

Language Development

PSYCH 320



Lecture 13
October 25, 2018

Midterm 2 covers up to next Tuesday (Oct 30)

Next Thursday (Nov 1) is a video relevant to Midterm 3

How to evaluate POS?

▶ What evidence would counter the POS argument?

- ▶ show how general learning mechanisms could lead to grammatical knowledge
- ▶ show input is not impoverished
- ▶ show that input is strongly related to grammatical development

When this argument was proposed we didn't have many studies related to how much information is actually in the input.

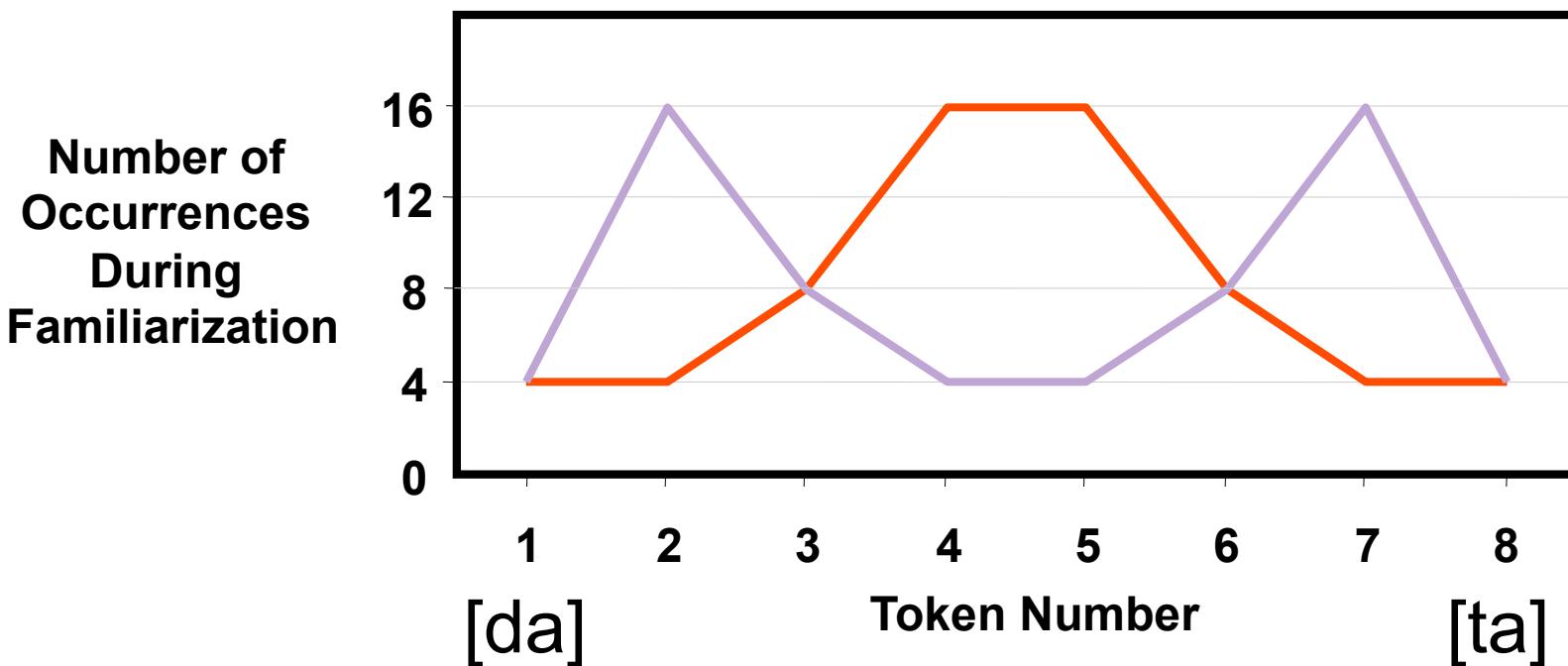
Is there a correlation between individual grammatical development and how much input the kid is getting? (this lecture)

POS argument says that there is not enough information in the input for babies to learn grammar.

Domain general learning mechanisms

- ▶ Statistical learning (or distributional learning)
- ▶ Remember these?
 - ▶ phonemic categories: Maye et al. (2002)
 - ▶ word segmentation: Saffran et al. (1996)
 - and cross-situational statistics (like to solve Gavagai problem)

Remember: Unimodal vs. Bimodal Distributions



Remember: Segmentation based on statistics

- ▶ train: golabutupiropadotibidakugolabubidaku...
 - ▶ 2 minutes of concatenated speech
- ▶ test: words (**golabu**) vs. part-words (**kugola**)

Domain general learning mechanisms

- ▶ Infants can track distributional information
 - ▶ Frequency of speech sounds (to learn about sound categories)
 - ▶ adjacent syllable co-occurrence (to learn about words)
- ▶ Why do we say this is a “general” learning mechanism?
 - ▶ Weren’t these language studies?
- ▶ Not specific to language. Can also learn about
 - ▶ sequences of tones, sequences of visual shapes

Not specific to the language domain. These techniques are also applied to recognizing faces for example.

Domain general learning mechanisms

- ▶ But how might the ability to track relationships among words help you learn about syntax?
- ▶ One example: tracking non-adjacent dependencies
 - ▶ abc; adc; axc: a and c are non-adjacent
 - ▶ a and c reliably occur together

There is something in the middle of a and c but they always appear together so they are related in some way.

Learning categories through non-adjacent dependencies

- ▶ Words from the same syntactic category tend to be surrounded by the same “frames”



- ▶ Maybe noticing that this non-adjacent frame is the same in all of these cases can help you group the words inside (Mintz, 2002)

We already know that babies can tell the difference between function words and content words, this is how babies can group words into smaller categories.

Learning categories through non-adjacent dependencies

Analyzed large corpus of IDS

How often do kids get frames with non-adjacent dependencies in their input?

- ▶ Cues to nouns and verbs reliable in “frames” of child-directed speech (Mintz 2002, 2003)
 - ▶ nouns appear in some frames; verbs appear in other frames
- ▶ Infants can group words based on whether they occur in the same frames

Evaluating POS

- ▶ There is information in the input that can help you learn grammar and infants are sensitive to it
 - ▶ tracking non-adjacent dependencies can help you learn about syntactic categories
- ▶ Is it really enough to give them all they need to know? How much needs to be innate?

More about the input

- ▶ Newport et al, 1977: What does maternal speech (here “motherese”) look like?
- ▶ Natural data from parent-child, parent-experimenter interactions
- ▶ 2 visits per child (6 months apart); children between 12 and 33 months

Children were somewhere between these ages (not exactly these ages)

Is parent-child speech input as messy as POS argument says it is?

Results: Maternal speech

- ▶ **Less complex?**
- ▶ **Yes: shorter MLU, highly intelligible, well-formed (fluent)** Slower, clearer when talking to child than when talking to experimenter
 - Better for children to learn from than Chomsky says (in some ways)
- ▶ **No: more utterance types (questions, imperatives, declaratives)**
- ▶ **Shorter, but not syntactically less complex**

When we talk to each other (two adults) we use a lot of declaratives (“I went to the store”). When you talk to kids you say a lot more questions (“What are you doing?”) and imperatives (“Clean your room”).

The “go” (subject) in “Go clean your room” is missing and the kid is left to figure that out, so these sentences are more complex.

Why these properties?

- ▶ Parent trying to “communicate with a cognitively and linguistically naïve child in the here and now”

Parents are trying to “keep things simple” for their kids. Parents assume if they used longer sentences, the kid would stop paying attention.

- ▶ Utterances are short, but not syntactically simple
 - ▶ Suggests that mothers use short sentences because of perceived processing constraints, not to simplify language instruction
 - ▶ correlation of length with age, not child’s linguistic ability (MLU)

Mothers aren’t trying to keep the grammar simple, only the length (mother only sensitive to the child’s cognitive level).

As kids got older, mother’s started to use longer sentences even if the kid was not very grammatically developed

Parent-child speech is not trying to teach kids the grammar, only being sensitive to cognitive ability.

Regardless of why parents speak this way, does it have any affect on kids grammatical development?

Relationship between input and grammatical development?

- ▶ No overall relationship between mothers' speech at 1st recording and children's speech at 2nd recording
 - ▶ e.g., higher complexity did not lead to higher MLU

If mom talked in more complex sentences, the child did not have a longer MLU later on.

- ▶ Relationship for some specific aspects of grammar
 - ▶ Child production of auxiliaries correlated with yes/no questions (e.g., *can you do it? do you want it?*) and expansion by mother auxiliaries = can/do/will/is
 - ▶ Why?
 - ▶ Child biased to pay attention to particular aspects of input
 - ▶ e.g., initial position (aux- inversion in questions)

Kids more likely to produce auxiliaries in second recording if parents used more questions and expansion

Auxiliaries occur at the beginning of the sentence in a question, and kids pay a lot of attention to the beginning (and ends) of sentences

The child and the input (grammar)

- ▶ “an interaction between the child’s listening biases and the mother’s presentation of aspects of syntactic structure predicts the rate at which the child learns certain language-specific constructions. But at the same time many general properties of emerging language competence seem to be insensitive to characteristics of the maternal speech environment”

There are relationships between mother-child speech and what a kid actually learns for very specific things like learning of auxiliary words because of kids listening biases.

But overall, no very strong relationships were found.

This shows some support for the POS argument!

Regardless of what parents do, a lot of children turn out somewhat similar in terms of grammatical development.

Note that participants were all from the same SES/cultural background (not a lot of variability in the input).

Not so fast

- ▶ Huttenlocher et al. (2002) – how about slightly older kids?
- ▶ Are 4-year-old children's grammatical abilities related to their input?
 - ▶ Multiclause sentences (*He gave a book to the girl* vs. *He thought he gave a book to the girl*)
 - ▶ #NP per utterance
 - ▶ Grammar comprehension

Is there a relationship between how many multiclause sentences the parents produced vs. how many the child produced.

Comprehension test

The lamp broke because it fell off the table.



The boy is picking up the baby who is holding a block.



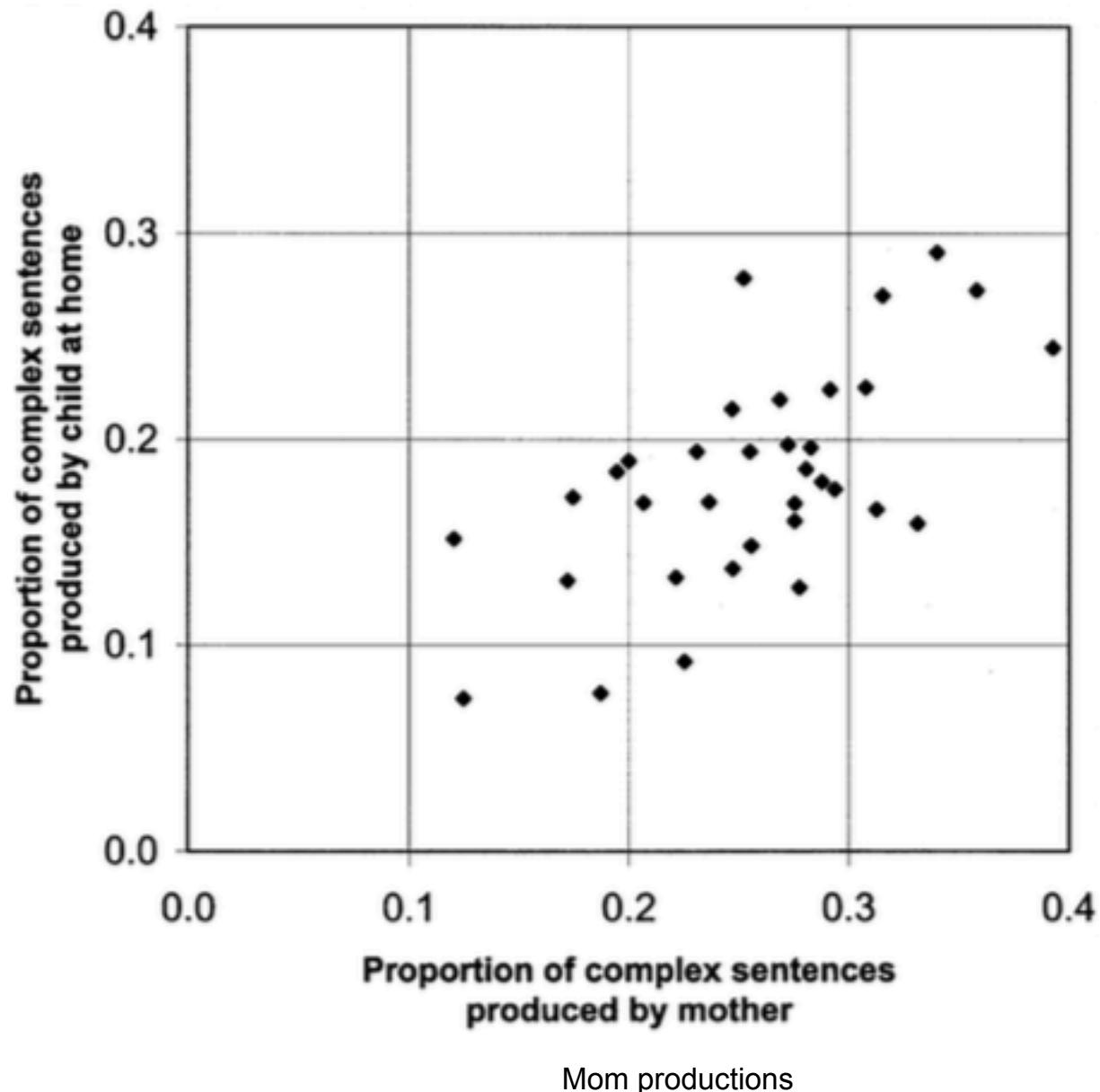
Fig. 3. Two sample items from the comprehension test, Study 1B.

Study 1

Looks like a fairly strong positive correlation with older kids (> 4 years old)

Kid productions

Parents who produced more complex sentences have kids that comprehend more complex sentences.



Not so fast

- ▶ **Huttenlocher et al. (2002)**
- ▶ **Study 2: to rule out genetics** Do smart parents simply lead to smarter kids?
 - ▶ Recordings of children in school and teachers' input
 - ▶ Level of children's syntax at beginning of year not related to teacher complexity; but growth over the year was (averaged across children in a class)

Still a relationship with teacher-child input so this seems to rule out genetics.

Summary

- ▶ The input is not all that messy when directed to children, and it does contain important information
 - ▶ Fewer grammatical errors
 - ▶ Relatively fluent (though disfluencies occur)
 - ▶ Repetitions and expansions of child's utterances; cues to syntactic categories
- ▶ Some aspects of children's grammatical development tied to particulars of the input
 - ▶ May change with age
- ▶ Other aspects similar across children
 - ▶ innate influences?
 - ▶ or is this because their input is similar?

Types of evidence the input gives you

▶ Positive vs. negative evidence

- ▶ Shows child that something (e.g., a particular sentence) is grammatical vs. that it is not

Kids are never going to hear their parents say sentences that are not grammatical so how do kids figure out what is not allowed?

▶ Explicit negative feedback

- ▶ Explicit feedback/correction when child produces an ungrammatical utterance

If you never hear a specific sentence then that must not be a valid sentence in the grammar, e.g. “No want that”.

▶ How much explicit negative feedback is there? Very little.

Try it out and see if someone tells you that you’re wrong.

- ▶ And explicit corrections just as likely to follow errors as correct utterances (Brown & Hanlon, 1970)

Parents don’t correct their kid’s incorrect sentences all that much in an explicit way.

- ▶ 20 Parents are more likely to correct the content of what a kid says but this doesn’t help them learn grammar.

Another kind of implicit negative feedback: If someone is confused or says “Huh” then child knows what they said was wrong.

Implicit negative feedback

- ▶ Indirect feedback that something is wrong
- ▶ Reformulations (Chouinard & Clark, 2003)
 - ▶ Kid: I want butter mine. Gives the kid the correct information without explicitly correcting them, rather than just saying “Okay”.
 - ▶ Dad: Ok, I'll put butter on it.
- ▶ Parents more likely to reformulate children's errors than correct sentences
- ▶ More reformulation when children are younger
- ▶ How much do children use these reformulations?

Input and grammar development

- ▶ There is information in the input; infants are sensitive to it (statistical learning studies)
- ▶ Evidence that input (positive evidence) related to some aspects of grammatical development
- ▶ Role of negative evidence unclear

The overall idea

- ▶ If there is more in the input (and the child is sensitive to it), less specialized knowledge has to be attributed to child Evidence against innate abilities.

- ▶ If there is less in the input (or the child is less sensitive to it), more has to be prepackaged in child
Evidence in favour of innate abilities.

- ▶ We're still working on it!

Last slide we did in this lecture



Language use (pragmatics)

learning to use
language to
communicate
appropriately

phrases, sentences (syntax)

so far this stuff is all that we
have talked about

words (lexicon, morphology)

learning the
structure of
language

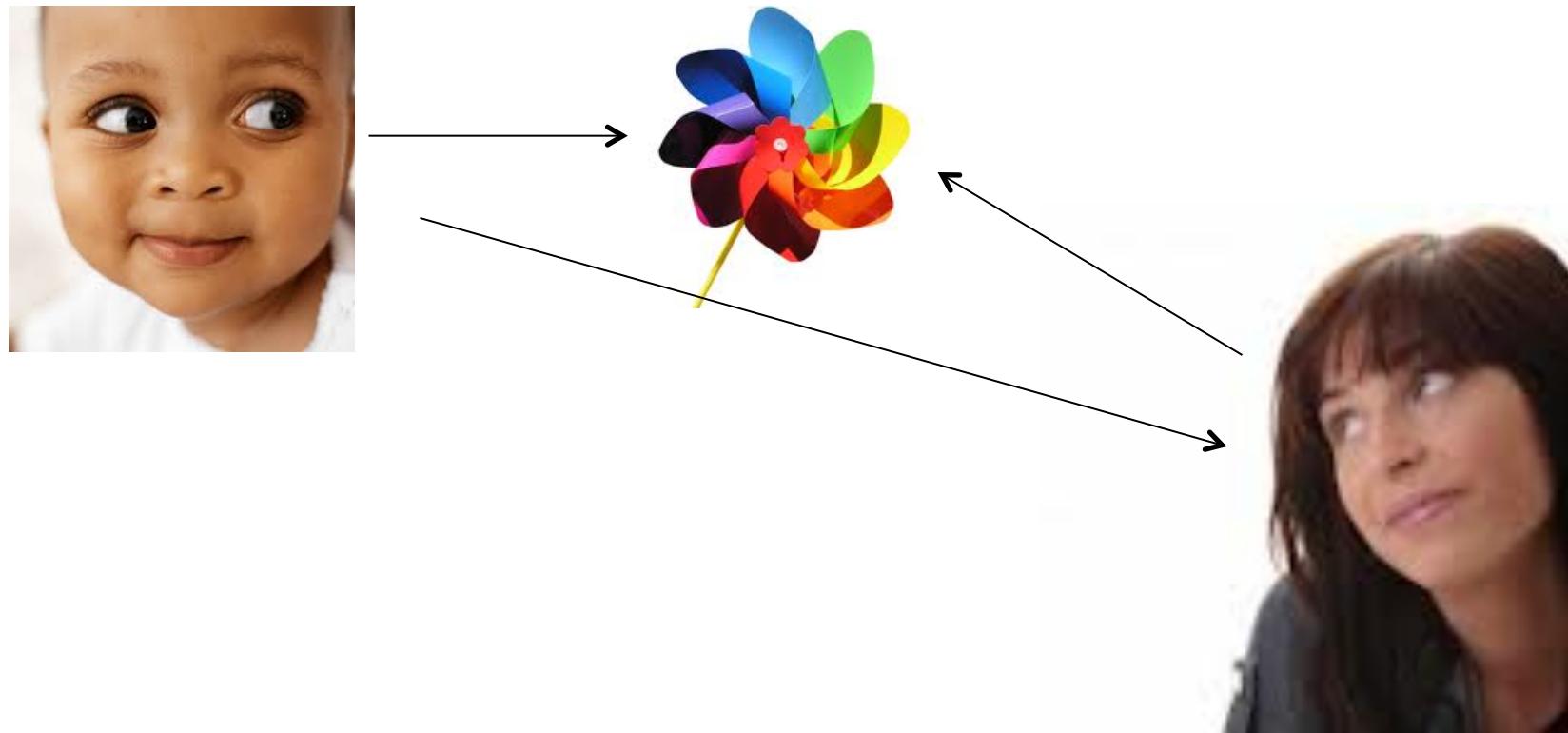
sounds (phonology)

Stages of early communicative development

Schwartz, 1983

- ▶ Stage 1: behavior has consequences, *but no intent to communicate*
 - ▶ e.g., burping, crying
- ▶ Stage 2: first attempts to communicate intentionally, *but not with language*
 - ▶ reach for, point to, hold up object, make noise, look to parent for assistance

Joint attention



Stages of early communicative development

Schwartz, 1983

- ▶ Stage 3: communicative behavior includes using language to refer. *Have intent and start to use language to express it*
 - ▶ even if it doesn't always sound like adult language -- e.g., protowords

Gesture

- ▶ **Gesture (e.g., pointing) often precedes words**
 - ▶ Pointing beginning of symbolic communication
 - ▶ To refer to, comment on, ask about
- ▶ **Predicts language development** (e.g., Rowe & Goldin-Meadow, 2009)
 - ▶ Distinct gesture + speech combinations (Mommy + [point to hat]) predict age of onset of 2-word speech
 - ▶ More meanings in gesture at 14 months → bigger vocabulary a couple of years later

Does gesture *affect* language devt?

Or just *reflect* language development?

- ▶ LeBarton et al. (2015): intervention study with 17 mos olds
 - ▶ 8 weeks of intervention
 - ▶ Condition 1 (experimental): *That's a dress [pointing]. Can you do this?*
 - ▶ Condition 2 (control): *That's a dress [pointing].*
 - ▶ Condition 3 (control): *That's a dress.*
 - ▶ Measured speech in parent-child interaction 2 weeks after intervention period
-

Does gesture *affect* language devt?

- ▶ Children in Condition I produced significantly more words at follow up
- ▶ Why?
 - ▶ could focus children's attention to objects, labels, or relationships between objects and words in general
 - ▶ practice referring to objects with gestures (words also refer to objects)
 - ▶ caregivers may provide more targeted input following gestures (label what children are paying attention to)

Summary: Communication and early language devt

- ▶ **Communication necessary for language development**
 - ▶ children acquire language to communicate
- ▶ **Communication affects language development**
 - ▶ Role of joint attention, gesture
 - ▶ Having caretakers who are more communicative/ responsive leads to faster vocab development

Communicative interactions and language development

- ▶ **Conversations support speech and vocabulary development:**
 - ▶ Having “conversations” with babies leads to faster vocal development (Gros-Louis et al 2014)
 - ▶ Infants who hear more one-on-one infant-directed speech have bigger vocabularies at 2 years (Ramirez-Esparza et al 2014)
 - ▶ For 2 year olds from low-income families, conversations including shared reference, rituals, and responses predict language skills at 3 better than quantity of words heard (Hirsh-Pasek et al, 2014)

Why?

- ▶ Helps infants understand that meanings are shared
- ▶ Shows them how language is used to communicate
- ▶ Contingency means parents will say words in situations where it is easier to map to referents
- ▶ Responsive parents adapt to current skill level/interest of infants

Communicative competence in older children

- ▶ Understanding your conversation partner's intent
- ▶ Understanding how intent can be communicated beyond literal meaning of words (implicatures, irony)
- ▶ Taking other person's perspective and knowledge into account
- ▶ Learning how to engage in longer conversations (discourse)

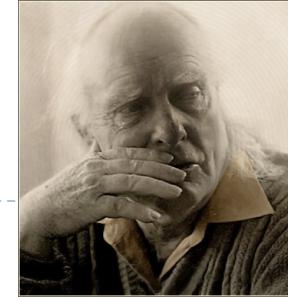
Intent and implied meaning

- ▶ Sometimes you cannot predict the intended meaning from the individual words or their combination
- ▶ We often go beyond the literal meaning
 - ▶ Make inferences
 - ▶ Interpret sentences non-literally

Grice's maxims

- ▶ Describe the rules of conduct for conversations
- ▶ Like syntax, these aren't prescriptive
 - ▶ a description of how people typically behave
- ▶ When people don't appear to be following the rules
→ implicature

Grice's Maxims



- ▶ Cooperative Principle (CP): people usually try to cooperate in communication
- ▶ We usually follow these maxims:
 - **Quantity**: don't provide too much or too little information
 - **Quality**: say something true
 - **Relevance**: be relevant

Quantity:

Provide the right amount of information

- ▶ Sarah: “Are you done with your term paper?”
- ▶ Chris: “I started writing it”

- ▶ Implicature: Chris didn’t finish writing the term paper

Quality: *Be truthful*

- ▶ Sarah: “How was your trip to the dentist yesterday?”
- ▶ Chris: “It was the most fun I’ve had in a long time”

- ▶ Implicature: it was not a whole lot of fun

Relevance:

Say things that are relevant to the topic

▶ Remember the recommendation letter:

I am writing this letter to recommend John for your finance position. John is always on time and he is a great cook.

Sincerely,

Prof Smith

Implicature: John is not qualified for the job