CHAPTER 1 A PROPOSITIONAL THEORY OF ASSERTIVE ILLOCUTIONARY ARGUMENTS OCTOBER 2017

> ***Man possesses the capacity of constructing languages, in which every sense can be expressed, without having an idea how and what each word means–just as one speaks without knowing how the single sounds are produced.***
> ***Colloquial language is a part of the human organism and is not less complicated than it.***
> ***From it it is humanly impossible to gather immediately the logic of language.***
> ***Language disguises the thought; so that from the external form of the clothes one cannot infer the form of the thought they clothe, because the external form of the clothes is constructed with quite another object than to let the form of the body be recognized.***
> ***The silent adjustments to understand colloquial language are enormously complicated.***
> (L Wittgenstein, *Tractatus Logico-Philosophicus*, 4.002)
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> ***The proposition 'Scott was the author of* Waverly*'....does not contain any constituent 'the author of* Waverly*' for which we could substitute 'Scott.'*** (B Russell, "On Denoting," *Mind, 1905)*

1. MAKING AND DISCHARGING SUPPOSITIONS I think that certain logical deductive systems were first called *natural* to contrast them with axiomatic deductive systems, either with or without a rule of substitution. The axiomatic systems were designed to establish results that were single formulas, or single sentences, and these "logical laws" were inferred directly from other logical laws. The systems of *Principia Mathematica* are like this, as are the systems presented in Hilbert and Ackermann's *Principles of Mathematical Logic* and Church's *Introduction to Mathematical Logic*. When compared to deductive reasoning carried out using expressions of natural language, these logical deductions have a somewhat "contrived" character.

Systems of natural deduction, in contrast, have arguments, or deductions, which begin with sentences or formulas that need not be logical laws, and infer consequences of the initial steps. An initial premiss might be a sentence or statement that is known to be true, or it might be one that is simply being supposed to be true. It is characteristic of systems of natural deduction to employ rules which *discharge*, or *cancel*, hypotheses. These hypotheses are initial premisses, initial *suppositions*, of the arguments in which they are canceled. The natural deduction systems make it possible both to establish results linking sets of premisses to conclusions and to establish single-formula or single-sentence results.

For example, a derivation from these three hypotheses:

$$[A \supset [B \supset C]], A, B$$

to the conclusion C might be continued, using a rule ⊃ *Introduction*, to obtain a derivation from '$[A \supset [B \supset C]]$' to '$[B \supset [A \supset C]]$.' Using ⊃ *Introduction* once more, we could establish that

'*[[A ⊃ [B ⊃ C]] ⊃ [B ⊃ [A ⊃ C]]]*' is logically true (if '*A*,' '*B,*' and '*C*' are sentences or statements) or displays the form shared by members of a class of logically true statements (if the formal language and deductive system employ variables and formulas rather than statements or interpreted sentences).

Natural-deduction systems typically employ introduction and elimination rules which involve occurrences of a single operator. These might be rules like ⊃ *Elimination*, or *Modus Ponens*, and *v Introduction*:

⊃ *Elimination*

A *[A ⊃ B]*

B

v Introduction

A

[A v B]

B

[A v B]

From this perspective, *Modus Tollens*:

[A ⊃ B] *~B*

~A

has the disadvantage of involving two connectives rather than just one. A one-operator rule makes clear the inferential contribution of that one operator, but with two operators, it isn't so easy to tell what role each operator plays. However, it is not absolutely essential that a system of natural deduction employ one-operator introduction and elimination rules. It isn't "unnatural" to employ an inference principle which involves two operators. So a system of natural deduction might, after all, have *Modus Tollens* as one of its rules.

Deductions, or derivations, in a system of natural deduction resemble deductive arguments or proofs in fields such as science or mathematics. To establish a conditional result that if *A*, then *B,* we might begin by supposing *A*, and then, by a deduction employing one or more steps, reason to the conclusion *B*. This would normally be taken as sufficient to establish the conditional result, especially if the result to be established were stated before deducing *B* from *A*. The arguer isn't required to *finish* her deduction by saying, "Hence, if *A*, then *B*." But what she isn't required to say is nevertheless tacitly understood. The supposition of *A* is discharged once it has been shown that given *A*, we can deduce *B*.

Someone who begins an argument (proof) by supposing that √*2* is a rational number, and then deduces a contradiction, might conclude by saying, "So √*2* isn't a rational number," which cancels the initial supposition. If she had announced the result before giving the argument, she might not repeat that result, but could easily say something like "QED" after reaching the contradiction. With the proof by contradiction, she would probably say *something* to indicate that the conclusion has been established. However, this isn't the case with all arguments that discharge hypotheses. When establishing a conditional, or a universal result, or even the consequence of a disjunction, once the argument from hypotheses which need to be discharged is completed, it is taken to be evident that the appropriate result has been established, and this is often, perhaps usually, not stated explicitly. If we begin by letting *ABC* be a triangle, and eventually conclude that the sum of the interior angles of this triangle is equal to two right angles, we can simply stop, and our audience will know that our result holds for all (Euclidean) triangles.

2. ILLOCUTIONARY ACTS AND ARGUMENTS We commonly do use natural languages to reason deductively from premisses which are not logically true or analytically true, and in many cases, hypotheses must be discharged in order to establish the desired results. We find this natural. Systems of natural deduction formalize a kind of reasoning that has long been familiar in deductive sciences. Although it is widely recognized that arguments from hypotheses are a natural form of reasoning, certain features of these arguments are frequently not recognized. In English, we typically mark a hypothesis in an argument by using either the word ‘suppose’ or the word ‘let’ (as in “Let *ABC* be a triangle”). I shall call these hypotheses *suppositions*; they are *initial suppositions* of deductive arguments.

Suppositions are most appropriately grouped together with assertions, or judgments, and denials. Assertions and denials are *illocutionary acts*. Illocutionary acts are *speech acts* or (better) *language acts*. A language act is a meaningful act performed by saying something, or writing something, or using words and sentences to think something. Illocutionary acts are the complete concrete language acts from which significant speech is composed. A typical simple illocutionary act is constituted by someone’s using a sentence or sentential clause to perform a meaningful act, and performing that act in a manner, or with a force, that determines what “job” is being performed with the sentence. Some typical jobs are *making an assertion*, *making a promise*, or *giving a command*. The act performed with a certain force (or in a certain manner) is, without the force, a *locutionary act*.

John Searle has argued against locutionary acts, either because they don’t exist or because they are abstract and incomplete when compared to illocutionary acts. Locutionary acts certainly exist, as I can illustrate by writing “Consider the statement that √2 is a rational number.” I made the statement (without accepting it) when I wrote what I did, and the statement I made was neither abstract nor incomplete. But Searle is right that most locutionary acts occur in the course of performing illocutionary acts. This makes them incomplete, and possibly abstract, components of those illocutionary acts. However, that doesn’t mean they are either unreal or unimportant. *Statements*, which are language acts performed with a sentence or sentential clause, which acts represent things as being this way or that way, and can appropriately be evaluated in terms of truth and falsity, are locutionary acts which can be regarded as the focus of attention for most standard theories of deductive logic.

Searle’s taxonomy of illocutionary acts recognizes five categories of these acts, and I shall discuss three of these categories in this book. The three are *assertive*, *directive*, and *commissive* illocutionary acts. I shall be primarily concerned with assertive illocutionary acts, which include assertions, denials, and positive and negative suppositions. In this chapter, I will be almost exclusively concerned with assertive acts. Making and accepting a statement (accepting it for representing things as they are), or making and reaffirming one's continued acceptance of a statement are acts of asserting the statement. A denial rejects a statement for failing to represent things as they are, while a positive supposition is something like an act of temporarily accepting a statement, and a negative supposition is like an act of temporarily rejecting a statement. A person (typically) makes positive and negative suppositions in the course of carrying out, or constructing, deductive arguments.

Assertions are commonly understood to be language acts that a speaker (or writer) directs to an addressee, but I am using this word to cover acts of producing a statement, and accepting or reaffirming it, whether or not there is an addressee. This means that all assertions, in my sense, are sincere. What would ordinarily be considered to be an insincere assertion is a *pretended* assertion for me. An assertion can involve a spoken statement, or a written statement, or even a statement which is merely thought. *Denials* are negative counterparts to assertions.

If we make a supposition, and infer a consequence of the supposition, our conclusion also has the status of a supposition, and I will call it a supposition. *Initial* suppositions must be distinguished from *dependent* suppositions, which are derived from, and so depend on, other suppositions. An assertion or denial can be an initial assertion or denial in a particular argument, or it can be derived from other assertions and denials, but if, say, an assertion is derived from other illocutionary acts, it doesn't depend on those acts. We can simply accept the asserted statement, and disregard the premisses from which it was derived. A dependent supposition is tied to the initial suppositions from which it is derived, and, in a sense, "carries" those suppositions along with it.

A genuine deductive assertive argument, the kind that occurs outside of logic courses and logic books, is an *illocutionary argument* which proceeds from illocutionary act premisses to an illocutionary act conclusion. The argument might begin with assertions, denials, and suppositions, and proceed to a conclusion which is also an act of one these kinds. To understand, investigate, and evaluate illocutionary arguments, we need to pay attention both to truth conditions of statements and to the illocutionary force with which statements are made. Standard systems of deductive logic, or logical theories, fail to do this. Standard systems do not "provide" for making, or representing, illocutionary arguments. Instead, they license what I shall call *deductive, or semantic, derivations:* these are concerned to investigate truth conditions, and to trace truth-conditional "connections" among statements.

A *locutionary argument*, as contrasted with an illocutionary one, is an ordered pair whose first member is a set of locutionary acts, the *premisses*, and whose second member is a single locutionary act, the *conclusion*. A locutionary argument is an abstraction which we can represent but not perform; such an argument is *valid* if its premisses entail its conclusion. Deductive derivations can be used to establish the validity of locutionary arguments.

Even standard systems of natural deduction are exclusively focused on truth-conditional connections, and are commonly understood to establish the validity of locutionary arguments. For these systems lack a notational device for indicating illocutionary force, and so lack the resources to recognize or give an account of certain features that are essential to the correctness of a deductive illocutionary argument. For an illocutionary argument, one which begins and ends with illocutionary acts, to be correct, both the truth conditions of statements and the forces of the illocutionary acts must be suitable. In a simple argument from assertions and positive suppositions to an assertion or positive supposition as a conclusion, the statements in the premiss acts must entail or imply the statement in the conclusion act. In addition, the force of the conclusion must not exceed the forces of the premisses. If there are one or more undischarged suppositions among the premisses, the argument will not support a conclusion which is an assertion or denial.

What is called the *truth and consequence conception of demonstration* in *Corcoran 2009* is a procedure that begins with statements that are known by the person carrying out the demonstration, who then constructs a deductive derivation to reach a statement which is a consequence of the known statements, which consequence apparently transforms itself into a piece of knowledge. But, surely, the actual demonstration that takes a person from knowledge to knowledge is an illocutionary argument that begins with assertions of known statements, and continues by asserting (and sometimes denying) further statements until the concluding assertion is reached. Along the way, some additional statements may be supposed, and these suppositions eventually be discharged. A genuine argument, the kind of argument that a person makes to figure out something for herself, or to convince someone else to accept or deny some statement, is an illocutionary argument.

3. LOGICAL THEORIES One way of conceiving a language, especially a natural language, regards that language as an independent "free-standing" entity governed by syntactic, semantic, and possibly other kinds of principles. The elements which compose this entity are expressions of various kinds. My own view is that a natural language, or even a made-up or artificial language that is actually used to say things (or write them), is a kind of activity, much like baseball is a kind of activity. Mine is a speech-act, or (better) a language-act conception of language. A natural language is "constituted" by language acts that members of a linguistic community perform, together with the skills and dispositions for performing these acts that are possessed by members of that community.

Logic is a study of language, and is investigated and studied by developing logical theories. A logical theory is constituted by a *framework*, or *frame*, containing three parts:

(1) A specialized written formal language, usually artificial,
(2) A semantic account for the language, which in standard theories provides the truth conditions of sentences in the language,

(3) A deductive system for establishing results which involve sentences of the language, such systems often codify logically distinguished items (logically true sentences, logically valid argument sequences) of the artificial language.

together with the *development* of the elements of the frame. The frame, together with deductions or derivations in the deductive system and the results established by these constructions constitutes a *narrow* logical theory, or a logical theory *narrowly conceived*. A logical theory *broadly conceived* includes the narrow logical theory, together with meta-theorems and their proofs concerning elements of the frame.

At the beginning of the modern period in logic, philosophers like Russell and Wittgenstein thought that the logical languages reveal hidden features of ordinary language. In the logical languages, grammatical form coincides with logical form, while in ordinary language, logical form is often concealed. Although this view was influential in philosophy, and in linguistics as well, it no longer seems plausible. Some of those hidden features don't exist–for example, physical objects are not logical constructions from sense data or sense contents, and sentences about physical objects do not, after a proper analysis, turn out to be about something else. Other such features turn out to be ones we can recognize if we know how they "show up" in the languages we employ.

Logical languages are essentially written, while ordinary language, natural languages, are essentially spoken. Logical languages are designed to be visibly or visually perspicuous, while ordinary speech is listened to, not seen. To understand the logical or semantic features of speech, we need to reflect on what we are *doing* when we speak, not on what we can see.

From the present perspective, the sentences of a logical language are best regarded either as visually perspicuous sentences of a canonical language, or as visually perspicuous *representations* of natural-language speech acts. My own preference is to conceive, or treat, logical-language sentences as representations. The logical language when conceived as a canonical language is much simpler than, say, ordinary English, and the logical language sentences conceived as representations often represent language acts belonging to a rather simple sublanguage of our ordinary language. It is easier to focus on features that interest us if we consider a simpler language or sublanguage, but this isn't a sign that people actually or ordinarily perform the simpler acts that would be associated with the simpler language. Sentences of most logical languages are also designed to highlight semantic structure, providing little syntactic information about the statements they represent. For example, we could use an artificial-language sentence '*[A v B]*' to represent a statement in virtually any natural language.

Although formal-language sentences can represent kinds of statements that might actually be made, they may fail to represent statements of kinds that are commonly made. As an illustration of what I have in mind, the English statement:

Some student in this class is a boy.

might in an elementary logic class be translated by one of:

(1) $(\exists x)[C(x) \& B(x)]$
(2) $(\exists x)[I(x, a) \& B(x)]$

Neither of the first-order sentences really captures the semantic structure of the English statement. The first-order sentences come closer to representing a statement made with a sentence like this:

For something, it is a student in this class and it is a boy.

This is a statement we *can* make, it employs an English sentence, but it isn't something we are likely to say. The first-order language represents language acts characteristic of a much simpler language than ordinary English. Sentences (1) and (2) represent statements which are, at best, approximations to the original statement. For many logical purposes, it is sufficient to deal with such approximations, but it can be illuminating to devise formal languages which provide representations that are more faithful to our actual statements.

When Russell wrote "On Denoting," he seems to have thought that the language of the predicate calculus reveals the hidden logical forms of the English sentences, or statements, that he was discussing. And he provided clumsy and complicated analyses of sentences containing definite descriptions, which some people I know still think are the correct analyses. What Russell actually showed was how we might use a much simpler language than ordinary English to convey more or less the same information that we communicate using sentences that contain definite descriptions. The simpler language that he employed contains connectives and universally quantified phrases, but no definite descriptions. While we might get by with a simpler language (or sublanguage) than the one we actually employ, there is no reason to think that the simpler language provides accurate analyses of the things we ordinarily say.

In ordinary speech, a definite description can be used to "pick out" or "fasten on" an object in order to predicate an expression of that object, and it can be used predicatively in order to represent an object as being the unique object which that description fits. A definite description can also be used to pick out an object in order to represent that object as being the same or not the same as an object identified in some other way. That we might get by with a language which contains no definite descriptions, or even a language in which all definite descriptions are used predicatively, doesn't help us understand how our ordinary language, our natural language, functions. Definite descriptions used as descriptive singular terms don't disappear once we really understand what we are saying–once we provide logically correct analyses of the things we are saying.

An account of the syntax of an artificial logical language is a collection of rules or principles for constructing artificial-language sentences. There is no reason to expect such an account to shed light on syntactic principles for natural languages. When the formal language is used to represent ordinary-language speech acts, the semantic account for the logical language gives the truth conditions for the natural-language statements that the formal-language sentences are used to represent.

In developing various systems of logic in this book, we will imagine that we are concerned with a fixed natural language, whose statements have definite meanings, and that expressions of the logical language represent specific speech acts or specific types of speech act. We don't envisage different interpretations assigning now this, now that speech act, or type, to a given logical-language expression. I will describe this situation by saying that we imagine that our logical language has a fixed *concrete interpretation*, which is a mapping from expressions of the logical language to types of speech acts performed with expressions of the fixed language. To provide a concrete interpretation for sentences of a first-order language, we might establish connections like this:

Let '*F(x)*' mean *x is a fish*
Let '*M(x)*' mean *x is a mammal*
Let '*a*' stand for Alaska

To give a concrete interpretation to a language of propositional logic, we would need to assign entire statements to atomic sentences.

We don't try to provide concrete interpretations of an entire formal language, but we do, when carrying out logical analyses, provide such interpretations for fragments of formal languages. We also, on different occasions, provide different concrete interpretations for the same fragments. But imagining that we have such an interpretation of the whole language is a heuristic practice that guides our employment of the language. The meanings, or semantic structures, of statements, together with the way the world is, determine which statements are true and which are false. Given a concrete interpretation of a logical language, each sentence of the language represents a statement that is definitely true, or definitely false, or, perhaps, neither one. We know (or believe) of some statements that they are true, or false, but for most statements that we can understand, we neither believe nor disbelieve them.

For a given a concrete interpretation of our formal language, different interpreting functions of the language represent different ways that things might turn out, as far as meanings alone are concerned. It isn't enlightening, or helpful, to think of the different interpreting functions as being, or determining, possible worlds, for as a person gains knowledge, she isn't narrowing down the range of worlds she might be in. She is finding out more about what her (and our) world is like.

Given a concrete interpretation, and the meanings of language acts represented by the logical language expressions, but no other information, there are certain interpreting functions which might indicate how things really are, but some interpreting functions will be ruled out. For example, if different logical-language sentences *A* and *B* represent statements with the same meaning, then an interpreting function which makes *A* true and *B* false is out of the question. So, given our interpreted language, only some interpreting functions are *admissible*.

An artificial logical language makes it convenient to characterize certain classes of statements and arguments or argument sequences. Its *logical form* is a perceptible feature of an artificial-language sentence. This form is *visibly*, or *visually*, perceptible. Our understanding of the truth conditions associated with logical form allows us to formulate deductive systems for which there are perceptible criteria distinguishing good from bad arguments.

An artificial-language sentence with its perceptible logical form represents a natural-language statement. The logical form of the logical-language sentence represents the semantic structure of the natural-language statement, but, ordinarily, it represents an abstract level of semantic structure. The natural-language sentence used to make that statement won't have a perceptible feature presenting or representing the statement's semantic structure. We don't need perceptible features marking semantic structures, because we supply the semantic structures of the natural-language statements that we make.

The deductive system which is part of a standard logical theory is really a system for constructing deductive derivations. It is primarily a system for codifying representations in the formal language, and is indirectly a means for codifying natural-language statements or argument sequences. It need not be intended, or even useful, for presenting, representing, or exploring illocutionary arguments. But in this chapter we will develop a logical theory suited for investigating (and constructing) illocutionary arguments.

4. ILLOCUTIONARY LOGIC Daniel Vanderveken and John Searle introduced the study of *illocutionary logic* in *Vanderveken 1985* and *Vanderveken 1990*. I consider my own work in the logic of speech acts or language acts to be an exploration of illocutionary logic. From my perspective, the subject could as well be called the *logic of language acts*. For locutionary acts and arguments, as well as illocutionary acts and arguments, are investigated by distinctive logical theories.

In investigating illocutionary logic, Searle and Vanderveken favor what might be characterized as a "top down" approach, while I prefer to investigate language-act arguments from the "bottom up." They view the study of illocutionary arguments as a supplement, or appendix, to standard logic, and they focus on very general principles/laws which characterize illocutionary acts of all kinds. In contrast, I understand locutionary and illocutionary acts, and (what I am calling) locutionary and illocutionary arguments to constitute a systematically and conceptually unified subject matter, which provides different areas, or fields, that are in need of logical investigation.

In addition to methodological differences between the Searle-Vanderveken approach and my own, there are substantive differences between their views of speech acts and mine. I will occasionally mention these in developing language-act logical systems, but I won't spend much time arguing against alternative views.

From the present perspective, a real language, a natural language, is constituted by the speech acts or language acts performed by members of the language-using community, together with the dispositions and skills for performing these acts possessed by members of that community, and by the (flexible) conventions that are "in place" for performing and understanding these language acts. A language, or language in general, is primarily an activity in which people engage. People *do* things with words when they speak and write, when they listen with understanding and read, and even when they use words to carry out their thinking.

The widely favored alternative to this conception regards a language as an independent "free-standing" entity governed by syntactic and semantic principles–but that alternative doesn't accommodate our own experience of speaking and of understanding what others have to say. From my perspective, a formal logical language scarcely counts as a language. We don't often perform language acts by speaking, writing, or thinking the sentences of such a language.

Although it is common to regard all illocutionary acts as communicative acts which are performed by an agent and aimed at addressees, I have conceived illocutionary acts more broadly. For some illocutionary acts, such as directives and promises, an addressee is essential. You can't ask someone to pass the salt if there is no someone there. But as I am understanding assertions, for example, what is essential is that the speaker/writer/thinker produces (performs) a statement and accepts it as being or representing what is the case. Although a speaker can address her assertion to someone else, I count it as an assertion if she judges a statement to be the case when she is alone, not intending to communicate this judgment to anyone else.

5. FORMALIZING THE STUDY OF ILLOCUTIONARY ARGUMENTS Imagine that we have a perspicuous formal logical language which contains sentences rather than simply schemas or open formulas, and that this language has a fixed concrete interpretation.

The perspicuity of the formal language is visual. We ordinarily use different particular expressions, or different groups or kinds of expressions for expressions belonging to different grammatical categories, and the spatial arrangement of expressions in a sentence or formula of the formal language represents the semantic structure or logical form of the ordinary-language speech acts represented by the formal-language sentence. We can tell by taking one look, for example, which occurrences of variables are bound by which occurrences of quantified phrases.

Think how difficult it must be to teach modern logic to students blind from birth. If there were a kind of braille notation for logical-language sentences, this notation couldn't possess the kind of perspicuity that a written language makes apparent to persons who see.

Given a formal language which contains interpreted sentences, we can introduce the following expressions for indicating illocutionary force:

⊢ – the sign of assertion ⊣ – the sign of denial
⌞ – the sign of positive supposition ¬ – the sign of negative supposition

The operators for assertion and denial are borrowed from Frege, the other two are my own idea. The operator for positive supposition is like the top half of the assertion sign, while the sign of negative supposition is the bottom half of the sign of denial. These *illocutionary operators* are prefixed to the sentential expressions. Illocutionary operators cannot be iterated, and a sentence prefixed with an illocutionary operator cannot be a component of a longer sentence.

A sentence in the logical language that contains no illocutionary operators is a *plain sentence* of the logical language. The result of prefixing a plain sentence with an illocutionary operator is a *completed sentence*. If the logical language were treated as a canonical language that can actually be used, then plain sentences would be used to make statements, and completed sentences would be used to perform assertive illocutionary acts. These illocutionary acts would have locutionary components. If, as I ordinarily do, we use the expressions in the logical language to represent ordinary-language speech acts, then the plain sentences represent statements and the completed sentences represent assertive illocutionary acts.

An actual language act must be performed by a particular person (or, possibly, by particular persons) on a particular occasion, but different people can sometimes perform speech acts that are essentially similar, and this allows us to abstract the speech act from the person who performs it. If two people on two occasions use a single sentence to make essentially similar statements, we can, and will, (abstractly) regard them as having made the same statement. What it takes for two actual statements to be essentially similar will vary from one situation to another, and will be largely determined by our purposes for carrying out a given inquiry.

A tree diagram like that shown here:

```
(1)   [A & [B & C]]
      ------------------ &Elimination
        [B & C]                [D & E]
        --------- &Elimination ---------- &Elimination
           B                      D
           --------------------------------- &Introduction
                 [B & D]
```

might be used to represent a *deductive derivation* in a conventional system of natural deduction. If the capital letters were replaced by meaningful sentences, the resulting diagram could be constructed by someone in carrying out a deductive derivation. We could use it to determine for ourselves, or to show to someone else, that if the initial premisses are both true, then the conclusion must also be true. In order to modify this diagram so that the resulting construction fully represents an illocutionary argument, the plain sentences on each line must be prefixed with expressions which indicate illocutionary force.

One way of inserting illocutionary operators in the schematic diagram above yields the following representation:

```
⊢[A & [B & C]]
------------------- &E
    ⊢[B & C]          ⊢[D & E]
    ---------- &E     ----------- &E
        ⊢B                ⊢D
        --------------------------- &I
               ⊢[B & D]
```

This represents an argument in which every step is an assertion. An argument having this form is, evidently, deductively correct. (It isn't appropriate to characterize such an argument as valid or invalid, as those expressions are customarily understood.) This representation isn't really an argument, because the metalinguistic variables are not used to make statements. And if the variables were replaced by meaningful English sentences, tree structures would provide an inconvenient format for making genuine arguments. (The arguments would be too big and unwieldy to write or type.) The logical system is an instrument of analysis, we don't need it to provide a template we can use in deriving the consequences of what we know and believe.

The argument schema above is a perspicuous representation of the *inferential structure* of a realistic, but rather simple, deductive assertive illocutionary argument. As is the case with sentences of the formal language, the perspicuity of this argument schema is visible, or visual. The spatial structure of the diagram shows what conclusions are immediately derived from what premisses, and also what conclusions are mediately derived from premisses without being immediately derived. An argument in, say, English, might have this inferential structure without being composed of sentences or statements arranged in the form of a tree diagram.

If a real person on an actual occasion makes an ordinary-language argument having the inferential structure represented by the tree diagram above, the capital-letter variables will represent statements she makes (performs) with natural-language sentences and the connective '*&*' will represent acts performed with one or more expressions (if she is speaking English, she might use 'and'). But the illocutionary operators may not represent acts performed with distinctive expressions. (We sometimes do use expressions to make illocutionary force explicit, but much of the time we don't.) These operators represent the forces of the illocutionary acts she (the arguer) is performing. They represent what she is *doing* but perhaps not anything she is *saying*.

A formal logical theory has a kind of generic character. The illocutionary theory can be used to represent language acts like statements, illocutionary acts, and arguments. These can either be canonical-language language acts or ordinary-language acts. Such a theory allows us to represent kinds of arguments that anyone can make to develop her own knowledge and belief, extending this knowledge and belief in the process. If the theory is used for teaching logic, it provides resources that anyone can employ to develop her own knowledge and belief. Someone who adapts or employs the generic theory for her own case produces (in partial form) her own theory of whatever her knowledge and belief concerns. This theory is constituted by the assertions and denials she makes and remains committed to maintain, as well as by her commitments to perform further assertive acts.

We don't need to perform acts with those forces when we read or listen to her arguments. But if we do, we are carrying out similar arguments, not the same arguments. Each person's assertions, denials, and suppositions commit her (inferentially, and so conditionally) to make further assertions, denials, and suppositions, but these acts don't commit other people. The commitments of someone's assertive illocutionary acts are features of these acts. A person who makes a serious deductive argument, as opposed to a deductive derivation, is tracing the commitments of her own illocutionary acts.

If the steps in the representation above are prefixed with different illocutionary operators, as here:

```
⊢[A & [B & C]]
-------------------- &E
    ⊢[B & C]          ⌞[D & E]
    ----------- &E    ----------- &E
        ⊢B                 ⌞D
        ---------------------------- &I
                ⊢[B & D]
```

the kind of argument that is represented may not be deductively correct. In this example, the argument is incorrect. The last "move" is the one that is mistaken. An asserted premiss, when combined with a positive supposition, will not support an asserted conclusion.

The deductive derivation in (1) does not represent an illocutionary argument, at least not perspicuously. Someone might tacitly understand the steps in the construction to represent suppositions, or assertions, and then consider the construction to represent a genuine argument. This is what we must do in a deductive derivation in which assumptions are discharged, as in this example:

```
(2)          x
         A   B
        ----------- &Introduction
        [A & B]
        --------- &Elimination
           B
        ---------- ⊃Introduction, discharge B
        [B ⊃ A]
```

Here we show that a hypothesis has been discharged by placing an '*x*' above it. To understand how this construction demonstrates that a statement *A* implies '*[B ⊃ A]*' (for any statement *B*), we must regard the initial occurrence of *B* as a positive supposition. Although standard systems of logic focus exclusively on truth-conditional relations linking statements, systems of natural deduction have us make and discharge suppositions in carrying out the reasoning sanctioned by their rules. For a perspicuous representation of an illocutionary argument based on the construction in (2) we might provide this tree diagram:

```
         x
 ⊢A     ⌞B
------------ &Introduction
⌞[A & B]
----------- &Elimination
   ⌞A
------------ ⊃Introduction, discharge '⌞B'
⊢[B ⊃ A]
```

In an *explicit* theory of assertive illocutionary arguments, at least in the kind of theory I will develop in this book, the deductions are perspicuous representations of kinds of illocutionary arguments that are actually carried out in "real life." These systems make it convenient to distinguish what depends on truth and truth conditions from what depends on illocutionary force, and may prove useful for investigating features like cogency and rigor.

6. A SIMPLE THEORY OF ILLOCUTIONARY ARGUMENTS Standard theories, or systems, of deductive logic are best regarded as *locutionary* theories. They deal with formal languages whose sentences are either used to make/perform statements (if the language is regarded as a canonical one) or to represent natural-language statements (otherwise). The statements are *assertive locutionary acts*. Sometimes the languages contain (open) formulas rather than, or in addition to, sentences, and the systems are used to obtain results about statements whose forms are displayed by these formulas, but I will limit my attention to theories which employ formal-language sentences.

A standard theory will provide a semantic account of the truth conditions of the statements either performed with or represented by formal-language sentences, and will formulate a deductive system for carrying out *deductive derivations* which establish semantic results concerning these statements. A deductive derivation might, for example, establish that a statement is logically true, or that some statements imply another statement, or that a locutionary argument is logically valid.

Standard theories deal with formal languages which don't contain operators (symbols) for indicating illocutionary force, and the semantic features that are explored depend on the logical forms displayed or represented by formal-language sentences. The deductive derivations sanctioned by standard theories trace truth-conditional connections linking statements, but these derivations are neither locutionary nor illocutionary arguments. Locutionary arguments are simply ordered pairs linking sets of premisses to conclusions, and illocutionary arguments have illocutionary act components.

A deductive derivation might begin with initial statements and proceed to statements which these imply, continuing this process until the desired conclusion is obtained. Derivations of this sort often involve "moves" that are appropriate to arguments by natural deduction, though arguments by natural deduction are most properly understood to be illocutionary arguments. These deductive derivations don't make clear how illocutionary force figures in their "practice." A semantic tableau system for establishing that locutionary arguments are logically valid seems more narrowly focused on truth-conditional connections, and may be the most "conceptually appropriate" kind of deductive system for a locutionary theory.

A person can gain new knowledge by studying and developing a locutionary theory, but this knowledge cannot be expressed within that theory. A person needs to say, in English or some other natural language, "Statement '$[A \supset [B \supset A]]$' is logically true," or "Statements $\sim B$, '$[A \vee B]$' imply A" to indicate what has been established by a deductive derivation.

To develop a perspicuous theory for exploring assertive illocutionary acts and arguments, we need to enlarge the formal language employed by the locutionary theory to include illocutionary force-indicating expressions, or *illocutionary operators*. This requires that the account of truth conditions for the sentences (and statements) in the original formal language must be supplemented with an account of semantic features of illocutionary operators and illocutionary acts. The expanded formal language with its more elaborate semantic account calls for a system which allows us to construct or represent deductively correct assertive illocutionary arguments.

Illocutionary acts are the *units* from which significant speech, and the significant use of language more generally, are composed. Children learning to speak are learning to perform, and to recognize, illocutionary acts. It seems likely that learning to recognize locutionary acts, and to distinguish them from illocutionary acts is a later development. So that initially children will learn to make and accept statements "all at once," and only subsequently come to realize that a single statement can either be accepted or denied, or supposed to be or not to be the case.

From the present perspective, one of the main reasons to develop a theory dealing with illocutionary acts and arguments is to capture or explain our linguistic practices, or some of them. Our logical theory is an empirical theory of these practices. But these linguistic practices are governed by norms, which our logical theory should capture. There are correct and incorrect ways of using language, and this includes correct and incorrect ways of making deductive assertive illocutionary arguments. The logical theory aims at uncovering the norms, and illuminating the practices.

In this chapter, I will present a system of propositional logic for investigating assertive illocutionary acts and illocutionary arguments. Although this is quite a simple system, it provides a clear illustration of what is characteristic of systems dealing with deductive assertive illocutionary arguments, and is the basis for different systems developed later in this book.

The language L_0 contains denumerably many (unspecified) atomic sentences, as well as sentences formed with the connectives '*v*,' and '*&*': *[A v B], [A & B]*. Atomic sentences and compound sentences formed from them with connectives are the *plain* sentences of L_0.

The language L_0 contains the four illocutionary operators illustrated earlier:

⊢ – the sign of assertion	⊣ – the sign of denial
⌙ – the sign of supposing a statement to be the case	¬ – the sign of supposing a statement to be false

If *A* is a plain sentence of L_0, then ⊢*A*, ⊣*A*, ⌙*A*, and ¬*A* are *completed sentences* of L_0. There are no other completed sentences. (So, for example, ⊢⊢*A* or ⌙⊢*A* are not well-formed expressions. Neither is '⊢*[*⌙*A &* ⊢*B]*.') These operators are chosen so that the positive operator becomes its negative counterpart when it is rotated 180°, and conversely.

The language L_1 is obtained from L_0 by adding the connective '~,' which is used to form sentences ~*A*; the horseshoe '⊃' of material implication is a defined symbol of L_1. Basing the language L_1 on L_0 in this way emphasizes that the negative illocutionary force operators are prior to negation and the source of significance for negation. But most of the time, I will deal with the language L_1 rather than the simpler language L_0. In both L_0 and L_1, a plain sentence *A* represents a statement, and a completed sentence represents an illocutionary act.

The sub-language of L_1 that contains only the plain sentences of L_1 is L_1^- and the corresponding sublanguage of L_0 is L_0^-. These sublanguages provide bases for two locutionary theories which won't be developed. But the semantic accounts for those theories also belong to the semantic accounts for L_0 and L_1. These accounts are entirely standard. Interpreting functions assign either truth or falsity to each plain atomic sentence, and these assignments determine valuations of all the plain sentences of the language.

A completed sentence '⊢*A*' represents an assertion. Although an assertion can be made either to come to accept a statement, or to reaffirm one's continued acceptance of a statement, I shall for convenience often speak of assertions as acts of accepting statements. Similarly, a denial might be an act of producing and coming to reject a statement, or an act of producing and reflecting one's continued rejection of the statement. Denials may or may not have an addressee.

There are some statements that different people can make. They can't really do this, but when one person makes a statement that is essentially similar to statements that different people can make, we can regard the different people as making the same statement. We can do this with statements that are essentially *third-person* statements. But a *first-person* statement is a statement that only one person can make. Different people can use the same first-person *sentence* to make statements, but each person's first-person statement is about herself. In developing logical theories, we might sometimes find it convenient to restrict our attention to third-person statements.

While we can use a plain sentence of the logical language to represent an essentially third-person statement, we can't do this with completed sentences. Completed sentences represent illocutionary acts. Different people can perform the same kinds of illocutionary acts, but they can't perform essentially similar illocutionary acts. A person developing an illocutionary logical theory can use completed sentences to represent her own illocutionary acts, she can also adopt someone else's perspective, even an ideal language user's perspective, and use completed sentences to represent that someone else's illocutionary acts. But every completed sentence has, in effect, got the word 'I' in its illocutionary operator.

It might seem that the prohibition on including one illocutionary force operator within the scope of another is a departure from ordinary usage, for in ordinary English, in addition to making illocutionary force explicit by saying:

(1) I assert that Buffalo is in New York.

we can also say:

(2) I assert that I assert that Buffalo is in New York.

However, in (2), only the first 'I assert that' can serve as an illocutionary force-indicating expression. The inner 'I assert that' merely *predicates* asserting that Buffalo is in New York of the speaker. In L_1, the illocutionary operators have no predicative use.

Conceiving of supposition as a distinctive kind of illocutionary act conflicts with the view expressed in *Vanderveken 2002*. In that work, Vanderveken limits what illocutionary forces (and, hence, what kinds of illocutionary acts) there can be, based on Searle's taxonomy of illocutionary acts. While Vanderveken recognizes assertive forces, there is no room in his account for supposition. However, to suppose that a statement represents what is the case is different from accepting that statement as one that does represent what is the case. It is quite obvious that we commonly do suppose statements to be true, statements about whose truth we are uncertain, or even statements we know to be false. To suppose a statement to be true is to make (to perform) that statement with a definite and distinctive illocutionary force.

A locutionary theory based on the (sub-)language L_1^- has an ontological, or *ontic*, character, while the system dealing with illocutionary acts and arguments has an *epistemic* dimension. These differences are reflected, in the first place, by the difference between plain and completed sentences. Plain sentences represent statements, which themselves represent things as being this way or that, and are true or false depending on how things actually are. In a fully developed and visibly perspicuous formal language, the grammatical categories of expressions used to form atomic sentences (in many formal languages, these might be individual constants and predicates) correspond to ontological categories, and truth and falsity are determined by the "layout" of reality.

7. RATIONAL COMMITMENT I have imagined that our logical language has a fixed concrete interpretation so that every plain sentence of the language is either true or false–every plain sentence represents a *statement* that is either true or false. (For the moment, we ignore the possibility that some sentences represent statements that fail to be either true or false.) But it is also customary to provide to provide a truth-conditional semantic account for logical formal languages. Such an account employs functions which assign values to basic expressions in the language, and we explain the truth conditions of statements (of plain sentences in the formal languages) with respect to the values assigned to the basic expressions. We then use the values of statements to characterize semantic features like logical truth and validity.

The meaning and truth conditions of a statement are semantic features of the statement, and are characteristic of that statement's *semantic structure*. *Its force is a semantic feature of an illocutionary act*. We need to identify an appropriate feature (a counterpart to truth) of assertive illocutionary acts, and show how this feature is relevant to evaluating deductive assertive illocutionary arguments.

To accomplish this, I will focus on the feature that I call *rational commitment*. This is a commitment to do or not do something, or a commitment to remain in a certain state, like that of accepting a given statement. I find it easiest to explain this feature by providing examples, because I am unable to give a verbal definition of rational commitment. Making a decision to carry out a given action will rationally commit a person to carry out that action. Performing some intentional acts can rationally commit a person to perform others. Rational commitment is either immediate or mediate. A person's immediate commitments are evident to her if she gives the matter her attention, but if performing act X_1 will immediately commit Anne to perform act X_2, and performing X_2 will immediately commit her to perform X_3,..., and performing X_{n-1} will immediately commit her to perform X_n, then performing X_1 may only mediately commit Anne to perform X_n. A person's mediate commitments may not be evident to her.

Rational commitment is not some kind of causal necessity. Like most people, I make many decisions which I don't carry out. Sometimes I forget what I decided to do, sometimes I change my mind, and sometimes I am unable to perform the action I decided on. Rational commitment, when recognized, *motivates* a person to act, but it may not carry the day. Honoring this commitment is a requirement of reason, and may or may not be a moral requirement. I can decide to do something like get a bottle of beer from the refrigerator, and then fail to do it, either because I forget what I intended to do, or for some other reason, without being culpable in any way.

Some commitments are conditional, like the commitment to close the upstairs windows in my house if it rains while I am at home, and others, like my commitment to get beer from the refrigerator, are unconditional. With the commitment to close the windows, we might say that I am committed to close the windows *on the condition of it raining while I am at home*. But it is more accurate to say that the commitment is *on the condition of my realizing that it is raining while I am at home*. My commitments can't motivate me to act unless I am aware of them, and, in the conditional case, I need to be aware that they are "in force."

Even unconditional commitments can depend on one or another kind of condition. If I make a decision to carry out some action next week, it may require some effort on my part to remember the decision. My carrying out the action I decided on depends on me remembering my commitment. But that wouldn't make my commitment a conditional commitment.

Coming to accept, or continuing to accept, some statements, and rejecting others, will *inferentially* commit a person to accept further statements, and to reject further statements. Positively or negatively supposing statements will commit a person to suppose others (either positively or negatively). If the person who accepts certain statements, and rejects others, is inferentially committed by this to, say, accept statement *A*, she has an *assertive inferential commitment*. The *inferential* commitment characteristic of assertive illocutionary acts is not a commitment to carry out reasoning, but is instead a commitment, *when* carrying out deductive reasoning, to make "moves" based on commitments which she recognizes.

If asserting *A* inferentially commits a person to assert *B*, and supposing *A* to be the case inferentially asserts a person to suppose *B,* it does not follow that supposing *A* will inferentially commit her to assert *B.* An assertion is stronger than a supposition, and can commit the arguer to assert or deny further statements, while suppositions can only commit the arguer to make further suppositions. Inferential commitment is an epistemic feature. A person can simply recognize her immediate commitments, and can, in principle anyway, come to recognize her mediate commitments.

Although I accept many statements and reject many others, I am uninterested in exploring most of the consequences of these beliefs and disbeliefs. For example, if I accept the statement "Today is Thursday," I will be inferentially committed to accept the statement "Either today is Thursday or it is now snowing in Beijing." However, I would have no interest in this consequence, and would not be committed either to consider or accept it. Still, if the matter somehow came up, and I took some interest in the issue of whether the statement was true, I would be committed to accept that either today is Thursday or it is now snowing in Beijing. It would be irrational to accept that today is Thursday, but refuse to accept the disjunction.

The truth conditions of statements and the truth or falsity of particular statements are ontological, or *ontic,* features of statements. Factual statements represent things and features of things, and are intended to be "measured" against the world. Features defined in terms of truth conditions are also ontic features, these include features like implication and incompatibility, or (semantic) inconsistency. The truth of a statement doesn't depend on its being known by anybody, and some statements imply another statement or not, regardless of whether anyone recognizes this, even regardless of whether anyone *can* recognize it. There are simple cases of implication that everyone can recognize, and complicated cases which are difficult to recognize, but the complicated cases are not built up in some way from simple cases.

In contrast, rational commitment is an epistemological, or *epistemic*, feature. It depends on being recognized, or, at least, on people being able to recognize it. But it is her immediate commitments that a person must be able to recognize. Mediate commitment may not be evident to the person who is committed. It is immediate commitment, not mediate or remote commitment, which motivates a person to act. People differ in their ability to recognize their commitments, so what might be a mediate commitment for one person could be an immediate commitment for someone else. But some commitments are so simple that any rational agent will be able to recognize them.

The distinction between mediate and immediate commitment is indicative of the temporal character, or the temporal dimension, of commitment, in contrast with truth and truth-conditional features like entailment and implication, which don't have such a character. A person's commitments motivate him to act or refrain from acting in the future, or to remain in a certain state (also in the future). The implications of a set of statements don't call for any kind of behavior.

A given person, at a time, is characterized by her commitments to perform or not perform certain acts, including her inferential commitments to accept or deny certain statements. Commitment is a natural feature of the human landscape. In making a "real life" deductive argument, a *natural* deduction, a person traces the immediate inferential commitments of her illocutionary acts and of the states that her acts reflect. A truly natural deduction involves moves from illocutionary acts to illocutionary acts, and the correctness of such a deduction depends on both truth conditions and illocutionary force.

But truth conditions by themselves are *inert* when it comes to constructing deductive arguments. A person needs to *recognize* the truth conditions of statements, and to *recognize* relations defined in terms of truth conditions, in order for the truth conditions to impact her argument. Her recognizing the relations can generate a commitment to perform an illocutionary act. She must also recognize her commitments before she can act upon them, but her immediate commitments are evident to her once she attends to them. Immediate inferential commitment is the "engine" which drives the rational process of deduction.

A person can construct an argument to find out something for herself. She can also make an argument to demonstrate something to other people. In an illocutionary argument, one which begins with real statements and illocutionary acts, and not with expressions containing (free) variables or schematic letters, a person should begin with assertions of statements that she really believes or knows, and denials of statements that she disbelieves or knows to be false. If her argument is aimed at one or more addressees, her initial assertions should be of statements accepted by the addressees, and her initial denials should concern statements disbelieved by her addressees. Any statements can be positively or negatively supposed.

As the argument proceeds, it can result in the arguer, or her addressee, accepting new statements and rejecting new statements and supposing new statements. These new illocutionary acts will produce new immediate commitments for the arguer or her addressee. An argument which, say, begins with zero or more assertions, together with positive suppositions of a number of statements, and concludes with the positive supposition of statement *B*, produces an immediate but conditional commitment (for the person who is tracing her own commitments in the argument) from asserting or supposing the statements she supposed to begin with to asserting or supposing *B*.

A person learns to perform and to recognize illocutionary acts when she learns to talk. She must also learn to establish and to recognize and respond to rational commitment. She doesn't need to study logic to do this, but (it would be nice if) studying logic might help her to do it better. Since commitment involves doing or not doing certain things, or continuing in a state that is intentionally entered into, the most appropriate way to present, and to explain, assertive inferential commitments is by presenting deductive principles and developing a deductive system. The very idea of commitment in a system dealing with illocutionary arguments is best illustrated or explained by a deductive system for illocutionary arguments.

Deductive systems are not ordinarily considered to be semantic, or to have semantic content, since axioms and rules are presented and characterized in terms of visible "syntactic" structure. Computers can be programed to produce proofs or deductive derivations which they don't understand. However, the expressions that are produced and manipulated in developing a deductive system represent meaningful language acts. For the person who understands the expressions, or the language acts, the deductive system is a semantic device.

In a standard system of logic, a locutionary system, a truth-conditional semantic account seems to capture the meanings of logical expressions. The deductive system, which licenses the construction of what I have called deductive derivations, simply codifies certain semantically distinguished expressions of the formal language. In an assertive illocutionary theory, we need both a deductive system and a formal semantic account which assigns values to expressions. But it is the deductive system which captures, or explains, commitment intuitively. So we will begin by presenting the deductive system S_1.

8. THE DEDUCTIVE SYSTEM S_1 This system contains arguments or deductions or proofs constructed according to rules we specify. However, it is customary to develop a deductive system, and to prove theorems, without actually constructing arguments. Instead, we construct representations of kinds of argument sanctioned by the deductive system. In the present case, we don't even have a list of the real atomic sentences of the language L_1. To develop the deductive system, we will often use upper case Latin letters to represent sentences of the language L_1, and

we use these letters in constructing representations of arguments. If we actually had the genuine sentences of the logical language, and we had actually correlated those sentences with genuine statements, then we could employ the resources of the deductive system to construct or represent genuine arguments. What we do instead is construct argument schemas that represent kinds of arguments. But we think and talk about these schemas as if they were real arguments. The rules we adopt, for example, are correct rules for real arguments.

The system S_1 is a (truly) natural deduction system which uses tree proofs. Every step in one of these proofs is a completed sentence. An initial step in a tree proof is an assertion ⊢*A*, a denial ⊣*A*, a positive supposition ⌴*A*, or a negative supposition ¬*A*. An initial assertion or denial is not a hypothesis of the proof. Instead, an initial assertion is understood to express knowledge or justified belief on the part of the arguer, and an initial denial is in order only if the arguer knows or justifiably believes the statement to be false. Not every sentence ⊢*A* is eligible to be an initial assertion in a proof constructed by a given person. In contrast, any supposition can be an initial supposition. Initial suppositions are hypotheses of the proof.

The following rules of inference of S_1 are *elementary:*

& Introduction	*& Elimination*		*v Introduction*	
⊢/⌴*A* ⊢/⌴*B*	⊢/⌴*[A & B]*	⊢/⌴*[A & B]*	⊢/⌴*A*	⊢/⌴*B*
-----------------	-------------	-------------	-------------	-------------
⊢/⌴*[A & B]*	⊢/⌴*A*	⊢/⌴*B*	⊢/⌴*[A v B]*	⊢/⌴*[A v B]*

The symbol '⊢/⌴' is used to indicate that the rule holds for both assertions and positive suppositions. In an instance of these rules, the conclusion is an assertion only if all premisses are assertions; otherwise the conclusion is a positive supposition.

The derived rule: *Modus Ponens*

⊢/⌴*A* ⊢/⌴*[A ⊃ B]*

⊢/⌴*B*

The conclusion is an assertion only if both premisses are assertions

is also elementary.

Someone might wonder how we are to construe the results established by tree proofs/deductions. What does a tree proof prove? A proof, or argument, that *we* make from uncancelled or undischarged illocutionary act premisses $A_1, \ldots, A_n$ to an illocutionary act conclusion *B* will establish that any person who performs illocutionary acts represented by the premisses is inferentially committed to perform an act represented by *B*.

A person who actually performed illocutionary act premisses represented by A_1,..., A_n and who carried an illocutionary argument of the type that our argument represents would conclude by performing an illocutionary act represented by *B*. If (i) this conclusion is an assertion ⊢B_1, she will have come to accept B_1, (ii) this conclusion is a denial ⊣B_1, she will have come to reject B_1 for being false, (iii) this conclusion is a supposition ⌞B_1 or ¬B_1, she will have established an immediate inferential commitment from accepting or supposing the statements she initially supposed true, and denying or supposing false the statements she initially supposed false to accepting, denying, supposing true, or supposing false B_1.

Deductive assertive illocutionary arguments are *dynamic* procedures in the sense that they enable the argument makers to enlarge their (explicit) knowledge or beliefs, and to use the enlarged knowledge/belief to further expand their knowledge or beliefs.

Our knowledge of the truth-conditions of the logical expressions in L_1 and our understanding of the forces of assertions, denials, and suppositions make it evident that a person who performs the premiss acts in an instance of one of the rules of S_1 will be inferentially committed to perform the conclusion act.

The following proof/deduction:

⌞*[A & B]*
----------- *&E*
⌞*B*
----------- *vI*
⌞*[A v B]*

is *schematic*. It represents a kind of illocutionary argument which we can see, and show, to be deductively correct. It establishes that whoever performs an act represented by '⌞*[A & B]*' is committed to perform the act represented by '⌞*[A v B]*'. (The various moves made in this proof are "tagged" with abbreviations of the names of the rules employed.) But the schematic argument is not any person's illocutionary argument, it is like a recipe that anyone might use to construct illoctuionary arguments of her own.

The following is also an elementary rule:

Weakening

⊢*A*	⊣*A*
------	-----
⌞*A*	¬*A*

The person who accepts/asserts a statement intends for this to be permanent. But to suppose a statement is to accept it for a time. The force of an assertion "goes beyond" that of a supposition, but "includes" the suppositional force. Similar remarks apply to denials and acts of supposing a statement to be false.

A *non-elementary* rule of S_1 is one for which at least one premiss is a sub-proof or deduction, and the rule *cancels*, or *discharges*, a hypothesis of this sub-proof. In illustrating these rules, the hypothesis which is canceled is enclosed in braces, and is written over the conclusion of the sub-proof. The non-elementary rules are below (the rule ⊃ *Introduction* is a derived rule):

```
v Elimination                                  ⊃ Introduction

                    {⌙A}      {⌙B}                {⌙A}

⊢/⌙[A v B]      ⌙C         ⌙C                    ⌙B
-------------------------------               --------------
          ⊢/⌙C                                 ⊢/⌙[A ⊃ B]
```

If the only hypotheses for these inference figures are those shown in braces, then the conclusion is an assertion; otherwise, it is a supposition.

The following proof:

```
  x
 ⌙A    ⌙B
------------ &I
⌙[A & B]
----------- &E
    ⌙B
------------ ⊃I, cancel '⌙A'
⌙[A ⊃ B]
```

establishes that supposing *B* to be true will commit a person to supposing '*[A ⊃ B]*' to be true. An '*x*' is placed above cancelled hypotheses. In this proof:

```
  x
 ⌙A    ⊢B
------------ &I
⌙[A & B]
----------- &E
    ⌙B
------------ ⊃I, cancel '⌙A'
⊢[A ⊃ B]
```

the conclusion is an assertion, because all hypotheses in the sub-proof leading to '⌙*B*' are cancelled.

If $A_1,..., A_n, B$ ($n \geq 0$) are completed sentences such that performing acts represented by $A_1,..., A_n$ will inferentially commit a person to perform an act represented by B, then $A_1,..., A_n$ *deductively require* B. If the commitment is based on the logical forms of the sentences involved, then $A_1,..., A_n$ *logically require* B. If $n = 0$, then B is *deductively compelling,* and is *logically compelling* if the commitment is based on the logical form of B.

If $A_1,..., A_n, B$ ($n \geq 0$) are completed sentences of L_1, then $A_1,..., A_n \rightarrow B$ is an *illocutionary argument sequence*, which we often call, more simply, an *illocutionary sequence*. The sentences $A_1,..., A_n$ are *premisses* and B is the conclusion. If the premisses of an illocutionary sequence either deductively or logically require the conclusion, then the sequence is either *deductively* or *logically connected*. Since we regard rational inferential commitment as an intrinsic feature of assertive illocutionary acts, a feature that we can simply recognize in simple cases, we are taking it to be evident that the deductive system S_1 enables us to establish that some completed sentences logically require others, and that some completed sentences are logically compelling. We will provide some additional support for this claim later in the present chapter.

There are so far no rules involving either the negative force operators or the negation sign. I regard denial as more fundamental than, and logically prior to, negation. So I first provide rules that characterize the negative illocutionary operators, and then base rules for negation on the illocutionary operators. We understand an explicit contradiction to involve two sentences A, $\sim A$ (or the statements that they represent), and systems of standard logic with rules *~ Introduction* or *~ Elimination* typically require explicit contradictions in order to "take back" the hypothesis of a sub-proof. In a system of illocutionary logic, positive and negative illocutionary acts with the same statement are "at odds" with one another–they are *incoherent*, and these will provide the basis for "taking back" a hypothesis. The rules for negative force operators are the following:

Negative Force Introduction

{⌞A}	*{⌞A}*	*{⌞A}* *{⌞A}*	*The conclusion is a denial if the only supposition above the line is the one in braces; otherwise the conclusion is a negative supposition.*
⌞B *⊣/¬ B*	*⊢/⌞ B* *¬B*	*⌞B* *¬B*	
---------------	----------------	-------------	
⊣/¬ A	*⊣/¬ A*	*⊣/¬ A*	

¬ Elimination

{¬A}	*{¬A}*	*{¬A}* *{¬A}*	*The conclusion is an assertion if the only uncanceled hypothesis above the line is the one in braces; otherwise the conclusion is a supposition*
⌞B *⊣/¬ B*	*⊢/⌞ B* *¬B*	*⌞B* *¬B*	
----------------	---------------	-------------	
⊢/⌞ A	*⊢/⌞ A*	*⊢/⌞ A*	

The principle ¬ *Elimination* is understood in such a way that the following is an instance of the principle:

```
 x
¬A     ⊢/˪ B     ⊣/¬B
-------------------------
       ⊢/˪A
```

The rules linking the negation sign to the negative force operators have a definitional character, for these rules provide an inferential characterization of negation.

~ Elimination

```
  ⊢/˪~A
 ---------
  ⊣/¬A
```

The conclusion is a denial iff the premiss is an assertion

~ Introduction

```
  ⊣/¬A
 ---------
  ⊢/˪~A
```

The conclusion is an assertion iff the premiss is a denial

We can establish the following principles of double negation:

```
⊢/˪ ~~A       ⊢/˪ A         ⊣/¬ ~~A        ⊣/¬ A
----------    -----------   -----------    -----------
 ⊢/˪ A        ⊢/˪ ~~A        ⊣/¬ A         ⊣/¬ ~~A
```

A proof of the first of these principles is below:

```
                x
⊢/˪ ~~A        ¬A
---------- ~E  ------- ~I
 ⊣/¬ ~A        ˪~A
------------------------ ¬E, cancel '¬A'
       ⊢/˪ A
```

The remaining principles can be proved in a similar fashion.

Given the principles ¬ *Elimination, ~ Elimination,* and ~ *Introduction*, the principle *Negative Force Introduction* is a derived rule. We can see this as follows:

Suppose there is a proof *Γ* from '˪*A*' to '˪*B*,' and another proof *Δ* which concludes '⊣/¬ *B*.' Then we can construct the following proof:

```
   x
  ¬~A
-------- ~I
⌞~~A
------- Double Negation, proved above
 ⌞ A
----- Γ     -------- Δ
⌞B          ⊣/¬ B
----------------- ¬E, cancel '¬~A'
      ⊢/⌞ ~A
     ---------- ~E
       ⊣/¬ A
```

Even though the principle *Negative Force Introduction* is redundant, it has been retained as a primitive rule. For the language L_0 which does not contain the negation sign is the predecessor and source of the language L_1, and the deductive system S_0 is just S_1 without the rules for negation. Both *Negative Force Introduction* and ¬ *Elimination* are rules of S_0, and neither is redundant.

Another illustration of proofs in S_1 is provided by the following:

```
                                   x
                                  ¬A
                     x          -------- ~I
                   ¬~A           ⌞~A
                  ------------------------ ¬E, cancel '¬A'
                           ⌞A
                      ------------- vI                 x
                      ⌞[A v ~A]                   ¬[A v ~A]
                  ------------------------------------------------ ¬E, cancel '¬~A'
                                 ⌞~A
       x                       ------------- vI
¬[A v ~A]                      ⌞[A v ~A]
------------------------------------------ ¬E, cancel '¬[A v ~A]'
                  ⊢[A v ~A]
```

The conclusion is an assertion, because all hypotheses are cancelled. In the last move in this proof, two occurrences of the hypothesis '*¬[A v ~A]*' are cancelled.

The relation between denial and negation is similar to the relation between other illocutionary acts and familiar logical operators or connectives. For there are conjunctive and disjunctive forms of assertion. These can be used to inferentially characterize familiar statement-forming logical operators, as we have characterized negation.

The system S_1 is a pretty standard system of (classical) propositional logic, except for the illocutionary force operators. This system helps make clear how considerations of force affect the correctness of illocutionary arguments. Locutionary argument *sequences* and locutionary arguments can be valid in one sense or another, but illocutionary arguments are not. These arguments are correct or not, in various senses. Its being truth preserving won't guarantee the correctness of an illocutionary argument; for the force of the conclusion must not exceed what the premiss acts authorize.

The logical forms of plain sentences of the language L_1 are perspicuous representations of the semantic structures of statements represented by these sentences. They are perspicuous representations of an abstract level of the semantic structures, because the actual statements will have more detailed structures than the logical forms represent. The arguments of the deductive system S_1 are perspicuous representations of the inferential structures of deductively correct arguments that can be constructed with assertions, denials, and suppositions of natural language statements represented by the plain sentences of L_1. Their inferential structures are semantic features (not pragmatic ones) of these arguments.

9. THE LOCUTIONARY SUBSTRUCTURE Historically, logic has had both an *epistemic*, and an *ontic*, dimension. Before the modern period in logic, the epistemic dimension received the most attention, with a focus on arguments, deductions, and proofs. Following the work of Boole and Frege, logic took an ontic turn. This is perhaps most obvious in the case of Boole, who showed little interest in deduction. (According to *Corcoran 2003*, Boole confused deduction with the process of finding solutions to equations.) Frege, in contrast, did have serious epistemic concerns. He developed a new style of deductive system, and regarded his deductions as models of rigor, in which fallacious appeals to intuition would have no place. Ironically, Frege was not concerned to *study* reasoning, he simply wanted to reason carefully and correctly. For Frege, logic is no more a study of knowledge and how we get it than physics is a study of these things. Logic is the science, or study, of truth.

Frege's conception of logic may have been influenced by his aversion to the psychologism that he saw in Kant's account of mathematics, especially arithmetic. In order to defend the universality of mathematics, or, anyway, arithmetic, and show that its truths weren't restricted to human cognitive agents, but would hold in any world whatever, Frege took up the project of showing that arithmetic belongs to a logic whose truths have this character. The job of logic, as he understood it, was to develop a perspicuous language for describing reality, a language in which grammatical categories reflect ontological ones, and to establish logical laws that have the form of statements about reality.

The ontological dimension of logic is a legitimate field of logical investigation. It was an important advance when logic was reconceived to incorporate ontology. But this advance need not, and should not, lead us to abandon the epistemic dimension of logic. Locutionary logical theories are suited to explore the ontic dimension, and illocutionary theories have an epistemic focus. Both kinds of theory belong to logic.

Human beings use language, and language acts, to introduce conceptual structure to the world we inhabit and experience, and they use language to impose conceptual structure on the world. Assertive locutionary acts introduce structure, and assertive illocutionary acts impose structure. Perhaps these structures are adequate, or more-or-less adequate, reflections of structures that are embodied or instantiated in the world apart from us, of the world as it is in itself. I doubt if we can know that this is the case, but it is clear that assertive locutionary and illocutionary acts are fundamental for saying what it is we know and believe, and illocutionary arguments are fundamental for exploring and reasoning about our knowledge and belief.

Locutionary theories for the sublanguage of L_1 constituted by the plain sentences of L_1 are standard logical theories which employ interpreting functions which assign either T or F to each atomic plain sentences of L_1 and determine valuations of all the plain sentences of L_1. Since we are imagining the formal language L_1 to have a fixed concrete interpretation, not all interpreting functions are legitimate. The legitimate interpretations are *admissible*, so we generally restrict our attention to a set of admissible interpreting functions. A plain sentence, and the statement it represents, is *logically true* iff it is true for (the valuations determined by) all interpreting functions, and is provisionally regarded as *analytic*, or *analytically true*, iff it is true for all admissible interpreting functions.

An *assertive locutionary argument* is an ordered pair whose first member is a set of statements, the *premisses,* and whose second member is a single statement, the conclusion. One of these arguments is *valid* if the premisses entail the conclusion, and is *logically valid* if the premisses imply the conclusion. I understand *entailment* to be a general semantic relation based on the “total” meanings and truth conditions of the statements involved, and *implication* to be the logical special case of entailment that is based on logical form. A locutionary argument is an abstract entity which a person can’t actually make or address to someone else. We can consider, and represent, locutionary arguments, and we can determine that one of these arguments is, or isn’t, valid. But we can’t “put our hands” on one.

A sequence of statements represented as below, or a sequence, or list, of plain sentences of the artificial language written as below:

$$A_1, \ldots, A_n \,/\, B$$

is a *locutionary argument sequence* in which the sentences (or statements represented) before the slant lines are premisses, and the remaining sentence/statement is the conclusion. One of these sequences is *valid* if the premiss statements entail the conclusion, and *logically valid* if the premiss statements imply the conclusion.

10. EPISTEMIC VALUES Truth and truth conditions are ontic features of statements. Whether a statement is true or not doesn’t depend on what the statement maker knows or believes, unless the statement is about her knowledge or belief. However, commitment is epistemic. The

(inferential) commitment to accept or reject a statement is *someone*'s commitment. What a person is committed to accept or reject depends crucially on what she knows and believes.

Typical systems of logic have a third-person character. They are conceived as dealing with objects or phenomena that anyone can access, and the statements they contain or represent are statements that anyone can make. Such theories may not incorporate prohibitions of first-person statements, but they take no account of such statements. A first-person theory might be a first-person *singular* or a first-person *plural* theory, but I will consider only the singular case. A first-person theory will contain, or represent, (some) statements that only one person can make. That one person is the person whose theory it is. In investigating statements and their relations in typical assertive locutionary theories, we don't care whose statements these are. They might be our own statements, or someone else's. Standard systems ignore the persons who make the statements that are studied, and even ignore, for the most part, the fact that these statements are language acts.

In contrast, theories of assertive illocutionary acts and arguments are "first-person" systems that deal with illocutionary acts performed by a particular person, and investigate illocutionary arguments made by that person. While different people can, often, make the same statements, they can't perform the same illocutionary acts. When two people accept or assert the same statement, each person's assertion commits her to perform further illocutionary acts, and has no such effect on anyone else. Each person's assertions form part of her knowledge and belief, and each person's illocutionary arguments can extend her own knowledge and belief.

An assertive logical *locutionary* theory is everyone's theory. Typical theories establish that some statements are logically true, that some locutionary arguments are valid, or that some statements imply others. There are two forms, or versions, of *illocutionary* theories for assertive illocutionary acts and deductive assertive illocutionary arguments: *generic* theories and *concrete personal* theories. A generic theory investigates features of acts and arguments that are based on the semantic structures or logical forms of the illocutionary acts involved. A generic theory might establish that assertions having certain structures or certain logical forms are analytically or logically compelling for anyone, and similarly for denials. It might establish that anyone performing assertive illocutionary acts with certain semantic structures or logical forms is inferentially committed to perform a further act with a specified structure or logical form.

The deductive system S_1 presented above has a generic character. I have not specified the actual atomic sentences of L_1 and I have not provided a concrete interpretation for these sentences. I did provide a few generic representations of logically compelling assertions and denials, and a few representations of deductively correct illocutionary arguments. In teaching this system in a logic class, I and the students might develop the generic theory to a much greater extent.

A concrete personal assertive illocutionary theory is for a particular person, and is constituted by assertive illocutionary acts and arguments that she performs or makes. The theory provides resources that the person can use to trace commitments from her acts of accepting, denying, or supposing some statements to reach conclusions in which accepts, denies, or supposes others. These conclusions enlarge her theory, and some of them come to form part of her knowledge and belief. Since a concrete personal theory is for a particular person, there are, potentially, as many of these theories as there are people.

The rules, or inference principles, of the system S_1 are to be used both for constructing generic arguments in developing the generic illocutionary theory, and for constructing deductive assertive illocutionary arguments from actual assertions, denials, and suppositions. It is evident (it is supposed to be evident, anyway) that the arguments sanctioned by S_1 are *logically correct*, and the single sentence results are *logically compelling*. This means we are taking it to be evident that an argument in S_1 from uncanceled initial premisses $A_1,..., A_n$ to a conclusion B establishes that $A_1,..., A_n$ *logically require* B. It is also initially at least plausible that if completed sentences $A_1,..., A_n$ of L_1 logically require completed sentence B, then we can construct an argument in S_1 from initial premisses $A_1,..., A_n$ to the conclusion B.

What may not be evident is how the deductive assertive illocutionary arguments in S_1 are related to the truth-conditional semantic account for the plain sentences of L_1. One thing we would like to know, and to show, for example, is that if $A_1,,,,, A_n, B$ are plain sentences of L_1 then $A_1,..., A_n$ imply B iff there is an argument in S_1 from $\vdash A_1,..., \vdash A_n$ as premisses to $\vdash B$ as conclusion. We would like to know, and to show, that commitment, as characterized by the system S_1 *tracks* truth, both soundly and completely.

11. COMMITMENT VALUATIONS To better understand how truth and commitment are linked, we will employ *commitment valuations* for persons at times. These are functions for particular people at particular times, and assign the value + to completed sentences which are either assertions or denials of sentences representing statements that the person in question is committed at that time to accept or reject. In spelling this out, we consider the commitments of an idealized *designated subject* at some particular time. At that time there are certain assertions and denials that she has made and remains committed to "maintain." She needn't actually be thinking about, or performing, these illocutionary acts at the time in question, though she must have some resources which enable her to produce or to represent those statements she accepts or rejects. Even when she isn't thinking about the illocutionary acts she has performed, she remains inferentially committed to perform (or "re-perform") those acts.

If we are considering knowledge, the assertions and denials that she has made with the force of knowledge claims and denials, which she remains committed to maintain constitute her *explicit knowledge.* Otherwise, all the assertions and denials that she has made and remains committed to maintain constitute her *explicit beliefs* and *disbeliefs.* For now, we will consider the designated subject's current knowledge to consist of her current explicit knowledge, and her current beliefs (and disbeliefs) to consist of her current explicit beliefs and disbeliefs. Later, in discussing epistemic modalities, we will refine this understanding somewhat. Because the designated subject is an idealized language user, which assumption allows us to develop a normative account, she really knows what she thinks she knows. If the assertion of *A* belongs to her explicit knowledge, then *A* is true, and if it is *A*'s denial that belongs to her explicit knowledge, then *A* is false. Similarly, her explicit beliefs are of true statements, and whatever she explicitly disbelieves is false.

A *commitment valuation for* L_1 is a function for a person at a time which assigns + to some assertions and denials of the language. For the present I will focus on belief and disbelief rather than knowledge; we will later be concerned to explore differences between belief and knowledge.

For a given time *t*, the *initial commitment valuation (at t)* assigns + to those assertions and denials that constitute the designated subject's explicit beliefs and disbeliefs at *t*. The initial commitment valuation at *t* determines a further commitment valuation, its *completion*, which assigns + to all the assertions and denials that the designated subject is (mediately) committed to perform on the basis of the logical forms of her explicit beliefs and disbeliefs.

It is our intention for the completion *V* of a commitment valuation V_0 that *V* assign the value + to those completed sentences $\vdash A$ and $\dashv B$ that represent the illocutionary acts which the first person of our logical theory is committed to perform by having performed the assertions and denials awarded + by V_0. Our formal characterization of a completion will initially be based on a conjecture about the connection between logical inferential commitment and truth values. We will later support this conjecture by establishing results linking the deductive-system characterization of inferential commitment to truth values.

To determine how the completions of initial commitment valuations work, we consider relations between truth and commitment.

Let *f* be an interpreting function of L_1 and let *V* be a commitment valuation of L_1. Then *V* is *based on f* iff (i) if *V* assigns + to $\vdash A$, then $f(A)$ = T, and (ii) if *V* assigns + to $\dashv A$, then $f(A)$ = F.

A *coherent* commitment valuation of L_1 is a commitment valuation that is based on an interpreting function of L_1. We will often confine our attention to a set *W* of (*semantically*) *admissible* interpreting functions, and consider commitment valuations that are *coherent with respect to an interpreting function in W* (that are *coherent*$_W$).

Although we are characterizing commitment valuations for an idealized designated subject, our account applies to anyone whose beliefs and disbeliefs are coherent. Not everyone's beliefs and disbeliefs *are* coherent, but ours is a normative account which enables us to determine what it takes for assertive illocutionary arguments to be deductively correct–which arguments will take a person from asserting/accepting true statements and denying false statements as premisses to conclusions which assert true statements or deny false ones. Someone whose beliefs and disbeliefs are coherent can still believe false statements and disbelieve true ones, but that person reasons correctly if her arguments would take her from asserting true statements and denying false ones to conclusions which are assertions of true statements or denials of false ones.

Let V_0 be a coherent commitment valuation of L_1. Then the *completion of* V_0 is the commitment valuation V of L_1 such that (i) *V(⊢A)* = + iff for every interpreting function *f* such that V_0 is based on *f*, we have *f(A)* = T, and (ii) *V(⊣A)* = + iff for every interpreting function *f* such that V_0 is based on *f*, we have *f(A)* = F. When we have a set *W* of admissible interpreting functions, then the *completion with respect to W* (the *completion*$_W$) *of* V_0 is the commitment valuation V of L_1 such that (i) *V(⊢A)* = + iff for every admissible interpreting function *f* such that V_0 is based on *f*, we have *f(A)* = T, and (ii) *V(⊣A)* = + iff for every admissible interpreting function *f* such that V_0 is based on *f*, we have *f(A)* = F.

We have used truth-conditional valuations to determine how commitment valuations work–to determine which sentences (statements) the designated subject is committed to accept and to reject. The designated subject understands the language L_1 (and the statements represented by sentences of L_1). She understands the commitment conditions of her illocutionary acts, and the truth conditions of statements in the language. Our account of commitment valuations and their completions is based on a conjecture that, to a large extent, the commitments of her illocutionary acts are determined by the truth conditions of the statements these acts "contain." If there is no way to satisfy the truth conditions of statement *A* without satisfying those of *B*, then we expect that accepting *A* will commit the designated subject to accept *B*.

The following matrices show how the completions of coherent commitment valuations "behave." (The letter '*b*' stands for *blank*, and indicates that no value is assigned.)

⊢*A*	⊢*B*	⊣*A*	⊣*B*	⊢~*A*	⊣~*A*	⊢*[A & B]*	⊣*[A & B]*	⊢*[A v B]*	⊣*[A v B]*
+	+	*b*	*b*	*b*	+	+	*b*	+	*b*
+	*b*	*b*	*b*	*b*	+	*b*	*b*	+	*b*
+	*b*	*b*	+	*b*	+	*b*	+	+	*b*
b	+	*b*	*b*	*b*	*b*	*b*	*b*	+	*b*
b	*b*	*b*	*b*	*b*	*b*	*b*	+,*b*	+,*b*	*b*
b	*b*	*b*	+	*b*	*b*	*b*	+	*b*	*b*
b	+	+	*b*	+	*b*	*b*	+	+	*b*
b	*b*	+	*b*	+	*b*	*b*	+	*b*	*b*
b	*b*	+	+	+	*b*	*b*	+	*b*	+

The values of assertions and denials of plain atomic sentences are not in every case sufficient to uniquely determine the values of the assertions and denials of plain compound sentences. If *A* and *B* are irrelevant to one another, and neither ⊢*A* nor ⊢*B* have a value, then '⊢*[A v B]*' shouldn't have a value. But if neither ⊢*A* nor ⊢~*A* has a value, we still want '⊢*[A v ~A]*' to have value +. Because of the middle row above, these matrices are not sufficient for determining (defining) what it is to be the completion of a coherent commitment valuation.

We will establish one fairly obvious result about the completions of coherent commitment valuations. But, first, we need this definition:

Let V_1, V_2 be commitment valuations of L_1. Then V_2 is an *extension of* V_1 iff for every plain sentence *A*, (i) if V_1(⊢*A*) = +, then V_2(⊢*A*) = +; and (ii) if V_1(⊣*A*) = +, then V_2(⊣*A*) = +.

Theorem 1.11.1 Let V_0 be a coherent commitment valuation of L_1 that is based on interpreting function *f*, and let *V* be the completion of V_0. Then *V* is an extension of V_0, *V* is based on *f*, *V* is characterized by the matrices above, and *V* is the completion of *V*.

Proof To show that *V* is an extension of V_0, suppose that *A* is a plain sentence of L_1 such that V_0(⊢*A*) = +, and that g is an interpreting function of L_1 such that V_0 is based on g. Then g*(A)* = T. But then *A* has value T for every interpreting function on which V_0 is based. Hence, *V*(⊢*A*) = +. Similarly, if V_0(⊣*A*) = +, then *V*(⊣*A*) = +.

To show that *V* is based on *f*, suppose that *V*(⊢*A*) = +. Then for every interpreting function g such that V_0 is based on g, we have g*(A)* = T. But then *f(A)* = T. Similarly, if *V*(⊣*A*) = +, then *f(A)* = F.

To show that *V* satisfies the matrices requires that we consider each connective. I will only treat negation; it is easy to establish the result for the other connectives. Suppose *V*(⊢*A*) = +. Then for every interpreting function g of L_1 such that V_0 is based on g, we have g*(A)* = T. Hence, for every such g, we have g*(~A)* = F. So *V*(⊣~*A*) = +. And, clearly, if *V*(⊣*A*) = +, then *V*(⊢~*A*) = +. Again, if neither *V*(⊢*A*) nor *V*(⊣*A*) has a value, neither *V*(⊢~*A*) nor *V*(⊣~*A*) has a value.

To show that *V* is the completion of itself, suppose that for every interpreting function g such that *V* is based on g, we have g*(A)* = T. And suppose that there is an interpreting function g* such that V_0 is based on g* and g**(A)* = F. Then, by the reasoning above, *V* is also based on g*. This is impossible. Hence, *V*(⊢*A*) = +. Similarly, if for every interpreting function g such that *V* is based on g, we have g*(A)* = F, then *V*(⊣*A*) = +.

12. A TRUTH AND COMMITMENT SEMANTIC ACCOUNT Deductive assertive illocutionary theories investigate illocutionary acts and illocutionary arguments. But these theories also deal with locutionary acts and their truth conditions. The illocutionary theories don't investigate locutionary arguments, but they do take account of the semantic features of the locutionary acts that figure in locutionary arguments. So far our treatment of commitment valuations has provided a semantic account for those completed sentences of L_1 which are either assertions or denials. We need to enlarge this account to accommodate suppositions. It is most

convenient to do this by considering the truth conditions of the sentences that are supposed to be true or supposed to be false.

Our truth and commitment semantic account for the completed sentences of L_1 is for a particular person at a particular time. Such accounts are *momentary* in the following sense: Given a person *P* and a time *t*, the *moment determined by P at t* is the period which begins at *t* and continues until person *P* either accepts a statement that she doesn't (correctly) deduce from her explicit beliefs and disbeliefs at *t*, or she denies a statement without deducing that denial from her explicit beliefs and disbeliefs at *t*, or she forgets or abandons some of her explicit beliefs and disbeliefs at *t.* The semantic account we develop characterizes the momentary commitments of the designated subject at an arbitrary time.

Given our understanding of initial commitment valuations and their completions, it is fairly easy to specify the conditions under which accepting some statements and denying others will commit a person to assert or deny a particular further statement. (Given an initial commitment valuation, it is fairly easy to specify which completed sentences $\vdash A$ and $\dashv B$ should receive the value +.) But supposing some statements also commits a person to suppose others. How shall we characterize the commitments of suppositions?

It won't do to have commitment valuations assign the value + to suppositions. A commitment-based account is momentary. A person's commitments to accept and deny statements are the same throughout a single moment, but suppositions come and go within a moment. Someone can make a supposition during a moment, and discharge that supposition in the same moment. To handle suppositions, we need a semantic account which has a modal character, for we are considering concepts belonging to epistemic modal logic.

For a given time, a person's initial commitment valuation *V* determines a class *X* of interpreting functions on which *V* is based. At that time, the person is committed to accept those plain sentences *A* which are true for every member of *X,* and to deny those which are false for every member of *X.* To deal with the positive supposition of *A,* as opposed to its assertion, within the moment determined by *V*'s time, we consider those members of *X* for which *A* is true. If plain sentence *B* is true for all those members of *X*, then supposing *A* to be true should inferentially commit the person to positively suppose *B,* and if *B* is false for all those members of *X*, then supposing *A* to be true should commit the person to negatively suppose *B*.

To give a general account of logical requiring, we need some preliminary definitions:

Let V_0 be a coherent commitment valuation of L_1, and let *V* be the completion of V_0. Let *A* be a completed sentence of L_1 which is either an assertion or denial. Then V_0 *satisfies A* iff *V(A)* = +. If *W* is the set of admissible interpreting functions, and V_0 is a coherent$_W$ commitment valuation and *V* is its completion$_W$, then V_0 *satisfies A with respect to W (satisfies$_W$) A* iff *V(A)* = +.

Let *f* be an interpreting function of L_1, and let *A, B* be plain sentences of L_1. Then (i) *f satisfies* ⌞*A* iff *f(A)* = T, and (ii) *f satisfies* ¬*B* iff *f(B)* = F.

Let *f* be an interpreting function of L_1 and *V* be a commitment valuation of L_1 based on *f*. Then $< f, V >$ is a *coherent pair for* L_1. If *W* is the set of admissible interpreting functions, and *V* is based on $f \in W$, then $< f, V >$ is a *coherent pair with respect to W* (a *coherent*$_W$ pair).

Let $< f, V >$ be a coherent pair (for L_1), and let *A* be a completed sentence of L_1. Then $< f, V >$ *satisfies A* iff either (i) *A* is an assertion or denial and *V* satisfies *A*, or (ii) *A* is a supposition and *f* satisfies *A*. If *W* is a set of admissible interpreting functions, and $< f, V >$ is a coherent pair with respect to *W*, then $< f, V >$ *satisfies A with respect to W* ($< f, V >$ *satisfies*$_W$ *A*) iff $< f, V >$ satisfies *A*.

Let $A_1,..., A_n$, *B* be completed sentences of L_1. Then $A_1,..., A_n$ *logically require B* iff (i) *B* is an assertion or denial and there is no coherent commitment valuation which satisfies the assertions and denials among $A_1,..., A_n$ but does not satisfy *B*, or (ii) *B* is a supposition and there is no coherent pair for L_1 which satisfies each of $A_1,..., A_n$, but fails to satisfy *B*. If *W* is the set of admissible interpreting functions, then $A_1,..., A_n$ *logically require B with respect to W* (they *logically require*$_W$ *B*) iff (i) *B* is an assertion or denial and there is no coherent$_W$ commitment valuation which satisfies the assertions and denials among $A_1,..., A_n$ but does not satisfy B, or (ii) *B* is a supposition and there is no coherent$_W$ pair which satisfies each of $A_1,..., A_n$, but fails to satisfy *B*.

If *A* and *B* are plain sentences of L_1, then (i) ⊢*A*, ⊣*B*, are *logically compelling* iff they are satisfied by every coherent commitment valuation, and (ii) ⌞*A*, ¬*B* are *logically compelling* iff every coherent pair for L_1 satisfies each of the completed sentences. If *W* is the set of admissible interpreting functions, then (i) ⊢*A*, ⊣*B* are *logically compelling with respect to W* (*logically compelling*$_W$) iff they are satisfied by every commitment valuation that is coherent$_W$, (ii) ⌞*A*, ¬*B* are *logically compelling with respect to W* iff they are satisfied by every coherent$_w$ pair for L_1.

Let *X* be a set of completed sentences of L_1 and let *A* be a completed sentence of L_1. Then *X logically requires A* and *A* is a *logical commitment consequence of X* iff (i) *A* is an assertion or denial and there is no coherent commitment valuation which satisfies the assertions and denials in *X* but does not satisfy *B*, or (ii) *B* is a supposition and there is no coherent pair for L_1 which satisfies every sentence in *X*, but fails to satisfy *A*. Given the set *W* of admissible interpreting functions, the definitions of *logical requiring with respect to W* and *logical consequence with respect to W* are as one would expect.

It is necessary to have two clauses in the definitions of logical requiring, because if *B* is an assertion or denial, its value is independent of the values assigned to suppositions. For example, consider these completed sentences:

⌞*A*, ¬*A*, ⊢*B*; ⊢*[B & A]*

There is no coherent pair which satisfies $\llcorner A$, $\neg A$, $\vdash B$ and fails to satisfy '$\vdash [B \,\&\, A]$,' because there is no coherent pair which satisfies $\llcorner A$, $\neg A$, $\vdash B$. However, the first three sentences do not logically require '$\vdash [B \,\&\, A]$,' for suppositions make no "demands" on assertions and denials. Incoherent suppositions logically require that we suppose true and suppose false every plain sentence, but they do not require that we assert or deny anything.

Illocutionary counterparts to analytic truth and logical truth are not concepts of some kind of truth. Historically, some speech acts which are deductively compelling have proved to be philosophically perplexing. Descartes' *cogito* provides an example. While he is thinking, and aware that he is doing so, Descartes is committed to accept the statement "I am thinking." Similarly, while he is aware of himself at all, Descartes is committed to accept the statement "I exist." But these statements are not analytically true, they need not be true at all. Knowledge of these statements is not *a priori*, not even for Descartes. A more up-to-date example of such a statement is what someone makes when she says "I am here now."

13. COMMITMENT TRACKS TRUTH To establish soundness and completeness results for S_1 with respect to our truth and commitment semantic account, we need some preliminary definitions.

An *inference figure* in the deductive system S_1 is an instance of one of the rules.

The *rank* of a proof/deduction in the system S_1 is the number of inference figures in that proof (this is the number of "moves" in the proof). The minimum rank is 0. (A completed sentence standing alone is a proof of rank 0; it is a proof of that sentence, either from no hypotheses if the sentence is an assertion or denial, or from itself, if the sentence is a supposition.)

Lemma 1.13.1 Let Γ be a proof in S_1 from (uncanceled) initial sentences $A_1, \ldots, A_n$ to conclusion B. Let W be the set of admissible interpreting functions of L_1. Let $f \in W$, and V_0 be a commitment valuation based on f such that each initial sentence is satisfied by the coherent$_W$ pair $< f, V_0 >$. Then B is satisfied by $< f, V_0 >$.

This is *proved* by induction on the rank of Γ. For the *base case*, the rank of Γ is 0. But then B is A_1, and it is given that B is satisfied by $< f, V_0 >$.

Inductive step I will consider only four cases of the inductive step. The other cases can be proved in a similar fashion. Let V be the completion$_W$ of V_0.

(1) The last (lowest) inference figure in Γ is an instance of *& Elimination*. (i) Then B is either $\vdash B_1$ or $\llcorner B_1$. (i) Suppose the conclusion of Γ is $\vdash B_1$ Then Γ ends:

$\vdash [B_1 \,\&\, C]$ $\vdash [C \,\&\, B_1]$
------------   or   -----------

$\vdash B_1$ $\vdash B_1$

By the hypothesis of induction, either $V(\vdash[B_1 \& C]) = +$ or $V(\vdash[C \& B_1]) = +$. Since, by *lemma 1.11.1*, V is characterized by the matrices given earlier, $V(B_1) = +$.

(ii) Suppose the conclusion of Γ is $\llcorner B_1$. Then Γ ends:

$\llcorner[B_1 \& C]$ or $\llcorner[C \& B_1]$
----------- -----------
$\llcorner B_1$ $\llcorner B_1$

By the hypothesis of induction, either $f[B_1 \& C] = \mathrm{T}$ or $f[C \& B_1] = \mathrm{T}$. Hence, $f(B_1) = \mathrm{T}$.

(2) The last inference figure in Γ is *Weakening*. So the conclusion of the proof is $\llcorner B_1$ or $\neg B_1$. (i) Suppose Γ ends:

$\vdash B_1$

$\llcorner B_1$

By the hypothesis of induction, $V(\vdash B_1) = +$. Since V is based on f (by *lemma 1.11.1*), $f(B_1) = \mathrm{T}$.

(ii) Similarly, if Γ ends with $\llcorner B_1$, $f(B_1) = \mathrm{F}$.

(3) The last inference figure in Γ is *v Elimination*. (i) Suppose the conclusion of Γ is $\vdash B_1$. Then Γ ends:

$\{\llcorner C\}$ $\{\llcorner D\}$

$\vdash[C \vee D]$ $\llcorner B_1$ $\llcorner B_1$

$\vdash B_1$

By the hypothesis of induction $V(\vdash[C \vee D]) = +$. Suppose $g \in W$ such that V_0 is based on g. Then V is based on g, so $g[C \vee D] = \mathrm{T}$. But then either $g(C) = \mathrm{T}$ or $g(D) = \mathrm{T}$. In the subproof in which the displayed hypothesis is satisfied by g, all initial sentences are satisfied by $< g, V_0 >$. By the hypothesis of induction, the conclusion of this subproof is satisfied by g. Hence, $g(B_1) = \mathrm{T}$. So for every interpreting function g such that V_0 is based on g, $g(B_1) = \mathrm{T}$. Hence, $V(B_1) = +$.

(ii) Suppose the conclusion of Γ is $\llcorner B_1$. Then Γ ends:

$\{\llcorner C\}$ $\{\llcorner D\}$

$\vdash/\llcorner[C \vee D]$ $\llcorner B_1$ $\llcorner B_1$

$\llcorner B_1$

By hypothesis of induction, ‘$[C \vee D]$’ is satisfied by $< f, V_0 >$. It follows that $f[C \vee D] = T$. So either $f(C) = T$ or $f(D) = T$. By another application of the hypothesis of induction, $f(B_1) = T$.

(4) Suppose Γ ends with $\neg$ *Elimination*. Then Γ concludes either with $\vdash B_1$ or $\llcorner B_1$. We will consider only one form of this rule, for the others can be treated in a similar fashion. (i) Suppose Γ ends:

$\{\neg B_1\}$

$\neg C$ $\vdash C$

$\vdash B_1$

Let $g \in W$ be such that V_0 is based on g and $g(B_1) = F$. By the hypothesis of induction and *lemma 1.9.1*, $g(C) = T$ and $g(C) = F$. This is impossible, so $g(B_1) = T$. Hence, there is no interpreting function in W on which V_0 is based for which B_1 has value F. For all such interpreting functions, B_1 has value T. So $V(\vdash B_1) = +$.

(ii) If the conclusion is $\llcorner B_1$, a similar argument will establish that $f(B_1) = T$.

The following theorem is a straightforward consequence of the lemma.

Theorem 1.13.2 (Soundness) Let Γ be a proof in S_1 from initial sentences $A_1, \ldots, A_n$ to conclusion B. Let W be the set of admissible interpreting functions of L_1. Then $A_1, \ldots, A_n$ logically require$_W$ B and the illocutionary sequence ‘$A_1, \ldots, A_n \rightarrow B$’ is logically connected with respect to W.

Corollary 1.13.3 Let Γ be a proof in S_1 from initial sentences $A_1, \ldots, A_n$ to conclusion B. Then $A_1, \ldots, A_n$ logically require B and the illocutionary sequence ‘$A_1, \ldots, A_n \rightarrow B$’ is logically connected.

To establish the completeness of S_1, we will consider sets of completed sentences of L_1.

In ordinary speech, ‘consistent’ is used for a semantic idea, and I will use it that way here. With respect to language acts, consistency concerns truth conditions independently of illocutionary force. Statements $A_1, \ldots, A_n$ are *consistent* iff there is no statement B such that both B and its negation are truth-conditional consequences of $A_1, \ldots, A_n$–this is equivalent to saying that the statements are consistent iff their truth conditions can be simultaneously satisfied. Consistency and inconsistency are general semantic concepts, and their logical special cases are *logical consistency* and *inconsistency.* When we are dealing with sentences and sets of sentences of a logical language, I will ordinarily omit the adjective 'logical' in discussing logical consistency or inconsistency.

Consistency characterizes (or doesn't) statements considered apart from illocutionary force, and it characterizes plain sentences of L_1. The epistemic concept which is a counterpart to consistency is *coherence*. If A is a statement, then the acts of accepting A and denying A are *incoherent* with each other. Supposing A to be true is *incoherent* with supposing A to be false. Illocutionary acts which commit a person to perform incoherent acts are themselves incoherent. Acts are *coherent* if they aren't incoherent. The general concepts of coherence and incoherence have logical special cases, *logical* coherence and incoherence, but I will frequently, even usually, omit the adjective 'logical' in dealing with these concepts. This new usage of 'coherent' and 'incoherent' "fits" our earlier definition of 'coherent commitment valuation.' If V_0 is a coherent commitment valuation, then it is coherent to accept the sentences (statements) assigned + by V_0.

It is never correct or appropriate to make incoherent assertions or denials. If $\vdash A$ is incoherent with $\vdash B$, and a person finds herself committed to both $\vdash A$, $\vdash B$, then she needs to modify her beliefs so that she is no longer committed to accept both A and B. If, at a given time, she can't see how to do this, then she may be "in the market" for a system derived from paraconsistent logic; such a system might help her to minimize her mistakes. But that is beyond the scope of this present discussion. However, while incoherent assertions are essentially erroneous, it is legitimate to make incoherent suppositions. That is the very "idea" behind the inference principles *Negative Force Introduction* and $\neg$ *Elimination*. (It is the idea behind *reductio ad absurdum*.)

To provide a completeness proof for S_1, we will introduce a concept of *deductive* coherence for sets of completed sentences of L_1.

Let X be a set of completed sentences of L_1. X is *deductively coherent with respect to* S_1 iff there is no plain sentence A of L_1 such that both $\llcorner A$ and $\neg A$ can be deduced in S_1 from premisses in X.

We identify deductive coherence and incoherence in terms of suppositions. If we can deduce both $\vdash A$ and $\dashv A$ from a set of sentences, then we can also deduce $\llcorner A$ and $\neg A$ from that set. But if we can derive both $\llcorner B$ and $\neg B$ from a set of sentences, we may not be able to derive $\vdash B$ and $\dashv B$. Incoherent suppositions don't by themselves commit us to incoherent assertions and denials.

Let X be a set of completed sentences of L_1. X is *maximally deductively coherent with respect to* S_1 iff X is deductively coherent with respect to S_1, and for every plain sentence A of L_1, either $\llcorner A \in X$ or $X \cup \{\llcorner A\}$ is not deductively coherent with respect to S_1.

Theorem 1.13.4 Let X be a set of completed sentences of L_1 that is deductively coherent with respect to S_1. Then X can be extended to a set Y that is maximally deductively coherent with respect to S_1.

The proof of this result is completely standard. (Proofs will be omitted when they are either straightforward or well known.)

Theorem 1.13.5 Let Y be a set of completed sentences of L_1 that is maximally deductively coherent with respect to S_1. Let A, B be plain sentences of L_1. Then (a) $\llcorner{\sim}A \in Y$ iff $\llcorner A \notin Y$ iff $\neg A \in X$; (b) $\llcorner[A \ \& \ B] \in Y$ iff $\llcorner A \in Y$ and $\llcorner B \in Y$; (c) $\llcorner[A \vee B] \in Y$ iff either $\llcorner A \in Y$ or $\llcorner B \in Y$.

Let X be a set of completed sentences of L_1 that is deductively coherent with respect to S_1. Let X be extended to a set Y that is maximally deductively coherent with respect to S_1.

Let f be a function which assigns T to every plain atomic sentence A of L_1 such that $\llcorner A \in Y$, and assigns F to the remaining (plain) atomic sentences. Let V_0 be a function which assigns + to every completed sentence A of L_1 such that $A \in Y$.

Lemma 1.13.6 The function f is an interpreting function of L_1 such that for every plain sentence A of L_1, $\llcorner A \in Y$ iff $f(A)$ = T (and $\neg A \in Y$ iff $f(A)$ = F).

Lemma 1.13.7 The function V_0 is a commitment valuation of L_1 that is based on f.

Theorem 1.13.8 Let X be a set of completed sentences of L_1 that is deductively coherent with respect to S_1. Then there is a coherent pair $< f, V_0 >$ for L_1 which satisfies every sentence in X.

Theorem 1.13.9 (Completeness) Let X be a set of completed sentences of L_1 and A be a completed sentence of L_1 such that X logically requires A. Then there is a proof of A in S_1 from premisses in X.

Proof If A is $\llcorner A_1$, the argument is completely standard.

Suppose A is $\vdash A_1$. And suppose that A is not deducible in S_1 from premisses in X. Let $|X|$ be the subset of X whose members are the assertions in X. Then $|X|$ logically requires A.

Then $|X| \cup \{\neg A_1\}$ is deductively coherent with respect to S_1. For suppose it is not deductively coherent. Then there are assertions $\vdash B_1, \ldots, \vdash B_m$ in $|X|$ and a plain sentence C such that both $\llcorner C$, $\neg C$ are deducible in S_1 from $\vdash B_1, \ldots, \vdash B_m, \neg A_1$. But then $\vdash A_1$ is deducible in S_1 from $\vdash B_1, \ldots, \vdash B_m$. By hypothesis, there is no such deduction.

By *Theorem 1.13.8* there is a coherent pair $< f, V_0 >$ which satisfies the sentences in

$|X| \cup \{\neg A_1\}$. This pair satisfies $\neg A_1$, so it does not satisfy $\llcorner A_1$. But this pair cannot satisfy $\vdash A_1$, for V_0 is based on f, and so is the commitment valuation V which is the completion of V_0. This is impossible. Hence A is deducible in S_1 from premisses in X.

Soundness and completeness results for the deductive system S_1 do not have quite the same significance as similar results for standard logical systems. The very idea of commitment in L_1 is best explained, and captured, by deductive principles and a deductive system. Our truth and commitment semantic account for L_1 involves a conjecture. Given a coherent commitment valuation V_0 which records the designated subject's explicit knowledge or beliefs at a given time, we defined the completion V of V_0 in such a way that $V(\vdash A) = +$ iff A has value T for every (admissible) interpreting function on which V_0 is based. This definition's being acceptable depends on commitment's "tracking" truth-conditional consequence. Soundness and completeness results support the conjecture on which the definition of the completion of a commitment valuation is based, by showing that the evidently correct deductive system does adequately track truth-conditional consequence associated with logical form.

14. COHERENCE Inconsistent statements (truth-conditionally) entail every statement. If X is an inconsistent set of statements, and A is an arbitrary statement, it is vacuously true that every way of satisfying the truth conditions of all statements in X also satisfies the truth conditions of A. But this doesn't have the damaging consequences that someone might expect. There is an uninteresting sense in which accepting all the statements in X commits a person to accept A, but this is of no great importance. To understand why not, consider the following argument, which justifies a form of disjunctive syllogism:

x
¬*B*
------ ~*I*   *x*
⌞~*B*   ⌞*A*
----------------- *&I*
⌞*[~B & A]*
-------------- *&E*
⌞*A*   ¬*A*
---------------------- ¬*E, cancel '¬B'*   *x*
⌞*[A v B]*   ⌞*B*   ⌞*B*
-- *vE, cancel '⌞A,' '⌞B'*
⌞*B*

The inference which exemplifies ¬ *Elimination* is not motivated exclusively by considerations involving truth conditions of premisses, because when considering only truth conditions, a person is simply led to further suppositions. The inference principle ¬ *Elimination* yields a further conclusion (possibly a supposition), but it also cancels a supposition. In making a "move" according to ¬ *Elimination*, a person is not simply tracing the inferential commitments of her initial assertions and hypotheses. *There is an independent (come what may) commitment to act coherently*. Once the opposing suppositions are reached in the argument above, the arguer is committed to remove the incoherence. The rule ¬ *Elimination* prescribes a certain format for doing this, but other ways of responding could be equally legitimate.

Even in our deductive system, the commitment to coherence can call for an arbitrary one of two moves. In the proof:

⌞~~*A*
-------   *x*
¬~*A*   ⌞~*A*
----------------- ¬*E, drop '⌞~A'*
¬~*A*

we have reached the conclusion '¬~*A*'. But from these premisses, our rules allow us to reach either the conclusion '¬~*A*' or '¬~~*A*'. Either hypothesis might be cancelled/discharged. The commitment here is to give up one of the incoherent hypotheses.

The commitment to achieve coherence dilutes or mitigates the commitments generated by incoherent assertions. Many of us may have incoherent beliefs, although often without realizing that we do. Such beliefs, considered by themselves, commit us to accept every statement. But we aren't rationally required to accept every statement. For the general commitment to achieve coherence *overrides* the commitment to accept every statement. The commitment to coherence is in opposition to the commitments generated by incoherent beliefs, and requires us to eliminate the incoherence.