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PLURALITY AS THE EPISTEMIC GOOD.

THEOLOGICAL EXPLANATION IN SCIENCE-RELIGION DEBATE

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Abstract: The aim of this paper consists in analyzing the pluralism of causal explanations in contemporary philosophy of science. Therefore, a two-fold problem is discussed. Firstly, the issue of different causal accounts within the new mechanical philosophy and the question regarding what philosophical reflections on the plurality of scientific explanation and causality can bring to theology. Secondly, Aquinas' metaphysics of the ultimate foundation of all reality in the triune God and how it can be insightful in its applications to contemporary theology. In conclusion the richness of reality, understood as the epistemic good (value) which implies moral (theological) humility, will be discussed.

Key words: causality, Thomas Aquinas, philosophy of science, new mechanical philosophy.

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1. Introduction

It has become the common belief that satisfying theological explanation can be reduced to one way of argumentation, a model, or philosophical vocabulary. The history of Christian theology, however, shows the opposite logic: it expresses the mystery of faith based on a variety of philosophical traditions that are assessed. The pluralism of explanation, practiced by classical theologians like Thomas Aquinas, arises from the belief that God, who created the world in one Word, is not possible to be understood in the same way. This multiplicity of beings as expressions of God's goodness is not a punishment or evil (because of its imperfection) but rather an epistemic good that leads humankind to discover the reasons for God's action.

In this paper, the state of research on causal explanation in contemporary science will be presented first, in taking the new mechanical philosophy as a case study. Next, the connotations of Thomistic theology will be indicated, which explain the richness and multiplicity of the created reality through the mystery of the Trinity. Finally, three perspectives (metaphysical, epistemic, and pragmatic) that emerge from the ongoing changes in the scientific explanation, especially the religion-science dialogue, will be commented.

2. Causal pluralism: the new mechanical philosophy as case study

One thing becomes obvious about the current philosophical literature on the issue of causality: there is the great diversity of causal concepts (Cartwright 2004; Godfrey-Smith 2009). Certainly, there are a number of different ways of being a causal pluralist, and this section will not be structured around a complete taxonomy of causal pluralism. Instead, four approaches to causation present in the new mechanical philosophy (NMP) will be described. The reason for this choice of the NMP is twofold. On the one hand, the NMP is one of the dominant approaches within the current philosophy of science, developing dynamically since 1990's. On the other hand, the mechanistic framework has brought up great renewal of causal explanations.

In their seminal work, Peter Machamer, Lindley Darden, and Carl Craver defined mechanisms as "entities and activities organized such that they are productive of regular changes from start or set-up to finish or termination conditions" (Machamer et al. 2000, 3). Even if mechanists have disagreed with one another about how to precisely define mechanisms, the common denominator of their approach is the conviction that the study of mechanisms is strictly interwoven with the

mechanistic explanation, which involves isolating a set of phenomena (that is an entity or system exercising a certain capacity) and positing a mechanism that is capable of producing/causing those phenomena (Illari and Williamson 2012). The causality was unpacked by mechanists mainly within four accounts, that is activity-based, difference-making, processual and mechanistic one.

2.1. Four meanings

The activity-based approach embraces the Anscombian view that causation should be understood in terms of productive activities (Anscombe 1993). As expressed in Machamer, Darden, and Craver's definition, activities are types of causings because specific activities indicate how and under what conditions mechanisms bring about their phenomena, for instance, in molecular biology or genetics. This view, Peter Godfrey-Smith (2009) has called the causal minimalism, showing some of its problems. In fact, our conceptual analysis on causality does not seem to be as simple as what Anscombe's examples suggest, primarily describing relations between objects and not between facts, processes, or events.

There are various approaches to understand the notion of difference-making, but probably its core idea is counterfactual, that is based on contrary-to-fact hypotheticals. Thus, a causal claim of the form "c caused e" would be understood as: if c had not happened, then e would not have happened either. A difference-making approach, expressed by James Woodward (2003) and particularly commented in mechanistic literature, appeals to manipulation as a basic element of the notion of stability. According to him, manipulations should be understood counterfactually, i.e., if some variable is a cause of some outcome, then manipulating the value of the variable would be a way of manipulating the outcome. The application of Woodward's manipulationist framework to the NMP offered an opportunity to characterize mechanistic (causal) regularities and individuate components of mechanisms. This account, however, attends more to the epistemology of causation than to metaphysics of causation.

A processual approach goes back to Wesley Salmon, one of the most prominent advocates of the causal conception of scientific explanation. Salmon (1984) proposed an ontic conception of explanation, where explanations have an explanatory force if they fit the *explanandum* into the causal structure of the world. Another key concept in Salmon's theory of causality is the notion of production. Causal production takes place whenever there is causal interaction, and the changes in the structure of processes will be propagated until another interaction takes place. It seems that Salmon's focus on causal processes, production, and interaction, brought up emphasis within the NMP on the idea of productive continuity (understood as a transmission of something from

cause to effect via a causal process) and emphasis on mechanisms' entities engaged in productive activities, and parts of mechanisms that produce a given behaviour by interacting with each other. It can be argued that this theory is too low-levelled, that is, having problems with most of our causal claims at higher levels of interaction in other sciences than physics.

The mechanistic account of causation, expressed in Stuart Glennan's works (1996; 2017), is certainly the unique one that offers an overall metaphysical view of the issue. Generally, for Glennan, mechanism is a complex (multi-level) system producing a behaviour via the interaction of a number of parts. The virtue of his account is that it tries to embrace accounts of causal production (like Anscombe's and Salmon's) and accounts of difference-making (like Woodward's). His view has been basically criticized for two reasons. Firstly, for the circularity, i.e., the concept of mechanism ineliminably contains a causal element. Secondly, for the bottoming-out problem. Referring to the latter point, mechanisms occur in nested hierarchies of levels, typically bottoming out in lowest level mechanisms. And then, because the mechanical theory of causation meets difficulties in explaining causation in fundamental physics (intended at the quantum level), there has to be a dichotomy in understanding of causation between the case of fundamental physics and that of other sciences.

2.2 Preliminary conclusions

We can draw four main conclusions from our brief survey of different causal accounts within the NMP: departure from the old mechanical view of causation, different responses to David Hume, shift from methodological to metaphysical pluralism, and different metaphysical commitments.

Firstly, the mechanistic discussion on causation has liberated the relevant causal notion from an overly austere view that restricted causation to only a small class of phenomena, such as collisions, attraction/repulsion, or energy conservation, what was generally typical for the Old Mechanism (Psillos 2011; Theurer 2013). In fact, this change is a novel development typical for the NMP, i.e., that mechanisms are understood in terms of entities and activities and elaborated as part of the actual investigatory practice of sciences. At the same time, this focus on methodological recommendations about investigating the world does not entail reductionist commitments to a single account of the metaphysics of the world. Adopting a pluralist stance on causation seems to reflect the complicated, multifaceted nature of phenomena in the world (Potochnik 2017).

Secondly, as Matthews and Tabery (2018) rightly point out, these four

accounts share dissatisfaction with the Humean regularity conception of causation, but each of them responds to Hume in a different way. Salmon and Glennan tried to identify, sought by Hume, the necessary connection between cause and effect. Salmon opted for causal processes, Glennan for mechanisms, arguing that both processes and mechanisms provide necessary connections between cause and effects. Woodward rather dismissed Hume's challenge since he has focused on the difference-making quality of causation.

Thirdly, even if the NMP is not a homogeneous philosophical approach, our survey has emphasized that different authors have tried to give a response to the question about the character of causal relation from within the same mechanistic framework. However, it does not indicate that there is a total agreement just upon one of the most appropriate ways of describing causal claims. Because the main source, which mechanists get their inspiration from, and intend to explain the nature of scientific practice and explanation, comes from both contemporary science and its particular research problems, there seems to be an agreement upon the fact of methodological pluralism in scientific practice. In case of Glennan's approach, not only the pluralism of the conceptual causal analysis was noted, but simultaneously the assumption of causal plurality in the world, that is, if there is a variety of mechanisms, then there is a variety of causes. Since the notion of causation has up till now mostly been seen to partake in the uniformity of the world, thus the pluralist stance points out that the issue of causal complexity has often been underemphasized in philosophy.

Fourthly, it results that these different causal approaches lead to different metaphysical commitments (Andersen 2014a; 2014b). Activitybased approaches can involve models of mechanisms that pick out the underlying structure of the world, constituted by objects and interactions between them. Generally, the activity-based approach and Glennan's account both agree with the worldview where causation is physical and productive. However, Glennan's approach offers a clear stance of the mechanistic account of causation, the singular and productive, where mechanisms are characterized in terms of entities and causal activities. Contrary, Woodward's account characterizes a mechanism through a number of variables and by its capacity to be manipulated in terms of difference-making; in reality, it is part of the counterfactual account of causation. This approach is primarily focused on the abstract description of the interaction between the constituent parts of mechanism. On the other hand, the processual approach of Salmon or Glennan, which is focused on physical and spatiotemporally continuous conditions of causal processes, seems to be particularly prone to microphysicalism about causation.

3. "Battle zone"

A brief review of the main concepts of causality and causal explanation so far present in the field of the NMP, clearly shows how the philosophical discourse shifted metaphysically and epistemologically away from the logical empiricist tradition. In fact, the NMP opts for the patterns of causal structure with more limited scope of generalizability rather than nomic necessity of universal character. Moreover, from our analysis, limited to the NMP, it results that there is no unique principle of causality nor unique theory of scientific explanation. We are rather witnessing some sort of creative pluralism within the philosophical reflection on causality. However, by shifting from this sort of mosaic present in the philosophy of science to a theological reflection on the world, some discomfort can probably be felt. In fact, in Christian theology, a metaphysical account of causation inherited from medieval times was primarily concentrated on formulating the metaphysical principle of causality, expressing the idea that there were necessary connections to be found in nature. Such a formulated principle served well enough to defend the stance of realistic philosophy and the royal road to the truth.

One clear consequence of this multidimensional philosophical perspective on scientific methodology and reality is that it will be difficult epistemic/methodological pluralism on Methodological pluralism will probably not be so disturbing for the realistically oriented theological mind, as the fact that different competing accounts of causation can motivate different, conflicting metaphysical viewpoints. Could this pluralism be avoided? It seems that the more prudent thing is to allow various metaphysical and methodological strategies. But if we allow it, how can we, from a theological perspective, still point to the unique truth, e.g., about the causal structure of the world? Are we still able to pick up the structure, or do we find ourselves in an embarrassing reconceptualization of our realistic intuitions about the world and the truth? The proponents of analyzed accounts do not disagree that there is a mind-independent reality, which has the capacity to resist our attempts to manipulate it in any way. In fact, this "realistic robustness" gives us the possibility to look for tiny parts, interactions, and processes that are there in the world and are featured in defeasible theoretical frameworks. Hence, from our analysis emerges "a modest and piecemeal practice of naturalist metaphysics, not giving a grand view of 'how the world is' arising from a priori reflection, but allowing metaphysical beliefs to emerge from a wellestablished practice" (Chang 2018, 182). Could this naturalistic metaphysical view be put into dialogue with the theological one? In looking for a response, we suggest analyzing Aquinas' metaphysics of the ultimate foundation of all reality in the triune God.

4. Aquinas' metaphysics of the ultimate foundation of all reality in the triune God

Contrary to modern connotations, creativity was understood by Aguinas as a causal relationship, and therefore he put it in a category inherited from the tradition of the Aristotelian relationship, which signifies intimacy and the ultimate (Roszak-Huzarek 2019; Dodds 1993). Thus, creation is not a change (McWorther 2013). Creation is a relation of what is not God to God: it has a different character in God (logical relation) and a different in creation (real relation), so there are specific effects on the side of creation (Kerr 2012). It is not about something in creation which can tell you that it is a creation, but a relationship of dependence. As a free act of granting existence, creation is an expression of God's unlimited goodness in which the world participates. This relational account of creation is rooted in the mystery of the Holy Trinity, from which Aguinas explains the act of creation: it can be understood in Trinitarian terms, where there is unity in action of the ad extra (Legge 2017). Processions of the Divine Persons within the Trinity are the cause of creation. The ultimate source of explaining the world lies in the purpose of the Trinity, in the spread of its goodness, which is not out of necessity, but an expression of God's free decision, and therefore love. In this way, God remains the efficient, exemplary, and final cause of creation.

The multitude of beings existing in the world is not a coincidence but results from the fact of the communication of goodness by God, who is not in need of gaining anything, but sharing it - the goodness of God, says St. Thomas, is impossible to be expressed by only one creature, hence their multitude (Wippel 1985). In other words, the divine goodness, which is simple and uniform in God, is communicated in a way of plurality and diversity that represents the goodness of God. At the same time, the world imitates God's goodness, not so much in the number of goods, but in the way they are implemented, and this expresses the idea of order (Hirschfeld 2018). This signifies the possibility of a diverse way of participation in the goodness of God. There is one world (ST I, q.47), but the multiplicity within one order illustrates where reality is rooted. God as the First Cause does not replace created causes. Creation is not only a one-off act but a constant maintenance of the world in existence (*creatio continua*).

4.1. Aguinas' view that we do not comprehend God's essence

Knowing God, whose goodness is imperfectly expressed by the multitude of particular goods, stands at the center of Aquinas' understanding of theology as *sacra doctrina*. Thomas is aware that due to God's transcendence, our knowledge of God is analogical, not univocal.

The essence of God, on which contemplation consists of human happiness, is not possible to be fully comprehended (comprehensio) by the created intellect, although in some way true cognition, though partial (apprehensio), takes place on earth (Blankenhorn 2015, 407). God is beyond the category of species and this, for Thomas, justifies the impossibility to know His essence exhaustively. We can know God, but not in the proper way of His infinity. In our earthy life, we can know God as the unknown. Even for those saved in heaven, the essence of God remains a mystery, and although their knowledge exceeds the earthly, they will need another power that God will give to the blessed: lumen gloriae.

That is why there is, in Aquinas' theological epistemology, a distinction between getting to know things in themselves (in se), and quoad nos as it is presented to us. We do not know God as He is in Himself, and although His existence is obvious in itself, He is not like that for our knowledge. We learn something not on the basis of intellectual forms (due to the orientation of our cognition on imaginations), but on the basis of His effects. Although knowing the cause through its effects can be twofold. In the first case, the effect is equal to the power of the cause and then leads to the discovery of quidditas, the essence; when there is no equality, then it is only possible to know that there is a cause. In consequence, Aguinas indicates a triple way of developing the knowledge of God: discovering His causality in things (1), the cause of more perfect effects that are reflected in His creation (2), and God as distant from everything visible (3). Due to the fact that man's existence is connected to matter, hence the way of knowing God is connected to discovering the causal presence first.

To understand this position, St. Thomas will need to delve into the matter of God's names (I, q.13), in which he considers our way of adjudicating God ex tempore based on the effects of God's action in history. Perceived perfection in creatures can be related to God, but not in the way of creatures. Although the sacra doctrina makes many claims about God, Aguinas is convinced that we do not know who God is, but who He is not (Jenson 2019). It is even expressed that "we talk about God in a way of mumbling", but even this bit of knowledge is more valuable than a lot of banality. The discovery of Aquinas through the reading of his works of Dionysius shows that there is an appreciation of negative theology in Thomistic theology (Humbrecht 2005; Rocca 2004). The way of negation (via negationis) shows his simplicity, which is a negative attribute because God's simplicity as actus purus is a denial of complexity. The multitude of our expressions of God has no real reflection in God, but it concerns our knowledge and flows from the nature of the human intellect. The way of negation is a peculiar filter that imposes theology on positively formulated terms about God (based on causal adjudication), so that they then can be elevated because of the incomparability of the Creator and creation. The language used in theology to speak about God must properly remember its creational perspective, from which we describe an inexhaustible mystery. Precisely this provokes fundamental problems: as when we would consider God's rest on the seventh day of creation as inaction, because - according to Aquinas - we do not know an action that would be motionless, and in God it exists.

The lack of describing God's action in one-way results from the fact that He is not explicit in his action: in case of the power of unambiguous agents, all their strength is manifested in effect, while God is not a kind of univocal agent, being outside any genre or specie. Consequently, no finite effect can fully express his power because it is smaller than Him.

4.2. Theological interpretation of the richness of reality

The understanding of creaturehood is not based on "cutting" it out of reality or describing it through the lens of visible characteristics, for in order to capture it fully it is necessary to relate it to *ordo* in which it operates. Within this picture, beings are not only characterized by a material cause, but also by a final cause, which is the first in the will but last in realization.

The wealth of reality evokes the arguments of ex convenientia. They constitute the imaginative role of theology, which tries to convey the richness of reality in its entirety and in the connections between things that are not visible from the beginning (Rogers 2019). The ability to see the whole perspective, which was the main purpose of writing the Summa Theologiae, is a sign of the presence of imagination in theological work (Bauerschmidt 2009/2010, 183). However, imagination is not a goal but a starting point for further theological thinking. For Aquinas, it is associated with the material world, through which we discover the knowledge of intangible things through phantasmata. To have an imagination, according to St. Thomas, is not so much about running away from the real world, as to get to know it better through the prism of the whole and the relationship of the perceived sensual reality. It is needed for knowing God on the basis of observed natural effects and for knowing Him by grace, when God creates certain images that express the truth about Him (gift of prophecy) better than created things.

In the context of the need for imagination in intellectual work, Keith Ward made a helpful distinction between "inferential" and "interpretative" hypotheses (Ward 2017, 49-55). The first occurs when hypotheses are built to explain earlier phenomena in time. However, they are not directly verifiable because there is no trace left of them today. An example of such a hypothesis could be the Theory of Big Bang, which actually is impossible to be observed, but it does explain the current state of reality well. The second type of hypothesis is the explanation of what is

observed, but invisible (e.g. electron). In this case, the theory can be tested in order to confirm it.

It seems that similar open thinking, and seeking an explanation of reality based on causal relations, was proposed by Thomas Aquinas. His proposal stems from the belief in the richness of reality in relation to his description and the possibilities of improving this recognition, which at the same time constitutes an anti-ideological approach. Aquinas explicitly adopts the principle of striving for the best explanation, which clarifies his information (Horvat 2017): if the theory is not working, it must be replaced with a better one.

4.3. Theological polyphony instead of one modeled theology

In view of the relational approach to the creation and the negative theology of Aquinas, the importance of the imagination in knowing God is not surprising. As Bauerschmidt notes, man's imagination is able to build a holistic view based on parts. though not Contrary to the tendency of his time, which wanted to explain the world on the basis of unum argumentum, as it was for St. Anselm of Laon (Hankey 2017). Thomas chooses the theological polyphony. This is evidenced by the structure of the Summa Theologiae, whose interpretative keys regarding subsequent parts may be different, but always directed to the main points of his theology: the exitus-reditus scheme, increasing presence of God, life of grace. They are not mutually exclusive, but complementary.

For this reason, the *sacra doctrina* has a special status and does not consist only in paraphrasing the biblical language, but has an argumentative nature in which authority and reason are harmonized. It is not an accumulation of particular shots, but a constant building of the synthesis *sub ratione Dei*, i.e. in interaction with the truth about the world, provoking a constantly new situation of faith.

Such a polyphonic style of practicing theology is evidenced by the frequent presence of alternative explanation possibilities that St. Thomas introduces when he is analyzing the meaning of theological statements. Although they often seem to sound heretical, his effort is to find an interpretation in which a given sentence could be accepted. Similarly, in explaining the Holy Scriptures, St. Thomas is not satisfied with one interpretation of the biblical passage: the *vel* often appears in his explanation, which not only signifies the transition from literal to allegorical interpretation, but sometimes offers more than one within the same type of exegesis.

This is not a pragmatist theologian who does not want to be exposed, but an expression of his understanding of the nature of the act of faith. Thomas is aware of the provisional formulas which we use to describe the transcendent reality that gives sense to the order of the created world (by the way of creation he emphasizes the importance of the external good

that gives meaning to all immanent goods). The act of faith does not apply to formulas but to the real of the statements. Therefore, it is possible and even necessary to create a new *credo* that will be an increasingly accurate interpretation of the revealed mystery. Considering this style of intellectual reflection, Eleonore Stump talked about a specific "quantum metaphysics" (Stump 2016), in which there is no single universally binding theological vocabulary, but the same truth can be expressed in several, complementary ways.

5. Conclusions

Hitherto we have proposed to analyse the causal pluralism present within the NMP and Aguinas' ultimate foundation of all reality in the triune God. However, one of the main objections directed to this type of juxtaposition could be its presumed incompatibility. In fact, we have not embedded our analysis in some sort of unifying philosophical system, which would embrace mechanistic and theological notions previously discussed, but we have chosen a more limited approach, where some fundamental philosophical and theological issues (such as causality, causal explanation, comprehension of God, theological interpretation of the richness of reality, theological methodological polyphony) are to be discussed (Beltrán 2018). This limited view does not indicate that we try to individuate some fundamental conclusions, on which the whole formulation of the dialogue between theology and philosophy of science would depend. On the contrary, we are looking for elaborating the triple perspective, that is the series of fruitful conclusions, helpful for future interdisciplinary analyses. Roughly put, our attempt is to compare metaphysical, epistemological, and pragmatic implications coming from the above philosophical and theological analysis.

Firstly, from the metaphysical point of view, it has been shown that different causal approaches within the NMP lead to different metaphysical commitments. Nevertheless, the mechanistic discussion on causation has liberated the relevant causal notion from an overly austere view that restricted causation to only a small class of phenomena. Hence, the kind of theological label, that current philosophical or scientific approaches to causality are merely reductionist, should be held back. It seems that only Glennan's approach presents proper metaphysical pluralism. Other approaches present rather conceptual (that we have different concepts of cause), epistemological (that we discover causal relationships by invoking different kinds of evidence), and methodological pluralism (that we discover causal relationships by invoking different kinds of methods). The fact of these different pluralisms stems from the complexity of the phenomena, whether associated with different levels of organization or multiple factors within the same level. This pluralist stance could

interestingly correspond with the theological view that the multitude of entities existing in the world is not a coincidence, but it results from the communication of God's goodness, shared by Him in an abundant way. There is one world, but it does not preclude the multiplicity within one, for instance, causal order. In other words, plural causal *modus operandi* retains its resemblance in the virtue of being part of the created world, to the goodness of the triune Creator. Thus, the first conclusion: the richness/complexity of reality can be seen as *vestigium Trinitatis*, as a sign of God's power and goodness.

Secondly, from the epistemological point of view, the proposed analysis of different causal approaches seems to be an attenuated form of realism or rather the middle ground between full-blown realism and a kind of relativism. This result would probably not be warmly received in the theological domain. But does it have to cause a strong defence from the theologically oriented mind? The epistemological and methodological pluralism present within the NMP seems to be a clear indicator of the current practice of modelling present in science. In brief, models are idealized structures used to represent the world, via resemblance between the model and the real-world target system. Since by definition models are incomplete and idealized, their commonness in scientific practice implies that our knowledge of causal nexus is inextricably bounded to a limited perspective. Even if issues of the perspectival account in the philosophy of science remain under wide discussion, we find strong resemblance between epistemic questions raised in the current philosophy of science with those raised in theology.

It is not a trivial matter, as it was discussed, that the theological thinking of Aquinas shows that our knowledge of God is analogous, not univocal. For this reason, in his theological epistemology there is often a distinction between getting to know things in themselves (in se), and as they are presented to us (quoad nos). This theological-epistemic suggestion stems from the conviction of the richness of reality in relation to its description, and the possibility of improving our comprehension of the reality of God or of the created world. Aquinas explicitly adopts the principle of looking for the best explanation, of currently available data: if the theory is not working, it must be replaced with a better one. It is not difficult to envisage the resemblance of his theological epistemology with epistemic commitments present within the NMP. Thus, the second conclusion: scientific and theological epistemic commitments show that we partially represent the reality, created or divine.

Finally, from a pragmatic point of view, our analysis shows that the metaphysical, epistemic, and methodological pluralism within the philosophy of science serves to remind us that one cannot simply read off truths, or the truth about what the world is like. At the same time, it does not imply that "anything goes" and that every claim is equivalent (Kellert et al. 2006, vii-xxix). On the contrary, the sort of realism that emerges

from the current philosophical mosaic is the tempered realism in fieri, in the sense of encouraging the creation of more knowledge about more reality. In this scientific and philosophical quest toward the knowledge of better representing the world, plurality presents itself as an unproblematic consequence. Such abundance of knowledge and various ways of describing reality can free up from unnecessary constraints of philosophical and theological monism. It means that, rather than trying to embed some theoretical problems (like causality) into one philosophical or theological framework, we can adopt, in pursuance of Aguinas' polyphonic style of doing theology, the style of practicing intellectual reflection, in which there is no one universally binding philosophical/theological vocabulary, but the same problem can be expressed in several ways (Sánchez-Cañizares 2019). This aspect underlines limits, partial character of scientific or theological reasoning. Thus, the third pragmatic conclusion: humility can serve as the foundation of interdisciplinary dialogue.

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