Chapter 1

Before and Beyond Leibniz: Tschirnhaus and Wolff on Experience and Method

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Leibniz’s importance for Christian Wolff, both intellectually and professionally, is widely recognized and indisputable. Yet Leibniz is only one of a number of figures who made an impact on Wolff’s philosophy, especially in the early stages of his intellectual career. It has been recognized for some time, for instance, that Wolff’s metaphysics, and particularly that elaborated in his later Latin series of textbooks, is indebted to scholastic thinkers (though of course the same can be said for Leibniz).[[1]](#footnote-1) Less appreciated, however, is Wolff’s frequent engagement with British thinkers, such as Clarke, Collins, Newton, as well as French and Dutch thinkers in his many reviews and essays published in the learned journal *Acta eruditorum*.[[2]](#footnote-2) Closer to home, Ehrenfried Walter von Tschirnhaus was a figure who exercised a direct and decisive, if largely overlooked, influence on Wolff’s philosophical enterprise. Indeed, Wolff was a Tschirnhaus devotée before he became acquainted with Leibniz, and a careful consideration of Wolff’s early writings reveals a persistent commitment to Tschirnhaus’s views on scientific methodology even as Wolff identified, and worked to rectify, its various shortcomings.

A focus on Tschirnhaus’s influence on Wolff can also serve to correct a widespread misconception of the character of Wolff’s rationalism, given that Tschirnhaus himself is clear that experience plays a crucial role in scientific investigation, a role that we will see Wolff likewise incorporates into his scientific methodology. Accordingly, in this chapter, I will consider Tschirnhaus’s influence on Wolff, with a focus on the first ten years of Wolff’s career, during which Wolff worked intensively on refining his (in)famous mathematical method, a project that owes its inception in no small part to Tschirnhaus. In the first section, I will consider Tschirnhaus’s own outline of this method in his primary text, the *Medicina mentis*, with emphasis on the central role played by experience, and then show how Wolff’s earliest publications take up various themes relating to it but also diagnose important deficiencies in Tschirnhaus’s exposition. In the second section, I turn to Wolff’s initial encounters with Leibniz and argue that no small part of Leibniz’s early significance for Wolff (as indicated by the correspondence between them but also by Wolff’s contemporary publications) lies in the solutions he supplies for the challenges Wolff had identified in Tschirnhaus’s account of scientific method. In the third and final section, I turn to Wolff’s complete elaboration of the mathematical method in his *German Logic* and contend that Tschirnhaus’s influence is evident, and particularly so in Wolff’s reliance on experience at every stage in its application.

1. Tschirnhaus’s *Medicina mentis* and Wolff’s dissertations

Tschirnhaus’s philosophy, particularly as detailed in his principal philosophical text, the *Medicina mentis et corporis sive artis inveniendi praecepta generalia* (1st ed. 1687, 2nd revised and expanded ed. 1695),[[3]](#footnote-3) might best be characterized as an experimental Cartesianism. Tschirnhaus, a Saxon nobleman, studied at the University of Leiden where the Cartesian Geulincx was active,[[4]](#footnote-4) and was an important member of Spinoza’s circle of friends (among whom he circulated the *Ethics*). Tschirnhaus was also an active scientist, mathematician, and inventor, who among other things developed new techniques for casting and polishing glass (particularly for use as lenses for burning metals) and played a (perhaps *the*) key role in the discovery of the secret for making porcelain. Tschirnhaus himself characterizes his aim in the *Medicina mentis* as outlining a “certain and constant method” for the discovery of all unknown truths. Specifically, Tschirnhaus aims to carve out a “middle-way” between the two unsatisfactory options offered by his contemporaries concerning the path to discovering truth, namely, between those who contend that all knowledge is derived *a priori* solely through reasons, and those who claim it is only gained *a posteriori* through experience (MM 290). The merely rationalistic methodology of the former is, presumably vitiated by its reliance on the syllogism which Tschirnhaus rejects as a means for discovery, but also errs in setting out from metaphysical principles in approaching knowledge of the natural world.[[5]](#footnote-5) The latter, purely empirical methodology, however, is wrong to abjure all use of reason or the intellect in discovery and moreover leaves itself open to sceptical challenges inasmuch as it dismisses inquiry into the criterion of truth as a speculative question (MM 38–9).[[6]](#footnote-6) Instead, Tschirnhaus claims that “one should at the outset begin *a posteriori*, but then in what proceeds everything should only be derived *a priori*, and then the singular is to be confirmed everywhere through evident experiences [*per evidentes experientias*]” (MM 290).

Regarding the first, *a posteriori* step in this methodology, Tschirnhaus indicates that we should start with experiences that can be had by anyone at any moment without considerable effort or possibility of error (MM 290–1), and here the Cartesian inflection of his thought is easily discerned. Tschirnhaus lists four such foundational experiences at the outset (and later in the conclusion) of the *Medicina mentis*: (1) “I am conscious of various things”; (2) “I am affected positively by some things and negatively by others”; (3) “I am able to conceive of somethings [...] but I cannot at all conceive of some other things”; and (4) “I notice various objects by means of the external senses and likewise by means of internal images and passions.”[[7]](#footnote-7) What makes these “most evident experiences [*experientia evidentissima*]” indispensable starting points for any attempt at discovery is not that, for instance, analysis of them alone serves to disclose new scientific truths, but rather that reflecting upon them yields core epistemological and psychological insights that will be drawn upon in any subsequent investigation (MM 291).[[8]](#footnote-8) Most importantly, consideration of these experiences supplies the criterion that allows for distinguishing truth from falsehood (cf. MM 34). According to Tschirnhaus, the mark of the true is that it permits of being grasped or thought (*concipere*), as when we grasp that the whole is greater than the part or that all radii in a circle are equal, whereas the mark of the false is that it cannot be thus conceived, as with the claim that the part is greater than the whole or that all radii of a circle are not equal (MM 34–5). While Tschirnhaus does not specify further what *concipere* consists in, it is clear that it does not simply amount to the bare thought of some thing (since that would cast too wide of a net) but instead involves a positive insight into the truth of some claim, such that it is immune to sceptical doubt (MM 34–5).

On the basis of these most evident experiences, and particularly of the experiences gained through outer and inner sense in accordance with the fourth, Tschirnhaus proceeds to elucidate the *a priori* step in his methodology, which step involves the application of a method borrowed from “mathematics” and geometry in particular.[[9]](#footnote-9) As characterized by Tschirnhaus, this method consists in the formation of definitions through the combination of primary concepts of things, then the derivation of axioms from these definitions, and finally the combination of definitions with one another to derive further truths identified as theorems (MM 67). Tschirnhaus’s understanding of axioms (i.e., as derived) is certainly peculiar,[[10]](#footnote-10) and his account of theorems, with the related discussions of scholia, problems, and hypotheses, does crucial work for his theory of invention; however, his method really relies upon his theory of definition. For Tschirnhaus, the aim of a definition is, quite literally, the “generation” of the thing defined, an aim that is readily realised in the case of geometrical definitions (i.e., of ‘circle’) but which Tschirnhaus extends to the notion of ‘virtue’ and, notoriously, to the notion of ‘laughter.’[[11]](#footnote-11) Tschirnhaus then proceeds to elaborate three detailed rules through which such definitions can be discovered.[[12]](#footnote-12) The first rule requires a survey of our thoughts relating to the various sorts of objects of our mind,[[13]](#footnote-13) and abstraction of as many genera as correspond to the different sorts of representations, and then repeating the process for these genera until we arrive at distinguishable “diverse natures” (MM 73). The second rule states that we should consider the various genera in order and identify commonalities, which Tschirnhaus calls the “elements [*Elementa*]” of the definition and through the combination of which a definition is formed (MM 85–6). Third, and finally, the resulting definitions are to be ordered according to which presupposes the other (either in terms of existential or conceptual dependence), until all elements are accounted for, and indeed until one can demonstrate through indirect proof that no further concepts can be formed of the defined notions (MM 91).

However, the completion of the *a priori* step with the move from definitions to axioms and theorems does not signal the end of Tschirnhaus’s account of the rules of invention, as he then returns to experience in search of “confirmation” of what has been thus derived.[[14]](#footnote-14) Tschirnhaus understands ‘confirmation’ fairly straightforwardly in terms of offering empirical support for what has been derived *a priori* through the method just outlined, such that we complete a circle through deriving the very experiences that spurred our investigation at the outset. Yet, Tschirnhaus also contends that experience, particularly in the form of a deliberately enacted experiment, is effective in combating our tendency to err. Since the intellect cannot err on its own (as its function is solely to grasp what is true), Tschirnhaus locates all error in the imagination inasmuch as it misleads us into mistaking the representations that have their source for accurate representations of objects (MM 165–6). Having derived *a priori* what is in fact the case concerning, for instance, space, namely that it is not a vacuum as represented by the imagination but extension as conceived by the intellect (MM 179), Tschirnhaus claims that we can then turn to instituting experiments designed to render intuitive the truth abstractly cognized by the intellect, with the intention of weakening the power of its images and making it tractable to the intellect’s guidance.[[15]](#footnote-15) Accordingly, Tschirnhaus concludes, error can be systematically avoided only when, after conducting our *a priori* derivations, we have confirmed everything through the clearest experiences, so that the imagination is altogether purged of erroneous impressions” (MM 294).

It would be difficult to overestimate the importance of Tschirnhausfor Wolff.[[16]](#footnote-16) Wolff first gained an interest in reading the *Medicina mentis* during his time in gymnasium (ELB 116–17), but it was only after taking up his mathematical studies in Jena in 1699 that he found himself able to profit from reading it (ELB 123–4). Wolff evidently read the text with great interest and care, marking his own copy with comments and queries and even later preparing an excerpted text for use in lectures for students without the requisite mathematical background (ELB 139). Unsurprisingly given this, Wolff’s earliest publications betray the unmistakable influence of the *Medicina mentis*, and far from interpreting Tschirnhaus “purely rationalistically [*rein rationalistisch*],”[[17]](#footnote-17) in extending Tschirnhaus’s project Wolff is keen to assign an important role to experience and the senses in the generation of cognition. This is nowhere more evident than in the dissertation Wolff wrote for his habilitation at Leipzig in 1703, *Philosophiae practicae universalis, mathematica methodo conscripta* which, according to Wolff’s report, Tschirnhaus himself regarded as the fruit of the *Medicina mentis* (ELB 134). Tschirnhaus’s influence is clear, for instance, in Wolff’s justification of his use of mathematical method with respect to this topic, namely because philosophizing in the mathematical way allows us to “accurately distinguish the concepts of the intellect from the perceptions of the imagination” (MMP II 190). Wolff’s regimentation of this mathematical method is also informed throughout by Tschirnhaus’s presentation; thus, Wolff sets out from definitions, and proceeds to axioms, which he explicitly understands as truths derived from individual definitions,[[18]](#footnote-18) which in turn yield propositions and theorems. Most importantly, however, in a nod to the importance of experience at the outset of Tschirnhaus’s methodology, Wolff presents a set of “Observationes” after the axioms, where these are observations whose truth we have established *a posteriori* “through sense experience instituted by the direction of the intellect” (MMP II 199).

Many of these same themes are likewise present in Wolff’s next two publications, both in 1703, though neither wears its Tschirnhausian character quite so explicitly on its sleeve. So Wolff’s presentation in the dissertation *De rotis dentatis* no longer includes a section dedicated to observations, yet he does indicate that experience will stay play a probative role (MMP II 227). More importantly, the *Disquisitio philosophica de loquela* (*De loquela*) takes up an issue fundamental to Tschirnhaus, namely, accounting for the communicability of an idea which Tschirnhaus views as criterial for taking a representation to be a concept of the intellect.[[19]](#footnote-19) Unexpectedly, in *De loquela* Wolff approaches the issue of the communicability of ideas through a metaphysical lens: proceeding from the principle, which Wolff identifies as Cartesian, that whatever is cognized of some thing is contained in the concept of that thing, he claims that it was Tschirnhaus’s distinctive methodological innovation to turn to the consideration of the concept itself by way of discovering truths about the thing itself (MMP II 245–6, §4). Applying this principle to the Cartesian concept of mind or spirit as a substance which is conscious of everything within it, however, shows that not all representations (such as of external things and their signs) can be deduced from it,and Wolff proposes to remedy this by conceiving of the mind as a being dependent upon God (MMP II 246–7, §5). In the course of surveying our experiences of the mind to show how its representations reveal this dependence upon God, Wolff turns to an account of signs which (for Wolff) raises the issue of how one mind can act (i.e., excite a thought) in another and is accordingly compared with the Cartesian problem of accounting for the interaction of mind and body. Wolff contends that this riddle can be resolved if we focus on our dependence on God and His will in accordance with which alone such affection can be understood to take place (MMP II 252, §13). That such influence (and so, that speech, and communicability) is possible is provided with *a posteriori* support by reference to the fact that the activity of one body on another, of the body on the mind, and of the mind and the body likewise cannot be conceived without reference to God’s will (MMP II 253, §§14–16).

Despite these manifold borrowings and emendations, Wolff was also a critical reader of Tschirnhaus at this early stage of his development, with the problems he identifies informing and motivating his subsequent philosophical efforts. Thus, he faults Tschirnhaus for offering only an obscure account of *concipere*, and for failing to show in a detailed way how (real) definitions should be discovered. Concerning the former, Wolff attempts to clarify *concipere* by understanding it in terms of “mutually positing thoughts [*cogitationes se mutuo ponentes*],” where things that cannot be thought at all are understood as “mutually cancelling thoughts [*cogitationes se mutuo tollentes*]” (ELB 124). Regarding the latter, Wolff faults Tschirnhaus for a too-narrow conception of real definition and for failing to give any precise guidance as to how the “elements of definitions” can be found (ELB 125). More importantly, however, he sought out Tschirnhaus himself during an Easter book fair in Leipzig in order to get his responses to these concerns. According to Wolff’s report, Tschirnhaus was satisfied with his gloss of *concipere*, but when questioned about how the elements of definitions are discovered, Tschirnhaus simply replied that “this would indeed be the main issue [*dieses wäre eben die HauptSache*]” (ELB 127). As we will see, Wolff continues to be pre-occupied with these problems from Tschirnhaus as he works towards refining the mathematical method, and it is this project that provides the initial context for Wolff’s interaction with and reception of Leibniz.

2. Leibniz and Wolff’s Tschirnhausian project

Wolff’s *Habilitationschrift* on practical philosophy proved rather fateful for his academic prospects, and later philosophical development, as it was this text that brought him to the attention of Otto Mencke, the founder of *Acta eruditorum* (in 1682)and, through him, Leibniz (ELB 133). Mencke, who examined the dissertation, sent it to Leibniz (without his knowledge, Wolff claims, though this has been disputed[[20]](#footnote-20)) for an appraisal, to which Leibniz responded approvingly, even including a message intended directly for Wolff.[[21]](#footnote-21) This was in any case the beginning of Wolff’s correspondence with Leibniz, which would continue until the latter’s death in 1716.

It would not be inaccurate to say that it often sufficed (at least in the early exchanges) that Leibniz informed Wolff of his own positions on a variety of philosophical issues for Wolff to adopt that position himself. Wolff’s first letter to Leibniz included his *Dissertatio algebraicae de algorithmo infinitesimali differentiali* dated Dec. 24, 1704, the same date as Wolff’s letter, and which is dedicated to Leibniz. This dissertation, which contains Wolff’s first published mention of Leibniz (MMP II, 271; §9; cf. also §4), concludes with a diverse set of Corollaries, the third of which is “The syllogism is not a medium of the discovery of truth” (MMP II 289). That Wolff should draw this corollary is not surprising, given Wolff’s admiration for Tschirnhaus and the fact that many of his teachers followed the Cartesian rejection of syllogistics (ELB 135–6). In his detailed reply of Feb. 21, 1705, however, Leibniz sharply reproves Wolff for this, saying simply “I would not dare to claim absolutely that the syllogism is not a medium of the discovery of truth” (BLW 18). This sentence was evidently all Wolff required in order to completely rethink his hostility towards the syllogism as he subsequently identifies his adherence to this opinion as a prejudice founded in the authority of famous men, among whom Tschirnhaus is numbered (ELB 136).

Even so, Wolff should not be taken as uniformly deferring to Leibniz’s authority on these topics, but instead as (in some cases) adopting a view that better accords with his other commitments and concerns. This is most evident concerning *De loquela*, which Wolff sends to Leibniz after this initial response and which Leibniz comments on in his next letter of Aug. 20, 1705. It is in this letter that Leibniz first points Wolff to his writings on the pre-established harmony, and specifically, the “New System” and the exchange with Bayle, and also informs Wolff of his rejection of the Cartesian doctrine that the mind is conscious of everything that takes place within it (BLW 32). In his subsequent letter, Wolff confesses his ignorance of Leibniz’s system and requests more detail since he lacks access to the texts (BLW 39), which Leibniz obligingly provides in his next letter of Nov. 9, 1705. Leibniz’s rejection of the claim that the mind is conscious of everything that it contains, which Wolff had previously endorsed (cf. MMP II 245, §3), allows Wolff to continue to uphold the principle that whatever is cognized of a thing must be *contained* (“*continetur*”) in its concept, which principle he claims to borrow from Descartes but which he also finds in Tschirnhaus (MMP II 246). Consequently, Leibniz’s conception of the (individual) soul as containing all of its perceptual states could only have seemed quite sympathetic, and given this it is not surprising that in his response, dated Dec. 2, 1705, Wolff offers a whole-hearted endorsement of Leibniz’s system (BLW 46–7).

Far more important in terms of their immediate impact were Leibniz’s interventions concerning various topics of relevance for Wolff’s understanding of Tschirnhaus’s mathematical method. First and foremost among these is Leibniz’s championing of the analysis of concepts into simpler notions, which method Wolff takes to provide an answer to his challenge to Tschirnhaus regarding the discovery of the elements of definitions (BLW 39).[[22]](#footnote-22) Second, and relatedly, Leibniz complicates the Tschirnhausian picture by arguing that the possibility of concepts must be demonstrated before those concepts can be deployed philosophically. Leibniz makes this point in relation to his criticism of the Cartesian (and Anselmian) ontological argument for God’s existence, which argument Wolff had deployed himself in his dissertation on practical philosophy (MMP II 195–6). As Leibniz writes to Wolff, “the Cartesian demonstration of the existence of God proceeds geometrically *if* you suppose a God to be possible” (BLW 18—my emphasis). Leibniz’s point, which obviously extends beyond the notion of God, would soon lead Wolff to consider various ways in which the possibility of concepts (which is to say their relation to possible things) can be proved. Significantly, in making this point to Wolff, Leibniz refers to an essay of his in the *Acta eruditorum*, namely the “Meditations on Knowledge, Truth, and Ideas” of 1684, and in the same letter to Wolff he brings his attention to his novel hierarchical organization of the Cartesian distinction between ideas (BLW 18).

Yet, Leibniz’s growing influence, philosophical and otherwise, upon Wolff did not change the fundamental outlines of his project, and (in spite of the rigours of his new position at Halle) Wolff managed a number of short philosophical publications around 1707 that filled out and extended his conception of the usefulness of the mathematical method. Of particular note is the *Solutio nonnullarum difficultatum circa mentem humanam obviarum*, which nicely illustrates how Wolff seeks to integrate and develop Leibniz’s insights within his own (steadfastly Tschirnhausian) framework. The essay itself presents a treatment of the origin of concepts and an account of the nature of reasoning which are both clearly influenced by Leibniz, particularly his discussion in the “Meditations” which Wolff had evidently read carefully by this point.[[23]](#footnote-23) So, Wolff accounts for how distinct, general concepts are derived from perceptions of individual things through successive abstraction from various determinations in the original representation. Wolff contends that the “reality [*realitas*]” of the resulting concept is secured given that it contains nothing that cannot be found in the original representation (MMP I 13); however, these notions can be arbitrarily combined with others, where the reality of the resulting representation must be proved either *a priori* through consideration of the contents of the concept (and the production of what is represented), or *a posteriori* through reference to a sensation of what is represented (MMP I 14). Concerning these general concepts, and here the Leibnizian influence is clearest, Wolff contends that as indeterminate they can only be represented through symbols, which are chosen in accordance with a *characteristic*, and are manipulated in accordance with rules specified in a *combinatoric* (MMP I 14). As an example of such a rule, Wolff specifies the mathematical rule of substituting like by like, which he considers in application to an example from natural science (“the fire melts the lead”). Wolff argues that through progressive substitutions of definitions for concepts, and careful consideration of their contents, we arrive at a new proposition (this is an example of the demonstration of what Wolff would later call a theorem) (MMP I 15–16).

A final, but important essay from this period relating to Wolff’s refinement of the mathematical method is his *Leges experientarum fundamentales* originally published in *Acta* in 1708, in which Wolff outlines the conditions under which experience can be made serviceable for use in the mathematical method, as Wolff evidently continues to believe that sense experience, when directed appropriately by the intellect, is a crucial source of cognition. Wolff begins, then, by explaining that we proceed from the perception of individual things by means of the external senses to universal cognition of such objects. With reference to his previous treatment of the origin of concepts, Wolff now makes clear that he takes distinct concepts to come to be originally from the understanding’s reflection upon sensory experience; thus he calls the distinct notions that arise “original” or “primitive” (“*primigenias*”) notions (MMP I 18), which are likewise not subject to doubt as regards their possibility, and thereby also signalling that he takes the foundational concepts for scientific investigation to originate in sensation (even if the concepts are no longer sensitive representations). Wolff goes on to briefly highlight two obvious uses for concepts thus acquired, namely, that they permit the recognition of cognized objects under them and that we can further derive concepts through abstraction from the marks of the original notion or its composition with others (MMP I 19).

However, the bulk of the remainder of the essay concerns the *limits* of our experience as Wolff is keen that we should also attend to these in the context of our reliance upon sensory cognition, as care is required in the distinction between the concepts we draw from it.[[24]](#footnote-24) As an example, Wolff considers our experiential cognition that things have a power for altering other things, or that a thing, A, has a power to influence another, B. Here, Wolff claims, our cognition is ambiguous between three different possibilities, where the concepts drawn will depend on the gloss of our experience (which Wolff does not call into question): first, that only the alterations on the part of A and B are accessible to the senses, second, that the causes of the alterations are also available to experience, or third, that the influence itself is distinctly perceived (MMP I 19). In the course of the essay, Wolff does not settle which of these options is the case with respect to the interactions among external objects, and much less between the soul and the body, yet Wolff does go on to use the example to derive a number of principles that should direct our examination and investigation of our experience in these cases. So, when the first is the case, Wolff notes that then we cognize nothing more through experience than that something has happened, and insofar as we want to seek out the cause of this or the conditions under which such a change happens, we need to bring it out through previous experience or further inferences which must likewise be carefully considered (MMP I 19–20). In the second case, Wolff warns that in order to be confident that we have perceived a cause, we must be careful to distinguish a genuine perception of causation from the mere perception that one thing succeeds another or that two things occur at once, we do not thereby have grounds to infer a causal relation between the two (MMP I 21). Finally, in the case where influence is directly perceived (which Wolff does not here rule out), we must use the resources of physics to investigate the nature of the power involved, but only once we have considered whether perhaps a part of the influence is not given to our senses, and in order to do this Wolff recommends a thorough experimental investigation of the conditions under which the change occurs (MMP I 20–1).

As should be evident, this examination of the foundational laws of experience is ultimately motivated by Tschirnhaus’s account of the role of experience at the outset of scientific investigation, and it is a function of the fact that Wolff continues to assign such a role to sensory experience that he also takes care to outline the laws that govern its use and to circumscribe its limits. This is hardly an aberration, or an immature empirical dalliance on his way to a mature and robust philosophical rationalism, as Wolff will continue to lay such an emphasis on experience, and not merely in physics but also in metaphysical disciplines such as psychology and natural theology (though we cannot consider these here). Indeed, Wolff’s continued interest in Tschirnhaus at this time is evident in another, more poignant respect as well. In his autobiography, Wolff notes that Tschirnhaus had informed him during their meeting at the book fair in Leipzig that the *Medicina mentis* had only been intended as the first part of a trilogy of works which, Tschirnhaus earnestly explained, would apply his method to mathematics proper and then to physics. Tschirnhaus never published these texts, though after his death in October 1708, only a few months after Wolff’s publication of his essay on experience, Wolff made inquiries regarding these manuscripts in particular so that “his discoveries might be preserved from decay, and to secure his fame for posterity,” only to find out that, like his friend Spinoza before him, Tschirnhaus had ordered his papers burned after his death (ELB 126–7).

3. Refining the mathematical method: The *German Logic*

What is in any case foremost on Wolff’s mind during the period until Leibniz’s death in 1716 is refining and systematizing the mathematical method. He accomplishes this in a series of texts, including the “Kurzer Unterricht von der Mathematischen Methode oder Lehr-Art” which opens *Der Anfangs-Gründe aller Mathematischen Wissenschaften* (1710) and its Latin counterpart, the “De Methodo Mathematica Brevis Commentatio” in the *Elementa matheseos universae* (first volume 1713), as well as the *Mathematisches Lexicon* (1716) which includes an entry on the method (pp. 889–91) as well as on each of its principal elements. In these efforts, Wolff continues to claim Tschirnhaus as his model; thus he writes that “no one has explained the mathematical method more skillfully [*geschickter*] than Tschirnhaus” and he even claims that his own presentation will help the reader to understand Tschirnhaus’s book better, “something [he] sincerely desires for every lover of truth” (KU 4). The most important and complete presentation of the method, however, is contained in the *Vernünfftige Gedancken von den Kräfften des menschlichen Verstandes und ihrem richtigen Gebrauche in Erkäntnis der Wahrheit* (*German Logic*) (1713) which, despite its presentation in a form (roughly) commensurate with traditional treatments in logic, Wolff nonetheless identifies as the definitive presentation of his method.[[25]](#footnote-25) Indeed, the *German Logic* represents the culmination of Wolff’s efforts to refine the mathematical method and revise it in light of his previous criticisms of Tschirnhaus and Leibniz’s interventions. We will consider the essentials of Wolff’s treatment in what follows, beginning with definitions, with an eye to these complementary influences.

i. Definitions

Wolff’s account of how we form real definitions begins with a discussion of concepts which serve as the referents of the term that is defined. Wolff’s presentation in the DL opens in a Lockean vein inasmuch as he contends that our concepts ultimately have their origin in sensation. So sensation (*Empfindung*) is identified with the consciousness of something being present to us, and the senses (*Sinnen*) are the capacity that leads us to the immediate sensation of things that are external to us (DL1 c. 1, §1–3). And while a ‘concept’ (*Begriff*/*notio*), is simply “any representation of a thing in our thoughts,” Wolff proceeds to claim that, since the senses provide us with representations of things outside of us, the senses also ultimately provide us with concepts (DL1 c. 1, §4–5). Wolff does not (at this stage at any rate) consider any other source for our concepts of external things (or of anything else for that matter), but instead turns to the question of how we form universal concepts from the singular concepts supplied by the senses. Wolff notes that we can compare (already acquired) concepts with one another with an eye to their similarities and differences with the result that we take some concepts to be of the same sort (*Art*), and this leads to a new, universal concept (DL1 c. 1, §24–6). Alternatively, a general concept can be formed by leaving out determinations in a given concept, though we can also arbitrarily add determinations to a given concept with the result that it is less general (DL1 c. 1, §28).

Following on Leibniz’s previous suggestion that the possibility of concepts must first be demonstrated, Wolff contends that it is only in the case of the initial concepts supplied by the senses (i.e., our thoughts of sensations),[[26]](#footnote-26) that our possession of the concept amounts to an immediate and indubitable proof of the concept’s possibility, which is to say, of the possible existence of the referent of the representation (DL1 c. 1, §29). Likewise, in the case of the second sort of concepts, namely those abstracted from concepts of sensation, Wolff argues that we can be certain of their possibility insofar as they are attained through leaving out determinations of concepts whose possibility is already certain (DL1 c. 1, §30). However, the possibility of the final sort of concepts—those formed through arbitrary determination—cannot be taken for granted, since “our will can make nothing possible” (DL1 c. 1, §31), and Wolff considers two ways in which they can be demonstrated, namely through experience or by means of a proof.[[27]](#footnote-27) The possibility of an arbitrarily formed concept can be proven from experience insofar as we find an example of the concept in the world and attend to whether it agrees with the concept (DL1 c. 1, §32), and it can be shown through a proof insofar as we show how it can come about or whether something of whose possibility we are already certain is entailed by it (DL1 c. 1, §33).

General, possible concepts are the objects of the definitions which constitute the initial step of the mathematical method. The question remains, however, as to how we arrive at the definitions of these concepts—what are the elements from which the definitions are now composed? It will be recalled that this is the very question Wolff posed to Tschirnhaus himself at their first meeting. Here, again, Wolff’s interaction with Leibniz comes into play, particularly Leibniz’s hierarchical re-organization of the Cartesian designation of concepts as obscure, clear, or distinct, as well his method of analysis by which the marks of complex concepts are distinguished from one another. By means of attention to our concepts and to what distinguishes them from one another, we can raise obscure concepts to clear ones (DL1 c. 1, §8–9), and by carefully distinguishing the marks in a given clear concept we can render it distinct rather than confused or indistinct (DL1 c. 1, §12, §17). Definitions, then, are formed through consideration of our distinct concepts (DL1 c. 1, §34) and, in fact, the method for rendering our concepts distinct is also that for forming their definitions,[[28]](#footnote-28) which is why Wolff nearly identifies distinct concepts with definitions (cf. DL1 c. 1, §34). As before, Wolff distinguishes between nominal and real definitions, or definitions of words (“*Wort-Erklärungen*”) and definitions of things (“*Sach-Erklärungen*”), where the former state sufficient properties by which the concept is distinguished from all other similar ones, and the latter show *how* the concept is possible by showing how an object corresponding to it can be brought about (DL1 c. 1, §38). In a departure from Tschirnhaus, however, Wolff allows that nominal definitions are not only useful for the purposes of everyday life, but they are also indispensable for discovering real definitions (DL1 c. 1, §47) insofar as one considers the marks enumerated in the nominal definition and comparing it with other cognitions to determine how the object can arise (DL1 c. 1, §51–2). This corresponds to the *a priori* method of discovering real definitions, but Wolff also provides a couple of *a posteriori* methods for discovering them, either (when we know nothing about the thing to begin with) through simple trial-and-error (DL1 c. 1, §48–9), or through careful investigation of the structure of the given thing (as with a machine—DL1 c. 1, §53).

ii. Axioms, Postulates, and Propositions from Experience

The discovery and formulation of definitions is crucial as definitions serve as the “grounds” of demonstrations (ML 495; KU §40), or chains of valid syllogisms which are linked inasmuch as the conclusions of the proofs earlier in the series serve as premises in a subsequent proof (ML 501), and the first premises of which are themselves propositions that are (indemonstrably) certain. Definitions can serve as these grounds, or first premises, in demonstrations though they do so in two different ways. First, they themselves can serve as first principles in the demonstration, where real definitions can do so immediately but nominal definitions must first have the possibility of their related concept proven before they can do so (ML 495).[[29]](#footnote-29) Secondly, definitions serve as grounds of demonstrations insofar as further propositions are derived directly from one of them. Wolff refers to these derivative propositions generally as “principles [*Grundsätze*]” (KU §27), and he divides them into theoretical and practical where the former assert that something is the case or pertains to some thing, and the latter that and how it could be done (DL1 c.3, §12). Theoretical principles are called “axioms [*axioma*],” though Wolff sometimes simply refers to them as “principles [*Grundsätze*]” (DL1 c. 3. §13), and these are explicitly understood in the Tschirnhausian sense (ML 223),[[30]](#footnote-30) whereas practical principles are called “postulates [*postulata*/*Heische-Sätze*]” (KU §28; DL c. 3 §13; ML 1086). Since both of these are taken to follow immediately from a definition, they are identified as “identical propositions” (ML 224) and they do not require further proof as they are “clear in themselves” given the definition, though Wolff comments that such a proof could readily be supplied (DL1 c. 5, §2).

Significantly, definitions and axioms are not the only allowable grounds for demonstrations as Wolff also argues that *experiences* (*Erfahrungen*/*experientiae*) can also serve as such grounds. As he writes, “one calls it a *demonstration* when one can conduct one’s proof so far until, in the last inference, one has nothing else than definitions, clear experiences, and other identical propositions as premises” (DL1 c. 6, §19; cf. also BC §2). Not every (proposition from) experience is suitable for this employment, however, and so Wolff devotes a chapter of the DL (c. 4, in DL1; c. 5 in subsequent editions[[31]](#footnote-31)) to setting out the conditions for their use in demonstrations. Commensurate with his early essay on the laws of experience, Wolff distinguishes between three different cases of experience that are so usable: first, the experience of a thing along with its properties; second, the experience of the changes that something undergoes; and third, the experience of a thing’s effects upon another thing (DL1 c. 4, §5). He then considers the means by which we might determine, for instance, that our experience is in fact of a *property* belonging to thing (such as three-sidedness to triangles), where a property is understood as something “that a thing must retain as long as it remains what it is” (DL1 c. 4, §6), Wolff claims that we must investigate whether the (alleged) property pertains to the thing in different circumstances and rule out the possibility that it has that feature only in light of some external ground, which we can do by altering its present circumstances (DL1 c. 4, §6). Alternatively, in cases where the thing under consideration cannot be easily moved, we might observe it over an extended period of time (DL1 c. 4, §7), or we might opt to investigate the matter *a priori* and, after acquiring a distinct concept of the thing, elaborate the marks of the concept to determine whether the connection between it and the alleged property is found (DL1 c. 4 ,§8).

As before, Wolff devotes special attention to our experience of causal connections. While he allows that a causal connection can be known with certainty insofar as an alteration comes to be as soon as one body is introduced to another (DL1 c. 4, §9), he cautions that we must take care in our observation to ensure that this is in fact what was perceived. We must ensure, for instance, that one or both of the two objects at issue, or some other factor involved, has not previously undergone some alteration without which the event would not have happened, where this requires a thorough investigation of the state of the things involved (DL1 c. 4, §10). Further, Wolff advises that we must undertake to show that a given causal connection is not merely an instance of correlation, “[s]ince two things could always be connected with one another either because they have the same cause or because one or both often occur” (DL1 c. 4, §11). We can, however, ascertain that a given connection is mere correlation insofar as we observe a case where the first event takes place and, in the absence of any hindering conditions, the second fails to occur (DL1 c. 4, §11). What all this goes to show is that experience of the sort that is admissible as a premise in a demonstration is not to be understood as the simple deliverance of the senses, but rather is a proposition that is subject to rigorous investigation. Given this, then, it is hardly surprising that he numbers under experiences so understood the results of *experiments* (*Experimente*/*Versuche*), which are repeated and varied to ensure the reliability of their results (DL1 c. 4, §§12–13). When these precautions are taken in the examination and confirmation of our singular experiences, Wolff claims that we can “quite easily change them into universal propositions” (DL1 c. 4, §15), and in an echo of Tschirnhaus’s “*experientiae evidentissimae*” Wolff dubs these “clear [*klare*] experiences” in order to distinguish them from the ordinary and unvetted deliverances of the senses, and he allows (the universal propositions derived from) them to serve as grounds of demonstrations without any consequent loss of certainty.

iii. Theorems and Problems

While definitions and propositions from experience provide the starting principles of demonstrations, it is theorems (*theorema*/*Lehrsätze*) that constitute the real core of Wolff’s method and the focus of his scientific project. Following Tschirnhaus, theorems (and problems) are generally identified as propositions that make a claim (affirmative or negative) about what is or can be that are or can be derived from multiple definitions (DL1 c. 3, §13; KU §33; ML1377–8). According to Wolff, a theorem is discovered through “experimentation,” that is, through beginning with simple definitions and formulating propositions whose correctness is readily apparent (DL1 c. 5, §4). In addition, and significantly, Wolff takes theorems to have a specific syntax, dividing them into a condition (*hypothesis*/*Bedingung*) and an assertion (*thesis*/*Aussage*), where the former states the circumstances under which some feature or property can pertain or not pertain to a thing, and the latter asserts that that same feature or property pertains to a thing (or not) (DL1 c. 3, §6). An example of theorem provided by Wolff is “a triangle is half of a parallelogram when both have the same height and base,” where the condition is “both have the same height and base” and the assertion is “a triangle is half of a parallelogram” (KU §35). Whereas theorems are theoretical propositions, problems are practical propositions (DL1 c. 3, §14) which simply state something that is to be done. Wolff divides the task expressed in a problem into two parts, the first is the ‘proposal [*propositio*/*Vortrag*]’, such as “show that a triangle is half of a parallelogram,” and the second the resolution (*resolutio*/*Auflösung*) in which the way in which the proposal is accomplished is laid out (ML 1093). While theorems clearly have priority in Wolff’s demonstrative enterprise, we tend to find theorems by arriving first at problems and resolving them.

Though Wolff’s account of theorems, and theory of propositions in general has been dismissed as a mere appendix to his logic, the real focus of which is thought to be his theory of concepts,[[32]](#footnote-32) in fact the opposite is the case. Not only do theorems represent the real engine of scientific discovery for Wolff, with definitions (and concepts) playing an explicit role in the demonstration of the discovered truths, but in addition Wolff’s account of theorems illustrate his ultimate reply to the ambiguity initially diagnosed in Tschirnhaus’s understanding of thought (*concipere*).[[33]](#footnote-33) As we saw before, Wolff had trouble understanding what, precisely, grounded the necessity of assent implied in Tschirnhaus’s account of *concipere*, a failing also diagnosed in the Cartesian account of clear and distinct perception. Rather than relying on a potentially misleading personal conviction, Wolff analysed this necessity in terms of “mutually positing” or “mutually cancelling” thoughts, such that having one thought implies or excludes another. Wolff now formulates this account in terms of his analysis of a theorem where a proposition is thought in the sense of *concipere*, for instance, when the two components of the theorem are such that the thought of the condition posits the thought of the assertion:

If now two thoughts are so constituted that the second necessarily takes place when one entertains the first, or that I must necessarily think the second when I think the first of some thing, *so, in this case the thoughts agree*; if however I cannot possibly think the second of some thing when I think the first of it, *so in this case my thoughts conflict with or contradict one another* (DL c. 3, §9; cf. KU §38).

As Wolff proceeds to claim, in the former case, where our thoughts agree (“*übereinstimmen*”), we say that “*we can think the proposition*,” and in the latter case “*we cannot think the proposition,*” where Tschirnhaus’s notion of *concipere* is clearly intended (DL1 c. 3, §10).[[34]](#footnote-34) Indeed, we might contrast this with the much broader account of thought offered earlier in the DL, where it is understood simply in terms of the consciousness of a representation. [[35]](#footnote-35) Yet the difference in senses of ‘thought’ is clearest in the case in which we cannot *think* a proposition, since Wolff’s point is obviously not that we are simply not aware of the proposition, but rather that the thought of one excludes the thought of the other (with the result being a negative proposition).

Wolff will round out his account of the mathematical method by the discussion of corollaries (*Zusätze*), or an application of a theorem to a particular case, scholia (*Anmerckungen*), or a further elucidation of something in the definitions or principles, and of course the syllogism as the primary instrument of discovery (DL1 c. 7, §1). Nonetheless, what should be clear is that Wolff recognizes an important, even constitutive role for experience in the crucial initial stages of the application of the method. So, we rely on experience in the form of sensation for the acquisition of concepts, experience is also a source for the discovery (*a posteriori*) of real definitions, clear experiences are allowed to serve as principles in demonstrations, and causal connections that are known through observation or experiment can serve as problems and issue in theorems. While this fact serves to rebut those who take the *mathematical* character of Wolff’s method to imply that it is purely rationalistic in character, it would nonetheless be equally incorrect to identify Wolff as a thoroughgoing empiricist in this respect, since the initial, individual concepts of the senses are rendered universal and distinct through the operation of the understanding, and the experiences that are ultimately admissible as grounds of demonstrations are the result of a rigorous vetting that serves to distinguish them from the unvarnished deliverances of the senses (DL1 c. 4, §8). Similarly to Tschirnhaus, then, Wolff holds that the senses can only reliably contribute to our cognition insofar as they are directed by the understanding.

In the end, this vital role that Wolff assigns to experience constitutes Tschirnhaus’s legacy in Wolff’s definitive presentation of his scientific methodology in the *German Logic*. Through his incorporation of (what Wolff himself terms) *a posteriori* and *a priori* methodologies within the context of the mathematical method, we can see that Wolff is aiming, as he had from the outset of his career, at an eminently Tschirnhausian “middle way” between empiricist and rationalist approaches to the discovery and justification of knowledge. Moreover, in highlighting Tschirnhaus’s importance for Wolff’s early thought, the foregoing also provides essential context for Leibniz’s influence on Wolff’s philosophical thought. Well before Wolff had heard of the “Leibnizian philosophy,” he had already carefully studied that of Tschirnhaus, and so far from it being the case that Wolff’s acquaintance with Leibniz had the effect of “repelling [*zurückdrängen*]” Tschirnhaus’s influence,[[36]](#footnote-36) it is rather the case that Leibniz’s influence, particularly in these initial stages, was most effectively exercised within the broader framework provided by Tschirnhaus.

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1. See Honnefelder (1990) and, recently, Leduc (2018). [↑](#footnote-ref-1)
2. These have been collected in Wolff (2001). [↑](#footnote-ref-2)
3. I will make use of the following abbreviations: [MM] *Medicina mentis et corporis* (Tschirnhaus, 1695/1964); [BLW] *Briefwechsel zwischen Leibniz und Christian Wolff* (Leibniz & Wolff, 1860/1971); [BC] the “Brevis commentatio” that prefaces the first volume of the *Elementa matheseos universae* (Wolff, 1713b, 1715); [CR] *Cogitationes rationales de viribus intellectus humani* (Wolff, 1740/1983); [DL1] *Vernünfftige Gedancken von den Kräfften des menschlichen Verstandes* (Wolff, 1713a), with ‘1’ added to indicate the first edition of this work; [ELB] *Christian Wolffs eigene Lebensbeschreibung*, (Wolff, 1841); [KU] the “Kurzer Unterricht” that prefaces the first volume of *Der Anfangs-Gründe aller mathematischen Wissenschaften* (Wolff, 1710); [ML] *Mathematisches Lexicon* (Wolff, 1716); and [MMP] *Meletemata mathematico-philosophica* (Wolff, 1755), with ‘I,’ ‘II,’ or ‘III’ to indicate section number. [↑](#footnote-ref-3)
4. See Beck (1969: 189). [↑](#footnote-ref-4)
5. See MM 27–8 and the unpaginated “Praefatio authoris ad lectorem”. [↑](#footnote-ref-5)
6. For additional discussion of the limits of empiricism according to Tschirnhaus, see van Peursen (1993: 396 and 408). [↑](#footnote-ref-6)
7. See MM, unpaginated “Praefatio”. [↑](#footnote-ref-7)
8. Thus De Vleeschauwer (1932: 672) refers to these “intuitions” as methodological presuppositions. [↑](#footnote-ref-8)
9. See the unpaginated “Praefatio”. For how Tschirnhaus considers his use of this method to depart from the traditional (synthetic) method employed in geometry, see MM 127–8 and Schönfeld (1998: 69). [↑](#footnote-ref-9)
10. This is noted, for instance, by Schönfeld (1998: 71). [↑](#footnote-ref-10)
11. For the generative aim of definitions, see MM 67–8; for the latter examples, see MM 70–1 and Beck (1969: 192). [↑](#footnote-ref-11)
12. For details, see Verweyen (1905: 89–95). [↑](#footnote-ref-12)
13. Tschirnhaus identifies three general classes of objects at issue here: *imaginabilia*, *rationalia* or *mathematica*, and *realia* or *physica*; cf. MM 74–6, and Schönfeld (1998: 67–8). [↑](#footnote-ref-13)
14. Contrast, for instance, Beck, who claims that for Tschirnhaus “[e]xperience is useful only in setting us under way,” (1969: 192). Against this, see particularly Wurtz (1988: 194–201). [↑](#footnote-ref-14)
15. See MM 214, 270, and 280. For extended discussion of this sense of ‘confirmation,’ see Wurtz (1988: 198–201). [↑](#footnote-ref-15)
16. As Wollgast summarizes (1988: 30), there would be “kein Christian Wolff ohne Tschirnhaus.” [↑](#footnote-ref-16)
17. The phrase is Winter’s (1960: 71). One might also here contrast Schönfeld, who accuses Wolff of an overly-rationalistic misinterpretation of the *Medicina mentis* (1998: 73). [↑](#footnote-ref-17)
18. See MMP II, 196 (definition 23, corollary 2) and 198 (first scholium of chapter 2). [↑](#footnote-ref-18)
19. Inasmuch as everyone is capable of grasping what is true by means of the intellect, whereas imaginings are a function of an individual’s past sensory experience, Tschirnhaus contends that the communicability of some matter of fact reliably indicates that it is an object of the intellect rather than the product of imagination. See MM 45–6. [↑](#footnote-ref-19)
20. For discussion of this see Gerhardt’s introduction to Leibniz and Wolff (1860/1971: 8n) and Arnsperger (1897: 24–5). [↑](#footnote-ref-20)
21. ELB 133. For the original note from Mencke (dated Nov. 12, 1704), see BLW 15. [↑](#footnote-ref-21)
22. On this see Schönfeld (1998: 73); and Arndt (1978: 21). [↑](#footnote-ref-22)
23. For further discussion of this essay, with a particular focus on its relation to Leibniz’s “Meditations,” see Pelletier (2017: 34–7). [↑](#footnote-ref-23)
24. MMP I 18: “Cavendum praeterea, ne per experientiam cognita ultra suos limites extendantur.” [↑](#footnote-ref-24)
25. Indeed, Wolff compiled a *précis* of Tschirnhaus’s *Medicina mentis* while lecturing on the text in Leipzig, and he reports that he made use of this and other such notes when writing his German works; cf. Arndt (1978: 16) and ELB 139–40. [↑](#footnote-ref-25)
26. These are likely the “original” or “primitive” concepts Wolff speaks of in the *Leges* essay. [↑](#footnote-ref-26)
27. Wolff had already introduced these two methods in his *Solutio nonnullarum difficultatum* essay (cf. MMP I 13–14). [↑](#footnote-ref-27)
28. See KU §§12, 17; BC §13; and ML 495. [↑](#footnote-ref-28)
29. Wolff takes this point from Leibniz’s “Meditations”; cf. Leibniz (1989: 293). [↑](#footnote-ref-29)
30. Contrast Leibniz, who takes credit for Wolff’s claim that axioms can be analysed into identical propositions and definitions (cf. BLW p. 163). While Tschirnhaus does not identify axioms as identical propositions he does claim that they are derived from definitions (MM 117–18). [↑](#footnote-ref-30)
31. It is likely by way of emphasizing the fact that clear experiences can serve as grounds of demonstrations that the chapter on experience precedes that on inferences (c. 6) in the first edition of DL (note that this follows the order of presentation in the KU: principles [§§27–29], followed by experiences [§§30–32], theorems [§§33–38]—corresponding to c. 5 in DL1 on the invention of propositions—and finally proofs and demonstrations [§§39–43]). [↑](#footnote-ref-31)
32. See Arndt (1978: 82). [↑](#footnote-ref-32)
33. See above. See also Wolff’s letter to Leibniz of Dec. 5, 1705 where he makes this connection clear (BLW p. 48). [↑](#footnote-ref-33)
34. Thus, in Wolff’s later, Latin translation of DL, he employs ‘*concipere*’ in this context; cf. CR c. 3, §83. [↑](#footnote-ref-34)
35. See DL1 c. 1, §2, and again, contrast the Latin translation of DL which uses ‘*cognitio*’ rather than ‘*concipere*’ in the parallel discussion (CR c. 1, §2). [↑](#footnote-ref-35)
36. Contrast Wundt (1945: 128). [↑](#footnote-ref-36)