Ananka Loubser

Tracing some consensus regarding pre-scientific frameworks in philosophy of science

First submission: 31 January 2012
Acceptance: 1 August 2012

The wide and sophisticated terminology of contemporary philosophy of science seemingly points toward a multitude of different pre-scientific frameworks (for example, worldviews, philosophy) directing our scientific investigations. This study, however, illustrates forms of consensus between the views of various prominent twentieth-century philosophers of science on the characteristics and functions of pre-scientific frameworks in scientific activity. It specifically highlights various helpful insights offered by reformational philosophy as its point of departure. This study finds that, on the pre-scientific level, fundamental motives and worldviews are usually recognised as pre-theoretical frameworks – with specific characteristics and functions – influencing scientific investigation. Reformational notions such as 'ground motive' and certain definitions of 'worldview' that did not originate in the context of 'philosophy of science' are introduced with a two-fold purpose: to establish a fruitful dialogue between reformational philosophers and more recognised philosophers of science, as well as to better equip us to trace what their views have in common.

Op soek na konsensus oor voorwetenskaplike raamwerke in wetenskapsfilosofie

Die wye en gesofistikeerde terminologie van kontemporêre wetenskapsfilosofie dui oënskynlik op 'n veeltal verskillende voorwetenskaplike raamwerke (byvoorbeeld, wêreldvisies, filosofie) wat ons wetenskaplike ondersoeke rig. Hierdie studie illustreer egter vorme van konsensus tussen die standpunte van verskeie twintigste-eeuse wetenskapsfilosowe wat betref die klassieke kenmerke en funksies van voorwetenskaplike raamwerke in wetenskaplike aktiwiteit. As uitgangspunt word verskeie nuttige insigte uit die Reformatoriese filosofie in die besonder uitgelig. Die studie vind dat, op die voorwetenskaplike vlak, fundamentele motiewe, asook wêreldvisies gewoonlik herken word as pre-teoretiese raamwerke – met spesifieke kenmerke en funksies – wat wetenskaplike ondersoek beïnvloed. Reformatoriese begrippe soos die 'grondmotief', asook sekere definisies van 'wêreldvisie', wat nie in die konteks van 'wetenskapsfilosofie' ontstaan het nie, word ingevoer met 'n tweeledige doel: om 'n vrugbare dialoog te bewerkstellig tussen Reformatoriese filosowe en meer erkenne wetenskapsfilosowe, sowel as om ons beter toe te rus om na te speur wat hulle standpunte in gemeen het.

Dr A Loubser, School of Philosophy, North-West University, Private Bag X6001, Potchefstroom 2520; E-mail: ananka.loubser@nwu.ac.za.

Acta Academica
2013 45(2): 59-84
ISSN 0587-2405

<http://www.ufs.ac za/ActaAcademica>

SUN MEDIA BLOEMFONTEIN

In contemporary[1] philosophy of science we read of the existence of different types of epistemic frameworks[2] (for example, worldviews, philosophy) which direct our scientific investigations.[3] While the awareness of the role of pre-scientific frameworks in science became increasingly accepted in the history of twentieth-century philosophy of science, a sophisticated use of terminology[4] concerning these frameworks also developed, giving the impression of considerable confusion or dissension, not only among authors, but also among different schools of thought.

This raises the problem statement of the article: is there consensus on the role and nature of epistemic frameworks? In this article, the term 'framework' refers, in general, to clusters of beliefs (for example, assumptions, premises, presuppositions, theories, or axioms) embedded in a pre-scientific or scientific structure, fairly coherent in terms of its functions; the term 'nature' refers to both characteristics and functions of frameworks; the term 'characteristics' refers to, for example, the number, content and context of elaboration of such frameworks, while the term 'functions' refers to the role played by

1 By using the adjective 'contemporary', I refer to the period beginning from the emergence of an anti-positivist approach (in Popper) and continuing with subsequent elaborations (by philosophers of science such as Kuhn, Polanyi, Feyerabend, and Dooyeweerd) of the role of presuppositions in science. To contextualise further, this turn occurred *circa* the time of the Second World War, although, according to Suppe (1974: 11, 168), the turn was anticipated to an extent by earlier works (for example, Poincaré 1905).

2 I accept that some frameworks such as ground motives and worldviews are not merely 'epistemic' frameworks, but also have other functions and can perhaps also be regarded as 'religious' or 'psychological' frameworks. However, the focus of this study is on science and knowledge and, therefore, the 'epistemic' qualification for the term 'framework' seems to be the most applicable. I am also aware that, in some contexts, for example, Popper (1996: 33-67; 1970: 55-8), the term 'framework' has incurred a negative connotation. Popper (1970: 55) was opposing Kuhn's interpretation of the role of paradigms. However, I am using the term in a more general sense, which does not imply negative connotations.

3 See Popper (1979: 344-7), Kuhn (1970a: viii), Dooyeweerd (1979: 8-9), Naugle (2002: 55-186).

4 For example, we find "ground motive" in Dooyeweerd (1979: 8-9), "premisses" in Polanyi (1946: 45), "paradigm" and "disciplinary matrix" in Kuhn (1970a: viii, 1974: 463), "horizon of expectations" in Popper (1979: 345), "worldview" in Naugle (2002: 55-186) and others, "hard core" and even "protective belt" in Lakatos (1978: 4).

frameworks in scholarship (for example, mediation, integration, connection, and filtration). By analysing these themes systematically and historically in the humanist and reformational traditions in philosophy of science, it will be shown that consensus is available to an adequate extent, even among 'rival' schools of thought.

In doing so, this article will contribute to a systematic clarification of the much debated issue of epistemic 'frameworks' on a pre-scientific level. These issues have often been surveyed in contemporary philosophy of science, without focusing on them specifically, with the result that authors have often stated their approaches, rather than arguing them rigorously.

A systematisation and clarification of these issues will constitute the necessary and preliminary groundwork for further studies in the way in which epistemic frameworks change. In addition, this study may facilitate dialogue between the two above-mentioned traditions.

This systematic and historical analysis focuses, in particular, on the pre-theoretical frameworks, such as, for example, fundamental ground motives (Dooyeweerd, Polanyi) and worldviews (Klapwijk, Popper, Kuhn, Feyerabend, Naugle).[5] As far as the theoretical frameworks are concerned, philosophy, special sciences, theories, axioms, and so on are usually widely recognised. This is not to say that there are no disagreements on their status: the issue of the demarcation criterion is a major example (see Coletto 2011b). Nevertheless, the recognition of these frameworks and the relative agreement on their nature is supposed to constitute a basis at least for dialogue. Given such relative agreement and due to space constraints, this article will, therefore, limit its scope to pre-theoretical frameworks. A brief summary of the philosophical schools examined in this study follows.

The reason for the choice of the specific humanist thinkers is that they are among the most influential contemporary philosophers of science and, as a consequence, cannot be neglected. However, the reformational tradition has developed valuable insights into the nature-freedom ground motive driving humanist thinking, as well

5 In keeping with the acceptable convention in reformational circles, I am using the terms 'pre-theoretical' and 'pre-scientific' as synonyms.

as into epistemic frameworks.[6] The reformational tradition proceeds from an integral, biblical starting point. In this sense, although being less well known than some of the more prominent traditions within Christian philosophy (for example, Scholasticism), the reformational school has made a valuable and original contribution. Therefore, I have also included the most important reformational philosophers of science. One advantage of this choice is that the comparison is made between schools of thought which are, at least ideologically, rather 'far' from each other, thus making any consensus particularly valuable. The reason why this article focuses on philosophers of science rather than on epistemologists, in general, is that frameworks are discussed more often and in detail in philosophy of science, while epistemology deals with broader themes (for example, types of knowledge). In order to pay some attention to frameworks that are perhaps not always readily recognised, let us start with the fundamental pre-theoretical frameworks.

1. The most fundamental frameworks?

The history of contemporary humanist philosophy of science shows increasing reliance on subjectivism accompanied by growing relativism and marked unease about the possibility of scientific objectivity. Concomitantly, the recognition of the role of presuppositions in scientific investigations formed a stark contrast to the conception of science according to the "received view" dear to the positivists (Coletto 2007a: 583-4). This may have had the effect that pre-theoretical frameworks became more 'acceptable' in the post-positivist period. In particular, frameworks regarded as originating in the knowing ability of the subject, or from the historical influence of social dynamics were readily recognised. Popper, Kuhn, and Feyerabend all seem comfortable accepting such frameworks, but they seem to be somewhat less comfortable with frameworks characterised by religious sources.[7] Nevertheless, in the humanist tradition, Polanyi

6 The nature-freedom ground motive is a fundamental duality in humanist thinking where the freedom of the human personality is placed in opposition to a rather deterministic view of nature.

7 In using the word 'religious', I follow Clouser (2005: 22-3) who states that "a belief is religious if it is a belief (1) in something(s) or other as divine or (2) a belief concerning how humans come to stand in proper relation to the divine".

started to recognise fiduciary frameworks as well. When it comes to the reformational tradition, Dooyeweerd, because of his contribution regarding religious ground motives, can be taken as representative of an abundance of authors (for example, Clouser, Klapwijk, Botha, and others) who discussed the role of fundamental frameworks in scientific thinking.

1.1 Herman Dooyeweerd

In his work *A new critique of theoretical thought*, Dooyeweerd demonstrates how pre-scientific frameworks, in particular religious ground motives, influence our theoretical thinking. In fact, theoretical thinking is possible and meaningful precisely because of a fundamental commitment of a religious nature. To understand what Dooyeweerd means by 'religious ground motive', it is necessary to examine the dynamics that, in his view, influence theoretical thinking.

1.1.1 Religious ground motives

Dooyeweerd (1953, 1: 68-9) describes how theoretical thought "gains a successively concentric direction to the presupposita which alone make it possible, no matter if the thinker has become aware of them in a really critical way of self-reflection". The "presupposita", in this instance, refer to transcendental ideas in the form of an 'answer' to a threefold fundamental question. The first question, which makes the theoretical attitude of thought possible, has to do with the idea of an origin of all meaning. This origin can either have an integral character – in which case only one Archè is accepted – or a dialectical character – in which case two or more principles of origin are accepted alongside one another.[8]

The divine, according to Clouser, is something that has absolute status; in other words, it is not relative to or dependent on anything else. This can include ultimate realities such as matter, rationality, and so on, and thus concerns "believers" such as naturalists, positivists, atheists, and so on. One practical implication is that debating about religious frameworks becomes possible and necessary, not only among members of the 'classical' religions, but among all human beings.

8 Meaning, in this instance, refers to "the being of all that has been created and the nature even of our selfhood. It has a religious root and a divine origin" (Dooyeweerd 1953, 1: 4). Philosophical thought should be directed towards a point of reference (or Archimedean point) "to which this modal diversity (of

A thinker's answer to the first question will determine his answer to the second question: whether or not one accepts the integral religious unity at the root of a diversity of aspects in reality, which grants a concentric expression to their totality of meaning.[9] This answer will, in turn, influence a thinker's attitude towards the third fundamental question: how one understands the mutual relation and coherence of a diversity of aspects of reality. According to Dooyeweerd (1953, 1: 69), these transcendental ideas "form an indissoluble unity".

Answers to these questions are always related to a 'religious ground motive' which drives theoretical and "historical development via certain cultural powers" (Dooyeweerd 1979: 9). The religious ground motive can either be internally dualistic and fragmentary, or internally unified, depending on the thinker's answer to the threefold question. In the case of dualistic religious ground motives, a "religious dialectic" arises, in which the "discord pushes one's posture of life to opposite extremes that cannot be resolved in a true synthesis" (Dooyeweerd 1979: 11). To understand what Dooyeweerd means by a religious dialectic, it is important to consider the difference between what he calls theoretical and religious antithesis.

1.1.2 Ground motives and antithesis

According to Dooyeweerd (1979: 12), theoretical antithesis concerns relative opposites which can be synthesised into a higher unity and as such resist any attempt by theoretical thought to absolutise them. In this theoretical sense, the proposition that one opposite absolutely

meaning) can be related, and to which I am to return in the process of reflecting thought" (Dooyeweerd 1953, 1: 8). An actual view of totality can only be obtained by "transcending the speciality of meaning" (Dooyeweerd 1953, 1: 8). Even after finding such an Archimedean point, a view of totality is not possible "apart from a view of the origin or Arché of both totality and speciality of meaning" since "meaning cannot exist by itself, but supposes an Arché, an origin which creates meaning. All meaning is from, through, and to an origin, which cannot itself be related to a higher Arché" (Dooyeweerd 1953, 1: 8-9).

9 In Dooyeweerd's (1979: 40-1) ontology, created reality displays several modes (aspects or modalities) of being in the temporal order. Although the modes are irreducible to each other, they have analogical coherence. Dooyeweerd distinguishes between the numerical, spatial, kinematic, biotic, psychical, logical, historical, lingual, social, economical, aesthetic, judicial, ethical and certitudinal modes of being.

excludes the other is nonsensical, since the opposites are merely two different ways in which temporal reality unfolds. Dooyeweerd (1979: 12) states that "instead of excluding they presuppose each other" and that "their mutual dependence points to a third element in which the two are united".

By contrast, a religious thesis "penetrates behind theory to the sure, absolute ground of all temporal, and therefore relative existence" (Dooyeweerd 1979: 8). This means that a religious thesis either claims absoluteness or abolishes itself – since the absolute has a right to exist in religion only and when the antithesis it poses is also considered absolute, no higher synthesis is possible. The religious dialectic, therefore, arises when "a religious ground motive deifies and absolutizes part of created reality" (Dooyeweerd 1979: 13). However, the poles of a religious ground motive are necessarily related to each other. This has the effect that the poles will alternately, in turn, be absolutised and depreciated. In this manner, a tension is created that is impossible to dissolve – the religious dialectic drives theoretical thinking, and practice, from pole to pole in a "pendulum dynamic", which is discussed further in the next section.

1.1.3 Fundamental driving forces in the history of Western thought?

In the history of Western thought, Dooyeweerd (1979: 15) identified four main religious ground motives characterised by such a dialectical drive: the form-matter ground motive of Greek antiquity, the power-law motive of the Roman Imperium, the nature-grace ground motive of Roman Catholicism, and the nature-freedom ground motive of modern humanism. In these dialectical ground motives, constituted by two poles in opposition, a 'pendulum dynamic' can be observed in 'phases' (for example, from rationalism to irrationalism or *vice versa*) that come and go throughout the history of Western thought.

With the exception of the four dialectical ground motives, a single ground motive exists unaffected by the 'pendulum dynamic', namely the creation-fall-redemption ground motive of biblical revelation (Dooyeweerd 1979: 15).

These ground motives "not only place an indelible stamp on the culture, science and social structure of a given period but

determine profoundly one's whole worldview" (Dooyeweerd 1979: 9). As such, these "religious drives control the development of western culture" (Dooyeweerd 1979: 14). The Greek ground motive, despite modifications, has continued to operate in Roman Catholicism and humanism, whereas the Roman Catholic ground motive has sought to combine the Greek motive with the biblical ground motive of creation-fall-redemption (Dooyeweerd 1979: 14).

Since the ground motives control the direction of cultural development, in general, they would also direct specific cultural endeavours, for instance special scientific inquiry. However, because the ground motives exert their influence on a religious level, rather than on a merely rational level, their existence and influence were not readily accepted by philosophers of science in the wake of the "received view".[10] However, since the 1940s, Michael Polanyi began to realise the potential influence of such fundamental commitments.

1.2 Michael Polanyi

To understand Polanyi's appreciation for the role of fiduciary frameworks in scientific thinking, it is necessary to briefly examine his epistemology. Polanyi (1946: 45) argues that what determines the nature of knowledge is "personal commitment to ideals" and is in a sense more akin to "religious" belief (*fides quaerens intellectum*) than to rationality. For Polanyi (1969: 170), the transition from particular clues to universal concepts cannot be achieved by "explicit logical inference". Our ability to cross this gap illustrates "the most striking powers of tacit knowing" which we employ to "focus our attention on the joint meaning of particulars, even when the focus to which we are attending has no tangible centre" (Polanyi 1969: 171).

In addition, the joint meaning of particulars is revealed as a "new quality" that is "more real" than the tangible particulars themselves, because it is "likely to show up in a wider range of indefinite future

10 One of the implications of the nature-freedom ground motive is that it attempts to define the place of human beings in the world as simultaneously above nature (supra-natural) by, for instance, absolutising human freedom over nature in the form of rationalism, and as part of nature (natural), for instance in certain types of naturalism, by believing that nature is all that is necessary to explain nature. For an indication of the practical implications of this paradox in terms of sustainable environmental management, see Loubser & Venter (2009).

manifestations" (Polanyi 1969: 168). Knowing the way in which certain particulars cohere in a focal centre involves commitment in the form of assent from the knower. Universal concepts must be held in universal intent as "the meaning of their particulars" and as "distinct from the clues by which they happen to manifest themselves" (Polanyi 1969: 170-1). On the basis of his epistemological background, Polanyi was prepared to recognise the more fundamental, pre-scientific frameworks.

1.2.1 Polanyi's theory of presuppositions

It appears that Polanyi agrees with Dooyeweerd, that belief or commitment gives the "focal centre" or "concentric direction" of meaning to theoretical thought. Such commitment forms a fundamental framework that shapes scientific perception and directs the selection of scientific problems (Polanyi 1946: 44; 1958: 122-4).

Polanyi (1946: 42) initially classifies the premisses underlying science into two classes, namely general assumptions dealing, for example, with the nature of everyday experience in terms of a naturalistic, as opposed to magical, mythological, and other outlooks, and particular assumptions, underlying the process of scientific discovery and its verification.[11] These assumptions are not inborn and, because they are "never formulated and transmitted in the form of definite precepts", they are usually acquired through "practice guided by intelligent imitation" which usually occurs in "close personal association with the intimate views and practice of a distinguished master" (Polanyi 1946: 42-3).

The young scientist, in her effort to understand science, must be driven by the belief that there is something valuable and meaningful that can be understood. Because this belief points towards things that are still beyond her intellectual grasp, she has no choice but to accept the "authority" of what she is yet to learn and, by implication, also the authority of those that guide her in their manner and outlook (Polanyi 1946: 44-5). Although she is expected to ultimately outgrow her reliance on such authorities, the initial act of trust is fundamental.

11 In the sections dealing with Polanyi's work, I maintain his spelling of the word "premisses".

Later, by relying more on her own judgment, her "intuition" and "conscience" will harmonise sufficiently with that of a community of other scientists (Polanyi 1946: 45-6). What forms the "shared ground" of this community is a third class of premisses called ideals. The ideals of science foster a kind of morality (or love of science) and consist of a fourfold proposition: "that there is such a thing as truth", "that all members love it", "that they feel obliged", and "are in fact capable of pursuing it" (Polanyi 1946: 71).

In addition to the premisses (classes 1, 2 and 3) which are located at pre-scientific level, Polanyi (1946: 85) also distinguishes a fourth class of premisses, namely ultimate suppositions, which "present remarkable diversity even though fundamentally based on common ground".[12] The ultimate suppositions are theoretical by nature which can be illustrated by means of various scientific examples[13].

All the premisses included in classes 1, 2 and 3 are pre-theoretical by nature since "they are of the kind which can be invalidated by the mere process of doubting them" (Polanyi 1946: 71), and our adherence to them is an act of ultimate conviction (Polanyi 1946: 81). As such, they form a "common ground of transcendent obligations" in which individuals are "rooted" (Polanyi 1946: 72) and which cannot be "explicitly formulated" but are found "authentically manifested only in the practice of science" (Polanyi 1946: 85). This means that, although some of Polanyi's premisses can be located at worldview level, there seems to be other premisses pointing towards the gradual disclosure of a more fundamental level.

> It would thus appear that when the premisses of science are held in common by the scientific community each must subscribe to them by an act of *devotion*. These premisses form not merely a guide

12 Different authors assign different meanings to the phrase 'ultimate' suppositions. In Polanyi, the phrase refers to premisses that are scientific and derived from other pre-scientific premises, for instance "fundamentally based on common ground" (Polanyi 1946: 85) almost like 'branches' are derived (or emerge) from 'roots'. On the contrary, in other authors (for example, Collingwood 1998), 'ultimate' refers to the 'roots' rather than the 'branches'.

13 Polanyi (1946: 85-8) explains, by means of examples ranging from Pythagoras to Einstein's work, that the universe was initially assumed to be governed by "numerical and geometrical rules" and relates how the features of this "materialistic and mechanical picture" were gradually abandoned to yield the presuppositions of science in the twentieth century.

> to intuition, but also a guide to conscience; they are not merely indicative, but also normative. The tradition of science, it would seem, must be upheld as an unconditional demand if it is to be upheld at all. It can be made use of by scientists only if they place themselves at its service. It is a *spiritual reality* which stands over them and compels their allegiance (Polanyi 1946: 54) [emphasis, AL].

The next section of this article compares the spiritual reality referred to by Polanyi to Dooyeweerd's fundamental ground motives.

1.2.2 Fiduciary frameworks and scientific thinking

Although Polanyi does not explicitly refer to a religious ground motive in the Dooyeweerdian sense, he does seem to agree with Dooyeweerd that the beliefs in the pre-theoretical domain form the basis of all theoretical knowledge:

> We must now recognize belief once more as the source of all knowledge. Tacit assent and intellectual passions, the sharing of an idiom and of a cultural heritage, affiliation to a like-minded community: such are the impulses which shape our vision of the nature of things on which we rely for our mastery of things. No intelligence, however critical or original, can operate outside such a fiduciary framework (Polanyi 1958: 266-7).

Furthermore, Polanyi's fiduciary framework seems to point towards a religious dimension, or in his own words, a "spiritual reality" (1946: 54) confirmed by "faith" (1946: 55). Like Dooyeweerd, Polanyi seems to recognize that fiduciary frameworks form a pre-theoretical driving force, that cannot be denied theoretically. He describes the hold of beliefs over theoretical thinking as follows:

> But though our thinking has contrived these artifices, yet they have the power to control our thought. They speak to us and convince us, and it is precisely in their power over our own minds that we recognize their justification and their claim to universal acceptance (Polanyi 1958: 265).

There is however, also a notable difference between Polanyi's fiduciary frameworks and Dooyeweerd's idea of religious ground motives. Polanyi tends to see the foundation (at least initially) as common to all scientists, while Dooyeweerd seems to recognize the existence of several different ground motives.

For Polanyi (1946: 56) the community of scientists is "jointly rooted in the same ideals recognized by all". Later however, the

"common ground" on which Polanyi's ultimate and even the general and particular assumptions are based seems to become eroded as his work increasingly follows the general pluralist trend towards post-modernism in philosophy of science (Coletto 2007b: 74-75). In my opinion, Dooyeweerd's (1953, 1: 3-67) recognition of a plurality of confessional presuppositions influencing the theoretical domain (Dooyeweerd 1953, I: 93-102) is a step in the direction towards a more satisfactory epistemological model.

1.3 Consensus on the nature and functions of fundamental ground motives

Herman Dooyeweerd and Michael Polanyi are not the only philosophers who recognise fundamental pre-theoretical frameworks. The existence of fundamental ground motives gained general consensus in reformational philosophy with a line of authors.[14] But even in humanist philosophy, in addition to Polanyi, several authors can be mentioned, among others Feyerabend (1975: 19-20, 180, 276; 1978: 70). In the case of authors who ignore the existence of fundamental pre-theoretical frameworks, it may be argued that the subliminal nature of these frameworks has caused the authors to be unaware of holding such frameworks. It was shown, for instance by Stafleu (1987: 204; see also Coletto 2007b: 33, 72-3), that Popper's work, although ignoring the existence of fundamental pre-theoretical frameworks, was not free of them. At this point, it may be helpful to briefly summarise the consensus regarding the nature and epistemic role of fundamental pre-theoretical frameworks.

One of the commonly recognized characteristics of fundamental frameworks is that they are pre-theoretical in nature. Because of their pre-theoretical nature, they cannot always be articulated theoretically and may, in some instances, be held subliminally. In addition, fundamental frameworks represent a commitment or assent to presuppositions that may not be the result of conscious (theoretical) choice and that cannot be denied theoretically. As such, fundamental frameworks form an ultimate reality which transcends what can be otherwise perceived.

14 See Clouser (2005: 1-5), Klapwijk (1984: 166), Duvenage (1985: 31-6), Botha (2002: 181, 214).

The common functions of fundamental frameworks are presupposed by their nature, and include giving direction and meaning to theoretical thought by driving it towards a concentric focal point of presuppositions. In this manner, they not only make theoretical thought possible, but also drive cultural developments such as science. Because fundamental frameworks exert their influence on a religious rather than a theoretical level, they can 'take hold' of people, forming a 'common ground' of convictions which yields universal claims. Apart from fundamental frameworks, worldviews and world pictures also function as pre-theoretical frameworks.

2. Worldviews and world pictures

Historically, human beings have viewed the world in many different ways. Venter (1996: 205-7) describes how human beings can understand their place – status and task – in the world, in relation to important categories. The categories God-law-cosmos are prevalent in the reformational tradition. This interpretation of the world becomes the person's and/or group's worldview and is a total view of life, providing basic orientation. Occasionally, a worldview can come into existence when the orientation is attempted in the absence of a supra-cosmic, supra-temporal (Archimedean) point from which a totality perspective can be attained. Because of this lack of an Archimedean point, the human subject has to orient him-/herself by using a model derived from everyday experience - a vantage point from inside created reality. Through such a model, features of created reality (for example, living organisms) are extended to the whole of 'life' (for example, in an organismic worldview). In other instances, worldviews do employ transcendental (Archimedean) vantage points.

Venter (1996: 205-7), among other authors, also distinguishes worldviews from world pictures. World pictures, according to him, are representations of the physical structure of the world. As such, world pictures often find expression in the natural sciences (for example, the Newtonian view of the universe), but may, when taken to be a description of life in the general sense, also influence a worldview (for example, a mechanistic worldview) (Venter 1996: 206-7).

This description shows that worldviews and world pictures emerge from fundamental frameworks such as ground motives, but also have

a very personal or communal character which remains historically and culturally relative. In addition, as views of the physical world, world pictures may be considered part of worldviews (broader views of life). In the following sections, the discussion of worldviews will implicitly include world pictures.

Although there is an abundance of literature on worldview in the reformational tradition, I will specifically examine the contributions of three authors, namely Wolters, Olthuis, and Klapwijk. The reflections of these authors are taken as a representative selection of the mature reflection regarding worldviews in reformational circles. It should be noted that, in humanist philosophy, worldviews are discussed especially in relation to natural science whereas, in reformational philosophy, they are related to all the special sciences. Once again, my thesis is that a degree of consensus on the nature and role of worldviews can be detected between the reformational and humanist philosophies.

In the following sections, the historical nature of worldviews will be further elaborated, and the functions of worldviews will be made more explicit. Worldviews will also be related to reality. I will begin by discussing the reformational tradition.

2.1 Albert Wolters: the pre-theoretical nature and historicity of worldviews

Wolters (1989: 18) notices that the term *Weltanschauung* (worldview) became pervasive in the spirit of German idealism and romanticism. During this period of reaction against the Enlightenment, the historically situated individual was re-valued. According to Wolters (1989: 18),

> ... a great reversal of values occurred wherein the universal was depreciated in favor of the particular, the abstract in favor of the concrete, the eternal in favor of the temporal, the identical in favor of the unique.

This observation leads Wolters to interesting insights regarding the historicity of worldviews.

Apart from the "cognitive orientation towards the whole" as "associated with the optical metaphor", a worldview "places emphasis on the particular, concrete, temporal, and unique character of that

viewing" (Wolters 1989: 18-9). This makes *Weltanschauung* a world outlook from a particular vantage point, unable to escape from its own historicity. Of course, this particular outlook can also be more than individual. It can be collective and as such be "held by anyone belonging to a given nation or class or period" (Wolters 1989: 19). In fact, because of its pre-theoretical character, *Weltanschauung* is available to the mass of people, rather than being accessible only to the scientific elite. It should be noted, however, that the reformational school does not accept the notion that worldviews are less 'rational' or correct than other types of frameworks, for instance, philosophy.

The paradoxical nature of worldviews as time and context-bound reflections, simultaneously claiming universality, caused Olthuis to propose an alternative understanding of worldviews.

2.2 James Olthuis: worlds and views in interaction

In the model proposed by Olthuis (1989: 30) "a worldview functions as a vehicle of mediation and integration in a two-way movement between faith commitment and other modes of human existence".[15] According to Olthuis (1989: 27-8), not only do ideas shape human action and culture, but ideas are also shaped by language (Von Humboldt, Heidegger, Gadamer, and so on), scientific frameworks (Polanyi, Kuhn), psychological personality types and development (Freud), our preoccupation with orthodoxy and resultant orthopraxis (Frankfurt School and Liberation Theology), as well as by genetic and organic predispositions (sociobiology). Olthuis (1989: 32) further observes that

> in the movement from life experience to faith experience, a worldview first shapes itself to the world and then shapes faith to itself, attuning and adjusting images of the cosmic order so that

15 It is important to note that Olthuis, in an earlier text (1985), recognises the discussion about the distinction between 'religion' and 'faith'. However, later (Olthuis 1989: 31-2) he seems to use the two terms 'religion' and 'faith' interchangeably. I do not agree with Olthuis on this point, since 'faith' refers specifically to the meaning-nucleus of the certitudinal aspect of reality, whereas 'religion' refers to the normative direction of all of the aspects of reality in coherence.

> they mirror experienced reality. As it shapes itself to the world, a worldview is confronted by the demands of life as a whole.

This view gives worldviews a kind of double function: both descriptive and normative (Olthuis 1989: 29). The descriptive lens will shape itself to our experience, whereas the prescriptive lens will shape experience to itself:

> Through both lenses of its dual focus, a worldview purports to give the true picture of reality. For its adherents, a worldview gives the truth about history, life and existence, and reveals the way to salvation and healing (Olthuis 1989: 29-30).

While worldviews are mostly argued from, they can (and ought) also be argued to. Experiences of aspects of reality may necessitate re-articulations of the worldview, increasing insight (Olthuis 1989: 33). However, such changes in worldview do not necessarily mean that the underlying "faith" (ground motive) automatically changes. The reason for this, according to Olthuis (1989: 32), is that "our basic beliefs receive their meaning in terms of how they fit into a particular worldview" so that "we often have diverging worldviews emerging from the same basic underlying faith commitment".[16] In fact, the process of worldview re-articulation (or even change) can often deepen one's faith.

According to another reformational author, Klapwijk (1989: 42), Olthuis refers to what it means to have a worldview in his phenomenological description, rather than providing a precise definition of "worldview" itself.

2.3 Jacob Klapwijk on the functions of worldviews

According to Klapwijk (1989: 41-3), a worldview is always presupposed in scholarly work and by "being a *transcendentale*" to philosophical rationality, it becomes impossible to define it in a "closed, rationally adequate" manner. In this sense, Olthuis's omission to define 'worldview' is acceptable to Klapwijk, who further notes that our failure to conceptualise 'worldview does not imply that worldviews do not exist or are inconsequential. It rather reinforces the notion that worldviews are a pre-theoretical type of framework influencing

16 Olthuis (1989: 32) gives examples of a variety of worldviews emerging from Buddhism, Hinduism, Islam and Christianity.

our theoretical reflections and discussions. This awareness cautions against rationalism.

In further appreciation of Olthuis's work, Klapwijk (1989: 42) notes that the term 'worldview' may be contaminated by a visual metaphor[17]. For Klapwijk, this is problematic because it implies an all-encompassing "view of the world" whilst being trapped inside the very world, leaving us with a "perspective of life and the world that a fish has of the water" in which it is swimming. Secondly, it leads us to a "somewhat resigned" understanding of worldviews as being "contemplative". For Klapwijk (1989: 42), the metaphor of seeing conveys "overtones of the medieval notion of *visio Dei*" as well as notions of German romantic idealism in which "worldview is primarily conceived as an idea". The concepts of 'contemplation' and 'viewing' were connected in the ancient Greek term '*theorein*' (Wolters 1989: 18).

Admittedly, Olthuis's phenomenological approach corrects this overly contemplative direction, by also pointing to the practical and normative implications of worldviews as sources of action in the world (Klapwijk 1989: 42-3). This means that worldviews function both as a "vision *of* life" and a "vision *for* life" (Klapwijk 1989: 42) and have practical and normative implications for concrete human existence. Worldviews are not merely a matter of reflection, but also shape our culture.

In another original contribution, Klapwijk proposes that ideas should be more freely and creatively exchangeable between different frameworks, rather than being trapped in a particular worldview. This requirement arises, because research is practised in a "complex society" where communication between researchers is part of the "nature of the scholarly, scientific way of thought" and where an "exclusively antithetical" position would isolate Christian researchers (Klapwijk 1986: 143). However, since non-Christian ideas cannot simply be synthesised into Christian thought, he (Klapwijk 1986: 144) suggests that these ideas should be "transformed", in other words,

17 Klapwijk (1989: 42) detects this inclination specifically in Dilthey who took the idea of "worldview" or "lifeview" quite literally, and notes that, since the time of Dilthey, this understanding of the term has often been predominant in debates on worldview.

appropriated in a critical manner. For Klapwijk, ideas should not be "prisoners" of frameworks, so that scientific communication can occur more freely. This may point to a disagreement rather than consensus between Klapwijk and Kuhn.

At this point, it is necessary, for the sake of evaluating the possibility of consensus, to consider contributions from authors (for example, Kuhn) in the humanist tradition, regarding the nature and function of worldviews in more detail.

2.4 Thomas Kuhn

It was noted earlier that the worldview level was present in the work of Kuhn's tutor, namely Polanyi. Thomas Kuhn proposed his idea of the paradigm as a hybrid framework, which spanned both the theoretical and the pre-theoretical domains. In doing so, he presented a particular form of worldview as an epistemic framework. Although paradigms are different from worldviews, the idea of a worldview is not absent from Kuhn's theorising.

2.4.1 Paradigms

According to a well-known critique by Masterman (1970: 61-5), Kuhn describes paradigms in "no less than twenty-one different senses" in *The structure of scientific revolutions*.[18] From these descriptions, however, Masterman (1970: 65) distinguishes three main facets of paradigms:

- Philosophical paradigms (metaphysical paradigms or metaparadigms) paradigms are equated with "a set of beliefs" (Kuhn 1970a: 4), "myth" (Kuhn 1970a: 2), "standard" (Kuhn 1970a: 102), "organizing principle governing perception itself" (Kuhn 1970a: 120), "map" (Kuhn 1970a: 108), or "something which determines a large area of reality" (Kuhn 1970a: 128).
- Sociological paradigms are "universally recognized scientific achievement" (Kuhn 1970a: x), "as like a set of political institutions"

18 Kuhn's concept of 'paradigm' consisted of several 'items' and was revised during the course of his work. A comprehensive explanation of the nature of the Kuhnian paradigm lies beyond the scope of this article. For a more detailed analysis of the paradigm concept, see Masterman (1970: 59-89), Botha (1988: 33-62) and Coletto (2007b: 86-9).

(Kuhn 1970a: 91), "like an accepted judicial decision" (Kuhn 1970a: 23).

- Construct paradigms (artefact paradigms) are "actual textbook or classic works" (Kuhn 1970a: 10), "actual instrumentation" (Kuhn 1970a: 59-60), linguistic or "grammatical paradigms" (Kuhn 1970a: 23), illustrative "analogies" (Kuhn 1970a: 14), "gestalt-figures" (Kuhn 1970a: 85), and so on (Masterman 1970: 65).

Other authors who accept Masterman's classification include Botha (1988: 47) and Coletto (2007b: 88-9). I agree with the classification, because it indicates that, for Kuhn, paradigms contain some elements that function on the pre-theoretical or worldview level (philosophical paradigms), as well as other entities that are more theoretical in nature.

Studying the roles of the facets of this hybrid framework may be useful to explain the antithesis accompanying scientific revolutions. In fact, according to Kuhn, after revolutions, a radical theoretical antithesis is created between the old and the new paradigm. I would argue that this possibly happens because of changes in the metaparadigm (the metaphysical or philosophical facets of paradigms). The implications of such a theoretical antithesis confirm the important role of presuppositions for science (theoretical frameworks). Subsequently, in *Second thoughts on paradigms*, Kuhn (1974) elaborated his idea of a hybrid framework further, by introducing what he termed the "disciplinary matrix".

2.4.2 The disciplinary matrix

As a hybrid framework, a disciplinary matrix can be conceived of as an integral unity, or as consisting of 4 separate facets (also recognised by Coletto 2007b: 88-9), namely:

- Shared symbolic generalisations.

Formalised universal propositions are regarded as natural laws, "routinely" used "without felt need for special justification" and "seldom challenged" by other members of the community. The symbols used to form expressions are "uninterpreted, still empty of empirical meaning or application", but the "shared commitment to the set of generalizations justifies logical and mathematical manipulation and induces commitment to the result" (Kuhn 1974: 464).

- Models.

Preferred analogies provide the scientific community "when deeply held, with an ontology". The models can be both heuristic, at one extreme, and "objects of metaphysical commitment", at the other (Kuhn 1974: 463).

- Values.

"[S]tandard criteria for evaluating the adequacy of a theory [...] provide the shared basis for theory choice". These characteristics include accuracy, consistency, broadness in scope, simplicity, fruitfulness of new research findings, and so on (Kuhn 1977: 321-2).

- Exemplars.

These are concrete problem solutions that are accepted by the group. The term 'exemplar' becomes the new and more fundamental sense of the term 'paradigm' (Kuhn 1974: 463).

Disciplinary matrixes need to be "attached to nature" by the human subject (Kuhn 1974: 467). Because some of the facets of the disciplinary matrix, in particular models and values, are pre-theoretical by nature, a disciplinary matrix can be said to have a worldview-like component. This means that worldview as an epistemic framework is, once again, recognised in Kuhn's philosophy of science. In the case of both paradigms and disciplinary matrixes, the worldview component is integrated by a theoretical component. This idea is confirmed by the fact that Kuhn (1970a: 111) occasionally defines scientific revolutions as "changes of worldview". In addition, according to Kuhn (1970a: 175), in one sense, the term 'paradigm' can be defined as "the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community".

This notion of a hybrid framework is not absent in reformational circles, and both Stafleu and Botha call this, for example, a "scientific worldview". Stafleu (1987: 242-9) describes a scientific worldview as a "theoretical view of reality" consisting of four aspects, namely "the ontological (what does the world look like?), the epistemological (what are the sources of knowledge?), the logical one (what counts as proof?), and the heuristic aspect (how are theories found?)". Botha (2002: 59-65) also recognises that "scientific worldviews" play a role in directing scientific theories. However, Coletto (2011a) pointed out

that it is not completely clear whether a "scientific worldview" differs significantly from the philosophy of specific disciplines.

2.4.3 Thomas Kuhn on the nature of worldviews

In agreement with an author in the reformational tradition (Wolters), Thomas Kuhn also recognises the historicity of paradigms. For Kuhn (1970a: 208), scientific development can be portrayed as "a succession of tradition-bound periods punctuated by non-cumulative breaks". This means that a paradigm contains worldview-like elements, which are perceived (by Kuhn) to be historical or "tradition-bound". In fact, for Kuhn (1970a: 210), "scientific knowledge, like language, is intrinsically the common property of a group or else nothing at all". In line with Olthuis, Kuhn also seems to believe that paradigms and reality are mutually interrelated, so that changes in the one influence the other and *vice versa*. On the one hand, paradigms specify which entities the universe does contain and which it does not (Kuhn 1970a: 7). This means that, for Kuhn (1970a: 6), scientific revolutions transform the scientific imagination "in ways that we shall ultimately need to describe as a transformation of the world". On the other hand, nature occasionally violates the "paradigm-induced expectations" of normal science (Kuhn 1970a: 52-3). This has the effect that, after exploration of the area of anomaly, a paradigm can be adjusted to fit the previously anomalous facts, or can enter a period of crisis ultimately leading to a revolution (Kuhn 1970a: 53).

In addition, Kuhn seems to suggest that different versions of a paradigm may stem from the same underlying framework. He (Kuhn 1970a: 6-7) refers to some changes as "episodes that were not so obviously revolutionary" as they only affected a smaller professional group. This may suggest that there are "main" paradigms which underlie several, slightly different, "smaller" paradigms (Kuhn 1970a: 49-50). This points to a further moment of agreement between Kuhn and Olthuis.

Kuhn (1970a: 111) argues that, after a scientific revolution, scientists are responding to a different world and that the change affects both what the scientists see and do. On this point, Kuhn seems to concur with Klapwijk: frameworks are not merely reflective, but also influence our actions. It appears that other authors in the

humanist tradition also agree. Paul Feyerabend (1975: 224-5) considers the natural sciences somewhat like languages. According to this view, languages are

> ... not merely instruments for describing events (facts, states of affair), but they are also shapers of events (facts, states of affair) (Feyerabend 1975: 223).

This means that languages contain a "cosmology, a comprehensive view of the world, of society, of the situation of man which influences thought, behavior, perception" (Feyerabend 1975). Feyerabend (1975: 224) believes that, since scientific theories are "sufficiently general" and "have developed in sufficiently complex ways", theories, like languages, contain elements of worldviews.

Before concluding it is necessary to summarise the points of agreement on the characteristics and functions of worldviews.

2.5 Consensus on the nature and functions of worldviews

Worldviews as frameworks are recognised by philosophers in both the reformational (Wolters, Olthuis, Klapwijk) and humanist traditions (Kuhn) in philosophy of science. These authors are not the only philosophers of science to agree on the existence of worldviews as epistemic frameworks, but due to space constraints all of the authors could not be examined.[19] The instances that were displayed are presented as sufficient justification for the thesis that worldviews are recognised frameworks in scientific thinking.

The common characteristics of worldviews include the following: worldviews represent a view of reality in terms of the human being's place in relation to important ontological entities and imply an ontic relation between these entities.

Worldviews have a historical, culturally relative character and can be held collectively by everyone in a certain class or period, but they can simultaneously be very concrete (personal). Worldviews are pre-theoretical by nature. Hybrid frameworks such as paradigms are supposed to contain worldview elements (pre-theoretical) as well as more theoretical elements. Worldviews can be re-articulated

19 See further references to Feyerabend and Popper at the end of this section.

(changed) following experience of reality. This change does not always necessitate a change in the fiduciary frameworks underlying the worldview, since different worldviews can be formed from the same ground motive.

The common functions of worldviews include the following: worldviews provide a cognitive orientation towards the whole in the form of a descriptive and normative 'guide to life'. This means that worldviews can both be argued 'from' and 'to', and that basic beliefs receive their meaning in terms of how they are elaborated in a particular worldview. In fact, one of the most important functions of worldviews seems to be their role in integration, by providing a unifying framework for experience. Finally, worldviews are not only reflective, but also a source of action and motivation with practical and normative implications.

3. Conclusion

During late-modern times, the 'received view' of science has been increasingly challenged by a growing emphasis on the role of the human subject in the generation of scientific knowledge. With this emphasis came a proliferation of terms indicating different epistemic frameworks (especially pre-theoretical) proposed to explain how the human subject comes to know. Although it appears that there are wide differences in the terminology employed to describe such frameworks, I have argued that some common ground does exist, at least between the humanist and reformational traditions in philosophy of science.

Further exploration of the theoretical frameworks could shed light on the interrelations between the pre-theoretical and theoretical frameworks, and explain how they cohere with one another. The present study is a necessary first step for further questions, for example: how does change (and constancy) in epistemic frameworks take place – are changes random or somehow constricted? Which change factors are the most important in science? Should epistemic frameworks be regarded as primarily changing or constant? These questions should be the focus of further research and will, it is hoped, stimulate further discussion about the relevance of epistemic frameworks.

Bibliography

Botha M E

1986. 'Bewitching' or confusing metaphysics: the demarcation between science and metaphysics according to Karl Popper. *Koers* 51(4): 430-40.

1988. Objectivity under attack: rethinking paradigms in social theory – a survey. Marshall *et al* (eds) 1988: 33-62.

2002. Of light and limits: philosophy matters. *In die skriflig* 36(2): 207-25.

Coletto R

2007a. Presuppositions and the challenge to objectivity in late-modern philosophy of science: causes and possible remedies. *Koers* 72(4): 583-602.

2007b. The legitimacy crisis in late-modern philosophy of science: towards a reformational response. Unpubl doctoral thesis in Philosophy. Potchefstroom: North-West University.

2011a. Towards a theory of presuppositions: Kuyperian contributions. *Koers* 76(1). [in press]

2011b. Science and non-science: the search for a demarcation criterion in the 20th century. *Tydskrif vir Christelike Wetenskap*, 47(1): 63-79.

Collingwood R G

1998. *An essay on metaphysics*. Oxford: Clarendon Press.

Clouser R A

2005. *The myth of religious neutrality: an essay on the hidden role of religious belief in theories*. Revised edition. Notre Dame, IN: University of Notre Dame Press.

Dooyeweerd H

1953. *A new critique of theoretical thought*, 1-4. Transl by D H Freeman & W Young. Amsterdam: Uitgeverij H J Paris.

1979. *Roots of western culture: pagan, secular and Christian options*. Toronto: Wedge.

Duvenage B

1985. *Christian scholarship as Word-bound scholarship*. Potchefstroom: Potchefstroom University for C.H.E. Potchefstroom Studies in Christian Scholarship.

Feyerabend P K

1970. Consolations for the specialist. Lakatos *et al* (eds) 1970: 197-230.

1975. *Against method: outline of an anarchistic theory of knowledge*. London: New Left Books.

1978. *Science in a free society*. London: New Left Books.

Klapwijk J

1984. Religieuze antithese en theoretische communicatie in de sociale wetenschappe. *Radix* 10(1): 153-68.

1986. Antithesis, synthesis and the idea of transformational philosophy. *Philosophia Reformata* 51(1-2): 138-52.

1987. Reformational philosophy on the boundary between the past and the future. *Philosophia Reformata* 52(2): 101-34.

1989. On worldviews and philosophy. Marshall *et al* (eds) 1989: 41-55.

KUHN T S
1970a. *The structure of scientific revolutions*. Chicago, ILL: The University of Chicago Press.

1970b. Logic of discovery or psychology of research? Lakatos *et al* (eds) 1970: 1-23.

1974. Second thoughts on paradigms. Suppe (ed) 1974: 459-82.

1977. *The essential tension: selected studies in the scientific tradition and change*. Chicago, ILL: University of Chicago Press.

LAKATOS I
1978. Introduction: science and pseudoscience. Worrall (ed) 1978: 1-7.

LAKATOS I & A MUSGRAVE (eds)
1970. *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press.

LOUBSER R A & J J VENTER
2009. Philosophical issues in environmental management: nature-culture dialectic and sustainability. *Acta Academica* 41(1): 22-68.

MARSHALL P A, S GRIFFIEON & R J MOUW (eds)
1989. *Stained glass: worldviews and social science*. New York: University of America Press.

MARSHALL P A & R VAN DER VENNEN (eds)
1988. *Social sciences in Christian perspective*. Lanham, MD: University Press of America.

MASTERMAN M
1970. The nature of a paradigm. Lakatos *et al* (eds) 1970: 59-89.

MCINTIRE C T (ed)
1985. *The legacy of Herman Dooyeweerd*. Lanham: University of America Press.

NAUGLE D K
2002. *Worldview: the history of a concept*. Mich: Wm B Eerdmans Publishing Co.

OLTHUIS J H
1985. Dooyeweerd on religion and faith. McIntire (ed) 1985: 21-40.

1989. On worldviews. Marshall *et al* (eds) 1989: 26-40.

POINCARÉ H
1905. *Science and hypothesis*. New York: The Science Press.

POLANYI M
1946. *Science faith and society*. Chicago, ILL: University of Chicago Press.

1958. *Personal knowledge: towards a post-critical philosophy*. London: Routledge & Kegan Paul.

1969. *Knowing and being*. Chicago, ILL: University of Chicago Press.

POPPER K R
1957. *The poverty of historicism*. London: Routledge & Kegan Paul.

1963. *Conjectures and refutations: the growth of scientific knowledge*. London: Routledge & Kegan Paul.

1970. Normal science and its dangers. Lakatos *et al* (eds) 1970: 51-8.

1979. *Objective knowledge: an evolutionary approach*. Oxford: Clarendon Press.

1996. *The myth of the framework: in defence of science and rationality*. London: Routledge.

STAFLEU M D
1987. *Theories at work: on the structure and functioning of theories in science, in particular during the Copernican revolution*. Lanham, MD: University Press of America.

STRAUSS D F M
2009. *Philosophy: discipline of the disciplines*. Grand Rapids, MI: Paideia Press.

SUPPE F (ed)
1974. *The structure of scientific theories*. Urbana, ILL: University of Illinois Press.

VENTER J J
1996. Conceiving conflict/ competition – gripped by a world picture: C Darwin, D H Lawrence and F A von Hayek. *Analecta Husserliana* 47: 205-48.

WOLTERS A
1989. On the idea of worldview and its relation to philosophy. Marshall *et al* (eds) 1989: 14-25.

WORRALL J & G CURRIE (EDS)
1978. *The methodology of scientific research programmes*. Philosophical papers, 1. Cambridge: Cambridge University Press.