AN ENLARGED CONCEPTION OF THE SUBJECT MATTER OF LOGIC

JOHN T KEARNS
UNIVERSITY AT BUFFALO, SUNY
kearns@buffalo.edu

Resumen: ***Una concepción ampliada del objeto de estudio de la lógica***:
El ensayo es una introducción a la lógica ilocucionaria, es decir a la lógica de los actos de habla. El autor propone una aproximación distinta a este campo de investigación con respecto al que han propuesto John Searle y Daniel Vanderveken. Ellos conciben la lógica ilocucionaria como un suplemento o un apéndice a la lógica estándar, la lógica de los enunciados, y se concentran en el estudio de leyes y principios muy generales que caracterizan todo tipo de actos ilocucionarios. Kearns, en cambio, concibe la lógica ilocucionaria como una disciplina muy comprensiva, con muchos subsistemas, que cobija a la lógica estándar como parte suya. El escrito describe brevemente el uso de los operadores ilocucionarios (de aseveración, de negación, de suposición de verdad o falsedad), explica la manera como se expande la concepción semántica en términos de condiciones de verdad para incluir los *compromisos racionales* del hablante y presenta un sistema de deducción para esta lógica. Como un ejemplo de lo que esta lógica puede hacer se ofrece una solución a la paradoja de Moore contenida en la aseveración "Está lloviendo, pero no lo creo".
Palabras clave: actos de habla, lógica ilocucionaria, Searle, Vanderveken, paradoja de Moore.

Abstract:
This paper is an introduction to illocutionary logic, *i.e.* the logic of speech acts. The author proposes an approach to this subject matter that is different from John Searle's and Daniel Vanderveken's views. They conceive illocutionary logic as a supplement or an appendix to standard logic, propositional logic, and focus on the study of very general laws and principles which characterize all illocutionary acts. Kearns, on the other hand, conceives illocutionary logic as a very comprehensive discipline, with many subsystems, which also embraces standard logic. The article briefly describes the use of illocutionary operators (those expressing affirmation, negation, assumption of truth or falsehood); it explains the way in which the semantic conception expands in terms of conditions of truth to include the speaker's rational commitments, and presents a deductive system for this logic. As an example of what this logic can do, a solution is proposed to Moore's paradox as contained in the affirmation, "It's raining, but I don't believe it".
Key words: speech acts, illocutionary logic, Searle, Vanderveken, Moore's paradox.

1. Language Acts

A *language act* or *speech act* is a meaningful act performed by using an expression. A person can perform a language act by speaking aloud, by writing, or by thinking with words. (Although I use the expressions "language act" and "speech act" interchangeably, the word "speech" does carry the suggestion of speaking aloud). The person who reads or who listens with understanding to someone who is speaking also performs language acts.

On my view, language acts are the primary bearers of semantic features, such as meaning and truth. Written and spoken expressions are the bearers of syntactic features, and can themselves be regarded as syntactic objects. Although it is language acts that are meaningful, various expressions are conventionally used to perform acts with particular meanings; the meanings commonly assigned to expressions are the meanings of acts they are conventionally used to perform. These conventions are not the source of the meanings of meaningful acts. The language user's intentions determine the meanings of his language acts. While it is normal to intend the meanings conventionally associated with the expressions one is using, a person can by misspeaking produce the wrong word to perform a linguistic act. I might by mistake use the word "Megan" to refer to my daughter Michelle. I still succeed in referring to Michelle, for I used the (wrong) name to direct my attention to Michelle, whom I intended. This may prove misleading to my addressee, and lead that person to think of Megan rather than Michelle.

The fundamental semantic feature of a linguistic act is its *semantic structure*. This is determined by the semantic characters of component acts, together with their organization. I will illustrate this with a simple example. If in considering the door of the room I am in, I say "That door is closed," I have made a statement which is an assertion. The statement has a syntactic character supplied by the expressions used. A semantic analysis can be given as follows:

(1)The speaker (myself) referred to the door;
(2) This referring act identified the door, and so provided a target for the act acknowledging the door to be closed.

The semantic structure is constituted by the referring act, the acknowledging (or characterizing) act, and the enabling relation linking the two component acts. The semantic structure can be described without mentioning the expressions used or the order in which they occurred. Such a description is language-independent.

Attention to language acts leads to an expanded conception of the subject matter of logic, for features of language acts have an important bearing on whether an argument is satisfactory, and this has not previously been noted. Although there are an enormous variety of language acts, acts performed with sentences, or *sentential acts*, are of particular importance in logic. Historically, those sentential acts which can appropriately be evaluated in terms of truth and falsity have received the most attention–these are *propositional acts*. Since the phrase 'propositional act' is a little awkward to say repeatedly, I also call these acts *statements*. This is a stipulated use for the word 'statement,' and is different from its normal use to mean something like *assertion*.

Some sentential acts are performed with a certain illocutionary force, and constitute *illocutionary acts*. Examples are promises, warnings, assertions, declarations, and requests.

Statements themselves can be used with a variety of illocutionary forces. An *argument* understood as a speech act has illocutionary acts as components. The arguer moves from premiss acts to a conclusion act which these are thought to support.

2. Illocutionary Logic

The logic of speech acts is appropriately called *illocutionary logic*, for it is features of illocutionary acts which contribute what is distinctive and new in this logic. Daniel Vanderveken and John Searle have pioneered the study of illocutionary logic in Vanderveken-Searle 1985 and Vanderveken 1990. However, their approach is quite different from mine. Theirs might be characterized as a "top down" approach, while mine is "bottom up." They view illocutionary logic 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 illocutionary logic to be a very comprehensive subject matter that includes standard logic as a proper part. I seek to develop systems which deal with specific kinds of illocutionary acts, and favor a multiplicity of different systems for "capturing" the different kinds of illocutionary acts.

A standard system of logic, or logical theory, consists of three components: (i) An artificial language; (ii) A semantic account for the artificial language; (iii) A deductive system which codifies logically important items in the artificial language.

From a speech-act perspective, a logical system is a somewhat empirical theory of a class of speech acts. An artificial logical language is not a genuine language, because its sentences are not used to perform language acts. Instead the sentences of the artificial language *represent* language acts. The semantic account is for the language acts that are represented, and the deductive system codifies sentences or sequences of them that represent logically important language acts.

A system of illocutionary logic is obtained from a standard system of logic by making three changes:

> (i) The artificial language is enriched with illocutionary-force indicating expressions, or *illocutionary operators*.

(ii) The semantic account of truth-conditions is supplemented with an account of the *rational commitments* generated by performing illocutionary acts. Asserting this or denying that will commit a person to make further assertions and denials; the same holds for supposing statements to be true or false.
(iii) The deductive system is amended to take account of illocutionary operators and illocutionary force.

3. A Simple System

I will illustrate a simple system of propositional illocutionary logic. The language *L* contains atomic sentences and compound sentences obtained from them with these connectives: ~, *v*, *&*. (The horseshoe of material implication is a defined symbol). The atomic and compound sentences are *plain sentences of L*. The plain sentences represent natural-language statements.

The illocutionary operators are the following:

⊢ –the sign of assertion	⊣–the sign of denial
⌙ –the sign of supposing true	¬ –the sign of supposing false

A plain sentence prefixed with an illocutionary operator is a *completed sentence of L*; there are no other completed sentences. Completed sentences represent illocutionary acts.

A statement can be accepted or rejected. A person performs an act when he comes to accept a statement. Once he has come to accept it, he continues to accept the statement until he changes his mind or he forgets that he has come to accept the statement. Continuing to accept a statement is not an act. A person who accepts a statement can perform an act of reaffirming the statement, or, as I prefer to say, an act *reflecting his continued acceptance of* the statement. An assertion is understood to be an act of producing and coming to accept a statement, or of producing and reflecting one's acceptance of the statement (an assertion of this sort doesn't need an audience). A denial is an act of producing and coming to reject a statement (for being false), or an act of producing a statement and reflecting one's rejection of it.

A statement can be supposed true or supposed false. Once made, a supposition remains in force until it is discharged (canceled) or simply abandoned. An argument which begins with assertions and denials can reach a conclusion which is an assertion or denial. An argument which begins with at least one supposition cannot (correctly) conclude with an assertion or denial, so long as the supposition remains in force. The conclusion will have the force of a supposition, and will be called a supposition.

The semantic account for the language *L* is a two-tier account. The first tier applies to statements apart from illocutionary force. This semantic account gives truth conditions of plain sentences and of the statements that these represent. The first tier of the semantic account presents the *ontology* that the statements encode or represent. The account of truth conditions for plain sentences of *L* is entirely standard. An *interpreting function for L* is a function *f* which assigns truth and falsity to the atomic plain sentences, and determines a *truth-value valuation* of the plain sentences in which compound sentences have truth-table values.

The second tier of the semantic account applies to completed sentences and the illocutionary acts they represent. In the case of *L*, it applies to assertions, denials, and suppositions. The second tier of the semantics deals with *rational commitment*. This commitment is distinct from moral or ethical commitment. It is a commitment to perform or not perform some act, or to continue in a state like accepting a certain statement. When we consider the commitment generated by performing acts of assertion, denial, or supposition, this commitment is conditional rather than absolute. A person who accepts a statement will be committed to accept some further statement (or to reflect her acceptance), if the matter comes up and she chooses to think about it –so long as she continues to accept the first statement.

It is rational commitment which provides the motive power leading a person from premisses to conclusion in an argument –the arguer needs to recognize that performing the premiss acts commits her to performing the conclusion act before she can be justified in deriving that act (or in using the premiss acts to support that act).

A commitment to perform or not perform an act is always *someone's* commitment. We develop the commitment semantics for an idealized person called the *designated subject*. This subject has beliefs and disbeliefs which are *coherent* in the sense that the beliefs might all be true and the disbeliefs all false. The second tier of the semantics concerns *epistemology* rather than ontology, but the epistemology must accommodate the ontology. The commitments generated by performing certain illocutionary acts depend on the language user understanding the truth conditions of the statements she asserts, denies, or supposes. We consider the designated subject at some particular moment. There are certain statements which she has considered and accepted, which she remembers and continues to accept. There are similar statements that she has considered and rejected. These *explicit* beliefs and disbeliefs commit her, at that moment, to accept further statements and to reject further statements. We use '+' for the value of assertions and denials that she is committed, at that moment, to perform.

A *commitment valuation* is a function which assigns + to some of the assertions and denials in *L*. A commitment valuation *V* is *based on* an interpreting function *f* if, and only if (from now on: iff) (i) If *V(⊢A)* = +, then *f(A)* = *T*, and (ii) If *V(⊣A)* = +, then *f(A)* = *F*. A commitment valuation is *coherent* iff it is based on an interpreting function.

Let V_0 be a coherent commitment valuation. This can be understood to register the designated subject's explicit beliefs and disbeliefs at a given time. The *commitment valuation determined by* V_0 is the function *V* such that (i) *V(⊢A)* = + iff *A* is true for every interpreting function on which V_0 is based, and (ii) *V(⊣A)* = + iff *A* is false for every interpreting function on which V_0 is based. The valuation *V* indicates which assertions and denials the designated subject is committed to perform on the basis of her explicit beliefs and disbeliefs.

A commitment valuation is *acceptable* iff it is determined by a coherent commitment valuation. The following matrices show how acceptable commitment valuations "work": In the matrices, the letter '*b*' stands for *blank* –for those positions in which 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*	+

In some cases, the values (or non-values) of assertions and denials of simple sentences are not sufficient to determine the values of assertions and denials of compound sentences. For example, if ⊣*A* and ⊣*B* have no value, and *A, B* are irrelevant to one another, then '⊣*[A & B]*' should have no value. But if ⊣*A*, ⊣~*A* have no value, the completed sentence '⊣*[A & ~A]*' will have value +.

4. Some Semantic Concepts

The truth conditions of a statement determine what the world must be like for the statement to be true. Many statements can be made true in different ways. For example, the statement:

> Some man (or other) is a geologist.

can be made true by different men –for each man, his being a geologist would make the statement true. The truth conditions of a statement seem best regarded as an ontological or *ontic* feature of the statement, if the ontic is being contrasted with the epistemic. But commitment conditions are epistemic. It is individual people who are committed or not by the statements they accept and reject. The person who makes a meaningful statement must recognize the "commitment consequences" of his statement if he understands what he is saying. At least, he must recognize the *immediate* commitment consequences, for no one can survey all of the longer-range consequences.

The distinction between truth conditions and commitment conditions gives us occasion to recognize different classes of semantic concepts. Consider entailment and implication. I am using 'entail,' 'entailment,' etc. for a highly general relation based on the total meanings of the statements involved. In contrast, I will use 'imply,' 'implication,' etc. for the logical special case of this general relation. The logical special case is identified with respect to the logical forms of artificial-language sentences. The statement:

(1) Every duck is a bird.

both entails and implies:

(2) No duck is a non-bird.

But:

(3) Sara's jacket is scarlet.

entails:

(4) Sara's jacket is red.

without implying (4), for the entailment from (3) to (4) is not based on features uncovered by logical analysis.

We can characterize *truth-conditional entailment* as follows: Statements $A_1,\ldots, A_n$ *(truth-conditionally) entail* statement *B* iff there is no way to satisfy the truth conditions of $A_1,\ldots, A_n$ without satisfying those of *B*. This characterization resists being turned into a formal definition. But *truth-conditional implication* can be defined formally: Sentences (of *L*) $A_1,\ldots, A_n$ *(truth-conditionally) imply B* iff there is no interpreting function *f* of *L* such that $f(A_1) = \ldots = f(A_n) = T$, while $f(B) = F$. (If there is implication linking sentences of *L*, then there is implication linking the statements which these sentences represent).

Let *X* be a set of plain sentences of *L* and let *A* be a plain sentence of *L*. Then *X (truth-conditionally) implies A* iff there is no interpreting function of *L* which assigns *T* to every sentence in *X*, but fails to assign *T* to *A*.

Let $A_1,\ldots, A_n$, *B* be plain sentences of *L*. Then '$A_1,\ldots, A_n$ / *B*' is a *plain argument sequence of L*. The sentences $A_1,\ldots, A_n$ are the *premisses* and *B* is the *conclusion*. (We also consider argument sequences whose components are statements. A plain argument sequence of *L* will represent a plain argument sequence whose components are natural-language statements). A plain argument sequence of *L* is *truth-conditionally (logically) valid* iff its premisses truth-conditionally imply its conclusion.

Illocutionary entailment links illocutionary acts. If $A_1,..., A_n, B$ are (each) assertions, denials, or suppositions, then $A_1,..., A_n$ *deductively require (illocutionarily entail)* B iff performing the acts $A_1,..., A_n$ commits a person to performing B.

Illocutionary implication links completed sentences of L and the illocutionary acts that these represent. In order to define illocutionary implication, some preliminary definitions are required.

Let z be a coherent commitment valuation of L, and A be a completed sentence of L that is either an assertion or denial. Then z *satisfies* A iff $z(A) = +$.

Suppositions are not assigned values by commitment valuations. But supposing certain statements will commit a person to supposing others. In supposing a statement either true or false, we consider truth values to determine what further statements we are committed to suppose.

Let f be an interpreting function of L, and let A, B be plain sentences of L. Then (i) f *satisfies* $\llcorner A$ iff $f(A) = T$, and (ii) f *satisfies* $\neg B$ iff $f(B) = F$.

Let f be an interpreting function of L and z be a commitment valuation of L based on f. Then $< f, z >$ is a *coherent pair for L*.

Let $< f, z >$ be a coherent pair (for L), and let A be a completed sentence of L. Then $< f, z >$ *satisfies* A iff either (i) A is an assertion or denial and z satisfies A, or (ii) A is a supposition and f satisfies A.

Let $A_1,..., A_n, B$ be completed sentences of L. Then $A_1,..., A_n$ *logically require (illocutionarily imply)* 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 which satisfies each of $A_1,..., A_n$, but fails to satisfy B.

Let X be a set of completed sentences of L and let A be a completed sentence of L. Then X *logically requires* A 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 which satisfies every sentence in X, but fails to satisfy A.

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

$$\llcorner A, \neg A, \vdash B; \vdash [B \& A]$$

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.

Let $A_1,..., A_n$, B be completed sentences of L. Then '$A_1,..., A_n \rightarrow B$' is an *illocutionary argument sequence* –for convenience I will simply say that it is an *illocutionary sequence*. We can define a concept of *illocutionary validity* that applies to illocutionary sequences. An illocutionary sequence '$A_1,..., A_n$' is *logically connected* (*illocutionarily logically valid*) iff $A_1,..., A_n$ logically require B.

I will use the words "consistent" and "coherent" for semantic ideas rather than syntactic or proof-theoretic ones. Let X be a set of plain sentences of L. Then X is *consistent* iff there is an interpreting function f of L for which every sentence in X has value T. (The sentences have the value T for the *valuation determined by f*).

Let X be a set of completed sentences of L. This set is *coherent* iff there is a coherent pair $<f, z>$ for L which satisfies every sentence in X.

5. The Deductive System *S*

This is a natural deduction system which employs tree proofs (tree deductions). Each step in one of these proofs/deductions is a completed sentence. An initial step in a tree proof is an assertion $\vdash A$, a denial $\dashv A$, a positive supposition $\llcorner A$, or a negative supposition $\neg A$. An initial assertion or denial is not a hypothesis of the proof. Instead, an initial assertion or denial should express knowledge or justified (dis)belief of the arguer. Not every sentence $\dashv A$ 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 are *elementary:*

& Introduction

$$\frac{?A \qquad ?B}{?[A \,\&\, B]}$$

& Elimination

$$\frac{?[A \,\&\, B]}{?A} \qquad \frac{?[A \,\&\, B]}{?B}$$

v Introduction

$$\frac{?A}{?[A \vee B]} \qquad \frac{?B}{?[A \vee B]}$$

The derived rule: *Modus Ponens*

$$\frac{?A \qquad ?[A \supset B]}{?B}$$

is also elementary. In these *inference figures*, the '?'s are either '$\vdash$' or '$\llcorner$.' If at least one premiss is a supposition, so is the conclusion. Otherwise, the conclusion is an assertion.

The following arguments are correct:

$$\frac{\llcorner A \quad \llcorner B}{\llcorner [A \,\&\, B]} \qquad \frac{\vdash A \quad \llcorner B}{\llcorner [A \,\&\, B]} \qquad \frac{\vdash A \quad \vdash B}{\vdash [A \,\&\, B]}$$

But even though they are truth preserving, these arguments are not correct:

$$\frac{\llcorner A \quad \llcorner B}{\vdash [A \,\&\, B]} \qquad \frac{\llcorner A \quad \vdash B}{\vdash [A \,\&\, B]}$$

Supposing the premisses commit us to supposing the conclusion, but the suppositions do not authorize us to assert the conclusion.

A deduction in *S* from initial (uncanceled) sentences $A_1,\ldots, A_n$ to conclusion *B* establishes that $A_1,\ldots, A_n$ logically require (illocutionarily imply) *B*. It also establishes that the illocutionary sequence '$A_1,\ldots, A_n \rightarrow B$' is logically connected. We can regard the *theorems* of *S* as illocutionary sequences established by deductions in *S*.

The following proof:

$$\cfrac{\cfrac{\vdash A \quad \vdash B}{\vdash [A \,\&\, B]}\,\&I \qquad \vdash [[A \,\&\, B] \supset C]}{\vdash C}\,MP$$

establishes that $\vdash A$, $\vdash B$, $\vdash [[A \,\&\, B] \supset C]$ logically require $\vdash C$. It also establishes that the illocutionary sequence '$\vdash A, \vdash B, \vdash [[A \,\&\, B] \supset C] \rightarrow \vdash C$' is logically connected, and is a theorem of *S.*

The rule *Weakening* is another elementary rule of *S*; it has two forms:

$$\frac{\vdash A}{\llcorner A} \qquad \frac{\vdash A}{\neg A}$$

The person who accepts/asserts a statement or who denies one intends for this to be permanent. But supposing a statement true is like accepting it for a time, and supposing it false is like rejecting it for a time. The force of an assertion or denial "goes beyond" that of a supposition, but "includes" the suppositional force.

In a standard system of logic, we cannot mark the difference between assertions and suppositions. In a standard natural-deduction system, each step in a proof from hypotheses amounts to a supposition. A proof from initial sentences $A_1,\ldots, A_n$ to conclusion *B* will, in effect, establish an illocutionary sequence '$\llcorner A_1,\ldots, \llcorner A_n \rightarrow \llcorner B$' to be logically connected. To use a system of standard logic to explore proofs (deductions) which have both hypotheses and initial assertions, we must give some extralogical statements the status of axioms (these can function as initial assertions).

The *non-elementary* rules of *S cancel*, or *discharge*, hypotheses (initial suppositions). In illustrating these rules, hypotheses that are canceled will be enclosed in braces, and I will no longer make use of the question mark. Instead, I will use expressions like '⊢/⌙' to indicate that the illustration applies both to assertions and to positive suppositions. Restrictions concerning illocutionary force will be stated on the side. The following are non-elementary rules (⊃*Introduction* is a derived rule):

```
      v Elimination                ⊃ Introduction
                {⌙A}  {⌙B}              {⌙A}
 ⊢/⌙ [A v B]   ⌙C    ⌙C                ⌙B
 -------------------------------    ---------------
            ⊢/⌙C                      ⊢/⌙[A ⊃ B]
```

For both rules, if the only uncanceled hypotheses above the line are those in braces, the conclusion is an assertion. Otherwise, it is a supposition.

The following deduction:

```
                x
               ⌙A    ⌙[A ⊃ B]
              ---------------------MP      x
 ⊢ [A v B]         ⌙B                      ⌙B
   ------------------------------------------- vE, cancel A, B
                   ⌙B
```

establishes that '⊢*[A v B]*, ⌙*[A ⊃ B]* → ⌙*B*' is logically connected. An *'x'* is placed above canceled hypotheses.

The rules for negative force operators are similar to rules that are normally provided for the negation sign. This reflects my view that denial (and negative supposition) are more fundamental than, and are logically prior to, negation.

Negative Force Introduction

```
 {⌙A}                                {⌙A}          {⌙A}     {⌙A}
 ⌙B    ⊣/¬ B             ⊢ /⌙B       ¬B             ⌙B        ¬B
 -------------------     ----------------------     -------------------
     ⊣/¬ A                      ⊣/¬ A                     ⊣/¬ A
```

The conclusion is a denial if the only uncanceled hypothesis above the line is the hypothesis in braces; otherwise, the conclusion is a supposition.

¬ Elimination

```
{¬A}                      {¬A}          {¬A}      {¬A}
˪B   ⊣/¬ B          ⊢ /˪B    ¬B          ˪B        ¬B
------------------  --------------------  --------------------
 ⊢/˪A                  ⊢/˪A               ⊢/˪A
```

The conclusion is an assertion if the only uncanceled hypothesis above the line is the hypothesis in braces; otherwise, the conclusion is a supposition.

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

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

The conclusion is a denial iff the premiss is an assertion

The conclusion is an assertion iff the premiss is a denial

The following proof illustrates some of these rules:

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

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 ***G*** from '⌞*A*' to '⌞*B*,' and another proof ***D*** which concludes '⊣/¬ *B*'. Then we can construct the following proof:

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

Even though the principle *Negative Force Introduction* is redundant, it will be retained as a primitive rule. For we are considering the language without the sign of negation to be the predecessor and source of the language which contains negation. When there is no negation sign, the principle *Negative Force Introduction* is (still) a correct principle, and it is not at that point a derived rule.

It is a straightforward matter to establish that the system *S* is sound and complete in appropriate illocutionary senses. In every proof/deduction of *S*, the uncanceled initial sentences logically require the conclusion; every proof establishes a logically connected illocutionary sequence. And for every set *X* of completed sentences and sentence *A* such that *X* logically requires *A*, there is a proof of *A* in *S* from initial sentences in *X*.

6. Moore's Paradox

While it may be interesting to develop a system of illocutionary logic as we have done, there is little point in doing so unless the new logic provides a new and better understanding of some phenomena, or enables us to solve or resolve problems that have perplexed us, or opens new areas for fruitful research. In fact, illocutionary logic does all of these things. Since the present paper has an introductory character, I will limit myself to some simple examples to illustrate my claim. More demanding applications of illocutionary logic are indicated in the References. Others will be provided in future publications.

Moore's "Paradox" concerns a statement like the following:

It's raining, but I don't believe it.

This statement has a contradictory "feel", but it isn't contradictory. The statement is consistent in a semantic sense. (It is possible for both conjuncts to be true together). Moore's puzzle, something less than a genuine paradox, is to explain what is wrong with the statement. (He discusses this in Moore 1944).

Suppose we expand the language *L* by adding an '*I believe that*' operator, where the I is the designated subject. And, for convenience, let us abbreviate this operator by using the box '$\Box$' of modal logic. We shall understand assertions to be claims of justified belief. The designated subject, and all of us as well, may sometimes adopt beliefs in a somewhat capricious manner, but we shall focus on the beliefs that she was justified in coming to hold. Some of these beliefs will turn out to be mistaken, but the designated subject isn't at fault for acquiring them.

When the designated subject makes a statement (using the sentence) '$\Box A$', she is using the box to talk about herself. And in her mouth, '$\vdash\Box A$' is a (justified) assertion that she believes *A*. But if we, not being the designated subject, were to make the statement '$\Box A$,' then we would be talking about the designated subject, not about ourselves. (But if we use the box to talk about the designated subject's beliefs rather than our own, an assertion '$\vdash\Box A$' will be *our* assertion about what the designated subject justifiably believes). In developing the deductive system *S*, and in considering arguments made with sentences of *L*, we ordinarily adopt the perspective of the designated subject. We are interested in the arguments that are correct for her, or for ourselves when we occupy the role of the designated subject.

The following inference principles are deductively correct for the designated subject:

$$\frac{\vdash A}{\vdash \Box A} \qquad\qquad \frac{\vdash \Box A}{\vdash A}$$

Performing the premiss act commits the arguer to perform the conclusion act. If the designated subject only asserts (in the present context) what she justifiably believes, then reflecting on her assertion should lead her to admit that she justifiably believes what was asserted. And if she is justified in asserting that she justifiably believes *A*, then she surely is entitled to justifiably assert *A*. However, although the principles are deductively correct, they are not invariably truth-preserving. A statement *A* can be true without the designated subject believing it; and the designated subject can justifiably believe a false statement.

The inference principle that is deductively correct for the designated subject is not correct for someone else, if the box is used to indicate the designated subject's beliefs. If we justifiably assert *A*, it certainly doesn't follow that we can justifiably assert that the designated subject justifiably believes *A* –or that she believes *A* at all. And if we can justifiably claim that the designated subject believes *A*, that gives us no license to assert *A*. A genuine inference principle, one that proceeds from illocutionary acts to illocutionary acts, can be correct for one person but not another.

Similar remarks apply to coherence. The sentences '*A*,' '~□*A*' (or the sentence '*[A & ~□A]*') are consistent. It is possible for them to both be true. But the sentences '⊢*A*,' '⊢~□*A*' (or the sentence '⊢*[A & ~□A]*') are not coherent, at least not for the designated subject. It can be possible for someone other than the designated subject to coherently make both assertions, but it isn't possible for the designated subject to do so. There are some true statements that can't coherently be accepted by some people. And this is the "answer" to Moore's puzzle. Accepting consistent statements can be incoherent. The person who asserts that it is raining, and also that he doesn't believe this, has made an incoherent assertion (or an incoherent pair of assertions).

By providing a larger conceptual framework than is available in standard logic, by recognizing concepts that apply to illocutionary acts as well as concepts that apply to statements (to propositional acts), the logic of speech acts shows that Moore's perplexity was due to the inadequacy of the standard logic's framework. The expanded framework provides the resources to characterize and understand the puzzling assertion.

7. What Is Wanted in a Deductive Argument

The word "argument" is associated with many meanings. In logic too, there are different kinds of argument, even when we restrict our attention to arguments of the sort that have premisses and conclusions (as opposed to, say, arguments of functions). Sometimes an argument is an ordered pair, in which the first member is a set of statements (or propositions) and the second member is a single statement (proposition). No arguing takes place in this kind of argument. Let us call arguments in this sense *abstract premiss- conclusion arguments*.

An argument can also be understood to have a status like that of a deduction (proof) in a conventional natural-deduction system. Such an argument is a sequence, or an "array" of statements (propositions), in which later statements are deducible/derivable from earlier ones. An argument in this sense is not *someone's* argument, and there is no one who is actually deriving some of its statements from others. I shall follow my colleague John Corcoran's lead, and call arguments in this sense *argumentations*.

I shall use the word "argument" without qualification for *speech-act arguments*. An argument in this sense *is* someone's argument. It advances from that person's premiss acts, which are illocutionary acts, to his conclusion act, also an illocutionary act. Speech-act arguments are either simple or complex. Simple arguments move directly from a number of premisses to a conclusion which they are thought to support. Complex arguments contain arguments as components, and proceed from initial premiss acts to an ultimate conclusion. (In some cases there are no initial premiss acts; such arguments start with hypotheses which are all discharged, or canceled, before the argument reaches its ultimate conclusion).

Elementary textbooks often switch from one conception of an argument to another, without acknowledging this, or even realizing that this has happened. To show that logic has practical applications, they consider speech-act arguments. In their exercises, the texts often give actual arguments from other sources. But these same texts insist that a deductively satisfactory argument must be valid in a sense that only applies to abstract premiss-conclusion arguments. Neither argumentations nor speech-act arguments are appropriately characterized as valid or invalid. (Earlier I introduced the concept of a (plain) argument sequence. An argument sequence will also be valid or invalid in the textbook understanding of validity).

I think it would be confusing rather than helpful to coin a new sense of "valid", and evaluate arguments for which we have deductive intentions as valid or not in the new sense. Instead, I will consider what it is for a speech-act argument to be *deductively correct.* A simple argument is *deductively correct* if performing the premiss acts will commit a person to performing the conclusion act. And a complex argument is *deductively correct* if its component arguments are deductively correct, and if the initial (uncanceled) premiss acts commit a person to performing the ultimate conclusion act. This definition is somewhat informal, although it captures the idea of deductive correctness. The definition fits those arguments that come out the same no matter who makes them. However, some arguments are correct for one person but not another. A more carefully formulated definition is needed to accommodate such arguments.

Perhaps the following is adequate. A simple argument is *deductively correct for a person P* if performing the premiss acts commits *P* to performing the conclusion act. A complex argument is *deductively correct for person P* if the component arguments are deductively correct for *P*, and performing the initial (uncanceled) premiss acts commits *P* to performing the ultimate conclusion act.

Textbooks which claim that validity is the appropriate standard for evaluating deductive arguments often go on to say that being valid isn't quite as good as being *sound* –where a sound argument is one that has true premisses in addition to being valid. Putting aside the fact that validity is not an appropriate standard for speech-act arguments, it is also inappropriate to insist on the importance of true premisses. Not all arguments are intended to take us from known truths to further truths. An argument that has a denial as one of its premisses won't be thought better if the denied statement turns out to be true. And when arguments begin with suppositions, it may not matter whether or not those statements supposed true really are true. Indeed, one begins a proof by contradiction by supposing true what he intends to prove to be false.

However, when we evaluate an argument in terms of deductive correctness, there are certain features which will make a deductively correct argument objectively better. If an argument begins with an initial assertion $\vdash A$ or an initial denial $\dashv B$, this argument is *epistemically inappropriate* (for the person who makes it) if the arguer doesn't accept A or reject B. In a context where we are dealing with justified belief and disbelief, the arguer who begins with $\vdash A$ or $\dashv B$ must *justifiably* believe A or *justifiably* disbelieve B. And we don't want an arguer who "goes through the motions" without giving thought to what he is doing. For the argument to be epistemically appropriate, the arguer must perform the conclusion act(s) because he is committed to perform that act (those acts) by having performed the premiss acts, and he recognizes that he is committed to do this. (Of course, an epistemically appropriate complex argument needs to have epistemically appropriate component arguments).

The best kind of argument (for which we have deductive intentions) is one that is deductively correct and epistemically appropriate for the person who makes it. It takes considerably more for an argument to achieve this status than is required for an abstract premiss-conclusion argument to be truth-conditionally valid. The development of illocutionary logic, with its expanded conceptual framework, helps us see that more should be expected of real-life arguments than is called for in conventional logic texts. Commitment and coherence are the concepts we need to employ in evaluating arguments and beliefs (and disbeliefs), and illocutionary logic provides the resources for understanding these concepts and characterizing them formally.

8. Further Applications

Illocutionary logic is not in competition with standard logic. Illocutionary logic offers an expanded conception of logic, and accommodates standard logic as a proper part. Illocutionary logic provides the resources to resolve or explain a number of problems that have proved puzzling from the standpoint of standard logic. The references at the end of this paper list articles which use illocutionary logic to deal with the surprise execution paradox, and with fiction, intuitionist logic, and conditional assertions. Other such applications will be forthcoming.

In addition, illocutionary logic provides the conceptual framework needed to incorporate the logic of supposition and assertion in a larger framework that accommodates other sorts of illocutionary acts. The logic of directives (requests, commands) and the logic of commissives (promisses, statements of intention) are included in this larger enterprise.

References

Kearns, J.T. (1997). "Propositional Logic of Supposition and Assertion". En: *Notre Dame Journal of Formal Logic* 38: 325-349.

(2000). "An Illocutionary Logical Explanation of the Surprise Execution". En: *History and Philosophy of Logic* 20: 195-214.

(2001). "The Rationality of Reasoning: Commitment and Coherence". En: Brogaard, B. & Smith, B. (eds.), *Rationality and Irrationality, Proceedings of the 23 rd International Wittgenstein-Symposium, Kirchberg-am-Wechsel (Austria) 2001*. Viena: ÖBVHPT Verlage: 192-198.

(2002). "Logic is the Study of a Human Activity". En: Childers, T. & Majer, O. (eds.), *The Logica Yearbook 2001*. Praga: Filosofia: 101-110.

(2003). "The Logic of Coherent Fiction". En: Childers, T. & Majer O. (eds.), *The Logica Yearbook 2002*. Praga: Filosofia: 133-146.

Kearns, J.T. (2004). "An Illocutionary Analysis of Conditional Assertions" próximamente en *The Logica Yearbook 2003*.

Moore, G. E. (1944). "Moore's Paradox". En: Baldwin, T. (ed..), *Selected Writings*. Londres: Routledge: 207-212. 1993

Vanderveken, D. & Searle, J. (1985). *Foundations of Illocutionary Logic*. Cambridge: Cambridge University Press.

Vanderveken, D. (1990). *Meaning and Speech Acts*. Cambridge: Cambridge University Press.

(2002). "Success, Satisfaction and Truth in the Logic of Speech Acts and Formal Semantics". En: Davis, S. & Gillan, B. (eds.), *A Reader in Semantics*, próximamente en Oxford University Press.

Artículo recibido: junio 6 de 2004 ; aceptado: octubre 10 de 2004