Chapter 2
THE CLAIMS OF RATIONALISM

According to tradition, a fundamentally important kind of knowledge can be attained a priori, that is, independently of sensory experience. Knowledge that is independent of sensory experience in the required way may possibly require some sensory experience to obtain the ideas (or concepts) needed to comprehend the relevant proposition, but this experience would not be sufficient to ascertain that proposition's truth. Epistemological rationalists[1] give one characteristic account of how a priori knowledge is obtained and how it can apply to domains to which we lack experiential access. I shall discuss this account in the present chapter. Another account, the one I am committed on the whole to defending,[2] is given by logical empiricists, philosophers holding a twentieth-century version of the epistemological doctrine originally espoused by David Hume. I shall discuss this kind of empiricism in the chapter to follow.

The A Priori, Universality, and Necessity

If knowledge does not require rational certainty, anything that we can know a priori can also be known a posteriori: it can be obtained from experience.[3] Logical and mathematical knowledge is almost universally regarded as attainable a priori, by the use of reason itself, but it can also be learned from others, from parents or teachers, and accepted as knowledge on their authority. Most elementary logic and mathematics is in fact learned this way. But according to tradition, anything that can be known a priori must ultimately, if it is known at all, be known a priori—by someone, somewhere. The reason given for this is that a priori knowledge is universal and necessary, and nothing universal and necessary can be known first-hand on the basis of sense-experience.[4]

Some standard examples will illustrate why a priori knowledge is plausibly regarded as universal and necessary. Consider "All bodies are extended, or spread out in space." This judgment identifies a defining characteristic of a physical body; it specifies one feature that something must have if it is to count as such a body. A judgment of this kind is clearly universal in scope, since it holds for all physical bodies, wherever they may be and whenever they may exist. It is also necessary, since a thing cannot fail to have its defining characteristics. Or consider "2 + 3 = 5." This statement is universal in scope because it holds for all couples and all triples: any couple and any triple sums to a group of five. It also asserts something necessary, since no couple and no triple could fail to sum to a group of five.

A proposition that is universal and necessary could not be known by experience, Kant thought, because experience teaches us only that a thing is so and

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1 The classification "epistemological rationalist" is fairly loose. The term is commonly applied to philosophers holding the views I attribute to rationalists in this chapter, but those philosophers do not agree on all epistemological issues. A precise classification is not worth attempting, in my opinion.

2 As I shall explain later in this chapter, I do not insist that all a priori knowledge *must* be analytic. I allow that some mathematical truths may not have this status, but if they do ultimately lack it, I have no idea what their ultimate justification is. Rationalist accounts of their truth, at least the kinds known to me, are unpersuasive—as I argue here. I consider myself a *moderate* rather than an extreme or *doctrinaire* logical empiricist.

3 Perhaps a distinction is required here. If I know that P on a teacher's authority, I know it on the teacher's say-so and thus know it a posteriori. But what I thus come to know is nevertheless an a priori truth, something knowable a priori, and I may know, a posteriori, that it has this status.

4 Kant gives this reason in his Introduction to the *Critique of Pure Reason*; see B3-B4.

so, not that it cannot be otherwise. Experience does justify us in making general statements such as "All bodies are heavy," but these statements are not "true and strict," Kant said, because their support is merely inductive: "We can properly only say that…so far as we have observed, there is no exception to this or that rule."[5] A teacher might convince us that some mathematical theorem is true and we might justifiably accept it on that teacher's authority, but we could not claim to know with certainty that it is true. To have that kind of knowledge, Kant thought, we would have to have first-hand knowledge of the relevant mathematical proof. Only a proof of this kind could assure us that the truth in question holds both universally and necessarily.

The view of a priori knowledge that I have been describing, which can be called the traditional view, is controversial today. W. V. O. Quine expressed the most general doubt about it in his famous paper, "Two Dogmas of Empiricism."[6] Quine's doubt concerned the very existence of a priori knowledge. If an *a priori* truth is one whose truth is necessary, an a priori statement can never be falsified. But Quine supported the view that "no statement is immune to revision." [7] It is arguable that reasonable revision is not always owing to error and that Quine's claim, if sound, does not necessarily undermine the possibility of genuine a priori knowledge. Yet Quine did seem opposed to the idea that genuine a priori knowledge is attainable. Although most philosophers nowadays seem to disagree strongly with Quine on this matter, he raised what I regard as the fundamental issue about a priori knowledge, and I shall pursue it later in the chapter.

Even if the existence of genuine a priori knowledge is not a serious issue for us, we must come to terms with the fact that Kant seems to have been wrong in holding that a priori knowledge is invariably universal and necessary. Saul Kripke made a strong case for this in lectures he gave in 1970 and later published as *Naming and Necessity*.[8] Some acute philosophers have raised objections with Kripke's criticism of Kant's contention,[9] but if Kripke's argument is reconstructed as follows, I think it is successful. Consider the assertion that the length in meters of a certain metal rod, the one known as the standard meter, = 1. Call this rod "*r*" and assume that we are speaking of it as it was at the time it was adopted as the official standard for measuring in meters. At this time, *r* had a particular length, call it "*L.*" According to the standard officially adopted, the length in meters of an object x at a time t is equal to 1 just in case x has L at that time. Expressed symbolically, this consequence of the standard is as follows:[10]

[SM]: For all x and t, $L_m(x,t) = 1$ if and only if x has L at t.

To show that the length in meters of the rod *r* is now, when the standard is adopted, equal to 1, we need only apply the rule SM to *r* itself. Instantiating the variables of SM to *r* and now, we obtain the consequence:

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5 *Ibid.*

6 Quine (1953).

7 Ibid, p. 43.

8 See Kripke (1980), pp. 56, 122n. In the early 1970's David Kaplan pointed out that an utterance of "I am here now" is analytically true although it is not (or does not state) a necessary truth. See Kaplan (1992a), pp. 508ff. The analytic truth of this utterance depends crucially on the fact that the referent of "here" is not determined by something other than the utterance in which it occurs. As Frank Jackson observed, if I point to a place on a map when I say "I am here," I might say something false. See Jackson (2000), p. 332.

9 See Soames (2004), ch. 16.

10 A standard of measurement for an extensive quantity (of which a meter is an instance) requires a much more complicated convention than SM, but SM is sufficient for the argument at hand. For a very helpful discussion of what such a convention actually requires, see Carnap (1966), chs. 6-9.

[C] $L_m(r, \text{now}) = 1$ if and only if *r* has L now.

Since we have stipulated that the referent of "L" is the length *r* now has, we know that *r* now has this length. We may therefore infer from C that $L_m(r, \text{now}) = 1$ or, in English, that the length in meters of r is now = 1. Our knowledge of this conclusion is a priori because we obtained it from a stipulation identifying L and a standard for determining whether a thing's length in meters is or is not equal to 1.

Although we know a priori that this result is correct, what we know is not a necessary truth. It is not necessary that the length in meters of *r* is now 1 because the length of *r could have been different* from L at this time. If *r* had been heated, it would have a length longer than L; if it had been cooled in a significant way, it would have shorter length. Thus it is *possible* that *r* has and always had a length that differs from *L*. As things are, the length in meters of *r* is equal to 1 because the length *r* happens to have was arbitrarily chosen as the standard for measuring lengths in meters. If *r* had possessed a different length, the convention would have been different if that length had been adopted as the standard unit. But *r*'s length was not different and the standard was not changed. So we can have a priori knowledge of something that is actually contingent.

In his 1970 lectures Kripke also argued that Kant was wrong in thinking that necessity is a criterion of a priori truth—that if a truth is necessary it must be knowable a priori.[11] Consider the assertion, "The person who in fact discovered bifocals was Benjamin Franklin." It is possible that Franklin did not discover bifocals, but if we know that he was the one who in fact did discover them, we can use the description "The person who in fact discovered bifocals" to single him out in actual as well as possible or, as Kripke called them, counterfactual situations. Now Franklin was necessarily himself: *he* could not possibly have been someone else. If we know, then, that the person who in fact discovered bifocals was Franklin, then we know that this person, Franklin, was necessarily Franklin. We therefore know that, on this reading, the statement "The person who in fact discovered bifocals = Franklin" is necessarily true. But the necessary truth of this statement cannot be known a priori. To know that it is necessarily true we must know that the description "The person who in fact discovered bifocals" applies to Franklin, and this is a matter of fact that can be discovered only empirically.

If we set aside identity statements and contingent statements that, like "The standard meter is one meter long," can be known to be true merely on the basis of conventions about meaning, we can perhaps agree with Kant that a priori truths, if they exist, are universal and absolutely necessary. The question is, "How can we possibly know a priori that any statement of this kind is true?" How could we know such a thing at all? I noted that W.V.O. Quine seemed to believe that this kind of knowledge is not actually attainable. He may have been wrong about this, as most philosophers apparently now believe, but the question is certainly important. How is such knowledge possible?

According to tradition, a priori knowledge is either axiomatic or provable by necessary inferences from axiomatic premises.[12] The idea of being provable this way can be made more precise by the following definition:

> A proof for a proposition P is a finite sequence of formulas ending in P each of which is either an axiom or an elementary logical consequence of preceding formulas.

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11 Kripke, pp. 97-105.

12 The classic account of this is given by Descartes in "Rules for the Direction of the Mind" (written in 1628 or thereabouts); see Descartes (1985), p. 14. In recent times Roderick Chisholm expounded a similar idea; see Chisholm (1996), ch. 3.

The formula ending the sequence here is a conclusion proved by the formulas preceding it. Since the sequence is finite, the formulas preceding the conclusion have an initial member. If we allow that the sequence may have only a single member, then P must be an axiom itself—in which case we can say that every axiom is a proof of itself. Also, if we allow conditional proof or indirect proof as elementary forms of valid inference, we can allow in proof-sequences formulas that are not inferred or even inferable from axioms. If these forms of inference are not counted as elementary, the conclusion of a strict proof will be inferred only from axioms and their logical consequences.

If the traditional idea is right, then, a priori knowledge will depend on or be obtained from axioms and elementary forms of inference. The requisite forms of inference must obviously be truth preserving: when they are applied to true premises, the conclusion they permit must invariably be true. If we can have a priori knowledge of something that is not itself an axiom, we must *know* that these forms of inference are truth-preserving. But how can we know this? The traditional answer is that the truth-preserving property of these forms of inference is knowable in the same basic way that axioms are knowable. For epistemological rationalists, axioms are known to be true by direct intuition or rational insight, and elementary forms of valid inference are known to be truth-preserving by the same kind of intuition or insight. For empiricists, the standard view is that logical axioms are analytically true, or true by virtue of meaning, and the truth-preserving property of elementary argument forms is insured by corresponding semantical rules.

Axioms and Primitive Rules of Inference

The rationalist idea that axioms are intuitively obvious does not accord with current logical practice. In fact, no particular formulas are now universally or even generally recognized as logical axioms. There are many different systems of classical logic, and although the theorems of standard systems are always the same, the axioms (if any are chosen) and the primitive rules of inference are often significantly different. As an example, Bertrand Russell and A. N. Whitehead listed five axioms for the system of propositional logic that they included in *Principia Mathematica,* namely:

1. $(p \vee p) \supset p$
2. $q \supset (p \supset q)$
3. $(p \vee q) \supset (q \vee p)$
4. $[p \vee (q \vee r)] \supset [(p \vee q) \vee r]$
5. $(q \supset r) \supset [(p \vee q) \supset (p \vee r)]$.

Paul Bernays soon proved that axiom (4) could be derived from the others and that it was therefore redundant, not needed as an axiom. But Russell's friend Jean Nicod offered a further simplification. Instead of taking "~" and "∨" as primitive connective symbols for the system, as Russell and Whitehead had done, Nicod suggested that "|" be used as the sole primitive connective, the formula "P|Q" having the sense of "not both P and Q." If this convention were adopted, Nicod showed, the whole system could be based on a single axiom with "P, P|(Q|R) so R" as the single primitive rule of inference. The axiom Nicod gave is "[p|(q|r)]|([t|(t|t)]|{(s|q)|[(p|s)|p|s)]})." I doubt that anyone would say this axiom is self-evident.[13]

I mentioned that Russell and Whitehead used "~" and "∨," translated "not" and "or," as primitive logical symbols for their system. This choice is significant

13 The example is discussed in Kneale and Kneale (1963), p. 26.

because the symbol for "if…then," namely "$\supset$," which plays a dominant role in their axioms, has a technical meaning that can be defined by means of "$\sim$" and "$\vee$," which are sufficiently close in meaning to the familiar "not" and "or" to be "taken as primitive," that is, used without a definition.[14] If one were merely told that "$p \supset q$" is to be understood as "if p then q," one would probably have great difficulty understanding why "$p \supset (q \supset p)$" and "$\sim p \supset (p \supset q)$" should have the status of logical truths and why "$p \supset (q \supset p)$" could reasonably be adopted as an axiom. The technical definition of "$p \supset q$" as "$\sim p \vee q$" makes it obvious why these formulas are logical truths: both are equivalent to "$(p \vee \sim p) \vee q$", which is a tautology.

Because the truths of classical propositional logic are distinguished by properties that can be characterized in formal terms—for instance, all theorems of this logic are truth-table tautologies—the class of such truths can be identified independently of axioms and rules of inference. The point in identifying axioms and primitive rules of inference for this system is to systematize the class of its truths—to identify a small class of truths from which the other truths can be inferred. Doing this makes a logical system useful for evaluating deductive inferences (they are valid if their conclusions can be derived from their premises by means of the axioms and rules chosen) and for ascertaining the logical truth of specific formulas: proofs can be constructed for logical truths. In the propositional logic the validity of inferences and the logical truth of specific formulas can be ascertained automatically by an algorithm (by truth tables), so the apparatus of axioms and rules is theoretically dispensable. But a comparable algorithm does not exist for the full system of predicate logic, so the apparatus of axioms and rules is vital there. Particular inferences can be shown to be valid, generally speaking,[15] only by means of a proof, and a formula can be shown to be logically true, generally, only in the same way.

My claim that the apparatus of axioms and rules is vital for the system of predicate logic actually requires an important qualification. Strictly speaking, axioms are not needed for a deductive system: rules are sufficient by themselves. Systems of "natural deduction" normally dispense with axioms.[16] To prove by deduction that some simple tautology is a logical truth, one can proceed by conditional proof or indirect proof. If we define "$p \supset q$" as "$\sim p \vee q$", we can show that "$p \vee \sim p$" is a logical theorem by a two-step inference. We first use conditional proof (C.P.) to prove "$p \supset p$":

1.	p	assumption.
2.	p	1, repetition
3.	$p \supset p$	1,2, C.P.

Then we use "$p \supset p$" to derive "$p \vee \sim p$":

4.	$\sim p \vee p$	3, definition.[17]
5.	$p \vee \sim p$	4, commutation

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14 The meaning of the symbol "$\vee$" actually differs from "or" in important ways. The symbol "$\vee$" must occur between formulas (or independent clauses), but "or" can meaningfully occur between noun phases, verb phrases, adjectival phrases, and adverbial phrases. The symbol "$\wedge$" differs from "and" in corresponding ways.

15 I introduce the qualification "generally speaking" because some inferences in predicate logic and some formulas of that logic can be evaluated by an automatic procedure: for example, "$(\exists x)(\exists y)Fxy \supset (\exists x)(\exists y)Fxy$" is a truth-table tautology. The point is that no automatic procedure is available for all cases. This was proved by Alonzo Church (1936).

16 See Montague and Kalish (1964).

17 The definition "$(p \supset q) \equiv (\sim p \vee q)$" holds for all formulas; in the proof "q" is replaced by "$\sim p$."

The possibility of dispensing with axioms in logic is worth mentioning in a discussion of epistemological rationalism because it shows us that self-evident truths would not be needed in logic even if they were available.

In spite of what I have been saying in the past few pages, some rationalist philosophers will insist that certain specific formulas do express self-evident truths and that certain elementary inference-patterns are self-evidently truth-preserving. These formulas and inference patterns deserve to be accepted without inference, they say, and they deserve to be considered axioms and elementary valid argument forms whether they are actually treated this way by logicians, or not. The philosophers who argue this way usually support their case by citing certain examples—typically, the law of non-contradiction, the law of excluded middle, and the rule of *modus ponens*—but they never, to my knowledge, support their conviction that *all* logical truths can be derived from self-evident axioms and self-evidentially truth-preserving rules of inferences, nor do they explain how they could know such a thing. To nail down their rationalist position, the conviction must be rationally supported and the explanation must be given.

In all cases that I am aware of, the range of examples that rationalists cite to support their position is limited and narrow. Some of the examples are logical, some are mathematical, and some are metaphysical, "Nothing could be both red and green all over the same time" being a standard instance of the latter group. I shall argue that the instances they cite invariably lack any claim to self-evidence. In the next chapter I shall discuss some of them again, arguing that their truth—if they deserve to be considered true—can be supported by considerations favorable to empiricism.

General Doubts about Intuitive Knowledge

Earlier in this chapter I used the words "intuition" or "rational insight" to describe the kind of awareness rationalists claim to have of the truths they consider self-evident. These words are in fact very widely used at the present time, although their meaning is much less clear than their users suppose.[18] Before discussing the examples I mentioned in the last paragraph, I want to make some preliminary remarks about intuitive knowledge. The remarks are prompted by the fact that philosophers who speak of such knowledge apply the classification to some occurrences that empiricists have no trouble acknowledging. The examples that arouse empiricists' doubts and suspicions have distinctive features that are responsible for their negative attitudes. It is important to understand what these distinctive features are.

It is useful to begin with the cases that an empiricist would have no problem accepting. These cases include the recognition of particular things and the recognition of instances of kinds or qualities. As far as particular things are concerned, I can obviously recognize my face in a mirror, my wife in a crowd, or an old friend in a photograph. Normally, I recognize such things immediately; I do no inferring at all. Kant described these recognitional acts as intuitions, but their objects are not truths, and there is nothing dubious about them. The recognition of an instance of something is a little more complicated. When I recognize a color, I am recognizing that something I see, some particular thing, has that color; I do this when I see a flag to be blue and yellow. Here again the recognition is immediate. I recognize the instance (at least I often do so) without making any inference or drawing any conclusion.

Lawrence BonJour gives a slightly more complicated example; he describes it as an example of "rational insight":

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18 This is persuasively argued in Hintikka (1999).

> Even to apply as straightforward and seemingly unproblematic a rule as *modus ponens,* I must see or grasp in an immediate, not further reducible way that the three propositions comprising the premises and conclusion are of the right forms and are related in the right way….[19]

As an empiricist, I can easily grant that I *may* see or grasp in an immediate, not further reducible way that the three propositions have certain forms and collectively constitute an instance of *modus ponens*. Recognizing such a thing is something I have learned to do, and there is nothing philosophically problematic about this—nothing, at least, that I recognize as philosophically problematic. But I would emphatically deny that I *must* see the argument form in this immediate way. If the argument were composed in a language I read with difficulty, such as German or classical Greek, I would no doubt have to do some serious inferring to recognize the instance. I would probably have to look up a number of words and I might have to think about declensions, conjugations, or even genders before I could make the relevant identification.

BonJour's view on this last matter is reflected in a clause that he adds to the quotation above. His addition, which follows a colon, is this:

> that, for example, the two simpler propositions in question are in fact identical with the antecedent and consequent of the conditional proposition [*sic*] is as much a necessary, a priori knowable truth as anything else.

There appears to be some difficulty with the text here, for the initial "that" seems to be preceded by a tacit "I must see or grasp," which introduces the clause I cited in the last paragraph. But BonJour's thought, pretty clearly, is that the following is a necessary, a priori truth: "the two simpler propositions are in fact identical with the antecedent and consequent of the conditional proposition." As far as I can see, the truth of this assertion is certainly not knowable a priori. If anything is a necessary a priori truth here--apart, that is, from the conditional statement corresponding to *modus ponens*--it is only the conditional assertion, "If the argument is an instance of *modus ponens*, it consists of three statements, one a conditional and the others synonymous with the antecedent and the consequent of that conditional." And this is a general assertion, one that an empiricist would regard as analytic.

Other examples of recognizing things as such and such (recognizing x's as F) are generically similar to recognizing an instance of *modus ponens*. If we recognize that a certain sentence is or is not grammatical (in relation to our own language, dialect, or idiolect) or that the predicate "knows that P," as we understand it, is not applicable to someone who has no evidence that P,[20] our recognition may be immediate, but it is not philosophically troublesome. It results from a competence we have developed as we learned (or otherwise came to possess) the relevant verbal system. Forty years ago psychologists specializing in learning theory would have accounted for this competence by appealing to some "conditioning" process of stimulus and response; today, a favored explanation would no doubt advert to neural activity and innate verbal capacities. The phenomenon is straightforwardly empirical, and the best explanation will be empirical as well. Nothing here should raise the hackles of a responsible empiricist.

The examples that do raise problems concern alleged truths that are non-empirical. These supposed truths are problematic, empiricists say, either because it

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19 BonJour (1998), pp. 131f.

20 Bealer (1999) regards this case as an example of a "rational intuition" (see p. 30).

is doubtful that anything genuinely factual is actually being recognized, or because it is far from clear, if something definitely factual and not merely verbal is being recognized, how that fact can possibly be known in the direct way rationalists suppose. Consider the first alternative, since I shall be discussing the second one in the next section. An example illustrating the problem empiricists see here can be drawn from the subject of ethics. Some philosophers nowadays attempt to prove the objective truth of certain moral judgments by pointing to examples that every reasonable person would acknowledge to be morally wrong—for instance, some young hoodlums setting a cat afire just for the fun of it.[21] But the moral judgment a reasonable person would make in a case like this and the repugnant attitude that would accompany it hardly show that an objective moral truth is being apprehended. Moral attitudes are instilled in children by parents and playmates as well as by pastors, teachers, and neighbors, and moral responses are evoked by these attitudes. Moral "facts" are poor candidates for the true explanatory factors, because different communities, and sometimes different groups in a larger community, instill different moral attitudes. On the day I write these words Islamic demonstrators in London are carrying signs declaring that the persons responsible for publishing a cartoon featuring the Prophet's face should be "beheaded." Yesterday a young man entered a gay bar in Boston and struck patrons with a knife and hatchet; and every day some people are demonstrating for, and others are demonstrating against, abortion, capital punishment, and the right to eat meat or use animals in medical experiments.

Apart from the variability of much moral opinion, people's opinions and feelings about what is laudable or blamable can be traced, as J. S. Mill emphasized in *On Liberty*, to "multifarious causes." One cause is, of course, the moral indoctrination they received as a child; this case is reinforced by what Mill called "the magical influence of custom, which is not only, as the proverb says, a second nature but is continually mistaken for the first."[22] Other causes that Mill cites include persons' reason or moral reflection, their prejudices, superstitions, and social affections, "not seldom their antisocial ones; their envy or jealousy, their arrogance or contemptuousness; but most commonly their desires or fear for themselves—their legitimate or illegitimate self-interest." Moreover, "wherever there is an ascendant class," Mill adds, a large portion of the morality of the country emanates from class interests and its feelings of class superiority"—and he supports this claim by a list of instances. These "multifarious causes," and others that Mill discusses, such as those occasioning the *odium theologicum* in a sincere bigot, which he takes to be one of the most unequivocal cases of moral feeling, make a rationalist's claim about directly apprehending moral facts seem decidedly simple-minded.

These remarks about the variability of moral judgment and feeling, and the many causes that bear upon them, do not, of course, imply that there is really no right and wrong in the moral domain. That is a contention that requires much further investigation. Mill himself seems to have believed that the utilitarian morality he accepted on purely secular grounds is rationally defensible and has a kind of objectivity,[23] but he did not suppose that the required defense included an episode of moral perception. Quite the contrary. If the defense he gave for the moral principle he advocated in *On Liberty* is representative of the defense he considered generally necessary, the requisite reasoning would be wide-ranging and elaborate. His

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21 The example appears to be standard in recent discussion; I saw it in an unpublished paper by Ernest Sosa, and a similar example is cited in Hintikka (1999), p. 137.

22 Mill (1859), p. 5.

23 I am thinking here of his famous claim in *Utilitarianism* that "considerations may be presented capable of determining the intellect either to give or to withhold its assent to the doctrine, and this is equivalent to proof." See Mill (1861), p. 5.

argument in *On Liberty* is possibly the most complicated argument he ever developed for a single principle.

Another important source of doubt about the truth of what may seem intuitively obvious is the history of the axiom of parallels in Euclidian geometry. This axiom was commonly perceived to be less obvious than Euclid's other axioms, but some mathematicians believed they could derive it from them. When their derivations were examined by means of the more rigorous logical methods that became available in the latter half of the nineteenth century, critics discovered that the derivations made use of geometrical intuitions that were equivalent to the axiom of parallels itself.[24] These equivalent intuitions seemed so natural that they were not recognized as distinct principles. When, later in the century, mathematicians were able to prove that the axiom of parallels is in fact independent of the other axioms, systems of non-Euclidean geometry were worked out with different axioms in place of the parallels one.

In 1915 Einstein developed his general theory of relativity, according to which the geometry of physical space has a particular non-Euclidian structure. Well before this time Bertrand Russell had already distinguished "actual" space from mathematical space, holding that the study of actual space is "an experimental science."[25] As a branch of pure mathematics, he said, geometry is a subject whose assertions are to the effect that "such and such consequences follow from such and such premises, not that the entities such as the premises describe actually exist." Thus, he continued:

> If Euclid's axioms be called A, and P be any proposition implied by A, then, in the [old] geometry…, P itself would be asserted, since A is asserted. But nowadays the geometer would only assert that A implies P…. And he would have other sets of axioms, A_1, …, A_n implying P_1, …, P_n… respectively: the *implications* would belong to Geometry, but not A_1 or P_1 or any of the other axioms and propositions (pp. 373f).

A rationalist philosopher who can concede Russell's claim that the study of physical space belongs to empirical science might nevertheless argue that pure geometry is not essentially hypothetical but makes categorical assertions about ideal geometrical objects such as trangularity, squareness, and Euclidean parallelism. But this approach is no longer taken seriously by geometers. Geometry can do quite well without postulating such entities. Arguments for ideal objects are not mathematical arguments, anyway; and it is mathematically sufficient to hold that any thing or things satisfying the axioms of a given system, if there be such, must satisfy the theorems deducible from them. There is no need to go further than this.

The striking dubiousness of supposed intuitions in ethics and geometry should make a cautious philosopher highly suspicious of every appeal to intuitions. It is simply all too easy for people to convince themselves that they are in direct connection with the truth when they are merely imagining that they are so connected. But particular subjects may provide better candidates for intuitive knowledge than ethics and geometry. In the following sections I shall consider a representative sample of the examples rationalists now offer for what they consider directly self-evident. I begin with logical truths and primitive rules of a priori inference.

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[24] See the clear and illuminating discussion in Carnap (1966), ch. 13.
[25] Russell (1902), p. p. 372.

Logical Truths and Rules of Inference

Perhaps the most frequently cited instance of a self-evident logical truth is the principle, or "law," of non-contradiction. Formulated in the usual way, "~(p ∧ ~p)," it seems to be a very simple principle, a suitable object of intuitive insight, but the formulation is very misleading.[26] The ingredient letter "p" is schematic; it stands in place of infinitely many formulas of infinitely varying complexity--and this infinite variety is a very inappropriate object of mental vision: we do not apprehend all the instances.[27] As a matter of fact, when we think about possible members of this infinite variety, some can be brought to mind that appear to falsify the law. Suppose we consider two statements, A and B, the first inscribed in a circle and the second in a rectangle. Suppose A is "The statement in the rectangle is true" and B is "The statement in the circle is not true." By obvious principles of logic and semantics we can easily derive the contradiction.

It may be useful to say a little more about how this contradiction is derivable. One way of proceeding is to use conditional proof. We first assume the hypothesis A and then derive its negation, from which we infer "~(The statement in the rectangle is true)." (From "A ⊃ ~A" we may infer "~A", for any formula "A".) We then assume the negation of A, that is, ~A, and proceed to derive A, from which we infer A, "The statement in the rectangle is true." (From "~A ⊃ A" we may infer "A".) We then conjoin the results of these inferences and obtain our contradiction, "The statement in the rectangle is true ∧ ~(The statement in the rectangle is true)."

As it happens, many sentences can be constructed in English that provide apparent counter-instances to the "law" of contradiction. Are they acceptable counter-instances? Obviously, someone convinced of the inviolable truth of the law of contradiction would want to say no, but to support this answer he or she will have to locate the error in the sort of reasoning I have given. When one uses a directly self-referential statement such as "This statement is false," one is apt to hear the response, "Self-referential statements are not acceptable substituends for the schematic letters in logical principles." But why should we accept this response? We can make all sorts of true statements that are directly referential, as when we say, "This is a sentence of English," "This is a grammatical sentence," and so on. Why are these sentences all right and sentences such as "The sentence in the rectangle is false" not all right when it appears in a certain circle and there is another sentence in a certain rectangle consisting of the words "The sentence in the circle is not true"? The only thing wrong is that these sentences or these combinations of sentences occurring in certain places give rise to contradictions.[28] If we want to avoid contradictions we can disallow such troublesome sentences, but we cannot plausibly rule them out on the basis of an alleged direct intuition of the truth of a law of contradiction. The alleged direct intuition is spurious because the law is highly general and schematic, and the intuition did not encompass (or survey) every instance pertinent to that law, some of which appear to provide demonstrable exceptions to it.

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26 Laurence BonJour, a recent defender of epistemological rationalism, formulates it with a quantifier in BonJour (1998), p. 33; he offers "for any proposition P, not both P and not P". But if his quantifier is understood in the usual way, his formulation does not make sense, for the inner formula then lacks a verb, like "not both Tom and Mary."

27 This is the usual way of formulating the law; another way of formulating it is to take the axiom as expressing a particular proposition and to include a rule of substitution that permits one to obtain all the other instances I speak of in the text.

28 Kurt Gödel's famous incompleteness theorem is founded on a formula that, in effect, says of itself that it is not provable in a system of a certain kind. Although the formula is self-referential, it is not considered paradoxical or objectionable because no contradiction is inferable from it. See van Heijenoort (1967), p. 352.

The reader should know that some respectable and responsible logicians contend that some statements should be accepted as both true and false because they can be proved to have this status.[29] Accepting them obviously requires someone wanting to retain a version of the principle of contradiction to restrict its application to formulas that cannot have both values. It is useless to object that this kind of restriction must be disallowed because any counter-instance to the classic principle will have to assume the principle in an unrestricted form. This objection is useless because it is false: asserting that "Q ∧ ~Q" is a counter instance to the schematic principle "~(p ∧ ~p)" does not involve assuming this principle. The classic principle, as commonly understood, is used to make an assertion about *all* conjunctions of a formula with its own negation. Asserting that a particular conjunction, "Q ∧ ~Q," is incompatible with "~(p ∧ ~p)" does not involve a general assertion of this kind.

Another standard logical principle often claimed to be intuitively obvious is the so-called law of excluded middle, "p ∨ ~p." Some rationalists actually doubt this principle, but it is inferable almost immediately from the principle of non-contradiction by one of De Morgan's laws. One reason for doubting the law of excluded middle lies in the vagueness of certain statements. A vague statement contains a predicate that clearly applies to some actual or imaginable objects, clearly fails to apply to other such objects, and neither clearly applies nor clearly fails to apply to a final group.[30] Objects in this last group are neither included in nor excluded from the extension of the predicate because the application conditions for the predicate are insufficiently definite to accommodate them. To take a proverbially vague predicate, suppose that Tom X is a man who is intermediate between being bald and being non-bald. Suppose that he cannot be truly classified either way. He is a borderline case of a bald man. If this is so, the semantic value of "Tom X is bald" is neither T (true) nor F (false) but IND (= indeterminate). But if "Tom X is bald" has this value, what is the value of "~(Tom X is bald)"? Obviously, it is IND as well. If it had the value T, "Tom X is bald" would have the value F; and if it has the value F, "Tom X is bald" would have the value T—and we are supposing that it has neither of these values. Well, if both "Tom X is bald" and "~(Tom X is bald)" have the value IND, what should be the value of their disjunction, "Tom is bald ∨ "~(Tom X is bald)"? The value should be IND as well. If neither of the subformulas has the value T, their disjunction can hardly have the value T: disjuncts with at least one true disjunct have this value. Similarly, it cannot have the value F, because formulas with false disjuncts have this value. But the law of excluded middle requires that it have the value T. Thus, the law appears to fail for this conjunction; it does not hold for all cases.

A similar result obvious holds for the principle of non-contradiction. If the value of both "Tom X is bald" and "~(Tom X is bald)" is IND, the value of their conjunction must be IND as well. The value could not be T because conjunctions with this value have true conjuncts; the value could not be F because neither conjunct has this value—and at least one must have it if the conjunction has it. But if the principle of non-contradiction is a law, the conjunction must have the value T. Any other value for the conjunction, for example IND, would be an objection to it. A person rejecting the law of contradiction as universally valid need not claim, therefore, that some instance of the schema "~(p ∧ ~ p)" is false and that an inner

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29 See Priest (1998).

30 See Sorenson (2006). Sorenson and Williams (2000) think vague statements should be considered true or false, but their reasons for thinking this have to do with the advisability of retaining classical logic. I comment on this matter in chapter three; see footnote 23.

formula of the form "p $\wedge\sim$ p" is true. It is sufficient to claim that some instance has a value other than T or F.

Philosophers who claim to see directly that the basic laws of classical logic are true obviously overlook ostensibly contrary instances involving vague predicates just as they overlook contrary instances containing "is true" and "is false." They do not see or intuitively apprehend the full generality of those laws; they do not contemplate all the instances pertinent to them, some of which appear to provide counter-instances. They neglect these instances just as they neglect currently rejected or questioned principles once deemed self-evident by other rationalist philosophers. Frege's Axiom of Abstraction[31]—that a class corresponds to every property—is now firmly rejected although it was once widely accepted as a truism; and the principle that every occurrence has a cause is now commonly regarded as false on scientific grounds although philosophers never seriously doubted it before the middle of the twentieth century. One would think that if highly respected philosophers had made erroneous claims about what is self-evident or intuitively obvious, their claims that this or that proposition has this status should be taken with a thousand grains of salt.

Do I believe that I have refuted the principles of classical logic? Do I think they should be rejected as false? It depends on how they are interpreted. If the principles—that is, the theorems—of classical logic are supposed to hold for all grammatical sentences that can possibly be put in place of the schematic letters in those theorems, which is the way many philosophers seem to regard them,[32] then the answer is yes. I have cited examples that will then count as counter-instances. But the principles of classical logic need not be taken to hold for all such sentences; they can be understood as applying to a restricted class of sentences, the ones that can be described as *proper substituends* for the schematic letters. If the principles are understood this way, it is arguable that I have identified no counter-instances. The crucial issue, then, is then how the proper substituends are identified. If we exclude the cases I have identified, have we excluded all possible falsifying instances? We certainly cannot claim to know this by "intuition," for we have not consciously surveyed all possible cases. It is uncertain, off-hand, whether statements such as "Zeus is insane" or "The Easter Bunny has a good sense of humor" conform to the principle of bivalence and are therefore either true or false but not some third value. This uncertainty is philosophically significant because, to be certain that we have rightly identified the class of sentences, or formulas, for which the theorems of classical logic are certain to hold true, we must know that no further qualifications will have to be made, and it is not at all obvious how we are suppose to know this. I will pursue this matter in the next chapter, when I consider an empiricist approach to logical truth. My aim in this chapter has been to cast serious doubt on the rationalists' approach. I think I have clearly said enough to make their strategy of directly intuiting the truth of a logical principle seem patently unrealistic.

To assure the reader that the opinion I am expressing here is not idiosyncratic, it is worth mentioning the example of Kurt Gödel, whose opinions on

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31 This is commonly formulated as an axiom schema, "$(\exists C)(\forall x)(x \in C \equiv \Phi x)$." Taking "$\Phi x$" as "$x \notin x$", one can quickly derive a contradiction. See Suppes (1960), pp. 5-8.

32 This seems to be true even of such well-informed and able philosophers as Hartry Field (2005), who very recently expressed the opinion that defenders of classical logic and of alternatives such as "fuzzy logic" do not really disagree as to whether any instances of excluded middle are true; the fuzzy logician will "just refrain from asserting some" (p. 84). Field is clearly wrong about this. At most the fuzzy logician will deny that he can point to an instance of excluded middle or non-contradiction that is actually false. He can, however, point to an instance that is plausibly *not true,* and this is enough to motivate his interest in an alternative to classical logic. If he is a firm believer in fuzzy logic, he will contend that what is plausibly not true in regard to vague statement is actually not true.

logic deserve everyone's respect. In commenting on *Principia Mathematica*, which he acknowledged to be the "first comprehensive and thoroughgoing presentation of a mathematical logic and the derivation of Mathematics from it," he expressed his regret that the work "is so greatly lacking in formal precision in the foundations." What is missing there "above all," he said, "is a precise statement of the syntax of the formalism." He illustrated this lack of precision by pointing to Russell's treatment of what he, Russell, called incomplete symbols, such as definite descriptions. Russell introduced such symbols by rules describing how sentences containing them are to be translated into sentences not containing them. But, Gödel said, "to be sure … that (or for what expressions) this translation is possible and uniquely determined and that (or to what extent) the rules of inference apply also to the new kind of expressions, it is necessary to have a survey of all possible expressions [of the relevant language system], and this can be furnished only by syntactical considerations."[33] We need such a survey to be sure that even a rule such as non-contradiction or excluded middle applies to every sentence of the language we are using.

Before pushing on to a consideration of the non-logical examples I promised to discuss, I want to say something about two elementary rules of inference, *modus ponens* and *modus tollens*. Rationalists typically regard these rules as self-evidently acceptable, but there are examples that some philosophers have considered counter-instances to them. I cite a possible counter-instance to *modus tollens* first, since it is the simplest:

> If it rained yesterday, it did not rain hard (yesterday).
> It did rain hard (yesterday).
> Therefore, it did not rain yesterday.

This seems to be a clear case of *modus tollens*, yet some have found it sufficiently problematic to merit discussion in a well-known philosophy journal.[34] An intuitive glimpse is evidently not sufficient to assure every sober mind of its indubitable status. Both premises could be true, but the conclusion must be false if the second one is true. A counter-instance to *modus tollens* might therefore seem to be a possibility.

Vann McGee discovered my second example some years ago.[35] Intuitively, it is much more plausible than the first example. To appreciate it, recall that the 1980 presidential election was won by Ronald Reagan, a Republican, and that Jimmy Carter, a Democrat, was second and Anderson, a Republican running as an Independent, was third. The example concerns this election:

> If a Republican wins, then if Reagan does not win, Anderson will win.
> A Republican wins (=does win).
> Therefore, if Reagan does not win, Anderson will win.

The first and second premises seem obviously true: Reagan won, and he and Anderson were the only Republicans running in the election. But the conclusion seems false. The real race was between Reagan and Carter; Anderson was far behind. So at the time of the election it would be false to say, "If Reagan does not win, Anderson will win."

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33 Godel (1951), p. 126.
34 See Adams (1988) and Sinnot-Armstrong *et al* (1990).
35 See McGee (1985).

There is actually some controversy about whether this argument is a genuine counterexample to *modus ponens*.[36] Its author, Vann Magee, thinks it is a genuine counterexample. At least one writer, Christopher Gauker, thinks it is not a counterexample to *modus ponens* but thinks it can be converted into a counterexample to *modus tollens* by switching lines (2) and (3) and negating them both.[37] I think (for reasons I shall mention in the next chapter) that, without some clarification of the English in which the argument is cast, it is impossible to say decisively whether it is or is not an acceptable counterexample. Here I shall merely note that the disagreement about this argument and the earlier one involving *modus tollens* supports my contention that the validity of these argument forms is not something that can plausibly be immediately grasped by an act of rational insight. As before, too many formulas are involved; too many considerations arise; too much cannot be decided without examining actual cases.

Alleged Self-Evident Factual Truths

The following are representative examples of nonlogical truths that rationalists claim to be self-evidently true; similar examples were included in a list supporting rationalism in a very recent discussion.[38]

1. A square is a rectangle.
2. Red is a color.
3. Everything red is extended.
4. Nothing can be both red and green all over.
5. *Taller than* is a transitive relation.
6. 7 + 5 = 12.

Off-hand, one would think that the first three examples are true by definition. My desk dictionary defines a square as an equilateral rectangle, and this implies that the sentence means "An equilateral rectangle is a rectangle," which satisfies Kant's famous definition of an analytic truth. The word "red" clearly refers to a certain color, and one would think that colors are by definition properties of spatially extended objects or quasi-objects such as rainbows.[39] Thus, only the last three examples would seem to be initially plausible cases of truths that might be immediately known by rational insight.

Rationalists view these sentences otherwise, of course. According to Roderick Chisholm, perhaps the best-known defender of epistemological rationalism in the last half of the twentieth century, the words in these sentences stand for "properties" and the sentences are true by virtue of essential relations between these properties. If, Chisholm said, we understand these sentences, we know what the relevant properties are; and if we bring them to mind, we can grasp the essential, unchanging relations between them. Our grasp of these relations shows us that the sentences must be true.[40]

Lawrence BonJour expounds a more complex view of how we grasp the truth of a priori propositions in his book, *In Defense of Pure Reason.*[41] His initial

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36 Bernard Katz has also argued that the argument does not provide a successful counter-instance to modus ponens, but his criticism is not the same as mine. See Katz (1999).
37See Gauker (1994) pp. 141f.
38See BonJour (2005), p. 100.
39 Actually, the third example raises an issue concerning spatial points that I will discuss in the next chapter.
40 Chisholm (1996), p. 27.
41 BonJour (1998).

statement of this view is very similar to the one Chisholm offers, but his elaboration of it introduces complexities that Chisholm did not consider. He proceeds by discussing the example of "seeing" that nothing can be both red and green all over at the same time. Like Chisholm he begins by emphasizing that in understanding the proposition he "comprehends or grasps the property indicated by the word 'red' and also that indicated by the word 'green'," and that he has "adequate conceptions of redness and greenness." He also claims to understand "the relation of incompatibility or exclusion that is conveyed by the rest of the words in the verbal formulation of the proposition, together with the way in which this relation is predicated of the two properties by the syntax of the sentence." Given this understanding of the ingredients of the proposition, he says he is able to "see or grasp or apprehend in a seemingly direct and immediate way that the claim in question cannot fail to be true--that the natures of redness and greenness are such as to preclude their being jointly realized (p. 101)."

His elaboration of this initial statement occurs seven pages later in his book:

> It is in the natures of both redness and greenness to exclusively occupy the surface or area that instantiates them, so that once one of these qualities is in place, there is no room for the other; since there is no way for the two qualities to coexist in the same part of the surface or area, a red item can become green only if the green replaces the red" (p. 108).

BonJour's initial account was directly perceptual: redness and greenness are somehow presented to his consciousness, and he sees their incompatibility directly. But this second account is more discursive. Seeing one thing, redness, he realizes that it is by nature a certain sort of thing--an exclusive occupier, with respect to a certain class of properties (color properties), of a surface or area. Seeing another thing, greenness, he realizes that it has a similar nature: it too is an exclusive occupier, with respect to the same class of properties, of a surface or area. Since he sees that redness is different from greenness and knows that both properties belong to the excluder class, he then *concludes* that no surface or area can be both red and green at the same time. How he realizes that redness and greenness are exclusive occupiers in this way is not obvious on this model. But when he does realize this, he concludes that redness and greenness cannot occupy the same surface at the same time by a valid form of reasoning, one requiring the complex premise, "For any x, y, z, and t, if x and y are exclusive occupiers, with respect to a class of properties C, of a surface or area z at time t $\wedge$ x $\neq$ y, then $\sim$(x and y occupy z at t)."

It seems to me that the elaboration BonJour offers makes his account much more realistic than the one Chisholm presents. Yet I also think that the tacit inference required by the elaboration is best understood and justified by the kind of empiricist position that I shall expound in the next chapter. To carry on my criticism of epistemological rationalism, I shall not restrict my target to the more complicated account but shall proceed as if the question of which rationalist view is most plausible were still up in the air.

A distinctive weakness of both BonJour's and Chisholm's views of the examples I have listed is their undefended assumption that redness, greenness, and color are discrete properties that we can "grasp" in the immediate way they describe. There is a long tradition of thinking of color this way (G. E. Moore famously described yellow as a simple, unanalyzable property),[42] but the concept we use is much too complicated for such a picture. For one thing, a surface can be red but appear to have some other color if seen in some atypical light. To be the way it looks a red

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42 See Moore (1903), p. 10.

object must look red when viewed in good light by an observer with a good eye for colors. This fact about observers and conditions of illumination is built into the concept of red (or any objective color) and this makes the property of being red a very complicated one. Because of this complexity, it is extremely doubtful that the connection of this property to a logically distinct property of comparable complexity could be grasped in any immediate, infallible way.

Another fact to keep in mind here is that the ideas (or concepts) expressed by the words "red," "green," and "color" are far too vague and too generic to represent discrete, graspable essences. If you start with a pail of white paint and begin adding small amounts of red, the paint will gradually become a faint pink, then darker and darker pink, and finally, if you add enough red, the paint will start getting red and eventually be red. There will be no cut-off points indicating when the paint first becomes pink and then stops being pink, and when it first becomes red. The same is true of red and many other colors that can be blended with it: there are no natural cut-off points that define the compound shades that may result. If a *de re* correlate were needed for "red," the most plausible candidate would seem be a so-called fuzzy set whose positive members include numerous shades of red (no doubt many thousands of them) of various degrees of brightness and saturation blended with wide variety of other colors.[43] The set would be fuzzy because its membership is not categorically defined: things belong to it in greater or lesser degrees.

If things are definitely red only because of determinate shades that fall within a certain range, the property of being definitely red is a derivative one specifiable by a quantified formula such as this: "$\forall x$(x is definitely red iff $\exists P$(P belongs to the family of definitely red shades $\wedge$ x has P))." A property so specifiable is plainly not a plausible object of direct apprehension. It can be "grasped" only by a discursive process seriously at odds with the picture presented by Chisholm and BonJour.

In spite of the complexities I have been emphasizing, there is nevertheless a kind of incompatibility between red and green that has nothing to do with metaphysics. Owing to the physics of light and the physiology of the human eye, it is not possible for us to perceive shades that contain mixtures of these colors.[44] To expose the error in the rationalist's metaphysical claim about the incompatibility of different colors, it will therefore be useful to consider a different pair. Yellow and green will suffice. A detailed example will also be useful, because the subject in question is complicated in ways that I have yet to indicate.

Before I present my example I want to announce upfront the strategy I shall be pursuing. I aim to show, first, that there is really no plausibility in the idea that a surface or surface part could not jointly exemplify, all over, two different generic colors. Such things could conceivably be both generic green and generic yellow at the same time. I will concede that they could not equally possess two distinct shades of color, any color, at the same place at the same time. But this last impossibility is not a synthetic truth that is known in the intuitive way BonJour describes. It is rather, I will argue, an analytic truth that follows from (and is provable by reference to) a basic classificatory convention for identifying determinate color shades.

Here is the example. Suppose two people, Tom and Mary, visit an arboretum and see a shrub with leaves whose color appears to include both these colors. Tom and Mary are told that the color is chartreuse, but it does not satisfy the definition of that color given by their dictionary, which is "a clear light green with a yellowish

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[43]For an informal discussion of fuzzy set theory and arguments for the view that the semantics of basic color terms is best represented in the formalism of fuzzy set theory, see Kay and McDaniel (1997).
[44]Ibid.

tinge."[45] Tom describes the color as greenish-yellow, which is a shade of yellow; and Mary describes it as yellowish-green, which is a shade of green. Considering the novelty of the color, neither person is clearly right, but their classifications seem inconsistent: greens and yellows are generically different. If both persons hold stubbornly to their own classifications, it seems reasonable to say that they are demarcating yellows and greens in different ways and that they therefore mean slightly different things when they speak of these two colors.

There is, however, another way of thinking about the color of the shrub that is no less acceptable than the ones Tom and Mary have. Tom, who describes the leaves as greenish-yellow, sees a kind of yellowness all over a given leaf; Mary, who describes them as yellowish-green, sees a kind of greenness there. But suppose a friend, Harry, describes the leaf as green and yellow all over: he sees both greenness and yellowness there. For him, the two colors are both present in this instance, and neither predominates. Instead of describing the color he sees as greenish-yellow, which is a shade of yellow, or yellowish-green, which is a shade of green, he describes it as green-yellow, a shade that exemplifies both generic colors in an equal degree. His descriptions shows that he conceives of generic green and generic yellow as overlapping in a region of the spectrum, and his conception makes it consistent for him to say that a thing can exemplify both colors all over at the same time.

As I said before I presented this example, I am not using it to provide a counterexample to a plausible rationalist claim about color-incompatibility. If two colors are described purely generically, there is really no plausibility in the idea that they cannot be exemplified by the same surface and the same time. Thinking this is impossible can only be owing to carelessness. But two specific color shades, no matter what generic colors they involve, are incompatible in the sense in question. No surface could possess them both at the same time. This fact does not support rationalism, however. It is simply a logical consequence of the way we distinguish specific color shades.

To appreciate this last fact, we should observe that a physical thing could clearly possess the same specific, absolutely determinate color at different times. But what would determine—what would settle the question—whether the absolutely determinate color (the shade that does not include more specific shades) possessed by a surface at time t is different from the determinate color it possesses later, at a time t*? The answer, pretty clearly, is "The determinate color the surface possesses at t is the same as the determinate color it possess at t* when and only when the color of the surface at the one time is indistinguishable from its color at the other time." But if two determinate colors are conceded to be distinguishable, it *follows logically* that nothing possesses both of them at the same place at the same time.[46]

It is important to realize that the impossibility at issue here is not a mere matter of color-exclusion; it is something that attaches to the truth of a conjunctive proposition, one that is best expressed by a sentence such as "There is an F, G, x, and t such that F is an absolutely determinate color, G is an absolutely determinate color, F ≠ G, x is a part or the whole of the surface of a physical body, x has F at t, and x has G at t." I think there is no plausibility in the idea that the necessary falsity of this complex proposition could be known by the simple procedures that Chisholm

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[45] This is what is given in *The Random House Dictionary of the English Language* (1968).

[46] This is very easily proved. Formulate the principle of color identity for determinate colors (CIDC) as "∀A∀B(DC(A) ∧ DC(B) ∧ Distinguishable (A,B) ⊃ A ≠ B)" and define "the determinate color of x at t" (in symbols, "DCxt = A") by "A is a determinate color and x has A at t." The impossibility of DC(xt) = A and DC(xt) = B (i.e. of x having both A and B at a time t) follows almost immediately by conditional proof.

and BonJour describe—this is, by bringing to mind and comparing different colors or color-shades. This is implausible because the complex proposition in question involves a technical concept—the concept of an absolutely determinate color—that presupposes distinctions that are not immediately obvious.

You might think that you could get an adequate idea of color determinacy merely by contemplating a color-expanse, since every actual expanse is bound to be fully determinate. But the sameness, the identity, of a determinate color is not a perceptible matter. An expanse of color may seem entirely homogeneous—I may be unable to discern any differences in it—but if one side is arranged against another, as when a side of a colored sheet of paper is folded upon another, I may learn that the color is not the same all over. Apprehending sameness always involves a comparison, so the identity of the color one sees (if there is just one) is not something that is immediately grasped by the mind. The notion of an absolutely determinate color, the sort of thing that cannot coexist with other properties of the same family, makes sense only in relation to a standard for sameness. The fact that the standard is objective (or public) indiscernibility in this case is not something that can be read off from what is before one's mind when one thinks of colors.

As I see it, the conjunctive proposition affirming the relevant incompatibility between colors is a consequence of a high-level analytic truth about absolutely determinate properties: it is a consequence of what we mean when speak of such things. I cannot properly defend this belief until I complete my discussion of analyticity, which I undertake in the next chapter. What I can confidently assert right now is that the BonJour and Chisholm account of how color incompatibilities are known is not credible. It is just as dubious as their account of logical truth.

Not all rationalists would agree with the accounts BonJour and Chisholm offer for the means by which color incompatibilities are ultimately known. George Bealer, who is an acknowledged rationalist, approach these incompatibilities differently, contending that intuitions of a priori certainty are episodes of "seeing" that are *prima facie* rather than certainly true.[47] But seeming incompatibilities are just as incapable of doing justice to the color-incompatibilties I have been discussing as the sort of direct perception of property connections that BonJour and Chisholm describe. The phenomena are bound up with conventions about the sameness of determinate colors, and they require a quite different analysis.

Although I shall pursue the notion of analyticity only later, it is pertinent to mention here that when Roderick Chisholm, in his classic textbook, attempted to refute the empiricist contention that assertions such as "Everything square is a rectangle" and "Being red excludes being blue" are analytic, he relied on Kant's eighteenth-century definition of an analytic truth.[48] But this definition was far out of date when Chisholm offered his refutation. In fact, Gottlob Frege explicitly called attention to the inadequacy of Kant's definition more than a hundred years before Chisholm's third edition was published, and leading empiricists left Frege's improved conception well behind in the 1930's.[49] Thus, although Chisholm's examples are not analytic in Kant's sense, it does not follow that they are not analytic in an improved sense that is more generally applicable.

Three Final Examples, Two Old and One New

47 Se Bealer (1999b), p. 247/
48 Chisholm (1996), pp, 34-36.
49 I discuss this in the following chapter.

The last two sentences on the list of alleged self-evident factual truths given at the beginning of this section concern the transitivity of the relation *taller than* and the identity of 5 + 7 and 12. My claims about the vagueness of "red" and "green" are also applicable to the example concerning "taller than." This last predicate is not nearly as transparent in meaning as one might initially suppose. There is no doubt that Wilt Chamberlain is taller than Yogi Berra and that a dwarf is not taller than a giant, but there are many pairs of objects for which the question "Is A taller than B?" has no more definite an answer than "Is Tom bald?" Consider this: Can a frog be taller than a tadpole or a wristwatch taller than a ring? Can a mountain be taller than a hill? Frogs, tadpoles, wristwatches, and rings have vertical dimensions, but they are not described as tall or short, and it is not clear that one can be taller than another. As for mountains, they can be tall but not short, and hills can be high or low. Can mountains and hills be compared for tallness? There is no definite answer to this. One can measure the heights of a mountain and a hill and declare that the one with the greatest height is taller than the other, but this way of speaking is not standard, and not clearly right or clearly wrong. The permissible arguments in the schema "x is taller than y" are not sharply demarcated. Yet if *taller than* were a discrete, determinate property that can be taken in by an intuitive act of consciousness, it should either be possessed by an ordered pair of objects or not possessed by it. We should not have any undetermined cases.

Even though "taller than" is a surprisingly vague predicate, it can be defined by other predicates, some comparably vague, in a way that shows the transitivity of *taller than* to be a consequence of a more basic transitivity, one involving the mathematical concept of *greater than*. If *a* is in fact taller than *b*, then *a* has a height that is measurably greater than the height of *b*. Let "*h(a*)" abbreviate "the height of *a"* and let "*_T_*" abbreviate "_is taller than_." If we define "xTy" as "h(x) is greater than h(y)"—in symbols, "h(x) > h(y)"—then we can prove the transitivity of *taller than* by proving that for any x, y, and z, if h(x) > h(y) and h(y) > h(z) then h(x) > h(z)." But the latter is a mathematical truth, one that is independent of the supposed graspability of the property *taller than.* The question I raised above about the indeterminacy of the permissible arguments in the formula "_ is taller than _" does not affect this proof of transitivity, because the formula expressing the transitivity of the taller-than relation is hypothetical: if "_T_" holds for the arguments of the antecedent, it holds for the arguments of the consequent. There is no need to worry about indeterminate cases.

The examples concerning *red, green, color*, and possibly even *taller than* have been seized upon by rationalists because they judge them to be necessarily true and to involve concepts that are not definable by means of simpler ones. If the predicates they feature cannot be defined this way, rationalists suppose, the specimen statements in which they appear cannot be "true by definition" and thus analytic; the empiricists must therefore be wrong about the basis for their truth. Yet our inability to define certain predicates, or find necessary and sufficient conditions for their application to suitable objects, need not be taken as evidence that such predicates connote indefinable properties, or any properties at all. Their application to objects may be justified by reference to properties--as when one justifies the application of "bald" to a man because he may have the property of being utterly hairless. But the property that does the justifying need not, as here, be the property supposedly expressed by the predicate. No such property may exist. In the course of learning English we come to apply "bald" to bare scalps, to deny it of hirsute ones, and to apply it to intermediate cases only with modifiers such as "slightly," "nearly," "almost," and "kind of." The sentence "If a man has no hair growing on his scalp, he is bald" may be necessarily true, but its truth does not depend on a property of baldness that an attentive mind can grasp and compare with other properties. It

depends on the way we use the words involved and the instances we recognize as unqualified instances of bald and non-bald persons.

The final example, the one concerning the identity of 5 + 7 and 12, deserves a far more elaborate treatment than rationalists typically offer. There have been importantly different theories of mathematical truth, and according to possibly the leading theory since the time of Frege, mathematical truths are reducible to truths of logic and set theory. Empiricists sometimes say that the truths of set theory are basically the same as those of logic,[50] but even if the former are acknowledged to possess a distinct subject matter, the axioms on which they rest are not declared to be intuitively obvious. Quine discusses five different axiom systems for set theory, and he spends many pages discussing their relative advantages and disadvantages. At no point does he attempt to justify an axiom by appealing to its self-evidence.[51] It may not be possible, in the end, to interpret mathematical truths in accordance with alternatives that philosophers have historically debated, but an interpretation that attributed their verification to a perception of intuitive obviousness would certainly not accord with the cautious attitude of serious writers on the subject.[52] As far as I can see, the obvious truth of "5 + 7 = 12" adds no significant support to the rationalist thesis regarding a priori truth.[53] To provide such support, those arithmetical examples must be accompanied by a credible philosophy of mathematics.[54]

Some interesting examples not offered by Chisholm or BonJour but apparently contrary to empiricist doctrine were given by Kripke in *Naming and Necessity*. Kripke did not offer these examples as anti-empiricist, but they are naturally viewed that way. Colin McGinn says that one of them (and I am confident that he would say the same of the others) is inconsistent with the empiricist view that necessary truths[55] are invariably analytic and depend for their truth on the analysis of the words involved in them. The example McGinn mentioned concerned the necessity of his being born to a particular pair of biological parents. His biological parents were Joe and June McGinn, and if Kripke was right, he, Colin McGinn, *could not* have been born to anyone except Joe and June. But the necessity here, expressed by the words "could not," is "not a matter of the meaning of the name 'Colin McGinn'"—nor is it a consequence of the meaning of the remaining words in the sentence, that is, of "could not have been born to anyone except Joe and June."[56] Kripke's other examples concern the matter from which an object such as a chair originated and the substance of which it is made. He expressed one example in the words, "If a material object has its origin from a certain hunk of matter, it could not have had its origin in any other matter."[57] His other example is to the effect that if a table was originally made of wood, it could not originally have been made of another substance such as ice.

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50 I can distinctly remember Carnap saying, in a logic seminar I took from him many years ago, that Zermelo's *Aussonderung Axiom* "looked like a logical axiom" to him.

51 See Quine (1969), ch. Xiv.

52 See Suppes (1960), Introduction.

53 "i = the square root of minus 1" is just as much a mathematical truth as "5 + 7 = 12," but i has always been considered an "imaginary" number. A philosopher's intuition seems a poor basis for distinguishing i and 5. i is considered imaginary because, according to the axioms for "real" numbers, a number such as i cannot exist.

54 A very suggestive novel approach to mathematical truth, one that does not support rationalism, is outlined in Fine (2005).

55 Contemporary empiricists will of course now concede that identity statements may be necessary but not analytic. See above, p. 40.

56 McGinn (2002), pp. 96f.

57 Kripke (1980), pp. 114f.

Kripke mentioned these examples in two different footnotes, and he did not therefore discuss them thoroughly. It is clear, however, as one can infer from his second example, that Kripke intended all three to have the form of conditionals. The example McGinn mentioned would thus be fully expressed as follows:

If the biological parents of Colin McGinn were Joe and June, then

Colin could not have been born to anyone other than Joe and June.

Although this sentence contains three proper names, its status as a necessary truth is a consequence of a more general principle that is expressible without any proper names—specifically:

∀x∀y∀z(the biological parents of x are y and z ⊃ x could not have been born to anyone other than y and z).

This last sentence, since it is wholly general in form, is not such an obviously unlikely candidate for the status of analytic truth as the one above. If it could be shown to be analytic, the one above could then inherit it, as "Aune is not both wise and stupid" inherits it from "No one is both wise and stupid."

Is there any plausibility in the idea that the general principle can be shown to be analytic? I think there is, at least if that principle is true and can actually be proved to be so. Kripke himself says that the related example that he stated fully, the one about the matter from which an object originated, is "susceptible of something like a proof," and if the proof he seemed to have in mind is sound, it is arguable that the result is an analytic truth. But to argue this, an acceptable conception of analytic truth must be developed. I shall therefore return to the example in the next chapter.

An Indirect Argument for Rationalism

Some of principal arguments supporting rationalism are indirect: they are intended to support rationalism by undermining its most widely held alternative. Arguments of this kind are reasonable if there is a strong probability or significant rational assurance that one or the other alternatives being considered is true or approximately true. Lacking this assurance, we must view these negative arguments as essentially motivational, advanced in the hope that they will induce your opponents to abandon their view in favor of yours. But for anyone who believes that some truths are universal, necessary, and knowable a priori, the only acceptable alternative to rationalism is some form of empiricism. So an argument against empiricism is very important for epistemology.

Empiricists agree that there are a priori truths, but they say that such truths are analytic, true solely by virtue of what is contained in a concept (Kant) or, roughly speaking, what is meant by ingredient words (Carnap). R. M. Chisholm opposed these views, insisting, in effect, that the statements empiricists consider analytic are not about ideas or words but about the world that ideas or words represent.[58] The world thus represented is what makes the statements true, he said: they are true because of what the world is like. As an illustration, consider the statement that Kant used in introducing the notion of an analytic judgment, "All Bodies are extended." This statement is true; it is so, Chisholm said, because *all bodies are extended.* If they were not extended, the statement would be false. Reality provides the relevant truth condition--not words or concepts, as empiricists suppose.

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58 I say "in effect" because the argument Chisholm actually gives is directed against what he calls "linguisticism," the view that a priori statements are "essentially linguistic," true by virtue of what words mean or how they are used. But Chisholm would certainly have modified the argument to apply to a conceptualist view, one implying that a priori statements are true solely because of what is contained in certain concepts or ideas.

If the argument just given were a good one, it would have to apply to all statements or all judgments. But many statements are hypothetical. Formulated in modern notation, Kant's statement that all bodies are extended would be "∀x(x is a body ⊃ x is extended)." This statement would be true if no bodies happened to exist at all. In view of this, how could it be things in the world, what exists at a time, that makes this statement true? If Kant was right, the statement is true because the predicate is contained in the concept of the subject: the subject concept specifies the conditions a referent would have to satisfy, and those conditions include the conditions required for satisfying the predicate. Because of this, we are assured that if anything were to satisfy the subject concept, it would satisfy the predicate. The fact that makes the judgment true is not, in this case, something about the extra-conceptual world; it concerns a connection between subject and predicate. It is a purely conceptual thing.

Chisholm, who said it is "properties" that makes a priori statements true, used a different kind of example in his truth argument; he did not use the example I borrowed from Kant. His example was:

> The English sentence "Being square excludes being round" is true
> if, and only if, being square excludes being round.

Here the truth of the mentioned sentence does apparently depend on something that somehow exists—namely, the properties of being square and of being round.

In spite of its initial plausibility, Chisholm's argument seems to break down on examination, and it certainly does not apply to the full range of truths that empiricists regard as analytic. The first step in examining it is to ask, "What does it mean to say that being square excludes being round?" "What is the property of being round excluded from?" If Chisholm is right, the world contains both properties, so the presence of one of them in the world does not (or should not) exclude the other from the world. Obviously, what being square excludes being round from is any object containing squareness; more exactly, it excludes roundness from any place where at any time some object contains squareness.[59] Since this is what the exclusion obviously amounts to, the statement "Being square excludes being round" really asserts something about all objects and all times, namely:

> ∀x∀p∀t (s round at place p at time t ⊃ ~(x is square at place p at time t)).

But this statement is hypothetical, and its truth does not obviously depend on what exists in the world. An empiricist would say it is dependent on an incompatibility between what is contained in the concept of being round and the concept of being square.

Another negative argument against empiricism applies primarily to modern versions holding that analytic truths are statements that are true by virtue of meaning, statements being true sentences with fixed interpretations. Rationalists such as BonJour insist that one can grasp a priori truths that one cannot express in language, and others claim that even if every truth were necessarily expressible in some language or other, one *may* nevertheless grasp a truth that is not in fact expressed in language. If a priori truths were invariably true statements, and if some of the truths that are supposed to be grasped are a priori, these claims must be false. Are they? What reasons can rationalists offer in their support?

In a passage in his book, *In Defense of Pure Reason*, BonJour wrote of the darkish blue of two books on his desk. He does not have specific names for these blues, he said, and he has no other means of representing them linguistically, but he

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59 A complex diagram could contain roundness (or circles) and squareness (or squares) at several places

nevertheless knows directly that nothing could have both of them all over at the same time. What is before his mind when he knows this cannot be linguistic, because the blues are not linguistically represented (pp. 57f). The trouble with this argument is that BonJour actually expresses the crucial proposition in language and does so in way that is as adequate for him as "This pen is mostly white" is adequate for me now. His reader does not know the referent of his "these colors" any more than my reader knows the referent my "this pen," but each of us knows what the referents of his own words are and each of us understands the sentences in which he has included those words.

In another passage BonJour quotes with approval A. C. Ewing's claim that a person who is capable of forming visual images might well see the truth of propositions such as the one concerning green and red without having to put them into words. To accomplish such a feat the person would no doubt have to have the concept of incompatibility that BonJour speaks of elsewhere,[60] but reflection shows that further concepts, or ideas, are necessary as well, for the proposition involves time, space, universality, thinghood, predication, and modality. To grasp the alleged truth about the red and green, one must be capable of thinking the thought *No thing could be both red and green all over at the same time.*" I suppose it is conceivable (at least if Wittgenstein was wrong about private languages) that someone could think such a thought without having a conventional language such as English or French, but it is hard to see how we could entertain all the propositions we are supposed to be capable of entertaining if we did not have a system of concepts or ideas that corresponds to words, particles, and grammatical constructions of conventional languages.

This response to the Ewing argument does not vindicate a language-centered account of analytic truth, but it does vindicate the sort of idea-centered or concept-centered approach of older empiricists. I say "approach" here because the details of their theories may be erroneous or inadequate for the full range of truths that a contemporary empiricist would want to consider analytic. But since ideas or concepts must be acknowledged as having contents that can be shared, wholly or partially, with other ideas or concepts, Ewing's argument does not itself refute the kind of account offered by older empiricists. I will consider its application to a more up-to-date account at the end of the next chapter.

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60 See p. 47 above.