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# Lorenzo Valla on the Problem of Free Will and Modal Logic

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**Abstract**

The question of free will, that is, the conflict between God's foreknowledge and man's free will, has been a long-standing controversy in the history of philosophy, dating back to Aristotle's discussion of "future contingency" and his refutation of "fatalism". Valla, as a Renaissance humanist, criticized Boethius's solution to the problem of free will in his “Dialogue on Free Will”, but was criticized for not answering the question directly. However, Valla responded to the question again from the perspective of modal logic in his “Dialectical Disputations”. This paper examines the ancient and medieval contexts of the problem of free will separately, and reassesses Valla's logical solution to the problem of free will in terms of the relationship between "future contingency" and the principle of bi-valence.

**Keywords:** free will, future contingents, bi-valence, fatalism, modal logic

The humanist Lorenzo Valla (1407-1457) criticized Boethius's treatment of the problem of free will in his “Dialogue on Free Will”, arguing that the latter's method of reconciling the problem of the conflict between God's foreknowledge and man's free will was unreasonable. For while Valla argues that the real problem lies in the relationship between the wills of God and man, and that attention needs to be paid to God's will rather than to his power of foreknowledge, the question of how exactly foreknowledge is compatible with man's free will Valla does not answer in “Dialogue on Free Will”. Instead, in his “Dialectical Disputations” Valla gives a second response to the question of free will in his discussion of modal logic. This perspective is not unique; the question of free will has been a topic of debate throughout the history of Western philosophy, and it has not emerged only in the cultural context of Christianity. Aristotle's discussion of Future Contingents and his refutation of Predestination, as well as the discussion of Cicero's “On Fate”, are very similar to the logic behind the theological version of the free will problem. The purpose of this paper is to organize the ancient and medieval background of the problem of free will, and to analyze how Valla attempts to solve this problem from the perspective of modal logic in the “Dialectical Disputations”, and to open up another way of approaching the problem of free will, with a different conception of the truth from the traditional one, than the one that was used for the discussion of the problem of free will in the late medieval period.

## 1. Introduction the Ancient Background of the Problem of Free Will

### *1.1 Paper Title Aristotle’s Study of “Future Contingency”*

In his “Dialogue on Free Will”, Valla criticized Boethius' “The Consolation of Philosophy” about response to the problem of free will. The problem of free will was expressed in the Middle Ages in the form of "theological determinism", in which God's foreknowledge seemed to deprive man of his free will, leading to the loss of the basis for the retrospect of moral responsibility. In the ancient and Hellenistic period, this problem was expressed in the discussion of "future contingency", which first appeared in Aristotle's “On Interpretation”. The affirmation and negation of "future contingency" implies whether human beings can intervene in an uncertain future, which is akin to whether they have free will. Aristotle uses "future contingency" to refute fatalism. The latter starts from the principle of bi-valence, which holds that any statement (proposition) is either true or false, with no intermediate value, independently of the tense of the sentence, i.e., whether it is past or present, or even a statement about a future event is either true or false. Even though future events may seem uncertain, there must be only one way in which they can happen or not happen, both of which have been determined by fate, and this reasoning based on the principle of bi-valence is also known as "logical determinism". This reasoning based on the principle of bi-valence is also known as "logical determinism". The lazy man's argument given by Cicero(H.Rackham, 1989, p224-225) in On Fate is an accurate restoration of "logical determinism":

"If it is fated for you to recover from this illness, you will recover whether you call in a doctor or do not; similarly, if it is fated for you not to recover from this illness, you will not recover whether you call in a doctor or do not; and either your recovery or your non-recovery is fated; therefore, there is no point in calling in a doctor."

Aristotle gives a twofold rebuttal. First, he insists on the existence of "future contingency," in which at least some of the future events are open and indeterminate, i.e., statements about them are neither true nor false. Secondly, he argues that "logical determinism" confuses hypothetical with actual necessity (Shields(2007)has distinguished them), since there is uncertainty about whether something will happen tomorrow, and although we can state that "it is inevitable that it will either happen or it will not happen", this inevitability does not transfer to either of the possible scenarios. In Aristotle's case of "Will there be a naval battle tomorrow", for example, even though it is not certain which will happen tomorrow, it is limited to stating that this judgement is necessary, and that a naval battle will either happen or not happen tomorrow. If the fatalist assumes that there will be a naval battle tomorrow, then "there will be a naval battle tomorrow" is true, and the truth-value of the statement must be unchanging, and they understand this "invariance" as a necessity; similarly, if one assumes that there will not be a naval battle tomorrow, then Similarly, if it is assumed that there will not be a naval battle tomorrow, then "there will be a naval battle tomorrow" is false, and likewise unchanging, and also a necessity. Therefore, no matter whether "there will be a naval war tomorrow" is true or false, it is a necessity, that is to say, whether a naval war will happen tomorrow or not is predetermined. Cicero(H.Rackham, 1989, IX.17) puts it more clearly:

"but that whereas in the things that have happened this immutability is manifest, in some things that are going to happen, because their immutability is not manifest, it does not appear to be there at all, and consequently, while the statement 'This man will die of this disease' is true in the case of a man who is suffering from a deadly disease, if this same statement is made truly in the case of a man in whom so violent an attack of the disease is not manifest, none the less it will happen. It follows that no change from true to false can occur even in the case of the future. For 'Scipio will die' has such validity that although it is a statement about the future it cannot be converted into a falsehood, for it is a statement about a human being, who must inevitably die. "

Aristotle's second rebuttal argues that fatalism cannot deduce from the necessity of elective propositions as a whole the necessity of the individual propositions of which they are part, because such reasoning does not reflect states of affairs. For propositions need to reflect states of affairs. Though if things have already happened, an invariant truth value for their statements can imply a necessity. But when things have not yet happened, we cannot use such a hypothetical framework to describe a future contingent event, i.e., something that may or may not happen, but is left in a state of limbo in which it is never asserted. In order to further clarify the meaning of contingency, Aristotle(On Interpretation, 23a5-20)distinguishes two kinds of possibilities, which have been described by Mori(2019, p363-369)as "one-sided possibility" and "two-sided possibility". The first is based on the reality of existence, for example, he can run and jump because he is realistically running and jumping, while the second is not realized, for example, although he is not walking at this moment, he may walk at some point in the future, and of course he may not be walking at that point in time, and the second possibility entails the opposite possibilities: it may not be possible or it may be possible. According to Aristotle, "contingency" denotes the second kind of possibility which contains opposite possibilities, "two-sided possibility".

But Aristotle's view of the existence of future contingencies is in fact a logical presupposition, and what he understands by "two-sided possibility" must be based on his first counterargument, which is that it must be presupposed that there are some representations of future events that are neither true nor false, but which at the same time do not imply that they neither happen nor do not happen. So, fatalism can doubt "future contingency", and it can be argued that even if future events appear to be uncertain, they are still determined, because even though they may or may not appear to happen, they are in fact only representations. So, if Aristotle insisted on the existence of future contingencies, his reasoning does not seem to be sufficient. Although the "future contingency" he proposes is in line with the impression that experience gives us, if he admits it, it means denying the principle of bi-valence, which is the basis of his propositional logic, then does it lead to the consequence of logical incoherence, which implies too great a compromise of "fatalism"? "The resultant logical incoherence would not imply too great a compromise with "fatalism".

### *1.2 Cicero on Fate*

The discussion of "future contingency" was inherited by the Stoics Chrysippus, Epicurus, and the sceptic Carneades, and is recorded in Cicero's “On Fate”. Diodorus (c. 340-280 BC) redefined "possible" to mean that only what is true now or what will be true in the future is possible. Because nothing happens that is not inevitable, anything that is possible either happens now or in the future, and what happens in the future is no more likely to change than what has already happened. Diodorus in fact relies on the principle of bi-valence to completely narrow down the meaning of "possible", limiting it only to the scope of "one-sided possibility" which implies necessity, and completely rejecting the

other meaning proposed by Aristotle,"two-sided possibility"—a thing may or may not occur.

Chrysippus would have objected to Diodorus' understanding of "possibility", but since he, like the latter, recognized the principle of bi-valence, he was unable to give a direct logical refutation. Epicurus was unable to make sophisticated logical inferences, but his sense of smell was acute, and he thought that if the principle of bi-valence led to "fatalism," then to oppose "fatalism" meant first to oppose the principle of bi-valence. Although this renunciation is an objection to the law of non-contradiction, at the expense of logical self-consistency. As for Chrysippus, although Cicero mentions in “On Fate” that he was in fact a conciliator who, on the one hand, recognized fate, but at the same time felt that the mind was not entirely subject to the inevitability of fate, and thus wanted to preserve the autonomy of the human will. However, because he could not give up the principle of bi-valence, he allowed "causal determinism" to replace "logical determinism" as the spokesman for "fatalism".

Epicurus, on the other hand, followed up his objection to the principle of bi-valence by suggesting that atoms make "swerve" movements that are beyond their natural nature. For to reject the principle of bi-valence means to agree that some propositions are neither true nor false, and propositions need to reflect the true state of affairs. "The movement of swerve is in a critical state of unpredictability, and thus seems to be beyond the scope of the formulation of the principle of bi-valence. At the same time, however, this motion has been interpreted as uncaused motion, and Chrysippus rejects "uncaused motion" in terms of the principle of bi-valence because he(H.Rackham, 1989, X)argues that "if uncaused motion exists, then every proposition (what logicians call an axiom axioma) is wrong if it is either true or false, because things that do not have a valid cause are neither true nor false, because they do not have a valid cause. efficient cause is neither true nor false; but every proposition is either true or false, and therefore uncaused motion does not exist. "Rather than insisting on the fictitious atomic motion of Epicurus, Carneades thought it better to insist on the possibility of some voluntary motion of the mind. This view actually reconciles the conflict between Epicurus and Chrysippus more explicitly than "future contingency" as a proposition of the existence of human free will. Carneades argues that even though the laws of nature, as external causes, constrain but do not completely determine the course of future events, experience leads us to believe that the activity of the human mind, as an internal cause, still plays a role. For this reason, he argues that "even Apollo could not foretell any future events". But the term "intrinsic cause" does not remove the threat of "fatalism", because unless it is proved that there is a true "uncaused motion", no matter how the notion of "cause" is modified, it will not be possible to prove the existence of a true "uncaused motion". Unless it is proved that there is a true "uncaused motion", no matter how the notion of "cause" is transformed, as long as the principle of bi-valence is logically recognized, the ontology of all kinds of "determinism" will always exist.

## 2. Medieval Background of the Problem of Free Will

### *2.1 Boethius's Response*

During the Middle Ages the discussion of "future contingency" almost disappeared, and the notion of "future contingency" metamorphosed into human "free will" continued to revolt against the new "fatalism". God functioned as the ultimate cause and therefore determined the course of any future event. If Carneades considered Apollo's foreknowledge insufficient, God's foreknowledge was fully formed. Valla, in “Dialogue on Free Will”, borrows Sextus' indictment of Apollo's prophecy to explain the difference in the power of the ancient Greek gods and the Christian God. God's greater foreknowledge allowed the question of free will to evolve from the "logical determinism" opposed by Aristotle and the "causal determinism" of Chrysippus into a "theological determinism". Boethius(David R.Slavitt, 2008, p151-152)argued against "theological determinism", the view that divine foreknowledge was incompatible with human free will:

"I don’t see how God can have foreknowledge of everything and that there can still be free will. If God sees everything that will happen, and if he cannot be mistaken, then what he foresees must necessarily happen. And if he knows from the very beginning what all eternity will bring, not only men’s actions but their thoughts and desires will be known to him, and that means that there cannot be any free will. There couldn’t be any thought or action that divine providence, which is never mistaken, did not know about in advance. If anyone deviated from what was planned, then there would have been no foreknowledge of the future, but only a guess, an uncertain opinion, which is not what any pious person could suppose that God would have "

At the same time, Boethius(David R.Slavitt, 2008, p154-155)wondered, how does God foresee how these uncertain things should turn out?

" The question, then, is how God can know in advance that these things will happen if they are uncertain. If he thinks that they will certainly happen even though there is some possibility that they won’t, then he is mistaken, which is

outrageous and even wicked to think or say. On the other hand, if he knows that they may or may not happen, what kind of knowledge is that? Then he doesn't actually know anything! How is that different from what Horace has Tiresias say in one of his satires: 'Whatever I say will happen, or maybe not'? How is God's divine foreknowledge different from mere opinion if, like men, he considers things that are uncertain? "

Although Boethius does not mention the notion of "future contingency," it is clear from the phrase "may or may not occur" that he extracts "two-sided possibility" as the word meaning of "contingency". The difference between him and Aristotle is that Aristotle, on the basis of his two understandings of the possible, could accept the "logical determinism" implied by the principle of bi-valence while retaining "future contingency", a conflict that was not intense enough because of the logical point of view, but which was not intense enough for Boethius. For Boethius, the contingency that accompanies human free will and the necessity that accompanies God's foreknowledge must be explained for theological reasons. Boethius proposes a response of "divine reason", arguing that God's reason transcends the level of human reason, and that therefore we cannot understand the compatibility of foreknowledge and free will because the level of reason is too low. The essence of his strategy is to appeal to mystery and to equate human free will with "future contingency", ensuring the existence of "future contingency" by comparing the two modes of cognition. But it still fails to respond to the problem because it does not touch the logical basis of the problem. And it was not until Lavenham (c. 1380) that this solution was more clearly expressed.

*2.2 Lavenham's Response*

Lavenham, unlike Boethius, was preoccupied with the logical foundations of the problem, and it is likely that he had read Cicero's "On Fate" and was familiar with the views of Diodorus and Cicero. Lavenham was keenly aware that the solution to the problem of free will in a theological context required a return to the ancient discussion of "future contingency" and the principle of bi-valence. He argues that human free will is preserved if it is shown that "future contingency" does not conflict with the necessity brought about by foreknowledge. Although "logical determinism" presupposes the recognition of the principle of bi-valence, he does not want to abandon this basic tenet of logic. Lavenham's aim is therefore to find a solution that preserves the principle of bi-valence and at the same time opposes the "logical determinism" on which "fatalism" is based. The question is whether there are other sources of the necessary validity claimed by fatalism. In "On Fate", Cicero(H.Rackham,1989, IX20) distinguishes between two kinds of "fatalism", the moderate fatalism which merely explains that the principle of bi-valence implies that the truth-value of statements about future events remains unchanged which is not understood as "necessity", unlike the extreme "fatalism":

"Moreover, those who say that things that are going to be are immutable and that a true future event cannot be changed into a false one, are not asserting the necessity of fate but explaining the meaning of terms; whereas those who bring in an everlasting series of causes rob the human mind of freewill and fetter it in the chains of a fated necessity."

Cicero notes the excessive semantic extension of "immutability" by "fatalism," a radical reading that is fundamentally different from understanding "immutability" as mere " This radical reading is radically different from the mere understanding of "invariance" as "necessity. This reading is rooted in a false impression of what happened in the past, because what has happened cannot be changed; it cannot not happen. As long as one does not accept the radical understanding of "fatalism" as "unchanging," one need not worry about its denial of human action and will. The principle of bi-valence is not so terrible. This is precisely Lavenham's strategy, that the principle of bi-valence and "future contingency" are not incapable of coexistence. It is only by revealing the extreme understanding of the "fatalistic" understanding of the "invariance" of the truth-value of statements (propositions) and rejecting it that the necessary semantic and logical preparations are made for the introduction of "future contingency". logical preparation for the introduction of "future contingency". His response focuses on the meaning of the notion of "True Future", considering that the future foreseen by God contains both necessary and contingent futures. He considered his response to be the "opinio modernorum" (modern view). But the question of how to state "contingent future" remains, and even if one rejects the fatalistic deduction that "invariance" slides into "necessity," as long as Lavenham recognizes the principle of bi-valence, then for something like "tomorrow will be" the future of the world is not a contingent future. then statements about events like "there will be a naval battle tomorrow" are still legitimate; they are still either true or false. This interpretation is certainly valid, but because it still relies on the principle of bi-valence in its entirety, the expression of such events remains vague and untrue. It is in fact a return to Aristotle's dilemma of describing "future contingencies".

We have previously analyzed how Diodorus' understanding of possibility directly cancels out the second Aristotelian meaning of possibility, that is, the "bilateral possibility" that may or may not occur, thus narrowing the meaning of "possibility" to necessity. This understanding is rooted in the impression of necessity brought about by past events. With Cicero-Lavenham's demolition of this impression from the point of view of semantics and logic, what is resurrected is

also the meaning of Aristotle's "bilateral possibility". But the expression "bilateral possibility" for future contingencies is still ambiguous, because on the one hand we can only logically state at most "there may or may not be a naval battle tomorrow", and at the same time we have to deal with the relationship between this expression with the help of modals and the principle of bi-valence. the principle of bi-valence.

Although there is only one outcome of any event, whether it happens or not, for each outcome, one is even more likely to happen. So, a statement based only on true/false is insufficient, and the principle of bi-valence is flawed for descriptions of future contingent events. This is because it cannot logically characterize the situation of future events that are still in a state of uncertainty, but can only be described with the help of an assumption that tries to simplify the complexity of things from a consequentialist point of view. So, we may need a new modal theory to deal with this kind of discussion of possibilities, at least the "two-sided possibility" given by Aristotle from a modal point of view are not sufficient to explain "future contingencies". The over-deduction of fatalism actually points to the shortcomings of the truth-value theory of propositional logic in describing complex events (future contingents), since even Aristotle admits that it is not possible to describe "there will be a sea battle tomorrow" or "there will be a sea battle tomorrow" or "there will be a sea battle tomorrow" in terms of "true" or "false". Even Aristotle recognized that one cannot describe with "true" or "false" the statement "there will be a naval battle tomorrow" or "there will not be a naval battle tomorrow", but how can one express future contingent states of affairs more precisely from a logical point of view? That is, is it possible to quantify the probability of future events more precisely, and to propose a different view of truth-value from the principle of bi-valence for describing such contingent random events? Valla's examination of Aristotle's modal logic gives his own solution in the context of everyday usage.

## 3. Valla's Response

### *3.1 One-sided Possibility and Two-sided Possibility*

In his "Dialogue on Free Will", Valla criticizes Boethius for not mentioning the discussion of "future contingency" and argues that the question of free will from a theological point of view is a misrepresentation because the Bible does not mention it. On the contrary, he believes that the question comes from ancient Greece, not from Christianity. So, his line of thought is not to give a diagnosis from a philosophical point of view, but to try to do so from a theological point of view. And the first thing is to restate the problem. He draws on the ancient Roman tyrant Sextus Tarquinius, who complained to Apollo why he had been assigned the fate of "adultery, treachery, perjury" and ultimately exile and death, and prayed for a change in his destiny. Apollo states that he can only pronounce his fate, not change it, because the will of Zeus is at work behind the scenes. With this scenario, Valla explains that the Christian God combines the powers of foresight and will of both Apollo and Zeus, possessing greater power in the form of omniscience and omnibenevolence, as well as being full of compassion for mankind. In doing so, Valla reveals that the more problematic conflict between God and humanity is the relationship between the divine and human wills. Valla's position is considered by Monfasani(VARIORUM COLLECTED STUDIES SERIES XI, p1-23) as "fideism" , that is, starting from faith and not focusing on and avoid the logical basis of the issue. For in his Dialogue, Valla very explicitly refuses to discuss the question philosophically, and his final solution is to appeal to Romans for his restatement of the relationship between the divine and human wills, arguing that human beings can only perceive God's will and believe that his motives for "being tough on some and merciful to others" are motivated by all-good considerations. He rhetorically attributes the problem to the mystery of God's will. In fact, he does not address the question head-on. This was not the case with Valla, who, after writing "Dialogue on Free Will", revisited the question of free will in his "Dialectical Disputations" and responded to it again from a philosophical perspective that he had rejected, that of modal logic.

In his analysis of the contrariety of the pairwise square, Valla suggests that universal propositions should be classified, and consequently proposes a hypothesis of "partial truth". Logicians teach that two propositions, one true and one false, can be equally false but not equally true. Just as "all horses are animals" and "all horses are not animals" are the opposites of true and false propositions respectively, so "all horses are white" and "all horses are not animals" are the opposites of true and false propositions respectively, but "all horses are white" and "all horses are not animals" are the opposites of true and false propositions respectively. "All horses are not white" are also opposites, even though they are false propositions, because horses are obviously white, black, yellow, brown, etc. But what strikes Valla as odd is to call the two false propositions opposites. Instead of saying that "all horses are white" and "all horses are not white", he thought it would be better to say that as a universal proposition the "true" part and the "false" part are the same. "False" part of a universal proposition is the opposite of the "false" and "true" parts of another relative universal proposition, respectively. That is to say, although "all horses are white" is a false proposition, it is not completely false, unlike the complete falsehood of "all horses are not animals", and the two kinds of falsehood have different textures. Therefore, it is better to say that "all horses are white" contains a partial truth and is not a complete false proposition.

Subsequently, Valla transitions to the analysis of modal words and combines this assumption of "partial truth" with the

strong and weak validity of arguments. It is on this basis that Valla proposes two kinds of truth, two kinds of reasoning based on the affirmation of the principle of bi-valence, and thus brings the logical analysis closer to the real state of events. Let us begin by recalling Valla's treatment of the six modal words, namely, necessary, impossible, probable, contingent, true, and false (possibile, contingens, impossibile, necessarium, verum, falsum). Continuing the subtractive approach to Aristotelian logic consistent with the Refutation of the Dialectic, he argues that these six words express a redundancy of state of affairs that can be cut in half, leaving only "impossible," "possible," "true," and "false". ". This does not mean, of course, that the other modal words should be abandoned; they can be used in appropriate contexts as well. Valla first deals with the "necessary-impossible" pair. He argues that "necessity" and "impossibility" are in fact modals, which is consistent with everyday usage and logic. This is in accordance with everyday usage and logic, since they state necessity on a positive and negative level respectively. Of course, they are not strictly equivalent, but they can be interchanged through negation, as in the case of "It is inevitable that a man will die quickly from a serious heart injury" and "It is impossible that he will die quickly from a serious heart injury". Next, Valla(Cophenhaver & Nauta, 2012, volume II, p.126-127) will address the "contingency-possibility" relationship:

“Likewise for ‘possible’ and ‘contingent,’ which correspond to these modes as their contraries. For if the two former modes are really one, why should the latter two not also be one? Clearly this is done by a complementary negation, seeing that ‘not possible’ is the same as ‘impossible,’ and ‘not contingent’ the same as ‘necessary.’”

By analogy, he argues that "possible" and "contingency" have the same meaning as "impossible" and "necessary". He argues that "possible" and "contingency" have the same meaning as "impossible" and "necessary. His reasoning looks like this:

(Major premise) Necessity equals impossibility (both mean necessity);

(Minor premise-a) Necessity is the opposite of contingency,

and (minor premise-b) Impossibility is the opposite of possibility;

Therefore, contingency equals possibility.

Note that in view of the distinction already made by Valla between "opposed" propositions, I take "opposite" here to mean contradiction in the strict sense. If the substitution event is presented as a proposition, then it is necessary to formalize the relation between "necessary" and "impossible" in the premise, which is not strictly equivalent:

(if X means "a thing happens", non-X means "a thing does not happen")

(Major premise) X is necessary = non-X is impossible;

(Minor premise a) X is necessary = X is not contingent, (Minor premise b) non-X is impossible = non-X is not possible;

So, X is not contingent = non-X is not possible;

Therefore, contingency ≠ possible.

So, from an argumentative point of view, the equivalence of "contingency" and "possibility" as Valla sees it, whether on the basis of everyday usage or on other grounds, is at least not logically self-evident, and this is not a trivial point. I think the key to understanding this lack of self-referentiality is what exactly does Valla mean by "possible" or "contingent"? It has been noted above those two possibilities emerge from Aristotle's "On Interpretation"--"one-sided possibility" and "two-sided possibility". The former one is defined as contradicting only the "impossible"; while the latter one contradicts not only the "necessary" but also the "impossible". "one-sided possibility" implies necessity, while "two-sided possibility" excludes any necessity, which is the "contingent" meaning of "future contingency". This is the "contingent" meaning of "future contingency". Since Valla has already pointed out that "contingency" contradicts "necessity", it seems that Valla has not asserted the relationship between "contingency" and "impossibility" according to the definition. But by definition it seems that Valla does not assert the relationship between "contingency" and "impossibility". However, if we substitute the relation of "contingency" to "possibility", then since "possibility" contradicts "impossibility", it is natural that "contingency" contradicts "necessity", and "impossibility" contradicts "necessity". But if we substitute Valla's view that "contingency" is equal to "possibility", then since "possibility" contradicts "impossibility", naturally "contingency" also contradicts "impossibility", which is in accordance with the definition of "bilaterally possible". Therefore, Valla's understanding of "contingency = possibility" together serves as the meaning of "bilaterally possible". This becomes clearer when combined with Aristotle's explanation of "future contingency", because Aristotle realized that the negation of modal propositions is different from the negation of ordinary propositions, and that the negation cannot be like the negation of the proposition that "all horses are animals" "All horses are not animals"; rather, it should negate the modal word, just as the negation of "He may walk" is not "He may not walk" but rather "He may not walk". This means that when "bilaterally possible" is used to state a future contingent event, it implies a pair of seemingly contradictory propositions, just as "he may walk" is simultaneously

implied by "he may not walk". or "It may rain tomorrow" and "It may not rain tomorrow" have the common negative proposition "It may not rain tomorrow". "It may not rain tomorrow". That is to say, relations that seem to be logically self-evident are self-evident when applied to the analysis of modal propositions. If Valla's seemingly non-self-consistent reasoning is understood in this light:

(major premise) X is necessary = non-X is impossible;

(minor premise a) X is necessary = X is not contingent, and (minor premise b) non-X is impossible = non-X is not possible;

Therefore, X is not contingent = non-X is not possible;

If we start from the general propositional reasoning, then it is obvious that we cannot conclude from the above premises that "contingent" and "possible" are equal, but since Valla's reasoning about "contingent" or "possible" is not the same as that of "contingent" or "possible", it is not possible for us to conclude that "contingent" and "possible" are equal. But because Valla's view of the equivalence of "contingency" or "possibility" does not really depend on a formal argument, as he claims, the reason is that he has already predetermined "contingency" and "possibility" to be equivalent. The reason for this is that he has pre-understood "contingency (possible)" as "bilaterally possible", and propositions involving modal terms are inherently incompatible with general propositions, since modal propositions themselves contain propositions that contradict them. So, if we substitute "contingency = possible" for "X is not contingency" in the conclusion here, which means that it is not contingency that something happens, the other half of the conclusion, "non-X is not possible", means that it is not possible that something doesn't happen. The other half of the conclusion, "non-X is not possible", indicates that it is not contingent that the thing does not happen, which seems to be a contradiction, but in fact it is not a contradiction because it is not a contradiction for modal propositions, i.e., it is said that the logical validity of whether a thing happens or does not happen is equivalent, and the conclusion is valid. The seeming logical incoherence of Valla's argument is due to the fact that his understanding of "contingent (possible)" as based on "bilaterally possible" implies contradictory propositions that do not conform to the principle of bi-valence. Although "it may rain tomorrow" and "it may not rain tomorrow" are consistent with everyday experience from the point of view of everyday usage, it is not sufficient to have only the principle of bi-valence when translating this understanding into logical relations.

*3.2 Necessary vs Credible Argument*

Of course, the modal word analysis described above ultimately serves to return to Valla's treatment of the problem of free will. This is the only text in which Valla(Cophenhaver & Nauta, 2012, volume II, p.139-141) refers to this issue in the “Dialectical Disputations”:

“I have used ‘possibly.’ Those people more commonly say ‘contingently,’ but to me this word seems to have been taken over from the countryside rather than the city, and so it gives a somewhat scruffy appearance. In their view, it is the opposite of ‘necessarily,’ so that whatever does not happen necessarily happens contingently, and whatever does not happen contingently happens necessarily—which is false. For I shall now be writing neither necessarily nor contingently but voluntarily and deliberately, and God makes man by will and grace, not by necessity and contingently. The famous problem of God’s foreknowledge and the freedom of our will depends on this. I have already produced a book on it, where I have shown it to be the result of chicanery on the part of philosophers that this problem has seemed insoluble when it was very easy to solve.”

The "book" means his “Dialogue on Free Will”. Somewhat surprisingly, Valla gives his diagnosis of the problem rather elegantly and, one might say, excessively succinctly: "Everything happens either by necessity or by contingency, or by contingency or by necessity." For no one had previously derived this hidden dichotomy so directly. Aristotle's refutation of "fatalism" as a "two-sided possibility" of "future contingency" is only a presupposition, and he did not give a theory of truth beyond the principle of bi-valence. Afterwards, Diodorus even canceled the meaning of "two-sided possibility" from the principle of bi-valence, and "possibility" was narrowly defined as "necessity". The discussion of "future contingency" almost disappeared in the Middle Ages, and its effect was gradually replaced by "free will" of human beings, but the logical crisis behind the question of free will persisted until Lavenham proposed the existence of two kinds of futures, and began to start from the principle of bi-valence and the principle of "future contingency" to "future contingency". It was not until Lavenham proposed the existence of two futures that the dilemma of modal logic behind the problem began to return from the principle of bi-valence and "future contingency". This signals the need for a new theory of truth-value that differed from the traditional bivalent principle of departure.

Valla argues that the insistence on the paradoxical relationship between "necessity" and "contingency" is at the root of the problem of free will. He argues that "it is wrong, in their view, to oppose "necessity" so that everything happens either by necessity or by contingency, or by contingency or by necessity." What is "wrong" here is not the contradictory

relationship between "necessity" and "contingency," but rather the "wrongness" of insisting on framing the question of free will from this perspective. perspective on the question of free will. Instead of simply applying the bivalent principle of either-true-or-false judgement to statements relating to modality, statements with modal terms should be distinguished from propositions in general, a clear sense of distinction that can be drawn from the title of Valla's chapter on analyzing modals, "Sentences are not modal, and all proofs aim at what and through what". But Valla seems to go even further, for it is surprising that propositions with modal terms are not called sentences, and then clearly, they cannot be regarded as propositions either. He does not limit modal words to the dimension of propositions, but applies them to arguments consisting of several propositions. He argues that modals should appear at the conclusion of reasoning as signifiers for evaluating the degree of plausibility (verisimile) and reliability of an argument. Accordingly, Valla(Cophenhaver & Nauta, 2012, volume II, p.137) divides proofs into two types and argues that the proofs used by "orators" include the necessary proofs used by logicians, i.e., syllogism structured only through true-false dichotomies from the principle of bi-valence:

“Accordingly, the greatest authorities, including Cicero and Quintilian, were not wrong to make the parts or types of proof just two, some being ‘necessary,’ others ‘credible’ or ‘not inconsistent’—the first relevant to logicians, but both to orators, the first lacking a comparative degree, the second not lacking it. Everything is more or less plausible than something else, in fact; but one thing is not, strictly speaking, more or less necessary than another, though perhaps it may be in ordinary usage.”

The fundamental motivation for this distinction also stems from the quest for two kinds of truths. As Valla puts it, the logician seeks "necessary truths", but since "necessity" has only two value spaces, true/false, it is not possible to incorporate into its proofs the modal relations that contain possibilities. Since the truth represented by modal logic is actual, the notion of "truth" from the principle of bi-valence does not satisfy the need for an actual proof. The theoretical value of the notion of "partial truth" had already been foreseen by Valla in his previous analyses of opposite propositions to the square. If "truth" is understood as a result that needs to be proved, then "necessary truth" is in fact a special state of being "partially true", and thus Valla incorporates the principle of bi-valence into his new modal logic. in his new modal logic. This is why Valla includes in the orator's repertoire the necessary proofs that belong to the logician, because in the context of practical language the determination of the truth or falsity of premises is often more difficult than the search for a valid form of argumentation. Finding "plausible" proofs and dealing with modalities containing "two-sided possibility" and greater complexity should be the goal of practice.

And because Valla(Cophenhaver & Nauta, 2012, volume II, p.131)further distinguishes between strong and weak arguments based on their plausibility, and because the signifiers of allomorphic and idiosyncratic propositions are relevant to the plausibility of an argument, he devotes a great deal of space to a review of the signifiers in everyday usage that denote allomorphic and idiosyncratic propositions (e.g., "all", "every", "always", "all", "every", "every", "every", "every"). ", "always", "usually", "frequently", "almost always ", "often", "occasionally", "rarely", etc.) are counted and categorized in minute detail:

“But whenever the reason is not absolutely true and absolutely certain, but partly true and partly certain, then the conclusion is not necessary but partly necessary. When this has a great deal of force, it will be called ‘plausible’ or ‘credible,’ meaning ‘very possible,’ and when it has little force, it will be called ‘possible,’ meaning ‘somewhat plausible’ and ‘somewhat credible.”

The first(Cophenhaver & Nauta, 2012, volume II, p.133), for example：

Almost every mother loves her son;

Clytemnestra is the mother of Orestes;

it is therefore plausible or credible or very possible that Clytemnestra loves Orestes.

The second(Cophenhaver & Nauta, 2012, volume II, p.135) , like:

Some (Or Sometimes) mothers have killed their sons out of hatred for their husbands;

the mother of Orestes hates Agamemnon, her husband and his father;

it is possible (somewhat plausible/credible) that it will come to pass that she kills Orestes.

At this point, Valla's understanding of possibility goes beyond the Aristotelian meaning of "two-sided possibility" and develops a tendency to try to quantify possibility by combining the modality of possibility with the credibility of

arguments, making uncertainty certain. It should be said that Valla appears to have gone far beyond the scope of what free will involves, but in fact returns to the modal logic underlying the question, and from "two-sided possibility" provides a new philosophical foundation for the theological solution to his rejection of the philosophical solution in On Free Will. He inadvertently developed Aristotle's modal logic and reconciled the conflict between Aristotle's theory of truth-value centralized on the principle of bi-valence and his modal logic, a potentially incongruous element that spread the shadow of "fatalism" into the Middle Ages precisely because of the inadequacy of logical explanations of possibility.

## 4. Conclusion

The reason for Valla's dissatisfaction with Boethius's scheme is that the latter's reconciliation of the problem of free will tacitly presupposes the logical contradiction of necessity/contingency, whereas the relationship between "necessity" and "contingency" is not simply summed up by the word "contradiction". The relationship between "necessity" and "contingency" is not simply summarized by "contradiction". Whether it is classical "logical determinism" or "theological determinism" that perceives the source of the simple bivalent treatment of the two modalities, the principle of bi-valence still brings about the predominance of either-true-or-false judgement, despite Aristotle's proposal of the "bilateral possibility". Despite Aristotle's rich notion of "two-sided possibility", which contains contradictory propositions, it was not successfully inherited, at least from a logical point of view, and was not revisited until the late Middle Ages. The logical status of contingency can only be restored by revisiting the simple and crude determination of "truth" based on the principle of bi-valence. Boethius's philosophical response does not address the modal dilemma underlying the problem, which is the root cause of Valla's criticism, since relying on an old logical language would only complicate the problem of free will. So, the significance of Valla's critique of modals in the Dialectical Refutation is also clear: not only does the problem of free will based on the old modal logic fall apart, but Valla takes a higher view and reconciles the study of logic, which is concerned with syllogism and necessary proofs, with rhetoric, which is concerned with various kinds of argumentation and plausible proofs. The significance of the latter, as Fubini(1999)suggests, would echo much later in Bacon's “The New Organon”.

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