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Thomas Brante
**Professions as Science-Based
Occupations**

Abstract: How professions should be defined and separated from other occupations has constituted an enduring theoretical and empirical problem in studies of the professions. In this article, the definitions of the so-called list approaches, involving enumerations of social attributes, are scrutinized. Weaknesses are highlighted and analysed. It is argued that an alternative approach to the issue of definition, commencing from the epistemic or cognitive dimensions of professions, may be more fruitful. One such possibility is presented by setting out from realist philosophy of science. The links between science and profession are explored by addressing, primarily, the relation between the concepts of mechanism and intervention. A new, 'invariant' definition is proposed. In conclusion, a few consequences for future empirical studies of the professions are outlined.

Keywords: profession; definition of profession; professional attributes; philosophy of science; mechanism; intervention

Research on the professions is based on a theoretical dilemma: how its object of study should be delineated and defined is far from obvious and thus it is far from clear which occupations should be called professions and which fall outside. In this article I will address this dilemma by critically scrutinizing the most common type of definition of professions and thereafter suggest an alternative definition. I start by presenting and discussing so-called attribute, trait, or list approaches to professions and then go beyond these, seeking to reach the core that studies of professions should commence from and rest upon.

The issue of how professions should be defined has haunted studies of professions for a long time. Why is it important? Firstly, if the study of the professions is or seeks to be a discipline of its own, its object of study must be 'constituted' as a specific object of knowledge. Professions must possess distinctive features of a kind making it meaningful to talk about them as a particular social stratum. If this is not the case, studies of the professions may as well become a part of ordinary work-life research, or the sociology of organizations. Therefore, clear differences must prevail between professions and other occupations. Secondly, a lack of definition will evidently have negative impact on research precision, and thirdly, the lack of a shared definition renders communication between scholars more difficult.

A good definition should comprise *genus proximum*, a broader category, and *differentia specifica*, signifying distinguishing properties. For instance, 'dog' may be genus proximum and differentia specifica the properties distinguishing 'poodle' from other dogs, simultaneously signifying what poodles have in common. In our case, most often genus proximum is 'occupation' (gainful employment) although

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there are other suggestions such as ‘practice’ or ‘authority.’ In our case, *differentia specifica* is what distinguishes professions from other occupations, simultaneously denoting what professions have in common, hence external difference and internal similarity. Further, consistency should prevail between lexical and operational definitions of the phenomenon in question; the definition should demonstrate validity and reliability, theoretically as well as empirically. For example, lexical definitions should be possible to operationalize so well that it can be decided which historical and contemporary occupations fall inside and outside the borderline of what a profession is. In addition, a definition should be ‘sustainable’, by which I mean enduring. Ideally, it should be invariant, that is, it should be valid for occupations of the 19th as well as the 21st century, and be valid regardless of nation. In other words it should be universal (independent of time and space), or context-independent, to use one more term. An overarching abstract definition based on invariant elements can be combined with definitions involving variant properties characteristic of various periods of time and conditions of emergence. Later in this article I will propose such a combination of definitions.

In the study of professions we find several attempts to formulate criteria for their ‘essence’, that is, to define the *differentia specifica* of professions. These attempts have been classified in various ways. One way is to distinguish the power approach (the Weber tradition), which has also been called the conflict approach or the cynical perspective, from the structural-functionalist approach (the Durkheim tradition), also called the consensus approach or the naive perspective. Typically, in the latter tradition a number of items characterizing professions are enumerated, which is why it is also called the list, trait, or attribute approach. Numerous lists have been suggested since the 1930s up until today. The attributes involve theoretical knowledge, long education, examinations, licensing, specific association, organization, various types of control, collegiality, ethics, work for the common good, autonomy, discretion, sometimes class position. It is this again dominating definition I will now discuss more closely. Let us begin with two examples.

In 1990, the following often quoted list was published by Burrage, Jarausch and Siegrist:

1. It is a full-time, liberal (non-manual) occupation;
2. It establishes a monopoly in the labour market for expert services;
3. It attains self-governance or autonomy, i.e. freedom from control by any outsiders, whether the state, clients, lay persons or others;
4. Training is specialized and yet also systematic and scholarly;
5. Examinations, diplomas and titles control entry to the occupation and also sanction the monopoly;
6. Member rewards, both material and symbolic, are tied not only to their occupational competence and workplace ethics but also to contemporaries’ belief that their expert services are ‘of special importance for society and the common weal’ (Burrage, Jarausch, & Siegrist, 1990 : 205).

Later, one of the authors has added a supplement:

7. Capabilities and skills that are justified scientifically or systematically;

8. Knowledge that is 'exclusive', 'profound', 'inaccessible' or 'not easily understood' by lay persons, and acquired in special institutions of advanced education;
9. Rules and attitudes regarding applications of this knowledge, from formal procedures to collegiality and a general orientation toward the common good, that are designed to promote trust more generally across civil society (Siegrist, 2002: 12155).

This suggestion is formulated by three Europeans. In the USA, in 2001, Elliott Freidson put forward a definition which is an ideal type or a specific professional logic with the following 'theoretical constants':

1. A body of knowledge and skill which is officially recognized as one based on abstract concepts and theories and requiring the exercise of considerable discretion;
2. An occupationally controlled division of labour;
3. An occupationally controlled labour market requiring credentials for entry and career mobility;
4. An occupationally controlled training programme which produces those credentials, schooling that is associated with 'higher learning', segregated from the ordinary labour market and provides opportunities for the development of new knowledge;
5. An ideology serving some transcendent value and asserting greater devotion to doing good work than to economic reward (Freidson, 2001: 180).

Problems and critical points of view

To repeat. If the concept of profession is to be an analytically fruitful and a scientifically useful instrument, it is necessary on the one hand that it really does discriminate between professional and non-professional occupational groups, and on the other (which in one sense is the same thing) that it explicates what is common to all occupations called professions.

In what ways, then, do the lists discriminate? How should these and other lists be understood and applied? For instance, is it required that all attributes must be present for calling an occupation a profession, or would it suffice with, for instance, half? Should they perhaps be understood as continua, similar to the screening lists in psychiatry, where one can score between 1 and 6 at every point, and if a sufficiently high score is obtained we are dealing with a profession? Do all attributes carry the same weight?

It would have been useful to have a manual, with explanations of which status the lists are intended to have as scientific instruments of categorization; how they are intended to be interpreted and applied. Unfortunately, in general instigators of the lists seem to be reluctant to provide such information.

To some extent the lists emphasize dissimilar things, and at the same time they present a number of items that are shared or similar. To my mind, by themselves none of the attributes are convincing as discrimination criteria. Let me just mention some simple pertinent examples; the reader can easily find more 'falsifying instances'.

Ethics: It is frequently claimed that professions are governed by a specific code of conduct ensuring occupational integrity, or else, as in Freidson (2001), that professionals are more devoted to doing good than to economic rewards; it is a part of their ‘third logic’.

The question is how this attribute is to be understood. In some formulations it could be read as meaning that the only thing required is that professional associations have an ethical code inscribed in their statutes. However, so have many ordinary labour unions. If the attribute implies that there is empirical evidence that professionals *de facto* act in manners morally separate from and superior to other occupational groups, the claim evidently becomes utterly dubious. It is hard to find studies demonstrating anything like that. On the contrary, several studies, and the media, indicate that misconduct, corruption and more are not uncommon among professional occupations and practitioners.¹

Rather, like many other occupational groups, professionals frequently find themselves in situations of *ethical ambivalence* (a concept borrowed from Robert Merton’s concept of social ambivalence, implying that contradictory norms and expectations characterize a role-set). For instance, the medical profession has ethical codes like the Hippocratic Oath and the Helsinki declaration, requiring that doctors always put the interests of the patients first. On the other hand, doctors treating more patients per time unit will get higher salaries, which may generate ethical uncertainty. Further, doctors are assumed to be loyal to the profit interests of their hospital or corporation, which may also stimulate ‘ethical’ ambivalence. Historically, professions cannot be seen as standing up to a higher morality or to a greater extent working for ‘the common good’ than other occupations. To mention just an extreme example: German physicians and other professions during the Nazi era, indicating that ethical principles vary with context. We can scarcely find clearly distinguishing features as regards moral behaviour and ethics.

Other attributes can be questioned in similar manners.

Organization: Professions are and have been organized in numerous different ways. It is not easy to find striking similarities in modes of organization between, for example, lawyers having their practice in the 19th-century English countryside and physicians employed at big modern Swedish hospitals. Neither is it the case that professional associations of Continental Europe are organized in ways that substantially differs from trade unions.

Control: During certain periods, professions have possessed great autonomy as regards internal division of labour, labour markets, socialization of the next generation, occupational discretion, and so on. But these types of control via autonomy are always time-limited and conditioned by relations to external powers. In recent decades, professions have been increasingly subjected to external controls, assessments, auditing, and governance, be it by the so-called New Public Management or by private corporations. The same applies to the attribute collegial organization and decision-making, a mode of governance that today is almost eroded at, for instance, higher institutes of learning in Sweden and elsewhere. Historically, most professions have periodically been completely dominated by other occupations and power-holders, which has given rise to theories of processes called ‘proletarianization’ of professionals.

¹ To mention just one pertinent media report, see Atul Gawande (2009), or http://www.newyorker.com/reporting/2009/06/01/090601fa_fact_gawande?currentPage=all

Culture: Professions are focused upon generalized cultural values separating them from other occupations, such as life and death (health), technology, safety, knowledge, and so forth. However, it is difficult to claim that many non-professional occupations do not have the same focus, such as other occupations in the field of medicine, or even car mechanics; the responsibility for life and death is similar.

It is relatively easy to find examples of occupations possessing most of the attributes suggested above but still do not count as professions, thus engendering boundary trouble. Artisans, e.g. electricians, is one example, party politicians another that satisfies most, if not all, attributes. Here is a more drastic example. In his book *The Professional Thief*, Edwin Sutherland (1937) demonstrates that organized crime, the mafia, achieves high values at most professional variables. They are self-reproducing, strive for occupational monopoly, are collegiate, use strong discretion, control their internal labour market and division of labour, control socialization of the next generation, issue credentials ('made guys', 'wise guys'), often see their occupation as a calling and uphold a strong code of ethics and honour (as Dylan expresses it: 'To live outside the law you must be honest'). The desire to work for the common good may be weaker, but, as noted, this is true for many professions and professionals.

If it is difficult to distinguish professions from other occupations by using the lists above, it is equally difficult to see how the lists delineate and define what is common to occupations counted as professions. There are big differences between, for example, physicians and engineers regarding organization, control, autonomy, norm systems and so on, which has given reason for calling engineering 'the failed profession' – a euphemism for the fact that engineers are comparatively unorganized and do not really fall into the category of professions, if defined in terms of the lists presented above. Confronting ambiguities of these kinds, several scholars have claimed that the boundary is fluid and that today, most reasonably qualified occupations are professionalized, or alternatively that a process of de-professionalization has occurred; there are no longer any professions. In both cases, the concept becomes meaningless and unusable for analyses of contemporary society. But let us not take that way out.

Several of the attributes suggested seem to be based on *generalized intuitions*, or to be cases of *abstracted empiricism*; they are not theoretically anchored. They seem to be applicable to particular occupations during particular periods, situations and contexts. Presumably, the attributes have appeared to be so obvious that they have been pronounced universal properties; that which is obvious for one epoch is generalized to invariant attributes. In general, I would suggest that social attributes of the listed kinds do not determine which occupations are professions, but the opposite: *The attributes of dominating truth regimes determine which attributes are regarded as the most salient for professions during a certain period of time.*

As early as 1964, Geoffrey Millerson questioned the attribute approach: 'Must a profession be organized? Must a professional pass an examination to show competence? Is a code of professional conduct always necessary to enforce integrity? Do professionals always operate a valuable public service?' Millerson's reply, which he supported theoretically and empirically as well as historically, is NO. He further claimed:

The designation of ‘profession’ is not a permanent monopoly of a few occupations; professional status is probably a dynamic quality; an occupation does not have to be organized to become a profession; presence, or absence, of a code of professional conduct does not signify professional, or non-professional status ... need for a code depends on the professional situation (Millerson, 1964: 6-9).

Andrew Abbott (2010) holds a similar view, arguing that attributes of the kind suggested above ‘don’t really matter’ (ibid: 175) in understanding the professions. The attribute or list approach, in which professions are defined by a number of “traits: schools, licenses, exams, ethics codes, etc ... was deemed beside the point by Freidson in 1970, was shown to be historically contingent by Larson in 1977, and was completely rejected by myself in 1988” (ibid: 178).

Another heavy opponent to the attribute or list approach is Pierre Bourdieu, arguing that such a definition of professions ‘is a folk concept which has been uncritically smuggled into scientific language’ (Bourdieu & Wacquant, 1992 :242). Bourdieu suggests that the concept of profession should be replaced with the concept of field.

Is it thus time to throw the notion of profession on the garbage dump of history? There is one attribute occurring in most list approaches that I have not yet discussed, viz. knowledge. In the list approaches we find this attribute in formulations such as: ‘Capabilities and skills that are justified scientifically or systematically.’ Education is also stressed, for example: ‘Training is specialized and yet also systematic and scholarly.’

Links to knowledge are expressed in quite imprecise and general terms, however, and knowledge is presented as one attribute amongst others. But there are important differences between this attribute (I would call it a property) and the others. Knowledge is the only attribute that is cognitive, the others are social. Could it be the case that it is here we find the key to what a profession is and thereby also the entrance to a more useful, universal definition? That ‘knowledge’ and the skills related to knowledge may even constitute the core from which the other (social) attributes can be derived and accounted for? To my mind, this chain of thought is worth pursuing together with attempts to specify the notion of ‘professional knowledge’. What *type* of knowledge generates the skills and practices we call professional?

The specificity of professional knowledge

An invariant definition of professions must be lifted out of contexts of empirical generalizations. Such a ‘purification’ can be accomplished by putting within parentheses all attributes that seem to be conjecture-dependent, not capable of consistently separating professions from other occupations, and thereafter focus upon what remains. I contend that it is at the epistemic dimension, the knowledge base, that the answer is to be found. Let us try this out.

1. Professions obtain their social status, autonomy, rewards, trust, and so on, due to their position and role as inter-mediators and appliers of the *highest knowledge* within specific social domains. There is no higher authority, no deeper source of knowledge and action to turn to. Put differently: professions constitute *asset points* to what is seen as the most profound (better,

more reliable, recognized) theoretical principles that can be transformed into practical use. Conversely: professionals *represent* higher theoretical principles.

2. This was true also for the pre-scientific era. Priests constituted the primary, sometimes only, asset point to the highest knowledge, that is, God's words and will. Shamans and others also built their status on being asset points to knowledge that was difficult to obtain, hidden, secret, or magical. After the scientific revolutions of the 17-th century and the subsequent Enlightenment age, these groups successively lost their knowledge monopoly and occupational privileges. Another type of knowledge slowly got foothold.
3. Currently, the highest modern knowledge is produced and distributed at the universities and is called scientific. Hence, contemporary professions are science-based occupations; their practice involves applied science.
4. Presumably, a delineation of professions of this kind appeared rather uncontroversial up to the 1960s, when universities were elite institutions involving a limited amount of classic educational programmes. In our times, higher institutions of learning are flooded by new educational programmes and combinations of subjects in attempts to create knowledge and skills that correspond to social or individual needs and interests, thereby seeking to chisel out niches on the labour market.
5. Point 4 confronts us with a choice. Either we accept that a few years of exposure to some university courses or programmes always leads to something we call professional knowledge, which will substantially thin out the concept of profession; it indeed becomes a social attribute, a social construction, amongst others. Alternatively, we attempt to delineate *a certain kind* of scientific knowledge as the basis for professional practice.
6. The latter alternative leads us to the domains of philosophy of science. In the following, I will try out such a possibility. This will be done by taking a detour. Starting by engrossing myself somewhat in a specific philosophy of science perspective, I will later re-emerge at the surface and suggest a new definition of professions.

Ontological models as links between science and profession

Now as we all know, there are several competing philosophies of science drawing demarcations between science and non-science in different ways, apparently implying that the problem of finding a criterion of professions is transferred to the problem of finding a criterion of science. I will not discuss or pretend to have resolved the 'eternal' issue of a sharp demarcation of science, however, but instead suggest an approach intended to provide a platform for understanding and defining professions – an approach that, needless to say, should be specified by empirical and theoretical research.

Reality comprises ontological levels of different depths. This insight or point of departure reoccurs in various shapes in French historical epistemology (Durkheim, Bachelard, Althusser, Foucault, Bourdieu), in critical realism and other realisms, but also, in another form, in Plato. How many levels there are can be discussed: here we rest content with two, one observable surface (the empirical level) and one level involving structures and mechanisms. These two levels are separate, and the

task of science is to explain the former with the help of the latter. As Marx said: If appearance and essence coincided, all science would be superfluous. One example: Material objects move in determinate ways; stones fall to the ground, humans move on earth, birds and aeroplanes fly. They move in determinate ways because of gravitation, that is, the mechanism of bodily attraction. Hence it is possible to understand the movements of things, and the order that prevails in the physical world, with the help of the underlying mechanism of gravitation/attraction. Movement (and immobility) are effects, or symptoms. This fact – structures and mechanisms explain surface phenomena – is also valid for chemistry, biology, medicine, and parts of the social sciences.

To obtain knowledge about surface phenomena, science must make an epistemological break with spontaneous thinking, with the ‘obvious’, by constructing an ‘object of knowledge’ seeking to depict the underlying level. The object is not something given but must be constituted into an independent, autonomous area of knowledge, a ‘natural object’ (Fournier 2000: 69) which is provided with a depth, that is, it comprises an empirical surface and underlying structures and causal mechanisms, in turn rendering scientific discourses possible, including measurement, verification and falsification (and also treatment, interventions, see below).

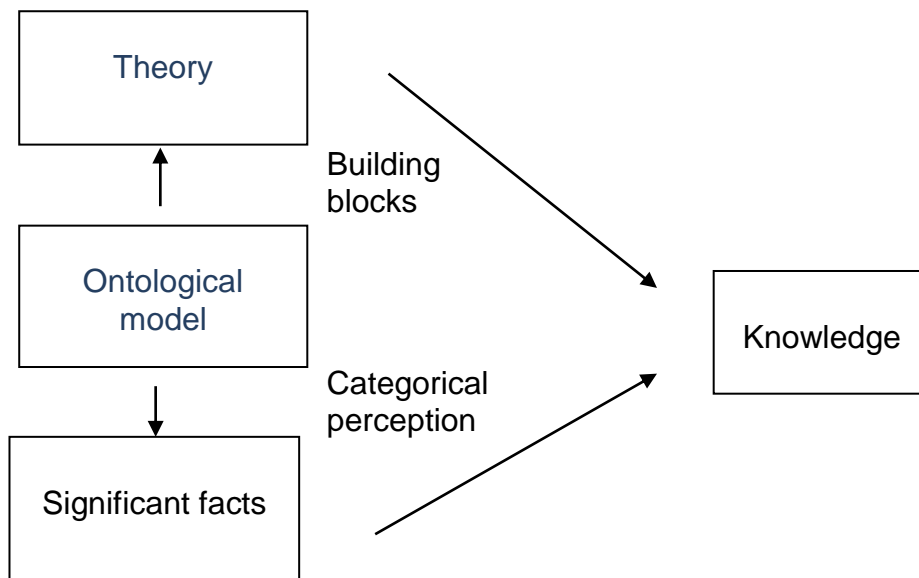
In order to make this object more concrete and useful I simplify somewhat by calling it an *ontological model*: ‘ontological’ because it purports to refer to the ultimate or bedrock elements of a research area, ‘model’ since it consists of a set of ordered elements and relations.²

Ontological models possess a *relative autonomy* in relation to theory and observation. Most often, research on models in the social sciences expresses the autonomy by separating ‘three distinct objects (theories, models, and the world), ordered with the theory at the most abstract end, the world at the opposite end, and the model at the interface between the two’ (Suárez, 1999: 171-2). Models are ‘independent of both theories and the world’ (Morgan & Morrison, 1999: 10ff).

Ontological models *represent* (or purport to represent) deeper aspects of reality, the ultimate components of research areas. Hence, our theories and observations, our knowledge, do not refer directly to reality but to ontological models. Models are employed to ‘represent aspects of the world’ (Giere, 2006: 63 f).

Ontological models govern *perceptions* of reality; observations are theory-dependent, but I would like to add *category-dependent*. Further, ontological models constitute the basis for *theory construction*; they bring about the basic building-blocks upon which theories (explanatory concepts, hypotheses, etc.) rest. Simultaneously, they also constitute *bridges* between theory and observation within a scientific tradition; models coordinate theory and data. The following figure summarizes these assertions:

² Epistemologically, the concept of ontological model corresponds to what may be called ‘epistemic domain’. There are a number of elements included in the domain, that is, they are epistemic factors, factors that may be employed to provide explanations. Just like the ontological model, the epistemic domain is transformed over time. To just mention one simple example: once upon a time, God was an epistemic factor possessing strong explanatory value. In contemporary science God is not included (neither are concepts like natural vacuum, phlogiston, ether, and so forth) in the ontological model and thus he is no longer an epistemic factor.



This structure, present in all empirical science, is set in motion by scientific research, that is, by matching theory with facts. To the extent it succeeds, at least partial knowledge of the intransitive dimension, or reality, is obtained.

But ontological models have more functions. Let me briefly summarize some of these.

One function is *classifying*; ontological models comprise basic categories that can be developed into finer sub-classifications. At the linguistic level, ontological models correspond to *schemes of categorization*. Examples are the periodic table in chemistry, Linnaeus’s classification of plants in biology; components are sorted and classified by the schemas. Corresponding typologies abound in the social sciences. We will come back to examples later.

A related function is to provide a platform for *specific modes of thinking*, what Ludvig Fleck called *Denkstil*, Mary Douglas used *thought style*, Thomas Kuhn *world* and *paradigm* in one of its senses, while Ian Hacking uses *style of reasoning*. Thus, what Kuhn called a paradigm shift or a scientific revolution is tantamount to a switch to another ontological model.

Another function recurring in many models is to identify a basic causal factor, a *mechanism*. A vital goal of many models is to ‘capture the mechanism proposed by a theory’ (Skvoretz, 1998: 240). Indeed, many models are purified descriptions of a structure (a set of ordered components) together with one (or more) central causal mechanisms – what in realism is sometimes expressed as an entity possessing ‘causal power’. One already mentioned example is gravity, where the mechanism is attraction between bodies, another Darwin’s theory of natural selection, where the mechanism is the struggle for survival, a third Marx’s theory of capitalism, where the mechanism is exploitation based on private ownership, a fourth the theory of rational choice where the mechanism is ‘rationality’, embedded in a structure also involving the components knowledge and preferences, see also below, a fifth Charles Tilly’s theory of the four mechanisms generating enduring, paired inequality. I define mechanism as *a cause that has causal relations as effects* (Brante, 2001). This function enables the epistemic operations verification and falsification.

Together, these functions provide the presuppositions for an epistemological break with everyday notions of reality, or with ‘spontaneous sociology’, as Bourdieu expresses it. Deploying ontological models, scientific research digs under the surface, explaining it in new, original ways.

There are of course numerous well-known examples of ontological models in the natural sciences. Lord Rutherford is famous for imagining atoms as ‘small billiard balls, preferably black or red’. Harvey conceived blood circulation as a hydraulic pump. They can also be seen as explications of the basics of a theory; indeed, Lord Kelvin insisted that the test of whether we understand a theory or problem in physics is ‘can you make a mechanical model of it?’ Presumably, the most familiar example is the geocentric and the heliocentric worldviews, based on two incommensurable ontological models. Are there corresponding models in the social sciences? For reasons of space I present only one example, pertaining to the issue of the ‘true nature’ of human beings.

For centuries, the social sciences have developed more or less sophisticated explanatory models of human action. During the first half of the twentieth century, humans were given an unconscious – the psychoanalytical model – and unconscious conflicts were seen as crucial causes of various kinds of (neurotic) behaviour. If we refine this ontological model to its most basic components we obtain: $a = f(i, e, se)$; actions are functions of relations between *id*, *ego*, and *superego*. During the 1970s, sociological accounts of individual action came to be predominant, involving factors such as socialization, internalization, role-taking, that were related to stratification and class. To choose one of a plethora of possible models; Parsons’ $a = f(r, v, n, s)$, that is, actions are functions of individuals situated in *roles* (as athlete, as parent); *values* associated with these roles (winning the tournament, raising your children to successful and happy citizens); *norms* stating how this is to come about (don’t take steroids, don’t physically abuse children); and also correcting positive and negative *sanctions* (rewards and punishments).

During the 1980s, economists’ models of individual action predominated. Individuals were understood as acting rationally on various ‘markets’ (including, for example, the marriage market), a theory that was rewarded the Nobel Memorial Prize in the Economic Sciences in 1992 (Gary Becker). The theory of rational choice can be formalized as $a = f(r, p, k)$, that is, actions are functions of: *rationality*, *preference* and *knowledge* governing choice and behaviour. Currently, the biological model of individual action is predominant: humans are seen as governed by their *genetic inheritance*, which at its simplest can be formalized as $a = f(g)$. These ontological models, indicating that the field is multi-paradigmatic and characterized by struggles over truth priorities, make entirely dissimilar types of observational evidence ‘significant’: introspection and dreams; cultural factors and social environments; rational and irrational choices; physiological properties. Each model is supported by its own paradigm and its own theories, and is matched with its own facts. The methods for collecting the data are of course highly different, often corresponding to incommensurable theories.

The dialectic between know-why and know-how, based on the shared platform of science and profession

Models of these kinds refer to relationships between basic ontological entities; in other words they depict one (or more) basic mechanisms generating a number of phenomena and causal connections at the empirical, observable level. They govern research and they govern professional practice, which is the point I want to emphasize: *scientific research and professional practice are governed by a shared basic model that breaks with everyday knowledge, with ‘common sense’.*

Theory as well as observation, abstract principles as well as practice, ‘know-why’ as well as ‘know-how’, are model-dependent. In several recent works, the philosopher of science Ronald Giere (2006) has discussed not the epistemological fundamentals of science but rather what actually occurs in modern science. Giere claims that scientific theory and observation do not refer to reality but to ‘representational models’ of reality. The relationship between model and reality is understood in terms of ‘reasonable fits’ or ‘similarities’.³ Giere summarizes scientific praxis in a simple formula:

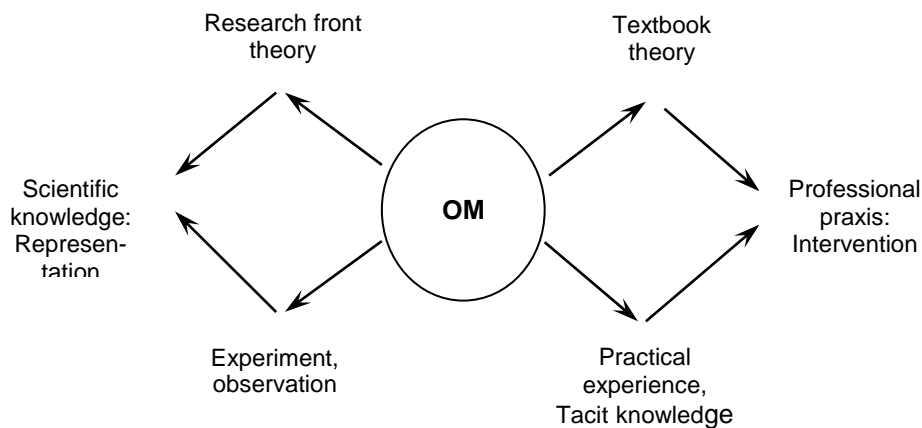
$$S \text{ uses } X \text{ to represent } W \text{ for purposes } P$$

S refers to a single scientist or a scientific discipline, X stands for model, W an aspect of reality and P for purpose. Correspondingly, we can write:

$$Pr \text{ uses } X \text{ to intervene into } W \text{ for purposes } P$$

Where Pr can be a single professional but also an entire profession, X is the same model used in the related science employed to represent reality, and P can stand for helping a patient or promoting the common good.

Hence, the link between scientific knowledge and professional practice, represented by an ontological model (OM), can be summarized in a simplified figure:



Of course, professional practitioners are more or less familiar with recent scientific theory and observation, with novel scientific knowledge. However, professional practice differs from the often idealized theories, observations and experiments

³ For a discussion of Giere’s thesis and how it can be applied in the social sciences (Giere illustrates only with examples from the natural sciences), see (Brante, 2010).

employed and conducted in science. In contrast to the closed world of the scientific laboratory, professional practice takes place in open systems where many more factors are influential. I contend that the meeting-ground between science and professional practice is based on a shared model that is developed, modified and sometimes rejected by input from both sides, that is, the scientific/theoretical and the professional/applied side.⁴ In addition, both sides employ dissimilar, but, when the profession is successful, compatible criteria. While scientific representations are assessed by falsification or degree of verification, professional interventions employ pragmatic or instrumental criteria, nowadays often evidence-based measures of efficiency.

In its most incisive form, the thesis of this article holds: Practitioners that do not have the left side of the figure with them cannot be defined as professionals, even though their interventions might work. Everyone from healers and quacks to astrologists are not professionals, according to this categorization.

Quickly returning to the ontological models of individual behaviour mentioned above and applying them to the issue of mental disorders and deviance: Psychoanalytic professional practice understands individual behaviour as causally governed by unconscious forces, implying that tensions can be reduced or eliminated by increased self-awareness, thus ‘talking therapies’ are preferred. Sociological models of individuals, stressing unequal socialization and status differences as crucial causal factors behind mental disorder, entail that individual behavioural problems are resolved by social reforms. Ordinarily one seeks to make changes in contexts, implying expensive (and hence not very popular in the eyes of the establishment) measures. Rational choice models imply that unwanted behaviour can be reduced by altering the basis of rational calculation, for instance by increasing penalties for criminal behaviour. Biological or genetic models, conceiving unwanted behaviour as effects of dysfunctional genes or chemical imbalances in the brain, propose medication and other individual treatments as the primary therapy. In all cases, science and profession meet in a shared image of subject matter, a shared view of basic causal mechanisms. Via a shared ontological model and its subcategories theory and evidence, diagnosis and treatment, become coherent.

Context, structure, and mechanism

Ontological models may comprise contexts, structures and mechanisms. Mechanisms are embedded in structures, and both mechanism and structure are situated in contexts. Context-dependence is sometimes trivial and implicit, sometimes crucial and decisive. The mechanism of gravity structures reality and is simultaneously operating in a world structured by itself, apparently independent of context. In contrast, the economic mechanisms of supply and demand function only

⁴ Hence the arrows in the figure above, signifying causal impact, should be supplemented by somewhat weaker arrows in the other direction. Scientific discoveries can form the basis for new professional practice, but the opposite also holds; in retrospect, technological innovations ‘from the floor’ are analysed, systematized and theorized by science. ‘Theorized’ implies that more abstract categories are developed and more general cause-effect relations are identified, frequently simplifying the meaning of interventions, which as a next step may imply that it is applied in other areas, i.e. science simplifies the emulation of applications. The history of the bacteriological paradigm is one example of numerous.

on certain types of open markets where free competition reigns (structure). The mechanisms of social work vary strongly with context, see further below. We can summarize this in a little formula, inspired by Pawson (2006):

Context + structure + mechanism → outcome

So the corresponding formula for the professions is:

Context + structure + intervention → outcome

Of course, contexts involve mechanisms of various kinds. So ‘context’ refers to a surrounding milieu of relevance for the structure and mechanism/intervention that is of interest for a certain outcome.

***Example: mechanisms and interventions
in the professions of medicine and pedagogics***

Models of the kinds described above involve mechanisms that, on the one hand, provide a basis for explanation, on the other indicate measures for intervention. Let us have a look at an example. In a comparative study of ‘know-how’ in the fields of medicine and education in the USA, the issue of science and efficient professional practice is explored (Sarewitz & Nelson, 2008). In the area of health, effective, science-based know-how has eradicated smallpox by the use of vaccination. This intervention works successfully always and everywhere; apparently, it is context-independent. The authors call it a ‘technological fix’. It is an example of a robust, enduring and recognized mechanism and intervention, engendering trust in a professional activity. In contrast, despite enormous resources and research, there has been little if any improvement in the area of literacy, the average reading levels, for a very long time in the USA. In brief, the cause suggested by the authors is the absence of a standardized core of professional know-how that can be enhanced by further research and replication.

However, to my mind this characterization of the educational sector is most likely mistaken. During the last century in the West, most children of each new generation have learnt how to read and write, and presently most children can do so, even in the USA. Ordinarily, the structure is a class-room involving a limited number of pupils and a competent teacher who, on the basis of knowledge of mechanisms, employs ‘interventions’ such as ABC books and systematic training.

So arguably, the structure, the mechanisms and the ‘technological fix’ for teaching children how to read and write are known. Most likely, external circumstances, that is, context, generate the failures by lacerating the structure, thereby rendering the proper functioning of the mechanism/intervention difficult. (Presumably, this is why semi-professions like teaching, social work and so forth include so much sociology and other social sciences in their educational programmes. They use another, more comprehensive, ontological model of human beings and another thought style, implying that change of context can be the primary remedy. If the context can be corrected, this means that the normal mechanisms of individuals can again operate in satisfactory manners. It should also be noted that in contemporary medicine, there is a plethora of complaints that are difficult to understand, such as chronic fatigue, fibromyalgia and electric hyper-sensitivity. In these cases the mechanisms seem to be unknown and physicians are

at a loss, primarily devoting themselves to recommending interventions in patients' contexts.)

Consequently, the distinction between context and mechanism can be employed to understand various types of interventions, for instance in the 'personal problems jurisdiction'. Professions such as psychiatry and social work often use dissimilar strategies and models. While the former administers mechanisms such as pharmaceutical drugs or talking therapies to transform the individual, social work uses another model, involving transformations of the individual's context so that his or her 'normal' mechanisms again can begin to function. Expressed differently, what constitutes a mechanism/intervention, 'technological fix', or 'magic bullet', in one model becomes context in the other, and vice versa.

We can now return to the formula for scientific and professional activity. Context plus structure plus mechanism/intervention generate outcome. If the mechanism (and structure) is context-dependent and there are variations in context, there will be variations in outcome, and vice versa. (However, in the latter case we then confront the paradox that if interventions and know-how can be standardized so much that the mechanism functions well always and everywhere, routinization and de-professionalization threaten to arise. Concerning vaccination, anyone can inject a vaccine after five minutes of instruction.)

Definition of professions and professional types

For lack of a better word, what may be called 'genuine' professions are occupations employing knowledge of the relations between contexts, underlying structures and robust mechanisms to explain/understand what occurs at the empirical surface and apply this knowledge to change context, structure and/or mechanism, which changes the surface or the symptoms: This suggests an apparently very simple basic definition of profession. Professions are:

Occupations conducting interventions derived from scientific knowledge of mechanisms, structures, and contexts.

It should perhaps be added that, of course, professions do not *only* employ science-based interventions in their practice. It is a necessary but not sufficient criterion.⁵

I have suggested an invariant or universal definition of profession. Since 'science' is a crucial component, obviously the universality is limited, slowly starting to be valid after the scientific revolutions of the 17th century, implying that professions did not exist before the 17th century. Another possibility is to distinguish modern professions from those of older or ancient origins, which are sometimes called status professions.

The next step would be to include social factors, which are always variant, or time- and space-dependent. To my mind, this should be undertaken by commencing from general social parameters and thereafter successively 'zooming in' to increasingly concrete and time-typical determinants, concepts and, subsequently,

⁵ To avoid misunderstanding I add that there is no evaluation involved here; the definition is purely analytical and stipulative. For instance, it is not implied that it is always necessarily better for clients or patients that a practice is professional in this sense.

attributes. Just to illustrate this way of procedure, here follows a brief sketch, but I want to stress that there are of course several alternative routes.

Once an invariant definition of the above kind has been established, at a lower level of abstraction distinctions can be inserted by separating between time-specific *professional types*. This concept constitutes a mediating link between a universal definition and single professions. Under the concept of professional type there are several professions with shared properties, distinguishing them from other professions. Professional types always emerge because of several causes. One crucial cause is shared contexts. Professions always occur in larger but specific social circumstances, implying that to function well they must be adapted to the demands, interests and characteristics of the social surroundings. In various ways, contexts cause professions to be regulated and undertake self-regulations regarding organization, moral imperatives, control devices, possibilities of autonomy, collegiality, and so on. Contextual factors conditioning the emergence of professional types may of course be of different kinds. For illustrative purposes I here mention only a few parameters at the macro-level.⁶

Adaptation to social formations. Social structures and accompanying ideologies emphasizing factors such as entrepreneurship and competition on open markets as the primary motor for business establishment and growth generate professional modes of organization and ideologies, including self-conceptions, drastically differing from ideologies emphasizing solidarity, unselfishness and publicly financed professions inserted in larger bureaucratic organizations. Hence we can distinguish between the professional types of industrial capitalism, welfare capitalism, and neo-liberal capitalism.

Professional fields, in Bourdieu's sense, constitute the immediate surroundings of a profession. Characteristic struggles within and between fields concern jurisdiction, 'the right to speak' and act with authority, generating stratification. Hence, it is feasible to make a distinction between dominating and subordinate professional types within fields and domains.

Power relations. Power resources are closely linked to the possibilities of professions to be more or less allied with strong economic and political interests, and to a greater or lesser extent be in possession of political, economic, ideological, cultural or symbolic power, or 'capital'. Socially and politically, professions are significant parts of contextually conditioned truth regimes. Thus a feasible explanatory categorization would be to distinguish between professional types that are connected to and gain support from powerful social interests, e.g. pharmaceutical companies, and those that are not.

There are of course several other suggestions for categorizations of professions into types. One example is the distinction between L- and T-professions (Hellberg, 1999; Larson, 1977), where L stands for living and T for thing, or between service professions and commercial professions (Hanlon, 1999), or between creative, carrier, and clinical professionals (Scott, 2008). Previously, setting out from employment conditions, I have elaborated a distinction between professions of state, politics, capital, 'free' (single private practitioners), and academic professional types. Which categorization is suitable is determined by on the one hand

⁶ Of course, the macro dimension should be supplemented with analyses of meso (e.g. modes of organization) and micro dimensions (e.g. the habitus and interactions of professionals). For all dimensions, professions should primarily be analysed by applications of established social and behavioural theories and methods.

research purpose, on the other hand which categorization has the best explanatory potential.

Another possibility, harmonizing with the definition of profession and the formula context-structure-mechanism above, is to analytically separate *types of professional knowledge*, for instance between primarily context-oriented (e.g. social workers, teachers, nurses), structure-oriented (e.g. law-makers and lawyers, previously theologians),⁷ and technologically and experimentally (e.g. physicians, engineers) oriented professional types.⁸

The next step would involve breaking down professional types into subtypes which can be further separated into more subtypes. At these levels it will be feasible to insert significant attributes for single professions; this is where the lists become relevant. The list and attribute approaches thus cannot be employed as definitions but as descriptions of the specific characteristics of a certain professional type, or subtype, during a certain historical period in a certain social formation; the attributes are dependent variables or effects, not definitions. To borrow a few words from another discipline: Genotype + environment = phenotype.

Conclusion

The social attributes presented by the list approaches provide us with dubious tools for separating professions from other occupations. At most, these versions of a *differentia specifica* capture surface phenomena reflecting broad but specific social and historical periods. Hence they should rather be seen as effects of the scientific base of professions plus external conditions, and can be employed to describe a specific professional type or subtype during a certain conjuncture. The attributes are inductively generated, and there are also political considerations; apparently, some occupations *should* be seen as professions even though they hardly fulfil the attributes, entailing that requirements are reinterpreted or stretched. The approach advocated here is deductive, implying that professions are defined by a theoretically anchored definition. In contrast to the inductive method, since it is not decided beforehand which occupations should be included in the professional tribe this approach may provide surprising results.

A profession obtains its status from a central base, that it is a truth regime. Because of its scientific base, a profession is the ultimate link to 'truth'; there is no higher authority. This and only this is what makes professions unique. Commencing from the fact that professions are carriers of certain types of scientifically anchored practice provides us with a more stable, invariant definition, a linchpin for the study of professions, which can be explored and specified as the next step. In the preceding, a possible entrance to such a new approach has been outlined.

⁷ The object for law-makers, lawyers, and theologians, is laws, regulations, and decrees, i.e. imperative, constraining and empowering structures governing social behaviour.

⁸ Distinction inspired by a conversation with my colleague Gunnar Olofsson, who suggests a separation between dogmatic, experimental and context-oriented, that is, mostly social-scientific, professions, see Olofsson, forthcoming.

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