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Social Sciences: Truthful or Useful?

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The theme of the 2006 IAP Conference, held at Alexandria, from 1–3 December 2006, was 'The Unity of Science'. Let me explain how I interpret this interesting motto. For me, this does not mean that there is one *regina scientiarum* that rules over the other fields of science and learning; a role that was allotted to theology in olden times, and that nowadays – in a more secular vein – is claimed by physics. In my view, the notion 'unity of science' rather refers to 'communality within diversity'. Disciplines vary in content, issues and methods. But there are also quite some common objectives, interests and concerns, the most important of which may be the common goal of searching for testable truth with objective and independent evidence. The communalities render it possible, or even imperative, to communicate and to cooperate. The diversity implies complementariness and calls for interdisciplinarity in the study of today's numerous and complex phenomena in science and society.

Introduction

Modern societies are facing striking and often disturbing changes and challenges. The internationalization of political strategies, the globalization of industry and trade, the increasing heterogeneity of national populations and the problematic effects this has on minorities and on social cohesion, are only some of them. Further, they have to cope with demographic changes, particularly with respect to the (future) age distribution. Not only will this have an effect on the country's economy, and on tax and insurance policies, there will also be an increasing demand for 'education permanente', for suitable employment for older workers, and for proper care for elderly people who will increasingly require (often advanced) medical services. Simultaneously, lifestyles will change with different modes and schedules of working being required along with an increasing need for leisure activities and travel. This list can be extended with many other developments in society and in the lives of individual citizens.

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Moreover, a modern society depends, more than ever, on the advancement of knowledge. Modern society has become a knowledge society. And this particularly concerns scientific knowledge. In the post-industrial knowledge society, it is especially *scientific* knowledge that has become a salient factor in economic production (see also Ref. 1). The European Commission too has adopted the view that knowledge is Europe's richest resource and that supporting it will be an important incentive for Europe's further cultural and economic development (as stated in the proposal for the 7th Framework Programme[2]). By promoting the European Research Area, this intensified production of knowledge and the development of high quality technology are recognized as crucial for a nation's, and the Union's, economic survival. But technological innovation is only successful in a society that is susceptible to such changes, or, to put it in another way, if the human and social factors are sufficiently identified and recognized. Therefore, it can be argued that insight into the processes of the acquisition and production of knowledge and the societal factors that further or impede the implementation of this knowledge for technological and industrial innovation is vital for the support of a knowledge-intensive society, and, therefore, that in this respect the social sciences are indispensable.

Let briefly define the content and to demarcate the domain of what I have cursorily referred to above as 'social sciences.'

Definition

One of the first attempts to differentiate systematically within the world of sciences was William Craxton's suggestion (15th century) to distinguish two kinds of learning: the study of divinity and the study of humanity, thus obviously trying to separate the supra-natural and the natural. Some hundred years later, Bacon made a further differentiation with his proposal to distinguish between natural and human philosophy, next to 'divine' philosophy.

Natural philosophy has developed into the multiplicity of disciplines that we now find under the heading 'natural sciences', or, more specifically, natural and life sciences. The latter distinction was strongly endorsed by Dawkins[3] who argued that since dead objects are, in his view, principally different from living objects, we need two kinds of sciences to study these objects: physics as the science of the dead, and biology as the science of living things.

With the waning of theology's predominance in the 19th century, 'divine' and 'human' philosophy later merged into what is called 'humanities' in the Anglo-Saxon tradition, 'letters' in some other cultures and, following Dilthey's proposal,[4] 'Geisteswissenschaften' in the German language area. This category encompasses a range of disciplines, including Classics, History and Archaeology, Linguistics, Arts and Literature, Philosophy and Theology.

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The natural sciences have developed a strong experimental/empirical, or *nomothetical*, methodology that distinguishes them from the humanities' more descriptive, understanding (Verstehen), hermeneutic, or *ideographic* approach. According to Snow,[5] these different orientations have even developed into two separate, in fact, opposed cultures: the alpha (humanities) and the beta (natural sciences) culture.

At the end of the 19th century, a third player, designated by the term 'gamma sciences', entered the arena. In addition to the study of nature and culture, the behaviour of human beings regarding their relation to their social environment now became the object of study. The nature and development of human cognitive and emotional functions, the interactions of individuals and with their social environment, the structure and dynamics of social systems (family, groups, communities and society at large), the functioning of social systems with regard to cultural, constitutional, economic and socio/political aspects, all became the object of scientific analysis in various emerging (main) disciplines: psychology, sociology, economics and political science. The further secession of sub-disciplines, such as demography, criminology, cultural anthropology, education studies, management studies and others, occurred over the course of the time.

Within this gamma-science domain (in our discourse indicated as 'social sciences'), three relatively separate main streams can be distinguished. First we have the *behavioural sciences*. They deal with intra- and inter-individual behaviour, focusing on the individual. Psychology, pedagogy, and the educational sciences belong to this category. Then there is the group of social sciences that concentrates on the informal and formal social relations between people and the societal institutions in which they are embedded: sociology, cultural anthropology, and political science. We call these *societal sciences*. Third, there is the group of sciences that deals with the production of wealth, the consumption of commodities and the management of states and the income and expenditure of private enterprises, the *economic sciences*. These include macro- and microeconomics, econometrics, operational research and management.

In what respect are we dealing here with a new and separate scientific domain, and can we speak of a 'third culture' as, for instance, Lepenies[6] does? What typifies the social sciences?

In the first place it is, of course, their content that typifies these sciences. As indicated, a variety of problems and issues are studied within the social science disciplines, but a common denominator is their focus on the functioning of human beings as social creatures. Social sciences study the nature of human beings and their behaviour, and the way people live together in an informal or institutionalized form. The human element is important here, and renders social sciences distinct from natural sciences and life sciences. The study of human beings and human social structures does not only deal with Dawkins' 'living

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things' of biology as opposed to the 'dead things' of physics, but with living things that have motives, intentions, norms and values, and whose social institutions have meanings, symbols, rules and rituals, all of which are not directly measurable, but have to be inferred from observables. Moreover, human beings and the development, changes and dynamics of their social structures are not only caused by external or internal determinable factors, but are also products of their own wilful influence, which is often illogical, inconsistent and unpredictable. Social sciences are, nevertheless, empirical sciences, studying observable phenomena with empirical methods, even if their insights are more probabilistic than deterministic. This is probably why the physicist Kresh once humorously stated that understanding atomic physics is child's play compared with understanding child's play.

Secondly – and related to the first point – social scientists use a diversity of methods, encompassing both nomothetic and ideographic approaches, for their research. Some disciplines, particularly the greater part of psychology (experimental psychology, testing and scaling, and cognition studies) and a significant part of sociology (empirical sociology), and economics (econometrics, and operations research) resemble 'natural sciences' as far as their use of mathematical techniques and, with respect to empirical issues, their rigorous 'Popperian' methodology are concerned. Other parts of social sciences lean towards the humanities in their descriptive, interpretative and sometimes even hermeneutic approach. Clinical psychology, cultural anthropology and social studies that explore cultural symbols, values and meanings, and dynamic social change processes are cases in point. Often, a combination of the two methodological approaches produces the richest insights.

Thirdly, the social sciences deal with a reality to which non-scientists too have access. Journalists, novelists, poets, radio and television producers, even gossiping neighbours speak and write about human motives, desires, needs, and about social and economic factors, structures, and developments, often using the same words and concepts as do social scientists. Non-scientists have common sense, experience and tacit knowledge that are not always easily distinguished from scientific social science knowledge. Consequently, it is sometimes difficult for social scientists clearly to demarcate scientific from pre-scientific knowledge, and to convince the general public that knowledge that is embedded in a sound theoretical framework and that is evidence based, does have an advantage over the layman's pre-scientific knowledge.

Fourthly, there is often a close relationship between social sciences and societal policy. Social science researchers generally maintain strong ties with politics, governments and/or industry. In many countries, we find that a Social Planning Bureau, or a similar institute, that offers national or local governments authoritative advice on social policies, is staffed with social scientists.

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The majority of psychologists go into practice in a clinical, developmental or industrial setting. Economists are favoured employees in industry, banks and other commercial institutes. In many reconnaissance studies and priority programmes in social sciences, we see an emphasis on applied, or, at best, strategic themes. In other words, social sciences are thought to have a close affiliation with practical utilization and policy making, and many of the research programmes in the social sciences show a strong inclination towards social relevance.

It is exactly this last aspect of social sciences that will be the subject of further discussion in what follows.

Social sciences as applied sciences?

As we have seen, social scientists find themselves, probably more than other scientists, in the field of tension between the requirement of finding the scientific truth and that of producing societal relevant insights, between truthfulness and usefulness. Let us take a closer look at this issue. The distinction between pure or basic science versus applied science has been a major topic of discussion among science philosophers ever since Francis Bacon, in his book *Novum Organon*,[7] asserted that science is only relevant if it aims at societal progress, practical application and human control over nature. Opponents maintain that science should be autonomous and should follow its own laws and standards with only one criterion: veracity. Concessions to practical applicability lead to the corruption, and, eventually, destruction of science. The difference between basic and applied social sciences has even been defended as rooted in a totally different epistemological tradition: the basic tradition, concerned with scrutinizing the essence of things, can be traced to the ontological tradition of Plato's ideas, whereas the applied tradition stems from everyday commonsense principles and rules as practised in the advisory tradition of Aristotle's politics.[8]

At present, science theorists take a different position. In the first place, the distinction between basic and applied research is much less clear-cut than has often been suggested. There is a great deal of overlap between the two spheres, and many emerging science and technology fields (for instance information and cognitive sciences, nanoscience and nanotechnology, and bioscience and biotechnology) contain substantial elements of both. It is increasingly difficult to identify parts of sciences that do not affect technology, or that are not themselves affected by technology. EuroScience President Connerade once stated that there are only two types of science: applied and not yet applied science.

In this light, we concur with a proposal by the European Commission's expert group on 'Maximising the wider benefits of competitive basic research funding at European level'. In its recent report *Frontier Research: The European Challenge*,[9]

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the group preferred the term 'frontier research' to the term 'basic research,' to reflect research that creates new knowledge and develops new understanding. The group further rejects the traditional distinction between 'basic' and 'applied' research, which would seem to imply that research can be either one or the other, but not both. Researchers engaged in frontier research may well simultaneously be concerned with producing new knowledge and with generating potentially useful knowledge.

In the second place, we should not confine ourselves to a strict dichotomy basic science versus applied science. There are different nuances and modifications with respect to the criterion veracity versus utility, even within the type of research in which veracity remains the main determining norm. Let us have a closer look at the spectrum between pure and utilized research.

First, we distinguish *pure*, *science-driven* research. Science always starts with curiosity, the wish to know the causes of and reasons for observables, and the desire to find an explanation for that which is not yet understood. In pure and science-driven research, these unanswered questions present themselves through experimentation, reflection and scientific discussions; they are science generated and conclusion oriented. It is clear that the primary fruits of this pure research are an increase and enrichment of our knowledge. As such, we deal with an independent and indisputable value of science – its intrinsic relevance. Fundamental research, be it in physics, biology or psychology, increases the general body of knowledge, which is an intrinsically valuable and precious quality of civilization, and an essential condition for the creation of the next generation of scientists. Through its scientific enlightenment of the general public – and this is especially true in respect of the dispersion of social science knowledge – it can further be regarded as an important instrument with which to develop and strengthen a society's intellectual defensibility and democratic foundation.

Second, there is what the OECD Frascati manual describes as *fundamental strategic* research. This definition refers to pure research, which is, nevertheless, directed towards problems that have been selected by policymakers as deserving high priority because of their political or societal saliency. This often occurs in the case of scarce resources (such as the setting of research priorities in developing or other economically less advantaged countries), or when there is strong political pressure for 'relevant' research to be done.

An example of the latter is the European Commission's allocation of the research funding in the first six 5-year Framework Programmes. Most of the FP-supported research was 'targeted' research; it always had to fall within the chosen priority fields. Only the seventh Framework Programme, which commenced in 2007, and which introduces the European Research Council (ERC), allows a modest part of the funds to be allocated to science-driven, cutting-edge research without a further prioritizing of themes or subject areas.

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Third, there is *practicable*, *science-driven* research. As the wording indicates, we are again concerned with science-driven research, but in this case, with research whose results will sooner or later (in a great many cases rather later) lead to important applications or innovations in the practical professional field. Many disciplines provide striking examples of the practical 'usefulness' of theoretical work, although, as mentioned, it often takes considerable time for some discoveries to reach the practical application stage. Maxwell's groundwork on the transmission of electronic waves, resulting in Marconi's telegraph some decades later; the development of the early fundamental Radon theory that lead to the later computer topography; 1920s polymer chemistry resulting in a booming plastic industry from the 1940s onward; fundamental physiological research that led to significant and innovative pharmaceutical remedies; the invention of the transistor principle finding its use in the semiconductor area; and – a striking recent example – a few CERN physicists developing a device with which to exchange large data files, thus sowing the seeds of the World Wide Web and bringing about the information and communication branch's enormous prosperity, these are all significant cases in point. By the way, this has been an important argument for many European research organizations, including All European Academies[10] with respect to defending and promoting basic research in European research programmes. Europe's economic and social future depends on the careful development and exploitation and, in particular, innovation of its knowledge base. Innovation in a knowledge economy requires new knowledge, and this new knowledge is specifically generated by cutting-edge, science-driven research.

It is not difficult to identify a great number of theoretical contributions to the social sciences that eventually found prolific application. We could point to the importance of learning theory for the advancement of didactic and educational practices, the use of experimental research on perception and attention for ergonomic applications in industry, traffic and marketing, the contribution of theoretical work in decision theory and risk analysis to industrial and governmental decisions, the usefulness of economic modelling for monetary policies, and that of the fundamental work on stereotyping and prejudice for dealing with minorities and migrants. These examples can easily be supplemented with numerous others. The point is that the researcher's primary intention is not the development of an instrument or the solution of a practical problem, but the advancement and increase of the knowledge of social behaviour through empirical and theoretical analysis. At the same time, this knowledge is utilized by the researcher him/herself or others at a later stage, and converted into practical applications.

Fourth, we can identify *problem-driven/product-oriented* research. The motivating force behind this type of research is not primarily theoretical interest or scientific curiosity, but the need to solve a practical problem or to develop a useful product. This type of research is usually referred to as 'applied research'.

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Various types of 'applied research' fall within this category, including:

- instrumental research oriented towards the development of instruments (for diagnosis, analysis, assessment);
- research aimed at the manufacture of products (drugs, tools, services);
- research on intervention methods for individuals or groups (development and evaluation of psychotherapy, organizational development, conflict prevention, community building);
- research on (the optimization of) procedures and processes (decision making, sales, social cohesion).

I would like to make two observations with respect to this category of research. First a methodological one: although both the origin and the objective of this type of research may stem from the need to solve a practical problem or to produce a useful method or instrument, instead of theoretical curiosity, there is nothing reprehensible about the research process itself. It follows the same rules and standards as basic research: questions are posed and the design is planned in an unbiased way, hypotheses are tested with objective data, the analysis and interpretation is 'value free' in the sense that no interests, power or external (e.g. financial) pressures should play a role. Standards are explicitness, testability, and replicability.

Secondly, applied research could also lead to generalizable laws and relationships, and thereby contribute to the increase of scientific knowledge. In fact, a great deal of what is now known about causes of individual behaviour or social processes is the product of applied research in behavioural, societal or economic science.

In other words, in principle there is nothing inferior about applied science, either in terms of quality and methods, or in terms of its contribution to the body of knowledge. Only its origin and its goal are different: it is problem induced and solution oriented.

Fifth, there is *auxiliary* research, research that is meant to be supportive in respect of policy and decision-making. Its contribution can be solicited in different phases of decision-making. In the first phase, the initiating phase, research may generate or help to identify the problem that needs attention. Survey research may reveal citizens' dissatisfaction, dangerous or risky procedures or rules, discrimination or injustice in the treatment of citizens, unsatisfactory working or living conditions, and the like. This may contribute to properly defining the question to be addressed. In the second phase, the search for alternatives, research may help to ascertain various options with consideration of their chances of success and their unwanted side effects. In the third phase, the finalization, the researcher may assist the decision maker by calculating the effect of possible amendments or adaptations by using a research-based simulation

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model, or a computer support system that can easily incorporate parameter changes. In the fourth phase, in which the implementation takes place, the researcher may assist by, for example, identifying possible causes for resistance to change, as well as by providing evaluation and follow-up studies.

The social scientist working in this context can still be operating within the boundaries of scientific activities based on finding the truth. Although auxiliary researchers as described above could be tempted to select biased information and agreeable alternatives, they help the decision maker more by providing objective and correct, rather than pleasing, information. It is my firm belief that if (applied) scientists start to compromise the truth, if research becomes politicized and the norms of veracity are infringed, their input will lose its independent contribution, and will eventually become useless.

The danger of violating the truth is even greater in another form of auxiliary research, namely when research results are solicited as ammunition for a discussion or a political debate, whether to attack or defend a certain position, or to create negative or positive attitudes with respect to certain ideas or proposals. I presume that social scientists working for political parties, or for a national or local government find this picture familiar. It is clear that the researcher should be very careful here. Veracity is all too often replaced by opportunism and expediency. Moreover, arguments brought in by scientists could start leading a life of their own. They may be used by the client, but also by opposing groups, activists and other interested parties. Biased and misleading interpretations, generalizations, and selective use are the rule rather than the exception. It is often impossible to get the genie back into the bottle again.

In this overview we have tried to show that within the borders of 'truthfulness' there is a variety of types of research in which practical relevance and usefulness may play a role during or after the research process itself. It has also become clear that the simple dichotomy 'pure versus applied' research does not suffice when describing the complex reality of scientific work.

Why under-utilization?

If the social sciences have such a strong affiliation with social policy and if the knowledge of the dynamics of human behaviour and its interaction with the social environment is so important for growth and innovation, then an interesting thought forces itself upon us: why is it that the social sciences are not fully used, why do governments and industrial leaders so often neglect or disregard the findings and insights rendered by social science research? Why do political or industrial decision makers not request assistance from the social sciences in the many instances when this would be expedient? Even in research funding, the social sciences find themselves in the lower priority area.[11–13] Of course,

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under-utilization is a general complaint of scientists – and that is why many of the following reasons for such under-utilization do apply in a great many other disciplines of science as well – but it is especially the social sciences that seem to suffer from this negligence. What are the causes of or reasons for this disregard, in particular of the social sciences?

In the first place, *ignorance*. Obviously, the fruits of the meticulous research work carried out by social scientists insufficiently filter through to decision makers and the general public. Yes, the latter do acknowledge that 'psychological and social factors' are important and that one should not forget about the importance of people's behaviour and the social conditions, but mostly this is the social 'science' of popular magazines, bestsellers and gurus. As incisively described by Pfeffer and Sutton,[14] this is often a mixture of hard facts, dangerous half-truths and total nonsense. Only the application of 'evidence based' social science will bear fruits.

Secondly, *confusion*. Even a supportive reader of social science research repeatedly runs into inconsistent and even contradictory results: does participation lead to better decision-making or not? Does violence on television lead to more or less aggressive behaviour? Do satisfied workers perform better or worse? Should school classes be heterogeneous or homogeneous? Does lower unemployment lead to inflation or not? Does national pressure for assimilation of minorities lead to integration or to segregation? There are almost always research results available to support either point of view. We know, of course, that such differences can often be explained in terms of different samples, circumstances, instruments, or even a divergent research design. We also know that, certainly in the social and behavioural sciences, much of our scientific knowledge has an uncertain and probabilistic character and that solid, indisputable truths are seldom found. The fact of the matter is that incompatible and inconclusive research results often motivate the negation of these results.

Thirdly, part of the reluctance to use social science knowledge is caused by an *anti-science attitude* that has unfortunately gained influence lately.[15] These days, we unfortunately all too often see facts being exchanged for dogmas, logic and reasoning for populist opportunism, and scientific findings for religious prejudice. The widespread public appreciation of science and its achievements that was evident until the middle of the 20th century has been replaced by doubts, scepticism and even enmity. The media, in which respect and admiration for science used to be predominant, now often express misgivings, criticism and disillusionment. It is likely that also those who should take social science knowledge into account in their daily work and decision making are affected by this anti-science sentiment, and turn away from evidence-based science.

And even if it is not a question of anti-science sentiments, many individuals, including industrial and governmental decision makers, reveal an unfortunate

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aversion to scientific and logical argumentation, and are inclined to accept all sorts of illogical views and claims. This is a dangerous development in our society as has been pointed out eloquently by Taverne in his book *The March of Unreason*.[16] In this respect, Dawes[17] has made an interesting distinction. Lack of sustaining evidence, evidence supporting the opposite view, or even outright contradictions are only important for people who (like to) think coherently and rationally, which takes time and effort. Unfortunately, many people think in the intuitive mode, which is swift, effortless and associative. This is then further reinforced by five of the 'seven sins of memory',[18] transience (forgetting things), misattribution (mixing aspects of memory), suggestibility, bias and persistency (perseverant memories of traumatic events). Dawes believes in educating people to become more rational thinkers, and hopes to fend off this intuitive mode.

Fourthly, there is, of course, *unwillingness*. People do not want to give up their pet theories and beliefs. People do not want to believe that common sense is not always a valid judgement measure, that handwriting does not reveal personality characteristics, that people are not always driven by financial incentives, that surveys often conceal the truth. People do not want to give up their prejudices, their ethnic, geographic or gender stereotypes. Sometimes this unwillingness to accept scientific truths is prompted by the fact that these truths are politically incorrect or unwelcome. Our own finding that the Chinese pupils in schools on Java had the highest average scores in almost all intelligence tests was not welcomed by Indonesian officials. The conclusion that violence and criminal behaviour are significantly higher among second-generation Dutch Moroccan immigrants than in other immigrant groups and in the native population is a sensitive matter. Similarly, findings regarding gender or ethnic difference have been contested for being politically incorrect.

In the fifth place, there is *distrust*. Decision makers often have experience of being put on the wrong track by so-called experts who sold unwarranted certainty, communicated 'probabilistic' knowledge as if it were solid conclusion, offered valid explanations when hypothetical interpretations would have been appropriate, or who suggested that their conclusions were based on empirical evidence when in fact the latter was unsatisfactory or even lacking. It is no wonder that decision makers often regard such 'misleading' scientific advice with suspicion and distrust.

Distrust also stems from social science advisors who do not sufficiently distinguish between research results and their personal opinions and normative views. Time and again, on the television or in newspaper interviews, we have professors of psychology or sociology presenting moral, pragmatic or political opinions instead of discussing scientific analyses or evidence-based conclusions.

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Of course, every citizen has the right to have and to present his own opinion, or to engage in political advocacy, but the point here is that this should be done in his personal capacity, and not in the name of science. In the latter case, social scientists lose their credibility as independent analysts, and are regarded as just another interest group.

Distrust may also be caused by another phenomenon: the general concern and doubts regarding the moral and ethical consequences of fast-developing science and technology. This was also revealed by a European survey of attitudes and opinions in which many people even express fear of scientists whose great knowledge could make them too powerful, and whose research could cross ethical boundaries, all of which is difficult to control.[19] Interestingly enough, it is not ignorance that should be blamed. There is a zero-correlation between knowledge of and (dis)trust in science.

In the sixth place, we mention *disappointment*. Many politicians and managers in industry or government complain that social scientists do not provide answers to the real questions with which they are confronted. Fragmented and detailed laboratory studies are not regarded as making sufficient contribution to the understanding and handling of the complex and multifaceted reality decision makers are facing. A strictly positivistic, quantitative tradition may be unsuitable to provide insight into the concrete contextual complexity of organizational or governmental decisions and strategy. Elsewhere,[20,21] we have argued that multi-method approaches, including qualitative and descriptive analyses, and the involvement of multidisciplinary teams, are necessary to address the compounded problems of modern organizations' strategies and courses of action. Such a renewed and successful approach would have to include a transdisciplinary orientation.

Finally, there is *deception*. This is particularly found in behavioural sciences that deal with the well-being and the mental health of people. Bona fide psychologists have to compete with all kinds of pseudo-scientific 'experts' who offer a range of furbished nonsense, which, however, often tallies well with intuitive prejudices.[15] Particularly in the field of individual or group counselling, organizational change and revival, and psychotherapy and healing, lots of pseudo-scientific allurements can be found, ranging from hypnosis to neuro-emotional integration, from reincarnation therapy to healing by prayer, from scientology to neuro-linguistic programming (NLP). As said, in spite of much contra-evidence, the popularity of this pseudo-scientific moonshine is alarmingly high. In addition to a shrewd commercial formula and marketing, there is also a flirtation with science (impressive names, such as neuro-linguistic programming, 'scientific' books, masters degrees and diplomas) that lead innocent citizens up the garden path. How can the general public separate the wheat from the chaff?

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Recommendations

By way of conclusion, we will make some recommendations for the social sciences.

(1) Recognize the whole spectrum from pure to applied social science. Recognize the specific goals and criteria of each of the different research forms on this spectrum, and therefore their specific characteristics and added value. Acknowledge the limitations of all specific methodological choices, and accept the need for a broader as well as more interdisciplinary approach at times to tackle the whole range of relevant social issues in present-day society.

(2) Ensure that the communication of research results is honest and fair. Do not focus too emphatically on the implementations for policy and practice, if unwarranted. Empirical evidence should be the only basis of conclusions, and with that a distinction should be made between reasonable certainties, probabilistic knowledge and educated guesses. Make a clear difference between scientific conclusions and personal beliefs and attitudes.

(3) Ensure that, in concrete cases, the social science knowledge, based on general laws and relationships, is contextualized. Within social sciences almost all generic laws and patterns are contingent upon a host of contextual variables. One of the most pertinent examples of the latter is culture. It is fair to say that in our multi-cultural world, the cultural contextualization of models is almost a prerequisite.

(4) Social scientists should develop the skills to use various types of media to communicate their findings to policy-makers and to the general public. They should also participate in public debate. We agree with a recent ESF report,[22] which states that 'Given that the public sector is the principal sponsor of research there is an increasing onus on all of us to devote more time to explaining, listening and debating.'

(5) Social scientists should not evade moral and ethical issues that almost inevitably arise out of their research. Research-related ethical issues should be given full attention, including:
   (a) justification of the choice of study: is it worth pursuing, and is it not in conflict with basic human values: human rights, human dignity, equality and non-discrimination,
   (b) the nature of the data gathering or experimentation: informed consent, no unacceptable damage inflicted on the object of research (people, animals, environment, organizations),

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(c) responsibility taken for what is done with the results of the study, either by the researcher or by others (for a more elaborate coverage of this subject see Ref. 23).

(6) Take a firm line with and endorse stringent regulations against pseudo-scientific movements and practices. A tolerant attitude, so typical of social and behavioural scientists, is not an appropriate method in this case. Quacks and swindlers deceive people, injure the general welfare, and encourage irrationality in society. And, in agreement with Dawes,[17] I believe that the world would be a better place if people made an effort to think rationally and to reason coherently.

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