Chapter 5
From Proofs to Verifications, and on to Falsifications

5.1 Chapter Overview

In philosophical circles, Dummett may well be seen as the most important campaigner for intuitionistic logic in the second half of the last century. This is because, as we already know, he had a novel and most ambitious vision: He would free intuitionistic logic from the narrow confines of mathematical discourse and show its applicability to *all* of our discourse and reasoning.

The key move in this project is the replacement of the concept of *proof* in the intuitionistic account with the concept of *verification*. As we have seen in Chap. 2, a central task (maybe even *the* central task) of a theory of meaning is to account for correct assertibility. Where the mathematical intuitionist was only correct in asserting something that was constructively provable, the verificationist will make a correct assertion if, and only if, what he says is verifiable. I will call any theory of meaning that is based on this central identification a form of *verificationism*.

VERIFICATIONISM An assertion is correct iff it is verifiable.

A theory that has only the concept of verification as its central concept will be called a form of *pure verificationism*.

However, we will see how Dummett runs into a problem when he tries to translate the clause for intuitionistic negation into purely verificationistic terms. The remedy that he himself proposed was to add *falsifications* to the account.[1] That is, instead of one central notion in mathematics (proof), here there will be two important notions that have to be incorporated into a theory of meaning, viz., verification and falsification. Their relative weight will have to be assessed, and I will follow Dummett in doing just that and extend his analysis.

At first, Dummett allows for falsifications to play a role only in determining the meaning of negations, that is, as part of the ingredient sense. Although one needs to

[1] Although Dummett often talks about meaning theories based on verification and falsification conditions in later works, the place where he extensively discusses falsifications is his *What is a Theory of Meaning (II)*.

A. Kapsner, *Logics and Falsifications*,
Trends in Logic 40, DOI: 10.1007/978-3-319-05206-9_5,

know both verification conditions and falsification conditions of a statement to be able to use it properly as a constituent of complex statements, the knowledge of the verification condition alone would suffice to use it on its own. The assertoric content is made up solely by its verification conditions. This is what I will call an *expanded verificationism*.

He then considers the possibility of giving the two concepts equal weight in the following way: An assertion could be held to be correct iff verifiable and incorrect iff falsifiable. This possibility, however, is soon dismissed, and I will spend some time in this and subsequent chapters to investigate whether this quick dismissal is justified. I will find that there are more options to consider here than Dummett allowed, and I will subsume them under the label *hybrid strategies*.

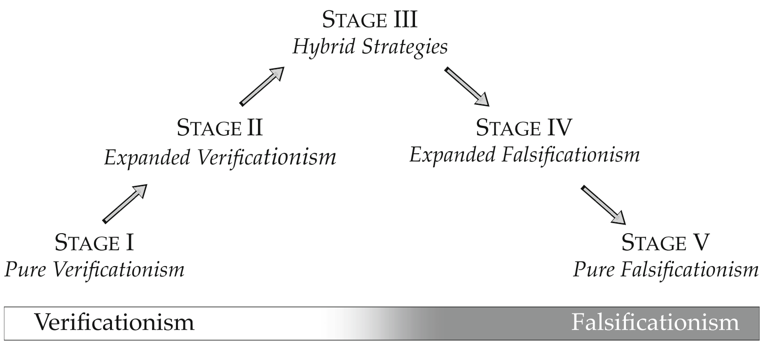
Lastly, Dummett suggests that we might be able to cope with only *one* of the two central notions after all. The thought is that it might be possible to build up a theory of meaning without any recourse to verifications at all, utilizing only falsifications. This seems to fit well to an important idea of his that we have not yet encountered: Between the notions of correct and incorrect assertions, it is actually the latter notion that is primary. Grasping the meaning of a statement is to know the conditions under which an assertion of it would be incorrect. Because he sees a close tie between finding an assertion incorrect and falsifying the asserted statement, he is driven to explore a purely falsificationistic theory of meaning. In such a falsificationism, an assertion is considered correct iff it is unfalsifiable.

FALSIFICATIONISM An assertion is correct iff it is unfalsifiable.

As his specific proposal is running exclusively on falsifications, without any need of verifications, I will call it *pure falsificationism*.

I will add one further stage that Dummett did not take into account: As it is not clear that a purely falsificationistic theory will fare much better than a purely verificationistic one when it comes to explaining the meaning of negated statements, I propose to investigate an *expanded falsificationism*. That is, of course, a theory that takes falsifications as the main notion in the assertoric content but makes use of verification conditions in the ingredient sense.

I thus discern five subsequent stages, with falsifications assuming an ever more prominent role down the line:



Stage I: *Pure verificationism*. This is the straightforward adaptation of the intuitionistic program to the empirical realm, with verifications assuming the role of proofs and no falsifications in sight.

Stage II: *Expanded verificationism*. Those are the theories of meaning that remain verificationistic in spirit, but employ falsifications in the ingredient sense, mainly to account for negations.

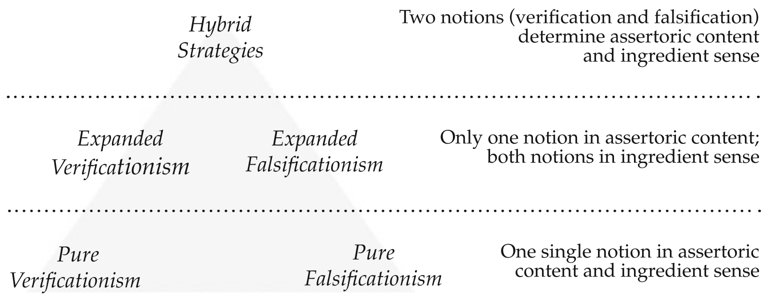
Stage III: *Hybrid strategies*. Theories in which verifications and falsifications are equally important to fix the both assertoric content and ingredient sense of statements. We will find three different approaches here, which I call the *CV&IF* strategy, the *discourse separation* strategy and the *burden of proof distribution* strategy.

Stage IV: *Expanded falsificationism*. These are theories that take Dummett's idea seriously that the incorrectness of assertions is more important than their correctness and that such incorrectness is to be tied to falsifications. However, at this stage, verifications are still around in the ingredient sense. They help to account for complex statements, just like falsifications did at Stage II.

Stage V: *Pure falsificationism*. Theories at this last stage are constructed according to Dummett's idea of how to dispense with all verifications. We find only falsifications, both in the ingredient sense and in the assertoric content.

The array above is not a flat one. The shape is, on the one hand, meant to emphasize that the two sides of the pyramid answer to two different accounts of assertibility. On the left, the verificationistic slope, a statement is assertible iff it is verifiable. The right side is the falsificationistic one, and an assertion is correct iff it is unfalsifiable.

Secondly, it will, unsurprisingly, turn out that there is a close similarity between Stages I and V on the one hand and Stages II and IV on the other. The pyramidical arrangement makes this symmetry even more obvious than the names of these stages themselves would have done.



The strategies that are found on the same level share not only the number of central concepts in the ingredient sense and the assertoric content. Also, the logics they support will turn out to be very closely related. The phenomenon of *duality* I talked about in the last chapter will make a frequent reappearance here.

Again, this chapter merely introduces the different stages; it will be the task of the chapters in the third part to shed some light on the question which logical systems are most likely to be motivated by theories of meaning at the different stages. Before that, the next chapter will investigate the unfamiliar take on assertibility that is driving the falsificationistic project.

As for the layout of the chapter you are reading now, I will mostly follow the rather obvious straight path marked by the arrows in the first diagram, which is also roughly the path Dummett took in his WTM. In Part Three, it will prove more useful to work through each horizontal layer at a time, from the bottom up.

Here, I will thus start with a short account of pure verificationism[2] and the problem that made the introduction of falsifications necessary in the first place: the meaning of negated statements.

5.2 Stage I: Pure Verificationism

To repeat, the first step in transmigrating the intuitionistic account of meaning to empirical areas of discourse is this: The mathematician's quest for proofs is replaced by a quest for *verifications*. Dummett writes:

> [The intuitionistic] theory of meaning generalizes readily to the non-mathematical case. Proof is the sole means which exists in mathematics for establishing a statement as true: the required general notion is, therefore, that of verification. On this account, an understanding of a statement consists in a capacity to recognize whatever is counted as verifying it, i.e. as conclusively establishing it as true. It is not necessary that we should have any means of deciding the truth or falsity of the statement, only that we be capable of recognizing when its truth has been established. The advantage of this conception is that the condition for a statement's being verified, unlike the condition for its truth under the assumption of bivalence, is one which we must be credited with the capacity for effectively recognizing when it obtains; hence there is no difficulty in stating what an implicit knowledge of such a condition consists in—once again, it is directly displayed by our linguistic practice. (WTM, p. 70)

He is putting forth, in short, a verificationistic theory of meaning. The content of a statement, so the verificationistic theory of meaning, is given by what would verify it. A statement is correctly assertible iff it is verifiable.

In talking about *verifiability*, we encounter a similar broad range of possible interpretations as in the case of *provability*. Although it seems that Dummett is taking the modality in different ways at different times, I will assume as a default notion of verifiability one that is exactly parallel to the notion of provability I worked out in Sect. 3.8. That is, I will say of a statement that it is verifiable iff it is decidable, and the decision method would lead to a verification of the statement. We might already have employed the method, or we might not. We do not even have to be sure which outcome applying the method would have, but we do need to know that applying the method would decide the issue.

[2] Together with the earlier chapter on intuitionistic logic, this chapter contains most of what I will have to say about purely verificationistic theories. Stage I, unlike the other stages, will thus not receive its own chapter in the third part.

As with the corresponding idea of provability, I believe that this makes for the most useful precisification of the notion of verifiability. It is, once again, a tensed notion. Statements that are not verifiable today may well become verifiable tomorrow. An untensed alternative would have to make recourse to an abstract realm of verifications that existed independently of our epistemic capacities, just as Prawitz's untensed provability had to employ a self-subsisting realm of proofs. If anything, the idea of such an independent realm of verifications seems even less plausible, given that empirical statements, unlike mathematical ones, include future tensed ones. To say that there might now be a verification of something that will happen in the distant future, whether or not we are able to devise a method of finding this verification, strikes me as too bold a proposition, and the quote back on p. 48 showed that Dummett would not have liked to make such a strong assumption either.

With this notion of verifiability, though, we run into a terminological problem that might lead to confusion: Although it fits Dummett's usage, it does not correspond to the notion of verifiability as it is understood in the writings of logical positivists. There, a statement is usually taken to be verifiable iff there are one or more observation sentences that together logically imply the statement. In other words, it is verifiable iff it is decidable, and the decision method could lead to a verification, though in fact it might also lead to a falsification. The root of this difference in usage is that the logical positivists wanted to use verifiability as a criterion of meaningfulness (and of course false statements should be considered meaningful as well as true ones), whereas Dummett wants to use verifiability as a criterion or surrogate for truth. Note that, interestingly, no similar problem seems to apply to our usage of "provable": No one I know of would want to say that "2 + 2 = 5" is provable.

While we are on the topic, let me note here that *falsifiability* will below likewise be interpreted along the same lines as verifiability and provability. We will consider a statement to be falsifiable iff it is decidable (i.e., we have a method of which we know that it will resolve the question), and the decision method leads to a falsification, whether or not anyone knows of that outcome. Again, care must be taken to avoid confusion with the notion of falsifiability that is often found in the philosophy of science, for example the work of K. Popper. There it will, as in the case of verifiability, not be required that the decision method should actually lead to a falsification.

In this work, an important role will be played by the idea of *unfalsifiability*. I will say that a statement is *pro tempore* unfalsifiable (or sometimes simply unfalsifiable) already if we, at the moment, lack a method of which we know that it will resolve the issue. This of course could change as we progress in our inquiry. I will assume that the fact that we (momentarily) lack knowledge of such a method is something we can recognize. On the other hand, I will say that a statement is recognizably eternally unfalsifiable in those cases in which it is known that a falsification will never be obtained.

Now, back to verificationism. In general, Dummett's verificationistic theory of meaning is of course a direct inheritance of Schlick's slogan "the meaning of a proposition is the method of its verification".[3] The verificationistic theory of meaning

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[3] Schlick (1936), p. 341.

had been championed by him and the other members of the Vienna Circle, as well as by A.J. Ayer, who popularized the view in Britain.

Indeed, Dummett has much sympathy with those verificationists, though he of course differed with them on important points (apart from the terminological difference in use of "verifiable" just discussed). Dummett naturally disagreed with them when they claimed that all metaphysical statements were meaningless. And he thought that they would have come to agree with him, had they thought matters through, that on their account of meaning classical logic would have turned out to be unacceptable.[4] The emphasis on verifications should (just like the emphasis on proof in mathematics) have lead them to intuitionistic logic.

To show that intuitionistic logic is in fact the logic adequate for verificationistic theories of meaning, a piecemeal definition of the verification conditions of complex statements is called for. Recall how this was achieved in the case of intuitionistic mathematics. Here is the BHK interpretation again:

- c is a proof of $A \wedge B$ iff c is a pair $(c1, c2)$ such that $c1$ is a proof of A and $c2$ is a proof of B
- c is a proof of $A \vee B$ iff c is a pair $(i, c1)$ such that $i = 0$ and $c1$ is a proof of A or $i = 1$ and $c1$ is a proof of B
- c is a proof of $A \supset B$ iff c is a construction that converts each proof of A into a proof of B
- nothing is a proof of $\bot$
- c is a proof of $\sim A$ iff c is a construction which transforms each proof of A into a proof of $\bot$.

Alternatively, $\sim A$ was defined as $A \supset \bot$. $\bot$ is some mathematical absurdity such as $1 = 0$.

The most straightforward verificationistic adaptation of this interpretation would be this:

- c is a verification of $A \wedge B$ iff c is a pair $(c1, c2)$ such that $c1$ is a verification of A and $c2$ is a verification of B
- c is a verification of $A \vee B$ iff c is a pair $(i, c1)$ such that $i = 0$ and $c1$ is a verification of A or $i = 1$ and $c1$ is a verification of B
- c is a verification of $A \supset B$ iff c is a procedure that converts each verification of A into a verification of B
- nothing is a verification of $\bot$
- c is a verification of $\sim A$ iff c is a procedure that transforms each verification of A into a verification of $\bot$.

$\sim A$ can, once again, be defined as $A \supset \bot$ instead of giving the last clause explicitly. As we are here not talking about mathematics, it might not be suitable to take $\bot$ to abbreviate $0 = 1$ any more. It may instead have to be some *empirical* absurdity, such as "The moon is populated by pink flamingoes." We will get back to the meaning of $\bot$ soon.

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[4] LBM, p. 10.

To tighten up the account so as to sustain a soundness and completeness proof, one would then simply turn to the Kripke semantics described in Sect. 3.7 and resolve to read value 1 as "verifiable" instead of "provable."[5] As mentioned above, it will come naturally to read verifiability along the same lines as I spelled out for provability in Sect. 3.8.

However, Dummett is not quite happy with such a simple translation from the mathematical to the empirical realm. He suggests that it is far from clear that the above clause for negated statements makes sense. Indeed, we might have to take recourse to falsifications to fix this problem.

5.3 Stage II: Expanded Verificationism

Here is the section that contains both Dummett's worry and his proposal to bring in falsifications:

> [A] proof of the negation of any arbitrary statement then consists of an effective method for transforming any proof of that statement into a proof of some false numerical equation. Such an explanation relies on the underlying presumption that, given a proof of a false numerical equation, we can construct a proof of any statement whatsoever. It is not obvious that, when we extend these conceptions to empirical statements, there exists any class of decidable atomic statements for which a similar presumption holds good; and it is therefore not obvious that we have, for the general case, any similar uniform way of explaining negation for arbitrary statements.
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> It would therefore remain well within the spirit of a theory of meaning of this type that we should regard the meaning of each statement as being given by the simultaneous provision of a means for recognizing a verification of it and a means for recognizing a falsification of it, where the only general requirement is that these should be specified in such a way as to make it impossible for any statement to be both verified and falsified. (Dummett (1993), p. 71)

The worry thus is that no empirical statement, no matter how absurd it may be, has any arbitrary statement as a consequence, and the remedy Dummett proposes is to explain negation in terms of falsifications. Although I am in sympathy with this latter move, it has to be said that the worry is not yet grave enough to warrant it. I will show below how the argument can be strengthened sufficiently, but first let me tell you why Dummett's doubt does not yet push us irresistibly toward falsifications in the ingredient sense.

As we know, the intuitionistic account of negation involves two ideas: The first idea is that a verification (or proof) of a false statement can be transformed into a verification of an absurdity. The second idea is the one Dummett objects to, that a verification of an absurdity in turn can be transformed into a verification of any statement whatsoever. But we also know that if this idea and its corresponding rules

[5] Indeed, in his book *Elements of Intuitionism,* Dummett immediately gives "p is verified at w" as a gloss for $v_w(p) = 1$ (p. 139).

are dropped, we still get an account of negation. We end up with the negation of Johansson's minimal logic.[6]

To claim that no satisfying constructive negation can be defined by the above clause and thus to make a case for the introduction of falsifications, we would also have to object to the first idea, the transformation of a verification of a falsehood into a verification of $\perp$. And indeed, there is good reason to do so.

Just as it is not clear which statement might be so absurd as to be turned into a verification of any other statement, it is equally doubtful whether there is a statement such that any verification of a false statement would lead to a verification of it. To verify that my body height is under a meter (it is not) means, among other things, to apply a measuring tape to my frame. There is just about no way we should expect to come up with to turn that (non-actual) measuring episode into a verification of, say, the claim that the moon is populated by pink flamingoes. That means that this claim, absurd as it may be, cannot play the role of $0 = 1$ in the mathematical case.

What other statement could? The only candidates general enough seem to be statements like "A false statement has been verified": Indeed, if a false statement has been verified, then this instance of $\perp$ will quite trivially be true. However, how should the transformation process look like that morphs a verification of a falsity into a verification of this statement? It seems that the falsity of the mathematical statement that leads to a proof of "0 = 1" can be inferred from the absurdity of the latter. However, for "A false statement has been verified," we seem to have matters upside down. The only way to make the required inference in general will be to know of the statement's falsity beforehand. It is quite unlikely that this route will prove fruitful.

If we choose not to rely on absurdities that cannot deliver what we need from them, then we are indeed in need of some other means to explain negation. As is apparent from the quote above, for Dummett this is exactly the point at which *falsifications* enter the picture.

5.3.1 Intuitionistic Logic?

Something that is not quite as apparent from the quote above or the discussion surrounding it[7] is this: How *exactly* are we going to explain negations in terms of falsifications?

Here is what I believe to be both the most natural and, incidentally, the best way of doing it: We should simply say that a negated statement $\neg A$ is verified iff A is falsified.

This approach will require the availability of falsification conditions for both atomic and complex statements. In particular, we have to decide when a negated statement $\neg A$ is falsified. The natural answer is that $\neg A$ is falsified iff A is verified.

[6] See Sect. 3.6.1.

[7] Indeed, I do not know that Dummett addresses the question anywhere at all.

Negation then becomes a kind of toggle switch between verifications and falsifications. I will refer to such a negation as a *toggle negation*.

Toggle Negation:

$\neg A$ is verified iff A is falsified; $\neg A$ is falsified iff A is verified.

Once both verifications and falsifications are in play, it is very plausible that we should have a means of switching back and forth between them and that negation should be the device to do that. Toggle negations can occur in quite different logical systems. The exact behavior of a logic with toggle negation will depend on how we decide to fix the verification and falsification conditions of the other types of complex statements. I will get back to this task in the chapter on Stage II theories (Chap. 8); the falsification conditions I shall argue for will bring us to one of the so-called *Nelson logics*.

However, one thing is already clear at this point: No matter which falsification conditions for the other connectives we choose, we will not come out with intuitionistic logic. This is because every statement will be logically equivalent to its double negation. We have that $\neg\neg A$ is verified iff $\neg A$ is falsified iff A is verified. Also, of course, we have that $\neg\neg A$ is falsified iff $\neg A$ is verified iff A is falsified. As in intuitionistic logic, Double Negation Introduction (DNI) will be valid in a logic with a toggle negation. But *unlike* intuitionistic logic, Double Negation *Elimination* (DNE) will also be valid.

Now, Dummett does not mention the possibility that the introduction of falsifications at the level of ingredient sense would have any effect on the logic. So, we must presume that he thought that it would be possible to work falsifications into the original account somehow to motivate intuitionistic logic.

Of course, this might be right. Even if the above account of negation as a toggle between verification and falsification might strike us as natural, there still might be a way to stick with the old setup. Two questions present themselves: The first is "Why?," and the second is "How?"

First then, *why* would we want to preserve the original account of negation as an implication of absurdity? The intuitionists had to come up with their crafty way of defining negation because there seemed to be no other constructive way of accounting for negative information in mathematics. They only had recourse to the positive notion of *proof*.

Here, however, the situation is quite different. We already have introduced a negative primitive notion, that of a falsification. To eschew the simple toggle account above for a more intricate account seems to be a piece of needless ingenuity.

Dummett has lately admitted to having become sentimentally attached to intuitionistic logic.[8] Understandable as that may be, it makes for bad philosophical motivation.

Frankly, the only good reason I can see for turning to the intuitionistic account for a constructive empirical negation would be to argue that the initially less contrived idea of a toggle negation cannot, in the end, be expanded to a logical system that satisfies

[8] Auxier and Hahn (2007), p. 489.

constructivist demands. For example, a natural worry might be that a negation that satisfies DNE will automatically turn any constructive logic into classical logic. I will argue that this is not the case and that the Nelson logic that we will meet in Chap. 8 will do nicely for a constructivist. Moreover, it will turn out that intuitionistic negation is definable in Nelson logic (while toggle negation is not definable in intuitionistic logic). Therefore, if we see something in intuitionistic logic that we do not want to go without being able to express, Nelson logic can answer to that need as well.

All this will be dealt with later. For now, let us see how a determined intuitionist who, for whatever reasons, finds toggle negation objectionable, could go about setting up his negation in terms of verifications and falsifications. When we keep up the old account of negation as defined as an implication $A \supset \bot$, then there are two possible ways in which falsification conditions could add to the account: It could be the falsification conditions of A that make the account plausible, or the falsification conditions of $\bot$.

Let us start with the first of these options: We keep the usual interpretation of $\bot$, viz. $1 = 0$ or some empirical absurdity. In explaining how a verification of the false empirical statement A could be turned into a verification of $\bot$, we employ the new notion of a falsification and assume that A is falsified. Because A is falsified, we know that there can be no verification of it, and we will be able to claim that we can turn any such non-existent verification into a verification of $\bot$, because we will never be required to actually do it. We are dealing with what I called in Sect. 3.6.1 an *empty promise conversion*.

Now, note the following: This attempt tries to play on the fact that A is actually falsified (or falsifiable). It then seems that the verification clause for negation just amounts to the same as for toggle negation:

$\neg A$ is verified iff A is falsified.

Whether or not the account of the falsification of a negation will come to the same as for toggle negation (viz., $\neg A$ *is falsified iff* A *is verified*) as well will depend on what we would like to say about the falsification condition of a conditional (because we are taking $\neg A$ to be defined as $A \supset \bot$). Although this is the topic of a later section, I can already tell you that the most plausible account is this: A conditional is falsified iff its antecedent is verified and its consequent is falsified. If we assume that $\bot$ counts as falsified, then the only thing of substance that this condition will require is the verifiability of the antecedent. Thus, what we get is, once again,

$\neg A$ is falsified iff A is verified.

So this way of introducing falsifications into the account to come up with a better negation will just give us a more roundabout way of saying the same we said above, and therefore, it will not give us intuitionistic logic.

Let us then investigate the second option. The task here is to employ the notion of a falsification to come up with a suitable candidate for $\bot$.

If we insist that $\bot$ is one particular falsified statement, then it is clear that we have not made much progress. What before was called an *absurd* statement is now a *falsified* statement. At most, this might have helped if we had a candidate $\bot$, but were worried that we could not make sense of the notion of "absurdity." But no matter what we call it, our problem was that we did not *have* a candidate to fulfill the necessary inferential role in the first place.

But there is actually no reason why $\perp$ should have to be one particular statement. We might say that $\perp$ is simply *any* falsified statement. To verify a statement, $\neg A$ would then be to supply a method to convert every verification of A into a verification of some falsified statement. In this case, as above, we will have to give falsification conditions for all statements. Perhaps we can be a bit more economical here, though: We might be able to do with falsification conditions for *atomic* statements only and have $\perp$ denote some falsified atomic statement.

What we have here is, on the face of it, actually not all that implausible. To verify a statement of the form $\neg A$, find some falsified statement and show that a verification of A would lead to a verification of that falsified statement.

One problem here might be that no one can know which statement you took to be the relevant instance of $\perp$, unless you tell them explicitly. But that might not impede understanding much more than the original account of negation in intuitionistic mathematics did. There you did know which absurd statement was claimed to be derivable, but you did not know how that would be pulled off by the speaker unless she told you. Here, you do not know how the transformation is supposed to work, plus you do not know what the transformation will lead to; however, you know that it will be *some* falsified statement or other.

Even if we were required to know which falsified statement is the relevant instance of $\perp$, such a negation may also be expressed by making the underlying conditional quite explicit: "If the sun had exploded two days ago, the climate would have changed dramatically. But it has not changed. So the sun did not explode two days ago."

Here, a worry might arise from the following fact: The report that the statement playing the role of $\perp$ is actually falsified is effected by some means of negation ("The climate has not changed"). But negation is what we want to explain! Apparently, for this not to end in a vicious regress, there must be some other way of communicating that fact. For atomic statements, this might work by verbal or actual ostension: "Take a look out of the window!" This again suggests that it would be a good idea to take $\perp$ to be an atomic statement. Then it would be possible to give the meaning of negation in the following way: For atomic statements, the negation will be verified iff the atomic statement is falsified. For complex statements, the negation will be verified if a verification of the complex statement could be turned into a falsification of an atomic statement.

So far, maybe so good. At this point, we have to consider that any falsified atomic statement could be employed to play the part of $\perp$. Now, if we want to get full intuitionistic logic and not be stuck with minimal logic, we once again have to make plausible that every verification of any instance of $\perp$ could be turned into a verification of any statement whatsoever. But how could this be plausibly maintained? Would it really be possible to turn any verification of "The climate has changed dramatically," say a thorough look out of the window, into a verification of "Madrid is in Switzerland?" Again, the prospects of a *truly constructive conversion* look dim.

What the intuitionist has to say at this point, presumably, is this: It is not the atomic statement in itself that makes the transformation possible, but rather the fact that it is an instance of $\perp$ and hence falsified. As there are no verifications of falsified statements, the possibility of the transformation is vacuously satisfied: We can always claim to be able to turn something into something else if we are sure that we will never be challenged to execute this maneuver. Once again, it is an *empty promise conversion* that we have to employ.

So, to sum up this section, the intuitionist can stick to his account of negation if he is willing to accept *empty promise conversions* as constructively unobjectionable. However, as I said before, I will later present a more attractive account, built up around the notion of a toggle negation. This account will be natural and constructive, and intuitionistic negation will be definable in it. However, you will have to wait until Chap. 8 to see the details.

For now, it is enough to have a rough idea of how an expanded verificationism (a Stage II theory) might look. We have made room for falsifications in the ingredient sense of statements, but until now, they play no role in determining the assertoric content of a statement. If we allow this, then we enter the third stage of the taxonomy, the realm of the *hybrid strategies*.

5.4 Stage III: Hybrid Strategies

Dummett acknowledges that, given the need for falsifications in the ingredient sense, it would be quite natural to employ them in the assertoric content as well. However, he has grave reservations against this; indeed, he categorically rejects the idea of a hybrid strategy:

> It was conceded above that [a constructivist theory of meaning] may have to allow that what is taken to constitute the falsification of a statement must be separately stipulated for each form of sentence. But, if so, this can only be for the purpose of laying down the sense of the negation of each sentence, no uniform explanation of negation being available: it cannot be for the purpose of fixing the sense of a sentence, considered as being used on its own. (WTM, p. 76)

In terms of the distinction he adopted later, Dummett holds that falsifications may feature in the *ingredient sense* of a statement, which determines how it contributes to the sense of more complex statements. They may not, however, enter into its *assertoric content*, the sense that determines whether an assertion of it will be judged to have been correct or incorrect. We have to stay at Stage II and must not be tempted by a Stage III approach.

If both verifications and falsifications were to play a role in determining the assertoric sense of a statement, then they both would have to have an influence on our verdict whether an assertion of it was correct or incorrect. The only way that Dummett can imagine this could be made precise is to say that an assertion is correct iff it is verifiable and incorrect iff it is falsifiable. This is a natural thought, even though I will suggest two other forms a hybrid strategy can take. I will refer to the present strategy, in want of a catchier title, the *correctness as verifiability and incorrectness as falsifiability* strategy, and abbreviate this from now on as CV&IF.

This strategy would lead to a problem in that, according to Dummett, it would allow for gaps between correct and incorrect assertibility. Such gaps, however, are not to be admitted:

> It would then follow that a speaker might be neither right nor wrong in making an assertion: not wrong, because it could be shown that the sentence could not be falsified; but not right either, because no way was known of verifying the sentence. This consequence would be fatal to the account, since an assertion is not an act which admits of an intermediate outcome; if an assertion is not correct, it is incorrect. (WTM, p. 77)

Dummett stresses that this refusal to make room for assertions that are neither correct nor incorrect is not supposed to mean that we have to be able to determine of each assertion whether it is correct or incorrect. He elaborates this point thus:

> If the content of an assertion is specific, then it must be determinate, for any recognizable state of affairs, whether or not that state of affairs shows the assertion to have been correct. If some recognizable state of affairs does not suffice to show the assertion to have been correct, there are two alternative cases. One is that this state of affairs serves to rule out the possibility of a situation's coming about in which the assertion can be recognized as having been correct: in this case, the state of affairs must be taken as showing the assertion to have been incorrect. The other is that the given state of affairs, while not showing the assertion to have been correct, does not rule out the possibility of its later being shown to have been so: in this case, the correctness of the assertion has simply not yet been determined. What is not possible is that any recognizable state of affairs could serve to show both that the assertion was not correct and that it was not incorrect, since the content of the assertion is wholly determined by which recognizable states of affairs count as establishing it as correct: so any state of affairs which can be recognized as ruling out the correctness of the assertion must be reckoned as showing it to be incorrect. Hence, if a sentence is held to be neither true nor false in certain recognizable circumstances, this cannot be explained by saying that an assertion made by uttering the sentence would, in those circumstances, be neither correct nor incorrect. (WTM, p. 80)

Thus what Dummett objects to is the possibility that we may come to know that an assertion is neither correct nor incorrect. He is not claiming that we will always know whether it was one or the other.[9]

It is not a straightforward matter how to make sense of this. The pattern is reminiscent of the double bind the intuitionists find themselves in due to their allegiance to tertium non datur and their rejection of bivalence. This peculiar situation, as you will recall, can be seen as emanating from the validity of LET ($\sim\sim(A \vee \sim A)$) and the invalidity of LEM ($A \vee \sim A$) in intuitionistic logic. In fact, one way of grounding the above contention that "any state of affairs which can be recognized as ruling out the correctness of the assertion must be reckoned as showing it to be incorrect" would be to argue that an assertion is incorrect iff (1) it would have been correct to assert its negation and (2) that negation has to be interpreted intuitionistically.

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[9] Cf. also WTM, p. 78: "[T]here cannot be a piece of knowledge the possession of which by any speaker would show both that he would not be right to make a certain assertion and that he would not be wrong to make it."

However, neither of these claims is trivially true. Regarding assumption (2): I have argued briefly above that, once we are ready to introduce falsifications into the ingredient sense, it is not perfectly clear any more that intuitionistic negation is the only, or even the most attractive, game in town. Consequently, it is not clear that we have to follow the intuitionists into every difficult situation that is created by their account of negation. For example, if we adopt a toggle negation account, it is clear that LEM and LET will stand or fall together, depending on how the rest of the theory is spelled out.

No, the argument that we cannot come to know of gaps between correct and incorrect assertibility must come from a further analysis of these notions. One part of this analysis will have to settle whether assumption (1) is justified. I will turn to this task in the next chapter.

But even taking it, for now, as given that an assertion cannot be known to be neither correct nor incorrect, it is not easy to understand what Dummett is driving at in those two quotes. They are from the same essay, but reading them in sequence is puzzling, as it is hard to keep in view where the problem is supposed to lie.

Consider the case envisaged in the first quote: A certain assertion is "not wrong, because it could be shown that the sentence could not be falsified; but not right either, because no way was known of verifying the sentence."

However, this assertion would, if correctness and verifications go together as indicated in the second quote, be described thus: We would know that the assertion is not incorrect, because we know that there can be no falsification of it. But whether it is correct is, as it has not been verified, "simply not yet determined." The situation is thus quite distinct from one in which we know that the statement is neither correct nor incorrect.

This case, of course, *could* arise as well (all this under the assumption that assertions are correct iff the asserted sentence is verifiable and incorrect iff it is falsifiable). Such would be a case in which we know that the sentence will never be verified and that it will never be falsified. Contrary to what one may think on first blush, this is a situation that also the intuitionist can envisage, even if it would be quite a weird situation from her point of view.

It would, for them, not constitute a breach of the LET, because the information that the statement could not be verified would already warrant assertion of the negation of the statement. Thus, if we were to tie incorrectness to falsifiability, an assertion of the statement would not be incorrect, but an assertion of its intuitionistic negation would be correct. This is because the intuitionistic negation requires only that the negated statement can never be verified (because its verification would lead to something absurd), not that it can be falsified.[10]

Intuitively, this seems indeed like a strange combination; but again, it presupposes the intuitionistic account of negation. Therefore the strangeness of this combination can only count against statements that are unverifiable and unfalsifiable in principle and the ensuing assertibility gaps if this intuitionistic presupposition is upheld.

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[10] In Sect. 6.4, I will consider and reject the idea that a verification of the impossibility to verify a statement should already count as a falsification of it.

If, instead, we employ the toggle negation, we get that neither the statement nor its negation is correctly assertible, and neither would assertions of them be incorrect. Again, that such an account is incoherent must be argued for by spelling out in more detail what it is to make a correct and what it is to make an incorrect assertion. And once again, I will turn to that question in the next chapter.

If we assume that assertibility gaps are not yet conclusively ruled out, then a hybrid strategy that takes correctness to be correlated to verifiability and incorrectness to falsifiability is likewise not yet off the table. However, besides such a CV&IF theory, there are two other kinds of theories at Stage III that I would like to offer up for consideration. Both of these accept the Dummettian contention that there are no assertibility gaps, and both are strategies to manage two *different* accounts of what it is to make a correct assertion.

These different accounts lie at the respective hearts of the ideas I have simply called *verificationism* and *falsificationism*. The verificationist claims, as we have seen, that a correct assertion is one that can be verified. The falsificationist, in contrast, holds that a correct assertion is one which cannot be falsified.

Before I sketch the ways, I believe these accounts can be combined at Stage III, let me tell you about falsificationism on its own. The theories that are *only* governed by the falsificationistic norm of assertion are to be found at the remaining two stages, Stage IV and Stage V.

5.5 Stages IV and V: Expanded and Pure Falsificationism

Now, why should we want to adopt a falsificationistic theory? This question is the main theme of the next chapter, but I will give a first glance in the present section.

The idea of a falsificationistic norm of assertion is Dummett's own. However, as I mentioned in the first section of this chapter, Stage IV is not among the options Dummett considers. Instead, after proclaiming Stage III to be untenable, he devotes several pages to outlining a Stage V theory. That is, a meaning theory that has no need at all for verifications, whether in the assertoric content or the ingredient sense.

He also adds a short characterization of a logic that would be motivated by such a semantic theory, a logic that I will examine in detail later on. The need to investigate an expanded falsificationism, that is a Stage IV theory, will arise from problems we will find with the purely falsificationistic theory and the meanings that Dummett thinks should be given to the logical constants in such a theory. As one might expect, these are quite similar to the problems with pure verificationism we have found in the first part of this chapter.

Now, I said that the central idea of falsificationism is that an assertion is correct iff it is unfalsifiable. However, it might be even better expressed as follows: An assertion is *in*correct iff it can be falsified. A falsificationistic theory of meaning is, according to Dummett, motivated by the following realization: The incorrectness of an assertion is prior to its correctness in our understanding of it.

> The fundamental notion for the account of the linguistic act of assertion is (...) that of the incorrectness of the assertion (...) By making an assertion, a speaker rules out certain possibilities; if the assertion is unambiguous, it must be clear which states of affairs he is ruling out and which he is not. (...) Thus, in the order of explanation, the notion of the incorrectness of an assertion is prior to that of its correctness. (WTM, p. 124)

The idea that assertions guide the audience by excluding possibilities can be found elsewhere as well. Take one extremely basic example as an illustration, adapted (with a slight modification) from van Benthem[11]:

A family eats out in a restaurant, and a waiter comes to take their orders. The father asks for a meat dish, the mother for a vegetarian one, and the child for fish. After a while, a different waiter comes out and brings the plates. Seeing the slightly puzzled look on the new waiter's face, the family realizes that he has no idea which of the six combinatoric possibilities of handing out the dishes is the right one. Helpfully, the father says, "The meat is for me," thus reducing the possibilities to only two. The mother goes on to exclude one more option by saying, "I asked for the vegetables," and the two assertions together have reduced the set of possibilities so successfully that the child does not have to say anything more to have the waiter distribute the plates correctly.

This process of weeding out wrong possibilities is of course also what Popper claims drives science. Furthermore, it is the idea that lies at the heart of epistemic modal logic, where the possibilities are represented as worlds in Kripke models.

In Dummett's theorizing, this simple idea is further developed as follows: On constructivist assumptions, we have to be able to recognize the states of affairs that define the content of an assertion in order to understand it. And these, according to the present proposal, are the ones that are excluded by the statement. In other words, what we have to grasp are their *falsification* conditions.

> These considerations prompt the construction of a different theory of meaning, one which agrees with the verificationist theory in making use only of effective rather than transcendental notions, but which replaces verification by falsification as the central notion of the theory: we know the meaning of a sentence when we know how to recognize that it has been falsified. Such a theory of meaning will yield a logic which is neither classical nor intuitionistic. (WTM, p. 83)

The assumption that what a statement excludes is exactly delineated by the states of affairs that falsify it is made by Dummett without further comment. Basically, the same general line of thought as above can already be seen in his early essay "Truth" (1959), even though there is no explicit mention of falsifications yet:

> A statement, so long as it is not ambiguous or vague, divides all possible states of affairs into just *two* classes. For a given state of affairs, either the statement is used in such a way that a man who asserted it but envisaged that state of affairs as a possibility would be held to have spoken misleadingly, or the assertion of the statement would not be taken as expressing the speaker's exclusion of that possibility. If a state of affairs of the first kind obtains, the statement is false; if all actual states of affairs are of the second kind, it is true. (TOE, p. 8)

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[11] Cf. van Benthem (2008).

Here, it would be important to know what exactly it means that a state of affairs obtains. Once again, there is no way to be completely sure how Dummett meant this, but to me it seems most plausible to say at this point that the obtaining states of affairs are the states of knowledge we might obtain, given our currently available methods.

Now, it is one thing to say that the content of a statement is clearly given by what it seeks to exclude. It is quite another to say that a statement is correct (or even *true*) if nothing it claims to exclude can be established. How well this actually fits our intuitions will, I think, depend on the area of discourse we are looking at.

To give an example in which the proposal looks quite implausible, take once again mathematics. Of course I can assert Goldbach's conjecture, and it will be quite clear what I seek to exclude by my asserting it. But even though no counter example can be given at the present moment, I will not be looked at as having made a correct mathematical assertion. If anything, the new way of judging a mathematical speech act correct will apply not to assertions, but to conjectures. These will stand as long as they are not falsified and will be elevated from their status to that of theorems once a proof is found.

After some more comments on the nature of correctness and incorrectness, I will spend the rest of the next chapter by suggesting some areas of discourse in which, I believe, the proposal has a better chance of being accepted. The most promising example will be taste talk, as in "Spinach is tasty."

5.6 Hybrid Strategies Again

This brings us back to the question which form a hybrid strategy can take. Assume that indeed for some areas of discourse verificationism delivers a better model, while in others falsificationism appears more attractive. In that case, a rather trivial form of a hybrid strategy suggests itself: Employ verification conditions to determine the assertoric sense in those areas in which verificationism seems more plausible and let falsification conditions play the lead role in those areas in which falsificationism reigns.[12]

I will call such a strategy a *discourse separation* strategy. Unlike the other hybrid strategy we have seen above, the CV&IF approach, a discourse separation strategy, will not give rise to gaps between correct and incorrect assertibility. In the verificationistic areas, an assertion will be correct iff verifiable, and incorrect otherwise. In

[12] When I say that this is trivial, I mean that it is easy to explain how verifications and falsifications are related to each other in the assertoric sense. The question of whether and how we can clearly separate different areas of discourse, on the other hand, is not trivial at all. Is "The number of tasty dishes on this menu is prime" a statement from the area of taste talk, or from the mathematical area? It is frequently assumed that a separation of areas of discourse is feasible, but it is actually far from clear to me how it can work in detail. However, I will not go into this problem in any depth in this book.

the falsificationistic areas, an assertion is incorrect iff falsifiable, and correct otherwise.

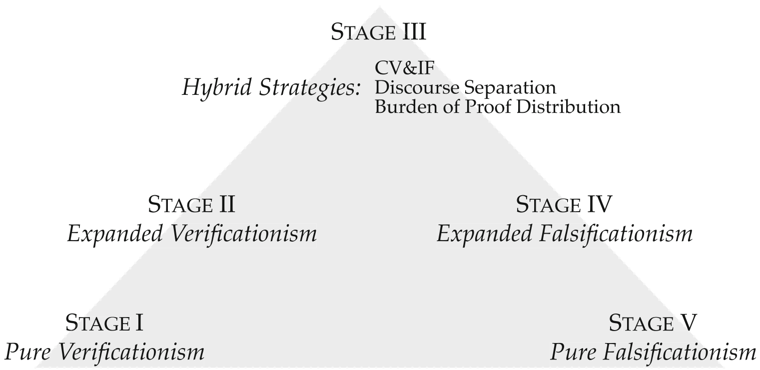
The third option I'll propose will likewise respect Dummett's disdain of such gaps, but it will strive to combine the verificationistic and the falsificationistic account of assertibility *in the same area of discourse*. The crucial device will be the notion of a *burden of proof*, a burden that may either lie on the speaker or on the audience. If the speaker bears the burden, assertibility will coincide with verifiability, as it is more commonly assumed. If the hearers have to bear it, then the assertibility will be construed as unfalsifiability. I will call this the *burden of proof distribution* strategy, or simply the *burden of proof* strategy.

I will supply more details about the exact ways a hybrid strategy can be set up in the chapter about Stage III.

5.7 Chapter Summary

I have discerned five different stages of falsificationistic involvement. Four of these are explicitly mentioned by Dummett. He started out with a pure verificationism (Stage I), which he had to expand to allow for a more plausible account of negation (Stage II). He dismissed, however, the idea that falsifications and verifications might both determine the assertoric content (Stage III). Instead, he toyed with the idea that this assertoric content might be determined by falsifications only and that verifications might be dispensed with completely (Stage V).

The stage not considered by Dummett (Stage IV) suggests itself once we become aware of problems involving the meaning of complex statements in the purely falsificationistic theory (Stage V). Those problems are very similar to those in the purely verificationistic theory (Stage I) that lead to the introduction of falsifications in the first place, and the remedy is also similar: The purely falsificationistic theory will be augmented by verifications in the ingredient sense, resulting in an expanded falsificationism.



Here we see the pyramid again. This time I have added the three options that I see for someone who, against Dummett's advice, opts for a hybrid strategy (Stage III).

First, we saw the variant Dummett had in mind and argued against. This is the *correctness as verifiability and incorrectness as falsifiability* strategy, CV&IF for short.

The other two options, in contrast, combine verificationism and falsificationism.

Firstly, I talked about the *discourse separation* strategy, which simply entailed that different areas of discourse were governed by different norms of assertion.

Secondly, I mentioned the *burden of proof* strategy. Here, both verificationism and falsificationism govern the same area of discourse. Under which of these norms an assertion will be judged to be correct or incorrect will depend on where the burden of proof lies at the moment of utterance.

Note that there is nothing that obviously forbids one to combine the *discourse separation* strategy with the other two: It might conceivably turn out that one area of discourse supports verificationism, a second one falsificationism, a third one a CV&IF theory, and a fourth one a *burden of proof* theory.[13]

Both of the latter hybrid strategies are basically mechanisms to switch from verificationism to falsificationism and back. Consequently, even if one of these hybrid strategies will turn out to be more attractive than what we find at the lower levels, we will need a good understanding of the verificationistic (I and II) and the falsificationistic (IV and V) theories. When I begin to discuss the stages one by one, it is therefore expedient to ascend the pyramid starting from the bottom.

The main concern of this step by step examination will be to discern the different logical systems that best fit the respective stages. Dummett himself only considered two different systems. He thought that both Stage I and II would motivate intuitionistic logic and that Stage V leads to a logic known as dual intuitionistic logic. (Stage III was rejected by Dummett as incoherent and Stage IV, once again, not considered.)

In contrast, I will suggest different logical systems for each stage. In other words: If Dummett is right in supposing that falsifications have some role to play in a correct theory of meaning, then no matter how great or small that role will turn out to be, intuitionistic logic will not necessarily be motivated by these considerations.

Before I turn to the logical details in Part Three, I will spend the next chapter on the idea that is common to all theories on the right side of the pyramid: To make a correct assertion is to say something unfalsifiable.

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[13] Not that I believe such an extremely eclectic outcome likely.