

# The Technological Relevance of Natural Language Pragmatics and Speech Act Theory

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# Outline

- What is pragmatics?
- What is speech act theory?
- How is this relevant to technology?

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# What is pragmatics?

It's the study of  
how language is used  
in specific situations  
to communicate.

# What is pragmatics?

Pragmatics is the newest major area of linguistics, first widely studied in the 1970s.

*Applications are still being discovered.*

# What is pragmatics?

Charles Morris, 1938:

*Relation of linguistic units to:*

**Syntax**      **Each other**

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**Syntax**      **Each other**

**Semantics**      **The things they signify**

**Pragmatics**      **The people who use them**

# What is pragmatics?

Important areas of pragmatics today:

- Discourse structure
- Language in context
- Speech act theory

# Outline

- **What is pragmatics?**
- **What is speech act theory?**
- **How is this relevant to technology?**

# What is speech act theory?

The study of

*what we do when we talk:*

stating facts,

asking questions,

making requests,

expressing feelings...

# What is speech act theory?

Terms from J. L. Austin,

*How to do things with words*, 1962:

**locution**

**what we say**

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**illocution**

**what we intend to**

**accomplish by saying it**

# What is speech act theory?

Terms from J. L. Austin,

*How to do things with words*, 1962:

**locution**

**what we say**

**illocution**

**what we intend to**

**accomplish by saying it**

**perlocution**

**what we actually**

**accomplish by saying it**

# What is speech act theory?

*Key fact:*

**Locution, illocution, and perlocution  
can be mismatched.**

**You do not have to swallow  
what people tell you.**

# What is speech act theory?

John Searle, *Speech Acts*, 1969:

There are many kinds of illocutions:

- Statements
- Questions
- Requests
- Promises
- ... (Some linguists classify > 200 kinds!)

# What is speech act theory?

Key claim of speech act theory:

*The F(P) hypothesis*

We do not simply communicate facts.

Everything we say is wrapped in an illocution.

Every P is wrapped in an F(...).

# What is speech act theory?

Putting it another way:

We do not perform "Vulcan mind melds."

We do not simply put information  
into each other's minds.

# What is speech act theory?

*No "Vulcan mind melds"...*

We must package everything we say  
in a speech act.

The hearer must figure out how to take it  
(and is not obligated to take it the way we  
wanted him to).

# What is speech act theory?

The logic of how to interpret speech acts is called **illocutionary logic**

(Vanderveken 1991, etc.).

# Outline

- *What is pragmatics?*
- *What is speech act theory?*
- **How is this relevant to technology?**

# Relevant to technology?

Have you noticed how often computers are content to perform “Vulcan mind melds”?

They just transfer data without decoding speech acts.

(Hello, spam and viruses!)

# Relevant to technology?

**But in fact  
the world of computers  
is full of speech acts.**

**All we have to do  
is look for them.**

# Relevant to technology?

## Examples:

- Windows message boxes
- Network protocols
- E-commerce
- Operating system calls

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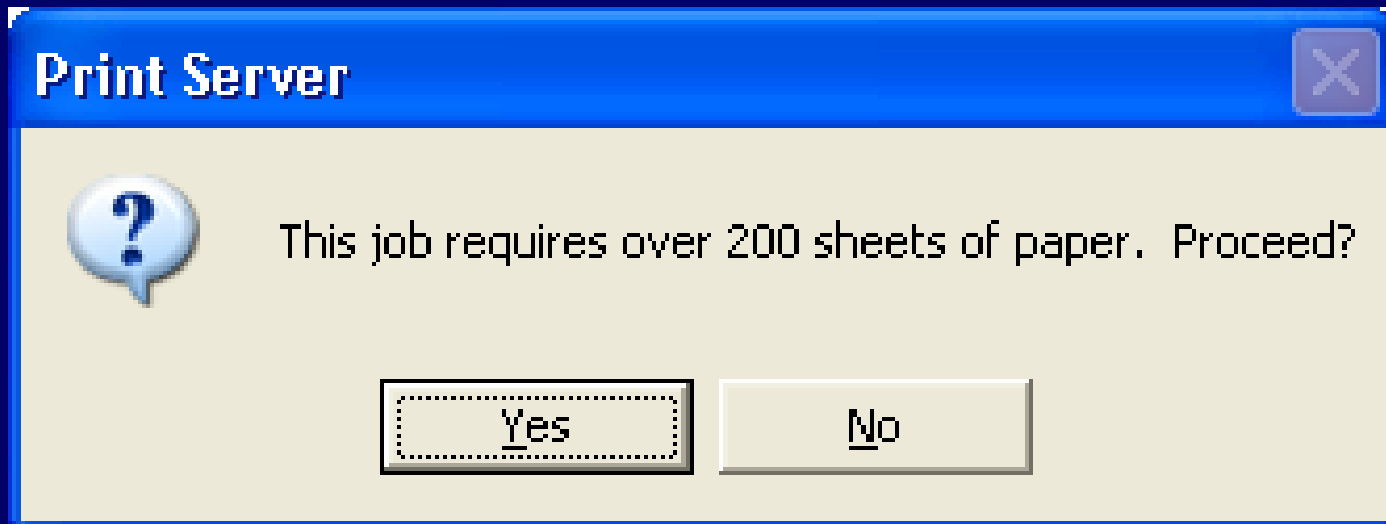
# Windows message boxes



**Direct speech act:** Statement of fact and request for acknowledgment.

**User must infer:** Go and pick up the printout.

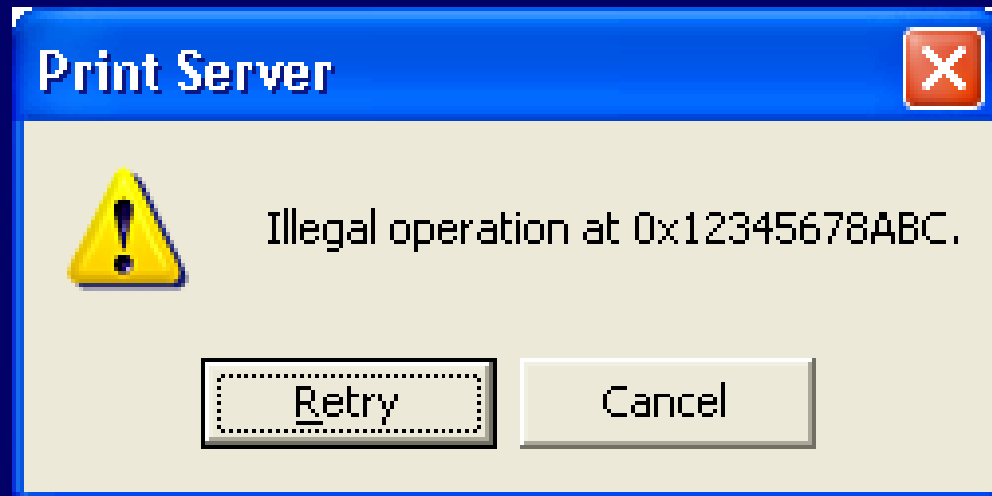
# Windows message boxes



Direct speech act: Yes/no question.

User must figure out what the answer should be.  
User must answer truthfully.

# Windows message boxes



**Direct speech act:** Statement of fact.  
Cryptic request for reply.

**User must infer:** what on earth this means!

# Relevant to technology?

## Examples:

- Windows message boxes
- Network protocols
- E-commerce
- Operating system calls

# Network protocols

Example: Delivering e-mail.

*(establish connection)*

220 wampus.ai.uga.edu ESMTP Sendmail 8.8.8/8.8.8

# Network protocols

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# Network protocols

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Statement, possibly insincere	220 wumpus.ai.uga.edu ESMTP Sendmail 8.8.8/8.8.8
	EHLO possum.ai.uga.edu
	250 wumpus.ai.uga.edu Hello possum.ai.uga.edu...
Request	EXPN Logicians
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# Network protocols

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	250 Don Potter <potter@uga.edu>
Statement with implicit request	MAIL FROM: mc@uga.edu RET=HDRS
	250 mc@uga.edu: sender OK

# Network protocols

## Example: Delivering e-mail.

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Statement, possibly insincere	220 wumpus.ai.uga.edu ESMTP Sendmail 8.8.8/8.8.8
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Request	250 wumpus.ai.uga.edu Hello possum.ai.uga.edu...
	EXPN Logicians
	250 Donald Nute <dnute@uga.edu>
	250 Don Potter <potter@uga.edu>
Statement with implicit request	MAIL FROM: mc@uga.edu RET=HDRS
	250 mc@uga.edu: sender OK
	RCPT TO: mac@mac.com NOTIFY=SUCCESS
	250 mac@mac.com: recipient OK

# Network protocols

## Example: Delivering e-mail.

Statement, possibly insincere	<i>(establish connection)</i> 220 wumpus.ai.uga.edu ESMTP Sendmail 8.8.8/8.8.8 EHLO possum.ai.uga.edu
Request	250 wumpus.ai.uga.edu Hello possum.ai.uga.edu... EXPN Logicians
Statement with implicit request	250 Donald Nute <dnute@uga.edu> 250 Don Potter <potter@uga.edu> MAIL FROM: mc@uga.edu RET=HDRS 250 mc@uga.edu: sender OK RCPT TO: mac@mac.com NOTIFY=SUCCESS 250 mac@mac.com: recipient OK DATA 354 Enter mail, end with "." on a line by itself <i>...text of message here...</i> 250 Message accepted for delivery

# Network protocols

## Example: Delivering e-mail.

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Request	250 wumpus.ai.uga.edu Hello possum.ai.uga.edu... EXPN Logicians
Statement with implicit request	250 Donald Nute <dnute@uga.edu> 250 Don Potter <potter@uga.edu> MAIL FROM: mc@uga.edu RET=HDRS 250 mc@uga.edu: sender OK RCPT TO: mac@mac.com NOTIFY=SUCCESS 250 mac@mac.com: recipient OK DATA
Request to end conversation	354 Enter mail, end with "." on a line by itself <i>...text of message here...</i> 250 Message accepted for delivery QUIT 221 wumpus.ai.uga.edu closing connection

# Network protocols

Note the variety of speech acts involved in network communication, and the possibility of insincerity.

(A smart hearer has to judge what he hears.)

*Many computer security problems could be attributed to a naïve view of speech acts.*

# Relevant to technology?

## Examples:

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# E-commerce

By electronic commerce  
I mean the automatic making  
of business deals by computer.

*Computers negotiate with each  
other, find the best deal and make it  
automatically, and even act as  
brokers or referrers for each other.*

# E-commerce

E-commerce in this sense has existed since the 1960s, often with clumsy protocols.

Examples:

ANSI X.12

UN EDIFACT

Even if clumsy, they are a boon to countries that do not speak a major world language.

# E-commerce

Older E-commerce protocols do not take speech acts into account.

X.12 has a different “form” for every type of transaction (over 800 of them), each with its own syntax.

# E-commerce

**KQML**

**(Knowledge Query Manipulation Language)**

**(T. Finin et al., mid-1990s)**

**is a speech-act-based  
language for electronic commerce.**

**(XML is not. XML is merely a syntax for data.)**

# E-commerce

Some KQML speech-act types:

## **Informatives:**

tell, deny, untell (retract)

## **Database performatives:**

insert, delete, delete-one, delete-all

## **Query performatives:**

ask-if, ask-about, ask-one, ask-all...

## **Responses:**

error (I can't understand you),

sorry (can't do it),

eos (end of stream)

# E-commerce

In conversations about databases, another prominent issue is how to deal with multiple answers.

**Deliver them all at once in a list, or as a series of individual statements, or one at a time as requested...**

These options turn up in several places in KQML.

# Relevant to technology?

## Examples:

- Windows message boxes
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# Operating system calls

Even a computer program  
talking to the OS  
has a repertoire of  
speech act types.

# Operating system calls

**Moore** (*Decision Support Systems*, 1998)  
found a variety of speech act types in  
AppleEvents (MacOS).

# Operating system calls

In any modern operating system, system calls can:

- State facts to the OS
- Ask questions of the OS
- Give commands to the OS
- Make requests of the OS (which the OS can turn down)
- Make promises to the OS (by providing a callback method)

Typically the programming language takes little or no notice of the difference between these.

**Relevant to technology?**

**So what should we do next?**

# Relevant to technology?

**So what should we do next?**

**What I've just given you is  
not a state-of-the-art report  
but rather an indication of  
where to explore.**

# Relevant to technology?

Anything that involves  
communication  
and intelligent agents  
is going to involve pragmatics.

Look for it!

# Some references

(where more references can be found)

Levinson, S., *Pragmatics* (Cambridge U. Press, 1983)

Mey, J., *Pragmatics: An Introduction* (Blackwell, 2001)

Searle, J. R., *Speech Acts* (Cambridge U. Press, 1969)

Covington, M. A., "Speech acts, electronic commerce, and KQML," *Decision Support Systems* 22 (1998) 203-211

Finin, T., et al., <http://www.cs.umbc.edu/kqml/>

Moore, S., "Categorizing automated messages," *Decision Support Systems* 22 (1998) 213-241

**Any questions?**