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Theory and Empiricism of Religious Evolution (THERE): Foundation of a Research Program (Part 2)

Abstract: This two-part article presents the research program for a theory and empirical analysis of religious evolution. It is assumed that religion is *primarily* a co-evolution to societal evolution, which in turn is a co-evolution to mental, organic, and physical evolution. The theory of evolution is triangulated with the systems theory and the semiotically informed theory of communication, so that knowledge can be gained that would not be acquired by only one of the three theories: The differentiation between religion and its environment can be reconstructed based on the theory of evolution. The elements of the theory of evolution can be understood as the formation of systems. The semiotically informed theory of communication clarifies the conditions of the combination of both the systems theory and the theory of evolution as well as its objects. In turn, the combination of the systems theory and the theory of evolution can describe how communication—including religion and science—evolves and is structured.

Keywords: Religious Evolution, Systems Theory of Religion, Religious Communication, Differentiation of Religion, Semiotics of Religion

Abstract: Die zweiteilige Aufsatzfolge präsentiert das Forschungsprogramm zu einer Theorie und Empirie religiöser Evolution. Es geht davon aus, dass Religion *primär* eine Co-Evolution zur gesellschaftlichen Evolution ist, die wiederum eine Co-Evolution zur psychischen, organischen und physischen Evolution ist. Die Evolutionstheorie wird mit der Systemtheorie und der semiotisch informierten Kommunikationstheorie trianguliert, so dass sich Erkenntnisgewinne erzielen lassen, die mit nur einer der drei Theorien nicht zu erreichen wären: Die Differenzierung zwischen Religion und ihrer Umwelt lässt sich evolutionstheoretisch rekonstruieren, die Gegenstände der Evolutionstheorie lassen sich als Systembildungen verstehen, und die semiotisch informierte Kommunikationstheorie klärt die Vollzugsbedingungen sowohl der Kombination von System- und Evolu-

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tionstheorie als auch ihres Gegenstandes. Umgekehrt kann die Kombination von System- und Evolutionstheorie beschreiben, wie Kommunikation – inklusive Religion und Wissenschaft – entsteht und sich strukturiert.

Stichwörter: Religiöse Evolution, Systemtheorie der Religion, religiöse Kommunikation, Differenzierung der Religion, Semiotik der Religion

5.2 Semiotic In-Formation of Communication Theory

As set out in the initial theses in the second chapter of the first part of this paper (see ZfR 26/1), communication is a selection process consisting of the parts utterance, information, and understanding. This triadic process can be modeled using semiotics.[1] Communication is based on the activation of sign processes, and semiosis provides the elementary syntax of communication. "We learn from semiotics that we live in a world of signs and we have no way of understanding anything except through signs and the codes into which they are organized" (Chandler 2007, 11). According to Peirce's theory of categories, semiosis always consists of firstness (abstract quality), secondness (relations), and thirdness (mediating representation):

– The category of firstness encompasses everything concerning what it is and how it is, because it is so without regard to anything other than itself. Firstness refers to what is present in its quality within the spectrum of rules and varying application, possibility, and reality. "Firstness in its purest form, as a complement to secondness and thirdness, is reflexive, symmetrical, nontransitive, and self-contained. As such, the most that can be said of it is that *it is as it is*" (Merrell 1997, 167). An example of firstness is the quality of blueness.

– The category of secondness includes everything that is and how it is, because of its connection with one or more second others. "Secondness requires the existence of some other accompanied by dyadic relations of action-reaction, cause-effect, sequence-consequence, and statement-counterstatement: it entails 'What Is ⟷ Is Not', according to classical logical principles. [...] Secondary marks the initiation of transitivity, asymmetry, non-reflexivity, and disequilibrium, and it at least gives a glimpse of the generation of time" (Merrell 1997, 167). Secondness refers to what has been established and connected, to

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1 For the application of semiotics in the study of religion, see, e.g., Volp (1998), Hermsen (2003), Tramsen (2003), Leone (2004, 2013a, 2013b), Kreinath (2006), Keane (2007), Yelle (2011, 2013, 2016), Linde (2013a, 2013b), Jensen (2014), as well as Leone and Parmentier (2014).

what is factual within the spectrum of identity and difference. An example of secondness is: The blue color of the car has the values 100, 149, 237 on the RGB scale.
− The category of thirdness covers everything that is and how it is, because it establishes the link between secondness and thirdness. Thirdness refers to a mediating being within the spectrum of facticity and contingency. "Thirdness, taking its cue from Secondness, is characterized by full-blown transitivity, radical asymmetry, temporality [...]. Entailing the incessant push toward generality, or regularity, Thirdness embodies the effort—however futile—to bring processes to completion, to arrive once and for all at the plenitude of things" (Merrell 1997, 167). An example of thirdness is: Peter agreed with Mary's statement that the blue of the sky is at its most beautiful in Tuscany.

Three different sign aspects correspond to the three categories:
− The *representamen* (R) (or sign vehicle; Morris 1938, 3) corresponds to firstness.
− The *object* (O) (or designatum, Morris 1938, 3) corresponds to secondness.
− The *interpretant* (I) corresponds to thirdness.

It should be noted, however, that "the terms interpretant, sign, and object are a triad whose definitions are circular. Each of the three is defined in terms of the other two" (Savan 1988, 43). Therefore, Peirce regards semiosis as "an action, or influence, which is, or involves, a cooperation of three subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs" (Peirce 1994, CP 5.484). Moreover, he emphasizes the permanent referential character of signs: The meaning of a sign "is, in its primary acceptation, the translation of a sign into another system of signs" (Peirce 1994, CP 4.127; see also CP 4.132). The three categories of firstness, secondness, and thirdness, and the corresponding sign aspects, always indicate to each other in semiosis and never have an independent existence. The triadic structure of the sign can be derived from this: "a sign stands for an object in some respect to some interpretant" (Parmentier 1994, 16). The Peircean sign model is, therefore, to be interpreted as a "relation of relations" (Bense 1975, 67; Burch 1997).[2] However, relations can only exist if differences are laid out in advance. That is why the Peircean sign model is also to be interpreted as a difference of

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2 Anthony Wilden (1980, 40) draws attention to the corresponding epistemological difficulties: "*Relations between relations cannot be talked about* in the analytic logic of lineal causality and unidimensional sequence. It is even possible that they cannot be talked about (digitalized) at all, whereas they can certainly be (and in fact always are) *communicated*."

differences—according to Gregory Bateson's understanding of information as "a difference which makes a difference" (1987, 276.321 et pass.). According to Elisabeth Walther (1979, 113–116), the following relations are to be distinguished (Figure 1):

- signification relation: representamen R ⇒ sign object O
- meaning relation: sign object O ⇒ interpretant I
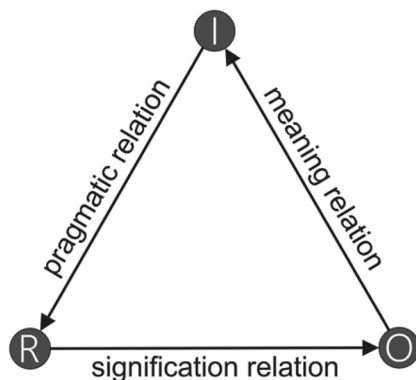- pragmatic or applicative relation: interpretant I ⇒ representamen R

Figure 1: The three relations in Peirce's sign model

The interpretant is a constitutive sign component; it mediates the relationship between the sign and the sign object. The interpretant, however, is not a human actor (which is also a sign) or just an act of consciousness. "The interpretant [...] is not only an 'interpretive consciousness which is a sign' but generally the interpretation, the interpretive field, the realm of the meaning of the sign. The interpretant itself is a sign (which is part of the thinking process) or an experience or a sensation, in other words, it encompasses all that is meant by 'meaning' in its widest sense" (Walther 1969, 6).[3]

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3 To avoid any confusion that the interpretation of the relationship between representamen and object is a sign *external* subject, which uses the sign, Peirce coined the neologism 'interpretant'. Human individuals are also made up of signs and—as an ascription in communication—nothing but a sign, and interpretants are not made up of human individuals. Peirce speaks "deliberately of 'interpretant' and not of the (human) interpreter" (Baltzer 1994, 360). Therefore the following applies: "Whatever process determines reference qualifies as an interpretant" (Deacon 1997, 63). Charles W. Morris (1938, 3) makes a clear distinction between the interpretant and the interpreter, whom he defines as a fourth factor of semiosis.

Charles Morris (1938) introduced the three dimensions of syntactics, semantics, and pragmatics into semiotics. "*Pragmatic* meaning is defined as meaning that is dependent on context, while the *semantic* value of a sign is the meaning, or notional core, that it has apart from contextual factors" (Mertz 1985, 4), and syntax encodes the meaning.[4] The syntactic, semantic, and pragmatic dimensions are all based on each other in semiosis (Figure 2). The pragmatic dimension controls "the manner in which signs 'do' things" (Yelle 2011, 357), whilst semantics refer to the indexical aspect of signs, and syntactics is responsible for the structure of sign correlations.
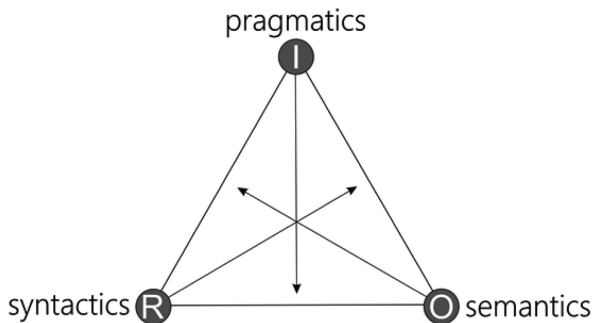

Figure 2: The mutual foundation of syntactics, semantics, and pragmatics

Figure 2 shows syntactics in the place of the representamen, because it controls the coding of semiosis. Semantics is located at the position of the sign object, because it is responsible for the interplay between self-referential sense (system) and other-referential reference (environment).[5] Pragmatics is to be put in the place of the interpretant because it is responsible for the mediation between syntactics and semantics. The mutual dependence of syntactics, semantics, and pragmatics is the precondition for the representational character of the sign[6], but at the same time, it leads to the interplay between semiotic conventionalization

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4 On the connection between syntax and coding, cf. Norbert Wiener (1989, 91): "Grammar is no longer primarily normative. It has become factual. The question is not what code should we use, but what code do we use."

5 The distinction between sense (or meaning; German: Sinn) and reference (or denotation; German: Bedeutung) goes back to Gottlob Frege (1960).

6 "*A sign must consist of a triadic relation, and it must signify*. A sign, therefore, consists of three relational dimensions: a syntactic structure, a pragmatic structure, and a semantic structure" (Pearson 2015, 137).

and innovation, and thereby to fuzzy semantics (Rieger 2000)[7]. This in turn requires, but also allows for, further connections, thereby rendering an open future possible. Religion is based on the interaction between syntactics, semantics, and pragmatics, too. Semantics becomes specifically religious only if it is based on a religious syntax in the sense of a specific religious code. Conversely, the religious syntax is realized in semantics that is determined in religious terms. The reciprocal condition is founded by religious pragmatics, i.e. by relating to a usage context defined in religious terms.

If we apply Peirce's semiotics to the newer systems theory and to second-order cybernetics as outlined in the chapter on the basics of systems theory in the first part of the article (see figure 1 in that essay), then the three sign components: representamen, sign object, and interpretant, must be duplicated for an elementary semiotic system to emerge (Figure 3).
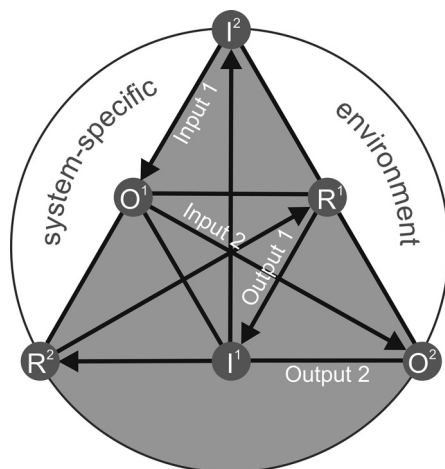

Figure 3: The semiotic elementary system

The semiotic elementary system identifies itself (i.e. distinguishes itself from its environment) in the following way: A representamen (R^2) (firstness), a sign object (O^2) (secondness), and an interpretant (I^2) (thirdness), acting as a processor, constitute a *sign form* which incorporates and observes a *sign content* including a representamen (R^1), a sign object (O^1) and an interpretant (I^1) (as the first processor).

The communicative activation of semiosis occurs through the incorporation of the triadic structured semiosis in the social space. The social space supple-

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7 I owe this reference to Frederick Elwert.

ments the three semiotic dimensions of syntactics, semantics, and pragmatics, by a fourth, i.e. the social dimension, which is, however, itself semiotic and therefore triadic in nature.[8] It comprises social forms ranging from, e.g., schools, lineages, movements, networks, and associations to formal organizations (for the present, see Krech, Schlamelcher, and Hero 2013; Heiser and Ludwig 2014). Modeled on the ideal type 'organization', a social form is based on its communication structure, the persons involved in the shape of ascription (formalized: personnel) and its program (ritual and other instructions, patterns of interpretation, dogmas, statutes, etc.) (Luhmann 2000, 9–10) (Figure 4).[9]
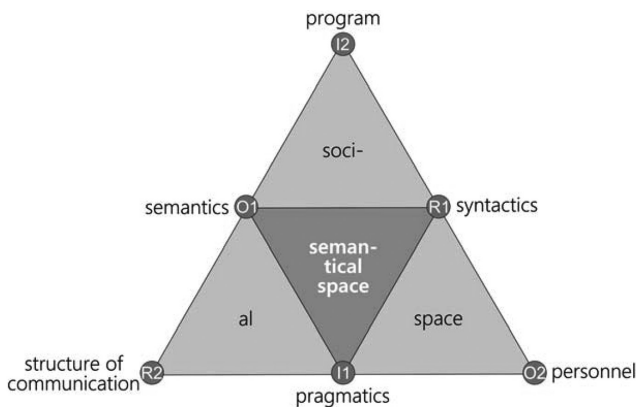

Figure 4: Correlation between semantic space and social space

The communication structure, which is placed at the semiotic position of the representamen, forms communication in systemic terms. The relationship between

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8 For the scheme 1,2,3–4 in European semantic and social history, see Brandt (1991) as well as the contributions in Brandt (2014). According to Peirce's semiotics, which I adhere to, number 4 connects to number 3 and it again unfolds into the three categories of firstness, secondness and thirdness. "The most fundamental fact about the number three is its generative potency" (Peirce 1994, CP 4.309). Number 4 may indeed close—in the sense of scheme 1,2,3–4 by Reinhard Brandt —, but semiosis itself is in principle non-completable. Luhmann's triad of interaction, organization, and society (1975) is also folded in by a fourth element and can be understood in accordance with the scheme 1,2,3-4: society "appears as a comprehensive unity (that includes all types of interactive and organizational sociality) and at the same time as one social system among others, *distinguished* in particular from interactions and organizations" (Tyrell 2015, 359–360).
9 Persons can be addressed and thus involved in religious communication in various ways. Regarding formalized membership as a specific feature of the European history of religions, see Zander (2016).

the communication system, the mental as well as—via the respective psychic systems—the organic and physical environment, is controlled by the concept "personnel" (or less formal: those persons who are addressed in a communication process). The personnel is located at the semiotic position of the sign object, because here the structural coupling between the system and its environment takes place. The program is located at the semiotic position of the interpretant because it mediates the relationship between communication structure and personnel. In a Roman Catholic service, for example, the liturgy, as part of the church organization, functions as a communication structure. The priests, the ministers, the reader, and the church attendants are the involved personnel, and the *Missale Romanum* is the program. The social space, in turn, is embedded in the societal space, which is divided up into subsystems such as politics, law, science, economics, health/social services, education, art, and religion. The example of a Roman Catholic service is embedded within the Roman Catholic Church as a religious organization, which, in turn, is nested within religion as a societal subsystem.

5.3 Religion as a Semiotic System

Against the backdrop of the considerations on semiotics, the question of what constitutes a complete religious sign as the elementary unit of religion is to be dealt with. The general semiotic code must be specified so that religion can distinguish itself (and be distinguished) from other forms of semiosis and fulfill its societal function of ultimately coping with undetermined contingency. In its differentiated form, religion is based on the code transcendent/immanent in order to proceed systemically, to distinguish itself from other social subsystems, and to fulfill its social function of ultimately coping with undetermined contingency. In accordance with the assumption that the religious code *in nuce* comprises all that is necessary for religious communication (as is the case with the genetic code for organic development), the binary distinction together with its mediating unity must be found in the religious code. Taking the distincions between self-reference and other-reference as well as between transcendence and immanence, including their unity, into consideration, the complete religious sign can be modeled as follows:
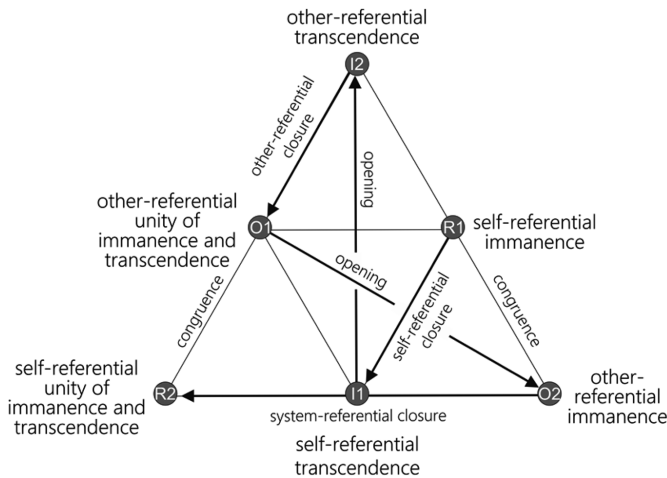
Figure 5: Composition of the complete religious sign

Any specific semiosis "needs to start from exceeding a representamen" (Leone 2014, S50). A religious sign system therefore begins with the representamen of a previous sign form (R^1). As the sign system is in the process of being formed, the representamen R^1 has the value of immanence. However, it only becomes an immanent sign element through the closure in the direction of self-referential transcendence with the value of I^1; designating something as immanent only makes sense in connection with transcendence. The self-referential closure based on the code transcendent/immanent is the first system-constitutive distinction. If, as a result, the sign system is determined to be religious, the paradigmatic opening to the second system level must also be based on the religious code. It occurs, however, in the direction of the value of other-referential transcendence. This is the first step of the emergence of religious information as a metaphorical *translation* of the metonymic *transcription*. This is where the forming religious sign system takes the path to the other-referential unity of transcendence and immanence. The sign object O^1 has this value, because on the one hand, it is the result of the metonymic inclusion of transcendence, but on the other hand, it opens other-referentially towards the immanence. This paradigmatic reopening towards the position of the other-referential immanence completes the second step of the emergence of religious information as the translation of the transcription—that is, *the difference of a difference*. Eventually, the other-referential immanence at the semiotic position of O^2 is transferred to the self-referential unity of transcendence and immanence at the position of R^2.

As soon as the religious sign system is closed, the closure process can retrospectively be outlined as follows: The representamen of the observing sign form

(R^2) is the point of transformation between the distinction of system and environment (Scheibmayr 2004, 283). In the case of a religious sign, it ensures the self-referential unity of transcendence and immanence. The representamen R^2 signifies the sign object O^2, in the place of which the other-referential immanence is to be located. The interpretant of the sign form (I^2) mediates between the representamen R^2 and the sign object O^2. As it is a religious sign, it is the other-referential transcendence that can be found in the place of the interpretant I^2, because I^2 is pragmatic and context-sensitive. The representamen R^1 and the interpretant I^1 of the observed religious sign content together process the self-referential code transcendent/immanent. Located at the position of the sign object of the observed sign content (O^1) is the other-referential unity of the distinction between transcendence and immanence. This unity is objectified, because it is observed by the sign form. It is other-referential, because it always refers to a dynamic object in the environment to which the semiotic system, via the immediate sign object, can only ever approach.[10] If individual signs are components of a self-referential organization as a "semantic closure" (Pattee 2012), they are determined in a complete religious sign as religious. In this model —as with the model of the general complete sign—it must be taken into account that the sign components are in a state of permanent oscillation, and their semantification can therefore also change their values. It is only on this basis that semiosis can remain flexible and enable follow-on operations. In addition, the two components of the religious code, in principle, refer to one another. Transcendence exists only as the reflection value of immanence, and immanence, in turn, can only come about in connection with transcendence. The model presented in Figure 5, therefore, represents only a snapshot of an oscillating process.

An example may help to show how a specific religious sign comes about. An observer (that might be any semiotic entity, e.g., a text, or a sequence in an oral conversation, where a person communicates a respective information) observes the following:

– HERE is a CHURCH. (Contexture 1)[11]
– A PERSON enters the CHURCH. (Contexture 2)
– The PERSON speaks a PRAYER. (Contexture 3)

According to the semiotic model outlined above, the three contextures have the following position:

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10 Regarding the distinction between the immediate and the dynamic object, see Peirce (1994, CP 4.536, 8.314, 8.333) and Short (2007, 191–196).
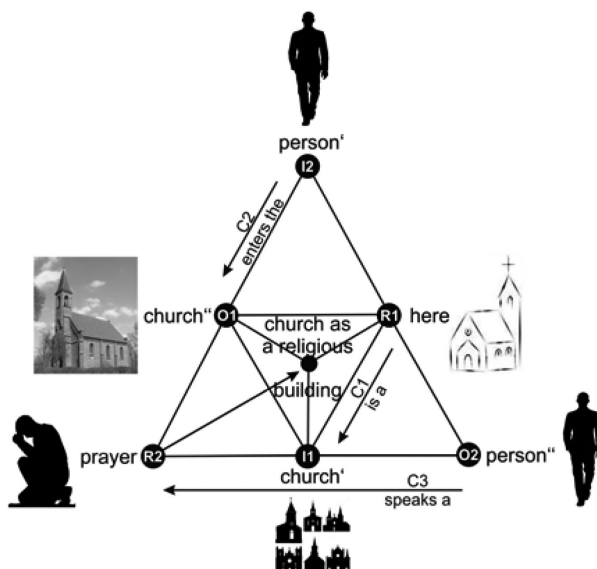**11** Contexture in the sense of a process of weaving parts into a whole.

Figure 6: Church as a religious sign

The indication HERE is, aside from the fact that THERE is not indicated, initially indeterminate. It only indicates presence and can refer to anything. A first clarification is made by the reference to A CHURCH. But A CHURCH is still neither determined semantically nor pragmatically. It could, for example, refer to a sign on a map or to a statement made during a guided tour for tourists. With the statement "A PERSON enters the CHURCH" the case starts being closed. The CHURCH'' is now determined as a building that PEOPLE can walk into. However, its closer determination remains undefined. If the PERSON is, for example, an ART HISTORIAN who would like to carry out restoration work on frescoes in the CHURCH, the CHURCH becomes a PLACE TO PRACTICE ART-HISTORY. It is only the subsequent and final contexture "The PERSON speaks a PRAYER" that determines the CHURCH as a SACRED SPACE. At the same time, CHURCH' is determined as a triadic sign in this case: as a concept of SACRED SPACE (thirdness), as a PHYSICAL BUILDING (secondness) and as a notion of a church with certain QUALITATIVE CHARACTERISTICS (firstness).
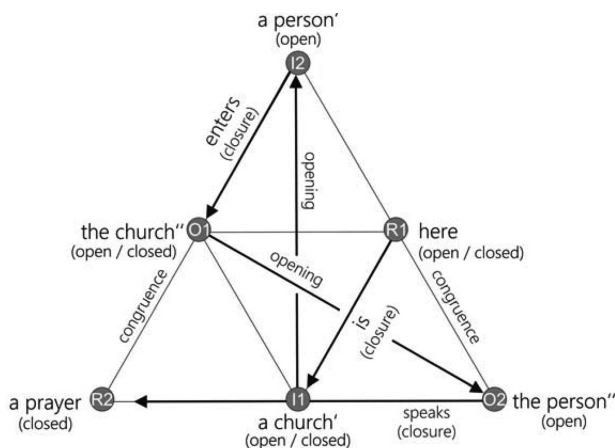
Figure 7: The oscillation between closure and opening using the example of the relation between a ᴄʜᴜʀᴄʜ and a ᴘᴇʀsᴏɴ

The example illustrates the oscillation between the syntactic closing and opening as well as between immanence and transcendence actualized in religious semantics (Figure 7). The sign component ʜᴇʀᴇ is semantically open in its own right, it can activate anything. The syntagmatic closure begins with the relation to the sign element ᴀ ᴄʜᴜʀᴄʜ'. But it is not yet determined either. The following relation between the two interpretants, ᴀ Cʜᴜʀᴄʜ' and ᴀ Pᴇʀsᴏɴ', is a paradigmatic opening, because ᴀ Cʜᴜʀᴄʜ', though determined by ʜᴇʀᴇ, can be connected to many things.[12] Opening means that ᴀ Pᴇʀsᴏɴ' is also semiotically open; it can behave in many ways and does not necessarily have to be related to ᴀ Cʜᴜʀᴄʜ'. The syntagmatic closure of the relation that follows makes ᴛʜᴇ Cʜᴜʀᴄʜ'' semantically unambiguous, because it determines it as a ʙᴜɪʟᴅɪɴɢ ᴏɴᴇ ᴄᴀɴ ᴇɴᴛᴇʀ. The subsequent paradigmatic opening points at the sign ᴛʜᴇ Pᴇʀsᴏɴ'', which can, once again, ʙᴇʜᴀᴠᴇ in various ways. The final syntagmatic closure folds in the other sign components and makes the final sign complete. A Pʀᴀʏᴇʀ as the representamen of the observing sign form determines the entire sign system in religious terms.

The semiotic syntax is linked to the semantification of the religious code in the following way: Hᴇʀᴇ has the value of self-referential immanence, which is related to the religious code via ᴀ Cʜᴜʀᴄʜ. The sign of ᴀ Cʜᴜʀᴄʜ occupies the value of self-referential transcendence and thereby gains potentially religious significance. The sign ᴀ Pᴇʀsᴏɴ has the value of other-referential transcendence,

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12 The distinction between syntagmatic and paradigmatic follows the proposition made by Roman Jakobson (1960).

which bears a relation of other-referential closure to the value of the other-referential unity of transcendence and immanence. This is the value of the sign THE CHURCH''. This sign merges transcendence with immanence insofar as THE CHURCH'' is, on the one hand, enclosed by transcendence and, on the other, it is immanent in other-referential terms, as it refers to a PHYSICAL BUILDING. The path of the emerging religious sign system then leads to the sign THE PERSON'' via the second paradigmatic opening. As a reference to the PSYCHE or the MENTAL BEHAVIOR of THE PERSON'', this sign occupies the position of other-referential immanence and is transferred to the self-referential unity of transcendence and immanence via a system-referential closure process. The sign A PRAYER, which takes this position, folds in and completes all elements of the sign system and defines them in religious terms. Accordingly, A CHURCH' in the sign object function on the left sign triad is defined as a SACRED BUILDING with an *other-reference to the physical environment*, in the interpretant function of the observed sign content it is determined as a SACRED SPACE in the sense of a *religious space concept*, and in the representamen function of the right triad it is defined as the *quality* of a SACRED SPACE—in this example as a quality that invites PERSONS to engage in religious behavior in the form of PRAYER.

Readers may surmise that all this is only 'plain' or 'dull' theory or even mere speculation. What is the relationship between empirical analysis and a theoretic model, between religion and its scientific description? The following chapter is devoted to this question.

6 The Emergence of Religion and Its Scientific Description

In their differentiated form, religion and science serve as functional subsystems of society, each based on their own code. They can therefore only observe—i.e. describe—one another as a specific environment. The balancing between religion and science, under the conditions of functional differentiation, is neither a task of religion nor one of science, but a matter of social coordination.[13] The functionally differentiated society is characterized by the fact that no subsystem is hierarchically superior to others and that a state of heterarchy prevails. Societal subsys-

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13 On the relationship between self-reference and coordination under the conditions of the functionally differentiated society, see Bendel (1993). According to the study by Legare et al. (2012), individual psyches are also able to coordinate 'natural' with 'supernatural' explanations.

tems carry out their mutual observation via analogies, which are converted into information, i.e. into digital literality, by means of the respective system-specific code. From there, further information is gained by metaphorical means again. To clarify how science and religion can observe its respective environment (e.g., each other) and internally generate information from semantic energy derived from its other-referential environment, a look at the relationship between metonymy and metaphor is useful.

6.1 The Relationship between Metonymy and Metaphor

The process of generating meaningful information can be understood by analyzing the relationship between metonymy and metaphor. While the metaphor is a *parabolic* analogy with a 'focal point', the metonymy rests on *symbolic* analogy.[14] The main difference between metonymy and metaphor has been analyzed by Roman Jakobson (1971). He distinguishes two types of sign arrangements: the *combination* or contexture (with the two subtypes *concurrence* and *concatenation*), as well as the *selection* or substitution. The constituents of a piece of information are connected to a code via an internal relationship as well as to the environment, from which the material for the generation of this information originates, via an external relation (Jakobson 1971, 243). Jacobson deduces the two constitutive principles of metonymy and metaphor from these two basic operations (Jakobson 1971, 254). Metonymy consists of a specific combination of signs on the syntagmatic axis and rests on the principle of contiguity (spatial and temporal proximity). The metaphor is a selection on the paradigmatic axis. It is produced by substituting one sign for another, to which it bears a paradigmatic relation, and is based on the principle of similarity. These two tropes, however, are not a categorical distinction, but poles which regulate the opening and closing of semiosis (see the articles in Dirven and Pörings 2003 as well as in Spieß and Köpcke 2015). Determining a sign element as a metonymy or a metaphor is carried out by the two interpretants as processors of the elementary semiotic system: "[...] there are always two possible interpretants (Peirce's term) of the sign, one referring to the code and the other to the context of the message. The interpretant referring to the code is linked to it by similarity (metaphor), and the interpretant referring to the message is linked to it by contiguity (metonymy)" (Wilden 1980, 47).

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14 Irony is a form of *diabolic* semiosis. It is based on ambiguity and keeps identity and difference in the balance. Its socio-structural correlation is, for example, the fool and the trickster (Bouissac 2015).

Metonymy and metaphor *together* are necessary for generating and processing information. The metonymic combination is related other-referentially to the semiotic context from which the material for the generation of information originates, and the metaphorical selection provides for the self-reference of the semiotic code.[15] For example, the sign CHURCH, if it refers paradigmatically to a SACRED SPACE, is metaphorically linked to the religious code, and metonymically linked to the semiotic context from which the material for the generation of information originates—for example in the statement: "You should go to church again." This sentence can be embedded in religious communication, for instance in a conversation on matters regarding one's religious conduct of life. In this case, both the code and the information context observed from an other-referential viewpoint are determined in religious terms. However, the sentence can, for instance, also be part of educational communication. In this case, the sign CHURCH is paradigmatically related to CHURCH ATTENDANCE as an educational means in the educational code communicable/non-communicable[16]. The distinction as well as the interplay between syntagmatic combination and paradigmatic selection provides an explanation for the basic polysemy of individual signs (Bartsch 2003). It is only in a particular pragmatic-semiotic context that they acquire a specific sense.

Analogies, by establishing similarity between something distinctive in comparison to some distinct other, generate and process the paradox of 'is and is not'. This is what metaphor theories call attention to.[17] The "predicative basic struc-

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15 See Fesmire (1994, 152): "Metaphors emerge through our interactions as structured modes of understanding and adapting to our physical, cultural, and interpersonal environments. They are thus of the same stuff as our habits. Our habits take an environment into themselves. It would, of course, be absurd to suppose that our habits of walking or driving are wholly subjectively constituted. Our habits, for example, of right-handedness or left-handedness have an organic fluency with our environment—we open doors, shake hands, write, and play music. [...] In just this way, metaphors are habitual (stable, but flexible) patterns of understanding and experiencing. *All metaphors take an environment into themselves*" [emphasis added].

16 According to Luhmann (2002, 59–60) following Kade (1997).

17 From the great wealth of literature on metaphor theories, it is worth mentioning the following works, from which the considerations presented here have particularly benefited: as a theoretical overview: Haverkamp (1996); summarizing the discussion: Haverkamp (2007); cognitive science: Lakoff and Johnson (1980, 1999), Fauconnier and Turner (2002); very instructive from a linguistic viewpoint: Dancygier and Sweetser (2014) (however, the understanding of the metaphor as *blending* [Dancygier and Sweetser (2014, 73)] is at least misleading, because it carries the danger of blurring the boundaries between semiotic systems and their [psychic] environment); on the paradox of the metaphor: Haverkamp (1998), against Davidson (1978); on the metaphor of space: Lagopoulos (2003), Cochetti (2004), Caballero (2006); on metaphors with special reference to religious language, among others: Barbour (1974), Ricœur and Jüngel (1974), Tracy (1978), Ricœur

ture" (Weinrich 1963, 337) of a "bold" or "living" metaphor produces a split-reference (Jakobson 1960, 371) or double reference ("suspended reference and displayed reference") (Ricœur 1978, 261); the "dead metaphor" as an entrenched metonymy or synecdoche obscures it (Silk 1974, 27–56). This is the paradox of the metaphor: "The metaphorical 'is' at once signifies both 'is not' and 'is like'" (Ricœur 1978, 6). In systems theory metaphors arise on the boundary between systems of meaning and their environment; they combine identity within the system with other-referentially observed similarity (Tourangeau and Sternberg 1981).[18] At these transitions, coded literalism and metaphorical surplus oscillate.

What is true for semiosis, on the whole, already applies to the complete sign as its smallest systemic unit. It is based on the two operations of metonymy and metaphor in the above-mentioned sense as well as on their synthesis (Figure 8).
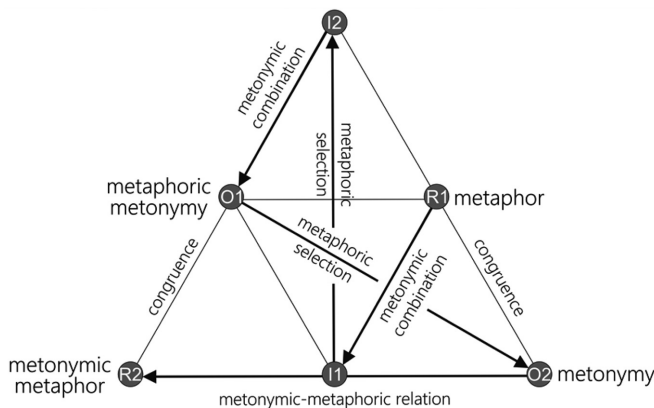

Figure 8: The positions of metonymy and metaphor in the complete sign

(1978), Noppen (1988), Soskice (1985), Jablonski, van der Lans, and Hermans (1998), Boeve and Feyaerts (1999), Botbol-Baum ([1996] 2007), Stoellger (2000), Zimmermann (2000), Soskice (2007) and Westbrook (2011); insightful in terms of the theory of science and the metaphorical core of modelling: Black (1954/55, 1962) and Hesse (1966); epistemological and communication theory: Debatin (1995), Bertau (1996); on metaphorical models as 'mediators' and 'autonomous agents': Morgan and Morrison (1999); still fundamental in metaphorological terms: Blumenberg ([1960] 2010).

18 In the distribution of transitions between semantic spaces "across the entire space of a language, so-called linguistic metaphors are generated", writes Lotman (2009, 19)—however, unlike advocated here, with recourse to individual consciousness as a "source of inspiration" for metaphors. As systems are mutually environments to each other, the highest tension is created in mutual perception. The metaphor bridges this tension and removes "all boundaries of untranslatability and unites the incompatible" (Lotman 2009, 22).

According to Peirce's sign theory, the metaphor is a type of representamen, because it is based on the principle of similarity and is self-referential.[19] The metonymy is a type of the sign object, because it is other-referential, even though it is transitively related to the respective code in the complete sign. The two tropes are both processor and process. In the sign system, the relations R^1–I^1 and I^2–O^1 are metonymic combinations that are based on a certain code (in the case of differentiated religion: on the code transcendent/immanent). However, the relation R^1–I^1 is self-referential, because the first interpretant transforms the metaphorical surplus by means of the system-specific code into information, which is manageable for the system. The relation I^2–O^1 is other-referential, because the second interpretant is environmentally sensitive and interprets the first sign object in view of other-reference. The transitions between I^1 and I^2 and between O^1 and O^2 are a metaphorical selection because they connect the level of the observing sign form with the level of the observed sign content. The relation between R^2 and O^2 is to be understood as a combination of metonymy and metaphor. While the sign object O^2 is other-referential and therefore context-sensitive, the representamen R^2 is self-referential and at the same time, it constitutes a possibility to connect to further semiosis.[20] Due to the relation between metonymy and metaphor, a change between the two can take place within the sign system (Bartsch 2003, 73–74; Goossens 1995). In the systemic process, O^1 is metonymical in character but interspersed with metaphorical elements. Conversely, R^2 is metaphorical in character, but transfers the other-referential metonymy into self-reference and thus also has metonymical elements. Due to the system reference of the complete sign, the relations between R^1 and O^2 as well as R^2 and O^1 are congruent.

The oscillation between metonymy and metaphor, as well as their synthesis, are the conditions for the production of semiotic information as a *translation* (metaphor) of the *transcription* (metonymy) in the interplay between closure and opening. At the same time, process (time) and structure, together with the

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19 Within Peirce's classes of signs, the icon is a type of representamen. To point out that there is no sign that is a pure icon, Peirce introduces the term hypoicon. The metaphor is such a hypoicon: "Hypoicons may be roughly divided according to the mode of Firstness of which they partake. Those which partake of simple qualities, or First Firstnesses, are *images*; those which represent the relations, mainly dyadic, or so regarded, of the parts of one thing by analogous relations in their own parts, are *diagrams*; those which represent the representative character of a representamen by representing a parallelism in something else, are *metaphors*" (Peirce 1994, 2). As a metaphor can never be a pure icon, it always contains metonymic elements that can be emphasized to a greater or lesser extent. For the iconic character of the metaphor see Sadowski (2009, 180).

20 Michel Serres (1982, passim) speaks of „passage".

position of the elements (space), must be mediated (see Figure 8, above). In *procedural* terms, the metonymic transcription induces the syntagmatic closure process regarding the respective code, while the metaphorical translation is based on paradigmatic openness. In *structural* terms, metonymy as a sign aspect of secondness (relations) is other-referential-open, while the metaphor as a sign aspect of firstness (quality) is self-referential-closed as a result of paradigmatic selection. In the complete sign, R^1, O^1, and I^1 are closed as a unity in the shape of the observed sign content but are open in the direction of the observing sign form. The sign system is therefore open in system-internal and epistemic terms, but it is closed in operative terms regarding the environment.[21]

The metaphorical translation of the metonymic transcription is the basal process of self-observation in a system: It draws a distinction (*transcription*) and observes it (*translation*) with respect to the synthesis of self-reference and other-reference. This process corresponds to Peirce's understanding of metaphors. They "represent the representative character of a representamen by representing a parallelism in something else" (Peirce 1994, 2). The "parallelism in something else" consists in the metonymy of the sign object. The interrelation between metonymy and metaphor as well as the oscillation of closure and opening makes it clear —at least to some extent—how semiotic information emerges in the process of translating the transcription.

6.2 How Religion Proceeds and Science Observes It

Against the backdrop of the relationship between metonymy and metaphor, the process of how religion relates to its environment can be understood. Religion refers to its environment in an other-referential and analogic manner and transforms respective semantic energy into coded literalism in order to thereafter refer to transcendence under immanent conditions by means of a metaphorical surplus. At the same time, from an internal religious perspective, however, the surplus constitutes the literal sense—made evident and plausible, for example, by means of divination or revelation—, and the environmental reference constitutes the metaphorical sense, which makes it possible to fold in and understand the

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21 Thermodynamics is known to distinguish between isolated, closed, and open systems. While isolated systems have no exchange with their environment, closed systems do exchange energy, but not matter, with their environment. Open systems, however, relate to their environment both via energy and matter (Kondepudi and Prigogine 2015, 4–6). Meaning systems, including religion, exchange semantic energy with their environment, which it processes internally into religion-specific information within the system, and they therefore belong to operatively closed systems.

environment. The double-direction of self-reference and other-reference only comes into view when the metaphor is understood in accordance with the triadic-relational sign model: it contains the difference between literal and figurative and, at the same time, it generates and represents its unity. This unity makes it possible for the transmission to take place in both directions of the difference. The reality status of both 'is' and 'is not' lies not only on one of the two sides of the distinction between religious and other kinds of communication, but moves at their interference points. The digitization of analogous, simultaneous, and equally valid relationships is carried out within a system by means of self-reference.

The formal considerations shall be briefly substantiated based on empirical data. The data stems from the treatise *The Flowing Light of the Godhead* (FLG), whose authorship is attributed to the Christian mystic Mechthild of Magdeburg (b. ca. 1207, d. ca. 1282).

Middle High German Version[22] (Mechthild von Magdeburg 1869, 37)	English Version (Mechthild von Magdeburg 2003, 43)
Wie die sele berůret gottes vrîheit in aht dingen	*How the soul interprets God's wooing in eight things*
Herre, min fůsse sint geuerwet mit dem blůte diner waren lôsunge, min vedren sint verebent mit diner edeln erwelunge, min munt ist gerihtet mit dinem heligen geiste, min ŏgen sint geklåret in dinem fürigen liehte, min hŏbet ist geslehtet mit diner getrůwen beschirmunge, min wandlunge ist lustlich von diner milten gabe, min flug ist gesnellet mit diner unrů-wigen lust, min irdensch sinken kunt von diner einunge mines lichamen. Je grôsser lôsunge du mir gist, je langer ich in dir můs sweben.	*Lord, my feet are stained with the blood of Your true act of redemption, my feathers have been smoothed by Your noble favour, my mouth has been formed by Your Holy Spirit, my eyes transfigured by Your fiery light, my head is made sleek by Your faithful protection, my movement is delightful because of Your generous gift, my flight is made swift by Your restless desire, my sinking back to earth is because of Your union with my body. The more You free me, the longer I may hover in You.*

This passage—like the entirety of the text FLG—is characterized by two metaphorical fields: physical gravity and eroticism. Both metaphors are folded in by religious communication and provided with specific religious meaning. In the perspective of the construction of religious meaning, 'upwards' is the positive

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22 The original version in Low German is missing.

(transcendent) value of the religious code and 'downwards' is the negative (immanent) value (for the case of Jewish mysticism, see Idel 2005; for Daoism, cf. Eskildsen 2007). Within religious communication, both directions have a religious value. Hell, for example, is—typically, though not universally—placed below (Bernstein 1993, 60.146; Bremmer 2014; Stausberg 2009; Le Goff [1981] 1990), while paradise is in heaven above (Lang and McDannell 1990). "Vertical orientation is [...] commonly used in metaphors that describe religious concepts. Jesus and god are considered the 'highest', whereas the antithesis of god, satan, is considered to be a 'lowly' being. Such metaphors likely develop through the historical belief that god resides high in the heavens, whereas satan resides deep in the underworld" (Meier, Scholer, and Fincher-Kiefer 2014, 51). Religion as a special coordination system connects the space determined in physical terms with meaning determined in non-religious terms—for example, with attributions of social status such as "HIGH STATUS IS UP" or political attributions such as "POWER IS UP" (Lakoff and Johnson 1980, 16)[23]—and transforms this combination into specific religious meaning. In referencing the quoted passage of the text FLG: *min irdensch sinken* (my sinking back to earth) goes down, and *lôsunge* (literally: release, seperation from; religiously: salvation) from the body goes up. Both directions are mediated by *sweben* (hover). Sensual perception of space is aided by the sign *lichamen* (body) as its medium hovers between heaven and earth (or even deeper: hell). *sweben* is the corporeal equivalent to the metaphor of flowing that is often used in the text FLG, as well as to the spatial metaphor of *unio mystica*.

The second metaphorical field in the text FLG, which is also used in the cited passage, is eroticism. It is a common metaphor within mystical communication (Bataille 1986, 221–251). In the text FLG, Mechthild's soul is the bride and the lyrical ego "is produced in part by the vicissitudes of erotic experience" (Newman 1995, 143). One of the strongest statements with sexual allusions is: „*Ich bin in dir und du bist in mir, Wir môgen nit naher sin*" ("*I am in you and you are in me, we could not be any closer*") (Mechthild von Magdeburg 1869, III.5, 66). In addition,

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23 Cf. also Connerton (1989, 74): "The direction upwards, against gravity, establishes the postural base in our experience of lived space for the dichotomous sense to which we attach values, such as those expressed in the oppositions between high and low, rise and decline, climbing and falling, superior and inferior, looking up to and looking down upon. It is through the essentially embodied nature of our social existence, and through the incorporated practices based upon these embodyings, that these oppositional terms provide us with metaphors by which we think and live. Culturally specific postural performances provide us with a mnemonics of the body." And William Stokoe (2001, 42) writes: "Meanings like 'up' and 'down' have been associated with human vision and movement for a very long time, thus they have become conventionally as well as naturally linked to their meanings. (They are both an index and a symbol.)"

the metaphor of flowing has connotations of semen and vaginal fluid during sexual intercourse. However, mystical union, though it contains *references* to physical sexual intercourse, *is not identical to it* (Keul 1999, 96).

The last part of the cited passage can be illustrated in the model of the semiotic system as follows (Figure 9):
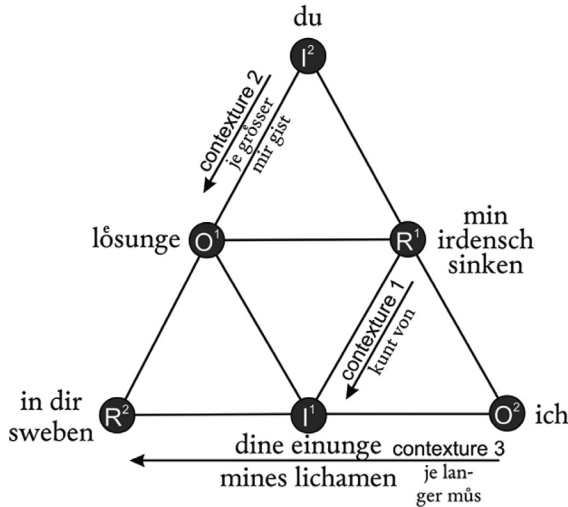
Figure 9: A sentence from Mechthild von Magdeburg in the semiotic model

min irdensch sinken (R^1) connects metaphorically to the preceding semiosis and is encoded by the interpretant I^1 *diner* [= God] *einunge mines lichamen* religiously. The second interpretant I^2 *du (you)* (= God), which takes the position of other-referential transcendence, draws semantic energy from the environment of religious communication in the form of *lôsunge* as the first sign object O^1. This word functions as a metaphorical metonym and is transformed by the interpretant I^2 *du* (= God) from the semantics of physical release into a specific religious meaning. In religious meaning, *lôsunge* stands for the other-referential unity of transcendence (salvation) and immanence (physical release). The second object reference (O^2) exists in *ich* as the lyrical ego. At this point, the semiotic system draws energy from the self-referential environment in the form of mentally represented body perception. *in dir mûs sweben* as the representamen R^2 occupies the position of a self-referential unity of transcendence (in the spatial metaphor: up) and immanence (in the spatial metaphor: down). This sign element completes the entire sign, and as a metonymic metaphor it represents the starting point for further semiosis. During the follow-on communication in the form of reading or reciting

this text, the reader (as an environment of communication) can take the place of the lyrical ego. Since the lyrical ego presents itself as one with God,[24] the reader or reciter (and thus the listener) can comprehend the uttered experience. The lyrical ego becomes the religious performing entity: an empty, context-free framework into which the readers or reciters can easily slip (Linden 2011, 379) and turn from external observers to communicatively addressed participants in religious communication (Nemes 2012, 47). In this way, religion can feed itself with further semantic energy, which it draws from the mental environment, and transform it into religious information.

Science in general, including the study of religion, also uses analogies to extract semantic energy from its environment (in this case: from religious communication as its empirical data and from certain academic approaches as the basis for modeling) and transforms it into system-specific information by means of the scientific code true/false (Luhmann 1990, 170). Every scientific model has a metaphorical character (Black 1962; Hesse 1966; Boyd 1993; Kuhn 1993; Holland 1998, 202–210; Hallyn 2000; Brown 2003; Drewer 2003; Kretzenbacher 2003; Gutmann, Rathgeber, and Syed 2010, 15–16). It is "an imagined mechanism or process, postulated by *analogy* with familiar mechanisms or processes and used to construct a *theory* to correlate a set of *observations*" (Barbour 1974, 30). A scientific model can only be verified by the code true/false to the extent that it attempts to include reality in the form of empirical evidence into scientific knowledge and to compare it with theoretical assumptions.[25]

Through mutual observation, religion and its scientific study cause interferences in the respective system. The religious statement "The Church is the Body of Christ",[26] for example, contains a lot more, much less, and a very different mean-

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24 The text FLG specifies the condition for dissolving the distinction between the text, the lyrical ego, the reader and God by noting at the beginning: „*Dis bůch sol man gerne enpfan, waṅ got sprichet selber die wort*" ("*One should gladly receive this book, for God himself speaks the words*") (Mechthild von Magdeburg 1869, 1).

25 Due to metaphoric nature, however, models are historically grown and can therefore change. In the case of science, for example, the following applies: "Metaphor plays an essential role in establishing links between scientific language and the world. Those links are not, however, given once and for all. Theory change, in particular, is accompanied by a change in some of the relevant metaphors and in the corresponding parts of the network of similarities through which terms attach to nature" (Kuhn 1993, 539). It is precisely this metaphoric nature that keeps models open for empirical work, but at the same time subjects them to constant historical change. In this regard, the research program developed here on a theory and empirical analysis of religious evolution is both timely and temporary.

26 According to 1 Corinthians 12:27: "Now you are the body of Christ, and members individually" (*Scofield Study Bible III* 2002, 1589).

ing than the sociological proposition "The Church is a religious organization". The opposite is true as well. The difference is expressed in the following assertion made by the former Pope Benedict XVI: "The Church is not to be deduced from her organization [other-reference; VK]; the organization is to be understood from the Church [self-reference; VK]. But at the same time it is clear that for the visible Church visible unity is more than 'organization' [system-referential unity of other-reference and self-reference under the condition of visible immanence; VK]" (Ratzinger 2004, 210–211). From a sociological perspective, however, the church is nothing more than a religious organization, a certain, albeit complex, social form. "Self-description problems of this kind arise particularly in those cases where religious institutions or 'associations' (Max Weber) claim all sacredness for themselves and regard their order and hierarchical structures as manifestations of God's will. Religious collectives of this type resist equation to 'profane' or 'secular' organizations. This type of 'egalitarianism' overturns the asymmetric self-distinction between the sacred and the profane, between the 'holy church' and the 'world' (as a social environment)" (Petzke and Tyrell 2012, 275).

7 The Mutual Transcription of Metaphors in the Fields of Natural Sciences, Social Sciences, and Cultural Studies

The draft of a theory and empirical analysis of religious evolution programmatically presented here is, among others, based on approaches in natural sciences. As was suggested, this is possible due to a homomorphism between religious, social, mental, organic and physical evolution. However, the possibility alone does not tell us anything about its usefulness. The purpose of this transfer is to bring the study of religion to areas beyond other-referential elements of hermeneutics (i.e. interpretation that is oriented towards persons and the subjectivities), to scientify it, and to center it in a self-referential way. This approach is meant in the sense of a "third culture" (Brockman 1995; Lee and Wallerstein 2004), which overcomes the dichotomy of the "two cultures" (Snow [1959] 2012) and which brings cultural studies, the social sciences and the natural sciences together to form a unified science.[27] Religion is no more a hermeneutic fact than 'nature'—at least as an object of communication—is exclusively bound to 'hard facts'.

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27 In the modern period, philosophical works on science agree "on the central point that the most important goal of the scientific method is the unity of all academic knowledge. What is more:

Against this background, the scientific description (i.e. 'deciphering') of the genetic code and cell processes is transferred to the description of semiotic processes in order to *inform* the study of religion.[28] It is also in the use of the concept of the meme that this must be done consistently if metaphorics are to hold up heuristically (Lynch 1996; Blackmore 1999; Aunger 2000; Blackmore 2001; Distin 2005; Dawkins 2006; Brodie 2009; Heylighen and Chielens 2009; Leigh 2010; Blackmore 2016).[29] The general semiotic code, which is responsible for the composition of a complete sign, is interpreted in this approach in analogy to the biogenetic code and corresponding cell processes—just as, vice versa, the cell can be interpreted as a semiotic system (Barbieri 2007b).[30]

Signs are as aggressive as genes and they push for reproductive and mutating development.[31] On the same basis as the general semiotic code, they each form

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the form of unity seems to justify the claim to validity and truth of academic knowledge in the first place" (Küppers 2000, 90). Ulrich Schnabel (2008) provides an interdisciplinary overview of the study of religion. Regarding a uniform scientific perspective in which the investigation of biological processes is synthesized with philosophical and semiotic aspects, cf. Salthe (1993). On the synthesis of natural and social sciences, see also Barad (2007), and for a perspective from the social sciences, cf. Descola (2013).

28 Perhaps the following detailed analogy is exaggerated or too far-fetched: A codon that encodes an amino acid in the biogenetic code consists of three successive building blocks (base triplets), each of which consists of one nucleotide pair. The model of a complete sign drawn up here also comprises six units, namely three differentiations of two elements each. After all, Douglas R. Hofstadter (1999, 519) dares to compare the biochemical and musical structure in his usual playful way: "CUA GAU—Cu Ag Au: *A typical segment of mRNA read first as two triplets [...], and second as three duplets [...]: an example of hemiolia in biochemistry.*" This in turn corresponds, on the one hand, to the sequence of the three distinctions in the complete sign, and on the other, to its circular structure of the observational sign form and the observed sign content. There are also analogies to other natural facts. The arrangement of the hydrogen atoms in the sp^3-hybridized methane hybrid orbital, for example, corresponds to a tetrahedron that resembles the semiotic double triangle when unfolded in the plane.

29 Critique of memetics, cf. Kuper (2000) and Bloch (2000) among others.

30 On biosemiotics, see Igamberdiev (2002, 2001), Sebeok (2001), Barbieri (2007a), Hoffmeyer (2008b, 2008a), Kull, Emmeche, and Favareau (2008), Kull et al. (2009), Favareau (2010a), including particularly Favareau (2010b) as well as Emmeche and Kull (2011), then Schilhab, Stjernfelt, and Deacon (2012), Romanini and Fernández (2014), Kull (2015) and already Sercarz et al. (1988). For the history of biosemiotics cf. Barbieri (2009). See also Ingold (1993, 36): "In anthropology, cultural information is made to play much the same role as is played by the genes in biology." Meanwhile, even thoughts concerning a "physiosemiosis" have been explored (Deely 2014).

31 In a similar way—but with a view to psyches—Scott Atran describes memes: "[...] memes serve only themselves. Just as genes or viruses use individual bodies to replicate and propagate, so memes allegedly use the minds that host them as (potentially disposable) transport vehicles. Cultures and religions are coalitions of memes seeking to maximize their own fitness, regardless of fitness costs for their human hosts" (Atran 2002, 17).

specific semiotic codes—for example, a religious one—, transmit themselves by means of sign division and combine to form sign systems that are organized on the basis of specific semiotic codes.[32] "Cultural transmission is analogous to genetic transmission" (Dawkins 2006, 189). But the analogization of biogenetic and semiotic code—at least in the approach advocated here—does not involve a naturalized understanding of socio-cultural reality and therefore also of religion, namely for two reasons. First, an analogy does denote similarity in some respect (i.e. similarity in difference to differences), but not identity. Second, the biogenetic code itself is a metaphor of prebiotic chemistry and molecular biology[33] borrowed from the subject of scripture and its deciphering (Brandt 2004; Stoschus 2005; Türcke 2005).[34] Insofar as the structural sciences are oriented by the reference medium of language and writing, they "increasingly contribute to the 'dematerialization' of the natural sciences, which in turn makes it possible to bridge the gap to the humanities" (Küppers 1996, 197). Scripture and the ability to read it are absolute metaphors as conceptualized by Hans Blumenberg (2010). They characterize not only cultural studies and social sciences, but also the natural sciences.[35] In accordance with the mutual analogization of the biogenetic

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32 According to the analogy between biogenetic and semiotic code, genes can, conversely, also be interpreted as signs (see El-Hani, Queiroz, and Emmeche 2008, 124–136).

33 The field of physics, which examines electron spin resonance in crystals for example, also works with metaphors; cf. Schwoerer and Wolf (2005, 160). For a metaphorical understanding of the genetic code see Barbieri (2007b, 2004). However, this approach bears the danger of obscuring the view that the genetic code should not only be interpreted *as* a metaphor, but that it itself operates *through* metaphors, too.

34 The biogenetic code is referred to as a "translation key": "The majority of the *information* stored in the genome *encodes* amino acid *sequences* of proteins [...]. In order to produce (*expression*) these proteins, a *text* from the 'nucleic acid *language*' has to be *translated* into the 'protein *language*'. This is where the term *translation* for protein biosynthesis process comes from. The '*dictionary*' that is used for this translation process is the genetic code. As there are 20 proteinogenic amino acids [...] the nucleic acid *language* must contain at least as many *words* (codons). In the nucleic acid alphabet, however, there are only 4 *letters* (A, G, C and U as well as T). *In order to form 20* different *words*, each *word* must have a length of at least 3 *letters* [...]. The codons actually consist of 3 consecutive building blocks (Base-Triplets)" (Koolman and Röhm 2009, 246; [emphasis added]). The discovery of the genetic code is called *deciphering*. Alan MacKay and Jacek Klinowski (1986) apply the metaphors of "letters", "words", "grammar" and "syntax" even to the description of inorganic structure formation. The "grammar" of inorganic structure formation, for example, consists of "intrinsic curvature" (MacKay and Klinowski 1986, 806). It was already Galileo Galilei who stated that "in nature philosophy is written with mathematical letters" (Dänzer 1960, 305).

35 However, the scientific work is increasingly characterized by imaging methods. More research into the relationship between image and text—in the form of diagrams, for example—is therefore necessary.

and the semiotic codes, the semiotic structure of communication, as well as the biogenetic code, are degenerated, universally[36], and as a whole, they cannot be put at rest. Just like communication, the biogenetic code has in information-theoretical, syntactic and semantic terms a demonstrably high error tolerance and adaptability (Natterer 2010, 92; cf. also Mattick 2003).[37] By analogy with the relationship between microphysical and macrophysical processes[38] as well as with processes in a cell and the numerous forms of organisms, the complete sign constitutes the elementary process of communication, which takes the form of semantic textures[39]; in terms of societal structure it becomes a societal system with differentiated subsystems, and in the social morphogenesis it takes the form of different social forms—ranging from the interaction in the form of an *encounter* (Kieserling 1999) to formal organizations (Luhmann 2000). This is the empirical-sociological correlation between semantics and social structure. The semiotic code contains the arrangement of the mechanisms that are essential for communication and it unfolds in discourses as well as in fixed socio-structural arrangements. Socio-cultural evolution, the autonomous part of which is the evolution of religion, is therefore not to be interpreted as an extension of biological evolution—that would be an incorrect form of reductionism—, but once again: in the sense of analogy to it.[40] As was noted earlier, biological and socio-cultural evolution form a relationship of a structural homomorphism. In the following passages, this will be explained on the basis of analogies between semiotic processes and cell processes.

I am far from understanding cell biology and its theory models. However, a formal analogy between the corresponding diagram and the semiotic model developed here quickly springs to one's mind. The theoretical biologist Robert

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36 I thereby assume—similarly to the generative grammar developed by Noam Chomsky (e.g., 1995)—that the elementary semiotic process is a process spanning different times and cultures, but which varies considerably in chronological and cultural terms concerning the type of coding, the semantic composition, and the pragmatic approach—by analogy with the variation in the biosphere.

37 A high level of error tolerance is also important in systems theory: "For (unplanned) systems resulting from evolution are always characterized by a high degree of 'error friendliness' and 'robustness' or 'loose coupling.' Otherwise, the functions of selection and restabilization could not be separated at all" (Luhmann 2013, 153).

38 In line with the assumption of weak emergence, according to which "the micro-level laws in principle capture the entire physics of the system" (Davies 2006, 37).

39 Textures in the sense of Sybille Krämer (2005, 52): "individual writings do not simply form 'texts', but first of all they form a 'texture': a web of spatial relations."

40 For the difference between extension and analogy in the narrower sense, see Ingold (1986, 47).

Rosen modeled the so-called *(M,R)*-system, where 'M' stands for metabolism and 'R' for repair[41] (Rosen 1991).[42] The diagram looks like this (Figure 10):
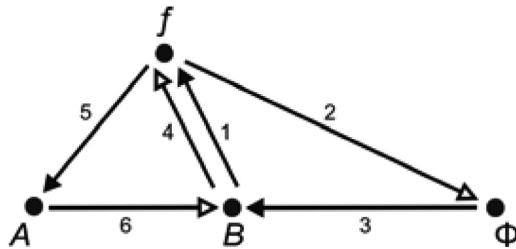

Figure 10: Robert Rosen's diagram 10C.6 depicting the (M,R)-system (in accordance with Rosen 1991, 251)[43]

The model is composed of the following processors and processes (also known as functors and functions, or operators and operations): the metabolical processor *f* uses inputs from set *A* to produce outputs of set *B*. *f* is caused by the repair processor Φ, which in turn is generated by a replication processor *b* from set *B*. The lines with hollow arrowheads stand for "an actual software flow from input (afferent) to output (efferent)", whereas the lines with solid arrowheads stand for "the induction or generation of this flow by the hardware" (Rosen 1991, 219–220).[44] The result is a circular system: "[...] every function is indeed entailed by another function in the graph itself. As far as entailment is concerned, the environment is out of the picture completely, except for the initial input *A*" (Rosen 1991, 251). The relations are (see also Cottam, Ranson, and Vounckx 2007, 2358):

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41 Also called *replacement* by others; cf. Letelier, Cárdenas, and Cornish-Bowden (2011, 105).

42 On the relationship between *(M,R)-system*s and autopoietic systems, cf. Letelier, Marín, and Mpodozis (2003). According to the authors, autopoietic systems are a subset of *(M,R)-system*s.

43 In order to provide a better overview, I have numbered the functions in the style of Cottam, Ranson, and Vounckx (2007, 2359).

44 Louie (2013, 115) explains: "Note that the processor *f* is *that which entails,* and the output (effect) *b* is *that which is entailed*. Because of the location of the symbols with respect to the arrows, 'that which entails' may be identified with the (tail of the) solid-headed arrow, and 'that which is entailed' may be identified with the (head of the) hollow-headed arrow. Stated otherwise, if something entails, then it needs to initiate a solid-headed arrow; if something is entailed, then it needs to terminate a hollow-headed arrow."

$f{\rightarrow}a{\rightarrow}b$ (metabolism; relations 5 and 6)

$f{\rightarrow}\phi{\rightarrow}b$ (repair [or exchange] function; relations 2 and 3)

$b{\rightarrow}f$ (replication [or closure] function; relations 1 and 4)[45]

However, this model is associated with a number of difficulties—especially with regard to the relationship between mechanism (hardware) and organism (software).[46] Although in the *(M,R)*-system a mechanism can 'contain' an organism and an organism a mechanism, this distinction remains sharply binary. "Abstractly, the recognition in general of a *single* object implies the existence of not two, but three separate domains: the object, its ecosystemic environment, *and* their interface: the bifurcating categorization of Nature proposed by *Rosen* into the complement of *mechanism* and *organism* is insufficient. An organism is *not* the complement of a mechanism: the complement of a mechanism is its *ecosystem*" (Cottam, Ranson, and Vounckx 2007, 2359). The latest research suggests a complex interplay between digital and analog processes within the cell: "[...] it now seems likely that a major part of reproductive and embryogenetic control is *not* exercised by the small percentage of DNA that, *seemingly directly* and digitally, controls protein synthesis. Many of the other DNA-related processes now coming to light depend on a multiplicity of more or less locally environmental analogue effects. This 'insertion' of *analogue* influences into the previously supposedly digital transcription-synthesis route between gene and protein has *enormous* consequences. A prime attribute of digital or quantized interactions is their insensitivity to 'noise' or small-scale, locally environmental influences. This simplifying isolation breaks down when analogue effects come into play, leaving the door wide open to genetic influence from the environment. [...] Chemico-

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45 The alternative designations of the functions are from Letelier, Cárdenas, and Cornish-Bowden (2011, 105).

46 "*Rosen* limits the class of functors to *hardware*, and that of functions to *software*. This appears to be unnecessarily restrictive. Within the context of conventional computing, *functors* may be *either* hardware (as physical arrangements of gates) *or* software (as, *e.g.*, virtual machines). Consequently, hardware *or* software may generate software (in *Rosen's* terms). However, hardware is *always* generated by hardware, and *never* directly by software. The vital difference between inorganic machines and organisms is that organisms *are* capable in some way of generating hardware from software" (Cottam, Ranson, and Vounckx 2007, 2358–2359). In line with Howard Pattee (2007) it must be emphasized that the distinction between 'hardware' and 'software' (i.e. between physical and symbolic processes), is not an ontological dualism, but an epistemological difference. Between the components of this distinction, one must look for analogies and correspondences—however, within certain confines: "It is illegitimate to push the analogies beyond the limited sphere in which they are valid" (Prodi 1988, 241). Social system formation determines the boundaries with the help of internal differentiation.

physical epigenetic codes are far more susceptible to environmental influence than are genetic codes" (Cottam, Ranson, and Vounckx 2007, 2357). Accordingly, Cottam, Ranson, and Vounckx (2007, 2360) see relations 2 and 3 in the *(M,R)*-system (Figure 10, above) as the ecosystem which complements the mechanism. An organism is, therefore, "the complex interface between mechanism and ecosystem" (Cottam, Ranson, and Vounckx 2007, 2363). The ecosystem corresponds to the transition between the non-specific and the specific environment of a system, as was described in the chapter on the foundations of systems theory in the first part of this article (see part 1, figure 1). The diagrammatic solution offered by the authors is as follows (Figure 11):[47]
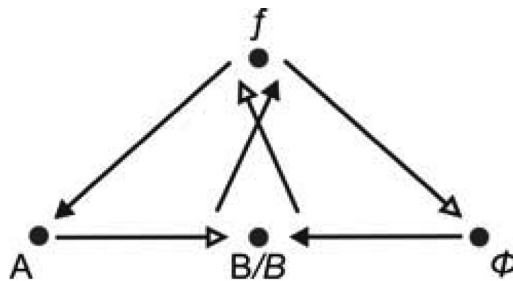

Figure 11: A variation of Robert Rosen's diagram 10C.6 depicting the (M,R)-system (in accordance with Cottam, Ranson, and Vounckx 2007, 2358)

If the *(M,R)*-system is autopoietic and self-referential, the functions not only have to be caused by one another, but there must also exist foundations of the relations (Goudsmit 2007). If one refers the *(M,R)*-system to the considerations on the double input-output process, which were discussed in the chapter on the foundations of systems theory in the first part of this paper (cf. part 1, figure 1), as well as to the resulting considerations on the semiotic elementary system (Figure 3, above), then the diagram of the *(M,R)*-system is to be modified as follows:

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47 The diagram bears resemblance to a *Möbius strip* which has neither an inner nor an outer surface. Glanville and Varela (1981) refer to this figure.
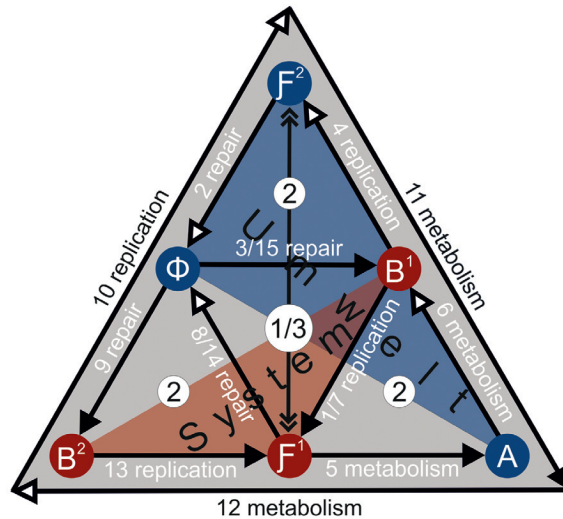
Figure 12: The (M,R)-system as a semiotic system with internal system-environment boundaries

From a semiotic self-referential perspective, the following applies: "[...] self-reference on the level of basal processes is possible only if at least two processing units which operate with information are present, and only if they can relate to each other and thereby to themselves" (Luhmann 1995, 138). In addition, the system must go through the function B→ F four times, through the function F→Φ→B three times, and through the function F→A→B two times in order to reach a closed state. The fully developed system starts with function 1 (B^1→F^1) and ends with function 15 (Φ→B^1) (Figure 12, above). Circularity creates a "bizarre hierarchy" of three levels, each with its own elements, "in which it is the case that, for each of the three members, that particular member is exactly in the middle of the hierarchy, is bizarre (counter-intuitive) but non-absurd (logically non-contradictory)" (Kercel 2002, 135).[48] The replication function B^2→F^2 (function 10) and the metabolism F^2→A→B^2 (functions 11 and 12) constitute a third level and fold in the preceding processes of the second and first level.

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[48] The *(M,R)-system* cannot be calculated with a Turing machine because, as Louie (2005, 2007a, 2007b, 2011) shows with the help of mathematical category theory, it contains an impredicative set. Zhang, Williams, and Gatherer (2016), by contrast, argue in favor of the calculability of the *(M,R)-system*. This can be done by transferring the classical diagram into the diagrammatic notation standard of the *Unified Modeling Language* (UML). Cf. also Palmer, Williams, and Gatherer (2016), who consider possibilities for calculating the *(M,R)-system*, too.

This modeling of the second-order would have to be—if it turns out to be useful—further considered, elaborated and, if necessary, modified further by experts, which cannot be done here.[49] Perhaps something has been gained from it for biosemiotics; I cannot verify that. But even if this modeling cannot be maintained from the point of view of theoretical biology, the analogization is still heuristically helpful for the understanding of the semiosis of socio-cultural processes in general and thus also for religion in particular. Then it could be called a productive misunderstanding. By analogy with the arrangement of the *(M,R)*-system in accordance with the semiotic model in the operatively closed state (Figure 12, above), the following arrangement of the sign elements in semiosis can be made:
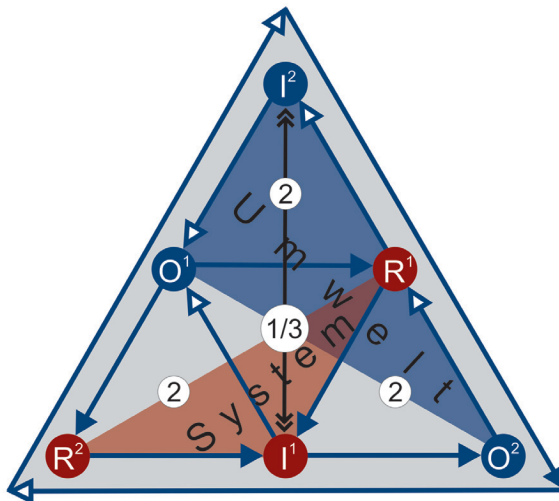

Figure 13: The elementary sign system in the semiotic model with internal system-environment boundaries

Analogization makes the following points clear:
–   The sign system creates an 'image' of itself and its environment within the system. This is achieved by observing the first inner level through the third outer level.

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49 The differentiation of ribotype, genotype and phenotype may also be important in this context (Mange and Sipper 1998; Herbert and Rich 1999; Barbieri 2003, 2007b).

–   The middle level of semiosis is characterized by the system-internal interplay between systemic code and environmental influences. Therefore, it represents the distinction between the observer and the observed, unified by the third level. The middle level corresponds to Stanley Salthes' conception of the "focal level", which is positioned between the lower and higher levels—or, according to the folding metaphor of the semiotic model: between the inner and outer levels (see Salthe 1985, esp. 125).[50] The middle level can only be observed by an external observer (Salthe 1985, 290). Due to the interplay between systemic code and environmental influences, the direction of the process reverses at the middle level. In the flowing state of the system, this is possible between the higher (or outer) and lower (or inner) levels: "[...] an entity can be both *a* and *not-a* because it is in the process of changing away from being *a*. A system of this kind would be indeterminate because it is in flux" (Salthe 1993, 232, referring to Voorhees 1985). However, systems must be studied when they are in a synchronous state, "because it is only then that they gain a quasi-determinacy sufficient to characterize them" (Salthe 1993, 232, referring to Voorhees 1983).

Against this backdrop, the relationship between metonymy and metaphor discussed above (cf. section 6.2) should be reexamined.[51] The analogization between cell processes and socio-cultural semiosis results in the following correlations:

–   The two metaphorical representamen R^1 and R^2 correspond to output processors B^1 and B^2.
–   The metonymic sign object O^1 corresponds to repair or replacement processor Φ.
–   The metonymic sign object O^2 corresponds to input processor A.
–   Interpretants I^1 and I^2 correspond to processors F^1 and F^2 of the *(M,R)*-system. They are responsible for replicating the semiotic code. Due to the pragmatic environmental sensitivity, I^2 additionally ensures that environmental influences are taken into account.
–   The syntagmatic functions $R^1 \rightarrow I^1$ and $R^2 \rightarrow I^2$ are key to the semiotic code. They correspond to the replicating (or closing) functions $B^1 \rightarrow F^1$ and $B^2 \rightarrow F^2$ and render a self-referential foundation of the sign system possible.

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50 See also Queiroz and El-Hani (2006, 92).
51 For an analogy of the linguistic processes of metaphor and metonymy with chemical reactions, see Darányi (2000).

- The semiotic function $I^2 \rightarrow O^1 \rightarrow B^1$ corresponds to the repair (or exchange) function $F^2 \rightarrow \Phi \rightarrow B^1$ and thus to the ecosystem described by Cottam, Ranson, and Vounckx (2007) as the complement to the mechanism of the *(M,R)*-system.
- The semiotic function $I^2 \rightarrow O^2 \rightarrow R^2$ corresponds to the metabolic function $F^2 \rightarrow A \rightarrow B^2$.

In keeping with the analogy between cell processes and communicatively activated semiosis, it is possible to understand how the religious system draws semantic energy from its environment and transforms it into system-specific information (Figure 13, above): It starts at the representamen R^1 as a unity of system and environment. Its metaphorical and ambiguous content is transformed by the interpretant I^1 as one of the system processors into clear, unequivocal religious information. In this way, the religious code is replicated. The interpretant I^2 as the second system processor then draws semantic energy from the specific system environment—or, mediated through it, from the non-specific environment—in the form of the sign object O^1, which is coordinated with the first representamen R^1. This is an analogy to the repair (or exchange) function of the *(M,R)*-system and at the same time the environmental sensitivity of the semiotic system in terms of its "ecosystem" (Cottam, Ranson, and Vounckx 2007, 2358–2359). Furthermore, the system draws semantic energy again from the system-specific environment in the form of O^2 and transfers it—mediated via interpretant I^2—into system-specific information in the form of the representamen R^2. R^2 is partially released into the system environment and partially constitutes the starting point for the replication of the religious code ($B^1 \rightarrow I^1$). In other words, R^2 is treated as a metaphor, the polysemy of which is then divided up into environment and system-specific information by means of a bifurcation.

Based on the mutual analogization of the *(M,R)*-system and the elementary sign system, it is also possible to specify the double input-output process (Figure 14, below), which was already the subject of the chapter on systems theory in the first part of the essay series.
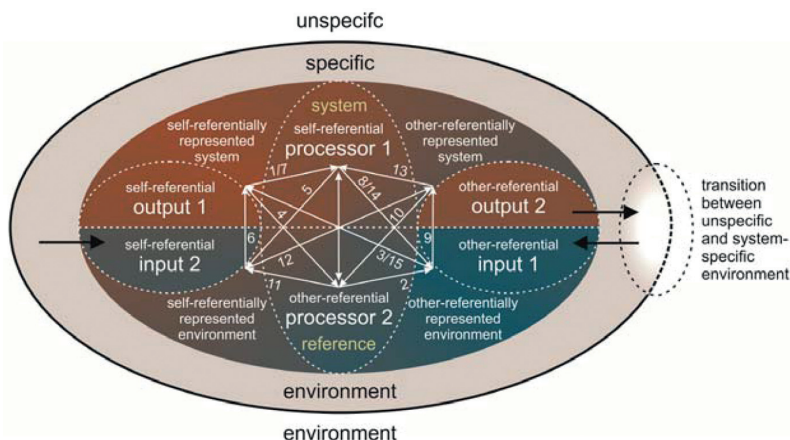
Figure 14: The specified double input-output-process

This way it becomes apparent how self-reference, other-reference, and system-reference interact with each other. The autopoietic process starts with the self-referential output 1, where the self-referential processor 1 has its starting point (relation 1). From there, the process takes the path to the other-referential processor 2, and, via the other-referential input 1 and the self-referential output 1, back to processor 2 (relations 2–4). The process then switches to the self-referential processor 1, which triggers the self-referential input 2 and output 1 (relations 5 and 6). Output 1 once again stimulates processor 1 (relation 7), which then regulates the other-referential input 1 and output 2 (relations 8 and 9). Output 2 stimulates processor 2 (relation 10), which controls the self-referential input 2 and the other-referential output 2 (relations 11 and 12). Output 2 stimulates processor 1 (relation 13), which eventually regulates other-referential input 1 and self-referential output 1 (relations 14 and 15).

8 Conclusion

The above explanations programmatically show how the combination of systems theory, the theory of evolution and the semiotically informed theory of communication can be used to design and empirically test a theory of religious evolution. The three theories have the following correlations with each other: evolution and system formation proceed within communication, communication is structured by means of system formation—including the relationship with the communicative environment—, and the relation between communication and system formation is mediated through evolution.
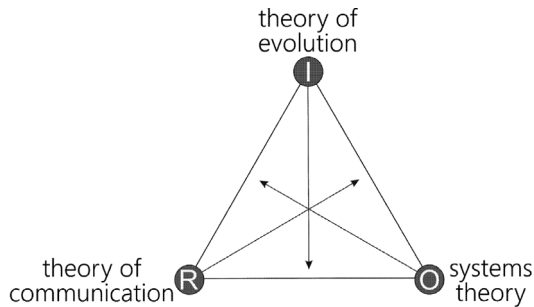
theory of
evolution

theory of
communication ® O systems
theory

Figure 15: The mutual foundation of the theory of evolution, systems theory, and theory of communication

In keeping with the positioning of the three theories in figure 15, their objects are located in the following semiotic positions: Communication—including semiotic syntax—is situated at the semiotic position of the representamen (sign vehicle), because syntax structures communication; system formation is placed at the position of the sign object, because system formation correlates with the system-specific environment; and evolution is located at the position of the interpretant, for it is social evolution that determines the possibilities of communication in semantic and structural terms—including the possibilities of a scientific description of religion. The study of religion itself takes place within communication (where else?), that is to say under the conditions of today's functionally differentiated society; and the relationship between the study of religion and its research object is regulated by the difference system/environment.

In conclusion, two issues should be pointed out regarding the relationship between modeling theory and empirical analysis. One of these issues concerns the degeneration of semiosis, which also applies to religious evolution. In biological evolution, it was and is apparently very helpful that the genetic code, as already mentioned, has a certain error tolerance. It is called degenerated because a 'semantic unit' (a specific amino acid) can be encoded by several different 'syntactic arrangements' (codons or triplets).[52] Translating back to communica-

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52 "Nucleotides consist of four nucleobases, two of which are complementary. Three pairs form a *codon* or *triplet*, which corresponds to a specific amino acid (comparable to a letter in a human language). Dozens to hundreds of codons (comparable words and sentences of the language) correspond to protein functions (protein building plans). The enzyme RNA polymerase is used for the *transcription* into messenger RNA (mRNA), i.e. the production of a working copy. In the ribosomes, the code is then *translated* via transfer ribonucleic acids (tRNS), i.e. the translation into protein structures (protein coding) whose amino acid sequence is clearly determined by the triplet sequence of the mRNA. A sequence of triplets that make up a protein code is a gene. ¶ For

tion[53]: equivocations, paraphrases, grammatical irregularities (such as anacolutha), semantic shifts, tropes as well as rhetorical ornamentation and parerga form analogies to the biological degenerated code and to biological systems.[54] Within a sign-chain, the interpretant and the representamen of a degeneration, as well as the immediate object, are, according to Peirce, also subject to certain dynamics.[55] Communication could only develop through the separation of variation, selection, and (re)stabilization by means of degenerated codes.

As with organic processes based on the genetic code, degeneration must also be taken into account in religious processes. In the empirical analysis of religious communication, it is therefore not always possible to expect a double, intertwined, triadic structure of the semiotic code. Rather, degeneration occurs again and again, so that the flexibility of semiosis is constituted by various possible combinations in the interaction between variation, selection, and (re)stabilization. However, in order for the religious system to emerge as self-referential and to reproduce and develop further, a sufficient density of the semantically substantiated religious code in non-degenerated form is necessary. The relationship between modeled pure form and empirical degeneration is a question that can only be clarified by means of empirical analysis.[56] In addition to a high density of complete signs, it is also possible for a pattern of a complete sign to arise within a

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the triplets or codons there are now 64 possible combinations (= amino acids). However, only 20 combinations + three stop codons are used (protein coding genes are indicated by so-called promoters and a start codon). This means that several codons stand for the same amino acid and therefore have maximum *redundancy*. The genetic code has in information-theoretical, syntactic and semantic terms a demonstrably high degree of optimality, error tolerance and adaptability. The DNA shows an extremely high information density. It includes not only information on protein synthesis, but also a variety of regulatory sequences and ribozyme codes, overlapping genes, etc., with the spatial structure of DNA also being a 'carrier of information'" (Natterer 2010, 92). Recently, science has questioned the invariance of the genome. The transmission of the genome to form an organism leads to eradications, duplications, and other mutations in different parts of the organism, according to Macosko and McCarroll (2013). This viewpoint shows the enormous flexibility of the genome, but also sheds new light on the development of diseases (Shendure and Akey 2015).

53 Translating back because the biological metaphors originate from the metaphorical field of writing.

54 On the degeneration of the code, which makes deviations and modifications possible, see Vaas (1994); on degeneration as a biologically ubiquitous property, see Edelman and Gally (2001).

55 "[...] we have to distinguish the Immediate Object, which is the Object as the Sign itself represents it, and whose Being is thus dependent upon the Representation of it in the Sign, from the Dynamical Object, which is the Reality which by some means contrives to determine the Sign to its Representation" (Peirce 1994, CP 4.536).

56 Pattern recognition and classification methods may be used for this purpose (cf., for example, Theodoridis and Koutroumbas 2009; Duda, Stork, and Hart 2000; Niemann 1983).

degenerated semiotic chain (Figure 16); this is a question of semiotic granularity and the relationship between information, decorative parerga, and parasitic noise.[57]
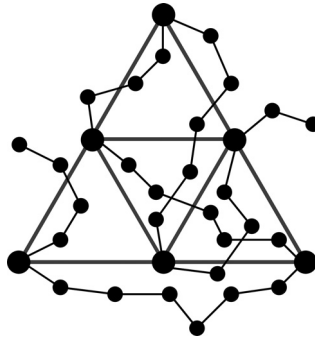

Figure 16: Degenerated semiosis with pattern of a complete sign

The second issue that shall be pointed out in view of the relationship between the modeling theory of religious evolution and religion as an empirical object concerns the relationship between geometry and topology. Both methods correlate with each other in a way that is similar to the relationship between empirical facts and their theoretical models: namely in a metaphorical relation (Black 1962; Hesse 1966; Boyd 1993; Kuhn 1993; Holland 1998, 202–210; Hallyn 2000; Brown 2003; Drewer 2003; Kretzenbacher 2003; Gutmann, Rathgeber, and Syed 2010, 15–16). Accordingly, the threefold inference procedure—i.e. exploration, inclusion, and (a preliminary) conclusion (German: *Er*schließen, *Ein*schließen und *Ab*schließen)—moves between geometry and topology according to the distinction made by Michel Serres (Serres and Latour 1998, 60), between geometric precision (modeling theory) and topological, factual accuracy (empirical analy-

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57 Patterns "are efficient ways of transmitting exact copies of frames [sc. empirical objects with certain properties; VK] [...] from one place to another, but our interests often favor a somewhat different goal: transmitting *inexact* copies that nevertheless preserve 'the' pattern that is important to us. [...] Sometimes we are interested in not just ignoring the noise, but eliminating it, improving the pattern in transmission" (Dennett 1991, 34–35). Insofar as the semiotic model is homomorphic to the Sierpiński triangle, the following applies: "Many fractals have some degree of self-similarity—they are made up of parts that resemble the whole in some way. Sometimes, the resemblance may be weaker than strict geometrical similarity; for example, the similarity may be approximate or statistical" (Falconer 2003, xxii).

sis). In terms of the relationship between analog exploration and digital inclusion, Roy A. Rappaport (1999, 88) states: "Precision is not accuracy, and sometimes there may be loss of accuracy in the representation of analogic processes or entities digitally. The advantage of digitalization is that it increases clarity." Accordingly, geometric modeling (Figure 17) is one side ...
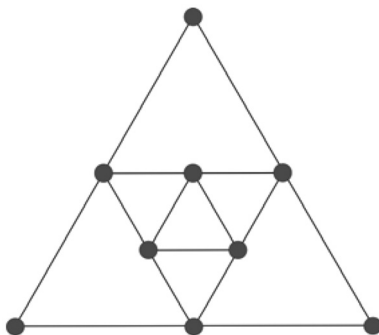

Figure 17: Geometric modeling

... and empirical reality (Figure 18, below) is the other side of scientific work in general, and the work on a theory and empirical analysis of religious evolution in particular.
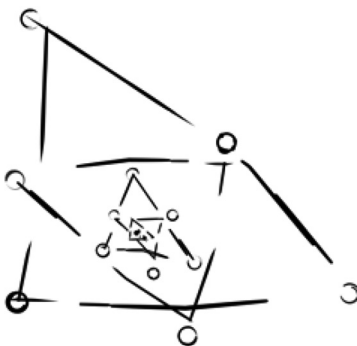

Figure 18: Empirical reality

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