The Technological Relevance of Natural Language Pragmatics and Speech Act Theory

Michael A. Covington

Associate Director
Artificial Intelligence Center

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**

What is pragmatics?

Charles Morris, 1938:

	Relation of linguistic units to:
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**

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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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How to do things with words, 1962:

locution	**what we say**
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.).

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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**

Relevant to technology?

Examples:

- **Windows message boxes**
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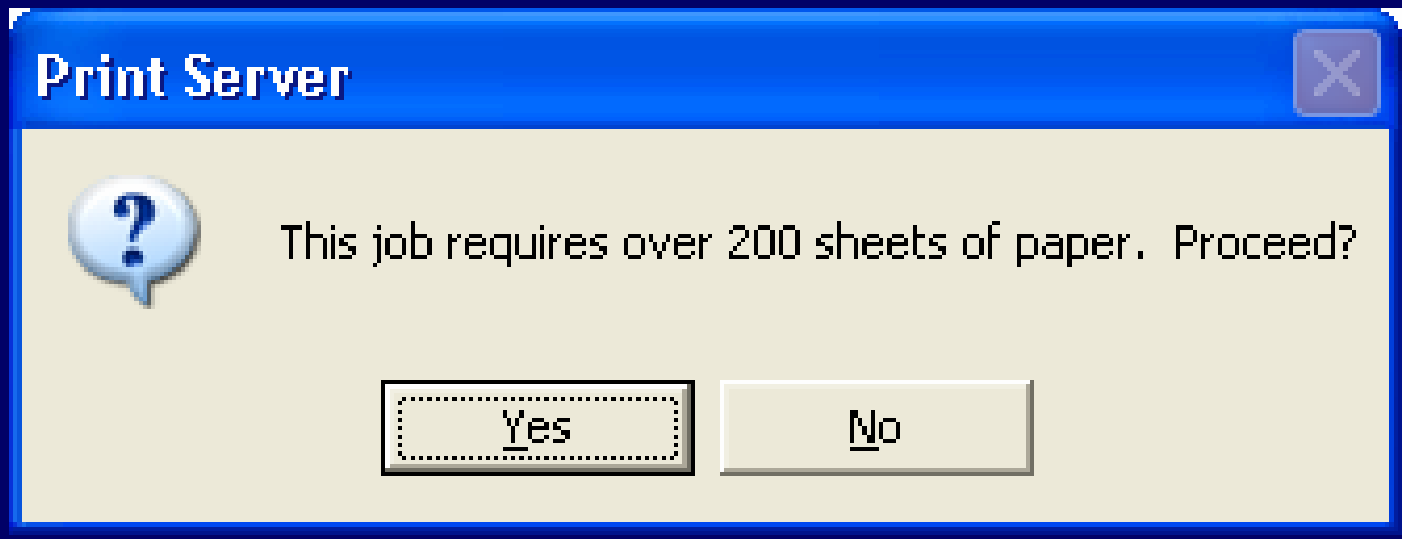
Windows message boxes

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

User must infer: Go and pick up the printout.

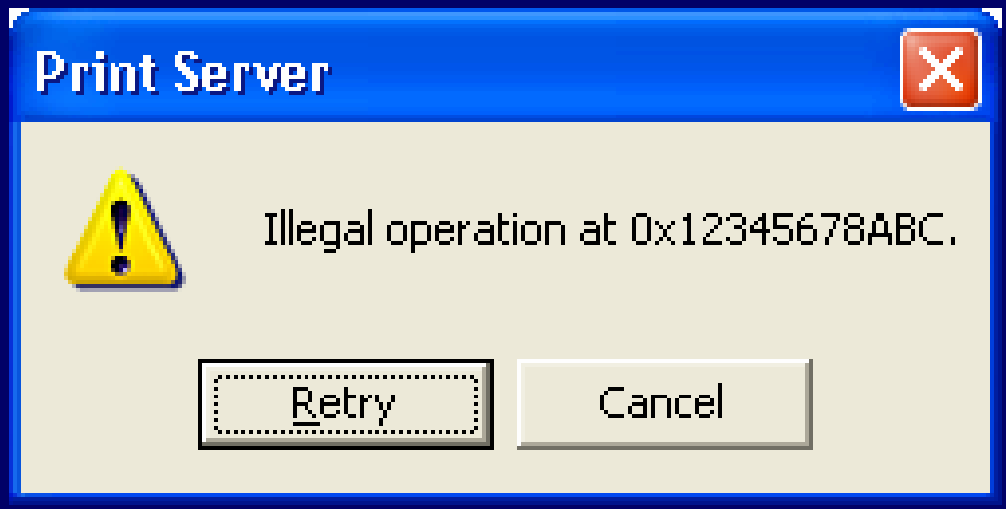
Windows message boxes



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 wumpus.ai.uga.edu ESMTP Sendmail 8.8.8/8.8.8
```

Network protocols

Example: Delivering e-mail.

Statement, possibly insincere

```
(establish connection)
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…
```

Network protocols

Example: Delivering e-mail.

Statement, possibly insincere

Request

```
(establish connection)
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…
EXPN logicians
250 Donald Nute <dnute@uga.edu>
250 Don Potter <potter@uga.edu>
```

Network protocols

Example: Delivering e-mail.

Statement, possibly insincere

Request

Statement with implicit request

```
(establish connection)
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…
EXPN logicians
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
```

Network protocols

Example: Delivering e-mail.

Statement, possibly insincere

Request

Statement with implicit request

```
(establish connection)
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…
EXPN logicians
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
```

Network protocols

Example: Delivering e-mail.

Statement, possibly insincere

Request

Statement with implicit request

```
(establish connection)
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…
EXPN logicians
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
…text of message here…
250 Message accepted for delivery
```

Network protocols

Example: Delivering e-mail.

Statement, possibly insincere

Request

Statement with implicit request

Request to end conversation

```
(establish connection)
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…
EXPN logicians
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
…text of message here…
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?

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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:

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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?