Chapter 5: Science, practice, and legitimacy: review of the literature.

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5.1 Introduction

Every profession requires possession of exclusive, ‘privileged’ knowledge as an essential feature of its social legitimacy (Bhugra, Malik & Ilkos 2010). Professional expertise requires not only the possession of such knowledge, but its judicious use in practice, and key elements of professions are the development of institutions of knowledge and the fostering ‘good practices’ with respect to maintaining, assessing, and applying knowledge. The kind of knowledge involved will differ between professions, historians for example applying hermeneutical and empirical approaches to knowledge, whilst astronomy is firmly placed in the natural sciences. For a profession to endure, actual practice must be integrally and consistently connected to this knowledge base and its scientific grounding (Abbott 1988): one must practice what one preaches. This consistency extends to professional attitudes towards and reflection on knowledge and science: too much heterogeneity is a potential threat to professional identity. Therefore, a profession's implicit or explicit philosophy of science and epistemological positions are intimately related to its social legitimacy and durability. The first part of this study pointed to a problem for psychiatry with respect to this sense of
consistency: whereas the classificatory project had a central role in legitimizing the profession (Bhugra et al. 2010, Engstrom 2003), the products thereof appeared to have limited relevance for (scientifically informed) clinical practice. After the DSM-III revolution, with its promise of an increasingly sophisticated empirical anchoring of classification, linked to both etiological research and research into the effectiveness of treatments, and the rise of evidence-based psychiatry, one would expect increased clinical use of the classificatory system, at the minimum as an aid to inductive reasoning. The participants, however, were almost unanimous in their view of the DSM as having a peripheral, mostly post-hoc, and primarily communicative function in practice, frequently mentioning its limited clinical and predictive utility. This points to inconsistencies between the scientific image with which the profession legitimizes itself to society, actual scientific progress, and the application of psychiatric science in practice. The clinical emphasis on pragmatism is at odds with the realism that the profession presents as its scientific foundation to the public. Following Abbott, this discrepancy detracts from professional legitimacy. Meanwhile, the scientific legitimacy of psychiatric practice remains contested, leading to calls for radical change of the paradigm shift variety (Rubin & Zorurmski 2012, Reynolds et al. 2009).

The aim of Chapters 5 and 6 is primarily descriptive: the goal is to empirically track and characterize the actual knowledge applied in the profession, the profession’s ‘good practices’ and legitimizing philosophies, and professionals’ views and attitudes to knowledge. In Chapter 6, the results of the second part of the qualitative study will be presented aimed at practitioners’ views of science, the manner in which they apply science in practice, and their views on legitimacy (which necessarily include a perspective on philosophy of science). In this chapter the literature on the theoretical content of psychiatrists’ knowledge sources and their epistemological assumptions and philosophies of science will be examined. This will be done from two perspectives: professional development, and organizational level. First the literature will be reviewed on the professional development of psychiatrists, the manner in which their theoretical knowledge and their expertise develops, and their attitudes towards knowledge and science. The emphasis lies on the way psychiatrists, from entering medical school view science, learn to apply knowledge, and select theoretical and therapeutic orientations, and what kind of influences are pertinent throughout this development and in professional life. This part focuses on the professionals themselves as they move from students to residents and towards full professional status. In the second part of the chapter external, contextual and institutional influences on knowledge and science views will be examined. Before reviewing the literature, a word on terminology is required.
5.2 Professional knowledge: conceptual variations

In the empirical research literature on knowledge in professionals, there is some definitional variation. Initially, two forms were distinguished: explicit and tacit knowledge. Botha et al. (2008) point out that this distinction is not a dichotomy: all knowledge is a mixture of tacit and explicit knowledge.

Explicit knowledge is knowledge that is formalized and codified, and is sometimes referred to as know-what (Brown & Duguid 1998). It is therefore fairly easy to identify, store, and retrieve (Wellman 2009). It is, in other words, “tellable” (Gascoigne & Thornton 2013).

Tacit knowledge, defined by Polanyi (1966), is sometimes referred to as know-how, and refers to intuitive, hard to define knowledge that is largely experience-based. It is context-dependent and personal in nature (Gascoigne & Thornton 2013). It cannot be communicated, understood or used without the 'knowing subject' (Nonaka 1994). Unlike the transfer of explicit knowledge, the transfer of tacit knowledge requires close interaction and the buildup of shared understanding and trust among participants. A further distinction within tacit knowledge was made by, amongst others, Horvath (2001), who distinguished embodied knowledge, differentiating between knowledge embodied in people and embedded knowledge, embedded in processes, organizational culture, routines, etc.

Eraut (2005) refers to three distinct definitions of knowledge in current use in relation to the medical profession:

Codified Knowledge: knowledge published in books and journals that are subject to quality control through different forms of peer review. Such information is professionally privileged in this manner. In recent decades this resource has become increasingly complex: professional guidelines, local and national policy documents, and user group publications have been added to the traditional sources, all of which are now more readily available through electronic publishing. Inclusion into or exclusion from this domain proceeds according to ostensive (scientific) criteria.

Cultural Knowledge: knowledge which has not been codified, and which plays a major role in work-based practices and activities. Much of this knowledge is acquired through participation in social activities, and is broader in scope than the concept of implicit learning associated with socialization.

Personal Knowledge: the knowledge individual persons bring to a situation that enables them to think, interact, and perform. The defining feature here is knowledge use rather than truth, as limiting such knowledge to the latter would exclude non-codifiable forms of knowledge. It includes personalized versions of
public codified knowledge, everyday knowledge of people and situations, know-how in the form of skills and practices, memories of cases and episodic events. Skills, according to Eraut, can be considered as forms of both cultural and personal knowledge.

Note that in this division, codified is equal to explicit knowledge, cultural knowledge has not been codified (but may be codifiable), whilst personal knowledge may be both explicit and tacit. Eraut’s distinction relates primarily to the ‘bearer’ and source of knowledge rather than its nature. Eraut states that the medical profession has usually defined knowledge in terms of codified knowledge, whilst the term ‘expertise’ is broader, including personal knowledge developed from experience (other than codified knowledge). Medicine, like other professions, is not legitimized by one distinct form of knowledge, but by its social purpose. Therefore, it uses theories from a range of disciplines, adjusting them to its needs and goals, and the use of science is justified only in so far as this furthers the social purpose. The pragmatic use of science is evident in differences in knowledge use between medical disciplines such as clinicians and researchers. Patel et al. found that clinicians rarely use basic science in explaining cases, whereas medical researchers prefer detailed, basic science explanations, without developing clinical descriptions (Patel et al. 1989). Eraut also points out that theories do not just simply derive from empirical evidence but also help clinicians understand, critique, and justify occupational practices. Therefore there is a bridge between theoretical positions and the social justification of a profession. Eraut puts it like this:

“Theories related to the ideology of a profession are particularly important in discussions of its goals and purposes, and modes of interaction with clients. Most doctors have a preferred view of their profession, i.e. an ideology or theoretical justification of its purposes and practices in terms of moral principles, views of society and occupational beliefs about the effectiveness of various practices. This plays an important part in sustaining professional identity and derives partly from ethical principles articulated by philosophers and partly from the cultural assumptions about the role of that profession that prevailed (or used to prevail) in that particular society.” (Eraut, 2005).

Eraut’s approach therefore offers a basic scheme in aid of examining knowledge development in the medical profession. Because of the conceptual variation noted above however, it is necessary to pay close attention to the definitions used when reviewing the literature. In the following we will take ‘explicit’ and ‘tacit’ to refer to the codified – non codified distinction, whereas ‘embodied/personal’ and ‘embedded/cultural’ will refer to the alternative sources of knowledge: from
persons (including one’s own person) or from local or broader cultural sources. Eraut also draws our attention to the dual legitimacy of knowledge in (medical) professions: in the one hand it is connected to the truth-seeking endeavor of science, on the other to the ‘modificatory enterprise’ (Berrios 1999) of medical practice, and hence, it is norm-bound. With this in mind we will now review studies of knowledge development in medicine and psychiatry.

5.3 Professional development, epistemology, and science views
In this section we will review the literature on the development of epistemological beliefs, views of science, and the sources of knowledge of psychiatrists throughout various stages of their training and professional career. In keeping with the general aims of this study, we will focus on empirical work on the development of knowledge and science attitudes in medicine and psychiatry, approaching this from two perspectives. The number of studies focusing directly on the development of philosophical and/or epistemological beliefs over time is limited, and can be found mostly in the so-called ‘personal epistemology’ literature, which will be reviewed. Therefore, studies focusing on professional development throughout medical training applying different methods but offering a window into philosophical beliefs will also be examined. Characterizations of the current state and attitudes to knowledge and science in psychiatry will be described. We will not be focusing on clinical reasoning, which was covered in chapter 2, though clearly there are close connections between what is seen as valid knowledge and the process of clinical reasoning.

Based on these interests, a literature search using the PubMed databases was performed using the search terms “epistemol*”, “philosophy”, “medical education”, “psychiatry”, “theoretical orientation”, “therapeutic orientation”, “attitude”, “beliefs”, “training” and combinations of the above. The search was limited to peer-reviewed journals. The paucity of research in this area necessitated use of a wide net of search terms and further selection based on whether the articles presented or reviewed empirical material, or if non-empirical, whether they contained theoretical perspectives relevant to the empirical results or for generating further empirical study. Further articles were obtained through follow-up references from those initially obtained and from general textbooks covering the subject (Fulford, Thornton & Graham 2006, Fulford et al. 2013, Brosnan & Turner 2009).

Personal Epistemology
Only recently has the concept of ‘Epistemological Beliefs’ been introduced in medical academic literature (Roex & Degryse 2007). This concept, variously
denoted as personal epistemology, ways of knowing, reflective judgment and epistemological theories, resources and beliefs, refers to ideas an individual has about knowledge and knowing, and has been mainly studied in college and high-school students (Hofer 2001). It can be seen as a metatheoretical position taken with respect to philosophy of science and epistemology. Personal epistemology is the study of how the individual develops a conception of knowledge and how that individual uses that to understand the world (Hofer 2002, Niessen 2007). Research in this area has produced different theories on the form in which this development occurs: through stages, as sets of beliefs, or as resources pragmatically engaged within specific contexts (Hofer & Pintrich 1997, Louca et al. 2004).

Work in this area began with the stage-model approach of the Perry Scheme (Perry 1970, 1981): based on annual interviews with longitudinal samples of Harvard students in the late 1950s and early 1960s, Perry and his team found that individuals moved through four stages. They began with a dualist perspective of knowledge, characterized by an absolutist, right-and-wrong view coupled with the belief that truth can be known, and the role of the teacher is to communicate it. They then moved towards multiplism, as they acknowledged the existence of diverse viewpoints and the possibility of uncertainty. Towards the end of this period of development, they were likely to see conflicting views as equally valid. The movement from multiplism to relativism was characterized by the recognition that some views are better than others. In the positions that followed, individuals developed a growing ability to forge commitment within relativism. This was seen as a progression of stages from simple to sophisticated views of science and knowledge.

Alternative models were proposed with different focal points. For example, Belenky et al. (1986) extended the research to wider variations in background, resulting in a slightly different characterization, and a novel identification of connected (empathic and caring) vs. separate (detached and impersonal) knowing, associated with gender. Kuhn (1999, 2000) focused on the epistemological nature of solving ill-structured problems (particularly relevant in psychiatry), and identified four stages: realist (assertions are copies of external reality, therefore critical thinking is unnecessary), absolutist (assertions are facts that are correct or incorrect in their representation of reality, critical thinking is a vehicle for comparing assertions to reality and determining their truth or falsehood), multiplist (assertions are opinions freely chosen by and accountable only to their owners, critical thinking is irrelevant) and evaluativist (assertions are judgments that can be evaluated and compared according to criteria of argument and evidence, critical thinking is valued as a vehicle that promotes sound assertions
and enhances understanding) (Kuhn, Cheney & Weinstock 2000). Within this scheme they located the coordination of subjective and objective ways of knowing in a dialectic progression, from primarily objective, to primarily subjective, to a balancing of the two.

As an alternative to such stage models which view epistemologies as a unified whole, belief models identify different dimensions such as structure of knowledge, certainty of knowledge, and source of knowledge, and assess subjects’ views on these dimensions. The research approach of Schommer (Schommer 1990; Schommer et al. 1992) proposed a model of beliefs about knowing and learning that are more or less independent, rather than developing in synchrony and in stages. For instance, a professional could hold sophisticated views about the certainty of knowledge in psychiatry, seeing theory as fallibilistic and emphasizing ‘commitment within relativism’, whilst also holding a naïve attitude to sources of knowledge, trusting expert opinion uncritically. Though epistemological beliefs may be described as comparatively global (Schommer 1990), this differentiation allows for epistemological beliefs to vary by discipline, e.g., in chemistry versus psychology (Hofer 2002). Nevertheless, epistemologies in the belief approach consist largely of relatively stable, robust cognitive structures. These beliefs are taken to be the building blocks of epistemologies (Louca et al. 2004). Also, this approach sees such beliefs as articulate and declarative, i.e. non-tacit, permitting study through interviews or questionnaires.

The third formal approach views personal epistemology as a set of cognitive resources at a ‘finer grain’ than stages, beliefs or theories (Louca et al. 2004, Hammer & Elby 2002). Focusing on the development of children, this approach posits the possibility of holding a range of different ideas on knowledge which may seem inconsistent from the point of view of the stage or (generalized) belief model, e.g. a child may know what’s for dinner ‘Because Daddy told me!’ whilst knowing where his teddy bear is ‘Because I saw you hiding it under your coat!’, displaying views of knowledge as transmitted and constructed simultaneously (Louca et al. 2004). Different contexts activate different resources.

The development of the research in this area therefore can be characterized by questions on form: the internal organization, domain-generality vs. domain-specificity, and tacit or non-tacit quality of knowledge. The question of generality versus specificity is interesting for psychiatry in view of the relatively uncertain knowledge involved: no fixed etiology or pathophysiology of mental disorders, and exposure, during training, to multiple (etiological) perspectives on mental disorder encompassing different scientific methods and Weltanschauungen. We could imagine beginning residents with certain pre-existing epistemological beliefs
being attracted to one theoretical perspective over another based on their generalized epistemological beliefs, but also being to a greater or lesser degree susceptible to alternative perspectives on science and knowledge throughout their training. Muis, Bendixen and Haerle (2006) provide a thorough review and an integration of the research focused on the question of generality versus specificity. They propose an integrated model (TIDE\textsuperscript{11}), accommodating both. They see personal epistemology as complex and socially constructed, development occurring as a function of one’s interactions with the social world. The context is the instructional environment, which is also embedded in the wider academic and sociocultural context. Thus, the TIDE framework can be understood as multilayered, one in which all levels are reciprocally influential. They distinguish general (nonacademic) and academic epistemic beliefs (acquired through schooling), the former developing from birth until death. The latter development begins with the commencement of formal education. They propose that academic epistemic beliefs are amalgamations of general epistemic beliefs in early life, but as individuals progress through higher levels of education, general epistemic beliefs are less dominant and domain-specific epistemic beliefs become more influential (ibid.). They note the rise of the concept of ‘cultural epistemology’, pointing towards a group’s shared set of epistemic beliefs influenced by the culture of that group. This concept forms a bridge towards the research on the ‘hidden curriculum’ (discussed below). As individuals become more specialized in a particular domain, which typically begins in upper-level high school, their academic epistemic beliefs are more representative of their focal domain. Through higher levels of education, especially in graduate school, their domain of study predominantly influences their academic epistemic beliefs. Academic domains have been classified epistemologically as well-structured (e.g. mathematics) or ill-structured (psychology, social studies), and furthermore according to 1) the existence of a unified paradigm, 2) their concern with practical application, and 3) their concern for life systems. Also, a pure domain focuses primarily on theoretical development (mathematics) as opposed to domains focused on practical application such as economics, termed applied. (Muis, Bendixen & Haerle 2006). Physical, chemical and biological sciences are characterized as paradigmatic (in Kuhn’s sense) whereas the humanities and psychology encompass more idiosyncratic content and methods. Psychology then is seen as soft, pure, and ill-structured whilst medicine is hard, applied, and well-structured. For psychiatry this is interesting from a developmental perspective, since basic medical training, as described above, engenders an institutional context that differs epistemologically from that of psychiatry, insofar as psychological theory and the

\textsuperscript{11} Theory of Integrated Domains in Epistemology (Muis, Bendixen & Haerle 2006).
humanities feature in residential training. Empirical work in this area confirms domain-specific qualities of these areas. For example, Lonka and Lindblom-Ylänne (1996) compared students in psychology and medicine on a number of epistemological beliefs, and found that in both groups there was a developmental trend throughout training from less developed dualist conceptions of knowledge towards more relativist ideas. Students in medicine demonstrated higher degrees of dualism than psychology students, supporting domain-specificity. This research suggests the transition from medical student to resident in psychiatry may involve a significant epistemic transition, a challenge possibly requiring a ‘leap’ towards a more sophisticated set of epistemic beliefs.

Medical Training: socialization and the hidden curriculum
Though there are international differences in phasing and content, all psychiatrists will have gone through medical school and residency training before assuming their formal professional role. Studies of professional development tend to focus on one of these stages and/or the transition between them. In characterizing development throughout medical training, it is important to have some historical perspective, as the philosophies of national and institutional curricula themselves change based on new insights, societal and professional needs. Irby, Cooke and O’Brien, for example (2010), offer a comparison between the state of medical training in the USA in 1910 and in 2010, based on two studies by the Carnegie Foundation for the Advancement of Teaching. According to the 1910 Flexner Report, medical education was mostly performed by local practitioners, operating schools on a for-profit basis. There was a lack of admission and academic standards, the schools relied heavily on lectures, and there was a great variability in curricula between schools. Recommendations included connecting knowledge to active forms of laboratory and clinical experience, a rigorous four-year scientific curriculum, standardization of entry standards, training physicians to ‘think like scientists’, ensuring training was performed by physician-scientists who engaged in teaching, research, and patient care, and the application of scientific knowledge to clinical problems. The Flexner Report had a strong impact, and the scientifically oriented, university-based medical school and teaching hospital quickly became the norm. Patient care, investigation, and teaching were the interconnected cornerstones of medical training until World War II. Medical training consisted of two years of basic medical sciences (e.g. anatomy, physiology, embryology) in schools and laboratories followed by two years of clinical experience at a teaching hospital. After the war, two major changes followed in the subsequent decades: the rise of biomedical, molecular laboratory-based research, and the transformation, with the passage in 1965 of Medicare and Medicaid, of clinical practice into large-scale business ventures. Primary income for medicals shifted to clinical practice
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revenue, and, increasingly, production pressures reduced time spent on teaching. Meanwhile, academic ‘publish or perish’ culture limited researchers’ opportunities to teach and see patients. Flexner’s integrative ideal, Igny et al. (2010) conclude, again requires reform. Equally though they recognize and applaud the boons of accrediting and licensing systems that ensure less disparity in quality of education, and of the scientific basis of medicine.

What though of the content of medical training internationally? Bloom (1988) points to internationally consonant developments in the nineteenth century where educational values were determined by the rise in influence of the laboratory sciences of biology and chemistry, and the development of clinical specialization. Ludmerer (1999) offers a concise description of the structure and content:

“The medical curriculum in the United States was arranged logically—that is, the course work was constructed so that each subject was based on courses that preceded and prepared for those that followed. The first two years contained the preclinical disciplines in a rationally arranged order: anatomy, biochemistry, physiology, pathology, bacteriology, pharmacology, pathophysiology, and an introduction to history-taking and physical examination. The last two years provided instruction in the various clinical subjects. Most of the time was devoted to the "major" fields of surgery, internal medicine, obstetrics and gynecology, pediatrics, and psychiatry. Lesser amounts of time were spent in specialized areas like urology, neurology, ophthalmology, anesthesiology, and orthopedics. The course of study was designed to familiarize students with the structure, function, and behavior of the human organism in health and disease, to acquaint them with the causes, physiological disturbances, and natural history of the various diseases, to introduce principles of therapeutics and surgery, and to present the environmental and social influences that affect health, illness, and recovery. Instruction emphasized active learning through laboratories, clerkships, and small-group discussions so that students might learn how to acquire information and solve problems.” (Ludmerer 1999)

Frenk et al. (2010) describe two major reforms of medical education throughout the 20th Century. The first was the move to a science-based curriculum exemplified by the developments in the USA above. The second was the introduction, around mid-century, of problem-based learning innovations, exemplified by the McMaster University approach to student-centered learning and developed further in the Netherlands at Maastricht University (Neville 2009). These were coupled with efforts to bolster integrative rather than discipline-based curricula. However, as is apparent from reviews of Dutch medical education (QANU 2012), local curricula vary in their emphasis on successive stage learning vs. early clinical and research

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training, and (successive) discipline-based vs. problem-based/integrative approaches. Nevertheless, the three basic mainstays of training persist: science, research, and clinical experience (both taught by experts and practiced by students). Local variations of emphasis lead to varying contributions of these factors throughout training. According to Bloom (1988), medical specialists are trained to perform a science-based, technically complex form of medicine. From a philosophy of science perspective, Cooke et al. (2006) note that the primary basis for medical knowledge and reasoning, from the Flexner Report onwards, has been “theoretical, scientific knowledge formulated in context-free and value-neutral terms”. This was not, however, what Flexner himself had intended. 15 years after his report, he wrote that the scientific perspective on medicine was marginalizing the social and humanistic aspects: “Scientific medicine in America — young, vigorous and positivistic — is today sadly deficient in cultural and philosophic background” (quoted in Cooke et al. 2006). According to Cooke et al., the authors of the 2010 Carnegie Foundation report, the same holds true today.

How do epistemological beliefs relate to practice throughout training? There is some empirical work in this area, primarily from sociology of medicine (cf. Brosnan & Turner 2009). A well-known concept from the sociology of medicine describing the more cultural, institutional and tacit forms of knowledge transmission in relation to medical education is the ‘hidden curriculum’, which refers to a range of opinions, values and attitudes that students learn not from the formal content of the education program (explicit knowledge), but from the experience of being in school, university, or apprenticeship practice (Hafferty and Franks 1994). The hidden curriculum can be transmitted through human behaviors such as role modeling or peer relationships (Gaufberg et al. 2010, Hundert, Hafferty, and Christakis 1996), but also through the learning environment, i.e. the educational and social milieu of medical school, which encompasses both profession-wide elements as local features, which may vary considerably (Rabow 2014). The structures and practices of institutions encompass both tacit and embedded knowledge.

Hafferty and Castellani (2009) reviewed over two decades of studies of the hidden curriculum, noting that the theory initially failed to gain traction with medical educators in the 80’s, but attained ‘cult-like status’ a decade later due to the ‘crisis of professionalism’ in which the public at large no longer saw medicine as primarily committed to public service. Public discontent over the rise of corporate medicine and the medical marketplace, and the prioritization of research over teaching in academic centers (again in part financially motivated) alerted educators to the possible negative impact of sociopolitical and socioeconomic factors on medical
training. The concept of the hidden curriculum however then became a conceptual vehicle for such negative factors, construed as hindering the formal curriculum from doing its advantageous work. This approach is apparent in the recent ‘professionalism movement’ (Cohen 2007) in medicine, aimed at regaining public trust through rediscovery and recommitment to professional values. The authors criticize this understanding, pointing out the oversimplifications at work in dichotomizing the internal and external, the formal and informal, and the explicit and tacit aspects of curricula and medical institutions and in too eagerly assigning negative outcomes to one or the other aspect. In other words, complex social processes such as medical education should not be reduced to a dichotomy between a pristine and internal formal curriculum and a pernicious, external, hidden one. Formalizing ‘recommitment’ while ignoring the internal, and possibly positive, workings of hidden curricula, risks missing essential contributions to professional development.

Medical training influences physician identity development in ways that affect physician-patient encounters (Silverman, Kurtz, and Draper, 1998). The focus on medical knowledge "creates a professional exclusivity that places others in a dependency relationship to the skills and knowledge of doctors and thus, alienates patients from physicians" (Shapiro, 1987, p. 80). Research conducted on the scientific attitudes of medical students and residents indicates that the dominant philosophy of science held is that of natural, biomedical science (Beagan 2000, Bloom 1988, Hafferty 2000, Cooke et al. 2006). Both through ostensive influences (explicit & codified knowledge) such as an emphasis on training in the basic sciences and through less conspicuous ones (cultural, tacit) such as modeling, institutional policies, evaluation activities, resource-allocation decisions, and institutional "slang", students acquire the ‘received view’ of science, tending towards realism and naturalism in their view of disease and medical science (Broadhead 1983., Woloschuk, Harasym and Temple 2004).

In further studies applying the hidden curriculum concept, Hafferty and Franks (1994) and Weston and Brown (1995) have found that medical education actually erodes physicians’ ability to develop social relationships with patients effectively. Mishler (1984) argued that the “voice of medicine” taught in medical school and residency clashes with “voice of the lifeworld” experienced by patients, with possible negative effects on doctor-patient communication and patient compliance. Beagan (2000) contended that medical training produces “socially neutral” doctors who might ignore social differences that exist between them and their patients in ways that hinder relational effectiveness. When medical students are confronted with suffering and disease they may survive by being emotionally
distant, or dehumanising patients (Kelly and Varghese 1997). This is fueled by the culture of medical training which promotes excessive devotion to work (Gabbard 1985) despite the adverse personal consequences (Coombs & Fawzy 1986). By the end of residency, many doctors adopt a biomedical perspective, distancing themselves from patients and the human side of medicine (Bonsteel 1997, Michelec 2012). A preference for action over reflection or observation and little tolerance for uncertainty (Benbassat 2013) may prejudice against the seemingly less certain foundations of the human sciences. The results from the fields of personal epistemology and sociology of medicine, therefore, are in agreement with respect to the epistemological development of medical students.

So far, we have seen that epistemic beliefs vary between persons depending on their nonacademic ‘epistemic development’, the relative sophistication of their beliefs and through (academic) domain-specific influences. Though the stage model indicates medical students will progress to more sophisticated epistemic beliefs, there is also extensive evidence for institutional influences in medical training expressing the (domain-specific) epistemology of well-structured, applied, hard science, with possibly adverse consequences for skills requiring knowledge based in the social sciences and humanities. The literature on socialization and the hidden curriculum offers us insights into the ways in which such beliefs are transmitted and learned.

Residency Training in Psychiatry
At the time of writing no studies were found specifically aimed at philosophical beliefs and attitudes of students and residents of psychiatry, nor of their developing views on science and knowledge. The further literature in this area is divided between studies on clinical reasoning, summarized in chapter 2, and literature on the general development of students and residents of psychiatry. Because these latter studies do partially relate to science and knowledge, we shall review them here.

Wear and Skillicorn (2009) examined curriculum phenomena in psychiatry as they were observed and experienced by attending physicians with teaching responsibilities, residents taught by those physicians and with teaching responsibilities for medical students, and medical students taught by attendings and residents during their psychiatry rotation. They divided their analysis between the formal curriculum (the actual course of study) and the informal curriculum

\[12\text{ In the United States and Canada, an attending physician is a physician who has completed residency and practices medicine in a clinic or hospital, in the specialty learned during residency. An attending physician typically supervises fellows, residents, medical students, and mid-level practitioners.}\]
(unplanned, idiosyncratic and opportunistic teaching in clinical settings), and focused on the value orientation of the department under study. They noted that within the formal curriculum high value was placed on building personal relationships. In the informal curriculum they noted the importance of professional role models, time constraints with regard to teaching opportunities and with regard to the time afforded to patient contacts, and lastly, the tension between 'textbook learning' and 'intuition/experience.' Role modeling was by far the most comprehensive source and explanation of the hidden informal curriculum. They noted that both students and residents emphasized differences between idealized textbook prescriptions and the actual performances of their supervisors, whereby the latter was seen as more “realistic”: the informal curriculum was “actually emphasizing what's important . . . what you actually need to do to assess the situation” and the formal curriculum suggesting “how we’d treat a patient if we had all the time in the world”.

A resident put it thus: “It’s just the real world. And the explicit curriculum is lip-service to some social ideal that we aspire to, and we should aspire to. . . . Life has a lot of leeway in making decisions, and [the formal curriculum] is just a statement of purpose, a focus. But it’s not realistic to make every decision through it.” (from Wear and Skillikorn 2009)

The dominant influence of role models in the informal curriculum led Wear and Skillikorn to conclude that the ‘hidden’ epithet is a misnomer: the residents’ and attendings’ attitudes, values and behaviors were plain to see, and anything but hidden. This kind of knowledge is clearly embodied, but whether or not it is explicit or tacit is a matter of debate, to which we will return in Chapter 7.

A quote from one of the participating attendings hints at a distinction between codified knowledge and understanding:

“Rules are there and rules are often good, but they often miss the richness of experience if you don’t follow rules, which sometimes leads you to better understand the depths of how wounded patients are.” (from Wear and Skillikorn 2009)

This implies support for the necessity of both rule-driven, nomothetic knowledge, and meaningful, idiopathic, understanding, present at residency levels, and therefore a departure from the emphasis on the scientific realism of medical education.

In the Seventies, Light performed a sociological study on how graduate training in American psychiatry of the seventies shaped the thinking, practice, self-image and values of resident psychiatrists (Light 1982). Light developed a ‘Sociological
Calendar’ depicting various stages of this process of the ‘transformation of the Professional Self’, as he put it. Importantly, this study took place at a time when (and an academic location where) there was a strong theoretical and practical dominance of psychoanalytical theory. Therefore, the study reads mostly as an illuminating description of the processes involved in becoming a psychoanalytical psychotherapist, which at the time was still a cornerstone of the professional identity of psychiatrists. Central themes Light identified from his analysis were, amongst others, the navigation of doctor-patient relationships, relationships with non-medical staff, and responsibility. Much of the focus of this study was on the first year of residency, during which residents would pass through quite intense phases of adjusting from traditional medical settings to the psychiatric-psychoanalytical environment, applying techniques, experiencing failures in this application, becoming disappointed and thinking ‘nothing works’, before adjusting expectations of ‘cure’, and moving towards a sense that ‘it’s not what you know that counts, but who you are.’ (Light 1982, pp 115-116.) This description corresponds to the “beginning psychiatry training syndrome” described elsewhere characterized by ‘temporary neurotic symptoms and psychosomatic disturbances’ (Hales and Borus 1986, Merklin and Little 1967, Waring 1974). This consists of three phases: the prodromal phase of initial adjustments in attitudes towards patients, peers, and professionals, a reaction phase of anxiety, depression, and/or psychosomatic complaints, and a ‘resolution phase’, entailing a resident’s greater sense of mastery and the view that the strength of the ego is an essential and normal component of professional development. The descriptions demonstrate a view of knowledge as practical wisdom embedded in psychoanalytic theory, and emphasizes the importance of the acquisition of professional knowledge through practice-based activity.

Light’s Sociological Calendar was revisited by Fann, Hunt, and Schaad (2003). They found many residents’ experiences had remained unchanged since Light’s study, such as the fear of being judged by supervisors, or initial skepticism towards patients, whilst differences reflected changes in psychiatric practice and mental health systems, the number of therapeutic tools and techniques required to be mastered having increased since Light’s study, in part due to the waning dominance of psychoanalysis, opening the theoretical framework of psychiatry to multiple sources. These studies highlighted the personal and emotional struggles involved in (early) residency training, and draw our attention to the importance of interpersonal relationships throughout this process, both with supervisors and with other professionals. They underline the importance of the ’role model’ concept of development and the challenge to professionals-in-training to develop
their own professional identity whilst navigating ongoing relationships with patients and professionals.

Specifically addressing factors influencing choice of theoretical/therapeutic orientation (e.g. affinity towards either cognitive-behavioral versus psychodynamic theory), Buckman and Barker (2010) and Buckman (2006) describe two external (e.g. institutional, curricular) models: the client-fit model, where the therapist selects the approach most suited to the client and/or the problem at hand; the evidence-based model, where the selection is made based on scientifically validated approaches, and suggest a third, internal (related to the trainee as a person) model, where clinicians may be predisposed to certain theoretical views and treatments, based on personal characteristics and philosophies. They mention the influence of training experiences, particularly the orientation of the supervisor, beginning during training but still influential after qualification. They found differences in the degree and sources of such influences: for CBT, training and person factors both predicted choice for CBT, but trainees’ personality and worldview were more influential. In contrast, choice for psychodynamic therapy over other models was influenced more by training factors than personality or philosophical worldview. Preference for CBT was associated with a Mechanistic worldview, whereas preference for psychodynamic therapy was associated with an Organismic worldview. Rosin and Knudson (1986) found that those of psychodynamic orientation prefer relational modes of teaching (embodied/tacit knowledge), as opposed to the more intellectual mode (explicit knowledge) preferred by the behaviorally oriented. Such differences may modulate the process whereby training influences are acquired. The importance of clinical experience as a determinant of preference for orientation has been found to increase with experience, to some degree overriding personal factors in influencing change of initial orientation (e.g., Vasco & Dryden, 1994). Buckman and Barker (2010) note that clinicians tend to define their practice in terms of a particular therapeutic orientation, and that training is also organized around therapeutic schools rather than for example, around a ‘common factors’-approach. They describe three models present in the literature on the selection of therapeutic orientation. The first is the evidence-based practice model, i.e. selecting treatment based on what has been empirically demonstrated to be of most benefit for a particular problem. The second is the client fit model, where therapists select the model most suited to the client and his or her problems. The third is the developmental model described by Stoltenberg and Delworth (1987), comprising of three stages: firstly, as novices, focusing inflexibly on one approach, then moving

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13 Based on the Organicism-Mechanism Paradigm Inventory (OMPI, Germer et al., 1982)
to a stage in which more approaches are considered but there is doubt as to which approach is preferable, and finally to a stage in which one feels confident in identifying with one preferred orientation whilst applying others flexibly and pragmatically. To what degree therapists veer more towards adherence of one particular therapeutic orientation versus eclecticism or integrationism may differ from person to person, though Buckman and Barker note signs that eclecticism may be on the decline.

In summary, with respect to the question of how psychiatrists’ views of science are formed and develop throughout medical training, the empirical studies of medical and residential training demonstrate that knowledge is transmitted through formal and informal channels, via explicit and tacit learning. Medical training progressively emphasizes nomothetic knowledge, which has been shown to impact empathic skills adversely. When physicians enter residential training in psychiatry, the emphasis changes, but not towards the other ‘scientific culture’, rather towards multiple theoretical perspectives. This may require a significant advance in resident’s personal epistemological development. It is an interesting question to ask whether this epistemic switch may have contributed to the ‘beginning psychiatric training syndrome’ described.

Residents’ choice of theory is partially and differentially determined by their own personality and philosophical world views, and by their training experiences, in which there is evidence of a degree of alignment between the values and worldviews inherent in theory, and those of the resident. However, throughout training and carrying into residency training, practical experiences are highly influential, either through role modeling or in personal clinical experiences. The backdrop of the ‘hidden curriculum’ or the not-so-hidden institutional values and assumptions needs to be taken into account for a full picture. Finally, the stage model of PE continues throughout further professional development: psychiatrists develop through stages with respect to their attitude to theory choice: from dogmatism, to doubt, to pragmatic flexibility.

Continuing Professional Development
Peck et al. (2000) define continuing professional development (CPD) as “...the process by which health professionals keep updated to meet the needs of patients, the health service, and their own professional development. It includes the continuous acquisition of new knowledge, skills, and attitudes to enable competent practice”. Therefore, the philosophical views inherent to CPD are of interest. In their international comparison of CPD systems, Peck et al. found that most systems were based on an hours related credit system (one hour of educational activity = one credit), and that CPD educational activities tended to be divided into three
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categories: external activities such as courses, conferences and video presentations, internal activities such as case conferences, grand rounds, and journal clubs, and ‘enduring materials’ such as web-based courses including assessment. Internationally, where psychiatrists are subject to mandatory recertification, demonstrating ongoing commitment to CDP is a major component of the process. Peck et al. note that there has been a move internationally from continuing medical education (clinical updates) towards continuing professional development, encompassing a wider scope of skills besides the medical: personal, social, and managerial skills. This is evident in the Netherlands, where recertification occurs every five years. Psychiatrists are required to amass 200 credit points (1 point per hour) of CPD activities within this period. Accredited activities are categorized according to related competencies, and though there is no stringent guideline for practitioners to maintain full competency across the board, the personal portfolio structure does encourage this. The competency areas are derived from the CanMEDS model describing seven contributing to medical expertise (Frank, Snell & Sherbino 2015). CanMEDS describes professionalism as composed of three core competences: a physician must be able to (1) deliver highest quality care with integrity, honesty and compassion, (2) exhibit appropriate personal and interpersonal professional behaviors and (3) practice medicine ethically consistent with the obligations of a physician. Verkerk, de Bree and Mours (2007) criticize this conceptualization of professionalism for its emphasis on personal qualities and behavior, thereby underestimating the importance of the contextual dependence of professionalism. They propose an understanding of professionalism as reflective professionalism to encompass this feature. An examination of the content of CPD from a philosophical perspective would be valuable, but is beyond the scope of this study. There is limited research into the ways in which medical professionals assess and integrate CPD into their practice. Bromm, Thomm and Wolf (2015) examined reasoning in laypersons and medical students about knowledge claims put forward by medical experts. Results showed that explanation patterns were influenced by epistemological beliefs but also about the person of the expert and the institutional practice of science. Both groups reported significantly more strategies of evaluating and validating the source rather than assessing the claim’s veracity based on their own understanding. Hence, when facing scientific conflicts, source validation and deference to another’s expertise is rather the rule than the exception. Gabbay and le May (2004) explored the knowledge management of primary care physicians in an ethnographic study in two English general practices. They found that clinicians rarely accessed and used explicit guidelines but relied on tacit ‘mindlines’ which were collectively reinforced and internalized. This knowledge was informed partially by brief reading, but mainly by their own and colleagues’ experiences,
interactions with each other and with patients, opinion leaders, pharmaceutical representatives (*embodied knowledge*), and other sources of largely *tacit knowledge*. Such a study has not yet been undertaken in psychiatrists. The sparse literature on philosophy in CPD therefore again draws out attention to processes akin to the hidden curriculum, embedded in other professional and institutional structures.

*Psychotherapeutic Models, philosophical views, Personal Characteristics*

So far, we have focused on general personal epistemological development and development throughout professional training from medical, through residency, to CME. A different perspective on knowledge sources is provided by studies that have directly addressed philosophical preferences within therapeutic orientations, by studying therapists. Lyddon and Bradford (1995) and Schacht and Black (1985) found that a cognitive-behavioral orientation is associated with the epistemic styles of empiricism and rationalism. Psychodynamic therapists meanwhile scored significantly higher on the epistemic style of ‘Metaphorism’ (Arthur 1998, 2000; Schacht & Black 1985). Metaphorism involves beliefs based on symbolic processes, and the testing of those beliefs through their generalizability to other experiences, relying on analogical reasoning. A number of studies used the related OMPI mentioned previously (Germer et al. 1982). ‘Organicism’ refers to the view in which phenomena are understood as dynamic and developing as a whole (Lyddon 1989). The ‘Mechanistic’ perspective on the other hand is objectivist and sees the world as composed of discrete and interacting elements (atomism) best understood through a reductive analysis of these constituent elements and their antecedent and consequent relations (Lyddon & Adamson 1992; Lyddon & Bradford 1995). Cognitive-behaviorist therapists as a whole were more Mechanistic, and psychodynamic therapists more Organismic, though in Arthur’s study these differences only occurred in the ‘novice’ group and disappeared in the more experienced group (hinting towards developmental processes described in the personal epistemology literature). Psychotherapists with psychodynamic and experiential orientations were found to be significantly more open to experience and more Intuiting on the MIPS, than psychotherapists of cognitive, behavioral, and systemic orientations. Psychodynamic and experiential therapies have a preference for the unstructured and symbolic as opposed to more concrete and externally observable phenomena (Scrugg, Bor & Watts 1999).

The literature on knowledge acquisition and maintenance after specialization is consistent with the developmental literature, emphasizing the importance of practically and personally transmitted knowledge, the influence of personal factors
in theory choice, and the relevance of metatheoretical reflections on knowledge and practice itself for professional identity and expertise.

Reflecting on the findings from these research perspectives on knowledge acquisition and views of science in professional development, it is apparent that even with some conceptual variation attributable to research traditions, contributions from codified, personal, and cultural knowledge are identifiable. Though it is tempting to hypothesize on the effect of the transition from a learning environment (medical school) to the context of professional practice on epistemic views and practices, many questions at this time remain unanswered. Does the requirement to apply practice within clinical contexts promote the increased valuation and application of personal knowledge, as suggested by the “rules are rules but do not capture understanding” quote above? Does the relationship between organismic and materialistic world views and theory choice also suggest relationships between personal epistemology and theory choice? How strong and lasting are the effects of the hidden curriculum on PE development? What concepts of professional legitimacy and accountability are connected to the developmental stages and personal beliefs described? For psychiatry, the transition from the mode of reasoning associated with basic sciences to clinical reasoning, identified as a distinct and only partially compatible mode of reasoning by Patel and Kaufman (2001), may be even more challenging to negotiate given the lack of recognized underlying pathologies tied to the taxonomic system. In other words, where the codified knowledge base is limited, the contribution of personal and cultural sources of knowledge to expertise would logically be higher. This underscores the importance of a deeper understanding of the epistemological development of psychiatrists.

5.4 Science views in professional life: contextual, theoretical and social sources
In the second part of this review, we switch the focus from the individual towards structural sources of knowledge and influences on personal epistemology, philosophy of science, and theory choice. Fig 5.1 presents a rough scheme of contextual influences on the professional, presented as a systems hierarchy of spheres in which the professional acts, whilst there are interactions between all levels. For example, as we saw previously: medicine answers to society and as a profession is legitimized through science and expertise, therefore society’s views of science and its underlying views on the justification of knowledge must hold a degree of consistency with science practice. Therefore, even ‘high-level’ societal ideas on science can affect clinical practice and as such, are relevant for this
The degree to which socially and institutionally embedded philosophies influence individuals and individual practice, is difficult to ascertain. There are multiple translations and interactions from one domain to the next, differentiation between and within psychiatric theorizing, and a further translation from the general to the particular in various degrees of idiosyncratic practice. In Chapter 6 we will try to examine science views bottom-up, from the practice perspective. Here the focus is on empirical contributions focusing on the content of epistemologies and philosophies of science within these domains. Their relevance for practice should be viewed through the lens of the findings of Chapter 3. Where (parts of) theories are integrated into practical reasoning and the DEF, the related philosophical assumptions and entailments embedded in these theories will also be represented therein to some degree.

For the literature review, besides general textbooks on the subject (e.g. Fulford, Thornton and Graham 2006, Radden 2004, Cooper 2007, Fulford et al 2013, Gifford 2011) a PubMed search was done with the following terms: (((medical epistemology) AND model theoretical[MeSH Terms])) AND philosophy[MeSH Terms], yielding 598 results. Based on relevancy, 45 articles were selected. Further articles were selected through backward snowballing.

Fig 5.1. The psychiatrist (Psych) is embedded within social and professional spheres containing (either institutionalized or cognitively held) assumptions on and philosophical attitudes to science. In the sphere of the medical profession, evidence-based medicine is currently a dominant model. At the level of the individual
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Psychiatrist and the profession of psychiatry, there are multiple theoretical sources available (PT = psychiatric/psychological theory). As the dominant taxonomy, DSM is placed here, as it carries within epistemic assumptions and preferences. Each level relates to the other whilst retaining a degree of autonomy.

Psychiatric and psychological theory

According to Mahrer (2000), psychological, psychiatric and psychotherapeutic theories necessarily harbor implicit or explicit philosophical views, but these are mostly taken for granted, rarely explicated, and therefore remain essentially hidden from view and immune to scrutiny. Aiming to describe such views is complicated by a number of factors. Firstly, there are terminological and conceptual issues. There is no shared taxonomy of philosophical positions related to psychiatric theory and practice, and hence, authors are at liberty to make their own distinctions. For example, Erwin derives ‘contextualism’ from Pepper’s scheme of ‘world views’ (formism, mechanism, organicism and contextualism) and applies it to ‘new behaviorism’, specifying its application to epistemology and criteria for Truth. Meanwhile, in Lyddon (1989) ‘Organicism’ refers to the view in which phenomena are understood as dynamic and developing as a whole. In other examples, such epithets as ‘reductionist’, ‘positivist’ or ‘postmodern’ may be applied to whole theories without specification of whether one is referring to epistemology, ontology, both, or neither. Also, analogous to the findings regarding personal epistemology, there is terminological variation in speaking either of philosophical beliefs, positions, attitudes, and/or values, and whether such things belong to the theories or the persons espousing the theories. A further complication is the perspective of the author. Some analyses are intended as philosophical critiques, either of the practice itself (e.g. Popper’s account of psychoanalysis) or of a philosophical position, where the author uses the theory as a stalking horse (cf. Erwin’s criticism of postmodernist philosophy, 1997).

Secondly, on the practical side, there has been major theoretical and practical differentiation and development in psychotherapies, coupled with a gradual loosening of strict theoretical affiliations by practitioners, espousing more eclectic and pragmatic attitudes. This is also expressed in the literature, older works more embedded in the dominant ‘Psychoanalytical versus Biological’ framework. Finally, there is variation in the faithfulness with which more or less regimented psychotherapeutic models are applied in practice, whilst tailoring of the general approach to the individual is to varying degrees affected by local, contextual factors. How philosophies travel from the general to the particular has very rarely been studied.
This being said, it is possible to derive a picture, albeit in broad strokes, of positions related to philosophy of science in psychotherapies. Both Fishman (1999) and Bracken & Thomas (2005) describe the rise of psychiatry and psychology in the 19th Century as a Modernist enterprise, both disciplines supported by the natural science perspective, committed methodologically to empirical testing of theory, to (laboratory) experimentation and verification, and espousing scientific realism and a correspondence theory of truth. The combined forces of anthropocentrism and rational philosophy enabled by the Enlightenment paved the way for the emancipation of the mental and sciences devoted to its understanding. Prior to such possibilities of thinking, madness was viewed as an expression of purely physical or supernatural forces (in fact, our sense of ‘mental’ was simply unavailable conceptually and ontologically. Such historical circumscription will be explored further in Chapter 9). According to Eiroá-Orosa and Fernández-Gomez (2012), the modernist legitimacy of the idea of mental health and of psychotherapy entails a picture of a the professional as objective, unbiased, and value-free, entailing Cartesian subject-object and fact-value dichotomies. To this picture, Slife, Reber and Richardson (2005) add the Modernist valuing of individualism and instrumentalism.

In psychiatric theory, the ‘medical model’ has been traditionally viewed (and criticized) as dominant. Zachar and Kendler (2007) distinguish four versions of the medical model: the organic disease, altered function, biopsychosocial and harmful dysfunction models. The models share a commitment to essentialism (the belief that psychiatric disorders exist independently of our theoretical notions and the job of scientists is to discover their inherent nature), but differ on such issues as whether disorders are better studied through categories or continua, whether disorders ‘reside’ in the patient or are also constituted by external events, or whether deciding whether something is a disorder implies a value-laden judgment.

The portrayal of psychiatry as a battle between two or three dominant schools of thought (psychoanalysis, biological psychiatry, and the humanistic psychotherapies) was a feature of 20th-Century historical and philosophical reviews of psychiatric scientific development (cf. Kleinman 1988, Fancher 1995, Allan Hobson 2002, Shorter 1999) and itself an argument, according to Horgan (1996), for psychiatry’s pre-paradigmatic scientific state. The development of the scientific grounding of psychoanalysis and psychodynamic theory in part mirrors the development of philosophy of science itself, moving from an initial theoretical grounding in the natural sciences, to a sui generis position as a science in and of itself, followed by attempts to place practice and theory within a hermeneutic framework, in the social sciences, and a reinvestment in empirical grounding of (parts of) the theory and its efficacy (Lacewing 2013, cf. Mills 2012). Fishman
connects the rise in popularity of the humanistic psychotherapies to a broad rise in belief in the relativism, perspectivism and constructivism captured under the umbrella of postmodernism. According to Fishman, humanistic psychology drew from three major contemporary Western European philosophical sources: humanism, phenomenology, and existentialism. The philosophy of science was grounded in the human sciences, prioritizing individual meaning and experience over naturalist rational application of generalized law. The historical cross-fertilization of philosophical and psychiatric versions of phenomenology is treated in impressive detail in Spiegelberg (1972).

**The DSM taxonomy**
Sadler has provided a thorough philosophical analysis of the DSM (2005). Sadler employs the term ontological values to describe commitments to certain notions of human nature, space, time, causality and other dimensions of human experience and being. Acknowledging that each DSM is the product of a committee, and therefore that it finally represents a compromise between a large number of viewpoints, he characterizes a number of assumptions:

a) Empiricism: genuine knowledge is based on perceptual experience. Nosological decisions are increasingly based on research studies conforming to the standards of natural and social science.

b) Hyponarrativity: people’s stories and storytelling play but a very small role in the DSMs. This is connected to the choice for a categorical and descriptive route to classification. Hyponarrativity, in Sadler’s view, is more a negation – a redirection, marginalization – than an assumption. It pushes the unfolding, context-bound, dynamically interacting experience of the illness to one side.

c) Individualism: mental disorders are things that happen to individual people, not relationships or groups.

d) Naturalism: though DSM recognizes the role of multiple sciences in understanding mental disorder, it does assume a unity to disorders: some natural order is assumed (expressed in the chapter structure, for example), and the manual speaks of ‘artificial comorbidity’ (implying a ‘true’ fundamental disorder beneath.

e) Pragmatism: for the DSM, this consists of two strands. Firstly, one main aim of the DSM is to aid the clinician in helping patients. The value of ‘clinical utility’ is central to this aim. Secondly, in the construction of the manual, a great many (social, scientific, political) influences and forces are recognized and accommodated in various ways. Some pragmatic aims are clearly political (acceptance by the American Psychiatric Association) whilst others
professionally instrumental (constructing a manual which can be used by nurses, insurance carriers, general practitioners and other mental health professionals). Sadler notes here that there is a tension between such pragmatic activity and a commitment to empiricism (aiming at objective description of the world), which is unrecognized in the manual itself.

f) Traditionalism: the DSM aims for continuity with the historical diagnostic conventions in psychiatry. Development of the taxonomy should be gradual, not seismic, in aid of research and management utility. This contrasts with the option of a statistical, bottom-up, bootstrapping approach, and to the taxonomy’s purported empiricism as many (societal, professional) values are ushered into the taxonomy in the aid of conservatism (cf. Faust & Miner 1986, Frances 2013).

**Evidence Based Medicine (EBM)**

EBM has emerged as arguably the foremost epistemological foundation of medicine and psychiatry in recent decades (Gupta 2014). Interestingly, EBM is a departure from the positivism of the classic medical model. Its central value is epistemic, not ontological: it does not assume, explicitly or implicitly, any causal mechanism (though critics have pointed out that its methods do prioritize certain causal structures, ibid.) and does not necessarily aim to uncover the causal structure of the world. EBM is based on observation and probabilistic relations. Its central tenet is the well-known evidence hierarchy, prioritizing specific sources of knowledge, and rather than placing causal mechanisms at its center, the relationships central to EBM are statistical and probabilistic. EBM prioritizes inductive evidence acquired through empirical methodologies which can be viewed as having been validated by the scientific community. EBM necessarily includes assumptions of atomism, empiricism, and objectivism. Some authors (e.g. Tanenbaum 1999) argue that it prioritizes statistical knowledge over clinical experience and intuition, but this depends on how one understands the prescribed manners of relating the general (the research evidence) to the particular. A slight variation on this criticism is the idea that EBM reduces the relevant knowledge of medicine to codifiable knowledge, thus neglecting the importance and value of tacit knowledge/intuition. This again, is a contested view: the Working Group on EBM acknowledged that there are many aspects of clinical practice that cannot be adequately tested (Falkum 2008). Gupta argues that EBM retains strong positivist assumptions:

“Elements of positivism remain deeply influential in contemporary medicine and even more so in EBM. The notion that true knowledge must be verifiable or falsifiable using certain empirical methods is evident in what EBM includes as evidence and the allowable ways to obtain evidence. The more difficult it is to verify data, the more
these very data are marginalized or even dismissed altogether by EBM. For example, feelings that arise in the clinician during a clinical encounter may be diagnostically informative, offering information as to a patient’s state of mind, intentions, fears, and so on, yet these are difficult to verify, and such sources of knowledge do not appear on the evidence hierarchy for diagnostics. EBM texts do not explicitly state that these sources of data should be rejected, but because they devote no text to the details of such data, it stands to reason that they are perceived as less important than the results of certain types of research that receive hundreds of pages of discussion.” (From Gupta 2014.)

The debate on EBM has also been framed as a debate on the adequate balance between the Aristotelean concepts of *phronesis* and *techne* (Dunne 1993). A related value, perhaps more entailed than inherent, is instrumentalism and utilitarianism: EBM is prescriptive of practice and serves as a foundation for professional guidelines for treatment, on the assumption that this will offer patients the best health outcomes. This in turn leads to a degree of standardization of treatment. Again, differences of degree affect the evaluation thereof: standardization has proven potential in raising quality of care, but there is a risk of overly rigid practice. Also, meaningful and narrative elements within the clinical encounter risk being marginalized, and the subjective elements of knowledge generation may be obscured (Gupta 2014). The manner in which EBM has been applied has attracted criticism: for bias in trials, selective publication, and undue influence of commercial interests (Every-Palmer and Howick 2014). Furthermore, where EBM is used as a tool by government or third-party payers to restrict access to care to only empirically tested treatments, EBM is being extended beyond its intent (hence the well-known maxim: ‘absence of evidence does not equal evidence of absence’). Dominance of EBM also lends more weight to criticism of narrow definitions of ‘benefit’ from care: RCT require outcome measures, and generally symptomatic improvement related to a DSM diagnosis is selected. Again, however, this is not a requirement of the EBM method: a different heuristic could be used. However, the epistemic requirements of adapting to RCT methodology implies certain theoretical phenomena (cognitions, behavior) are more amenable to EBM methodology than others (experience, personal growth, societal integration). Wachtel and Messer (1997) state that the criteria often employed in EBM research are covertly value laden, reflecting definitions of therapeutic success more congenial to some approaches than others. Often left out or unable to fit within the research paradigm are criteria such as character change, genuineness, depth of feeling or a concern for the process by which change is achieved. The instrumentalism of EBM has another dimension, in suggesting technique (e.g. of psychotherapy) and therapist can be separated. EBM is now a central element of
the explicit curriculum of medical education and CPD, and as such, we may expect its epistemological assumptions to affect clinical practice. This, however, depends on degree of uptake in practice, an issue in which significant barriers are still present (Wallace, Nwosu and Clarke 2012).

The findings of this study seem to add to the problem. EBM and its actuarial type reasoning had a limited role in diagnosis. If diagnosis involves a significant degree of construction and pluralism as we found in this study, this weakens the legitimizing power of EBM, based as it is on identification of features corresponding to a taxonomic concept. Also, a significant weakness of EBM from the clinical perspective is its base in induction and statistical relationships, which have lower explanatory value than the causal and meaningful connections practitioners value in practice at the individual level. In summary, the disconnect between the outward, legitimizing 'science' face of psychiatry (DSM/EBM) and internal, professional practice (pluralist and theory-based) presents a significant tension and a problem for psychiatry's legitimacy.

*Philosophy of science and epistemology in society and medicine*

'Medicine' may relate to both practice and science. Khushf (2013) makes a distinction between pure and applied epistemology, the former relating to knowledge that can be propositionally encoded, as opposed to the latter, and quoting Mainetti (1992) in emphasizing the importance of nonpropositional knowledge in medical practice:

"Diagnosis is not knowledge for knowledge's sake. It is knowledge for the sake of action. Medicine exists in order to cure, to care, to intervene, or in limiting cases, to know when not to intervene. Medicine is not a contemplative science." (Mainetti 1992)

Though we can recognize empiricism, rationalism and instrumentalism in classic Greek medicine, 'modern' medicine is seen to be an Enlightenment product, almost tautologically of the Modern period, in which human reason replaced religious belief as a foundation for truth and natural, mechanistic explanations based on the scientific method replaced classic humoral theory and supernatural explanations. What we now see as the modern medical model was both cause and effect of the evolution of the Age of Reason. Discoveries like the circulatory movement of blood through the body were instrumental in the gradual shift towards a mechanistic and atomistic view of the physical realm. The original model for modern medicine was based on the model of organic disease, assuming the presence of a material, causal essence within the body. Where earliest forms were based on the lesion model,
functionalist models developed in the 19th century. Further technical developments expanded the levels at which functions could be determined (biochemical, molecular, genetic), however the underlying assumption is that mechanical or functional explanation will be able to fully account for disease. This ontological assumption is accompanied by a preference for objective, natural science methodology, and for empiricism. According to Hedges and Burchfield (2005), the materialism within this model tends towards eliminative materialism, based on physicalism: the view that the laws of physics are ultimately sufficient to provide a full explanation of the phenomena in nature. This may lead to a slip from epistemological materialism to ontological realism: only that which is material is real. An alternative is some form of interactional dualism between mind and body. On this dualist premise, the medical model\textsuperscript{14} has been criticized for a tendency towards material determinism (though this does not logically follow). Where dualism is retained, human experience tends to be seen in atomized terms: physical ‘objects’, such as brains or humans, are composed of individual, self-contained cells. Their interactions have causal effects. This form of essentialist determinism leads to individualism: the cause of disorder cannot be located in an interaction, but lies within the individual. A central goal of medical science was to establish causal, law-like relationships allowing for predictions, offering instrumental value. This aim tends towards generalization from particulars, prioritizing, in Windelband’s terms (1894), nomothetic over idiographic knowledge. Modern medicine has been characterized (cf. Bracken and Thomas 2005, Slade 2009) as tending towards individualism, reductionism, and technological solutions. The overarching collection of epistemic preferences connected to post-Enlightenment science is sometimes termed the ‘received’ or ‘traditional’ view of science. These concepts encompass a set of broadly related, naturalistic assumptions on science, best viewed from the family resemblance perspective. Table 5.1. lists a number of assumptions associated with this perspective (from Traweek 1996).

\textsuperscript{14} The term ‘medical model’ implies more coherence and agreement than may be the case (Zachar and Kendler 2007).
Table 5.1. Epistemic assumptions of the ‘received view’ of science (Traweek 1996).

- Scientific knowledge is amassed progressively and cumulatively.
- The scientific method identifies and controls all variables in an experiment.
- Scientific reasoning proceeds by deduction and induction: hypotheses are deduced from existing empirical data, and experimental data are tested against hypotheses inductively.
- Scientific research is made objective by eliminating all biases and the emotions of the researchers.
- Scientific research is neutral with respect to social, political, economic, ethical, and emotional concerns.
- Scientific research has an internal intellectual logic; though there is an external social/political/economic/cultural context for science, it can only affect which scientific ideas are funded or applied.
- Improvements in the quality of life and the duration of human life during the past two hundred years are due primarily to the application of scientific discoveries.
- Technology is applied science.
- Basic research and applied research are easily differentiated.
- There is a significant rate of ‘social return’ on scientific research.

Fulford, Thornton and Graham (2006) offer a closely related conceptual map of the elements of the traditional view of science, based on the stage model of the practice of science (table 5.2):

| Stage 1: Data collection (observation) | measurement, objectivity, accurate, observation, data. |
| Stage 2b: Theory building – identifying causes | testable means of understanding natural world, discovery, explanation, testability, causation, natural laws, reduction, fact, prediction. |
| Stage 3: Theory testing | experiment and measurement, agreed method, quantification, refutation, objectively valid, value-free variable, probability, hypothesis. |
| Stage 4: Advancement of knowledge | cumulative knowledge, orderly progress, increasing refinement, not mythology or metaphysics, certainty, truth, unity of science. |

Table 5.2. Conceptual map of the traditional science model. From Fulford, Thornton and Graham 2006.

Towards the end of the nineteenth century, support for this view of science blossomed into positivism (the theory that knowledge is based on natural phenomena, their properties and relations, and therefore, only information derived from sensory experience, and interpreted through logic and reason, is a valid form of knowledge). From there, logical positivism and logical empiricism developed and dominated early Twentieth Century philosophy of science,
emphasizing the empirical element and positing that a statement is meaningful only if it is either purely formal (essentially, mathematics and logic) or capable of empirical verification.

Whereas subsequent work in philosophy of science has provided alternative models for science, in medicine the received view remains an influential model often still serving a socially legitimizing role to medical professions (this will be expanded upon in Chapter 7). In psychiatry, Hempel’s logical positivism proved highly influential, even decisive, in paving the way for the DSM-III (Wallace 1994). According to Thagard (2005), contemporary Western medical researchers and practitioners seek to explain medical outcomes using mechanistic hypotheses about their causes—symptoms by hypotheses about diseases, diseases by hypotheses about antecedents, epidemics by hypotheses about changes in environmental or behavioral conditions. Only rarely, however, can a fully generalizable causal theory be provided in medicine, leading to a preference for describing partial mechanisms (the causal power of which to be determined in a given context) and operating in parallel. Parallel non-reducible mechanisms working in concert require a degree of pluralism to the background epistemology. De Vreese, Weber and van Bouwel (2010) therefore argue for a pluralist approach to explanation based on the goal-dependence of explanations: the best form and level of explanation depends on the kind of question one seeks to answer by the explanation, and in order to answer all questions in the best way possible, one needs more than one form and level of explanation. Though most authors agree on the past and current dominance in medicine of the received view of science, alternative and/or complementary perspectives are noted.

**Institutional, social, and cultural influences**

Some of the wider social influences on clinician's reasoning have been mentioned above, where they are developmentally relevant, e.g. in the ‘hidden curriculum’ and in implicit world views embedded in psychotherapy theories, for example. The institutional and social context that mental health care is delivered in also co-determines practice, whether through explicit professional norms, implicit assumptions, or the economic and physical organization of care. Famously, the antipsychiatry movement of the Fifties and Sixties also contained a sociological critique of the asylum as a ‘total institution’ socializing patients into the role of the good patient, ‘dull, harmless, and inconspicuous’ (Goffman 1961). A central argument of the antipsychiatry period was psychiatry's purported role as an enforcer of society’s desire to control and repress unwanted thoughts and behaviors. Though it may seem that the prime relationship of sociology and psychiatry has been a critical one, Bloom (2005) notes that in the Postwar period,
there was a fruitful supportive collaboration between sociology and psychiatry, coinciding with psychiatry’s social expansion in this period. The founding of the NIMH, and the interest in social determinants of mental disorder within the influential Group for Advancement of Psychiatry were both influential factors herein. According to Bloom, this collaboration has waned in recent decades, in part due to psychiatry’s reorientation to a narrower psychobiological perspective, in the process becoming more bureaucratic and technological. However, though ‘antipsychiatry’ has now been unrecognizably transformed as a concept and chiefly serves a purpose in straw man arguments (e.g. applied in ad hominem attacks towards critics of the DSM), Foucauldian analysis of power and psychiatry has never lost its relevance (Kraan 2006). Critical evaluation of the mutual shaping of psychiatry and society is still evident in the literature, and recently has been energized by contributions from the Recovery perspective (Rudnick 2012, Slade 2009). Reflecting changes in the organization of mental health care, recent critical publications have focused on the effects of changes in funding and rationalizing organizational strategies such as managed care (cf. Donald 2001), the distorting effects of commercial interests (Healy 2013) or their role in the actual construction of disorder concepts (Greenberg 2010, Healy 2008). These analyses specifically draw attention to the work done by psychiatric conceptualizations, such as the descriptive, categorical nature of the DSM, in facilitating social processes, such as rationalization. However, wider concerns are also noted, including the risk of psychiatric concepts facilitating ‘false epidemics’ (Frances 2013), reconfiguration of the self as a product (Timimi 2008), or confirming the political status quo (Moncrieff 2008). Within philosophy of psychiatry, critical social perspectives on psychiatric thought and concepts have been a solid feature of its recent growth in scope (Bracken & Thomas 2005, Lewis 2006, Chung et al. 2007). Anthropology, ethnography and other forms of qualitative research have also proven to be valuable resources for examining interactions between social processes and psychiatric practice (e.g. Luhrmann 2001, Messinger 2011). This work alerts us to the fact that social developments have significant theoretical and conceptual influences on psychiatry. The more general impact of historical and social developments on the way psychiatry as a profession legitimizes itself will be the subject of Chapter 7.

Attitudes towards science in society
One of the central requirements for the social recognition of a profession is the possession of expert, privileged knowledge. Science is a mainstay of the medical profession and by extension, of psychiatry. Science itself, however, does not reside in an abstract vacuum but is embedded in social institutions like schools, universities, and government departments (Ede & Cormack 2012). In the
relationship between society and science a tension has long been recognized between the pursuit of science for the furthering of our intellectual understanding of the world (science for science's sake) and for the utility of its products. Inevitably therefore, society's views of science and what comprises legitimate knowledge, will affect science-as-practice. At societal level, the research area known sequentially as 'scientific literacy', 'public understanding of science' (PUS) and 'Science-in-Society' is relevant. This area is concerned with determinants of general trust in science, examining the relationship between knowledgeability on and attitude towards science, and reciprocally, examining scientists' attitudes and prejudices towards the public (Bauer, Allum and Miller 2007). PUS encompassed rationalist and realist views of public attitudes: according to the former view, attitudes are formed through rational judgment. If the public are provided with better quality information on science, their attitudes should improve. For the realist-empiricist, attitudes are emotional relationships with the world, and positive attitudes are met with the logic of advertising: a question of winning hearts rather than minds. Bauer (2009) notes the influential 1985 report of the Royal Society of London indicating insufficient support for science. The assumption that better science would lead to more positive attitudes fueled a research focus on the latter. But this expectation was not confirmed: though there may be some overall relation, on controversial issues there was no correlation at all. Both well-informed and less well-informed citizens were to be found on either side of scientific controversies (ibid.). One study found an inverse U-shape relationship between knowledge and attitudes. As societal knowledge increases, somewhere on this axial transition an inversion occurs: below a certain level increasing knowledge drives positive attitudes towards science, whilst above it knowledge encourages skeptical attitudes. Educated citizens are less impressed by views of science which amount to a modern 'myth of science'. The more knowledgeable people are, the less they are inclined to ideological views of science: they assume a more utilitarian assessment (ibid.).

Sinatra, Kienhues and Hofer (2014) describe three influential areas of psychology and education research relating to public thinking and reasoning about science: epistemic cognition, motivated reasoning, and conceptual change. Epistemic cognition includes the epistemic beliefs individuals hold: their conceptions of the nature of knowledge and knowing (this area is closely related to that of personal epistemology, the latter being more development-oriented). The authors describe four dimensions of epistemic cognition that have been identified across several models: certainty, structure, and source of knowledge, and justification of knowing. Beliefs are characterized as more or less scientifically sophisticated along these dimensions. Whereas a less advanced view includes beliefs such as that knowledge
is certain and stable, either true or false, and can be handed down by an authority, a more advanced view is characterized by beliefs that knowledge is complex and relativistic, by accepting the uncertainty and mutability of truth, and acknowledging that knowledge is construed individually (Kienhues and Bromme 2012). However, here too beliefs are context and topic-dependent. Chinn, Buckland & Samarakapungavan (2011) noted different components to epistemic cognition (e.g. epistemic aims, values, virtues and vices), arguing that a particular and unique set of epistemic beliefs and cognitions is likely to be evoked in a particular setting. Epistemic cognition is also influenced by content knowledge of a discipline and its research methods. Motivated reasoning refers to unconscious biases in information processing (Kunda 1990). Epistemic motives (such as individuals’ capacity for tolerating ambiguity and uncertainty versus the desire for definitive answers), cognitive biases, vested interests and social identity all influence how science-related information is processed. Finally, conceptual change research is based on the fact that people assess scientific information relative to their pre-existing ideas on the subjects involved, and focuses on the cognitive, affective, and motivational factors involved in knowledge restructuring, such as goals, epistemic motivations, epistemic beliefs, personality dispositions, interest, self-efficacy, and emotions. The research underlines the criticism of the ‘deficit’ model of PUS: relationships between knowledge and scientific literacy are complex, and people’s attitudes, values, and beliefs about the nature of science, the nature of knowledge, and the topic itself all figure in the public’s understanding of science.

Empirical research on the content of public epistemic beliefs specifically related to medicine and psychiatry is limited. Kienhues and Bromme (2012) developed an instrument (‘epistemic beliefs about medicine’ or EBAM) to measure laypersons’ epistemic beliefs. This covered certainty of medical knowledge, credibility of medical textbooks and internet sources, preliminarity of knowledge, and justification of medical knowledge. Barnes et al. (2013) developed a similar scale, the ‘discipline-based epistemological beliefs scale-lay medical knowledge’ (DEBS-LMK). Given the complexity of domain-specific and contextual influences on epistemic beliefs, further empirical study is required in specific areas of medicine such as psychiatry, and general statements cannot be validly made.

5.5. Summary: professional between science and society?
If the work in personal epistemology and sociology of medicine is connected to the research on personal factors in theory selection, a broad picture arises of a dynamic interplay between developmental and structural influences: personal characteristics and attitudes, training and professional experiences, developing within institutional and societal contexts, which themselves can be characterized
Chapter 5

at various organizational levels. Epistemologies may be explicit and traceable within learning materials of medical and psychiatric training facilities, but are also expressed in less ostensive institutional cultures, and are demonstrated and transmitted in practical training activities, which may contain significant tacit elements.

Specifically for psychiatry, several forces seem to be pitted against each other. The ‘stage-development’ model of PE proceeds towards ‘commitment within pluralism’, whilst within medical training, there is, conversely, a narrowing down of the epistemic outlook towards a positivist/empirical natural science view. Personal traits, epistemic styles, interactions and professional experience modulate this development, whilst there is a diversity to the content of the ‘hidden curriculum’ and the local socializing processes students, residents, and psychiatrists are exposed to. Finally, the transition to psychiatry provides an ‘epistemic jolt’ where the new resident is confronted with a domain in which the singular medical perspective appears as one of many.

Part two of the review offered a brief overview of the kind of epistemic commitments that can be found embedded in the theoretical resources available to the clinician and the institutions, concrete and abstract, she works in. But also at higher levels of social organization, it is possible to trace epistemic commitments and values related to science; equally, interactions between levels are open to empirical (historical and sociological) examination. For example, psychiatry chose to react to the existential challenges of antipsychiatry by bolstering its natural science credentials, turning to its roots in the search for pathophysiology. But other epistemic options remained open, such as the actuarial, inductive approach EBM is grounded in. Psychiatry’s legitimacy thereby remains firmly rooted in the empirical, naturalist perspective in medicine, according with the findings of the way medical students’ epistemic views develop. Related epistemic values also are present in the dominant classification scheme, DSM. With respect to psychiatry’s interface with society, it is noteworthy that epistemic valuing of discrete, quantifiable entities and actuarial methods align with socio-economic pressures towards rationalization in health care, expressed through their embeddedness in clinical and academic institutions. Therefore, it seems as if there may be little room for what Marcum (2008) has described as the ‘humanistic model’, or Mishler’s ‘voice of the life-world’ (1984). However, we should recall Khushf’s distinction between pure and applied epistemology, and the forms development takes throughout training, in which practical experience, modeling, tacit learning play an important role. It remains to be determined how large or small the gaps are between individual pure and applied epistemologies.
The tensions between the 'societal face' of psychiatry and actual practice signaled in the results of this study on diagnosis return here: whilst the work on professional development points to an individual process gradually moving from a singular theoretical approach to ‘commitment within pluralism’ grounded in pragmatism, the social history of the profession itself frequently points to a ‘narrowing’ down of the scientific perspective, from two cultures at loggerheads along the traditional fault line of the Methodenstreit (mind versus matter), to a dominance of biopsychiatry with its accompanying domain-specific epistemic views. The studies on professional knowledge development, however, do not support dichotomous views of natural and human science, fact and value: the influences of personality, personal world views, institutional values through explicit and hidden curricula, the importance of role modeling and personal (clinical) experience, intuition and tacit knowledge all imply fundamental interactions between factual and normative matters throughout professional development, affecting theory choice, styles of practice, and personal professional norms. In other words, values reach deep into professional development. If we agree that the profession as a whole, in recent decades (as appears to be the consensus amongst historians) has strengthened its traditional ties to medicine and re-emphasized its natural science basis, this complicates matters for professionals: the publicly professed scientific identity of the professional has become an inherent part of the social contract, and creates public and political expectations of the professional. This in turn affects professional norms, leading to a tension at the level of practice: if the general professional norm emphasizes natural science, in the mode of the scientist-practitioner, the fundamental epistemology thereof is in conflict with that of a pluralist, pragmatic practice. To a degree this tension also applies to EBM: professed in public, in practice afforded a more limited role (so far). But if the scientist-practitioner model does not seem to adequately represent professional development as described above, and the model does not adequately cover the findings of Chapter 3, the question arises of how practitioners navigate this conflict and legitimize their claim to privileged professional knowledge and status. With this in mind we now turn to the results of the second part of our qualitative study, which focuses on the role of science in actual practice, connecting the role it plays in explanations and decision making to psychiatrists’ views on science, and their descriptions of professional development and current views and actions with regard to knowledge and learning. For a detailed explication of the methodology we refer to chapter 2, in the following Chapter the results will be presented and discussed in relation to the abovementioned literature.
5.6 Main points from Chapter 5:

- The discrepancy between the public professional allegiance to scientific realism/naturalism and the values-infused pragmatic and pluralist practice identified in this study creates a legitimacy problem for psychiatrists.
- Explanatory pragmatism conflicts epistemically with EBM.
- The ‘hidden curriculum’ is influential in the epistemic development of medical students and residents, including personally and practically transmitted knowledge (e.g. through role modeling).
- The dominant philosophy of science in (basic) medical training and theory is realist, empiricist, and naturalist.
- The research on personal epistemology points to a challenging epistemic transition in the move from general medicine to psychiatry.
- Residents’ choice of theory is partially and differentially determined by their own personality and philosophical world views, and by their training experiences, in which there is evidence of a degree of alignment between the values and worldviews inherent in theory, and those of the resident.
- There are widespread sources available on the epistemological and ontological assumptions embedded in medical and psychiatric theory, including nosology. Influential current epistemic values include empiricism, individualism, naturalism, technical rationality, and pragmatism.