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PHILOSOPHY OF MIND IN THE LATE MIDDLE AGES AND RENAISSANCE

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RENAISSANCE FACULTATIVE LOGIC AND THE WORKINGS OF THE MIND

The "cognitive turn"

Marco Sgarbi

1 What is facultative logic?

The topic of this chapter is the origin of facultative logic within Renaissance Aristotelianism and its impact on early-modern philosophy of mind. In particular, I want to show how Renaissance Aristotelianism foreshadows some of the conceptions that later historical-philosophical research branded as essentially anti-Aristotelian. For a thorough understanding of the development of modern philosophy it is indispensable to focus on the facultative logic of Renaissance Aristotelians in the final decades of the sixteenth century. It was at this time that a paradigm shift took place, especially in the interpretation of Aristotle's psychology. The shift may not always have been sudden and controversial, but was nonetheless significant within the Aristotelian tradition. In what we could call a "cognitive turn", the subjects of facultative logic became, in opposition to classic Aristotelian logic and syllogistic, concepts rather than terms, judgments rather than propositions, reasonings rather than syllogisms.[1]

The main advancements in the field of facultative logic happened in those centres where there was already a strong Aristotelian tradition, such as in Padua, which provided the model for many sixteenth- and seventeenth-century German and English universities. It was in Padua that logic and psychology joined forces to form the new discipline that we now call facultative logic, which forms the basis for the philosophy of mind that developed at the end of the seventeenth century and throughout the eighteenth. This chapter focuses specifically on the developments of Aristotelianism in the British Isles and in the German territories because it is in these two regions that major advancements in the field of philosophy of mind were to occur, with empiricism on the one side and critical philosophy on the other.

What is facultative logic? James Buickerood characterized it as the science of "the principles of the habituated regulation of the mind in the apprehension of truth and the acquisition of knowledge and properly grounded opinion".[2] There

are two important aspects of this definition. First, facultative logic has to do with a "habituated", that is, a consolidated way of using the mind, and investigates its principles. Such a definition, however, leaves open the question of whether this "habituated regulation" is something innate or something that is acquired over time, a topic that will be of particular interest at the end of the Renaissance. The second aspect is that this logic should determine the ways in which the mind acquires knowledge by helping to discover the truth or to form a well-grounded opinion starting from sensible experience. Both these aspects had a profound impact on the advancement of the philosophy of mind in Germany and in England, and it is through their examination that I aim to show the developments of facultative logic for the purpose of establishing a connection between the Renaissance and the early-modern period, an area which is largely *terra incognita* for philosophical-historical research.[3]

In the first part of the chapter we introduce the elements of Aristotelian logic, which will contribute to the origin of facultative logic during the Renaissance. This new kind of logic was elaborated first and foremost by Jacopo Zabarella, who developed a complex theory of habits that characterizes both the nature of logic itself and a "second nature" acquired by the mind. Then we focus on the reception of Zabarella's doctrine of habits by Protestant authors working on the European continent such as Johann Heinrich Alsted and Abraham Calov, who helped establish new disciplines concerning the philosophy of mind, namely hexiology, gnostology and noology. Zabarella's ideas also influenced British Aristotelians, who elaborated a distinctive Aristotelian empirical philosophy of mind, to which I will finally turn in my last section.

2 The Aristotelian tradition and facultative logic

In order to understand the origin of facultative logic within Aristotelianism, one should go directly to the source, that is, to Aristotle. Prior to Aristotle, facultative logic was difficult even to conceive, on the one hand because there was no corresponding concept for "faculty". The term most widely used to define it, δύναμις, meaningfully characterized not so much a capacity as a force or a power,[4] for which at least an "intentional" activity of the subject is necessary. On the other hand, Plato did not provide an elaborated theory of cognitive powers or forces and their objects,[5] "by which human beings are able to do what they are able to do".[6]

Aristotle's first sketch of what in the Renaissance would become facultative logic appears in his treatment of the parts of the soul: vegetative, sensible, rational and locomotive.[7] All these parts have in themselves a characteristic force through which the human being can grow, sense, think and move. Only the rational part of the soul that eminently thinks, however, is a "faculty" properly speaking, because in Aristotle's philosophy of mind, a faculty is characterized by an intentional force of the soul and for this reason sensation, lacking any intentional controllability and being merely passive, cannot be properly conceived as a faculty.[8] Also imagination itself, which mediates knowledge between sensation and understanding, is

a blind force, not a faculty, precisely because it does not presuppose any active intervention of the knowing subject. Therefore, for Aristotle facultative logic was concerned with neither sensation nor imagination, but with the natural faculty of the understanding, because only understanding is intentional.

Aristotle develops his facultative logic in *Posterior Analytics*, II.19. Even if sensation is not a genuine faculty, it is nonetheless the starting point of Aristotle's facultative logic,[9] because the first objects of knowledge are always sensibles. Without sensation no knowledge would be possible. Sensibles then rest in the mind in some animals. If they do not rest in the mind of an animal, only sensible knowledge is possible, but if they do, then after various sensations, a kind of "intellectualization" is possible. Memory originates from this kind of sensation, followed by experience. From experience a "general concept" (καθόλου) is formed that rests in the mind. In this way, it is possible to acquire a disposition for scientific knowledge. The mental process, which infers from the various particulars to what is the same in all of them, is a kind of inductive process (ἐπᾶγωγή). This form of induction is a process of notification of knowledge from matter to form, from singular to universal, that can be considered as a kind of reflection, because what is in the world is reflected in the mind through a series of mirrorings: 1) from the external object, sensation produces a sensible copy of itself in the mind; 2) particular sensibles are mirrored in the imagination, forming general images; and 3) images are reflected in the intellect, generating universal intelligible species. At the end of the cognitive process, what was initially particular in the sensation and in the external world becomes a universal concept that reflects the object of experience. By contrast, the mental process that produces knowledge of the product of this induction is called intellection (νοεῖν), which is performed by the understanding, that is, as we shall see, the habit of principles. The process of acquiring and knowing general concepts and principles is therefore twofold. On the one hand, we have the formation of preliminary and rough knowledge, which relies on induction (ἐπᾶγωγή), and on the other hand, we have the actual cognition of the intelligibles (νοεῖν), which is a kind of intuitive and immediate act of grasping what is given and generated by experience.

This kind of actual cognition of immediate first principles, with which every scientific demonstration begins, is qualitatively different from the cognition that follows the conclusions of the demonstration, since there is a passage from a general, indeterminate concept to a determinate, universal concept. In fact, for Aristotle the formation and intellection of general concepts and principles produces only temporary knowledge, which must be proven discursively by means of demonstration before becoming scientific knowledge.

Aristotle's facultative logic is concerned with sensation and memory, on the one hand, and with understanding, on the other. Its goal is to determine how sensible knowledge could become universal, since singular, sensible knowledge itself cannot be considered scientific in Aristotelian terms. It is exactly in dealing with scientific knowledge and the understanding that Aristotle tackles one of the key issues of facultative logic in the construction of the knowing subject, namely the

problem of habit. In the *Categories*, Aristotle distinguishes habits from dispositions, in that the former are more stable and durable.[10] Dispositions of the mind, by contrast, are easily removable and change quickly. But if a disposition remains, takes root in the mind and is hard to remove, it becomes a habit.[11] In his *Rhetoric*, Aristotle maintains that a habit gives rise to all the actions that we do because we are used to doing them,[12] and he adds that "habit is something like nature, for the distance between 'often' and 'always' is not great, and nature belongs to the idea of 'always,' habit to that of 'often'".[13] In the *Nicomachean Ethics*, Aristotle characterizes five intellectual habits: 1) art, 2) science, 3) prudence, 4) wisdom and 5) understanding, which should not be confused with the understanding as a natural faculty of the mind.[14] Art and prudence relate to production and action, respectively, whereas the habits involved in facultative logic are science, understanding and wisdom. By "science" (*scientia*) Aristotle means "scientific knowledge", that is, the knowledge of what is known as necessary.[15] This kind of knowledge can only be attained through demonstration, which must be based on true and well-known principles.[16] These principles are provided and discovered by the habit of principles, that is, a form of acquired understanding that supervenes on the natural understanding that the mind already possesses.[17] Instead, wisdom is both understanding and the science of higher things, like causes and principles, because wisdom specifically knows what follows from the principles and the highest truths.[18]

The reciprocal relations between science, understanding and wisdom are elaborated by Aristotle in the final chapters of the *Posterior Analytics*. We have already emphasized how crucial these chapters are to understanding the genesis of facultative logic. According to Aristotle, wisdom is knowledge of true, higher and superior things. Before knowing these things, however, we must know true things in general, that is, we must acquire scientific knowledge. Scientific knowledge is only possible through demonstration, but demonstration is based on principles, and only understanding gives assent to principles, therefore wisdom and scientific knowledge require understanding. Thus, for Aristotle, understanding is the fundamental habit without which neither science nor wisdom are possible, and the Renaissance Aristotelian tradition immediately recognized the importance and significance of this particular habit. Aristotle's conception of habits is crucial because it is the foundation of a preliminary theory of knowing subjectivity. Depending on how these habits develop, two or more subjects can know the same object differently.

In *Metaphysics* II.3, 995a15–30, Aristotle states that it is necessary to be trained in "how" (πος) every type of knowledge must be investigated, and it is absurd to simultaneously seek the knowledge and the method for obtaining it (τρόπος ἐπιστήμης). Τρόπος ἐπιστήμης is a central concept in Aristotle's philosophy of mind. Most of the time, τρόπος means manner or method, but also way, disposition or attitude, and in this specific case, it characterizes the relation between the knowing subject and the knowable object. For Aristotle, τρόπος ἐπιστήμης is the point of view, the perspective that one takes in knowing. For instance, unlike mathematics, material objects do not justify adopting a rigorous τρόπος

ἐπιστήμης, because matter is accidental and no scientific knowledge (*scientia*) is possible of accidental things. Every subject matter requires a particular method or mode of knowing. This is particularly clear from Aristotle's example:

> [A] carpenter and a geometrician both try to find a right angle, but in different ways; the former is content with that approximation to it which satisfies the purpose of his work; the latter, being a student of truth, seeks to find its essence or essential attributes.[19]

Both carpenter and geometrician have the same matter of cognition, the right angle, but they investigate and consider it differently according to their different purposes. This shows that knowing subjects can adopt many different standpoints. And as Renaissance Aristotelians clearly recognized, these different standpoints depend on the various habits the knowing subjects have acquired.

As Charles Lohr (1999: 288) has rightly pointed out, the search for the intellectual habits was completely neglected by the Aristotelian tradition before the Italian Renaissance.[20] It was Jacopo Zabarella (1533–1589) who rediscovered their importance.[21] According to Zabarella, habit characterizes both logic as an instrumental discipline and the second nature of the mind. This twofold conception would become a constant in the development of facultative logic among early-modern Aristotelians, as well as in defining the other instrumental disciplines that deal with various habits of the mind (e.g., hexiology, gnostology and noology).

In his commentary to *Posterior Analytics*, Zabarella deals with the two main habits that logic presupposes, namely understanding and science. Understanding is the habit of the cognition of principles, while science is the habit of demonstration.[22] Zabarella states preliminarily that the habit of principles (that is the understanding), like all the other habits, is not innate, but supervenient on the inborn powers of the mind and is acquired by experience. The formation of the habit of principles is described following the above-mentioned passage in *Posterior Analytics* II.19. All knowledge comes from sensation, which is a kind of power of judgment that shows the differences among things. The method that proceeds from sensation to the acquisition of general concepts and principles is called induction.[23] Induction for Zabarella is clearly the means to acquire the habit of understanding, but it is not to be confused with the act of intellection. In fact, induction only makes general concepts and principles cognizable from experience, while intellection knows them in a clear and evident way. Induction is not a process for demonstrating or knowing something unknown from something already known as an intellection, but the "notification" of the thing through itself (*notificatio rei per se ipsam*). It presents sensible knowledge to the understanding and makes its intelligibility possible. Sensible knowledge is therefore prior to any other cognition, but it is not the only kind of knowledge; for Zabarella there is also intellectual knowledge, which is the only knowledge properly speaking.[24] Thus, from Zabarella's standpoint, there is no doubt that all our cognition begins with experience. In fact, our cognitive faculties are awakened by experience through

the stimulation of the senses. Still, not all our cognitions arise from experience, since the understanding makes an essential contribution by grounding scientific knowledge, firstly by finding the first principles and secondly by formulating correct reasoning through demonstration. After many similar experiences the mind acquires the habit of principles, which makes it more prompt in acquiring future knowledge.

Zabarella develops his theory of habits of the understanding in particular in his *Liber de tribus praecognitis*, which specifically deals with the conditions under which the mind is able to acquire scientific knowledge. The object of knowledge is twofold according to Zabarella. The first, material part is the *res considerata* (the angle in the case of the carpenter-geometrician), while the second, formal part is the *modus considerandi* (the different ways of looking at the angle). Logic concerns the *modus considerandi*, because it is the only stable and invariable element of the object of knowledge, while the *res considerata* changes with every experience. For instance, we can see many different angles, but the ways in which we look at them are always the same if we are a carpenter or geometrician. It is worth noting that the *modus considerandi* does not only pertain to the object of knowledge. Being the mode of consideration of the *res considerata*, it also characterizes the precondition of the mind for knowing the object given by experience.[25] Logic, which deals with the *modi considerandi*, became for Zabarella an inquiry into the condition of the possibility of cognition in relation to a possible object in general. The condition of the possibility of cognizing an object characterizes what Zabarella calls precognition. Precognition is what determines our initial approach to knowledge, and it cannot be accidental, since otherwise all knowledge, and logic itself, would ultimately be accidental too. This precognition, which precedes the actual cognition of the object of knowledge, is ultimately constituted by the habit of the mind, in particular that of the understanding, which differentiates a geometrician from a carpenter in seeing an angle. Zabarella's facultative logic therefore aims to investigate the formation of the habit, focusing on its interplay with the natural powers of sensation, imagination and understanding.

In the process, he contributed to the rise of Renaissance facultative logic in at least two respects. On the one hand, he emphasized the importance of experience and thereby substantiated the view that all knowledge starts from sensation and proceeds from a form of induction for acquiring the epistemological habits of the mind, that is, for developing the cognitive faculties. On the other, he established that facultative logic should dig deeply into the condition of the possibility of knowing in relation to any possible object of knowledge, and thus engage in an inquiry into the cognitive faculties, their possibilities and their limits. This last aspect was particularly developed by German Protestant authors such Alsted and Calov.

3 Hexiology, gnostology and noology

Zabarella's facultative logic enjoyed widespread success in the German territories. We can count more than a dozen authors who were working on facultative

logic in the seventeenth century, names such as Clemens Timpler (1563–1624), Bartholomäus Keckermann (1571–1608), Johann Heinrich Alsted (1588–1638), Georg Gutke (1589–1634) and Abraham Calov (1612–1686).

The early reception of Zabarella is particularly evident in Alsted's *Philosophia digne restituta* (1612). Alsted's originality in the history of facultative logic lies in his awareness of the autonomy of the science of cognitive faculties and in his invention of a new science called hexiology (from the Greek: ἕξις, habit), which represents both the first systematic theory of habits and a rough draft of a facultative logic. Intellectual habits are defined by Alsted as what arranges the mind in such a way as to make cognition possible.[26] For every habit there is one and only one operation of the mind that corresponds to it. There are many kind of habits, but the most interesting for facultative logic are theoretical habits, "which are those inclined to assent to necessary things",[27] such as understanding, science and wisdom. Understanding is "a contemplative habit which is inclined to assent firmly and evidently to first principles",[28] or also "the habit of principles, that is the intellectual power of determining the assent to firm and self-evident principles".[29] Understanding is necessary because the natural light, "which is the intellectual power itself",[30] is not sufficient to convince us to assent to the first principles. Like Zabarella, Alsted therefore recognizes two kinds of understanding: natural and acquired. Natural understanding is characterized by the act of intellection, which knows intelligible species directly and intuitively, while acquired understanding, which is the real habit, is a kind of second nature that the mind attains through experience and is responsible for the formation and possession of universals, or general principles, rather than their cognition.

By contrast, science is the habit that "is inclined to assent to necessary conclusions knowing the proper causes".[31] The habit of science differs from that of understanding because it concerns true and evident conclusions based on principles. Unlike Aristotle, Alsted states that a science of singular things is possible.[32] According to Aristotle, as previously mentioned, science is only what is universal and necessary, and it is not possible to provide a demonstration of singular or accidental things. Yet, Protestant philosophers like Alsted and Timpler wanted to ensure the scientific character of reasoning and theological conclusions by extending the scientific validity of universal conclusions to individual, historical facts dependent on divine providence, in order to attest to the validity of Scripture.[33] For this reason Alsted supports the idea of the possibility of having scientific knowledge of non-being and of accidental things.[34] Wisdom, finally, is the habit that "is inclined to assent to necessary conclusions, according to first and higher causes".[35] Wisdom is the habit of metaphysics[36] and is also characterized as a "combined habit of understanding and science, that is, the habit of principles and conclusions".[37] Therefore, wisdom exceeds understanding and science in dignity, but it cannot exist without them.

The real rise of facultative logic in Protestant countries can be traced back specifically to the foundation of the new disciplines called "gnostology" and "noology" in the wake of Zabarella's and Alsted's ideas. The first important

work on gnostology is Georg Gutke's, *Habitus primorum principiorum seu Intelligentia* (1625), which is based on Alsted's *Hexiologia*, but devoted solely to the "understanding", featuring a re-elaboration of Zabarellean logic. After Gutke, Valentin Fromme (1601–1679) published his *Gnostologia* (1631), which exerted a powerful influence in Northern Germany, especially on Abraham Calov.[38] Calov was the first to elaborate an organic system of sciences that introduced disciplines aimed at investigating the habit of mind, namely *gnostologia* and *noologia*.[39]

Like logic for Zabarella, gnostology for Calov is an instrumental discipline[40] that has to do with the habit of mind responsible for perfectly knowing an object.[41] This habit is something that supervenes on natural cognitive powers and is rooted firmly in the mind.[42] It differs from other habits in that it deals not with principles, like the habit of understanding, nor with necessary things, like science, nor with first causes, like wisdom, but with the simply cognizable.[43] In Calov's words, gnostology is a discipline that concerns the mental habit that deals with the cognizable *qua* cognizable,[44] and thus considers an object's mode of knowing in general. The object of this discipline is the cognizable (*cognoscibile*). Gnostology deals with the second nature of the mind as a habit aimed at improving knowledge according to mental natural powers.[45] Calov states that the cognizable differs from the intelligible, which is "all that is", and encompasses both the somewhat (*aliquid*) and the nothing (*nihil*).[46] He denies the possibility of having knowledge of the intelligible object, because this knowledge goes beyond the human faculties and belongs only to God; indeed, "it is rash to know natural things beyond nature".[47] Calov counts as knowledge only what can correspond to reality. For this reason he states that the cognizable always has a representational ground; it has objective reality,[48] while the intelligible does not:

> [T]he object is a real concept . . . an intelligible (*noema*) is in a broader sense an object, since every object that is is an intelligible, but not every intelligible is an object. In fact, all that can be understood by the understanding is an intelligible, but the object still requires another relation (*relatio*).[49]

For the intelligible to be cognizable it must have a relation to something else; for Calov this something else is an object of experience, that is, a representation in the mind. He draws a distinction between what is cognizable, i.e., representable, and what is thinkable. What is contradictory, he argues, is non-being, which is not, however, pure nothing. Non-being is in the realm of thought and intelligibility, but not in the realm of the cognizable. On the contrary, Calov considers being as the first object of cognition.[50] Quoting Zabarella, Calov says: "the object [of cognition] contains two parts: 1) the thing considered, or the material part; 2) the mode of considering, or the formal part".[51] The cognizable can be considered materially, if it concerns the being of the object itself, or formally, if it concerns the way in which object is considered in the mind. In the former case it represents

the relation to the mind and, in a broader sense, the concept. In the latter case, it is what specifies the very general abstractions and transforms the being into the real "first cognizable" (*primum cognitum*).[52] The being as first cognizable is not a mere abstract concept but, as we have seen, always requires a representational ground, that is, an object (*objectum*) in front of the subject (*subjectum*). Calov is rehashing Zabarella's distinction between *res considerata* and *modus considerandi rem*, but what is striking is the significant terminological shift. While Zabarella spoke of a "subject" (*subjectum*) that "has two parts, one is material and is called matter; while the other is form and it is called mode of considering",[53] Calov dealt with an object (*objectum*) in two ways: in terms of subject matter and mode of considering, thus demonstrating a new kind of terminological and philosophical sensitivity. This seems like a mere terminological shift with no substantial theoretical consequences, but in fact it opens the way for the early-modern use of the conceptual pair object-subject, where the object is the thing known in external reality and the subject is the knowing mind. Calov adds that beings are material objects, while their form is the possibility of knowing them (*scibilitas*).[54] Form, Calov states, is a pure function of the mind (*pura mentis functio*),[55] which means that our mode of considering (*modus considerandi*) is a pure function of conceiving, knowing and signifying the matter from different standpoints (*res considerata*). It should be clear that from Calov's standpoint, being coincides with the cognizable so that the various transcendentals of being – that is, the properties beings have *qua* beings – must refer to being as a cognizable. That transcendentals of being refer to a cognizable, that is, to an object of cognition in general, is the radical novelty introduced by Calov, one that would allow the notion of "transcendental" to migrate from metaphysics to facultative logic. Transcendentals are very general concepts that define beings in general (including concepts like perfection, unity, truth, goodness, time, space, necessary-contingent, cause-effect, permanent-succeeding).[56] What is really remarkable in Calov is that a transcendental does not designate a mere being, but a cognizable, and thus characterizes all the essential attributes without which the cognizable would not be an object of cognition. Calov's transcendentals are attributes of an objective reality, of a thing represented in the mind. Even if it is true that a cognizable is always a cognizable for a mind, Calov's transcendentals do not pertain to the knower, as in Immanuel Kant, but to the known object. They are the condition of its possibility of being cognizable.

Calov builds his system of habits around the differences between cognizing (*cognoscere*), understanding (*intelligere*) and knowing (*scire*). *Cognoscere* means to have or to acquire a cognition; *intelligere* means to understand or conceive something directly; *scire* means to know scientifically or apodictically or discursively, by means of causes. These three operations of the mind correspond to three different objects. The cognizable, as we have already seen, always has a representational ground,[57] while the intelligible is directly understood and conceived in the mind, and does not necessarily refer to a real, existing object.[58] The knowable (*scibile* or *contemplabile*) is a particular kind of cognizable that our mind understands by means of the causes.[59] Unlike cognizing, knowing characterizes for Calov the

contemplation of necessary being (*ens necessarium*).[60] The knowable as an object of the habit of science stands between the object of understanding and the object of wisdom. On the one hand, understanding is the habit of the first principles[61] that provides the basis for demonstrating the knowable. On the other hand, however, wisdom is the habit of principles and conclusions[62] and is not possible without science. Between understanding and wisdom there is another difference: "understanding is the simple and first habit, while wisdom is derived and composed".[63] Understanding is simple because it merely consists in assenting to the principles and it is first because it knows the first principles. Wisdom is derived in the sense that it assents to conclusions grounded in principles, and composite because it involves both principles and conclusions.[64] The science of the mental habit that leads the mind to acquire the first principles of knowledge (*principia cognoscendi*) and demonstration is noology.[65] Invoking Philip Melanchthon's distinction of the three operations of the mind, that is, simple apprehension, judgment and reasoning, based on the three Aristotelian objects of logic (i.e., concepts, propositions and syllogisms), Calov asserts that simple apprehension is studied by gnostology and concerns the way in which we know sensible and intelligible objects. Noology studies the second operation of the mind, which consists in the union of a predicate with a subject by means of a copula in order to formulate propositions. These propositions result in principles and axioms, which are the proper subject of noology. The *prima principia cognoscendi* are "the most common and known axioms, on which every our cognition, which from nature we can have, depends".[66] Calov's importance in the history of the philosophy of mind consists in the innovative way in which he embraced and reformulated Renaissance Aristotelianism. In the process, he constructed new disciplines that deal specifically with cognitive faculties and came to exert a powerful influence on Gottfried Wilhelm Leibniz, the German Enlightenment and critical philosophy.[67]

4 British Aristotelians and the new philosophy of mind

The dissemination of Zabarella's works in the British Isles marked the definitive abandonment of humanistic logic[68] and triggered a new interest in facultative logic, which differs greatly from that developed in Germany in that it emphasizes the empirical process of knowledge. British philosophers at the end of the Renaissance showed great expertise in commenting on and interpreting Aristotelian texts by means of Zabarella's exegesis.[69] The most important Aristotelian scholar of the period was Griffith Powell (1561–1620). In his *Analysis analyticorum posteriorum sive librorum Aristotelis de Demonstratione* (1594), Powell focuses on particular aspects of Aristotelian facultative logic, highlighting its empiricist emphasis on the importance of sensation and induction as instruments of knowledge. According to Powell, all knowledge is knowledge of causes, by means of which the mind properly knows particulars. If science looks for causes and principles, these are not what is "most knowable by us", but what is "most knowable by nature". What is "most knowable by us", by contrast, is what comes from the

senses, that is, sensations, which are always particular. The Aristotelian question is: How can we acquire knowledge of first principles and causes from sensations? According to Powell, there is no innate knowledge of first principles; rather, the mind acquires knowledge of them after a lengthy cognitive process which forms the habit of the understanding. After acquiring this habit the mind is able to grasp the principles immediately. Powell describes the workings of the mind as a process of transition from sensible to intelligible knowledge. He explicitly states that there is no knowledge prior to sensible knowledge, for it is only through the senses that we acquire knowledge. Sensation does not passively receive knowledge from experience, but functions as an active faculty in perceiving sensible things; it is a discriminative force. This activity is only possible for certain animals and it consists in the grasping of the sensible object from corporeal things. If enough sensible species rest in the memory, the memory enables the mind to form general concepts. What is important for Powell is that the memory of experience is possible only through sensation, and it is only through experience that general concepts rest in the mind. For Powell, therefore, the entire cognitive process is based on sensation.[70] This process, which operates in the mind together with sensation and understanding, is a kind of induction,[71] and it is the only way of knowing the first universal principles and causes by means of the understanding or *habitus principiorum*.[72] Powell's commentary refers explicitly to Zabarella's ideas, but simplifies them by considering sensation as the central issue of the doctrine of the method for discovering and acquiring scientific knowledge. Powell's work thus represents a first step towards an empirical epistemology.

The influence of Paduan Aristotelianism in general and Zabarella's facultative logic in particular lasted at least until the mid-seventeenth century, as is evident from John Flavell's (1596–1617) *Tractatus de demonstratione methodicus et polemicus* (1619). The popularity of this textbook was so great that it "hath been taken into the hands of all juniors", such as, for instance, Thomas Hobbes and John Locke.[73] Flavell's facultative logic starts from a strong criticism of the doctrine of innatism. Against the Platonists, Flavell argues that there are no innate ideas or principles in the mind, but that all knowledge comes from sensation, so that the mind continuously acquires new knowledge, leading to the acquisition of the habits of science and of principles. Sensation is therefore the first instrument of scientific knowledge.[74] Without sensation and sensible knowledge, science would be impossible for three reasons. First, all scientific knowledge comes from the conclusions of demonstrations, which depend on the cognition of principles, grounded in turn on induction from sensation. Therefore, no conclusions would be possible without sensible knowledge from sensation. Second, all intellectual knowledge, as Aristotle says, comes from previous knowledge, which itself cannot be intellectual knowledge, as otherwise a vicious circle would result. The knowledge which precedes intellectual knowledge is sensible knowledge. And third, according to Flavell, there is nothing in the intellect that was not first in the senses, and so all intellectual knowledge comes from sensation.[75] Flavell explicitly establishes that without sensation, science would be impossible because

1) intellectual knowledge needs the confirmation of the senses; 2) the mind cannot judge things such as colours, odours and so on without the senses; and 3) the intellectual object, being the result of a process of reflection and induction, always comes from the senses.[76] Sensation provides the matter of knowledge (*res considerata*) through induction, which is the process of the formation of universal concepts and principles by which the mind reasons. All arts and sciences are thus based on experience and induction, from which the mind, after many observations, generates the first principles.[77] Flavell adds that induction cannot directly infer a general conclusion from a singular observation, because the mind gives its assent to principles and universal concepts only after many observations and experiments.[78] In Flavell's facultative logic, observation and experiment became central ways of acquiring scientific knowledge. Principles are conclusions of intellectual knowledge. Flavell emphasizes that the knowledge of principles cannot be reduced to a mere apprehension from experience, as one might expect, but always involves experiments and judgments to test its correctness.[79] Like Zabarella, Flavell views induction not as a process proceeding from the unknown to the known, for in itself induction is not properly a process for discovering new knowledge, but a process that transmits to the intellect the universal aspect of what is apprehended by sensation, which would otherwise be obscure and unknown.[80] Induction, however, plays an essential and ancillary role in the scientific method, which both Flavell and Zabarella view as a regressive, two-step method consisting of an (inductive) inference from an observed effect to its cause, and a subsequent inference from the cause to the effect.[81] As Charles B. Schmitt has observed in Powell and Flavell, a radical change occurred in the field of logic, a shift away from humanistic dialectic towards facultative logic, a "cognitive turn", in other words, which lies at the foundation of British empiricism.[82] Flavell's discussion was more systematic than Powell's and more concerned with the epistemological issues of empiricism, giving an overview of important logical topics that would dominate the debates in the following three or four decades in the British Isles, such as the problem of innatism, the origin of sensation, the role of observations and experiments and the systematization of knowledge.

The most important and influential book on facultative logic in England at the end of the Renaissance, however, was Robert Sanderson's *Logicae artis compendium* (1615). Sanderson's handbook on logic has been said to look "like an excessively psychologistic way to define the subject",[83] namely facultative logic in England. Recalling Zabarella's definition,[84] Sanderson defines logic as an instrumental art that directs the mind in knowing things. He rejects the idea that "logic or dialectic is the theory of disputing".[85] There are three parts of logic, following the tripartition of mental operations leading to scientific knowledge. The first part deals with the apprehension of concepts, the second with the formation of judgments, while the third deals with reasoning and method.[86] The most original part of Sanderson's logic is the third, in which he also introduces new elements in an attempt to elaborate a new theory of knowledge. New knowledge is not discovered through demonstration or the regressive method, which are useful only in

verifying the scientific nature of knowledge, but is characterized by a fourfold process culminating in induction. The primary and fundamental means of acquiring new knowledge is sensation, through which the mind comes to know various, singular things. The second means of invention is diligent observation, or *historia*, which connects the various sensible particulars in the mind. The third means is experience, which collects and classifies the various observations and conserves them in such a way that they can be applied to future knowledge. The fourth means is induction, which infers universal conclusions from the abundant collection of experience.[87] For Sanderson induction is a particular kind of argumentation that proceeds from a sufficient enumeration of the particular cases to the formation of universals. It can be of three kinds: 1) perspicuous, clear and distinct, if all enumerated cases are considered; 2) implicit, if only some cases are considered and others assumed to be the same; or 3) not perspicuous, when from only one example it infers a general conclusion.[88] Sanderson particularly emphasizes the extreme utility of induction for discovering first principles and universals of the causes and of all other universal things to be proved: universal principles, causes and truths that constitute the edifice of science. But he also recognizes the intrinsic weakness of induction, in that a single exception or counterexample can overturn its universal conclusions.[89] Exceptions and particular cases must necessarily be considered because they can refute the conclusions, and so must not expunged from the theory. Sanderson thus pays particular attention to the empirical aspect of knowledge, more than any other logician of his time. His account of knowledge, although inspired by Zabarella's conception of induction, shifts radically towards empiricism, focusing on the cognitive process of knowing particulars more than the Stagirite himself ever dared to.

Sanderson's facultative logic represents a decisive step toward an empirical philosophy of mind in which the investigation of syllogism has given way to the examination of the cognitive process of knowledge formation based on sensation and induction. It is hard to overstate the importance of Sanderson's epistemology, since all subsequent logicians considered and discussed his approach. If we consider that his *Compendium* was the standard textbook in British universities, we can understand the wide circulation of his empirical ideas and their impact on several generations of thinkers, who came to conceive facultative logic as an instrument of science in which knowledge was based primarily on experience.

Perhaps the most interesting text of facultative logic is Zachary Coke's *The Art of Logick* (1654).[90] Coke's textbook is heavily indebted to Christopher Airay's *Fasciculus* and Bartholomaeus Keckermann's *Systema systematum*.[91] There is no doubt that Coke's logic was the most complete handbook on facultative logic written in English prior to Locke's *Essay*. Coke's work clearly shows how Aristotelian logic increasingly shifted its focus from a mere consideration of syllogism to a careful examination of the intellect and its functions with respect to the objects of experience. There are three specific elements at the base of Coke's facultative logic: 1) the object of knowledge, defined as all those things present in nature;

2) an innate faculty of the mind, which is the intellect; and 3) a particular disposition through which the intellect is ordered in its operation and which can be either immediate or acquired by knowledge.[92] The order and right arrangement of the intellect depends on logic, which is a directive discipline, that is, one that prepares and structures the operations of the mind and reason in the cognition of things.[93] The mental operations required for cognition are: 1) the understanding and the thoughts of things and 2) the signification of these thoughts. Only logic, among directive disciplines, can correctly direct these two operations.[94] Facultative logic is thus primarily the art of directing the mind in its knowledge, secondarily the art of teaching ways of thinking clearly and judging things distinctly and finally a corrective method for the mind's errors. By directing the thoughts and operations of the mind in knowing things, logic reveals itself to be a true τρόπος ἐπισήμης, to repeat the Aristotelian formula.[95]

More particularly, logic guides our thoughts about everything conceivable according to a rule, in such a way that the mind draws correct conclusions by means of an ordered process and avoids any kind of confusion.[96] Logic plays an important role because the mind, being a natural faculty that consists in bodily humours and temperaments, may be ill-disposed to cognition.[97] Logic can be a corrective of the mind, and for this reason it is important to know the faculties of the mind preliminarily by its properties.[98]

Within this framework Coke devotes a long section to the exposition of epistemological doctrines, the limits of the understanding and the use of logic as a corrective instrument for mental errors. For Coke, the fundamental feature of the mind is that sensible objects are the most knowable to us and only subsequently does the intellect acquire intellectual knowledge. Therefore, all knowledge begins from experience. The second feature is that the intellect cannot understand the specific nature of things in a distinct and ordered way, therefore, to discover the truth, artificial rules are required. Third, the intellect is directed toward thinking about universals, while sensation concerns particulars; this implies the necessity of mediating between these two kinds of knowledge. Fourth, according to Coke, at any given time the intellect is occupied with the thought of only one thing, and this thought, amid a flux of other thoughts, is determined by a temporal order within the mind. Fifth, the object of knowledge must be proportionate to the finite capacities of the mind and to the limit of the intellect. For instance, the infinity of God cannot be comprehended by a finite intellect by means of logic. Coke points out, furthermore, that the intellect can assent to conclusions which are not demonstrated in a necessary way, as with induction, for example. Finally, the instruments of mental operations must be pure, that is, the intellect should not be pathologically affected.[99] This is because logic should help us to prevent possible errors and defects of the intellect. There are three defects of the mind in the realm of epistemology. The first is aberration in the apprehension of things, which means that the mind grasps things incorrectly. The second is obscurity in the nature of things and difficulty in distinguishing their marks and properties. The third is negligence and confusion in the apprehension of things, which means that the mind grasps things

correctly but confusedly. Logic provides a cure for all these defects by explaining, testing, ordering and arranging things.[100]

It is important to note, however, that logic is not only "cathartic", according to Coke, that is, its role is not simply to prevent or correct possible errors of the mind. It also focuses on the interplay among the various workings of the mind, in particular on thinking, which is the understanding, insofar as it deals with things in the world.[101] These can be of three kinds. Some are infinite, such as God, and no logical instrument is sufficient to understand them. Others are finite and created. Of these, some are spiritual, imperceptible and understood only with great effort; others are corporeal and known properly by the understanding. This last class is the proper subject of facultative logic.[102]

Coke narrows the field of facultative logic, and therefore of knowledge, to corporeal and physical things alone and defines the limits and boundaries of human understanding. All that goes beyond experience and sensible knowledge is the object of either divine revelation or a confused understanding; distinct knowledge and the correct use of the intellect rely only on sensory experience. The intellect, however, does not act directly on sensible knowledge of particulars, but rather on their conceptual abstractions.[103] The first means by which facultative logic acquires new knowledge is through the senses. The second means is observation, which presupposes the use of the senses; observation, in Coke's definition, is a reflection of the data obtained by the senses. The third means is experience, that is, the collecting of the observations and examples retained in the memory. The final means is induction, the real inventive instrument, which, from the judgment of the senses and from the experience of observations, generates a common universal notion on which the logical instrument can operate.[104] For Coke facultative logic is defined not only by the process of acquiring knowledge, but also by the material on which it operates. This material is twofold: primary and representative or secondary. The latter consists of logical terms, or words, which represent concepts, also called *secundae notiones*. *Primae notiones*, meanwhile, are our concepts of things as they are. *Secundae notiones* do not refer directly to things themselves, but rather to intellectual rules by which the mind can deal distinctly and regularly with things. For Coke, as for Zabarella, *primae notiones*, even if they are concepts, directly concern things as they are. Thus, Coke writes, when someone imposes names, they aim first of all to name the things themselves and only afterwards other concepts. For instance, the word "man" primarily expresses the concept of human nature, and as such it is a *prima notio* or *intentio*, but when we consider the word "man" as a species, or a kind, it becomes a *secunda notio*, which is not derived immediately from the things that constitute human nature, but rather from the intellect's way of conceiving "man".[105] Perhaps the most interesting part of Coke's facultative logic is his idea of method, which brings Zabarella's philosophy of mind very close to that of Locke. Like Zabarella, Coke recognizes two methods: the compositive (synthetic) and resolutive (analytic) method. The compositive method proceeds from the universal to the particular, from the simple to the compound, while the resolutive method proceeds from the

effect to the cause, from the compound to the simple.[106] Resolution, Coke adds, is feasible and effective only if we know the process by which the compound was constructed. In other words, only if the mind knows how a thing is constructed can it resolve that thing into its correct parts. Thus, every analytic process begins with the knowledge of a thing to be analyzed, of the thing's construction.[107] This "constructivist" perspective, which is shared by Thomas Hobbes, leads to the corollary, that we cannot know the essence or substance of natural things, because they are not generated by the human mind. By means of resolution it is possible to know only certain qualities of a thing, but not what it truly is. Knowledge of the thing, therefore, depends on the mind's capacity to resolve the object of knowledge into simple and elementary concepts, which usually coincide with what is apprehended by the senses. Coke therefore reaches the Aristotelian conclusion that facultative logic does not deal with things in themselves, but with the elements that make knowledge of things possible. Even if there is an isomorphism between things and *primae notiones*, from a cognitive standpoint, it is impossible to know the essence of things since they are not generated by the mind. Scientific knowledge only concerns mathematical and geometrical truths; in physical matter the mind can acquire scientific knowledge only if the observed effect or "fact" can be reproduced from the causes. In this sense, Coke's facultative logic could only lead to an empirical and experimental approach in which controlled experiments determine the cause of a given effect, a cause which would have remained unknown by analysis alone. In conclusion, Coke represents a move towards a more complex philosophy of mind through the original development of certain suggestions inherent in the facultative logic that English Aristotelianism had originally inherited from Zabarella. He presages issues and problems that are typical of the philosophy of mind of John Locke, Richard Burthogge and David Hume.[108]

5 Conclusion

A melting pot of philosophies and philosophical trends, almost all of which were destined to disappear in the following century, the Renaissance was without doubt a controversial age. It has often been said that early-modern philosophy arose in opposition to the philosophy of the Renaissance, to Aristotelianism in particular, which is thought to represent a conservative and static kind of thought that was incapable of responding to the needs of the modern world. Historiography loves clear-cut contrasts and grand oppositions and generally shuns the various shades of grey. Moments of rupture and contradiction are easier to handle than continuity and periods of hardly perceptible transformation, yet it is not always possible to accurately capture the movement of a thought through history. The cases I have mentioned here, albeit briefly, show that Aristotelianism did not vanish with the advent of modern philosophy, but was in fact receptive to new developments and problems, and this allowed it to be changed and transformed from within. Internal changes within Aristotelianism were varied because the stimuli that the Aristotelians received were different. In Germany, three new disciplines – hexiology,

gnostology and noology – emerged within Aristotelianism. In themselves they were instrumental habits for the other sciences, but most of all they dealt with the habits that the mind acquires over time in the exercise of its cognitive faculties. The peculiar aspect of the German thinkers of this period is their insightful investigation of the condition of the possibility of knowledge, an investigation based on examining the formation and use of these habits of the mind. Their works make it possible to identify different objects of knowledge according to the various ways of knowing and to engage in a preliminary and a priori critique of the boundaries of the mind's faculties. In England, on the other hand, a peculiar Aristotelianism emerged that focused on the problem of sensible knowledge and the empirical approach. It is no coincidence, therefore, that this movement led to British empiricism. Both philosophical movements, in Germany and in England, represent a decisive cognitive turn of Aristotelian logic in favour of the construction of a new philosophy of mind.

With its investigation of the workings of the mind, Renaissance Aristotelianism therefore represents an important starting point, a *palaestra rationis* for the facultative logic of the next two centuries: a movement that demands reassessment in the overall history of the philosophy of mind.

Notes

1 Cf. Falkenstein & Easton (1997: 1).
2 Buickerood (1985: 163).
3 So the lamentable lack of knowledge of the history of philosophy even extends beyond the years 1300 to 1600, as Schmid has mentioned in the introduction to this volume.
4 For a prehistory of the concept of δύναμις, Cf. von Staden 1999.
5 Cf. Plato, *Republic*, 477 D7–E3.
6 Plato, *Republic*, 477 C1. Cf. Smith 2000.
7 See Chapter 3 of this volume.
8 Aristotle, *DA*, II.5, 417 b 242–245.
9 Aristotle, *PostAn*, II.19, 99b35.
10 Cf. Aristotle, *Cat.*, I.8, 8b27–29.
11 Cf. *Cat.* I.8, 9a1–4.
12 Cf. Aristotle, *Rhet.* I.10, 1369b6.
13 *Rhet.* I.11, 1370a4–7.
14 Cf. Aristotle, *NE* VI.3, 1139b16–17.
15 Cf. *NE* VI.3, 1139b20–21.
16 Cf. *NE* VI.3, 1139b33–34.
17 Cf. *NE* VI.6, 1141a6–8.
18 Cf. Aristotle, *NE* VI.7, 1141b1–2, and 1141a18–20.
19 Aristotle, *NE* I.7, 1098a25–35. Cf. Pozzo 1998.
20 Cf. Lohr (1999: 288).
21 Cf. Sgarbi 2012a; Sgarbi 2013.
22 Cf. Zabarella, *OL*, 1262f.
23 *OL*, 1266c.
24 *OL*, 1282f – 1283a.
25 Cf. *OL*, 502e. Cf. Pozzo (1998: 157–158).
26 Cf. Alsted, *PDR*, 254.

27 *PDR*, 260.
28 *PDR*, 260.
29 *PDR*, 261.
30 *PDR*, 261.
31 *PDR*, 268.
32 *PDR*, 274.
33 Cf. Lohr (1999: 292).
34 *PDR*, 274.
35 *PDR*, 277.
36 Cf. *PDR*, 277.
37 *PDR*, 278.
38 Cf. Wundt (1945: 242–257).
39 Cf. Wundt (1939: 242–254); Sparn (2001: 582–585).
40 Cf. Calov, *MD*, 1.
41 Cf. *MD*, 1.
42 Cf. *MD*, 1–2. In the *Gnostologia*, Calov defines the habit as "firm quality rooted in the mind for the perfection of the cognition of the object". Cf. *MD*, 29.
43 Cf. *MD*, 2.
44 *MD*, 1.
45 *MD*, 1.
46 Cf. Timpler, *MSM*, 38.
47 Calov, *SP*, 10.
48 *SP*, 10.
49 *MD*, 25.
50 Cf. *MD*, 183.
51 *MD*, 26.
52 Cf. *MD*, 183.
53 *OL*, 502e. On this shift cf. Pozzo 2003; Pozzo 2004; Pozzo 2012.
54 *MD*, 28.
55 *MD*, 28–29.
56 Cf. *SP*, 198.
57 *MD*, 10.
58 *MD*, 10.
59 *MD*, 47–48.
60 Cf. *MD*, 48.
61 *MD*, 51.
62 *MD*, 51.
63 *MD*, 54–55.
64 Cf. *MD*, 55.
65 *MD*, 38.
66 *MD*, 38.
67 Cf. Sgarbi 2010.
68 Cf. Jardine 1988.
69 Cf. Sgarbi 2013.
70 Cf. Powell, *APP*, 338–339.
71 Cf. *APP*, 340.
72 Cf. *APP*, 340.
73 Wood (1817, vol. 2: 207).
74 Cf. Flavell, *TDMP*, b. 2, 107–108.
75 Cf. *TDMP*, 108–109.
76 Cf. *TDMP*, 109.
77 Cf. *TDMP*, 48.

78 Cf. *TDMP*, 48–49.
79 Cf. *TDMP*, 49.
80 Cf. *TDMP*, 51.
81 On regress cf. Jardine (1988: 686–693).
82 Cf. Schmitt (1983: 36).
83 Trentman (1976: 192).
84 Cf. Sanderson, *LAC*, 1.
85 Howell 1961, 304.
86 Cf. *LAC*, 2–3.
87 Cf. *LAC*, 226–227.
88 Cf. *LAC*, 151.
89 Cf. *LAC*, 152.
90 Some have raised doubts about the authorship of the work by attributing it to the theologian Henry Ainsworth (1569–1622). Cf. Measell 1977; Measell 1978.
91 On Keckermann's influence on Coke, cf. (Serjeantson 1999: 207).
92 Cf. Coke, *AL*, 1.
93 Cf. *AL*, 2.
94 Cf. *AL*, 2–3.
95 Cf. *AL*, 3.
96 Cf. *AL*, 8.
97 Cf. *AL*, 8.
98 Cf. *AL*, 4.
99 Cf. *AL*, 5. Cf. Keckermann, *SS*, 67.
100 Cf. *AL*, 5. Cf. *SS*, 68.
101 Cf. *AL*, 3.
102 Cf. *AL*, 6–7.
103 See page XXX below for a characterization of this distinction.
104 Cf. *AL*, 6–7.
105 Cf. *AL*, 11–12.
106 Cf. *AL*, 187.
107 Cf. *AL*, 217.
108 Cf. Ayers 2005; Sgarbi 2012b.

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