ILLOCUTIONARY ORIGINS OF FAMILIAR LOGICAL OPERATORS

1. ACTS OF USING LANGUAGE Illocutionary logic is the logic of *speech acts*, or *language acts*. Systems of illocutionary logic have both an ontological, or *ontic*, and an *epistemic* dimension. In the modern period of logic, logical theories or logical systems have a primarily ontic focus. They are concerned to represent what exists, to reflect the different categories of entities, to investigate the truth conditions and truth-conditional features of statements about these entities, and to explore features of models of statements and sets of statements. Before the modern period, logic had a largely epistemic focus, for it was concerned to investigate arguments, deductions, and proofs. Because of its two dimensions, illocutionary logic is not a rival to standard logic. Standard systems of logic are, in effect, incorporated in systems of illocutionary logic. We obtain systems of illocutionary logic by adding things to standard systems of logic.

My work in illocutionary logic is based on the understanding that language acts, and the skills and dispositions to perform language acts possessed by a community of language users constitute the fundamental linguistic reality. Someone who uses an expression meaningfully performs a language act. That someone might speak out loud, or write something, or simply think in words. A person who reads or who listens with understanding is also performing language acts, but we usually focus on language acts from the perspective of the person who produces the expressions that are used.

I use the expressions ‘speech act’ and ‘language act’ interchangeably, but ‘language act’ is often the more appropriate expression, because many speech acts are not actually spoken aloud. Speech acts are the primary bearers of semantic features such as meaning, truth, and truth-conditions. Spoken or written expressions are the bearers of syntactic features, and can themselves be regarded as syntactic objects. For logical investigations, *sentential acts*, or acts performed by using a single sentence, are especially important. Among sentential acts, those that are true or false are even more important. I understand a *statement* to be a true or false sentential act; this is a *stipulated* meaning for this word, for statements are more often understood to be something like assertions.

Sentential acts are typically performed with a certain *illocutionary force* such as the force of a promise, of an assertion, a question, or a request. Statements themselves can be performed with a variety of illocutionary forces. A single statement can be *asserted* or *denied*, it can be *supposed true* or *supposed false*. I understand an *assertion* to be an act of making a statement (which is “performing” the statement) and *accepting* it as being or representing what is the case. This is also a stipulated meaning for ‘assertion,’ since my assertions don’t require an audience, and are always sincere. If a statement is supposed true, and some further statement is deduced from it, that further statement also has the status of a *supposition* and I shall call it a supposition. *Arguments* as I shall understand them are language acts in which a person begins with premisses which are illocutionary acts, and reasons to a conclusion which is also an illocutionary act. Premisses and conclusions are not simply statements, they are acts of accepting statements, or rejecting them, etc.

A logical theory, or logical system, is constituted by a formal language, which is usually artificial, a semantic account for that language, and a deductive system for establishing one or another kind of results concerning items in the formal language. Since people do not ordinarily speak, write, or think with sentences of logical languages, I find it helpful to construe these sentences as representations of language acts that people either do or might perform. The semantic accounts in logical theories are then for the language acts that are represented.

2. PROPOSITIONAL ILLOCUTIONARY LOGIC Let *L* be the language which contains infinitely many (unspecified) atomic sentences, and compound sentences formed with the symbols '~,' '*v*,' '*&*' for negation, disjunction, and conjunction. (The horseshoe '⊃' of material implication is a defined symbol.) Atomic sentences and sentences built from them by using connectives are the *plain sentences* of *L*. Plain sentences represent statements independently of considerations having to do with illocutionary force.

The language *L* as we have it so far is a familiar sort of logical language. But now we enlarge the language with these *illocutionary operators*:

⊢ – 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*. Each completed sentence contains exactly one illocutionary operator, the first symbol in the sentence. Illocutionary operators cannot be iterated, and one cannot occur within the scope of another. Completed sentences represent illocutionary acts.

The ordinary connectives represent something a person *says* when she makes a statement. They contribute to the "content" of a statement. But the illocutionary operators represent what a person *does* in making a statement. A person sometimes uses an expression to make explicit the force of her act, but often does not. People rarely say "I assert that" in making an assertion. But the illocutionary force of her act is nonetheless a conventional feature of a person's illocutionary act, a semantic feature rather than a pragmatic one.

The completed sentences of a system of illocutionary logic do not represent language acts that a person performs in talking about the assertions, denials, etc. of someone else. They are for a person to use in performing, or representing, her own language acts. We can study and develop a system of illocutionary logic to investigate the language acts of someone else, of an arbitrary person perhaps, but only if we put ourselves in her position, and develop the system from her perspective. I develop systems of illocutionary logic from the perspective of an idealized person whom I call the *designated subject*, to whom I ordinarily refer with feminine pronouns.

Systems of illocutionary logic have two levels, the *ontic* level and the *epistemic* level. At the ontic level, there are plain sentences, and a semantic account which gives truth conditions of these sentences (of the statements which they represent). A conventional kind of interpreting function assigns truth and falsity to atomic plain sentences, and determines a valuation of the plain sentences. The epistemic level is the level of completed sentences. These sentences have their own semantic account based on *rational commitment*. Performing some illocutionary acts commits a person to perform others–if the matter comes up, and she remains committed to the original acts. Given some illocutionary acts which the subject performs, functions which I call *commitment valuations* are used to determine what further acts she is committed to perform.

The deductive system *S* is a natural-deduction system employing tree proofs in which each "step" is a completed sentence. The rules of the system take account of both truth conditions and illocutionary force. So, for example, this form of *modus ponens*:

$$\frac{\llcorner A \qquad \llcorner [A \supset B]}{\vdash B}$$

is incorrect, because premisses which are merely supposed will not support a conclusion which is an assertion. These forms are correct:

$$\frac{\vdash A \qquad \vdash [A \supset B]}{\vdash B} \qquad\qquad \frac{\llcorner A \qquad \llcorner [A \supset B]}{\llcorner B} \qquad\qquad \frac{\llcorner A \qquad \vdash [A \supset B]}{\llcorner B}$$

3. FIRST-PERSON LOGICAL SYSTEMS Different people can make essentially the same statement. In considering the logic of statements, we consider features involving truth and truth conditions, and ignore the matter of who it is that makes the statements. Standard systems of logic, which amount to first-level systems of illocutionary logic, are "third-person" systems of logic for investigating statements, sets of statements , their truth-conditional consequences, their models, etc. At the ontic level, one person can study statements made by anyone, either herself or someone else.

Different people cannot make essentially the same assertion, denial, etc. Jones' assertion of statement *A* commits Jones to make further assertions and denials, but does not commit Smith to anything. The commitments generated by performing an illocutionary act are essential to that act, and this essential part includes who it is that is committed. Epistemic-level systems of illocutionary logic, which are the complete or total systems of illocutionary logic, are "first-person" logical systems. They are for a person to use to express, or represent, her own illocutionary acts, and to explore the consequences to which these commit her.

If we have a number of statements, and their truth conditions are satisfied, there are certain other statements whose truth conditions must also be satisfied. There is no distinction between immediate and remote *truth-conditional consequences* of the initial group of statements. It is different with commitment. Performing an initial number of illocutionary acts will *immediately* commit a person to perform a number of further acts. Performing one or more of those further acts will immediately commit the person to performing still further acts. Performing the initial acts *mediately* commits the agent to these still further acts. It is only immediate commitment which motivates or rationally requires an agent to perform an act. In constructing arguments in a first-person deductive system, the designated subject traces the immediate commitments of the acts she is performing.

It is because systems of illocutionary logic are first-person systems that epistemic modal logic can easily be accommodated within illocutionary logic, without giving rise to the many puzzles and paradoxes that attend standard systems dealing with knowledge or belief. In a context where assertions have the force of knowledge claims, and '$\Box A$' is understood as *the assertion of A follows from my current knowledge*, the following principles:

$$\frac{\vdash A}{\vdash \Box A} \qquad \frac{\vdash \Box A}{\vdash \Box\Box A} \qquad \frac{\vdash \Box A \quad \vdash \Box[A \supset B]}{\vdash \Box B} \qquad \frac{\vdash \Box A}{\vdash A}$$

are evidently correct. These principles do not give us information about what the designated subject (or anyone) knows or doesn't know, they are inference principles which the designated subject (or anyone) can use to extend her own knowledge. These principles remain correct even if we replace the box by the operator '$\boldsymbol{K}$' for *I know that* as follows:

$$\frac{\vdash A}{\vdash \boldsymbol{K}A} \qquad \frac{\vdash \boldsymbol{K}A}{\vdash \boldsymbol{K}\boldsymbol{K}A} \qquad \frac{\vdash \boldsymbol{K}A \quad \vdash \boldsymbol{K}[A \supset B]}{\vdash \boldsymbol{K}B} \qquad \frac{\vdash \boldsymbol{K}A}{\vdash A}$$

Standard systems of epistemic modal logic are puzzling and unsatisfactory because they are third-person systems attempting to do a first-person job.

First-person systems of illocutionary logic are also needed for dealing with the use of proper names, descriptive singular terms, and demonstratives and other indexicals to *refer* to particular objects. Just as it is essential to an illocutionary act whose act it is, so it is essential to a referring act whose act it is. Each person in referring to a particular object exploits connections linking her to that object, and each person exploits connections that are peculiar to herself. Systems of illocutionary logic for dealing with referring are simple and intuitive, avoiding the cumbersome complexity that is introduced in trying to devise third-person logical systems to deal with these phenomena.

4. CONNECTIVES AND QUANTIFIERS To deny a statement is to reject the statement for being at odds with the way things are, for being false. But in denying a statement, we don't *characterize* the statement as false–we do that in *negating* the statement. In English, we commonly deny statements by blocking or barring their acceptance. A person might deny that Prague is in Moravia by using this sentence:

Prague is not in Moravia.

The speaker uses the word ‘not’ to block the predication of ‘is in Moravia’ of Prague, and by doing this blocks the assertion that Prague is in Moravia. The same sentence might be used on another occasion to perform an act with a different structure.

If the language *L* initially possessed no sign of negation, but contained the illocutionary operators for denial and for supposing false, we can imagine that a reflective speaker of the language might have distinguished their level of force from the negative character of these illocutionary operators, and introduced a sign for making negative statements that can themselves be either asserted or denied. This sign would be “explained” by the following principles. (I use ‘$\dashv/\neg$’ to indicate that the illustrations cover both denials and supposings false; and use ‘$\vdash/\llcorner$’ for assertions and supposings true.)

~ *Introduction*

$$\frac{\dashv/\neg A}{\vdash/\llcorner \sim A}$$

The conclusion is an assertion only if the premiss is a denial

~ *Elimination*

$$\frac{\vdash/\llcorner \sim A}{\dashv/\neg A}$$

The conclusion is a denial only if the premiss is an assertion

The negation sign characterizes a statement as being one that “deserves” to be denied. The introduction of negation in this way enriches the expressive power of the language, by making it possible to produce compound statements with a negated component. Being able to characterize a statement as false also gives rise to the Liar Paradox.

The relation between denial and negative supposition, on the one hand, and statement negation on the other, together with the possibility that denial might be prior to negation and the source of the significance for negating expressions, suggests that we take a look at other connectives. We can conjoin two statements to form a compound statement, and assert the compound statement. It is simpler, more straightforward, and more common to unite two independent assertions conjunctively. For example, we might transcribe what someone says out loud either as:

Frank was at the party. And Kathy was also at the party.

or like this: Frank was at the party, and Kathy was also at the party.

In the second example, we have represented the speaker as using one sentence to make two assertions. Unless the speaker pauses for a very long time after saying that Frank was at the party, it seems quite arbitrary whether we use two written sentences or one sentence to represent what she said. In either case, she has made two assertions. We also conjoin other illocutionary acts such as requests:

Please take out the garbage and turn on the light on the front porch.

or even: Mary, please take out the garbage, and Kevin, turn on the front porch light.

These symbols:

$\vdash_{\wedge}$
$\dashv_{\wedge}$
$\llcorner_{\wedge}$
$\urcorner_{\wedge}$

will be used to represent conjunctive assertions, denials, and suppositions. A conjunctive assertion, which is a way of asserting two statements without making (performing) a single, conjunctive, statement, will be represented like this:

$\vdash_{\wedge}$*[A, B]*

Assertions aren't true or false, except in a derivative sense, but I will say that a conjunctive assertion is *objectively incorrect* if one of the asserted statements is false; it is *objectively admissible otherwise.*

In a language without conjunctive statements, in which there are conjunctive assertions and (positive) suppositions, we could introduce a conjunction operator, '*&*,' for forming compound statements, and explain it by means of these inference principles:

& Introduction	*& Elimination*	
$\vdash_{\wedge}/\llcorner_{\wedge}$*[A, B]*	$\vdash/\llcorner$*[A & B]*	In each case, the conclusion is an
-------------	--------------	assertion only if the premiss is an
$\vdash$*[A & B]*	$\vdash_{\wedge}/\llcorner_{\wedge}$*[A, B]*	assertion

We can also recognize disjunctive assertions, denials, and suppositions. A disjunctive assertion of two statements narrows down the way things can be, without being completely specific. We also make disjunctive commands ("Either take off your hat or leave the room"), requests, and promises, in addition to assertions, denials, and suppositions. A unified and uniform theory of language use ought to recognize disjunctive and conjunctive forms of illocutionary acts of various kinds. Given the operators for disjunctive assertions, denials, and suppositions shown here:

$\vdash_{\vee}$ $\dashv_{\vee}$ $\llcorner_{\vee}$ $\urcorner_{\vee}$

we can introduce an operator for forming disjunctive statements, and explain it inferentially as follows:

v Introduction	*v Elimination*	
$\vdash_{\vee}/\llcorner_{\vee}[A, B]$	$\vdash/\llcorner[A \vee B]$	The conclusion is an assertion
--------------	--------------	only if the premiss is an assertion
$\vdash/\llcorner[A \vee B]$	$\vdash_{\vee}/\llcorner_{\vee}[A, B]$	

I have argued in *Kearns 2006* that most speech acts performed with indicative conditional sentences are illocutionary acts which don't contain conditional statements. In a *conditional assertion*, for example, the consequent is asserted *on the condition of the antecedent*. In a conditional assertion, denial, or supposition, the antecedent and consequent are genuine statements, but these are not combined to form conditional statements. A conditional assertion is *objectively incorrect* if the antecedent is true and the consequent false, and *objectively admissible* otherwise. A major reason for the bad fit between ordinary conditionals and material conditional statements is that the ordinary conditionals are conditional illocutionary acts, and are not the assertion, denial, or supposition of conditional statements. The primary function of a conditional assertion, denial, or supposition is to establish an inference principle for the person performing the conditional act, or to reflect an inference principle which is already in force for that person. For example, the person who makes this assertion:

If Jennifer has the day off, then Ken has their car today.

has established a commitment to accept/assert that Ken has the car once she learns that Jennifer has the day off.

My conjecture is that the expressions which we regard as distinctively logical are statement-forming expressions derived from, or based on, epistemic-level illocutionary operators in ways analogous to those in which operators for negation, conjunction, and disjunction can be obtained from denial, and from conjunctive and disjunctive assertion. Material implication has a similar relation to conditional assertion, although material conditional statements don't play an important role in ordinary speech. Even universal and existential quantifiers have illocutionary counterparts. A universal assertion establishes (for the speaker) an inference principle, and an existential or indefinite assertion ("something is such that...") is a kind of generalization of a disjunctive assertion. For example, this universal assertion:

Every student in the logic class is 19 years old.

establishes for the speaker a commitment from acknowledging someone to be a student in the logic class to accepting/asserting that the person is 19 years old. There are also universal commands ("All of you sit down") and promises ("I promise each of you that you will receive an

A for the course"). Universal assertions can be used to introduce and explain universally quantified statements, and indefinite assertions will provide the basis for existentially quantified statements.

That logical operators have an illocutionary basis would help to explain why we find natural deduction systems with introduction and elimination rules for the various operators to be natural. Unlike, say, *modus tollens*, these rules apply to a single operator which is the principal operator of a sentence (statement). The "defining" connection linking a logical operator to its illocutionary counterpart explains an operator which is the single and principal operator in a sentence in terms of an illocutionary operator which is the single operator in an illocutionary act.

Recognizing illocutionary "origins" or "foundations" for logical operators relieves some of the metaphysical pressure to recognize features in the world corresponding to these operators. We don't need to countenance negative facts or states of affairs, for example, or universal ones. A true negative statement "It is false that *A*" simply indicates that statement *A* "deserves" to be denied because of *A*'s bad fit with the way things are, it doesn't represent an intrinsically negative feature in the world.

If their derivation from illocutionary operators is what gives familiar logical operators their distinctively logical character, then there will be other candidates for operators/expressions which have a distinctively logical character. Epistemic modal operators will have a claim to be considered logical expressions. For in a context where assertions have the status of knowledge claims, we can introduce the box and characterize it with these principles:

$\Box$ *Introduction*	$\Box$ *Elimination*
$\vdash A$	$\vdash \Box A$
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$\vdash \Box A$	$\vdash A$

Introduced in this way, the box has the significance *the assertion of A follows, in the sense of commitment, from my current knowledge.* Additional principles, adapted from system *S4*, are needed for supposition, since the principle $\Box$ *Introduction* isn't correct when a statement is merely supposed to be true.

Identity, which is usually treated as a logical concept, also deserves this status on the current understanding of what makes an expression a logical one. When a person uses an expression to *refer* to an object in the world, she exploits a connection linking her to that object. While different people can refer to the same object, each person exploits connections proper to herself. A standard system of logic can't accommodate or explain the referring use of singular terms, because standard systems lack the epistemic resources found in systems of illocutionary logic.

Given a person, and an object, there will be many connections linking the person to the object. She won’t know about most of them, and so can’t exploit them to refer to the object. There may also be connections which she does know about and which link her to a single object, without her knowing that they do this. When a person discovers that different connections lead to a single object, she will *consolidate* these connections into a single “package.” An act consolidating the connections associated with different expressions, or an act which reflects their consolidation, has a status like an assertion; it can be used to introduce and explain an operator (a predicate) for identity. For example, we might have consolidating operators:

$$\vdash_{=},\ \llcorner_{=}$$

and use them to give us an identity predicate:

$$\begin{array}{ccc} = \textit{Introduction} & \qquad & = \textit{Elimination} \\ \\ \vdash_{=}/\llcorner_{=}[\alpha, \beta] & & \vdash/\llcorner[\alpha = \beta] \\ \text{---------------} & & \text{--------------} \\ \vdash/\llcorner[\alpha = \beta] & & \vdash_{=}/\llcorner_{=}[\alpha, \beta] \end{array}$$

(Perhaps these considerations can help to demote identity from being a metaphysical heavyweight among relations.)

A short bibliography of papers by John Kearns about illocutionary logic

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