goldman, the tacit dimension consists of the "routines which complement the explicit rules of practice, which tell [the physician] which rules to employ when, and which case requires the use of which information" (1990, p. 53).

Although Michael Scriven (1979) acknowledged the importance of tacit or implicit reasoning in clinical judgment, he claimed that such judgment is not simply a matter of tacit knowing. In like manner, logical reasoning in terms of rules or algorithms is also important; but, again, clinical judgment is not reducible to logical reasoning. According to Scriven, "in clinical inference leading to clinical judgment, we operate from such rough guidelines *and these cannot be adequately formulized either as statistical or as exact generalizations*" (1979, p. 15). In other words, clinical judgment is neither an intuitive faculty nor a logical faculty; rather, it is a skill.

Scriven claimed that the skill needed for clinical judgment is based on logic different from traditional mathematics. This logic is one of "considerations." What

[4] In a twenty-five year retrospective article, Feinstein (1994) has acknowledged that patient-care research is advancing and that there is still ample room for improvement in the process of making clinical decisions.

Scriven meant by this is a logic that can combine the multifaceted dimensions of information required to make a clinical judgment. Besides relevant generalizations, his "logic of considerations" also incorporates "many relevant estimated values of variables." The result is an epistemology he called "the theory of weak knowledge." It is an epistemology that includes "possibilities and approximations" in its epistemic base. In conclusion, Scriven contended that although statistical or actuarial methods do outperform intuitive or clinical methods it is not necessarily the case that all such objective methods will prevail all the time.

7.1.4 Phronetic and Narrative Reasoning

Recently, Aristotle's notion of *phronesis* or practical reason has also been used to explicate and defend clinical judgment from a humanistic or humane perspective (Jonsen and Toulmin, 1988; Pellegrino and Thomasma, 1981a). For example, Kathryn Montgomery defines clinical judgment in terms of "the practical reasoning or phronesis that enables physicians to fit their knowledge and experience to the circumstances of each patient" (2006, p. 33). Montgomery contrasts this type of practical reasoning with that of scientific reasoning, for the latter is concerned with obtaining truths of a universal sort while the former is concerned with the truth of the individual patient presenting to the physician. Clinical judgment based on practical reasoning leads to the best course of action for a patient given the specific conditions for that patient and not for some statistical mean given some generic set of conditions.

Duff Waring (2000), however, challenges the claim that clinical judgment is the result of phronetic reasoning. Waring argues that it is best described as a result of *techne*, for the practice of clinical judgment as *techne* leads to the production of health. Aristotelian *phronesis*, on the other hand, is concerned with "living well in general." According to Waring, clinical judgment may be analogous to *phronesis* but it does exemplify it.

Humane practitioners also utilize narrative reasoning, when making clinical judgments. For example, Montgomery examines the role of narrative reasoning *versus* scientific reasoning in clinical judgment with respect to generalization and particularization. Although generalization, especially for epidemiological statistics, is important for the science of medicine, particularization, in terms of the patient's individual values and concerns, is critical for sound clinical judgment. "Understanding the particulars," asserts Montgomery, "despite the inexact relevance of biological science and statistical epidemiology to the circumstances of one person's illness, is medicine's chief moral and intellectual task" (2006, p. 86).

The particulars of a patient's illness are best determined though narrative reasoning, according to humane practitioners. Moreover, anecdotal case studies are not incidental for medical practice but essential. Thus, the individual patient is not peripheral but central to clinical judgment and to medical practice. And, for that patient what is important is what Montgomery calls the "individual cause," which

addresses why the patient became sick in the first place. That cause is best determined through narrative, not scientific, clinical judgment.

7.1.5 Good Clinical Judgment

What makes for good clinical judgment? There are several criteria that have been proposed to determine such judgment. Arthur Elstein (1976), for example, identified several features of a good clinical judgment. The first is "affective sensitivity." "Sometimes good judgment," noted Elstein, "is said to be displayed when a physician is sensitive to the emotional needs of a patient as well as to the psychological and social problems that frequently arise in coping with a grave illness or as a consequence of certain therapies" (1976, p. 698). Good judgment, therefore, requires the physician to take into account more than simply the clinical data concerning the patient's physiological or pathological condition.

The second feature of a good judgment involves the physician's ability or capacity to evaluate competing principles, in order to determine which principle applies in a given case or if another principle should prevail. In other words, a physician, in order to display good judgment, may need to think outside the traditional clinical box. Elstein provided an example of a patient suffering from both congestive heart failure and significant blood loss. One requires removal of fluid, the other addition. "A physician with good judgment," according to Elstein, "knows how to reconcile these apparently competing demands" (1976, p. 698). The final feature of a good clinical judgment is an ability to select an adequate diagnostic hypothesis or therapeutic protocol. For example, a physician displays good judgment when presaging difficulties associated with different therapeutic protocols and ameliorating them for the patient.

Engelhardt (1981) proposed that good clinical judgment also involves the fewest costs or risks to the patient, both in terms of diagnosis and therapy, with respect to morbidity, pain and suffering, and financial expenditures. Clinical judgment consists of both a correct diagnosis of a "medical problem" and its resolution in terms of an appropriate therapeutic modality. "Good clinical judgment," for Engelhardt, "requires, then, the reliable weighting of the probable diagnostic significance of various clinical findings while taking into account the significance for the patient of various possible adverse outcomes" (1981, p. 314).

The foundation of good clinical judgment, according to Engelhard, is prudence, especially in terms of what a patient values *vis-à-vis* health and sickness. Such judgment assists a patient in negotiating "the geography" of medical problems and their solutions. Prudence allows both patient and physician to choose between various competing values. A good clinical judgment then is a complex process that results in the most appropriate clinical outcome for the patient. Finally, it is "a creative process in the sense of requiring changing responses, given different patient evaluations of the significance of such possible outcomes" (Engelhardt, 1981, p. 314).

Narrative reasoning, as already alluded to, is also considered essential for good clinical judgment. For example, Montgomery claims that the very features biomedicine denies in its attempts to be a science are the ones needed for sound clinical judgment and good medical practice. These features include "appreciation of the individual person and the anecdotal event, recognition of a person's pain, attention to feelings, an awareness of one's emotional life and participation in the lives of others, and knowledge of the provisional nature of clinical knowing" (Montgomery, 2006, p. 174). Narrative reasoning provides the best means for accessing this information. It is through the interpretation of the patient's illness story that physicians are best able to understand the suffering associated with illness and then to make the appropriate clinical judgment concerning what best to do therapeutically. Trisha Greenhalgh (1999) makes a similar claim for the role of narrative reasoning in clinical judgment. She argues for a "narrative-interpretive paradigm" to make sense of not only the objective clinical data but also the subjective data of the illness experience.[5]

7.2 Clinical Decision Making

Whereas judging pertains to evaluation of evidence, decision making involves action on that judgment. After weighing or judging the evidence, one then decides on the best course of action. One simply does not evaluate the evidence and then generally does nothing. Rather, judgment of evidence often calls forth some type of action based on that judgment. For example, to collect laboratory evidence on a patient's condition and then evaluate it leads to some type of therapeutic action. To stop short of deciding on an action after making a judgment fails to complete the full operations intelligence calls forth.

Lonergan (1979) revised his tripartite cognitional structure articulated in *Insight* to include a fourth level, the level of decision. Once one makes a judgment about the evidence, then a decisive action generally follows. Importantly such action is the level at which freedom occurs, a freedom that involves responsibility on the part of the self-conscious knower. For Lonergan, only through our decisions are we authenticated: "One has to have found out for oneself that one has to decide for oneself what one is to make of oneself; one has to have proved oneself equal to that

[5] Greenhalgh argues for a clinical judgment that integrates both the objective and subjective dimensions of clinical judgment, especially in terms of evidence-based medicine: "Far from obviating the need for subjectivity in the clinical encounter, genuine evidence based practice actually presupposes an interpretive paradigm in which the patient experiences illness in a unique and contextual way. Furthermore, it is only within such an interpretive paradigm that a clinician can meaningfully draw on all aspects of evidence—his or her own case based experience, the patient's individual and cultural perspectives, and the results of rigorous clinical research trials and observational studies—to reach an integrated clinical judgment" (1999, p. 325).

moment of existential decision; and one has to have kept on proving it in all subsequent decisions, if one is to be an authentic human person" (1979, p. 121).

Although decision making in general has an important existential dimension, clinical decision making is founded on more formal decision analysis procedures, which are examined in the first part of this section. I then look at various decision models that have been proposed for clinical decision making, followed by a clinical example illustrating clinical decision making. Finally, the procedure of tree pruning in order to make decision making manageable is examined, concluding with a discussion of the advantages and disadvantages of applying formal decision analysis to the clinic.

7.2.1 Decision Analysis

Whereas clinical judgment depends on implicit or tacit dimensions of human cognitive and emotional resources, clinical decision making involves more formal strategies such as flow charts and algorithms, especially assisted by computer technology. In other words, whereas clinical judgment is concerned with questions of understanding pertaining to the patient's illness and whether that understanding is accurate based on the evaluation of the clinical evidence, clinical decision making is concerned with the decisions about what action to take and whether it is the best one to take for the patient. The questions that animate decision making are: "How do people decide on a course of *action*? How do people choose what to do next, especially in the face of uncertain consequences and conflicting goals?" (Goldstein and Hogarth, 1997, p. 4). These questions have stimulated a vast literature on medical decision making, in an attempt to answer them.

"Sound clinical decisions," according to Jerome Kassirer and colleagues, "depend upon the integration of a variety of facts regarding a patient's condition with an extensive store of medical knowledge" (Kassirer et al., 1988, p. 212). This general approach is divided into a number of steps. For example, David Ransohoff and Alvan Feinstein (1976) identified five of them. The first is precise articulation of the clinical problem, often in a hypothetical format, followed by construction of a mathematical model of it. The form of the model is generally in terms of a decision tree, composed of branches connected by decision and chance nodes. The next step is to assign objective or subjective probabilities to uncertain events within the decision tree. Peter Doubilet and Barbara McNeil (1988) divided these probabilities into objective probability values, those that are based on previous evidence, and subjective probability values, those that depend on the physician's expert opinion or judgment. The third step is to assign a "utility" value for each expected outcome. These values are often based upon the personal value or preferences of either the patient or physician. The next step is to determine the expected value for each branch of the decision tree, by calculating the product between the probability and utility values for each branch of the decision tree. The final step is to choose the branch with the highest expected utility.

The goal of formal decision analysis, then, is to maximize the expected value of a decision. It is important to note that in humanistic models it is imperative to factor

into a decision the patient's values or preferences concerning the outcome. Even though one branch of a decision tree yields the highest expected value, it may be rejected because of the patient's values. For example, a clinical practitioner may assign a utility of 0 to death as an outcome, while the patient may not. Moreover, Doubilet and McNeil (1988) and other advocates of decision analysis have added an additional step of sensitivity analysis, which involves altering systematically assumptions and values within the first three steps to determine how sensitive a decision is to variation of these assumptions and values. This step is important since clinical decisions are based on uncertainty, and physicians are unlikely to trust their clinical judgment unless the decision based on this formal style of analysis demonstrates that it can account for uncertainty.

7.2.2 Decision Models

Within the last several decades, a variety of models have been proposed to account for clinical decision making. Deborah Zarin and Stephen Pauker (1984) provided a general scheme for most models. In their scheme, the first three steps of decision making correspond to the following inputs: structuring the problem in terms of a decision tree, probabilities or likelihoods of outcome, and values or utilities of outcome. These three inputs result in a decision and consequent action *via* an integrative process. Zarin and Pauker then identified four possible types of models, which "differ from one another in (1) which of the two participants (doctor or patient) is the source of each input, and (2) the source of the integrative process that is used" (1984, pp. 185–186).

The first model is the classic or traditional paternalistic model, in which the physician is the source for all the inputs and integrative process. The next two models incorporate the patient in an effort to satisfy the doctrine of informed consent. In the first of these models, the physician informs the patient of the inputs and possible outcomes; but, the patient remains a passive agent and the physician is still the source for the integrative process. In the next model, the physician informs the patient but it is the patient who decides what inputs to use and who is the source of the integrative process. In the final model, the physician is responsible for the first two inputs, the structure of the decision tree and probability of outcomes, and also is responsible for informing the patient about them. The patient is then responsible for the third input or the value or utility of the outcome. The physician is the source of the integrative process. For Zarin and Pauker, the last model is the best for clinical decision making since it involves the expert knowledge of both the patient and physician.

7.2.3 Example

Jerome Kassirer (1976) has provided a superb example of clinical decision making, based on an actual clinical case. The patient was a twenty-four year old female, who had both kidneys removed several years earlier because of bilateral hypernephromas.

Recently, she received a kidney transplant, underwent a splenectomy, and was treated for *Klebsiella* sepsis and pneumonia. She was admitted to the hospital because of vomiting and diarrhea, and she was found to have a fever (104.2°F) and rales in the left lung. Her symptoms worsened, and "she had severe left upper quadrant abdominal pain radiating to the left shoulder, generalized abdominal tenderness, diminished bowel sounds, splinting of the left chest, and poor movement of the left diaphragm" (Kassirer, 1976, p. 156). Her white blood cell count was 8,900. The initial diagnosis was subdiaphragmatic or subphrenic abscess, which is an accumulation of purulent exudates or pus below the diaphragm.

Although the diagnosis was uncertain the clinical decision facing the attending physicians was whether to operate or not, in order to resolve the abscess by draining the pus. The decision tree contained two main branches: the first represented surgery, the other not. At the time of the uncertain diagnosis, the probability the patient was suffering from a subphrenic abscess that could be resolved through surgery was 0.3. According to Kassirer, this probability meant that "we have estimated that 30% of patients with a clinical picture comparable to that shown by this patient on this date would have a subphrenic abscess and 70% would not" (1976, pp. 157–158).

Both main branches also bifurcated, with the first branch representing a surgically correctable abscess and the other a non-surgically correctable one. The probabilities for resolving the abscess were based on evidence published in the literature. In order to determine the best decision, the utilities were next calculated. The best outcome, a spontaneously resolved abscess by non-surgical protocol, was assigned arbitrary units of 100, while the worst, death, 0 units. Other outcomes ranged between these two values. Based on these utilities, the expected value for surgery was 62.5 units, while for non-surgery 81.1 units.

The clinical decision made in this case was to treat the patient non-surgically with antibiotics and fluids, along with nasogastric suction. Although the patient improved initially, after several days her symptoms became worse. As Kassirer narrates, "the new data available from the evolving clinical course, the change [increase] in white cell count, the results of echography, scan, and plain film markedly increased the probability of a surgically accessible lesion" (1976, p. 159). The probabilities were revised to reflect the changing clinical picture, even though there was no precedent within the published literature. Based on the same utilities as before, the outcome of the new decision tree differed from the original. Now the expected value of surgically resolving the abscess was 38.9 units, while non-surgical were 25.9 units. Even though surgery was the best decision, Kassirer points out that it is not without serious risks given the deteriorating condition of the patient.

7.2.4 Pruning Decision Trees

Clinical decision trees can become quite large and complicated (Kassirer, 1976). In response, physicians and patients may only focus on a sub-branch of it and

ignore others. Consequently these trees are often pruned by removing sub-branches, through the physician's clinical judgment. "Branches can be pruned," claims Kassirer, "only if it is obvious from inspection that the probability and utility of the outcome are such that their combination will yield a value that will contribute little or not at all to the expected value of the outcome" (1976, p. 161).

Even though the pruning process is often carried out at an intuitive or instinctive level, there are principles that can be used to make pruning more logical in nature (Schwartz et al., 1973). The main principle concerns the degree of the probabilities and risks. "If both the probability of a given event and the risks associated with it are extremely high," claim Schwartz and colleagues, "the branch cannot be pruned. In contrast, if both the probability and the risks are low, branches can be pruned with impunity. The decision to prune or not to prune," they add, "when there is a low probability but a relatively high risk is more difficult" (Schwartz et al., 1973, pp. 461–463). Besides the probabilities and risks, the values or utilities associated with the branches, especially from the patient's perspective, must also be factored into whether to prune or not.

7.2.5 Advantages of Decision Analysis

Given the level of uncertainty in medicine and the decisions that must be made often on incomplete information, decision analysis provides several advantages for making clinical decisions. "Advocates," according to Stephen Eraker and Peter Polister, "have claimed that decision analysis enhances effective decision making by providing for logical, systematic analysis and by prescribing a course of action that will conform most fully to the decision maker's own goals, expectations, and values" (1988, p. 380).

Specifically, Eraker and Polister identified three advantages to decision analysis for clinical decision making. The first is that decision analysis is explicit in terms of its overall structuring of the clinical problem, especially with respect to the formation of a decision tree. "With the decision analysis framework," observed Eraker and Polister, "one can identify the location, extent, and importance of any areas of disagreement, and ascertain if any such disagreements have a significant impact on the indicated decision" (1988, p. 382). The next advantage is the quantitative nature of decision analysis, in terms of the probabilities and values. Such quantification provides a more objective means for evaluating the various clinical decisions. The final advantage is the prescriptive nature of decision analysis, which provides the best option in terms of what diagnosis to make or therapy to follow.

7.2.6 Criticisms of Decision Analysis

Although decision analysis continues to influence diagnostic and therapeutic decisions, there have been several criticisms levied against it. In comments on Kassirer's 1976 paper,

for example, Ransohoff and Feinstein (1976) identified several problems with the strategies of decision analysis. The first is that the decision tree must include all the possible outcomes and actions or it will distort the clinical problem. "If these additional courses of action are possible and reasonable but are not considered in a decision analysis," according to Ransohoff and Feinstein, "then the structure [of the decision tree] is unsatisfactory because the problem has not been completely evaluated and the results may therefore be misleading" (1976, p. 166). The next set of problems concerns the estimation of the probabilities for the various outcome branches. Most probabilities in the literature may not be appropriate for the particular patient under treatment and that quantifying such probabilities may be difficult at best for the physician (Ransohoff and Feinstein, 1976).

The final set of problems revolves around assigning utility values. The first problem is "that many important outcome values are intangible and are therefore not easily measured" (Ransohoff and Feinstein, 1976, p. 166). The second problem is the comparison of possible outcomes, which have different attributes and require different scales for measurement. "This double task of converting intangible and multi-attribute outcomes into meaningful numbers," according to Ransohoff and Feinstein, "creates a major difficulty that *is* inherent in decision analysis and that cannot be managed readily if at all" (1976, p. 167). The final problem is who determines the utility values. Should it be the patient, the physician, hospital or HMO administrators, insurance company executives, or society at large such as politicians? Each of these would most likely assign a different utility value to a particular outcome (Ransohoff and Feinstein, 1976).

There are other problems with the quantitative approach of decision analysis. For example, Patrick Croskerry points out that clinical decision making is a complex process: "there are often too many variables or unknowns in the clinical situation, too many ethical and financial restrictions, or too many other resource limitations to even allow a simple quantitative approach to guide each clinical decision" (2005, p. R5). Logical rules associated with decision analysis cannot capture the complexity of many clinical decisions.

Croskerry (2005) also identified several hard wiring problems with the quantitative nature of decision analysis. The first is instinctive or behavioral in nature. The reasoning process that underlies decision making is adaptive in nature and reflects evolutionary pressures. Thus, much of human decision making depends upon the hard wiring selected through natural selection. In addition, personality and gender also influence clinical decision making. There are various styles of decision making that reflect a clinician's personality or gender. For example, anesthesiologists are by lot withdrawn compared to surgeons and may acquiescence to a surgeon's clinical decision concerning an operation (Croskerry, 2005).

Heuristics and biases also play an important role in clinical decision making (Croskerry, 2005; Tversky and Kahneman, 1974). "A variety of studies in the clinical setting," according to Croskerry, "have repeatedly demonstrated the importance of heuristics and biases in information processing and establishing a diagnosis" (2005, p. R3). Heuristics are the rules of thumb that permit a clinician to include or factor intuitions into a decision. For Amos Tversky and Daniel

Kahneman, "heuristic principles…reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations" (1974, p. 1124). However, there are a number of biases, around forty in all at the time of Croskerry's article, which can distort a clinical decision. These biases include, for example, ascertainment bias, ego bias, gender bias, outcome bias, and overconfidence bias. Given the complexity of clinical decision making, Croskerry concludes that "one approach does not fit all… There will always be a gradient of decision-making that parallels the degree of uncertainty associated with the wide variety of patient conditions, and which are to some extent discipline-specific" (2005, p. R6).

7.3 Summary

Clinical judgment and decision making are important epistemological components of both the biomedical and humanistic or humane models of medical practice. For biomedical practitioners, clinical judgment and decision making are based on scientific reasoning. This often leads to a paternalistic position for physicians, who find it too difficult or too time consuming to translate the technical dimension of medical language and concepts that under gird clinical judgment and decision making into language and concepts the patient can understand in order to participate in the judging and decision making processes. Of course, this paternalism not only plays an important role in the origination of the quality-of-care crisis but also exacerbates it.

Humane practitioners, on the other hand, endeavor to include the patient as an active agent in the clinical judging and decision making processes. By including the patient in these processes, the physician and patient can communicate more effectively. Narrative-based medicine has been championed as a means for promoting more effective communication that leads to an enhanced quality-of-care.