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PAUL WEINGARTNER

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Bochenski: Attempts to Apply Logic to Problems of Religion

Paul Weingartner
Universität Salzburg

Abstract. The paper deals with four areas of problems of religion where logic is applied. The kind of application used is mainly to take established laws and rules of formal logic but also to develop some new semantical relations. The first area is that of levels of extension and intension: In religious texts, like in the bible, but also in literature there are sometimes cases where a word is a name (in the literal sense) for some object and this object is a name (in the metaphorical or spiritual sense) for some other object. These semantical levels are analyzed by offering exact definitions. A further area is analogy where it is shown how applied logic can help to offer definitions and analyze the important relations of analogy by proportionality and by attribution. A third area is that of the problem of evil. It is shown that two very widespread arguments which attribute every evil to God are either invalid or have false premises. The last area of problems are those of an analysis of religious belief. It is shown that there are not only differencies between scientific and religious belief (as is expected) but also a lot of interesting similarities.

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Résumé. Cet article traite de quatre sortes de problèmes religieux où la logique est susceptible d'être appliquée. Les applications consistent notamment à emprunter certaines lois et règles de la logique formelle, mais aussi à développer quelques nouvelles relations sémantiques. Le premier domaine d'application est constitué par les niveaux de l'extension et de l'intension : dans les textes sacrés comme la Bible ou même la littérature se trouvent parfois des cas où un mot est un nom (au sens littéral) pour un objet et que cet objet est un nom (au sens métaphorique ou spirituel) pour quelque autre objet. On analyse ici les niveaux sémantiques impliqués en proposant des définitions exactes. L'analogie constitue un second champ de réflexion : on montre comment la logique appliqué est utile pour formuler les définitions et pour analyser les relations importantes d'analogie proportionnelle et d'analogie par attribution. Le problème du mal est au centre du troisième développement : deux arguments largement répandus qui attribuent tout mal à Dieu sont soit non valides, soit ils présupposent de fausses prémisses. La dernière sorte de problèmes concerne l'analyse de la croyance religieuse : on établit non seulement les différences – comme on peut s'y attendre – entre la croyance scientifique et religieuse mais également nombre de ressemblances significatives.

Introduction

In his *Logic of Religion* Bocheński points out that there are some necessary conditions for the application of logic to a certain field: (1) There must be a discourse which has (2) some objective structure i.e. can be semantically interpreted in an objective way and to which (3) methodology can be applied. All the points are acceptable in general. In the third point however Bocheński requires that the field to which methodology is applied contains only propositions (which are true or false). This condition seems to me too restrictive. The reason is this: Every religious context includes moral norms and value judgements (besides propositions). Norms are usually not called true or false because instances which do not fulfil a norm do not refute the norm. Even if it is possible to concentrate on the *content* of norms and to retranslate them into propositions ("that-clauses") of the form "it ought to be the case that " it should be explicitly mentioned that methodology is also applied to norms. The same holds for value judgements: As to value judgements they have at least the grammatical form of propositions. From this point of view they can be true or false. And it is just a fact that a great number of value judgements of everyday life (which are not or only indirectly concerned with ethical or moral or aestethical values) are easily accepted as being true or false (for example concerning: high quality meat, successful operation, properly

running motor). As for the value judgements concerned with ethical or moral or aestethical values we may leave it open whether they can get truthvalues or something analogous; in any case methodology has to be applied to them.

Bocheński distinguishes two stages of application of logic to religion. The first is the application of well established laws and rules of formal and applied logic in general. The second is the development of special logical and methodological tools.

In all four chapters of this essay mainly the first kind of application is used. But in the first two chapters also the second kind is used insofar new semantical relations will be defined.

The first chapter deals with levels of extension and intension as a tool of interpreting religious texts. The second chapter is concerned with analogy. The third chapter deals with some special arguments concerning the problem of evil and the fourth compares scientific and religious belief.

1. Levels of Extension and Intension

I shall begin with an important passage of the Summa Theologica of Thomas Aquinas:

> In every branch of knowledge words have meaning, but what is special here is that the things meant by the words also themselves mean something. That first meaning whereby the words signify things belongs to the sense first-mentioned, namely the historical or literal. That meaning, however, whereby the things signified by the words in their turn also signify other things is called the spiritual sense; it is based on and presupposes the literal sense. [Thomas Aquinas, STh I, 1, 10]

The semantic relation which is characteristic especially for that part of theology which is concerned with the interpretation of the scriptures is – according to Aquinas – the following one: The linguistic expression *a* signifies (is a sign for) the thing *x*, and the thing *x* signifies (is a sign for) the thing *y*.

The usual relation of signification (or of reference and meaning) is only two-place (has only one level), i.e. a linguistic expression *b* signifies (is a sign for) a thing *z*. For this one-level relation there are numerous examples. Thus the linguistic expressions 'father', 'table', 'book', 'red', 'tasty', 'wise', 'Socrates', 'Bocheński' signify the things, properties and persons: Father, table, book, red, tasty, wise, Socrates, Bocheński.

1.1 Examples for the two level relation of signification

The two level relation of signification (reference and meaning) can be illustrated by the following examples. First level:

'Shepherd', 'soil', 'seed', 'wheat', 'weeds', 'father', signify (and mean) the things or persons: shepherd, soil, seed, wheat, weeds, father.

Respective examples of the second level: The things or persons, shepherd, soil, seed, wheat, weeds, father signify (refer to and mean) Christ, soul, word of God, virtue, vice, God-Father.

The relation of signification on the first level, where linguistic expressions signify things, is called literal or historical sense as mentioned above; that on the second level, where things signify other things is called spiritual sense. The important fact of this relation of signification is that things are used like (linguistic) signs signifying other things.

2nd level	soul	word of God	virtue	vice	Christ	external life
1st level	soil	seed	wheat	weeds	shepherd	life
word	'soil'	'seed'	'wheat'	'weeds'	'shepherd'	'life'

Now I want to point out that signification (reference and meaning) relations like the one described on the second level do not only occur in theology or religion. They also occur in common language and in scientific discourse:

2nd level	Mozart	emergency	France	purchase value	yellow fever
1st level	Mozart-Memorial	3 sounds per minute	blue-white red flag -	50 francs bill	yellow face
word	'Mozart-Memorial'	'Alpine emergency signal'	'blue-white- red flag'	'50 francs bill'	'yellow face'

The relation between the first and the second level can be mainly of two sorts: conventional and non-conventional. What is usually accepted as conventional is the relationship between linguistic expressions and the first

level of signification.[1] A conventional relation between the first and second level happens in the case of the flag for France and the special sounds for emergency. Also some of the traffic signposts ("traffic prohibited", "priority", etc.) are conventional.

A non-conventional relation between the first and the second level can be again twofold: first it can be a relation of similarity and second it can be a causal relation. Examples for similarity are: Mozart memorial (statue of Mozart) – Mozart, Rembrandt's portrait of his mother – his mother, the signposts "turn", "falling rock" – turn, falling rock ... etc. Examples for causal relation: Smoke – fire, symptom of a disease – disease, warning cry of an animal in a herd – danger, movement of the spider web – prey. The example with the 50 francs bill does not fit very well in one of the two classes although there are some complicated causal relations via economic laws and present economic situation.

Coming back to the examples from the bible given above it seems that all of them are cases of similarity, even if the relation of similarity will be quite complicated.

1.2 Analysis of the Examples

On a closer look it turns out that there are important differences among the examples. Those examples which express a relationship of similarity can be characterized by the following five properties:

(1) The linguistic sign *a* signifies (refers to) the thing (the class of things, objects) *x*, and *x* signifies (refers to) the thing (the class of things, objects) *y*.

(2) The linguistic sign *a* does not signify (refer) directly to the thing (the class of things, objects) *y*. Between *a* and *y* there is no usual relation of signification (or reference).

(3) The thing (the class of things or objects) *x* is not identical with the thing (the class of things or objects) *y*.

(4) *x* and *y* are contraries, i.e. there is nothing which is both *x* and *y*.

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[1] This hypothesis is proposed in the platonic dialogue Cratylos. It was corrected by modern linguistics, see especially the investigations of Sapir and his pupils.

(5) x and y are comparable, i.e. there are non-trivial properties which belong to both x and y.[2]

These five properties can be expressed by the following definition:

D1 $$\mathrm{Ext}^2_1(a,x,y) \leftrightarrow \mathrm{df}\, x = \mathrm{Ext}(a) \wedge \mathrm{Sig}(a,x) \wedge \mathrm{Sig}(x,y) \wedge \neg\mathrm{Sig}(a,y) \wedge x \neq y \wedge \neg(\exists y)(z \in x \wedge z \in y) \wedge (\exists w)[w \neq V \wedge x \in w \wedge y \in w]$$

Where 'Sig(x, y)' stands for 'x signifies (refers to) y', 'Ext^2' for 'two-level extension', 'V' for 'universal class' and '$\mathrm{Ext}^2(a, x, y)$' can be read as 'a has the two level extension x and y'.

Although D1 offers a description for the examples of similarity it does not give an interpretation of the examples for a causal connection or for a conventional one. The main difficulty seems to be that condition (5) is too strong: It will be difficult to find common properties (of non-trivial kind) which are specific enough to relevantly connect the levels of extension in some interesting way. What are such common properties for smoke and fire, for the sudden movement of the spider's web and the waiting spider ... etc.? Therefore we have to find a weaker though deeper relation for the levels expressed by these examples. One option is to replace comparability between x and y by comparability or by similarity between relations. In the latter case of similarity between relations we speak of analogy. When applying these options it will turn out that also those groups of examples which have been interpreted with D1 can be analyzed in a more detailed way.

First we replace condition (5) by the following condition (5') which contains comparability between relations: (5') there is a relation P between national flag and the group of inhabitants (of the respective nation) and a relation Q between the (respective) nation and the group of citizens, such that P and Q are comparable, i.e. have common properties like tribute for example.

D2 $$\mathrm{Ext}^2_2(a, x, y) \leftrightarrow \mathrm{df}\, x = \mathrm{Ext}(a) \wedge \mathrm{Sig}(a,x) \wedge \mathrm{Sig}(x,y) \wedge \neg\mathrm{Sig}(a,y) \wedge x \neq y \wedge \neg(\exists z)(z \in x \wedge z \in y) \wedge (\exists u)(\exists P)(\exists v)(\exists Q)[P(x,u) \wedge Q(y,v) \wedge (\exists Z)(Z \neq V \wedge P \in Z \wedge Q \in Z)]$$

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[2] Common properties which are trivial like "being a thing" or "having effects" are ruled out. Although it would be difficult to offer a precise criterion here the most important point seems to be that x and y are similar with respect to some specific area. For example soil and soul are the ground for something good or bad.

With definition D2 also the example of the sower (in the bible) can be interpreted : P is a relation between soil and wheat, Q between soul and virtue. Another example for which D2 is suitable (but also D3 below) is this: The linguistic expression 'Ten dollar note' signifies the bill (bank note) and the bill signifies a certain purchase value: P may be the relation between the bill and the hardness of currency, Q the relation between the purchase value and the constancy of purchasing power.

As mentioned above the conditions and definitions given can also be formulated with intensions. In this case intensions are understood as classes of properties. A level of meaning can then be understood as either a level of intension or as a level of both extension and intension.

The next two definitions use either intensions or both extensions and intensions. The main difference with respect to D2 is that the general requirement of comparability between relations is replaced by a more specific form of mutuality that is by an isomorphism. Because of the isomorphism we call these levels "levels of analogy" (AnL).

D3 $\mathrm{AnL}_1^2(a,x,y) \leftrightarrow \mathrm{df}\, x = \mathrm{Int}(a)$[3] $\wedge$ Sig $(a, x) \wedge$ Sig $(x, y) \wedge \neg$ Sig $(a, y) \wedge x \neq y \wedge \neg\, (\exists z)\, (z \in x \wedge z \in y) \wedge (\exists u)(\exists P)(\exists v)(\exists Q)[P(x, u) \wedge Q(y, v) \wedge IS(PQ)]$

The following definition has two different linguistic expressions a and b with respect to their extensions and intensions:

D4 $\mathrm{AnL}_2^2\,(a,\ b, x,\ y, u, v) \ \leftrightarrow\ \mathrm{df}\, x = \mathrm{Ext}(a) \wedge u = \mathrm{Int}(a) \wedge y = \mathrm{Ext}(b) \wedge v = \mathrm{Int}(b) \wedge \neg$ Shape$(a, b) \wedge$ Sig$(a, x) \wedge$ Sig$(a, u) \wedge$ Sig$(b, y) \wedge$ Sig$(b, v) \wedge$ Sig$(x, y) \wedge$ Sig$(u, v) \wedge x \neq y \neq u \neq v \wedge \neg\ (\exists z)\, (z \in x \wedge z \in y) \wedge \neg\, (\exists z)\, (z \in u \wedge z \in v) \wedge (\exists P)\, (\exists Q)\, [P(x,u) \wedge Q(y, v) \wedge IS(P, Q)]$

The relations here can also be arranged differently: $P(x, y)$, $Q(u, v)$. 'Shape(a, b)' stands for 'a is of same shape as b'.

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[3] Here Int(a) can be replaced by Ext(a) to obtain a similar definition D3*.

D4 can be applied to the parabel of the shepherd. In this case the linguistic expressions 'shepherd' (a) and 'Christ' (b) signify their extension (class of shepherds (x)), Christ (y) and their intensions (properties of shepherds (u)), of Christ (v) and further there is a relation of signification between the class of shepherds (or an element representing the class) (x) and Christ (y) and between the properties of shepherds (u) and (some of) the properties of Christ (v). The relations P and Q may be arranged as $P(x, u)$, $Q(y, v)$ or as $P(x, y)$, $Q(u, v)$.

Observe that the application of D4 to this parabel presupposes that the linguistic expression 'Christ' occurs in the text. If it does not (i.e. if only 'shepherd', 'sheep', ... etc. occur in the text) then the parabel can be interpreted by definition D3 where 'shepherd' (a) signifies the class or properties of shepherds (x) and x signifies Christ (y) and u and v may be the classes of sheep and of men and P and Q similar relations of taking care.[4]

1.3 Are Levels of Signification a Case of Ambiguity?

In order to answer this question we have to give first a precise definition of ambiguity (or equivocation). Usually one calls two linguistic expressions ambiguous if and only if they are of the same shape but have different meanings. Thus different tokens 'ball' may mean the ball used in sport, the geometric object, the astronomical globe, the dancing-event. This can be expressed by the following definition:

$$\text{D5} \qquad \text{Ae}(a, b) \leftrightarrow \text{df } \text{Shape}(a, b) \wedge \text{Ext}(a) \neq \text{Ext}(b) \wedge \text{Int}(a) \neq \text{Int}(b)$$

If we apply D5 to pairs of tokens 'ball' respectively we can see that in no case the extensions or intensions are identical; in some cases their properties overlap (geometrical and astronomical ball) but in others they are all different (ball in sport and dance event).

Cases which can be described by D1-D3 cannot be cases of ambiguity (in the sense of D5).

First because there are no two tokens of same shape having different extensions and intensions since only one token (a) occurs in the definitions D1-D3.

Second because a transitive relation of signification is explicitly denied in definitions D1-D3 by the clause: $\neg\text{Sig}(a, y)$. If we would have $\text{Sig}(a, y)$

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[4] For further considerations of levels of meaning see Weingartner [1976] ch. 3.63.

instead then there would be two tokens of same shape (a) having different extensions (or intensions) x and y.

Third because different levels of signification (reference and meaning) must not be confused with ambiguity or equivocation. The latter takes place if a sign (more accurately two signs of the same shape) has (have) different meanings (extensions and intension) on the first level to which the relation of signification is directed. But this is not the case in any of the definitions or examples.

Cases which can be described by D4 also cannot be cases of ambiguity (equivocation). This is so because the tokens a and b are not of same shape, they are different linguistic expressions which mean different things (as usual). Even in case the expression 'shepherd' (a) would signify not only shepherd but also (directly) Christ the expression 'shepherd' would not be ambiguous according to Def 5 because it is presupposed that Ext and Int of linguistic expressions are only on the first level.

That means one must not confuse levels of signification (reference and meaning) with ambiguitiy. That the linguistic expressions a and b have their extensions and intensions occurs on the first level of signification. On the second the thing (class of things) x signifies the thing y and the properties of x signify the properties of y.

2. Analogy

Bocheński's research on analogy culminated in the article "On Analogy" published in 1948. It was the first serious study of analogy with the tools of modern logic and it contains several important basic insights which will always be used when studying analogy.

Bocheński's essay contains three assumptions concerning analogy:

1. Analogy is a relation between two linguistic expressions (predicate terms).
2. Analogy is a similarity relation between (usually two) relations .
3. Those two relations are relations between a thing and a property of that thing.

Assumption (2) is basic and it is an important insight to understand analogy which is already implicit in Thomas Aquinas (question 13 of the first part of his Summa Theologica). But (1) and (3) are not necessary conditions and can be changed or generalized. In my approach on analogy I have left (2) untouched but have generalized (1) and (3) in the following way:

1' Analogy is a relation between any objects or systems.

3' The two (or more than two) relations are relations between the extension (if it is an individual thing the extension contains only one element) and the intension (which is interpreted as a set of properties) or between elements of two intensions.

2.1 Examples of Analogy Relations

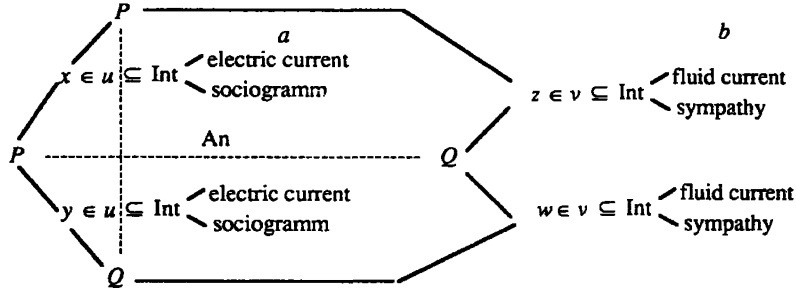
We classify objects into *natural objects* or systems (such as atoms, planets, cells, human individuals, societies etc.), *concrete artificial objects* or systems (like houses, railways, computers, linguistic tokens etc.) and *conceptual objects* or systems (like concepts, propositions, theories, arguments etc.). Then we may distinguish analogy relations among one group of objects or between objects of two different groups:

Electric current – fluid current, living organism – society, force of body – force of soul. Plan of a house – house, gun – electron gun, argument in natural language – argument in symbolic logic. Class of natural numbers – class of positive integers, hypothesis about vaccines in animals – hypothesis about vaccines in men.

Map – section of land, sociogram – social group relations, electric conductor – nerve. Computer – automata theory, tree diagram of a sentence – proposition, electron microscope – theory of it. Evolution – theory of evolution, theory – (real) model.

2.2 Definitions of analogy

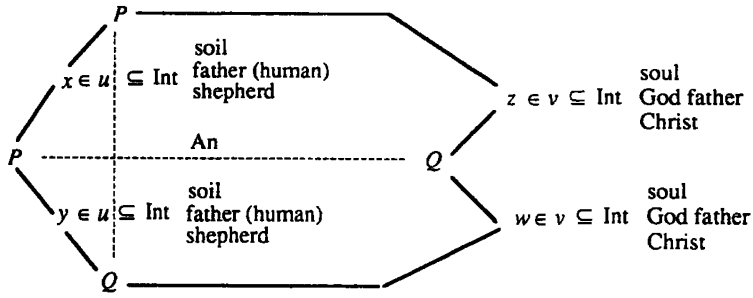
We try to analyse first the analogies between electric current and fluid current, sociogram and sympathy relations and then the biblical examples:



x ... voltage / arrow top
y ... intensity / arrow end
z ... potential / sympathy giving
w ... intensity / sympathy receiving

D6 $\mathrm{An}(a, b, u, v) \leftrightarrow \mathrm{df}\ u \subseteq \mathrm{Int}(a) \wedge v \subseteq \mathrm{Int}(b) \wedge u \neq v \wedge (\exists P, \exists Q)[P \neq 0 \wedge Q \neq 0 \wedge \mathrm{Is}(u, v, P, Q)]$

Analogy



ability to grow wheat
x ... ability to produce children
to love the sheep

ability to grow weeds
y ... take care of children
to search for the lost sheep

ability to grow virtue
z . to create men
to love men

ability to grow vice
w ... take care of men
to search for the lost man

From the pictures one can see that the relations P and Q can be arranged differently: P between different properties of soil (or of electric current) and Q between different properties of soul (or of fluid current). This is the arrangement as it is described by definition D6. But as the pictures show we can rearrange P and Q such that P is a relation between a property of soil (of electric current) and the respective property of soul (of fluid current), and similarly with Q. This arrangement can be described by the following definition D7:

D7 $\mathrm{An}\,(a, b, u, v) \leftrightarrow \mathrm{df}\ u \subseteq \mathrm{Int}(a) \wedge v \subseteq \mathrm{Int}(b) \wedge u \neq v \wedge (\exists P)(\exists Q)\ P \neq Q \wedge$

$P \subseteq u \times v \wedge Q \subseteq u \times v \wedge P \neq 0 \wedge Q \neq 0 \wedge \mathrm{Is}(u \cup v, u \cup v, P, Q)$.

In both definitions D6 and D7 the relations P and Q obtain between two different properties (of one or two things) and not between the thing (or its extension) and a property as it was proposed by Bocheński.[5] The latter relations are much weaker. In physics for instance one compares voltage times intensity in the electric current with the respective factor in the fluid current or voltage and potential and intensities in both currents. Also in the biblical examples the analogy relations are stronger and less trivial if one relates different properties (of soil or of father or of shepherd) to one another. Or in the other arrangement a property of soil (of father, of shepherd) with a respective one of soul (of God father, of Christ). The pictured analogy relations are the following: The relation of voltage to intensity of the electric current is analogous (isomorphic) to the relation of potential to intensity of the fluid current. The relation of arrow ends to arrow tops of the sociogram is analogous (isomorphic) to the relation of sympathy givers to sympathy receivers. The relation of the ability to grow wheat to the ability to grow weeds of the soil is analogous (isomorphic) to the relation of the ability to "grow" virtue to the ability to "grow" vice of the soul. And similarly for the other analogy relations. The analogy defined by D6 and D7 are types of analogy by proportionality. Analogy by proportionality is the most important type of analogy used by Thomas Aquinas. In addition he uses also the analogy by attribution which – in one form – is used already by Aristotle. A further type of analogy is proposed by Cajetanus, it is the analogy by alternatives. With respect to this latter kind, Bocheński showed that it hardly can be accepted for the interpretation of texts of the bible especially if the comparison between world (man) and God is at stake. The main point is that in contradiction to the definitions of analogy by proportionality and by attribution where we have only similarity relations between relations in the definiens of analogy by alternatives some partial equality is smuggled in. This leads to the consequence that in an application of the analogy by alternatives to the syllogism *Barbara* only the middle terms are analogous whereas the major terms are not. For instance in the syllogism: "Every being is good; God is a being; therefore: God is good" only the terms 'being' are analogous not the terms 'good'. But this is completely unacceptable for an application in religion (theology): The term 'good' can never be applied in the same sense to creation and to God.[6]

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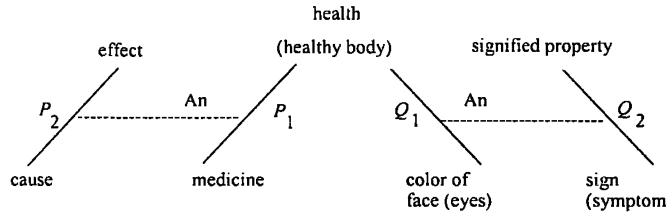
[5] In my [1979] I have given both types of definitions. For further investigations see Weingartner [1976] ch. 3.64.

[6] For details see Bochenski [1948] chapters 13 to 16.

2.3 Analogy by Attribution

Here I only want to characterize one type of analogy by attribution, the one which is called *plurimum ad unum*. This one is frequently cited in the tradition and Aristotle's famous example for it is the one with health: healthy medicine, walk, food etc. and healthy face, colour of the eyes, urin etc. are all related to health. The first three like a cause to its effect, the last three like a symptom (sign) to what is signified.



Thus the relation P_1 between healthy medicine and healthy body is analogous to the relation P_2 between cause and effect; and the relation Q_1 between colour of the eyes and healthy body is analogous to the relation Q_2 between the symptom and that signified by it.[7]

3. Arguments Concerning the Problem of Evil

The following arguments are two frequently used arguments which try to show that God wills every evil. Since "evil" is understood quite generally in the arguments they are thought to apply to moral evil too. I shall first state the arguments in common language and then give the translation into the symbolic language (of propositional calculus):

Argument I

1. God's power and will has no restrictions concerning facts, i.e. applies to every event.
2. Therefore: if something happens (some event occurs) then God wills that it occurs.
3. Evil occurs.
4. Therefore God wills that evil occurs.

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[7] The accurate definition is more complicated than the previous definitions. Cf. Weingartner [1979].

	1.	$\forall p(gWp \vee gW\neg p)$
Therefore:	2.	$\forall p(p \rightarrow gWp)$
	3.	E
	4.	gWE

Here 'p', 'q' are propositional variables which represent states of affairs, 'gWp' stands for 'God wills that p is the case', 'E' stands for 'evil occurs'.

Argument II

1. God's will is always fulfilled, i.e. whatever he wills occurs.

1a. Otherwise he would not be almighty.

2. Therefore: If God wills that evil does not occur then evil does not occur.

3. Evil occurs.

4. Therefore God wills that evil occurs.

1. $\forall p(gWp \rightarrow p)$

1a. $\neg\forall p(gWp \rightarrow p) \rightarrow \neg \mathrm{Alm}(g)$

2. $gW\neg E \rightarrow \neg E$

3. E

4. gWE

'$\mathrm{Alm}(g)$' stands for 'God is almighty'.

3.1 Commentary to the first argument.

Concerning every argument one can ask two questions:

(1) Is the argument valid, i.e. does the conclusion (logically) follow from the premises?

(2) Are the premises true?

If both questions can be answered affirmatively then the conclusion is true and is justified by the premises.

The answer to the first question with respect to the first argument is partially yes and partially no. Because the argument from the second premise on is valid, but the argument (indicated by "therefore") from the first to the second premise is not valid. That is, the second premise does not follow from the first

one. In fact the first follows from the second and so the second is stronger: By contraposition form the second premise: $\neg\, gWp \rightarrow \neg\, p$, by substitution from the second premise: $\neg\, p \rightarrow gW\neg\, p$. Both together lead to: $\neg\, gWp \rightarrow gW\neg\, p$ i.e. to 1.

Concerning the truth of the premises E is certainly true, but 1. and 2. are false, at least according to Christian religion but probably also according to the other four world religions (Judaism, Islam, Brahmanism, Buddhism). The first premise is the thesis of the allwilling God. It says that God engages his will with respect to every states of affairs: either he wills that it occurs or wills that it does not occur. But there is no doctrine of an *allwilling* God in any of the five great religions of mankind; though in some of them there is an almighty omniscient and benevolent God. Premise 1. (and of course 2.) is not compatible with a free will of man: Since every moral human action is a state of affairs, we may substitute for 'p' 'person a commits the moral action h at time t' and obtain that either God wills that it occurs or wills that it does not occur. And if his will is always fulfilled (i.e.: $gWp \rightarrow p$, which follows from his almightyness) then if he wills the action to occur it will occur and if he wills the action not to occur it will not occur. Now it is also easy to see that from premise 1. with the help of $gWp \rightarrow p$ one can derive premise 2. And this means that from premise 1. plus: $gWp \rightarrow p$ and E the conclusion gWE (God wills that evil occurs) is derivable. Since the concept of evil (E) is not restricted also moral evil is included.

Premise 2. is the thesis of fatalism. It says that whatever state of affairs (event) obtains, God wills that it obtains. And since evil (of different sorts) obtains, God wills that evil occurs. As pointed out already the thesis of fatalism is stronger than the thesis of the allwilling God. From premise 2. it follows that man has an excuse for every action, even for stupid actions and for criminal actions because it is God's will. If we agree that man is free and responsible at least for a part of his moral actions then these consequences – which seem to be absurd anyway – cannot be true and so premise 2. cannot be true.

If premises 1. and 2. are false their negations are true. Since 1. is weaker than 2. the negation of 1. is stronger than the negation of 2. The negation of 1. is: For some (states of affairs) p: neither God wills that p nor God wills that $\neg p$; i.e. he keeps back his will from some states of affairs or he does not interfere in some states of affairs. A father may keep back his will with respect to the fight of his sons: he may will not to interfere. Similarly God may will not to interfere (may will not to apply his will) with respect to moral decision of man. That is that he neither wills them to occur in such and such a way nor wills them not to occur in such and such a way. And this is a necessary condition for God's tolerating (certain kinds of) evil.

3.2 Commentary to the second argument

Concerning the second argument I shall first ask whether the premises are true. As we shall see the answer here is: Yes. This will become clear from the following consideration: Premise 3. is empirically true as was accepted already with respect to the first argument: there is evil (of different sorts, including moral evil) in this world. Premise 1. must be true of an almighty God: If God wills that something p occurs then p occurs. If this principle would be violated then for some states of affairs p God would be in the same position as man is often: he wills that something occurs but it does not occur. Such a God who lacks some power is clearly abandoned at least by the three Abraham-religions Judaism, Christianity, and Islam. Thus if he is almighty premise 1. follows. This is what premise 1a. says, since its contraposition is: $\mathrm{Alm}(g) \rightarrow \forall p(gWp \rightarrow p)$, i.e. if God is almighty then for any states of affairs p: if God wills that p then p occurs. From this consideration it follows that premise 1. (and 1a.) is acceptable as true. Now premise 2. is only a substitution instance of 1. and therefore in fact no new premise and also true.

Since the premises are true the remaining question is whether the argument is valid, i.e. whether the conclusion gWE follows from the premises (especially from premises 2. and 3.). The answer to this question is clearly: No. This can be seen as follows. The inference rule to be applied to premises 2. and 3. is *modus tollens*. It has the form: $A \rightarrow B$, $\neg B$ therefore: $\neg A$. In order to see more easily the application one may use $\neg\neg E$ instead of E. What in fact follows then is $\neg\, gW\neg E$ (but not: gWE). But to identify both would be a great confusion. From $\neg\, gW\neg E$ one cannot derive gWE unless one does not smuggle in as an additional premise (or presupposition) the allwilling God. Because for the latter it holds that $gW\neg\, E \vee gWE$, i.e. $\neg\ gW\neg\, E \rightarrow gWE$. But this is just the questionable point here: If we do not assume that God need to apply his will to every event (and thus to every state of affairs which is an evil) then for some event p he neither wills that p occurs nor wills that p does not occur, i.e. he keeps back his will with respect to some event (for example with respect to evil in the moral sense). That means then that the thesis of the allwilling God is false and cannot be presupposed (as an enthymem) in the second argument. And so the second argument is invalid and its conclusion is therefore not proved.

4. Scientific and Religious Belief

According to a widespread view scientific belief (i.e. belief in scientific hypothesis or theories) has nothing to do with religious belief (i.e. belief in the creed of some religion). In this chapter I shall show that this view is mistaken.

On a closer look it will turn out that there are a number of interesting similarities though of course also important differences. I shall begin with similarities and then shall continue with differences.

4.1 In both scientific and religious belief we can distinguish three questions: (1) What is believed? (2) What (kind of activity) is believing? (3) Why is it believed? They are answered for both types of belief by giving the *content* of the belief, by describing the special action of believing and by giving reasons for believing.

As to the content it holds for both kinds of belief that it (at least an essential part of it) is of propositional character. That is, what is believed is something which is the case or not the case, which is true or false. That this is so for scientific belief need not to be underlined but it is also true for religious belief. To believe in the creed of religion makes only sense if the creed is at least partially of propositional character. A Christian believes that Christ was resurrected and a Moslem that Mohammed was the greatest prophet. But in addition to that there is belief in norms, i.e. in the validity of certain norms for example in the ten commendments and also value judgements like the one that the life after death is more valuable than this live ... etc.[8] Is there such a thing, a belief in norms, also in scientific belief? The answer is: Yes, if we extend the scientific belief to the methodology of the respective discipline. In the methodology are general norms like: the successor theory should give correct results where the forerunner theory gave them and it should give new correct results; or more special ones like: One should look for continuous dependencies between cause and effect and then interpret them by differential equations (this rule was based on the belief that the lex continuitatis holds generally which is a doctrine of Leibniz's philosophy).

4.2 Strong belief and weak belief

In both, scientific and religious belief we can distinguish between strong and weak belief. We may characterize the weak kind of belief by saying: a person (weakly) believes that p is the case iff the person thinks that p is true (or if the person holds that p is true or considers, regards p as true). Then it is obvious that this kind of belief is included in (or implied by) knowledge: If a person knows that p is the case he (she) also thinks that (considers, regards) p is (as) true. It is easy to understand then that both the scientist who believes

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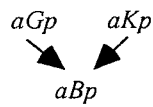
[8] Although Bochenski does not require that the content of religious belief consists exclusively of propositions, but requries that it does so at least partially (cf. his Logic of Religion, ch. 10 and 13) he does not mention norms and value judgements.

strongly in some scientific hypothesis and the religious believer think that what they believe is true. Hintikka in his well known study "Knowledge and Belief" has investigated this (weak) kind of belief which is implied by knowledge. Let this kind of weak belief be called "B-belief". There is however both in scientific and in religious discourse a stronger kind of belief. And this is the more important kind for both science and religion. It has two main features; first it also – like knowledge – implies the weak belief (B-belief) and second it is knowledge exclusive. The second property is expressed by the following statements: if a person b strongly believes (scientifically or religiously) that p is the case then b does not know that p (and does not know that not-p) is the case. Since if the person would know that not-p is the case he (she) couldn't believe that p is the case. And if he (she) would already know that p is the case he (she) need not any longer believe it. Let this kind of strong belief be called "G-belief".

There are famous examples in the history of science: The belief in the independence of the Continuum Hypothesis (by von Neumann and others) before and more strongly after Gödel had proved the first part in 1939 was G-belief. There was no real knowledge before Cohen's proof in 1963. Similarly for Fermat's last theorem before the final correction of the proof in 1994. The same holds for famous experimental results like the Michelson-Moreley experiment, Einstein's photo-electric effect, the proof of the derivation of light rays because of huge masses and the expansion of the universe. Before the results have been proved by experiment there was strong belief (by Einstein, A. Friedman and others) but not knowledge. For religious belief it is evident that what is believed is not known. But at least for the three Abraham-religions (Judaism, Christianity and Islam) in the life after death the believer will know what he believed in this life. For Christianity there is a famous passage in St. Paul: When we will know later our (religious) belief will have an end [I Corinth. 13, 12].

Summarizing the features of G-belief and of B-belief we can state the following thesis:



$$aGp \rightarrow \neg aKp \qquad aKp \rightarrow \neg aGp$$
$$aGp \rightarrow \neg aK\neg p \qquad aKp \rightarrow \neg aG\neg p$$

The fact that G-belief is knowledge-exclusive does not mean that there are no interesting relations with knowledge. On the contrary there are several

relations to knowledge in both scientific and religious belief: First the important difference is that knowledge is sufficiently justified whereas belief is only partially justified, there is always somewhere a gap in the justifying reasons. Even if one hypothesis can be much better corroborated than another it is still not known (to be true).

Further relations are: (1) If someone G-believes that p then he knows that he beliefs (we presuppose here that the belief is conscious). (2) If someone G-believes that p then he knows what it is that he believes (provided that this is not taken too accurately). (3) Someone may G-believe some propositions p at time t_1 and know p at a later time t_2. (4) Someone may G-believe that a thing (say an elementary particle) has property F and know that it has property H. The famous example in the area of religious belief is the doctrine of medieval Christian philosophers that we can know the existence of God but can only have beliefs guided by revelation about what belongs to his essence. (5) Someone may G-believe that p and someone else may know that p. This is compatible both in science and in religion.

4.3 Consistency Criteria for belief

First we shall assume for both scientific and religious belief that if someone believes (G or B) that p then he does not believe the contrary (the negation of it). That is: $aGp \rightarrow \neg\, aG\neg\, p$. The opposite implication certainly does not hold, otherwise we would claim that persons have a belief with respect to every states of affairs, i.e. $aGp \vee aG\neg\, p$.

But a question here is whether it could be the case that someone believes that p at time t_1 but believes that non-p at a later time t_2. I think this can be the case for a certain class of propositions but not for all of those about which we have strong belief. Thus it can be the case about an assumption of String Theory but not about the equation of mass and of energy. And similarly it can be the case about how a certain passage in the Genesis can be interpreted but not about the question whether Christ was resurrected (for Christian believers).

As further consistency criteria we can accept the following ones: If p is consistent and not known then it is also consistent to believe it: $(\mathrm{Con}(p) \wedge \neg\, aKp) \rightarrow \mathrm{Con}(aGp)$. The same holds if we replace $\mathrm{Con}(p)$ by $\mathrm{Con}\,(aGp \wedge p)$. The statement $\mathrm{Con}(aGp) \rightarrow \mathrm{Con}(p)$ does certainly not hold. A case in point is Frege's strong belief in his axiom V of his *Grundgesetze der Arithmetik* (of which Russell showed that it is contradictory).

Besides consistency criteria there are certainly several easy logical and mathematical laws which are presupposed by both scientific and religious

belief. Examples are the multiplication table and modus ponens, modus tollens, dictum de omni and others.

4.4 Reasons for belief

The reasons why we believe something are important components in both scientific and religious belief. And as it was pointed out already the common thing is that these reasons are never complete or sufficient to such an extent that we could speak of knowledge.

A first reason for belief is consistency. Therefore an important task is to (try to) show that what is believed is not impossible. And this is connected with the consistency criteria of the last chapter: what is important is to show that what is believed is consistent. Because inconsistency is a strong hindrance for belief. And this is not only so for scientific belief but also for religious belief (at least according to the great theologians and philosophers of the Middle Ages like Moses Maimonides, Anselm of Canterbury, Albert the Great or Thomas Aquinas). Also Duns Scotus and Leibniz stress this point with respect to proofs for the existence of God. A second reason for belief which is especially concerned with empirical science is the principle that what is believed has consequences which have been corroborated or confirmed.

Scientific hypotheses often start from generalizations of data which are then interpreted with the help of the hypothesis and the data are at the same time confirming instances. Usually a lot of other confirming instances (where not only the number, but also the quality and severeness of tests is important) are necessary to strongly believe in the new hypotheses. Sometimes the hypothesis is only confirmed theoretically (as a part of a theory) and the crucial test has been provided much later (for example the gravitation between masses was proved by Cavendish 111 years after the first appearance of Newton's Principia).

But is this principle also applicable to religious belief? I think in some sense it is. Religious believers have a view in which they interpret the beauty and order in the world as a confirming instance for their belief in an almighty and omniscient creator. Or they see confirming instances of ethical doctrines in the bible when observing family life or life in society. By these ethical doctrine I do not mean pure norms but certain predictions about life which are connected with norms. For instance like in the fourth commendment. There are then also 'negative' confirmations in the following sense: If the ten commendments or the principle of charity are frequently violated in a particular society, then these facts are interpreted as confirmations in the validity of the violated principles. Even if this latter idea belongs more to the Christian and

Jewish Religion the following idea is more general: The general experience that a too high evaluation of and concentration on outer passing things of this world leads men to restlessness, sorrow and unhappiness is interpreted as confirming the general doctrines of all religions to higher evaluate the supernatural inner and lasting goods of mankind.

4.5 Differences between scientific and religious belief

In chapters 4.1 to 4.4 we have listed common features or at least similarities between scientific and religious belief. In the next chapter I shall list some differences but I will be more detailed only with respect to one important difference. It is the following:

Religious belief includes the belief that what is religiously believed cannot be false. Scientific belief admits that what is scientifically believed can be false. This claim needs some clarifying comments.

First concerning religious belief. What is meant here is certainly serious belief in important propositions of a creed of a religion. The creed of a religion consists of those propositions by which a believer belonging to that specific religion is defined, i.e. as someone who believes those propositions of the creed.[9]

But concerning such propositions it holds that if they are believed religiously, this belief includes (implies) the belief (the strong assumption) that those propositions cannot be wrong. Symbolically:

4.51 $aG_{R}p \rightarrow aB \neg \Diamond(aG_{R}p \wedge \neg p)$

For some religions, especially Christianity, Judaism and Islam the reason for this lies partially also in the fact that the religious believer believes that those propositions (of the creed) have been revealed by an omniscient and almighty god even if this revelation happened via mediators. The more mature religious believer would certainly concess that there might be theological (exegetical) discussion about the correct interpretation of some of the propositions of the creed (of a particular religion). But this does not mean that 4.51 is violated. One way of handling this is to understand 4.51 conditionally in the sense that the mature religious believer grants to make the presupposition "if p is correctly interpreted". But independently of that there are some basic beliefs which do not allow much debate of interpretation: either Christ (more than a prophet) was born or not, either Christ resurrected or not. Though there

9 Cf. Bochenski (1965) ch. 3.4.

may be a debate on the meaning of Christ (son of God etc.), but hardly about "was born" or "resurrected". Similarly with "there will be reward or punishment after death" etc. And in respect to such propositions the religious believer also believes that they cannot possibly be (altogether) false, even if he may grant that he might not understand some detail here.

Does 4.51 hold for scientific belief? The usual answer to this question is: No. And the reason usually given for the answer "No" is that scientific belief admits that what is scientifically believed can be false. But the main point here to be questioned is whether the "No" holds equally for all scientific propositions.

Let's begin with mathematics. First many cases in mathematics are examples for scientific knowledge, not for scientific belief. But there are the great conjectures like Goldbach's or Fermat's last theorem ... etc. Here the situation is certainly different from that in religion: before the proof is done there is scientific belief which admittedly can be wrong. After the proof is completed there is scientific knowledge. But there are also other cases. Von Neumann conjectured that the Continuum Hypothesis is independent of the axioms of set theory; and after Gödel had proved the first part (its consistency with the axioms) von Neumann (and others) had a quite strong belief that also the negation of the Continuum Hypothesis is consistent with the axioms. At that time it was rather difficult to say that those who had this strong belief (which was well justified) would admit that the conjecture could be false. Still stronger examples of this sort are cases in empirical science. If we ask a physicist whether he would admit that the principle of conservation of energy could be false he either would plainly say "No" or ask back what do you mean by such a question. Einstein strongly believed in the experimental predictions of General Relativity before they were proved by experiment (for example in the deviation of light rays, which was first confirmed 1919). Newton believed strongly in the general gravitation among masses (which was proved only 111 years later). One could go on with similar examples. Even if I do not claim that we have here the same case as expressed by 4.51 concerning religious belief there is still considerable similarity. However for a great many cases in empirical science – especially for new hypothesis which have not been confirmed severely enough – it is of course correct to say that the scientific belief in these hypothesis is such that it is admitted that they might be false.

4.52 Further important differences are:

Religious belief is connected with the belief and the desire in a state of happiness or reward after this life (in this world or – for most of the religions in another one) whereas for scientific belief there is no such connection with a

transcendent state. Therefore religious belief is connected with desire and will in a special way which is not the case for scientific belief.

The particular connection of religious belief to the transcendent state of happiness or reward which is conceived as the final goal is this: If a person *a* believes religiously that *p* – provided that *p* belongs to the Creed of that religion, i.e. to the important statements of it – then *a* also believes that if he would not believe that *p*, he would not reach the state of happiness or reward (his final goal). And since the religious believer believes in the existence of such a state of happiness (in the actual existence concerning saints or prophets and in the possible existence for him) and further since he wants to be happy, he also *wants* to believe. This is an important point. Many great Christian philosophers, at least from Augustine on stressed the important impact of the will in religious belief. For them religious belief (faith) was understood from the very beginning as an action of both intellect and will. This action belonged to both sides of the highest sphere of the human soul, e.g. to reason which included both intellect and will.

Is there an analogon for scientific belief? Even if it does not hold generally as in religious belief it may hold sometimes for particular cases that if some scientist believes in a scientific hypothesis, then he also wants to believe in it. Think of the inventor of some new interesting hypothesis. Of him it may be true to say that he also wants and wills to believe in the hypothesis he has proposed.

4.53 Religions belief searches for or tries to provide or claims ultimate and global explanations. Scientific belief does not claim and usually neither searches nor tries to provide ultimate and global explanations.

Ultimate and global explanations are such which provide a highest reason such that there is no need or there even is no possibility to give another higher reason for that. Thus an ultimate cause which causes everything except those actions for which men have free will or an almighty omniscient creator who created the universe are examples.

Though science too aims at powerful explanations and though hypotheses, laws and theories are replaced by more general hypotheses, laws and theories in the course of development of a certain scientific discipline and even by comprehensive theories interrelating several areas of disciplines or several disciplines, still ultimate explanations for all known phenomena (of any science pace of any experience) are not claimed nor offered nor aimed at.

On the other hand it was always understood as the task of philosophy and religion to give more general answers and more general explanations than

the sciences will ever give. However also here there are exceptions: There are some newer branches of science in respect to which this difference is again smaller. There is modern cosmology which tries to explain the beginning and development of the whole universe, there is the extension of Darwin's theory to the development also of non-living things and of the universe, there is general Systems-Theory which tries to interpret everything as certain ordered structures ... etc. Thus in these branches there are certainly trends which come closer to the characteristicum of religious belief to search for and to provide (if not to claim) rather global and very general (even if not ultimate) explanations.[10]

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[10] For further investigations see Weingartner [1994].