Theory and practice in Industrial Psychology: *Quo vadis*?

JOHAN CD AUGUSTYN
Africa Centre for HIV/AIDS Management
Stellenbosch University
South Africa

GAWIE G CILLIÉ
Department of Industrial Psychology
Stellenbosch University
South Africa

Correspondence to: Gawie G Cillié
e-mail: ggc@sun.ac.za

ABSTRACT

This article critically evaluates the science and practice of industrial psychology. It reaches the conclusion that a major shift in paradigm and mind-set is essential for the discipline to survive. The article discusses assumptions about knowledge within the science and practice of industrial psychology and suggests ways to expand the notion of scientist and practitioner. It also discusses modes of knowledge acquisition within industrial psychology and proposes a post-modern view of the interface between theory and practice. It concludes with suggestions to revitalise the interface between theory and practice.

Keywords: theory and practice, scientist, practitioner, revitalising interface, post-modern view

As far back as 1913, Hugo Münsterberg touched on the notions of scientist and practitioner in his seminal work *Psychology and industrial efficiency*, devoting an entire chapter to a discussion of means and ends. He came to the following conclusion in his reflection on the newly founded discipline of applied psychology:

"In other words, we ask how to find the best possible man, how to produce the best possible work, and how to secure the best possible effects . . ." (Münsterberg, 1913, p. 24).

When the Psychological Corporation was founded in 1930, it clearly followed the gist of Münsterberg's definition of applied psychology in describing its function:

"The objects and powers of this corporation shall be the advancement of psychology and the promotion of the useful application of psychology . . . It shall have the powers to render services involving the application of psychology to education, business, administration and other problems . . ." (Griffiths, 1934, p. 434).

The debate about what constitutes industrial psychology was continued by Titchener (1914), Weld (1928), Vitelis (1931), Carmichael (1930) and, more recently, Dunnette and Hough (1990), Campbell (1990) and Landy and Conte (2004). In 2001, a special edition of the *South African Journal of Industrial Psychology* was, in fact, dedicated to a discussion regarding the future of industrial psychology as a discipline and profession (Veldsman, 2001).

The aim of this article is to revisit the debate on the science and practice of industrial psychology and to put forward suggestions for revitalising the interface between theory and practice in this field.

When looking at the current balanced score-card of the profession of industrial psychology, it seems as if the dreams of Münsterberg and his contemporaries have not yet come to fruition.

In 1990, Dunnette asked whether practitioners of industrial and organisational psychology are using the best that the field has to offer and whether the science and practice of the discipline have a synergistic impact on each other. He came to the harsh conclusion that industrial psychology is not doing well. He blames, among others, the "burden of the publication process" and continues by saying that ". . . what is published does clearly suggest that a potential serious schism exists between the two worlds of industrial and organisational psychology, the academic and the non-academic – the science and practice" (Dunnette, 1990, p. 10).

This schism is extensively addressed by McIntyre (1990, p. 28), who is very critical of the current status of the science and practice of industrial psychology:

"Organisations constituting the workplace pose questions with an impatient spirit. Hence, science's strategy for answering these questions – based on data collection, data analysis, and cautious conclusions – is perceived in the workplace as 'irrelevant'. Because their basic goals differ, science and the workplace are fundamentally incompatible."

The state of science was extensively discussed during the last three decades by Guion (1988), Campbell (1978; 1982; 1987), Dunnette (1984), Owens (1983) and Vroom (1983), during which barriers to good science were identified.

As far back as 1988, Guion criticised the reward system in academia. He coined the term "publish or perish" and referred to "publication fever", a disease with the symptom to publish everything in the absence of anything important to say. In his criticism of the reward system, Guion warned about the consequences of such a system:

"The primary result of these opposing reward systems is to weaken seriously the level of excellence of what appears in our journals from what could be. Persons in academia are often pressurized by the system into trying to publish small studies, incompletely conceived and conducted, and far from constituting increments in our science. Our journal editors face an impossible task. No matter how they try, they cannot single-handedly change an ingrained reward system. The result, as we all recognize, is that the ratio of chaff to wheat in our journals is higher than we would like" (Dunnette & Hough, 1990, p. 14).

On the same topic, Dunnette and Hough (1990, p. 16) refer to a small study done by John Campbell in 1982 in which he asked researchers to describe the circumstances surrounding the studies that they had completed and which, in retrospect, they regarded as not amounting to much. These circumstances were characterised by aspects such as (a) the availability of a database, (b) the opportunity to make use of an established phenomenon, (c) the need for a quick publication, (d) the desire to address a topic that was "hot" at the time, (e) an attempt to get another article out of old data by simply using a different statistic, (f) the requirement to do a study on someone else's contract on an issue that was of no intrinsic interest and (g) an opportunity to perform an easy replication of another project.

It is fair to ask whether industrial psychology has done any better during the past 15 years. It does not seem so: industrial psychology might even have lost ground. The fads, fashions and folderol pointed out by Dunnette as far back as the mid-1960s (Dunnette, 1966) are indeed still alive and well in South Africa. Industrial psychologists still keep their pets, have their fun, suffer their delusions, keep their secrets and ask their questions. Research at academic institutions is often neither needs-driven nor problem-orientated; it appears rather to be a function of data availability and that the norm is the recycling of available data and pursuing of hot topics. There is an explosion of research on notions like emotional intelligence, leadership, personality, and burn-out and stress. In academic circles, those who try to apply knowledge in their teaching and consulting to organisations are often (almost bizarrely) labelled practitioners, while their colleagues who publish (irrespective of the quality or usefulness of the publications) are labelled academics. It is very much "publish or perish", the academic bean-counters seeming concerned only about quantity. What is often missing in research publications is convincing arguments for the significance of the research questions. One is often left with the "So what?" question. Published research is, in reality, often discounted by the captains of industry as a waste of time.

Pietersen (2005) deals extensively with the strengths and weaknesses of industrial psychology in South Africa. In his article, he utilises a meta-theoretical approach to assess the nature of knowledge development in industrial psychology. Dealing extensively with the recent reviews of industrial and organisational psychology as a discipline (Kriek, 1996; Schreuder, 2001; Watkins, 2001; Maolusi, 2001; Pienaar & Roodt, 2001; Renecle, 2001; Veldsman, 2001), he concludes that there is a lack of focus on aspects of knowledge development in industrial psychology other than the usual concerns of the discipline, both applied and practised.

Pietersen (2005, p. 84) proposes that industrial psychology must "embrace additional knowledge perspectives, theoretical frameworks, research strategies, methods and literatures beyond that which are currently in use." If this were done, he is convinced that industrial psychology "will continue to be and become more relevant as an organisational science/discipline in South Africa" (Pietersen, 2005, p. 84).

Despite the above, however, an uneasiness remains regarding the tension between the theory and practice of industrial psychology.

Tulving and Madigan (1970) formally rated 540 articles published in scientific journals in terms of their contribution to knowledge. Two-thirds were judged as "utterly inconsequential"; only about 10% were judged worthwhile. They moreover concluded that most published papers are not read.

Garvey and Griffith (1963) estimated that 50% of the papers published in American Psychological Association (APA) journals are read by fewer than 200 people and that two-thirds of the articles are never cited by another author.

With reference to the work of Tulving and Madigan, Dunnette and Hough (1990, p. 45) came to the following disturbing conclusion:

"It is difficult to escape the conclusion that, of all the research projects designed, the proportion that is actually supported, conducted, written up, published, and read by an appreciable number of people is very, very small."

The discipline is clearly at a critical juncture and both academics and practitioners are to blame. When one looks at the state of the practice, it becomes apparent that concepts like "psychology" and "industrial psychology" are often disliked in the world of work. Industry finds the scientific method impractical and burdensome and often of little relevance to the solving of people-related business issues; industrial psychology scores very low on the critical scales of industry. This failure to solve people-related business issues is epitomised by Campbell (1990, p. 57):

"If we have learned anything about applied problem solving in industrial and organizational psychology, it is that the implementation of 'programs' expected to operate as advertised, after the initial flurry of attention, is usually doomed to failure."

Many of the theories and models possibly have very little *ecological value*; they fail to address the real, practical issues. Despite the fact that this is an often-told story, industrial psychology does not seem to be doing better; it seems rather to be doing worse. The result is that both the scientific and the practical aspects of the field suffer. There is, in fact, a real danger that industrial psychology might become an exclusive, academic discipline and that the application of psychology in the world of work might be left to practitioners who are poorly trained theoretically and dangerously incompetent in the application of the body of knowledge of industrial psychology to real-world problems. It seems that applied psychologists are slow learners and that a major shift in mind-set and paradigms might now be the only way out of the dilemma.

Lykken (1990) sees progress in science as dependent on the paradigms of the discipline. These paradigms not only dictate what questions are important to the discipline but also provide guidance for how to address them.

Campbell (1990, p. 46) pointed a finger at both academics and practitioners almost 15 years ago:

"Given the difficulty of its chosen assignment, psychology has compounded its problem by devaluating teaching and public service in favor of doing research. As a result, more people are conducting research than should be, spreading the available resources too thinly and filling the journals with too much that is unimportant. We seem particularly susceptible to overuse of jargon and the pursuit of faddish research topics."

The response to this state of affairs has been poor, to say the least.

Sweder and Fiske (1986) question the contributions of industrial and organisational psychology to applied problems, be they organisational or societal. They refer to the common problems of, for example, decreasing educational achievement, shrinking job skills and a drop in productivity. Industrial and organisational psychology simply cannot provide answers to such problems, despite sizeable growth in the discipline over the past 25 years.

It is time to continue the debate, a debate that will hopefully help to ensure that industrial psychology does better in the 21st century. Such a debate will require a revisit of current paradigms and a serious look at the state of the science and

practice of industrial psychology. What follows is a further contribution to this debate.

Assumptions about knowledge

Landy and Conte (2004, p. 6) recently stated that ". . . the simplest definition of industrial and organizational psychology is the application of psychological principles, theory and research to the work setting . . ." They articulate their definition in greater detail by stating that ". . . I/O psychology facilitates responses to issues and problems involving people at work by serving as advisors and catalyst for business, industry, labor, public, academic and health organizations . . ." (Landy & Conte, 2004, p. 7) and that "I/O psychology needs to be relevant and study the problems of today, not those of yesterday . . . I/O psychology needs to be useful and the I/O psychologist must always be thinking of ways to put our research into practice . . . I/O psychology must be grounded in the scientific method . . ." (pp. 15-16).

The definition and goals clearly include both science and practice; they also refer to the tension between science and practice. The tension between the science and practice sides is probably *the first issue* that needs to be revisited and addressed.

The tension between science and practice is multidimensional and caused by many factors. One of the most critical factors is the difference in the assumptions made by academics and researchers in *creating* what they consider knowledge, on the one hand, and the assumptions made by practitioners and managers in *using* what they consider knowledge, on the other hand. Both seem to have their own selective view of reality or frame of reference (Klimoski, 1992).

According to Klimoski (1992) assumptions about knowledge have several components, and point out that theory and practice differ on each of them.There is a clear difference in the way that we think and reason about knowledge; we can call this the cognitive component. Researchers often prefer to think in terms of *objective, measurable data*, for example, while practitioners and managers almost always prefer to think in terms of *experiential* data. Science normally places the *usefulness* of research findings in a larger context. Scientific enquiry is regularly conducted through four broad stages: the scientist attempts to conceptualise a problem; a theory or model is formulated or existing theories are adapted; possible solutions or outcomes from the model are formulated; and the model is put forward as a remedy for the problem. Neglecting any of these stages can damage the validity of scientific research. Scientific inquiry frequently, however, omits *problems from the world of work* from the research process. The scientist often conceptualises a problem without doing a reality check on the problem. In other words, it might be a neatly formulated problem in theory but it lacks relevance in the real world; it lacks the synergistic impact referred to by Dunnette and Hough (1990).

The science of industrial psychology and its paradigms has been around for decades and is well developed. The scientists and practitioners of industrial psychology, however, still argue over what constitutes relevance (Campbell, 1990; Klimoski, 1992): *descriptive relevance* reflects the adequacy of a theory for capturing the essential properties of a phenomenon as it impacts on organisations; *goal relevance* reflects the correspondence of the outcome variables of a theory with the issues that decision makers may wish to influence (Klimoski, 1992). Industrial psychologists are often reluctant to adopt, as dependent variables, the business variable by which managers must live or die. Indeed, they often conceptualise and formulate their "own unique problems", once again without doing a reality check.

Operational validity can be found in theories that offer guidance for implementation and intervention. The scientist prefers *traditional or technical validity*, while the practitioner seeks *relevance in the real world* and justifiably measures the contribution of a theory accordingly.

The *timeliness of theory and research* is *a further issue* that needs to be revisited and addressed. Good theories from a scientific perspective relate to *universal issues*, while good theories from a managerial perspective relate to *current issues or issues of the day (Klimoski,1992).* A few current issues in the world of work include the following: how much current research is directed at the notion of continuous, lifelong learning; the learning organisation; the effect of downsizing and rightsizing on long-term organisational effectiveness; effective models for performance management; the linking of behavioural interventions to the goals of an organisation; a balanced score-card; the utility of behavioural interventions; and models to accelerate basic adult education and training.

It is not suggested that researchers only adopt a decision-making perspective or rely entirely on the practical applicability of models or theories. Industrial psychologists could, however, adopt these criteria as reality checks of the applicability of science. In doing so, both the science and the practice of industrial psychology would most certainly benefit.

A last issue that needs to be revisited and addressed is the volume of research and knowledge generated by practitioners for the benefit of the discipline. The majority of industrial psychologists in industry formally contribute very little to the body of knowledge of our discipline in the form of publications. The reason for this low contribution is most probably a function of a current belief according to which practitioners do not see themselves as contributors to technical and professional knowledge or simply do not have the time or motivation to document the successes and failures of their interventions.

The differences in assumptions referred to previously have formed part of industrial psychology for decades. Practitioners, on the one hand, often accuse their academic colleagues of doing too much research and of writing too many publications that are of little or no use to real-world problems. Academics, on the other hand, accuse their colleagues in organisations of not doing any research at all or of carrying out interventions that lack sound theory. The result is that academics and practitioners operate in isolation and that theory and practice become increasingly polarised. A comparison of the view of Dunnette (1976) on the interface between theory and practice in the first edition of the *Handbook of industrial and organizational psychology* with his view 14 years later, in the second edition of the *Handbook* (Dunnette & Hough, 1990), indicates clearly that industrial psychology has moved backwards rather than forwards.

Expanding the notions of scientist and practitioner

It seems to be the right time to expand and redefine the notions of scientist and practitioner. By expanding *the notion of what we call science* and by redefining *the interface between science and practice*, it could be possible to promote the participation of both academics and practitioners in the future growth of our discipline. Such redefinition or repositioning would also allow the science and practice of industrial psychology to have a synergistic impact on each other (Dunnette & Hough, 1990; Hackman, 1985). In order to expand the notions of science and practice, the concepts of scientist and practitioner should therefore be revisited.

In describing the field of industrial psychology, most people refer to the concept of the scientist-practitioner model (Bass, 1974; Campbell, 1990; Dunnette & Hough, 1990; Hackman, 1985; Klimoski, 1992). This involves the study of the behaviour, thoughts and feelings of employees as they function in the workplace (*the science side*) and then goes on to use this information to maximise the well-being and effectiveness of

employees in the world of work (*the practice side*). The scientist-practitioner model has always been a necessary part of the field. Without it, the field has no claim to distinction (Campbell, 1990; Dunnette & Hough, 1990).

This does not, however, imply that all activities must necessarily involve both science and practice. In most cases, industrial psychologists tend to vacillate between the two roles or prefer one role to the other.

It is, however, fair to say that most industrial psychologists enjoy the possibility of contributing to both science and practice; it is part of their professional identity. Academics do usually, however, stress the primacy of science. Similarly, practitioners usually feel that good application is only as good as the knowledge on which it is based.

It is also fair to say that tension between science and practice has existed from the earliest days of the field. While some have anguished over this, others have viewed it as a normal and even healthy interplay. Scientific practice and practical science – what could be better? Trying to live up to this model, however, could well be very challenging for academics and practitioners (Dunnette & Hough, 1990; Guion, 1988; Klimoski, 1992).

Modes of knowledge acquisition

Klimoski (1992) coined this notion in his presidential address to SIOP and went on to say that true interaction between science and practice is absolutely essential for the field of industrial psychology to be viable. It is indeed possible for this vision to be realised but it will take a huge effort and a change in mind-set and paradigm. It is also highly dependent on a willingness to alter thinking about what constitutes science and, especially, what are considered *legitimate modes of knowledge acquisition* (Klimoski, 1992).

In thinking about science and what constitutes a contribution to knowledge, several answers come to mind. Perhaps foremost are the *theories and models* dealing with psychological phenomena. Because industrial psychology is an applied field, another contribution involves the developing and testing of models of *psychological processes and systems* as they exist in the world of work. *Theories and models for effective organisational practices* most certainly also contribute to science. It is of vital importance that such a broader definition of scientific contribution be accepted. Many problem areas in an organisational context have previously been ignored by researchers. The acceptance of such a mutual contribution to science, however, could provide the impetus for model building and theory development for organisation-specific problem solving.

It is also necessary that the working theories of practitioners as best practices be accepted until they can be explained by existing or new theories. In this way, the work of practitioners would gain higher appreciation and could become the departure point for new research. To adopt an ostrich approach and simply argue that interventions cannot work because they do not fit existing theories is short-sighted and could even be detrimental to the discipline.

There are two paradigms that are most often used by researchers. The one can broadly be termed *inquiry from the outside*. Here, researchers are employed mainly by universities or research institutions and conduct their research from a vantage point outside of organisations. The other paradigm that potentially exists can be termed *inquiry from the inside*. This suggests that practitioners within organisations are also doing scientific and professional work (Klimoski, 1992).

By comparing these two paradigms according to a number of criteria, Klimoski (1992) clearly highlights their differences. Looking at the relationship between the researcher and the organisational setting, inquiry from the outside (the conventional model of science) is typified by *detachment*. Here, knowledge and understanding are obtained mainly through interviews and survey data obtained at a given time. Inquiry from the inside assumes that the researcher must be aware of the realities of the situation through personal *involvement*. From this basis of validation, the researcher emphasises sound measurement and logical comparison. The practitioner in the real situation relies on personal knowledge of the situation, validated through experience in the organisation.

Roles also differ. In the traditional paradigm (inquiry from the outside), the researcher is mostly a *spectator or onlooker*, while the practitioner (inquiry from the inside) is mostly an active *role-player*.

From the point of view of the source of the analysis, a further difference is evident. In the traditional paradigm, the researcher *preselects* the categories for investigation and tests them by stating a research hypothesis. The practitioner, however, is not bound by preselected categories but is rather guided by *experience* in and with the practical situation. The primary goal of an inquiry from the outside is *generalisability*, while inquiry from the inside seeks information about and *relevant* answers to the *unique situation* within a specific organisation. Inquiry from the outside seeks *universal knowledge*; inquiry from the inside seeks *knowledge applicable to a specific situation*. It is thus clear that the outcomes sought by the scientist and practitioner are vastly different.

It is perhaps fair at this point to ask what knowledge is. According to the paradigm of investigation from the outside, the scientist seeks universal principles in organisational life and tries to limit the effect of a specific situation. As a result, systems, theories and trends are accepted only when they hold the same meaning across many situations. Investigation from the inside attempts to gain insight into human behaviour as it manifests itself within a situation. Models, theories and systems have limited, if any, relevance when they are isolated from a situation. Valid knowledge is often needed for the effective management of a particular situation; responsible action needs measurement for successful management. The practitioner is an actor within an organisation and tries to find situational anchors in order to decide on appropriate action. There is investigation, there is knowledge, there is validation, but these are by no means carbon copies of the formal scientific method.

Inquiry from the outside and inquiry from the inside are often prompted by different circumstances and done for different purposes. Both must, however, be viewed as *systematic and valid modes of knowledge acquisition*. There is clear justification for both paradigms (Campbell, 1990; Dunnette & Hough, 1990; Klimoski, 1992). Neglecting the paradigm of inquiry from the inside, however, is not only short-sighted but also detrimental to the utility of the discipline of industrial psychology. The recognition of the importance of inquiry from the inside will not only narrow the divide between theory and practice but also enhance the knowledge base of the discipline.

Post-modernism in the philosophy of the science of industrial psychology

Going beyond the traditional paradigms as spelt out in the previous section will allow the redefinition of the interface between the work of the scientist and the work of the practitioner.

The approach to knowledge acquisition termed "inquiry from the inside" must be viewed as part of the more general post-modernism movement in the philosophy of science. Post-modernism offers an alternative conception of the interface between science and practice, an alternative that emphasises the mutual interdependence of science and practice (Babich, 1994; Bohm, 1992; Borgman, 1992; Klimoski, 1992; Rosenau, 1992).

A post-modern approach does not deny the validity of traditional modes of inquiry but views them as only one way to generate knowledge. Practical reasoning, as used in consulting and managing, for example, can also serve the purpose of science. Thus, in a post-modern view, practice is no longer only the application of scientific finding; it is also the setting for knowledge development through practical reasoning. Practice now becomes another venue for theory development and hypothesis testing. Theories developed without sufficient job-relatedness lack ecological validity; they fail to perform in application and often have to be modified or even abandoned. If the post-modern view were adopted, the scientist-practitioner model would be redefined. Both academics and practitioners would be viewed as legitimate contributors to knowledge. More importantly, both groups would be expected to contribute to knowledge, albeit each in its own way (Bohm, 1992; Borgman, 1992; Klimoski, 1992).

The acceptance of a post-modern approach holds many potential benefits. Academics could, for example, make better use of insights coming from organisations and developed through inquiry from the inside. Research published in journals would also be a better reflection of the mutuality of science and practice, a reflection that is often sadly missing. Teaching would furthermore be more relevant and non-academics would increasingly see themselves as contributors to the body of knowledge of our discipline. In addition, industrial psychology would become stronger; the dialogue between scientists and practitioners would be enhanced and mutual respect between the scientist and the practitioner would become stronger. A better industrial psychology would be the end result.

Revitalising the interface between theory and practice

The most important vehicle to revitalise the interface between theory and practice is probably the training of future industrial psychologists at tertiary institutions. Lykken (1990) proposes an interesting role-playing exercise in which an eminent older physicist and an eminent older psychologist return to their graduate oral examining committees, convened in 1960, for example, to compare what they know now in their respective fields to what was known more than four decades ago. The members of the physics committee would sit in open-mouthed wonder at the tales told by their former student. But how would the psychology committee react to what the former student had to say? (Campbell, 1990, p. 46). It is indeed a thought-provoking question!

Students should first and foremost be properly schooled in the theories, models and systems of psychology and industrial psychology. It would also be necessary to identify the competencies needed to *articulate* and *translate* these theories, models and systems for the decision makers who are responsible for people-related business issues in the world of work. These vital competencies (often sadly missing in curricula) should include notions like diagnostic skills, strategic planning, strategic flexibility and a results-orientated approach. Further issues that spring to mind would be the capacity to make things happen, effective writing and communication skills, applicable interpersonal competencies and a practical orientation. Future industrial psychologists should be able to articulate and translate their discipline for decision makers. This would require the revisiting of current training paradigms in industrial psychology.

Revitalising the interface also calls for more visible contact between academics and their counterparts in industry. Academics should spend more time in industry and practitioners should become increasingly involved in training at universities. Non-academics should work with academics with a common purpose, mutual respect and a two-way flow of useful knowledge. Best practices should be accepted as state-of-the-art applications, even if current models and theories cannot fully explain the effectiveness of the best practices. The result of such revitalised mutuality between science and practice would hopefully be high-quality, relevant and useful applied science and effective informed practice.

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REFERENCES

Babich, B.E. (1994). Philosophy of science and the politics of style: Beyond making sense. *New Politic Science: A Journal of Politics and Culture*, 30/31, 99-114.

Bass, B.M. (1974). The shadow and the substance. *American Psychologist*, 29, 870-886.

Bohm, D. (1992). Postmodern science and a postmodern world. In C. Jencks (ed.), *The postmodern reader*. (pp. 151-157). London: Academy Editions.

Borgman, A. (1992). *Crossing the postmodern divide*. Chicago: University of Chicago Press.

Campbell, J.P. (1978). *What we are about: An inquiry into the self-concept of industrial and organizational psychology.* Presidential address presented at the annual meeting of the American Psychological Association (Division of Industrial and Organizational Psychology), Toronto.

Campbell, J.P. (1982). Editorial: Some remarks from the outgoing editor. *Journal of Applied Psychology*, 67, 691-700.

Campbell, J.P. (1987). Publishing in refereed journals: Aversive or reinforcing? [Review of L.L. Cummings & P.J. Frost (eds.), *Publishing in the organizational sciences*.] *Contemporary Psychology*, 32, 600-602.

Campbell, J.P. (1990). The role of theory in industrial and organizational psychology. In M.D. Dunnette & L. Hough (eds.), *Handbook of industrial and organizational psychology. Volume 1* (Second edition). Palo Alto: Consulting Psychologists Press.

Carmichael, R.D. (1930). *The logic of discovery*. Chicago: Open Court.

Dunnette, M.D. (1966). Fads, fashions and folderol in psychology. *American Psychologist*, 12, 343-352.

Dunnette, M.D. (1976). *Handbook of industrial and organizational psychology*. Chicago: Rand McNally.

Dunnette, M.D. (1984). *I/O psychology in the 80s: Fads, fashions and folderol revisited*. Invited address presented at the annual meeting of the American Psychological Association, Toronto.

Dunnette, M.D. (1990). Blending the science and practice of industrial psychology: Where are we and where are we going? In M.D. Dunnette & L. Hough (1990), *Handbook of industrial and organizational psychology. Volume 1* (Second edition). Palo Alto: Consulting Psychologists Press.

Dunnette, M.D. & Hough, L. (1990). *Handbook of industrial and organizational psychology. Volume 1* (Second edition). Palo Alto: Consulting Psychologists Press.

Garvey, X. & Griffiths, Z. (1963). *Reports of the project on scientific exchange in psychology*. Washington, DC: American Psychological Association.

Griffiths, C.R. (1934). *An introduction to applied psychology.* New York: Macmillan.

Guion, R.M. (1988). *Pitfalls in the march of science*. Invited address presented at the annual meeting of the American Psychological Association, Atlanta.

Hackman, J.R. (1985). Doing research that makes a difference. In E.E. Lawler, A.M. Mohrman, S.A. Mohrman, G.E. Ledford & T.G. Cummings (eds.), *Doing research that is useful for research and practice*. San Francisco: Jossey-Bass.

Klimoski, R. (1992). Industrial and organizational psychology: The interface between theory and practice. Unpublished

presidential address presented at the annual conference of the Society for Industrial and Organizational Psychology, Montreal. Spring 1992.
Kriek, H.J. (1996). Bedryfsielkunde in Suid-Afrika: 'n Toekoms-perspektief. *Journal of Industrial Psychology*, 22(1), 7-11.
Landy, F.J. & Conte, J.M. (2004). *Work in the 21st century: An introduction to industrial and organizational psychology*. New York: McGraw-Hill.
Lykken, D.T. (1990). What's wrong with psychology anyway? In D. Chiccetti & W. Grove (eds.), *Thinking clearly about psychology*. Minneapolis: University of Minnesota Press.
Maolusi, K.P. (2001). Repositioning industrial psychology for the creation of new futures in turbulent times. *SA Journal of Industrial Psychology*, 27(4), 17-21.
McIntyre, R.M. (1990). Our science-practice: The ghost of industrial-organizational psychology yet to come. In K.R. Murphy & F.E. Saal (eds.), *Psychology in organizations: Integrating science and practice*. (pp. 27-48). New York: Erlbaum.
Münsterberg, H. (1913). *Psychology and industrial efficiency*. Boston: Houghton Mifflin.
Owens, W.A. (1983). Some major barriers to scientific progress in personnel psychology. Paper presented at the annual meeting of the American Psychological Association, Anaheim.
Pienaar, Y. & Roodt, G. (2001). Die teenswoordige en toekomstige rolle van bedryfsielkundiges in Suid-Afrika. *South African Journal of Industrial Psychology*, 27(4), 25-33.
Pietersen, H.J. (2005). Knowledge development in industrial/ organisational psychology (South Africa). *SA Journal of Industrial Psychology*, 31(2), 78-85.
Renecle, S.D. (2001). The relevance of industrial psychology as a profession and discipline in South Africa. *SA Journal of Industrial Psychology*, 27(4), 22-24.
Rosenau, P.M. (1992). *Postmodernism and the social sciences*. Princeton: Princeton University Press.
Schreuder, D.M.G. (2001). The development of industrial psychology at South African universities: A historical overview and future perspective. *SA Journal of Industrial Psychology*, 27(4), 2-7.
Sweder, R.A. & Fiske, D.W. (1986). Uneasy social science. In D.W. Fiske & R.A. Shweder (eds.), *Metatheory in social science: Pluralisms and subjectivities*. Chicago: University of Chicago Press.
Titchener, E.B. (1914). Psychology: Science or technology? *Popular Science Monthly*, 84, 42-46.
Tulving, E. & Madigan, G. (1970). Memory and verbal learning. *Annual Review of Psychology*, 29, 437-484.
Veldsman, T.H. (2001). A new playing field, game and/or different rules? Into the future with industrial psychology as a discipline and profession. *SA Journal of Industrial Psychology*, 27 (4), 34-41.
Vitelis, M.S. (1931). *Industrial psychology*. New York: Norton.
Vroom, V.H. (1983). On advancing organizational psychology as a science. In R.A. Katzell (chair), *Advancing I/O psychology as a science.* Symposium conducted at the annual meeting of the American Psychological Association, Anaheim.
Watkins, M.L. (2001). Industrial psychology: An identity crisis and future directions. *SA Journal of Industrial Psychology*, 27(4), 8-13.
Weld, H.P. (1928). *Psychology as science*. New York: Henry Holt.