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Christian Wolff and Experimental Philosophy

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1. Introduction

'Experimental philosophy' is not only the name of a widely discussed new trend in the philosophical arena. From the late 1650s until at least 1800, scores of philosophers endorsed what they called experimental philosophy while polemizing against their speculative, armchair opponents. For instance, John Dunton opened his *Young-Students-Library* of 1692 by stating that natural philosophy may be 'Subdivided into *Speculative* and *Experimental*.'[1] Of these two forms of natural philosophy, we must 'as much as possible, Exclude the first, for an indefatigable and laborious Search into Natural Experiments, they being only the Certain, Sure Method to gather a true Body of Philosophy'.[2] Along similar lines, Diderot distinguished in 1754 between

> two kinds of philosophy, *the experimental and that based on reasoning*. The
> former has its eyes bandaged, walks always feeling its way, grasps whatever
> falls into its hands and finds precious things in the end. The other gathers
> these precious things, and tries to make a torch of them; but this pretended
> torch has up to the present served it less well than the gropings of its
> rival [...][3]

Among the authors who professed their sympathy for experimental philosophy was

Christian Wolff. Not only did Wolff advocate the use of experiments within physics, but also, he claimed that

> experimentation could [...] be extended to all the other parts of philosophy. And thus a broader notion of *experimental philosophy* would emerge than when, as is usually the case, that expression is used only to designate experimental physics.[4]

Following his own suggestion, Wolff emphasized the importance of experiments for moral and political philosophy.[5] He sketched the disciplines of experimental cosmology (*CG* §4), experimental theology,[6] and even experimental ontology.[7]

This may strike many as surprising, given that Wolff is widely taken to be a rationalist[8] and he is sometimes called an extreme[9] or arch-rationalist.[10] If Wolff was a thorough-going rationalist, it is unclear why he placed particular emphasis on the importance of experiments for every part of philosophy. In contrast with the received image of Wolff as a rationalist, some scholars hold that his philosophy combines rationalist and empiricist elements, it is a *via media* between empiricism and rationalism,[11] or it cannot be adequately described by means of the distinction between empiricism and rationalism.[12] However, even these scholars typically claim that Wolff grants a substantial place to non-empirical cognitions. For instance, according to Giorgio Tonelli, Wolff takes ontology and cosmology to be 'completely a priori *stricto sensu*'.[13] How can this be reconciled with Wolff's proposals to develop an experimental ontology and an experimental cosmology?

This chapter assesses whether we should take the suggestion that Wolff's

philosophy is a 'universal experimental philosophy' at face value. The chapter argues that we should and it establishes three conclusions. The first conclusion concerns the role of experience in Wolff's system. By comparing his views with those of early modern experimental philosophers, we can see that Wolff does not only agree with several of their claims, but he also puts them into practice in the way he develops his own philosophical system. Wolff's system relies on experience at every step, far beyond what many commentators have acknowledged, including commentators who do not classify him as a rationalist.

The second conclusion concerns the geographical and chronological reach of early modern experimental philosophy. So far, the study of experimental philosophy as a movement has been mostly confined to the British isles. This chapter provides evidence for the influence of experimental philosophy in early eighteenth-century Germany, long before Kant's contemporaries explicitly endorsed the experimental method in the last three decades of the eighteenth century.[14]

The third conclusion concerns the usefulness of the notion of experimental philosophy as a historiographical category. It has been argued that this notion provides more effective terms of reference than the traditional notion of empiricism for interpreting 'the diverse range of discussions of method' among English natural philosophers in the late seventeenth century.[15] This chapter shows that the notion of experimental philosophy is also helpful for interpreting Wolff's system. The terms 'empiricism' and 'rationalism' are employed in a wealth of different meanings, not least with reference to Wolff.[16] As a consequence, any discussion of his empiricism or rationalism would involve distinguishing several senses in which he can be called respectively an empiricist and a rationalist. By contrast, experimental philosophers

shared a relatively well-defined set of methodological commitments. These provide non-ambiguous terms of reference for interpreting Wolff's method. The chapter argues that Wolff's thought is shaped by two distinct, but compatible methodological commitments. They are, on the one hand, his commitment to develop a thoroughly experimental philosophy, and on the other hand, his commitment to build a system according to a mathematical demonstrative method. References to Wolff's alleged empiricism and rationalism can be identified or – perhaps more usefully, given the ambiguity of 'empiricism' and 'rationalism' – replaced with references to his endorsement of the tenets of experimental philosophers on the one hand and of a mathematical demonstrative method on the other.

After summarizing the key features of early modern experimental philosophy (§2), the chapter examines Wolff's statements on the method of natural philosophy (§3) and on the role of hypotheses (§4). Wolff's views are in line with those of refined experimentalists, except for his emphasis on the importance of a priori cognitions (§5). However, Wolff's notion of a priori is so weak that experimental philosophers would be willing to admit the existence of a priori cognitions in Wolff's sense (§6). More importantly, Wolff adheres to an ideal of philosophy as a demonstrative science that is indifferent to the a priori or a posteriori origin of cognitions and that accounts for features of his system that his experimentalism leaves unexplained (§7).

2. Early Modern Experimental Philosophy

We can think of early modern experimental philosophy as a movement. Like many

movements, experimental philosophy had many self-declared members (like Newton[17]), some staunch promoters (like d'Alembert), some sympathizers who were somewhat at the fringe, and some declared enemies (like Margaret Cavendish[18]). Bacon was posthumously recruited as 'the patriarck of experimental philosophy'.[19] Aristotle, Descartes and, later, Leibniz were typically portrayed as its foes.[20] Experimental philosophers identified themselves with a tradition that was initiated by Bacon. It was continued by members of the early Royal Society like Boyle and Hooke and, later, by Newton. It was extended to the study of the human mind by Locke and to the study of morals by Scottish philosophers. For instance, Hume's *Treatise* is subtitled 'an Attempt to introduce the Experimental Method of Reasoning into Moral Subjects'.

Contemporary experimental philosophers reject philosophical arguments based on unwarranted premises about people's intuitions. Similarly, early modern experimental philosophers rejected theories about the natural world that were based on untested assumptions and principles.[21] They typically used the terms 'hypothesis' and 'speculation' to decry particular propositions or entire theories that did not rely on observations and experiments. Hence, their adversaries were called *speculative* philosophers. For instance, German experimental philosophers rejected Kant's first *Critique* by describing it as a 'whole of the most abstract speculations of logic and metaphysics',[22] 'independent from any experience'.[23]

The opponents of experimental philosophers typically endeavored to develop natural philosophical systems according to a demonstrative method based on principles, as stated in Thomas Hobbes' *De corpore*:

The end of science is the demonstration of the causes and generations of

things; which if they be not in the definitions, they cannot be found in the conclusion of the first syllogism, that is made from those definitions; and if they be not in the first conclusion, they will not be found in any further conclusion deduced from that; and, therefore, by proceeding in this manner, we shall never come to science [...][24]

According to experimental philosophers, their adversaries posited the principles used as premises for demonstrations 'without prior recourse to experiment or observation or at best,' with 'a kind of *post hoc* concession to experiment or an attempt to save the phenomena'.[25] Against this way of proceeding, seventeenth-century experimental philosophers put forward a two-stage model of natural philosophical inquiry. In the first stage, we must perform a large number of experiments and observations on designated topics and organize the information gathered in structured collections, Baconian natural histories. The primary aim of this stage is to collect data in preparation for the *future* elaboration of theories. Only in the second stage will we be entitled to develop theories and hypotheses. Yet compiling natural histories was an enormous endeavor which would occupy many generations of researchers. Theory construction was seen as a task which could only be accomplished in a distant future.[26] As a result, experiments and observations on the one hand, theories and hypotheses on the other hand, were 'on different sides of the methodological divide'.[27]

Things changed somewhat once philosophers started to acknowledge the extraordinary achievements of Newton's *Principia*. Newton did not employ the Baconian method of natural history. However, he still pursued an a posteriori approach to the study of nature, while opposing hypotheses and speculative theories. Along

similar lines, later experimental philosophers emphasized the empirical origins of our knowledge of nature and were wary of a priori claims or arguments. As Diderot wrote in the passage quoted above, experimental philosophy walks 'always feeling its way'. It relies on experience at every step.

3. Wolff: An Experimental Philosopher?

For chronological reasons, Wolff could not have known Diderot's endorsement of experimental philosophy. However, he was well acquainted with the natural philosophical and methodological claims of British experimental philosophers. Wolff's volumes of experimental reports contain scores of references to the works of Boyle and Hooke.[28] Wolff was personally involved in the diffusion of Locke's ideas in Germany. He acted as the Locke expert of the *Acta eruditorum* of Leipzig, reviewing the first publication of several Lockean works.[29] He also reviewed works by other British philosophers such as Boyle and Newton. Wolff made frequent reference to Newton's *Principia*[30] and to the *Opticks*.[31] Interestingly, Wolff refers to the second edition of the *Principia* and to the queries in the *Opticks*, where Newton's adherence to the methodological outlook of experimental philosophy is most explicit.[32]

Given Wolff's knowledge of British experimental philosophers, it is not a coincidence that he repeats many of their methodological proclamations. Experimental philosophers claimed that one should not posit natural philosophical principles and proceed solely from them, independently from experience. Wolff agrees:

It seems to me to be still much too early to posit certain general principles

[*Gründe*] as elements of things, from which one wants to derive everything that is possible in nature by means of the pure intellect as, for instance, *Descartes* did.[33]

Like British experimental philosophers, Wolff holds that the employment of a wrong method transformed Descartes' physics into mere fiction.[34] When one infers prematurely particular natural events and features of natural objects from a few general principles, one 'fantasizes and starts to poetize'.[35] 'Poetizing' and 'developing fictions' were typical expressions with which British philosophers criticized Descartes. Like them, Wolff relates natural philosophical fictions to the abuse of hypotheses:

> We do not approve fabricated hypotheses, that many people nowadays ably introduce within natural philosophy, pretending anything arbitrarily, being altogether unable to prove that what they imagine could exist in nature.[36]

Several experimental philosophers declared that, to avoid this mistake, they refrained from formulating hypotheses. Wolff appears to embrace the same policy: 'I considered that I must avoid fictitious hypotheses, of which the writings of physicists abound everywhere'.[37] '[T]he study of physics would be very useful for the benefit of human life if we were eventually freed from hypotheses [...]: and all my efforts tend to that [aim]'.[38]

Having ruled out the speculative method that is based on principles and hypotheses, Wolff concurs with experimental philosophers that the study of nature must start from experience, that is, observations and experiments. These must be carried out

on the model of Francis Bacon.[39] Wolff also praises Robert Boyle[40] and Isaac Newton, the author of the 'incomparable *Mathematical Principles of Natural Philosophy*'.[41] Like Newton,[42] Wolff declares: 'Indeed, I do not admit within science any other principles, on the basis of which I give reason of something else, apart from those that were deduced from observations and experiments following a legitimate thread of inference'.[43]

Physics must derive their principles from experience[44] and never trespass its boundaries: 'I do not proceed beyond what observations and experiments allow; as for the other things, I prefer to acknowledge my ignorance, rather than deceiving myself and others with fictions'.[45] Wolff does not mention 'observations *and* experiments' by chance: he carefully distinguishes observations, which do not require our intervention, from experiments, which require our intervention (*DM* §325; *Anmerckungen* §99; *PE* §456). He stresses the importance of experimenting to establish truths that observations alone cannot reveal (*DP* §107). This is especially true for physics, which must start from experiments.[46] Wolff stresses the importance of providing detailed experimental reports, which will enable others to replicate the experiments.[47] He puts his recommendation in practice in his three volumes of experimental reports.[48]

Eighteenth-century experimental philosophers endeavored to apply the method of experimental natural philosophy to other disciplines. In doing this, they relied not only on real-world experiments, but also on observations and introspection. Introspection was particularly important for the natural histories of the understanding[49] and for the authors who sought 'to account for *Moral*, as the great *Newton* has taught us to explain *Natural* appearances'.[50] Their experimental philosophy could be called an *experiential* philosophy, insofar as it relies not only on experiments, but on all varieties of

experience. As we saw in the introduction, Wolff too claimed that experimentation should be extended to every part of philosophy. To this end, he relied on real-world experiments as well as observations and introspection. On the whole, Wolff agreed on many points with British experimental philosophers, especially those Newtonians who aimed to 'banish all *hypotheses*'.[51] Yet, as we will now see, Wolff's considered views on hypotheses differ from those of the Newtonians.

4. Wolff vs the Newtonians on Hypotheses

Like the Newtonians, Wolff praises experiments and criticizes the way many natural philosophers employ hypotheses. Yet Wolff does not 'absolutely reject every use of hypotheses'.[52] In his view, '[p]hilosophy must use hypotheses insofar as they pave the way to the discovery of certain truth'.[53]

Astronomers provide the model for this use of hypotheses:

From some apparent events, they infer what they have to assume, in order for [the events] to follow, and they posit [...] that the hypothesis applies to all [similar] events [...] To determine whether they did well to assume the hypothesis, they infer what follows from it on the basis of a correct reasoning, in order to compare it with the remaining phenomena that they have observed or that can be inferred from observations. [They do this] to determine whether what has been observed agrees with the hypothesis. If they gather that [observations and hypothesis] are in contrast with one

another, they improve the hypothesis, and in this way they constantly move closer to the truth.[54]

Natural philosophers should imitate 'astronomers by deriving hypotheses from common observations and by correcting and perfecting them after they have sought [to make new] observations and to examine experiments'.[55] 'And so, in the same way of astronomers, we come closer and closer to the truth, until [...] we finally reach it'.[56]

Observations and experiments, then, are not an alternative to the assumption of hypotheses. On the one hand, experiments are necessary 'as examinations of physical hypotheses'.[57] They enable us to confirm, refine, or reject them. On the other hand, hypotheses and the theories of which they are part can provide a stimulus to carry out new observations or experiments. 'Based on the example of the astronomer', Wolff stresses

how much theory owes to observations and how much, on the other hand, observations owe to theory, since observations perfect theory and theory in turn continuously perfects observations. He who is ignorant of any theory and does not have much ability to use the faculty of knowing will only discover obvious and mostly imprecise [truths] on the basis of observations. There would not be much progress, unless one could presuppose some theory; and the more [a theory] is developed, the more discoveries one will make by means of observation[s].[58]

Consistent with this emphasis on the interaction of hypotheses and observations,

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Wolff criticizes those who reject every hypothesis within natural philosophy:

> If one rejects the use of hypotheses within philosophy, and only wants to admit what is already certain and established, he will much obstruct the progress of the sciences, which able philosophers should promote as much as they can.[59]

Many Newtonians could fall within the category that Wolff criticizes. According to Wolff, those who praise Newton for excluding hypotheses from the domain of natural philosophy do not realize that Newton himself

> indulges in hypotheses in those very areas in which they think he abstained from employing them [...] In fact, what else is universal attraction or gravity, [...] if not a hypothesis which is assumed because of certain phenomena and then is extended to all matter?[60]

Wolff's refrain is that not the use, but the abuse of hypotheses is to be condemned.[61] He formulates several prescriptions that philosophers should follow to avoid abusing of hypotheses. For instance,

- before accepting a hypothesis, one should make sure that it does not entail any contradiction;[62]
- one must show that the entities whose existence the hypothesis implies exist in nature;[63]

- if a hypothesis is incompatible with one single observed phenomenon, it must be abandoned;[64]

- if a hypothesis does not explain all the phenomena that it was designed to explain, it is improbable (*L* §610);

- since experiments and observations can make hypotheses more probable, but not certain, one must never mistake hypotheses for certain propositions, which Wolff calls dogmas.[65] Also, one should not employ hypotheses as premises in the proofs of dogmas, because one cannot establish a certain proposition on the basis of uncertain assumptions (*DP* §128);

- one must not employ hypotheses as reasons for action where mistakes might bring about dangerous consequences, for instance within medicine and moral philosophy.[66]

5. Wolff and Refined Experimentalists

Not all experimental philosophers were as radical as Newton in their professed rejection of hypotheses. Some granted that hypotheses may have a place within natural philosophy, but only in a distant future, after the completion of large natural histories on which hypotheses can be based.[67] Yet, as a matter of fact, British experimental philosophers did not wait until the completion of natural histories to endorse a number of hypotheses, such as the corpuscularian hypothesis.[68] This suggests that, in their view, we are entitled to endorse some hypotheses before the completion of natural histories. According to Robert Hooke, this was the position of the Royal Society. Hooke writes

that the Royal Society rejected not every hypothesis, but 'any *Hypothesis* not sufficiently grounded and confirm'd by *Experiments*'.[69] Along similar lines, Thomas Sydenham proposed that hypotheses based on facts and observations are 'stable and permanent'.[70] Wolff would agree.

The endorsement of some natural philosophical hypotheses led Robert Boyle, like Wolff, to formulate a list of the requirements that a hypothesis should satisfy to be 'good' or even 'excellent'.[71] Despite their proclamations against theorizing and speculating, Boyle and Hooke admitted that knowing some hypotheses and theories helps researchers in their observations and experiments:

> For by this Means the Mind will be somewhat more ready at guessing at the Solution of many Phenomena almost at first Sight, and thereby be much more prompt at making Queries, and at tracing the Subtilty of Nature, and in discovering and searching into the true Reason of things.[72]

In turn, experiments and observations test hypotheses,[73] giving rise to a virtuous circle of experiment and theory. Thus, Boyle detailed the mutual benefits of experimental and speculative philosophy, including those 'flowing from speculative philosophy to experiments'.[74] Boyle's and Hooke's views are in line with Wolff's comments on 'how much theory owes to observations and how much, on the other hand, observations owe to theory', quoted in Section 4.[75]

In view of these similarities between the views of Boyle, Hooke, and Wolff, it is tempting to class them all as refined experimentalists. While emphasizing the reliance of natural philosophy on experience, refined experimentalists acknowledge the

usefulness of hypotheses and the reciprocal relation of experiment and theory. However, there are two significant differences between Wolff on the one hand, Boyle and Hooke on the other.

First, Boyle highlights the reciprocal relation of experiment and theory while explaining how to construct natural histories.[76] This is the first stage of natural philosophical inquiries. Its aim is not to refine theories or hypotheses, but to collect data in view of the future elaboration of natural philosophical systems. Although Hooke acknowledges the reciprocal relation of hypotheses and experiments, he also states that, until a 'Philosophical History' is 'pretty well stored with choice and sound Materials, the Work of raising new Axiomes or Theories is not to be attempted'.[77] It is not obvious how Boyle's and Hooke's statements on the reciprocal relation of experiment and theory can be reconciled with their two-stage model of natural philosophical inquiry. This problem does not arise for Wolff because the two-stage model is foreign to his outlook. For Wolff, data collection and theory building are largely simultaneous and interdependent.

Second, experimental philosophers like Boyle and Hooke hold that our entire natural philosophical knowledge must be acquired a posteriori from the 'materials' of observations and experiments.[78] Boyle and Hooke would reject any non-empirical proposition as an unwarranted speculation. By contrast, Wolff holds that a priori propositions are an essential part of natural philosophy.[79] According to Wolff, experiments are useful to confirm 'what has been proven a priori'.[80] For instance,

the rules of motion, which have been discovered by the new mathematicians, are indeed proven in [mixed] mathematics; however, this

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does not prevent one from explaining them by means of experiments as well. When *Galileo* discovered the rules according to which heavy bodies move when they go upward, they fall or they are thrown, he did not stop at mathematical demonstrations, but he also confirmed them with experiments. Also, the great mathematicians *Huygens* and *Wren* proceeded in the same way [...] They had good reason [to do so]. In fact, experiments are proofs that one sets up in order to get further reassurance that one has not been unlucky in one's reflection.[81]

These statements make clear that, for Wolff, natural philosophical knowledge does not derive entirely a posteriori from experiments and observations. Some natural philosophical claims can only be established a posteriori, but others can be established a priori and then confirmed a posteriori.

This integration of a priori and a posteriori knowledge is reflected in Wolff's statements on the relations between the sciences. In his view, experimental physics is not the whole of physics. It is only the first part of physics, designed to provide experiments and observations on which dogmatic physics will build (*DP* §109). The latter is based on experiments, but also on demonstrative arguments. Moreover, physics borrows some principles from general cosmology (*DP* §94). This is the part of metaphysics that establishes the features of any possible world (*DP* §78) by means of demonstrative arguments from ontological principles (*CG* §2). Within cosmology as 'within the whole of philosophy', experience makes it possible to 'confirm a posteriori dogmas established a priori' (*CG* §4 n.) Thus, for instance, empirical psychology precedes rational psychology and provides some principles for it (*PE* §4). However,

rational psychology is not based solely on experience. It also establishes some claims a priori.[82] Some of them lead to conclusions that empirical psychology can prove a posteriori (*PE* §5), confirming the conclusions of rational psychology.[83]

Wolff's statements on the relations between the sciences make clear that, although he follows experimental philosophers in praising observations and experiments, he does not follow them in rejecting demonstrative reasoning and a priori arguments. Wolff often uses the phrase 'marriage of reason and experience' [*connubium rationis et experientiae*] to capture the main thrust of his system.[84] In the spirit of that phrase, Wolff combines experiments with hypotheses. He emphasizes the experiential basis of philosophy, while integrating it with a priori arguments. He endeavors to develop thoroughly experiential or experimental sub-disciplines, like empirical psychology and experimental physics, but he combines each of them with a sub-discipline that relies at least in part on a priori arguments, like rational psychology and dogmatic physics. Accordingly, rather than being a universal experimental philosophy, Wolff's system may be a combination of experimental or experiential sub-disciplines with sub-disciplines that employ speculative arguments decried by experimental philosophers.

To assess whether this suggestion is correct, we must examine Wolff's notion of the a priori. If Wolff has a weak or unconventional notion of the a priori, he may state that some claims of dogmatic physics or rational psychology are established a priori even if they ultimately rely on experience.

6. Wolff's Weak A Priori

As it turns out, Wolff's notion of the a priori is so weak that early modern experimental philosophers could have easily admitted the existence of a priori truths in Wolff's sense. Wolff does not adopt the old notion of a priori proof as a proof of statements about effects from statements on their causes, nor does he adopt the later notion a priori truth as a truth that is independent from experience.[85] Wolff calls a truth a priori if it has been established by means of an inference:

> *Indeed*, either *we make use* of our own capacities to *establish* [*truths*] *only by means of our sense*[*s*], or else *we derive yet unknown* [*truths*] *by inferring them from other cognitions*. In the former case we are said *to discover a truth a posteriori*, whereas in the latter case [we are said to discover a truth] *a priori*.[86]

For Wolff, all inferences can be formulated as syllogisms.[87] We discover truths a priori when we establish them by means of syllogisms (*PE* §460), regardless of whether their premises have been established empirically or independently of experience.

When all the premises that we rely on have been established by means of inferences, we are employing what Wolff calls pure reason. When some of the premises that we rely on have been established non-inferentially on the basis of experience, we are employing impure reason (*PE* §495). Wolff calls the cognitions that we acquire by means of impure reason mixed cognitions:

> A *mixed cognition* is a cognition that is acquired partially a posteriori and partially a priori.

For instance, from experience, i.e. by paying attention to what we see, we learn that the Sun emits light. Hence, we know that the Sun emits light a posteriori. From the definition of a triangle and by means of an inference, we discover the reason why its three angles are equal to two right angles; hence, we cognize it a priori. From the effects of the Sun, that we know a posteriori, we discover by means of the notion of fire that the Sun is [made of] fire: hence, our cognition that the Sun is [made of] fire is mixed. (*PE* §434)

We rely on pure reason only 'in arithmetic, geometry and algebra. [...] Reason in physics is the least pure, because everywhere within physics we accept truths known a posteriori about [material] things, as is common in astronomy as well'.[88] Indeed,

even in abstract disciplines, like *first philosophy*, fundamental notions must be derived from experience, which provides the foundation of factual cognition [*cognitionem historicam*] [...] *moral* and *civil philosophy* derive principles from experience too. Indeed, even *mathematics* presupposes some factual information [*historicam quandam notitiam*] from which it derives the notion of its object and some axioms. I am referring to *pure mathematics*, as this is [even] more apparent with regard to mixed mathematics.[89]

Wolff's 'marriage of reason and experience' is nothing more than the 'co-operation of reason' (that is, inferential knowledge) 'and experience' (*PE* §497) that

takes place 'when reason is not pure' (*PE* §496). It need not be a combination of empirical knowledge with cognitions that, being acquired or justified wholly independently of experience, are a priori in a strong sense of the term. The marriage of reason and experience takes place, for instance, when experiments confirm conclusions previously arrived at by means of inferences. This is what Wolff has in mind when he mentions experiments that confirm a priori claims.

Experimental philosophers would agree that there are a priori cognitions in Wolff's sense of the term. However, they would stress that none of those cognitions is also a priori in the stronger sense of having an entirely non-empirical justification (for instance, being proven on the basis of premises all of which are established independently from experience). To determine whether Wolff would agree with this claim, we must examine the structure and foundations of his demonstrative system.

7. A Priori Cognitions and Philosophy as a Demonstrative System

As is well known, Wolff's two series of philosophical treatises (written respectively in German and in Latin) adopt a mathematical demonstrative method. Each treatise covers one discipline or sub-discipline. Basic disciplines establish claims on which the remaining disciplines rely. For instance, physics employs claims established within cosmology (*DP* §94), which borrows some propositions from ontology (*CG* §9). In each treatise, a series of numbered propositions are demonstrated by means of syllogistic arguments from propositions established either earlier on in the treatise, or in treatises devoted to more basic disciplines.

The format of Wolff's works resembles Descartes' *Principles of Philosophy* and Spinoza's *Ethics*. Descartes' *Principles* were a favorite polemical target of experimental philosophers from the 1670s onward. Spinoza's *Ethics*, with its reliance on many propositions that were posited without explicit reference to experience, hardly conformed to the methodological precepts of experimental philosophers. Instead, the structure of Descartes' *Principles*, Spinoza's *Ethics*, and Wolff's works recalls Hobbes' account of the demonstrative method in the passage quoted in Section 2. Hobbes was a critic of Boyle's experimental philosophy and a source of inspiration for Margaret Cavendish's attack on experimental philosophy.[90] On the whole, Wolff's adoption of a mathematical demonstrative method associates him with authors who were either against or outside of the experimental philosophy movement. This might suggest that Wolff's method is incompatible with a thoroughly experimental philosophy. Introducing definitions and axioms and deducing any other propositions from them may seem appropriate for a priori inquiries, but not for disciplines that are built on the basis of experience.

In this regard, it should be borne in mind that Wolff distinguishes methods of discovery from methods of exposition. Philosophers can use the mathematical method as a method of discovery by inferring hitherto unknown truths from known premises (*PE* §403). However, they must also rely on other methods of discovery. These include the construction of geometrical figures to discover geometrical theorems (*PE* §470) and recourse to experiments and observations to discover truths about the natural world (*PE* §457). Thus, Wolff's requirement that we follow the mathematical method of exposition does not preclude one from relying on experience. It is compatible with the view that our knowledge has an entirely empirical origin and justification, with the exception at

most of analytic statements. Seen in these terms, Wolff's mathematical ideal could be an instance of what Condillac called *l'esprit systématique*, that is, the tendency to systematize the cognitions that experience affords us. It need not be an instance of the *l'esprit de système* that experimental philosophers regarded as a hallmark of their speculative foes.[91]

To understand the significance of Wolff's mathematical method, we must establish whether the premises that provide the foundations of his system are established empirically or independently from experience. In particular, we should focus on the premises that make – in Kantian terms – synthetic claims about the world, rather than those that make analytic claims on linguistic meanings, relations between concepts, or how things would be if they existed at all. Assuming that there is a genuine distinction between analytic and synthetic statements, experimental philosophers can rely on analytic truths, in addition to synthetic truths that are based on experience.

Of course, Wolff never literally claimed that we can know analytic or synthetic truths a priori. The first explicit statements of the analytic/synthetic distinction were made by Immanuel Kant long after Wolff's death in 1754.[92] However, Wolff explains at the beginning of his Latin system that we know what is and what happens by means of the senses, hence a posteriori (*L* §§30-1). Wolff claims that we can prove God's existence by employing the ontological argument as formulated by Leibniz.[93] Some scholars hold that Wolff's version of this argument turns it into an a posteriori argument, but this is controversial.[94] If Wolff's version of Leibniz's argument is an a priori argument, it will be the sole exception to his claim that we can establish existential statements only a posteriori.[95]

Setting aside the issue of God's existence, one could imagine two arguments on

behalf of the thesis that Wolff's views, unlike those of experimental philosophers, entail the existence of synthetic a priori truths. The first argument concerns our knowledge of the laws of nature. The argument relies on three assumptions:

1. Laws of nature are expressed by synthetic statements.

2. Laws of nature are necessary.

3. Wolff agrees with Kant's view that '[e]xperience teaches us, to be sure, that something is constituted thus and so, but not that it could not be otherwise […] if a proposition is thought along with its *necessity*, it is an *a priori* judgment'.[96]

Hence, Wolff must admit that laws of nature are not only synthetic, but also – in virtue of their necessity – warranted a priori.

This argument fails because, for Wolff, laws of nature are not necessary, but 'contingent' (*CG* §527). They 'do not have any unescapable necessity' (*Anmerckungen* §240) 'for, indeed, they could well have been different' from how they are (*DM* §1008). In Wolff's view, it is precisely because the the laws of nature are contingent that they 'must be derived from experience' (*Anmerckungen* §240). They are expressed by what Kant would call synthetic a posteriori statements, not by synthetic a priori statements.

The second argument concerns our knowledge of essences. Wolff regards the essence of a being as the set of its most basic properties. The ascription of those properties to a being is the necessary condition for the ascription of any other properties to it.[97] According to the second argument, Wolff holds the following:

1. The knowledge that a feature is an essential property of a being is an instance of

synthetic knowledge.

2. Since '[t]he essences of things are necessary',[98] to know that a feature is an essential property of a being is to know that it necessarily belongs to it.

3. Necessity requires apriority. The knowledge that a property necessarily belongs to a being can only be warranted a priori.

Hence, Wolff must hold that our knowledge of essences is an instance of synthetic a priori knowledge.

Wolff adopts different argumentative strategies to establish what the essence of different kinds of being is. In what follows, I will assess the argument with regard to the essence of simple beings, which lack parts (*DM* §75), and to the essences of bodies, which have parts and occupy space (*DM* §§51, 606). The essences of simple beings consist of their most basic properties, from which other properties can be derived. The most basic properties of simple beings as such are lack of parts, figure, size, or movement, and the property of not occuping space (*DM* §§71, 81). According to Wolff, a proper understanding of the notion of a simple being is sufficient to ascribe those properties to simple beings (assuming that they exist).[99] Hence, knowledge of the essence of simple beings is not an instance of synthetic knowledge. It is an instance of analytic knowledge.

'The essence of a composite being is the way in which' its 'parts are combined with one another' (*Ontologia* §533). Accordingly, to know the essence of a composite being is to know what its parts are 'and how those parts are joined, so that the composite may derive from them' (*Ontologia* §534). If this were knowledge of necessities, it would have to be warranted by a priori arguments because necessity

requires apriority. However, Wolff denies that this is knowledge of necessities because he holds that any combination of material items is contingent. When Wolff discusses the essence of composite beings, he backtracks from his earlier claim that essences are necessary and claims instead that the '[t]he essence of a composite being consists of nothing else than mere accidents'.[100] Accordingly, when a composite being splits into multiple parts, its essence 'is removed' and '*nothing but mere accidents perishes*' (*Ontologia* §789).

Since the essences of composite beings are accidental, we can know them on the basis of experience. For instance, we know the essence of a clock when, having examined it, we understand what its parts are and how they are combined, so as to move the clock's hands.[101] We will know the essence of the blood if we identify the types of particles that compose it, how and in what ratio they should be mixed to form the blood.[102] We will know the essence of the human body if we know 'the shape of its individual parts, their qualities, and the way in which they are joined, which are taught by anatomy' on the basis of experience.[103] Knowledge of the essence of composite beings is not synthetic a priori, but synthetic a posteriori, because those essences are contingent. Wolff's considered view is that the only necessary essences are those of the simple beings which, for him, are the basic constituents of reality.[104]

One might claim that Wolff's views differ from those of experimental philosophers in yet another way: not because he admitted synthetic a priori truths, but because he did not admit any a posteriori truths at all. Two claims that can be found in the literature might support the ascription of this view to Wolff. Some scholars have claimed that Wolff attempted to derive the whole of human knowledge entirely a priori.[105] Others claim that, for Wolff, all knowledge is analytic. The former claim is

hardly compatible with Wolff's emphasis on experience as a source of knowledge. As for the latter claim, whether Wolff followed Leibniz in holding that all truths are ultimately analytic is a complex question that will not be pursued here.[106] While some interpreters have endorsed this view, others have argued that there are significant differences between Wolff's and Leibniz's theories of judgment.[107] At any rate, even assuming that Wolff took all truths to be analytic, the passages quoted above on the importance of experience for knowing nature show that Wolff, like Leibniz, thought it to be at least practically impossible to know matters of fact by way of analysis.[108] They can only be established on the basis of experience. Hence, Wolff admitted a posteriori truths.

In fact, Wolff relies on experience in order to establish a large number of propositions. These are of two kinds:

- axioms, that is, self-evident propositions that are typically introduced at the beginning of Wolff's treatises. Wolff holds that, although we can accept axioms as true simply because they are self-evident, we can also establish their truth by means of arguments.[109] Several of them are clearly based on experience (e.g. *Ontologia* §27).

- propositions that are introduced later on in the treatises and, unlike axioms, are not self-evident. Of these, some are introduced on the basis of empirical remarks (e.g. *PE* §501). Others are introduced on the basis of a combination of empirical remarks and previously proven propositions (e.g. *L* §5).

Propositions that are based, at least in part, on experience can be found in every

area of Wolff's system. They include, among others, natural philosophical claims on the existence of corpuscles (*CG* §228), psychological claims on our consciousness of the external world (*PE* §11), and ontological principles like the law of non-contradiction.[110] They are established on the basis of very diverse kinds of experience:

- experience of facts concerning a vast number of items; for instance, that objects retain their essential properties, but not their nonessential properties through time (*L* §68);

- experience of specific occurrences, like the case of a person who grew up in the wild among bears;[111]

- experience afforded by specific disciplines like astronomy (*CG* §§51, 52) and biology (*CG* §§53, 54);

- experience obtained by means of scientific instruments like microscopes (*CG* §§228, 231);

- linguistic experience, understood as the source of knowledge of facts about the correct use of language (*L* §210);

- our awareness that we are conscious of ourselves and external objects (*PE* §11) and that our senses give us access to their properties (*L* §30);

- awareness of what we can or cannot think; for instance, the impossibility of thinking contradictory states of affairs (*Ontologia* §27).

Wolff relies on experience in the most basic and abstract discipline, ontology, and even in a discipline like cosmology (*CG* §§51, 52, 53, 54, 228, 231) which, he claims, derives entirely from ontological principles (*CG* §2). Acknowledging this is important

for realizing that the whole of Wolff's philosophy can be aptly characterized as a *philosophia experimentalis universalis*, a philosophy that relies on experience at every level.[112]

However, appeal to experience is not the only way, besides inference, in which Wolff introduces new propositions. A striking feature of Wolff's system is the great number of definitions. Wolff has a theory that specifies which definitions are acceptable.[113] In many cases, however, he does not explain why we should accept specific definitions. This contributed to creating the image of Wolff's system as a speculative castle in the air, based on arbitrary stipulations rather than observations and experiments.[114] Yet, while some Wolff's definitions appear be stipulative, others appear to express or regiment current linguistic usage or to be based on experience. At any rate, Wolff does not usually attempt to vindicate his definitions by showing that they are based either on experience or on conceptual analysis. All that Wolff expects from his readers is to accept that his definitions are true, so that he can use them as the basis for subsequent arguments.

The same applies to many of the propositions for which Wolff provides empirical justification, in addition to a priori arguments. For instance, Wolff argues that we can know that we are conscious of ourselves and other things by paying 'attention to our perceptions' (*PE* §11). He then refutes a hypothetical opponent. The refutation relies on the assumption that one can only doubt something if one is conscious (*PE* §12). It would be natural to regard this as an analytic, non-empirical statement based on the meaning of 'to doubt'. However, Wolff is not concerned to specify whether that statement, or his argument as a whole, are empirical or non-empirical. He is only interested to establish his claim regarding consciousness, so that he can use it as a

premise for subsequent demonstrations.

In order to establish his claims, Wolff does not hesitate to combine various forms of justification. This is evident in his defense of the law of sufficient reason in the *Ontologia*. After its first appearance in the *Deutsche Metaphysik* (§30), Wolff's law of sufficient reason had been subjected to vehement attacks. In response, Wolff's *Ontologia* adduces many reasons for endorsing it:

- a proof based on earlier propositions (§70);

- remarks intended to show that the law of sufficient reason is consistent with our experience (§72);

- an argument for the claim that we can regard the law of sufficient reason as an empirical generalization (§73);

- the claim that, psychologically, we would find it difficult to believe that something is the case even if there is no reason for it to be the case (§74);

- the claim that the law of sufficient reason is an axiom, hence it is self-evident (§75).

Several of these remarks, including the proof in §70, are based at least in part on experience.[115] However, Wolff does not stress this. He is not concerned to persuade his readers that the law of sufficient reason is true because it has an empirical foundation. He is only concerned to persuade his readers that the law of sufficient reason is true. He musters every consideration, empirical or otherwise, that he thinks will help him achieve that aim.

This indicates that quite often, Wolff does not focus on building a system on

empirical foundations, but on building a system on foundations that his readers will accept as solid. Hence, when Wolff takes a definition or proposition to be sufficiently uncontroversial, he may introduce it without further justification (e.g. *L* §219). He may claim rhetorically that no one would question it (*L* §30) or he may state that its truth can be seen from examples (*L* §109). When Wolff argues for a proposition whose empirical foundation he finds apparent, his reference to experience may be sketchy, especially if compared with the extensive empirical evidence often adduced by Boyle or Newton in support of their claims. Often, when a proposition is not an axiom, Wolff only shows that it is a priori in the etymological sense of being derived from prior propositions. He does not point out whether those propositions include empirical premises, although this is typically the case.

Wolff's mathematical method is compatible with the development of a system entirely based on experience. The method allows indiscriminately for 'definitions, undoubted experiences, and axioms' (*L* §498) as premises for demonstrations. Definitions and axioms can be based on experience, although Wolff's mathematical method does not require this. It only requires that the system has 'certain and unmoved principles'.[116] Empirical statements can fulfill this requirement. When they do, Wolff calls them undoubted experiences. Those experiences have withstood rational and empirical scrutiny, yet they are by no means indubitable.[117] Wolff's pragmatic stance[118] does not require him to achieve absolute certainty or to chase away Cartesian demons before establishing the foundations of his system.[119]

As Wolff does not aspire to make the premises of his system demon-proof, so he does not endeavor to show that all of those premises are based on experience. While he is keen to show the empirical basis of many claims, he introduces others without

referring to experience. When he takes their truth to be potentially controversial to his (pragmatically minded) readers, he does not hesitate to adduce a host of different reasons for accepting those claims. These reasons typically include empirical arguments. However, exhibiting the empirical foundation of Wolff's premises is less important in his eyes than dispelling any reason for his readers to doubt them.

8. Conclusion: Experimental Philosophy and the Mathematical Method

In conclusion, Wolff shares many commitments with experimental philosophers. He emphasizes that every part of philosophy must rely on experiments and observations. He allows the use of hypotheses in a way that is consistent with the views of refined experimentalists. He takes some claims to be established a priori, but his notion of a priori is so weak that experimental philosophers would find this unproblematic. Nevertheless, Wolff's commitment to experimental philosophy does not account for the overall structure and certain features of Wolff's system, such as the many definitions whose empirical or non-empirical basis is simply not stated. These features of Wolff's system are to be explained in the light of a second basic commitment. This is the commitment to develop his philosophy as a deductive system based on foundations that his readers would find uncontroversial. Wolff's concern to ensure the acceptance of those foundations, as required by his mathematical method, sometimes pushes his concern to ground philosophy on experience to the background. In the light of this fact, an important dimension of Wolff's *connubium rationis et experientiae* is his combination of two distinct, albeit compatible, methodological commitments. They are

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his commitment to build a *philosophia experimentalis universalis*, a universal experimental philosophy, and his commitment to develop philosophy as a deductive system based on solid foundations.

Examining Wolff's system in the light of the tenets of early modern experimental philosophers has led to three results. First, Wolff's system relies on experience to a great extent, much more than commentators have generally acknowledged. Second, the examination of Wolff's system shows that early modern experimental philosophy had a significant influence in early eighteenth-century Germany, well before Kant's contemporaries like Tetens and Feder endorsed the experimental method in the last three decades of the century. Third, Wolff's alleged empiricism and rationalism can be identified or – perhaps more usefully, given the wealth of differing meanings in which 'empiricism' and 'rationalism' are used – replaced with references to two distinct methodological commitments. They are Wolff's commitments to develop a thorough-going experimental philosophy and to build a mathematically demonstrative system. These concurrent methodological commitments are two driving forces at the basis of his thought.[120]

Abbreviations used

Hobbes

EW = The English Works of Thomas Hobbes of Malmesbury, vol. 1 (London: Bohn, 1839).

Leibniz

GP = C.I. Gerhardt (ed.), *Die philosophischen Schriften von Gottried Wilhelm Leibniz* (Berlin: Weidmann, 1875–90).

L = L.E. Loemker (ed.), *Philosophical Papers and Letters*, 2nd edn. (Dordrecht: Reidel, 1969).

Wolff

GW = *Gesammelte Werke* (Hildesheim: Olms, 1965-) [series number in Roman numerals, followed by the volume number in Arabic numerals].

Anmerckungen = Der Vernünfftigen Gedancken von GOTT, der Welt und der Seele des Menschens, auch allen Dingen überhaupt, Anderer Theil, bestehend in ausführlichen Anmerckungen, 4th enlarged edn. (Frankfurt a.M.: Andreae, 1740), repr. in GW I 3.

CG = Cosmologia generalis (Frankfurt a.M.: Renger, 1737), repr. in GW II 4.

DM = Vernünftige Gedancken von GOTT, der Welt und der Seele des Menschen, enlarged edn. ('Deutsche Metaphysik'; Halle: Renger, 1751), repr. in GW I 5.

DP = 'Discursus praeliminaris de philosophia in genere,' in *L*, 1-104, trans. Richard J. Blackwell as *Preliminary Discourse on Philosophy in General* (Indianapolis: Bobbs-Merrill, 1963).

L = Philosophia rationalis sive Logica, 3rd revised edn. (Frankfurt a.M.: Renger, 1740), repr. with notes and an index by Jean École in GW II, 1.

Ontologia = Philosophia prima sive ontologia (Frankfurt a.M.: Renger, 1736), repr. in GW I 3.

PE = Psychologia empirica, revised edn. (Frankfurt a.M.: Renger, 1738), repr. in GW I 5.

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1 John Dunton, *The Young-Students-Library* (London, 1692), vi.

2 Ibid.

3 Denis Diderot, *Pensées sur l'interprétation de la nature* (Paris, 1754), art. xxiii, quoted from *Diderot Interpreter of Nature: Selected Writings*, trans. Jean Stewart and Jonathan Kemp (London: Lawrence and Wishart, 1937), 46, italics added. On the origins and features of early modern experimental philosophy, see Peter Anstey, 'Experimental versus Speculative Natural Philosophy,' ['Experimental'] in Peter Anstey and John A. Schuster (eds.), *The Science of Nature in the Seventeenth Century: Patterns of Change in Early Modern Natural Philosophy* (Dordrecht:

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Springer, 2005), 215-42; Peter Anstey and Alberto Vanzo, 'Early Modern Experimental Philosophy,' forthcoming in Justin Sytsma and Wesley Buckwalter (eds.), *A Companion to Experimental Philosophy* (Maldell, MA: Blackwell).

4   *DP* §107 n., trans. modified.

5   See 'De Experientia morali,' ['Experientia'] in *Horae subsecivae marburgenses anni MDCCXXXI* (Frankfurt a.M.: Renger, 1735), repr. in GW I 34.3, 681-719, 682; *DP* §107 n.

6   See 'De differentia intellectus systematici & non systematici,' ['Differentia'] in *Horae subsecivae marburgenses anni MDCCXXIX* [*Horae 1729*] (Frankfurt a.M.: Renger, 1729), repr. in GW I 34.1, 107-54, at 137; 'De Influxu philosophiae Autoris in Facultates superiores,' ['Influxu'] in *Horae subsecivae marburgenses anni MDCCXXXI* (Frankfurt a.M.: Renger, 1735), repr. in GW I 34.3, 1-106, §12; *DP* §107 n.

7   See Christian Wolff, 'De notionibus directricibus & genuino usu philosophiae primae,' in *Horae 1729*, 310-50, at 345; Jean École, 'De la notion de philosophie expérimentale chez Wolff,' ['Notion'] *Études philosophiques* (1979): 397-406, repr. in his *Études et documents photographiques sur Wolff* (Hildesheim: Olms, 1988; GW III 11), 53-62; Jean École, 'En quels sens peut-on dire que Wolff est rationaliste?,' ['Sens'] *Studia leibnitiana* 11 (1979): 45-61, at 48-52. Wolff also states that empirical psychology belongs to experimental philosophy (*DP* §111 n.) He categorizes politics, economy, technology, and the liberal arts as parts of experimental philosophy. See Giorgio Tonelli, 'The Problem of the Classification of

the Sciences in Kant's Time,' ['Classification'] *Rivista critica di storia della filosofia* 39 (1975): 243-94, at 244-5.

8   See e.g. Ian Hunter, *Rival Enlightenments: Civil and Metaphysical Philosophy in Early Modern Germany* (Cambridge: Cambridge University Press, 2001), 7, 273, 276; Matt Hettche, 'Christian Wolff,' ['Wolff'] in Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, [*Encyclopedia*] Fall 2008 Edition, http://plato.stanford.edu/archives/fall2008/entries/wolff-christian/; Brigitte Sassen, '18th Century German Philosophy Prior to Kant,' in Zalta (ed.), *Encyclopedia*, Spring 2010 Edition, http://plato.stanford.edu/archives/spr2010/entries/18thGerman-preKant/, §2; William Bristow, 'Enlightenment,' in Zalta (ed.), *Encyclopedia*, Summer 2011 Edition, http://plato.stanford.edu/archives/sum2011/entries/enlightenment/, §1.1; Brandon C. Look, 'Grounding the Principle of Sufficient Reason: Leibnizian Rationalism Versus the Humean Challenge,' in Carlos Fraenkel, Dario Perinetti, and Justin E.H. Smith (eds.), *The Rationalists: Between Tradition and Innovation* (Dordrecht: Springer, 2011), 201-19. For a review of the earlier literature on Wolff's alleged rationalism, see Luigi Cataldi Madonna, 'La metodologia empirica di Christian Wolff,' ['Metodologia'] in his *Christian Wolff und das System des klassischen Rationalismus: Die* philosophia experimentalis universalis [*Wolff*] (Hildesheim: Olms, 2001; GW III 62), 12-46, at 13-7.

9   See e.g. Christine M. Korsgaard, *Creating the Kingdom of Ends* (Cambridge: Cambridge University Press, 1996), 5; Frederick C. Beiser, *Diotima's Children: German Aesthetic Rationalism from Leibniz to Lessing* (Oxford: Oxford University Press, 2009), 73.

10 See Sebastian Gardner, *Routledge Philosophy Guidebook to Kant and the Critique of Pure Reason* (London: Routledge, 1999), 5.

11 See e.g. École, 'Notion,' 406; École, 'Sens'; Hans Werner Arndt, 'Rationalismus und Empirismus in der Erkenntnislehre von Christian Wolff,' ['Rationalismus'] in Werner Schneiders (ed.), *Christian Wolff: 1679–1754: Interpretationen zu seiner Philosophie und deren Wirkung*, 2nd edn. (Hamburg: Meiner, 1986), 31-47; Daniela Gay, 'Philosophie und empirisch-experimentelle Naturwissenschaften bei Johann Georg Sulzer und Christian Wolff,' in Jürgen Stolzenberg and Oliver-Pierre Rudolph (eds.), *Christian Wolff und die europäische Aufklärung: Akten des 1. Internationalen Christian-Wolff-Kongresses*, vol. 4 (Hildesheim: Olms, 2008; GW III 104), 145-58, at 145.

12 See e.g. Max Wundt, *Kant als Metaphysiker: Ein Beitrag zur Geschichte der deutschen Philosophie im 18. Jahrhundert* (Stuttgart: Enke, 1924), 37-8; Hans-Jürgen Engfer, *Empirismus versus Rationalismus? Kritik eines Philosophiegeschichtlichen Schemas* (Padeborn: Schöningh, 1996), 274-83; Jean-François Goubet, 'Fondement, principes et utilité de la connaissance: Sur la notion wolffienne de système,' *Archives de philosophie* 65 (2002): 81-103.

13 Tonelli, 'Classification,' 247. Tonelli expressed his reservations regarding the empiricism-rationalism distinction as early as 1959. See his *Elementi metodologici e metafisici in Kant dal 1745 al 1768: Saggio di sociologia della conoscenza* (Turin: Edizioni di «Filosofia», 1959), vol. 1 (only published), 19.

14 See e.g. Johann Nicolaus Tetens, *Philosophische Versuche über die menschliche*

Natur und ihre Entwicklung (Leipzig: Weidmanns Erben und Reich, 1777), repr. 1979, vol. 1, iv, xvi-xxi; Johann Georg Heinrich Feder, *Untersuchungen über den menschlichen Willen, dessen Naturtriebe, Verschiedenheiten, Verhältniß zur Tugend und Glückseligkeit und die Grundregeln, die menschlichen Gemüther zu erkennen und zu regieren* (Göttingen: Meyer, 1779–93), repr. 1968, §4. As regards Wolff, scholars have highlighted the influence of a specific experimental philosopher, John Locke, on several aspects of his thought. See e.g. Gustav Zart, *Einfluss der englischen Philosophen seit Bacon auf die deutsche Philosophie des 18. Jahrhunderts* [*Einfluss*] (Berlin: Dümmler, 1881), 17-30; Davide Poggi, 'L'*Essay* di J. Locke e la *Psychologia empirica* di Christian Wolff,' in Ferdinando Luigi Marcolungo (ed.), *Christian Wolff tra psicologia empirica e psicologia razionale: Atti del seminario internazionale di studi, Verona, 13–14 maggio 2005* (Hildesheim: Olms, 2007; GW III 106), 63-94. This chapter discusses the influence of the wider movement of which Locke was part on the methodological commitments that shape Wolff's system.

15 Anstey, 'Experimental,' 238.

16 For diverging characterizations of rationalism, see e.g. Rainer Specht, 'Einleitung,' in *Geschichte der Philosophie in Text und Darstellung*, vol. 5: *Rationalismus*, ed. Rainer Specht (Stuttgart: Reclam, 1979), 11-21, at 15; Stuart Brown, 'Leibniz's Break with Cartesian Rationalism,' in A.J. Holland (ed.), *Philosophy, Its History and Historiography*, (Dordrecht: Reidel, 1985), 195-208, at 195, 198; Michael Ayers, *Locke: Epistemology and Ontology* [*Locke*] (London: Routledge, 1991), vol. 2, 154; and Stephen Priest, *The British Empiricists* [*Empiricists*], 2nd edn. (London:

Routledge, 2007), 7. For diverging characterizations of empiricism, see e.g. Specht, 'Einleitung,' 15; Ernan McMullin, 'The Significance of Newton's *Principia* for Empiricism,' in Margaret J. Osler and Paul Lawrence Farber (eds.), *Religion, Science, and Worldview: Essays in Honor of Richard S. Westfall* (Cambridge: Cambridge University Press, 1985), 33-59, at 33; Michael Ayers, 'Was Berkeley an Empiricist or a Rationalist?,' in Kenneth P. Winkler (ed.), *The Cambridge Companion to Berkeley* (Cambridge: Cambridge University Press, 2005), 34-62, at 37, 44; and Priest, *Empiricists*, 5-7.

17 See Isaac Newton, 'An Account of the Book Entituled *Commercium Epistolicum Collinii & aliorum, De Analysi promota*,' ['Account'] *Philosophical Transactions of the Royal Society of London*, 342 (1714–15): 173-224, at 222 (published anonymously).

18 See Margaret Cavendish, *Observations upon Experimental Philosophy* [*Observations*], ed. Eileen O'Neill (Cambridge: Cambridge University Press, 2001 [1666]).

19 Henry Power, *Experimental Philosophy* (London, 1664), 82.

20 Yet Leibniz, like Wolff, took himself to be 'strongly in favour of the experimental philosophy' (W.H. Turnbull et al. [eds.], *The Correspondence of Isaac Newton*, [Cambridge: Cambridge University Press, 1959–77], vol. 6, 252, trans. in H.G. Alexander (ed.), *The Leibniz-Clarke Correspondence: Together with Extracts from Newton's* Principia *and* Opticks [Manchester: Manchester University Press, 1956], 186).

21 See e.g. Newton's criticism of Leibniz in the passage cited in note 17 above.

22 Johann Georg Heinrich Feder, *Ueber Raum und Caussalität zur Prüfung der kantischen Philosophie* (Göttingen: Dieterich, 1787), repr. 1968, iv; see Christoph Meiners, *Grundriß der Seelen-Lehre* (Lemgo: Meyer, 1786), sig. b1 1.

23 Ibid., sig. b5 5.

24 Thomas Hobbes, *De corpore: Elementorum philosophiae sectio prima*, ed. Karl Schuhmann (Paris: Vrin, 1999 [1655]), 6.13; trans. as *Elements of Philosophy: The First Section Concerning Body*, *EW*, vol. 1, 82-3.

25 Peter Anstey, *John Locke and Natural Philosophy* (Oxford: Oxford University Press, 2011), 4.

26 See Samuel Parker, *Free and impartial censure of the Platonick philosophie: Being a letter written to his much honoured friend Mr. N.B.* [*Censure*] (Oxford, 1666), 45-6.

27 Peter Anstey, 'Philosophy of Experiment in Early Modern England: The Case of Bacon, Boyle and Hooke,' *Early Science and Medicine* 19 (2014): 103-132, at 108. For details, see Section 5 below.

28 See e.g. *Allerhand nützliche Versuche, dadurch zu genauer Erkänntnis der Natur und Kunst der Weg gebähnet wird* [*Versuche*], 3 vols. (Halle: Renger, 1727–29), repr. in GW I 20, vol. 1, §§63, 86, 124, 133, 165, 187; vol. 2, §§6, 23, 36, 133.

29 See Ivano Petrocchi, *Lockes Nachlaßschrift* Of the Conduct of the Understanding *und ihr Einfluß auf Kant: Das Gleichgewicht des Verstandes. Zum Einfluß des*

späten Locke auf Kant und die deutsche Aufklärung (Frankfurt a.M.: Olms, 2004), 117.

30 See e.g. *DP* §161 n.; *Elementa matheseos universae* [*Elementa*] (Halle: Renger, 1741), vol. 5, repr. in GW II 33, §§252, 257; 'Praefatio Physicae Electivae Jo. Christoph. Sturmii Tomi II,' ['Praefatio'] in *Meletemata mathematico-philosophica* (Halle: Renger, 1755), repr. in GW II 35, Sect. 3, 140-7, 144.

31 See e.g. *Versuche*, vol. 2, §§153, 155, 157; *DP* §20 n.

32 See e.g. *Versuche*, vol. 2, §§10, 104.

33 *Vernünfftige Gedancken von den Würckungen der Natur* [*Würckungen*], 2nd edn. (Halle: Renger, 1725), Preface, sig.):(5 3-4; see *Ausführliche Nachricht von seinen eigenen Schrifften, die er in deutscher Sprache [...] heraus gegeben* [*Nachricht*], 2nd enlarged edn. (Frankfurt a.M.: Andreä und Hort, 1733), repr. in GW II 9, §164. On the meaning of Wolff's expression 'pure intellect' or 'pure reason', see Section 6. Along similar lines, Leibniz criticizes Descartes's 'imaginary hypotheses' which go well beyond what is warranted by experience. See e.g. Gottfried Wilhelm Leibniz, letter to Christian Philipp, 1679, *GP* iii. 282/*L* 272.

34 'Praefatio' 143.

35 *Würckungen*, Preface, sig.):(5 4.

36 *Elementa*, vol. 5, §492.

37 *Ratio praelectionum* [*Ratio*], 2nd enlarged edn. (Halle: Renger, 1735), repr. in GW II 36, 179.

38 *Ratio* 190. In this regard, it is important to note that Wolff's use of the term 'hypothesis' is more constrained than Boyle's and Locke's use. They often called whole theories, such as Descartes' vortex theory of planets, hypotheses. Wolff occasionally refers to astronomical theories as hypotheses. However, he normally uses this term for specific statements that are assumed to be true because they explain certain phenomena (*DP* §126).

39 'Praefatio' 142.

40 'Praefatio' 142.

41 'Praefatio' 144.

42 See Isaac Newton, *Philosophiae naturalis principia mathematica: The Third Edition (1726) with Variant Readings*, ed. Alexandre Koyré and I. Bernard Cohen (Cambridge, Mass.: Harvard University Press, 1972 [1726]), vol. 2, 764; Newton, 'Account,' 222-4.

43 'Praefatio' 143; see *Ratio* 180.

44 See Christian Wolff, 'Von dem Nuzen der Erkenntnis der Natur, in der Erkenntnis GOttes [sic] und der Herrschaft über die Creaturen,' in his *Gesammelte kleine philosophische Schrifften*, vol. 3 (Halle: Renger, 1737), repr. in GW III 21, 317-32, at 328; *DP* §107; *Würckungen*, Preface, sig.):(5 3. This also applies to philosophy as a whole. See *DP* §§34, 35.

45 *Ratio* 179.

46 *Nachricht* §8.

47 See *Versuche*, vol. 1, §5; *Nachricht* §164; *Deutsche Logik*, Ch. 5, §12.

48 See *Versuche*. According to Gunter Lind, '[i]t is apparent that Wolff tried most' of the experiments reported in *Versuche*. See Gunter Lind, *Physik im Lehrbuch 1700–1850: Zur Geschichte der Physik und ihrer Didaktik in Deutschland* (Berlin: Springer, 1992), 112.

49 See Peter Anstey, 'The Experimental History of the Understanding from Locke to Sterne,' *Eighteenth-Century Thought* 4 (2009): 143-69.

50 George Turnbull, *The Principles of Moral Philosophy*, ed. Alexander Broadie (Indianapolis: Liberty Fund, 2005 [1740]), 5.

51 John Toland, cit. in Anstey, 'Experimental,' 229; see Newton, 'Account,' 222-4.

52 'Praefatio' 143.

53 *DP* §127; see 'De Hypothesibus philosophicis,' ['Hypothesibus'] in *Horae subsecivae marburgenses anni MDCCXXIX* (Frankfurt a.M.: Renger, 1729), repr. in GW I 34.1, 177-230, 184.

54 'Hypothesibus' 186; see *DP* §127 n. On the role of hypotheses in Wolff's philosophy, see Charles A. Corr, 'Certitude and Utility in the Philosophy of Christian Wolff,' *Southwestern Journal of Philosophy* 1 (1970): 133-42, at 138-42.

55 *Elementa*, vol. 5, §310.

56 'Hypothesibus' 187.

57 *Ratio* 167; see *Nachricht* §164.

58 'Experientia,' 688; see Luigi Cataldi Madonna, 'Vernunft und Erfahrung: Zur Entwicklung der empirischen Methodologie in der Rationalistischen Tradition des 17. und 18. Jahrhunderts,' in his *Wolff*, 47-82, at 79-81.

59 'Hypothesibus' 187.

60 *Elementa*, vol. 5, §309.

61 See e.g. *DP* §127 n.; 'Influxu' §83; 'Hypothesibus' 181.

62 *Elementa*, vol. 5, §311.

63 'Hypothesibus' 201. This requirement does not apply to mathematical hypotheses (*Elementa*, vol. 5, §257).

64 *L* §609; *Elementa*, vol. 5, §311.

65 See 'Influxu' §§78-9. In those paragraphs, Wolff implies that dogmas are certain propositions. Elsewhere (*L* §743), he states that dogmas are universal propositions.

66 'Hypothesibus' 183-4.

67 See e.g. Parker, *Censure*, 45-6; Thomas Sprat, *The History of the Royal Society of London for the Improving of Natural Knowledge* (London, 1667), repr. 1958, 107.

68 See e.g. ibid., 254-6.

69 Robert Hooke, *Micrographia: Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses with Observations and Inquiries Thereupon* (London, 1665), To the Royal Society.

70 Thomas Sydenham, 'On Dropsy,' in *The Works of Thomas Sydenham M.D.*, trans.

R.G. Latham (London, 1848–50 [1683]), vol. 2, 163-84, at 173.

71 Robert Boyle, 'MS Notes on a Good and an Excellent Hypothesis,' in his *Selected Philosophical Papers* [*Papers*], ed. M.A. Stewart (Indianapolis: Hackett, 1991), 119; Robert Boyle, 'The Requisites of a Good Hypothesis,' in Michael Hunter and Edward B. Davis (eds.), *The Works of Robert Boyle* [*Boyle Works*] (London: Pickering and Chatto, 1999–2000), vol. 13, 270-2.

72 Robert Hooke, 'A General Scheme, or Idea of the Present State of Natural Philosophy,' ['Scheme'] in *The Posthumous Works of Robert Hooke* [*Works*] (London, 1705), 1-70, at 19; see *Correspondence of Robert Boyle* (London: Pickering and Chatto, 2001), vol. 3, 171.

73 See e.g. ibid.; Robert Boyle, *The Origin of Forms and Qualities According to the Corpuscular Philosophy* [1666], in *Papers*, 1-96, at 18; Robert Hooke, 'Lectures and Discourses of Earthquakes and Subterraneous Eruptions,' in *Works*, 279-450, at 331; Hooke, 'Scheme,' 19.

74 Robert Boyle, 'Materials relating to *The Usefulness of Natural Philosophy*,' in *Boyle Works*, vol. 13, 289-361, at 354. Boyle's treatise on this topic has been lost.

75 'Experientia,' 688.

76 See Peter Anstey and Michael Hunter, 'Robert Boyle's "Designe about Natural History",' *Early Science and Medicine* 13 (2008): 83-126, at 107.

77 Hooke, 'Scheme,' 18.

78 For the metaphor of construction materials, see the last quotation in the body of the

paper. See also D.R. Oldroyd, 'Some "Philosophicall Scribbles" Attributed to Robert Hooke,' *Notes and Records of the Royal Society of London* 35 (1980): 17-32, at 19.

79 I explain Wolff's notion of the a priori in Section 6.

80 'Differentia,' 137.

81 *Nachricht* §178.

82 In one passage (*DP* §112 n.), Wolff suggests that rational psychology is entirely a priori. Many other passages contradict this suggestion. See Jean École, 'Des rapports de l'expérience et de la raison dans l'analyse de l'âme ou la *Psychologia empirica* de Christian Wolff,' *Giornale di metafisica* 21 (1966): 589-617, at 592-4, and especially Corey W. Dyck, 'The Divorce of Reason and Experience: Kant's Paralogisms of Pure Reason in Context,' *Journal of the History of Philosophy* 47 (2009): 249-75, at 254-8.

83 See École, 'Notion'.

84 e.g. in *Versuche*, vol. 1, 3; 'Experientia,' 682 n.; *PE* §497; *Elementa*, vol. 5, §312; *L* §1232. One can find a similar expression in Leibniz's plans for the constitution of the Prussian Academy of Sciences, which aims 'to unite in a happy marriage theoreticians and observers so as to improve on incomplete and particular elements of knowledge' ('Grundriß eines Bedenckens von Aufrichtung einer Societät in Teutschland zu auffnehmen der Künste und Wißenschafften,' A VI. i. 538).

85 The old notion of a priori proof was adopted, for instance, in Johann Gottlieb

Heineccius, *Elementa philosophiæ rationalis et moralis*, revised edn. (Frankfurt a.O.: Hartmann, 1738), 125. The later notion can be found in Johann Heinrich Lambert, *Neues Organon oder Gedancken über die Erforschung und Bezeichnung des Wahren und dessen Unterscheidung vom Irrthum und Schein* (Leipzig: Wendler, 1764), vol. 1, 414.

86 *L* §663; see Hans-Jürgen Engfer, 'Von der Leibnizschen Monadologie zur empirischen Psychologie Wolffs,' in Sonia Carboncini and Luigi Cataldi Madonna (eds.), *Nuovi studi sul pensiero di Christian Wolff* (Hildesheim: Olms, 1992; GW III 31), 193-215, at 212-3. The senses include the five outer senses and apperception or inner sense (*PE* §436).

87 Wolff holds that apparently non-syllogistic forms of reasoning like immediate inferences and inductive reasoning can be transformed into syllogisms (*L* §§421-98).

88 *PE* §495 n. The next quotation in the body of the paper suggests that only some arithmetical, geometrical and algebraic reasonings rely on pure reason, whereas others are based on experience.

89 *DP* §12. Factual cognition [*cognitio historica*] is cognition of 'the things that are and take place in the material world'. We acquire it 'thanks to the senses' (*DP* §1). Given Wolff's statements, the claim that he regards 'metaphysics as a demonstrative *a priori* science' (Hettche, 'Wolff,' §2) is true only on a weak sense of the expression '*a priori*'. *Pace* Tonelli ('Classification,' 247), not even ontology is 'completely a priori *stricto sensu*'.

90 See Cavendish, *Observations*.

91 See Étienne Bonnot de Condillac, *Traité des systèmes*, ed. Georges Le Roy (Paris: Presses Universitaires de France, 1947 [1749]), vol. 1; trans. Franklin Philip as *A Treatise on Systems* in *Philosophical Writings of Étienne Bonnot, Abbé de Condillac* (Hillsdale, New Jersey: Erlbaum, 1982–87), vol. 1. A helpful survey of Wolff's texts on the mathematical method and the art of discovery can be found in Juan Ignacio Gómez Tutor, *Die wissenschaftliche Methode bei Christian Wolff* [*Methode*] (Hildesheim: Olms, 2004; GW III 90), 103-10, 243-70.

92 See Immanuel Kant, *Kritik der reinen Vernunft* [*Kritik*], ed. Jens Timmermann (Hamburg: Meiner, 1998 [1781/1787]); trans. Paul Guyer and Allen W. Wood as *Critique of Pure Reason* (Cambridge: Cambridge University Press, 1998), A6-13/B10-4.

93 See Christian Wolff, *Theologia naturalis, methodo scientifica pertractata. Pars posterior, qua existentia et attributa Dei ex notione entis perfectissimi et natura animæ demonstrantur* (Frankfurt a.M.: Renger, 1751), repr. in GW II 8, §21. For Leibniz's reformulation of the ontological argument, see his *Meditationes de Cognitione, Veritate et Ideis*, A VI. iv. 588-9/*L* 292-3.

94 See Mariano Campo, *Cristiano Wolff e il razionalismo precritico*, vol. 1 (Milan: Vita e Pensiero, 1939, repr. in GW III 9), 658; *contra*: Jean École, *La métaphysique de Christian Wolff* (Hildesheim: Olms, 1990; GW III 12-3), vol. 1, 414-5.

95 Wolff denies that the existence of a being can be inferred from its essence, for instance, in *Anmerckungen* §18.

96 Kant, *Kritik*, B3.

97 *DM* §§33, 34. Wolff divides properties into essential properties, attributes, modes, and relations. The ascription of essential properties to a being is a necessary and sufficient condition for the ascription of attributes to it (*L* §§220, 221) and a necessary, but insufficient condition for the ascription of modes and relations to it (*L* §258).

98 *DM* §38, *Ontologia* §299.

99 The premises of Wolff's argument for the ascription of properties like the lack of parts to simple beings are, or depend on, definitions (e.g. *DM* §§36, 44, 51, 75) and the law of contradiction (*DM* §38). Wolff's argument for the *existence* of simple beings relies on the empirical premise that composite beings exist (*DM* §76). Wolff's emphasis on the link between essence and possibility (*DM* §35) and his denial that, except in God's case, the essence of a being entails its existence suggest that, for him, statements on a being's essential properties lack existential import.

100 *Ontologia* §789. For Wolff's definition of 'accident,' see *Ontologia* §785.

101 *Vernünftige Gedancken von den Kräfften des menschlichen Verstandes und ihrem richtigen Gebrauche in Erkäntniß der Wahrheit* [*Deutsche Logik*], ed. Hans Werner Arndt (Hildesheim: Olms, 1962 [1754]), GW I 1, Ch. 1, §48 n.; *Ontologia* §§155 n., 534 n., 789 n.

102 I have derived this explanation by combining the comment on the blood in *Anmerckungen* §24 with a more general comment concerning 'mixed bodies' from *Ontologia* §534 n.

103 *Ontologia* §534 n. See *Deutsche Logik*, Ch. 1, §48 on knowledge of the essence

of the eye.

104   Wolff's views on the relation between simple beings and bodies are analogous to Leibniz's views on the relations between monads and bodies. However, unlike Leibniz, Wolff claims that simple beings interact with one another. See Hettche, 'Wolff,' §8.2.

105   See Franco Volpi, 'Kants Elision der Zeit aus dem Satz vom Widerspruch,' in Gerhard Funke (ed.), *Akten des 4. Internationalen Kant-Kongresses: Mainz. 4.-8. April 1981* (Berlin: de Gruyter, 1981), vol. I.1, 179-85, at 180. This claim has a long ancestry. See e.g. John Watson, *The Philosophy of Kant Explained* (Glasgow: Maclehose, 1908), repr. 1976, 59.

106   See e.g. Gottfried Wilhelm Leibniz, 'Principia logico-metaphysica,' A VI. iv. 1644/*L* 267; letter to Arnauld, 1686, A II. ii. 80.

107   See Wilhelm Risse, *Die Logik der Neuzeit* (Stuttgart: Frommann, 1964–70), vol. 2, 594-6; Winfried Lenders, *Die analytische Begriffs- und Urteilstheorie von G. W. Leibniz und Chr. Wolff* (Hildesheim: Olms, 1971), 150-9; Lewis White Beck, 'Analytic and Synthetic Judgments before Kant,' in his *Essays on Kant and Hume* (New Haven: Yale University Press, 1978), 80-100, at 88.

108   See e.g. Gottfried Wilhelm Leibniz, 'On Universal Synthesis and Analysis, or the Art of Discovery and Judgment,' A VI. iv. 543/L 232; letter to Joachim Bouvet (1697), A I. xiv. 831, trans. Lloyd Strickland at <http://www.leibniz-translations.com/bouvet.htm>.

109   See Hettche, 'Wolff,' §6: '[a]lthough *prima facie*, it is unclear why Wolff

attempts to advance both views, it is perhaps worth pointing out the difference between (1) being able to be demonstrate the truth of a proposition and (2) knowing the truth of a proposition because it is self-evident. [...] A proposition could be known immediately one way and yet, in another way, follow as a conclusion of a sound deductive argument'.

110   See ibid., §27. Other propositions that derive entirely or in part from experience are found ibid., §§27, 52, 74; *PE* §§62, 68, 82, 91, 501; *L* §§3, 4, 5, 13, 30, 31, 32, 60.

111   See *L* §5. Wolff's discussion of this case provides insights into the method of his empirical psychology and its relation to rational psychology. See Matteo Favaretti Camposampiero, '*Homo inter bestias educatus*: Langage et raison à partir du *Discursus praeliminaris*,' *Lumière*s 12 (2008): 29-39, at 38-9.

112   This expression appears in the subtitle of Cataldi Madonna, *Wolff*.

113   Its most detailed exposition is in *L* §§152-97. For a survey of Wolff's texts, see Gómez Tutor, *Methode*, 120-68.

114   See e.g. Immanuel Kant, *Träume eines Geistersehers, erläutert durch Träume der Metaphysik*, in *Kant's Gesammelte Schriften*, ed. Königlich Preußische (Deutsche) Akademie der Wissenschaften, vol. 2 (Berlin: Reimer, 2nd edn. 1912), 315-73, at 342, trans. David Walford as *Dreams of a Spirit-Seer Elucidated by Dreams of Metaphysics* in Immanuel Kant, *Theoretical Philosophy , 1755–1770* (Cambridge: Cambridge University Press, 1992), 329.

115   Among the premises of that proof is §53. It derives from §52, whose truth 'we

experience for the very nature of our mind'. We know it through introspection, which for Wolff is a form of experience.

116   *DP* §30, trans. modified.

117   See Arndt, 'Rationalismus,' 34; Luigi Cataldi Madonna, 'Wahrscheinlichkeit und wahrscheinliches Wissen in der Philosophie von Christian Wolff,' *Studia leibnitiana* 19 (1987): 2-40, at 34.

118   See Cataldi Madonna, 'Metodologia,' 26.

119   Passages like the following show that Wolff is not concerned with radical scepticism: 'If a thing causes a change in another and the change takes place as soon as the one comes in contact with the other, or as soon as a body is mixed with the other, there is no doubt that the one [body] is the cause of the change in the other' (*Deutsche Logik*, Ch. 5, §9).

120   I am grateful to Peter Anstey, Matteo Favaretti Camposampiero, Eric Watkins, and audiences in Christchurch and Dunedin for valuable comments on earlier versions of this paper.