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**Science and Religion:**  
Steps toward an Analytical Framework within  
Contemporary Science Studies

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## Zusammenfassung

### **Science and Religion:** Steps toward an Analytical Framework within Contemporary Science Studies

Silke Gölker

Das Verhältnis von Wissenschaft und Religion war eines der zentralen Themen bei Gründung der Soziologie und ist im Laufe der Jahrzehnte von der Agenda der empirischen Wissenschaftsforschung weitgehend verschwunden. Das Papier argumentiert für eine Wiederaufnahme der Debatten zu diesem Thema und entwickelt einen ersten Bezugsrahmen für empirische Analysen. Dafür wird Wissenschaft als Entdeckungs-, Rechtfertigungs- und Überzeugungskontext beschrieben und Religion als Organisation, als (Teil von) Kultur und als individueller Glaube. Für die jeweiligen Dimensionen wird reflektiert, welche Fragestellungen eine Untersuchung des Verhältnisses von Wissenschaft und Religion aus Perspektive der aktuellen Wissenschaftsforschung leiten sollten.

### Abstract

The relationship between science and religion was one of the most important topics in the era when sociology was founded but it has since disappeared from the empirical science studies agenda almost completely. This paper argues for reopening the debates on these issues and develops a preliminary framework for empirical analysis. This involves describing science as a context of discovery, justification, and persuasion; religion is seen in terms of organization, individual faith, and as (a part of) culture. Regarding all the dimensions, this paper discusses which questions should guide the investigation of the relationship between science and religion from the perspective of contemporary science studies.

## ***Content***

<i>Introduction</i>	<i>P. 1</i>
<i>Science and Religion: Perspectives in Sociology, History and Theology</i>	<i>P. 3</i>
<i>Dimensions of Religion and Science</i>	<i>P. 7</i>
<i>Steps toward a Conceptual Framework</i>	<i>P. 12</i>
<i>Summary and Outlook</i>	<i>P. 17</i>
<i>References</i>	<i>P. 20</i>

## Introduction<sup>1</sup>

On Thursday, August 4, 2011, a man killed his former mother-in-law and her daughter. He shot at his former brother-in-law, who was injured in the attack but survived; his ex-wife only survived because she hid. The murderer is an immigrant from Turkey and a Muslim. A psychologist was asked to explain this violent act and he said: “These men are convinced that they acted in the right. They have not experienced the Enlightenment, they have hardly any sense of being wrong.” (Berliner Zeitung, August 6, 2011)<sup>2</sup>

What do we learn from this? The psychologist tells us that there is one part of the world that has experienced the Enlightenment and one part that had not. We do not find any explication about what the Enlightenment means in this interview, but we read about the effects of being “enlightened” or not. According to this statement, the lack of enlightenment leads people to lack a sense that certain actions are wrong. So, whereas in the “enlightened” Western world people have this sense, in the “non-enlightened” Islamic world they do not. Obviously, this quote may act to create and reinforce boundaries between the Western and the Islamic world and it is racist in character since the speaker renders general judgments on a whole cultural group. However, it is said almost in passing in a serious newspaper.

The term Enlightenment, today, has acquired an everyday meaning that is very broad and has something to do with rationality. Initially, the Enlightenment said something about the particular relationship between science and religion. Scholars in the era of the Enlightenment were convinced that there would be a (better) world without religion, based on reason alone. Around 250 years later, we can see that religion did not disappear; in fact its importance appears to be rising again across the globe. In line with this, religion is back on the social science agenda. The number of publications and conferences on the topic is rising rapidly and associations are (once again) setting up sections on the sociology of religion<sup>3</sup>. Theories of

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<sup>1</sup> The author thanks Bruce Mazlish, Detlef Pollack, Dagmar Simon, Holger Strassheim, and Donald A. Yerxa for very helpful comments on earlier versions of this paper.

<sup>2</sup> Own translation. German: “Die Männer sind ja überzeugt, das Recht für die Tat zu haben. Sie haben keine Aufklärung erlebt, ein Unrechtsempfinden ist kaum vorhanden.“

<sup>3</sup> The German Sociological Association refounded the section for sociology of religion in 1995 after it was closed in 1970. The European Sociological Association founded a work group for the sociology of religion in 2011. The working group “Religion and Politics” has been working within the German Association for Political Science since 2001.

secularization are being called into question again (Eder 2002; Lehmann 2004; Pickel 2010; Tschannen 1991) and the relationship between religion and democracy is being reflected upon anew (Buchstein 1996; Habermas 2002; Merkel 2004; Werkner et al. 2009).

However, the contemporary science studies have not, thus far, paid attention to any questions of religion. On the one hand, this is remarkable, given that the relationship between science and religion was one of the most important topics in classical sociology. On the other hand, this might be seen as a logical development given that the western sociology followed these classics and the Weberian idea of strictly separable value spheres of science and religion.

The aim of this paper is to bring the relationship between science and religion (back) onto the agenda of science studies. Within the field itself, major contributions have been made to showing the embeddedness of all scientific work in its particular historical and regional environment. Consequently, there is reason to assume that the religio-cultural environment does have an influence on scientific work as well, though this assumption seems to militate against the idea of science as an enterprise purely based on rationality. New investigations of the relationship between contemporary science and religion, however, are important to learn more about both, about the role of religion in contemporary societies and about scientific inquiry and its search for certainty. Science studies has the tools to address those questions empirically and thus also to challenge the widely repeated narratives such as the one quoted above.

In this paper, I shall outline some historical and theological perspectives on the relationship between science and religion in a broad sense (Section 2). I then shall define different dimensions of the term religion on the one hand and of science on the other hand (Section 3) in order to then more precisely develop steps toward an analytical framework (Section 4). In Section 5, I shall discuss some general requirements that should apply to new research in line with the framework developed.

## Science and Religion: Perspectives in Sociology, History and Theology

The relationship between science and religion was one of the most important topics in the early *sociology*. (Gabriel and Reuter 2004) Comte (1956) described a development from a theological to a metaphysical to a positivist era and thereby looked at religion solely as a fixed-term phenomenon that (positivist) sociology would overcome. However, the sociological classics already assumed that religion had some permanent functions. Max Weber conceptualized different “spheres of values” for science and religion: In the “disenchanted world” science is responsible for the production of “intellectual knowledge concerning what is and should be” (Weber 1988 [1920]: 566) whereas religion “[...] claims to offer an ultimate stand toward the world by virtue of a direct grasp of the world's 'meaning.'” (ibid.).<sup>4</sup> Hence, Weber described a process of differentiation that would later become the minimal consensus within the manifold debates on secularization. (Tschannen 1991) Western sociology followed this “independence model” (Barbour 1997) for decades with the effect that the science-religion relationship was not the subject of much sociological investigation. Later theorists on secularization suggested a number of other reasons for the decline of religion, such as pluralization and the resultant privatization of religion (Luckmann 1991 [1967]), competition on the “Weltanschauung” market (Berger 2000 [1980]; McLeod 1997), or socio-structural developments such as individualization and urbanization (Bruce 1995; Bruce 1999). The rise of modern science became only one, and not even the most important, factor within these theories. It is against this backdrop that the science-religion relationship disappeared from the agenda of science studies almost completely.

Whereas the contemporary science studies do not pay much attention to the relationship between science and religion, this issue continues to be important in the *history of science*<sup>5</sup>. For a long time, the *conflict thesis* dominated within the field: Science in its modern sense as systematic method of obtaining proof was seen as an enemy of religion. From this perspective, the history of Scientific Revolution became a history of the emancipation of science from religion. It was this emancipa-

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<sup>4</sup> Translated by Hans H. Gerth and C. Wright Mills. (Weber 1946)

<sup>5</sup> See, for example, Brooke and Ihsanoglu (2005), Brooke (1991), Daston and Park (1998), Dixon et al. (2010), Harrison (1990), Holterhoff (2009), Kleeberg and Vidal (2007) regarding the relationship between science and religion in Europe; Adang and Schmidtke (2010), Iqbal (2007), Makdisi (1991),

tion and the rise of scientific method that then became the pathfinder for enlightenment—the victory of reason above metaphysical explanation. However, recently, a number of contributions have called the conflict thesis into question, and with it the starting point for the argument that led to the Western independence model. Most prominent, Brooke (1991) offers an alternative view of the relationship between science and religion in the era of Scientific Revolution. Instead of looking at both separately and opting for either the conflict or the harmony thesis, he describes a history of interaction between science and religion. He focus on the cases of Galileo and Darwin and thus on the most popular examples of the conflict thesis. Historical perspectives are always shaped by their own historical environments—this thesis underlies contemporary historical work.<sup>6</sup> The specific environment of the positivist era led to a specific construction of the history of scientific revolution. (Osler 2010)

This construction was not only in opposition to the Christian churches, but it also served and still serves to create boundaries between different religions. The “narrative of Enlightenment” (Martin 2005) in the Western world is related to a posited absence of an Enlightenment in the Islamic world (remember the newspaper article mentioned in the introduction).<sup>7</sup> For decades, the dominant view on the development of science in the Islamic world contained the following arguments: (1) There is a rich scientific tradition that dates back to the Middle Ages; (2) particularly in this era, Islam was more in harmony with science than Christianity<sup>8</sup>. But then (3) the scientific revolution in the Western world caused the decline of science in the Islamic world.

In fact, the important inventions that led to the industrial revolution and thereby to economic power of the Western world were only very late adapted within the Islamic world. Some contemporary Islamic authors, such as Nasr (1968) or Iqbal (2007) give normative reasons for that (see below). However, a detailed reconstruc-

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Nasr (1968), Nasr (1973), Nasr (1993), Ragab (2010), Schmidtke (2008) regarding the relationship between science and religion in the Middle East.

<sup>6</sup> See also the various contributions in Dixon et al. (2010).

<sup>7</sup> Küçük (2010) shows that the construction of the particular conflict between Islam and science was mainly influenced by the writing of Ernest Renan in the late 19<sup>th</sup> century. The narrative of lack of Enlightenment is also prominent, for example, in the writing of Lewis (2002), in the mass media, and in articles regarding the Turkey’s EU membership (Fach 2005), or in theological speeches such as one from Pope John Paul II (Der Heilige Stuhl 1992).

<sup>8</sup> E.g., Iqbal (2007) describes important inventions that intend to adjust buildings to face Mecca.



tion of the different development paths that led to the scientific revolution in the Western world, and which did not lead to the same developments in the Islamic world, has not yet been done in the history of science. And only in recent times do we find new investigations that attempt to provide a more integrated view of these developments and emphasize the common roots of the intellectual histories of Islam, Christianity, and Judaism (Schmidtke 2008).

The history of science is also a history of its relationship with religion. Recent findings that call into question the historical validity of the conflict thesis should also provide impetus for the development of a new perspective on the contemporary relationship between science and religion. Since every scientific inquiry builds “on the shoulders of giants” (Merton 1993 [1965]) we can assume that today’s scientific view of the world is also shaped by in part by religion-influenced scientific traditions. However, these influences may be very subtle and difficult to reconstruct. More important, there are new developments regarding the issue today. On a more popular level, we see this in the new debates about evolution and creationism that are prominent in the UK and to an even greater extent in the US;<sup>9</sup> these have also become an international fight between Christian and Islamic creationists. (Hameed 2010) We should also consider the international “Islamization of science” movement as an important development. The idea of this movement is to “bring back” Islamic values in all kind of scientific inquiry by institutionalizing new curricula for all disciplines in science and humanities. (e.g. Edipoglu 2006)

In addition to these debates at the borders of scientific community, there are still ongoing debates within the field of *theology*. However, contemporary theological questions are not principally concerned with the conflict between evolution and creationism, but rather focus on ethical issues. The ethical perspective is surely motivated by a belief in God as creator, however this belief is no longer in opposition to the findings of evolution. Melsen (1990) put it this way: “[...] although both creation and evolution are interested in the origin of life, they ask entirely different questions. Evolution tells us something about the how and why the different forms of life have been developed. Creation says something about the *existence* of the world, itself, together with its potencies.” (ibid: 29, emphasis in original). The po-

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<sup>9</sup>One prominent example is the evolutionist atheist position of Dawkins (2006) and the criticism on it (McGrath and McGrath 2007). See Giberson and Yerxa (2002) regarding the origins debates in American culture.

tencies of becoming of the world also play an important role in Peacocke's theology (Peacocke 1990). In his view, "God as ultimate Being gives ordered being to ('lets-be') a world that has sufficient order to be constituted of continuing entities and structures" (ibid: 185). In his mind, thus, evolution with all its unpredictable potencies does not contradict to Christian belief in God as creator but rather expresses "divine Becoming [sic]" (ibid.)

According to these concepts, there is no need to fight against evolution while arguing for an ethics that assert that God is creator. Ethical issues are addressed on two slightly different but connected levels. Firstly, there are numerous debates in connection with particular research topics. Most obviously, research in biology in general and genetics in particular rise a lot of questions on how to define human life, how to deal with the human body and how to treat nature more general (Deane-Drummond 1997; Erwin et al. 1994; Willer 1998). Furthermore, theologians have been intensely discussing the responsibilities of physicists and other researchers regarding the military use of their work (Kemp 1994; Lackey 1994). Secondly, ethics in science are discussed on a more philosophical level. While arguing for a better integration of science and theology, theologians also criticize the positivist paradigm in contemporary science itself. Referring to Einstein's ambition in searching for the "inner justification of natural law" (Torrance 1990: 36), Torrance argues for a recovery of ontology in the fields of social sciences. Melsen's (1990) criticism on the positivist paradigm is very similar when he asks: "Are the side effects of science and technology not partly due to the exclusively pragmatic view of science and technology?" (ibid: 32) We find the same argument also from an Islamic perspective. Nasr (1993) points out that Islamic science has to be different from the "Western" utilitarian way of doing science and needs to reflect its effects on the creation as a whole.

The above-quoted theological arguments for a science "beyond positivism", coincide remarkably with a number of critical statements of nontheologians. Most prominent, Jürgen Habermas (2002) has emphasized a new integration of a religious-ethical perspective in the scientific inquiry. In keeping with his focus on a theory of language, he puts his criticism in linguistic terms: "When sin turned into guilt, something was lost." (ibid.: 72)<sup>10</sup> Mazlish (1998) does not ask for an integra-

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<sup>10</sup> Own translation. German: "Als sich Sünde in Schuld [...] wandelte, ging etwas verloren."

tion of religious thought when he stresses the need to always try to systematically take into account the unintended consequences of certain investigations. However, since those consequences will never be completely predictable, scientists will have to deal with uncertainty.

Science studies was in fact founded in a spirit of criticism of the positivist paradigm. Up until this point, scholars in the field have studied the various influences shaping the academic work. However, questions about the contemporary coevolution of religious environment and science and scholarship have rarely appeared on the agenda so far. The following chapters discuss the steps needed to change this.

### **Dimensions of Religion and Science**

The aim of this paper is to bring the relationship between science and religion back onto the science studies agenda. Within this field, groundbreaking work has been done during the last few decades analyzing scientific work as social process on a microlevel. These tools enable contemporary scholars to study the relationship between science and religion empirically. However, before we can develop a conceptual framework in this sense we need to clarify more precisely what we are talking about. Both science and religion are highly complex terms and their definitions are widely disputed. I will not present a final definition for the one or the other either but will instead describe their different dimensions to provide orientation for the future analysis.

#### *Dimensions of Religion*

There is an extensive history of different definitions of religion. One difficulty is that the sociology of religion, the primary producer of those definitions, evolved and developed almost exclusively in the Western Christian environment. (Gabriel and Reuter 2004; Tenbruck 1993) Definitions, therefore, were related to Christianity and other denominations were described in relation to that definition. Even the relationship between God and humans or the differentiation between profane and sacred cannot serve as basic concepts since they are not present in all denominations. (Matthes 1993; Stolz 2001 [1988]).

For our purposes, I shall distinguish between the following three dimensions, which are often present at the same time in public debates:

*Religion as organization:* This dimension refers to all forms of organized representation. Much of the sociology of religion after the classics took the form of the sociology of churches. Following the positivist paradigm, religion was (and still is) measured in terms of church membership (Engelhardt et al. 1997; Hasselmann et al. 1984; Hild 1974; Kirchenamt der EKD 2003). Today, debates are much more focused on individual attitudes and on the function of religion. Nevertheless, religion as organization continues to be an important dimension and comes into play whenever questions of power are to be addressed. Again, the Christian churches differ from other denominations in several respects. Neither Islam nor Buddhism or Hinduism have such fixed worldwide organizations and clear hierarchies. However, we do find institutionalized positions, rituals, and forms of “divisions of religious labor” (Bourdieu 2000) here, which are related to power relations in the sense of Bourdieu’s concept of fields.

*Religion as (part of) culture:* The relationship between religion and culture is difficult to define<sup>11</sup>. From a functionalist point of view, religion can be seen as part of culture.<sup>12</sup> Culture then refers to all techniques developed by humans in order to satisfy their needs and to cope with challenges. Since those challenges are historically and regionally contingent, cultures are manifold and changing. Religion is used to satisfy the human need for meaning and to cope with the particular challenge of finiteness. Various cultural symbols and rituals are rooted in religion and faith. Changes over time may result in them only being loosely coupled to their former religious meaning, however they continue to be important rituals.

Furthermore, the term culture also has a substantial and moral dimension. (Moebius 2009: 32) Culture, then, means searching for a morally good way to live together. Religion and its institutions have been the main domain for dealing with moral questions for centuries. Thus, it is hard to separate the values and moral attitudes that are present in a particular contemporary culture from their religious roots. In this sense, religion is part of an implicit underlying interpretative scheme, as Luck-

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<sup>11</sup> Opielka (2007: 10f) criticizes how sociologists of religion ignore the term culture and sociologists of culture ignore the term religion.

<sup>12</sup> Regarding the term of culture, its history, and different concepts see (Moebius 2009).

mann describes: “Views of the world—having in its core a perception of a good life with regard to a transcendental reality—are conveyed to following generations in long historical processes.” (Luckmann 2002: 286)<sup>13</sup>

*Religion as individual faith:* Whereas the cultural dimension emphasizes the implicit and underlying character of religion, individual faith is something particularly remarkable. Luckmann (1991 [1967]) began a new phase in the German sociology of religion when he argued for analyzing and reflecting on individual faith instead of only focusing on institutions. With this, the conceptions of religion that followed became more open and independent from church membership. (Hahn et al. 1993)

Explanations of individual faith are in line with explanations of the cultural meaning of religion and are functionalist in character. Humans use religion in order to cope with the knowledge and the experience of finiteness and transcendence. Different authors emphasize different aspects of this common argument. For instance, Luckmann (1991 [1967]) and Berger (2000 [1980]) focus on the different levels of transcendental experience all individuals have in their lives. Oevermann (1996) mainly stresses the need to justifying one’s own existence. Luhmann (2002: 115ff) focuses on the general need for meaning. Integrating all individual ways of coping with transcendence and finiteness, however, makes the empirical boundaries of religion even more diffuse. Every search for meaning, from “radical fundamentalism to the foothills of spiritual wellness movements” (Höhn 2007)<sup>14</sup>, can be called religion.

As we can see, all three dimensions of religion—organization, culture, and individual faith—interact one with each other. The cultural symbolic and moral meaning of religion is realized, produced, and reproduced by organizations and individuals. However, though these dimensions overlap and are not strictly separable, they can provide us with initial orientation and allow us to organize an analytical framework.

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<sup>13</sup> Own translation. German: “Weltansichten – in deren Kern sich eine Vorstellung des guten Lebens mit Blick auf eine transzendente Wirklichkeit befindet – werden in langen historischen Ketten kommunikativer Prozesse an nachfolgende Generationen [...] vermittelt.“

<sup>14</sup> Own translation. German: “[...] radikalen Fundamentalismen bis hin zu den Ausläufern einer spirituellen Wellnessbewegung“

### *Dimensions of Science*

Science means the scientific production of knowledge. However, what does that mean? The scientific method as a systematic proof in the sense of Merton's "universal skepticism" (Merton 1990 (1942)) was only established in the era of scientific revolution and the Enlightenment that followed. The term "scientist" was first used in 1840 by William Whewell in his "Philosophy of the Inductive Science" (Snyder 2002). However, we can certainly identify activities that predate this usage in various fields, like physics, astronomy, biology, which we would today call scientific disciplines. The term science acquires yet another different meaning when it is used in contemporary public debates about the power or the influence of science. "Science" is sometimes used to talk about scientific organizations, sometimes to refer to individual scientists, or to a scientific community, or even to the products of scientific inquiry.

For our purposes, I shall describe a broad systematization that focuses on the process of scientific work. I firstly refer to the distinction between the "context of discovery" and the "context of justification," which was introduced by Reichenbach (1938) in the 1930s. This distinction has been widely discussed, criticized, and extended. (Hoyningen-Huene 1987) However, it continues to be valuable for contemporary work in the science studies. I will extend the perspective in two aspects: Firstly, following Heintz (2000: 119), I will describe the "context of persuasion" as a third distinction. Secondly, I will interpret all three dimensions while taking into account the framework of co-production (Jasanoff 2004). That means, processes of discovery, justification, and persuasion are not only to be found and analyzed within the scientific community but should rather be understood as processes that are pursued by science and society simultaneously. To look at scientific work as co-production also implies looking at power relations—the question is "[...] how societies produce authoritative knowledge and functioning technological artifacts." (Jasanoff 2005: 19)

Against this backdrop, we shall describe the above-mentioned three contexts in a way that reflects the interaction between science and society. This will reveal the following dimensions of the term science:

*Context of discovery and agenda setting:* This dimension describes all the processes by which a particular topic becomes a research topic. Reichenbach (1938) focused mainly on the question of how an individual researcher makes his or her discoveries and how he or she selects the topics for further research. In a broader sense, this dimension also includes the various institutional aspects of who decides which research topics are to be addressed and how. Thus, the whole setting of national and transnational regimes of funding and governing scientific work affect the context of discovery.

*Context of justification and the production of knowledge:* Initially, the context of justification was mainly described as a matter of methodology. The question was about which methods were to be used in order to convince the scientific community of the truth of a particular discovery—this truth is always temporary until a better proof is obtained. (Popper 1959) However, the sociology of science after Fleck (1999 (1935)) and Kuhn (1962) deals with questions of methodology not only referring to the cognitive but also to the social processes within the scientific community. Thus, the context of justification can also be seen as the whole process of scientific knowledge production. This again includes organizational aspects such as which procedures are facilitated, for example, by technical equipment or by law. Furthermore, labor organization within a research team as well as underlying rules and norms within a particular scientific community shape the context of justification.

*Context of persuasion and knowledge acceptance:* Processes of persuasion mean processes in order to convince others not only of the truth (in the sense of methodological accuracy) but also of the relevance of a particular work. These processes can be seen in concentric circles. The scientific community is located within the inner circle. One dominant principle that is used to persuade the scientific community is the peer review. This principle is implemented in various procedures in order to assess publications, research programs, or whole organizations. Within the outer circle, we find the whole range of actors in the fields of policy, the economy, and among the public. Studying the context of persuasion in this sense raises questions about the complex field of applied research and scientific consultancy. Furthermore, questions of the public understanding of (the value of) science and the public awareness and acceptance of scientific results are part of the context of persuasion.

## **Steps toward a Conceptual Framework**

The above-developed initial systematization of different dimensions of both terms—religion and science—now should enable us to investigate the relationship between science and religion more precisely. This section has two aims: Firstly, I shall describe which work is already done in order to understand the relationship between science and its environments. Actually, there are a variety of conceptions and empirical results in this respect. However, the studies do not pay much attention to religion as part of science's environment. Furthermore, these works are drawn from different disciplines, they are in part contradictory, and more work is necessary in order to draw a more consistent picture. Therefore, I shall then describe the main focus and questions for further research. I will organize these reflections according to the three dimensions of scientific work and will reflect on the different dimensions of religion regarding to them.

### *Context of Discovery and Agenda Setting*

The question why a particular topic becomes a research topic is closely linked to the more general question: What is science and scholarship for? Various investigations in the field of the history of science as well as in science studies show how the answer to this question varies depending on its historical and individual contexts. Merton's (1990 [1942]) normative idea of communism and universalism is still important and scientists are asked to direct their science to serve public goals and not private interests. However, "public goals" can mean, for example, critical reflection on the capitalist system as a whole (see the debates on positivism Adorno 1974) or it can mean a particular contribution to a particular technical, economic, or political problem. Thus, we find a quite strong consensus that the scientific agenda is not set by the scientific community on its own, let alone by individual scientists, but is a result of manifold mutual interactions between the scientific community and its environments. For instance, Bloor's work (1991 [1976]) analyzing the influence of class interests on scientific programs, or Forman's historical investigation focusing the influence of Weimar culture on developments in quantum physics (Forman 1994 [1971]) emphasize the structural embeddedness of all scientific work. A number of analyses show the interactions between science, economy, and the public



sphere<sup>15</sup>. Debates on how to conceptualize those relationships remain open. The thesis of dedifferentiation has been prominent for a while, however, today, scholars once again emphasize the intrinsic logic of scientific community<sup>16</sup>.

Against this backdrop, we can assume that the religio-cultural environment does have an influence on the agenda-setting process in science as well. Regarding the dimension of *religion as organization*, we can assume that churches and other representatives will attempt to influence the research agenda based on their ethical positions. Firstly, religious organizations run a number of important universities and research organizations and can thus push for particular topics to be studied. Secondly, they can try to influence regulatory policies. As mentioned above, research in the life sciences raises a number of ethical issues. Governments have found different ways to deal with those sorts of issues; however, religious representatives are often involved in institutionalized debates. In the German case, Chancellor Schröder established the German Ethics Council in 2007, a committee with representatives from different stakeholders of society. This council does not have any decision-making power but its aim is to discuss topics like bio banks, stem-cell research, and brain research from an ethical and legal perspective and to give recommendations to policymakers. In addition to experts from the legal and public-health field, some Protestant and Catholic theologians, as well as some bishops, are also members of the Council (see [www.ehtikrat.org](http://www.ehtikrat.org)). In spring 2012, a council member from an Islamic cultural background was appointed for the first time. When asked about his expectations, he pointed out that he will probably be in the minority within the committee often. (Domradio 2012)

These sorts of commissions are discussed in the social science (Bogner 2009) and we find a broad literature on how discussions about and regulations governing research in life sciences vary between nation states. (Jasanoff 2005 ; Metzler 2007; Valkenburg and Aarden 2011) In principle, those works should be capable of ad-

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<sup>15</sup> Regarding the relationship between science and policy see, for example, Beck and Bonß (1989), Bonß (1994), Caplan (1979), Mai (1994), Rudloff (2004), Weingart (2001), Weiss (1977); regarding the relationship between science and public sphere Guba and Lincoln (1989), Neidhardt (2002), Neidhardt et al. (2008), Nowotny et al. (2004); regarding the relationship between science and economy Braun-Thürmann (2006), Braun-Thürmann et al. (2010), Braun (2004), Potthast and Guggenheim (2008), Torka and Borchering (2008), Torka and Knie (2010)

<sup>16</sup> Gibbons et al. (1994) argue that traditional boundaries between disciplines and between basic and applied research lose its significance; they name this new style of scientific knowledge production

addressing the *cultural dimension* of religion as well since they in part analyze public discourses. However, the particular influence of religio-cultural backgrounds is only addressed implicitly, if at all. Thus, we have little knowledge about how religious representatives and a particular religio-culture shape the agenda-setting process in science.

Regarding the dimension of *religion as individual faith*, we can assume that individual faith and religious socialization do play a role in how scientists choose a particular research topic as well. Religion continues to be an important biographical factor, though the role of particular denominations has been declining. (Ebertz 1995) One's position to religion and faith becomes particularly obvious in critical biographical transitions. (Wohlrab-Sahr 1995) The choice of occupation is one of those transitions that is reflected on and questioned several times in one's life course. Thus, we can assume that the motivation to do a particular research is related to one's individual value system and, as the case may be, one's individual religiosity. However, again, we know little on whether and how believers chose their topics in a different way. To what extent would we have a different research agenda if the majority of scientists would be members of a particular denomination?

#### *Context of Justification and the Production of Scientific Knowledge*

As shown above, there is a quite strong consensus about the fact that historical and regional environments influence processes of discovery and agenda setting. We do not find the same consensus regarding the context of justification. Actually, the current research and scholarship does not investigate the historical and social embeddedness of particular methods and validation practices, but rather focuses on differences within the scientific community. Thus, the idea of a universal method for all disciplines seems to have been left by the wayside, however epistemic styles vary depending on disciplines and research fields. Most research on this topic has been done in the field of natural science. Knorr-Cetina (1999) described different epistemic cultures in high-energy physics (posttraditional communitarism) and in molecular biology (individualism). These cultures shape the validation practices and are not questioned within a particular lab community. Heintz (2000) applied the constructivist method in order to analyze mathematics. She concludes that modern

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„mode 2. Weingart (1999) relativizes this concept; he describes new couplings between science and its contexts.

mathematics “leaves hardly any space for sociological analysis”<sup>17</sup> (ibid.: 274) Thus, the epistemic characteristics within this discipline are so firm and coherent that there are no cultural differences between different research groups. Recently, scholars have conducted similar studies in the field of social sciences and humanities. (Camic et al. 2011)

As mentioned, these investigations focus on characteristics of particular research groups and do not address influences from “outside” the scientific community explicitly. However, the descriptions do show the context-dependent character of validation practices. Obviously, questions of equipment play an important role for practices of “laboratization” (Knorr-Cetina 1988: 87). Regarding the dimension of *religion as organization*, we can also assume that the institutionalized participation of religious representatives has an impact. Returning to the German case of the Ethics Council: They, for example, give recommendations regarding biobanks. (Deutscher Ethikrat 2010) Biobanks are collections of human body substances and the availability of such collections does influence validation practices. A number of other regulations, e.g., regarding clinical trials or tests on animals are based on ethical decisions. Thus, the institutionalized participation of religious representatives within such decision-making processes might not only shape the agenda-setting process but also validation practices.

Questions about the dimension of *religion as part of culture* and *religion as individual faith* are more difficult to address, but no less important. One way of conceptualizing this question might be using the framework of socialization and identity construction. While the above-mentioned investigations observe socialization processes within the scientific community only, one would also have to take into account the primary and secondary socialization of the researchers and hence the question whether religion plays a role in their lives or not. Still, it would be difficult to analyze whether and how individual religiosity influences individual validation practices. However, one focus should be the question how individuals deal with uncertainty. As mentioned above, theologians argue for a new integration of theological thought in scientific inquiry while criticizing the positivist paradigm. The conceptual forerunner for these ideas is Polanyi. His conception of implicit knowledge, summarized in his famous sentence “we can know more than we can tell” (Polanyi 1966:

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<sup>17</sup> Own translation. German: “[...] für eine soziologische Analyse tatsächlich kaum Raum mehr las-

4)), has had strong impact on the Anglo-American theology (Losch 2011: 166ff). The main idea is that all scientists, be they in the social science, the humanities, or the natural science, have to deal with uncertainty. They will always have to define conditions that they are not able to prove. Thus, the empirical question is how they deal with the unexplained and unexplainable elements in their research. This leads to another question of whether religious believers deal with these unexplainable elements differently than nonbelievers and if so, whether it has any influence on the processes of validation?

### *Context of Persuasion and Knowledge Acceptance*

Scientific work is community work. An individual scientist will hardly have any impact without the recognition and the acceptance of his or her colleagues. As there is no absolute and universal certainty, all scientific work is to be considered with universal skepticism (Merton 1990 (1942)). The best possible method to serve and improve quality in science, therefore, is the peer review, which means critical assessment by members of the scientific community who are familiar with the particular research topic. Today, procedures of peer review have been established not only to inform publisher's decisions about whether or not to select particular articles but also to inform funding decision regarding research projects or even regarding whole research institutes. Researchers are asked to persuade the community within the context of these procedures.

At first sight, peer-review procedures, thus, are procedures within the scientific community, seemingly leaving little space for influence from the side of religion. Regarding the dimension of *religion as organization*, this holds true at least for all countries that have established this institutionalized self-steering of the scientific community. However, regarding the dimensions of *religion as part of culture* and as *individual faith*, we have to address the same questions as for the context of justification. Scientists are the evaluators and the question is whether individual religiosity has an impact on their judgment. Again, similar to the justification context, scholars have not addressed this question so far, however they focus on potential differences in valuation practices depending on disciplines and research fields. In this respect, for example, Lamont (2009) identified different "epistemic styles" by analyzing interviews with members of evaluation committees in humanities, histo-

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ry, and social sciences. She found out that a “comprehensive style” is dominant in all disciplines, a “positivistic” style ranks in second place in the social sciences only, whereas a “constructivist” style is the second most important one in humanities and history. The “utilitarian style” is less important in all disciplines. (see also Guetzkow et al. 2004). Such investigations illustrate the extent to which fundamental value systems and understandings of the function of science and scholarship influence judgments. These value systems continue to be important even in peer-review procedures that are shaped by policy interests (Gülker 2012; Gülker et al. 2012; Torka 2011). Against this backdrop, the question of whether these judgments refer to the norms of scientific community only or also to individual value systems that are shaped by (sometimes religious) socializations, and how this comes about, are important.

In a broader sense, the context of persuasion includes all aspects of how scientific results are communicated to society, or more precisely to actors in policy, economy, and the public sphere, and how these results are accepted and used. With this perspective, we enter into the whole debate on “knowledge order” (Carrier et al. 2007) or “civic epistemologies” (Jasanoff 2005). Though these concepts emphasize the importance of cultural particularities in dealing with different sorts of knowledge, religion has not been an explicit topic so far. However, some people do use religion as source of knowledge and the power of scientific knowledge is related to the power of other accepted sources of knowledge. In this respect, the fight between evolutionists and creationists is only the most obvious case. We can imagine a number of other cases, e.g., in the field of medicine—most disputes around conventional or nonconventional medicine imply some sorts of metaphysical questions.

## **Summary and Outlook**

The aim of this paper has been to bring the relationship between science and religion (back) onto the agenda of contemporary science studies. Science studies emphasize the need for a critical reflection on all scientific knowledge production and its embeddedness in historical, regional, and cultural contexts. Religion is part of these contexts and its influence has been underestimated so far—Western sociolo-

gy followed the “independence model” for decades and science studies simply was not much interested in questions of religion.

Scientific knowledge is coproduced. (Jasanoff 2004) This paper presents an initial systematization of where to look in order to find out more about the religious side of this co-production. Religion as organization is involved in processes of agenda setting and in the regulation of validation procedures; religion as part of culture and individual faith might play a role in individual validation and persuasion practices and might play a role for the question of which knowledge is accepted within a particular society. Table 1 summarizes the core questions to be addressed empirically:

**Table 1: Summary of empirical questions**

<b>Dimensions of Science Religion</b>	<b>Context of Discovery and agenda setting</b>	<b>Context of justification and the production of knowledge</b>	<b>Context of persuasion and knowledge acceptance</b>
<b>Religion as Organization</b>	(How) do representatives participate in agenda setting processes?	(How) do representatives influence regulations?	(How) do representatives comment on scientific findings?
<b>Religion as (part of) culture</b>	How are research topics discussed in the public sphere? What is the role of religious arguments?	How are validation practices discussed in the public sphere? What is the role of religious arguments?	Which sources of knowledge are accepted in the public sphere?
<b>Religion as Individual faith</b>	How do individuals choose their research topics? What is the role of religious socialization?	(How) does faith influence validation practices? How do individuals deal with uncertainty?	How do individuals judge within peer review? Which sources of knowledge are how important?

Empirical work is needed—a description of “knowledge orders” (Carrier et al. 2007) would be required to address the relationship between knowing and believing. However, a new analysis of the kind suggested in this paper would be a pioneering work and would have to meet the following conditions:

- *Interdisciplinarity*: Within the scope of this paper, I have only focused on developing some initial ideas on how to think about the relationship between science and religion today. My perspective is mainly from the science studies. However, this provides some sense of how important it would be to integrate deep expertise of history of science, philosophy, and theologies. In particular, cooperations between social sciences and theology are rare<sup>18</sup>. Thus, new ways to communication and promote mutual comprehension should be tested.
- *Inter- and cross-national perspective*: Religion has no national boundaries, though the institutionalized importance of certain denominations is regulated on a national level. The same is true, to some extent, for the scientific community: Though scientific institutions are regulated differently on a national level, scientists belong to and communicate within a worldwide community. Contemporary studies on the relationship between science and religion, especially if they are comparative in character, have to find a way to deal with these complex interrelations.
- *Methodological openness*: It follows from the points above that new investigations of the relationship between science and religion also require new methodological tools, or rather new combinations of these tools. The institutionalized influence of religion can be observed from an actor-centered perspective using the tools of discourse analysis. However, when it comes to questions of individual faith and its role in scientific work, one also needs to focus on aspects of biography and everyday practice (e.g., via ethnography).

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<sup>18</sup> Regarding the relationship between science of religion and theology see Graf (2004: 249ff).

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