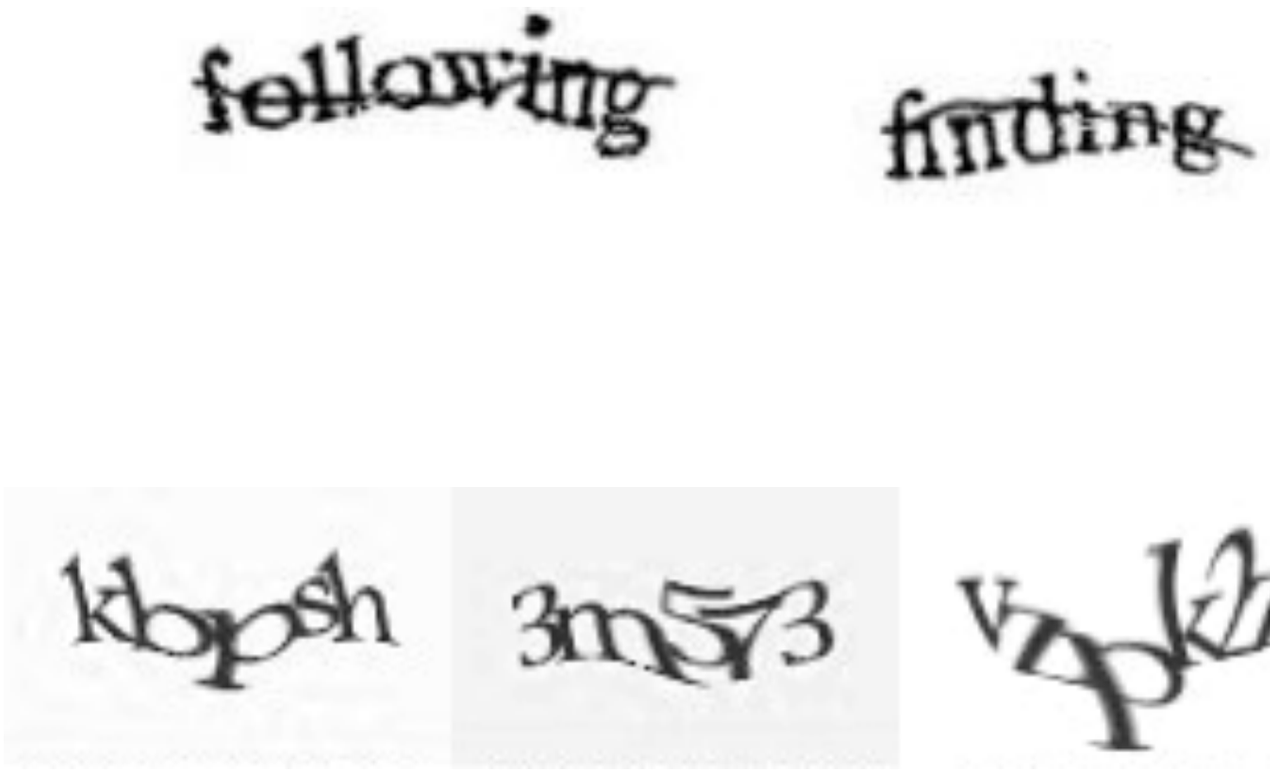
Why NLP?

Natural Language Processing
CS 4120/6120—Spring 2016
Northeastern University

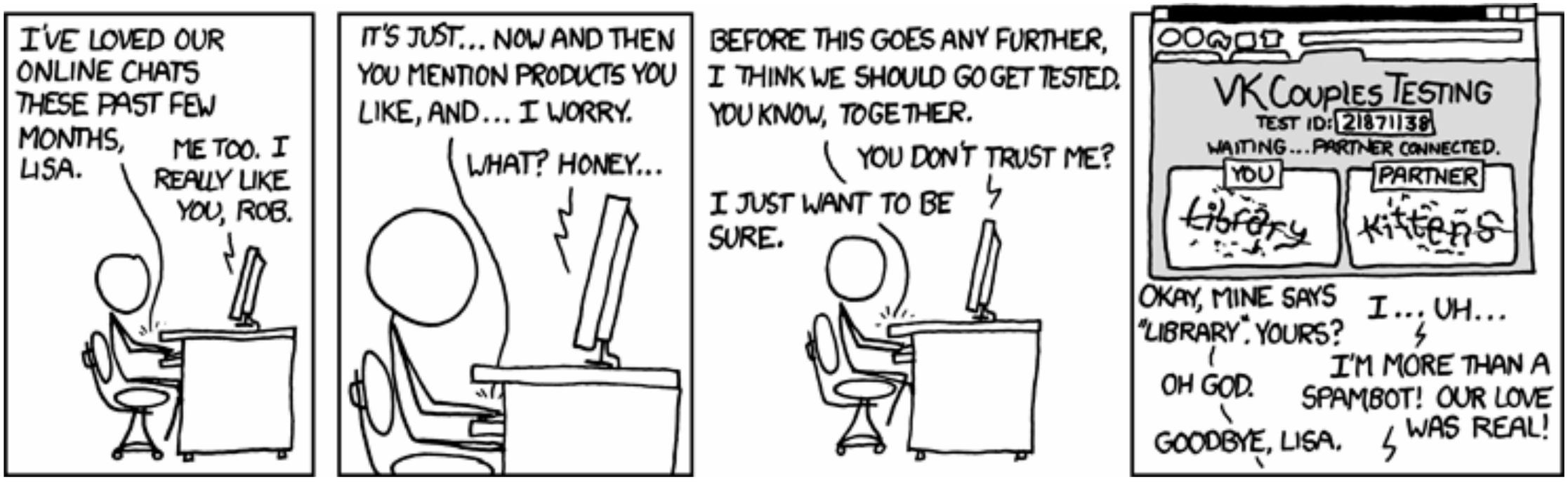
David Smith

Codes

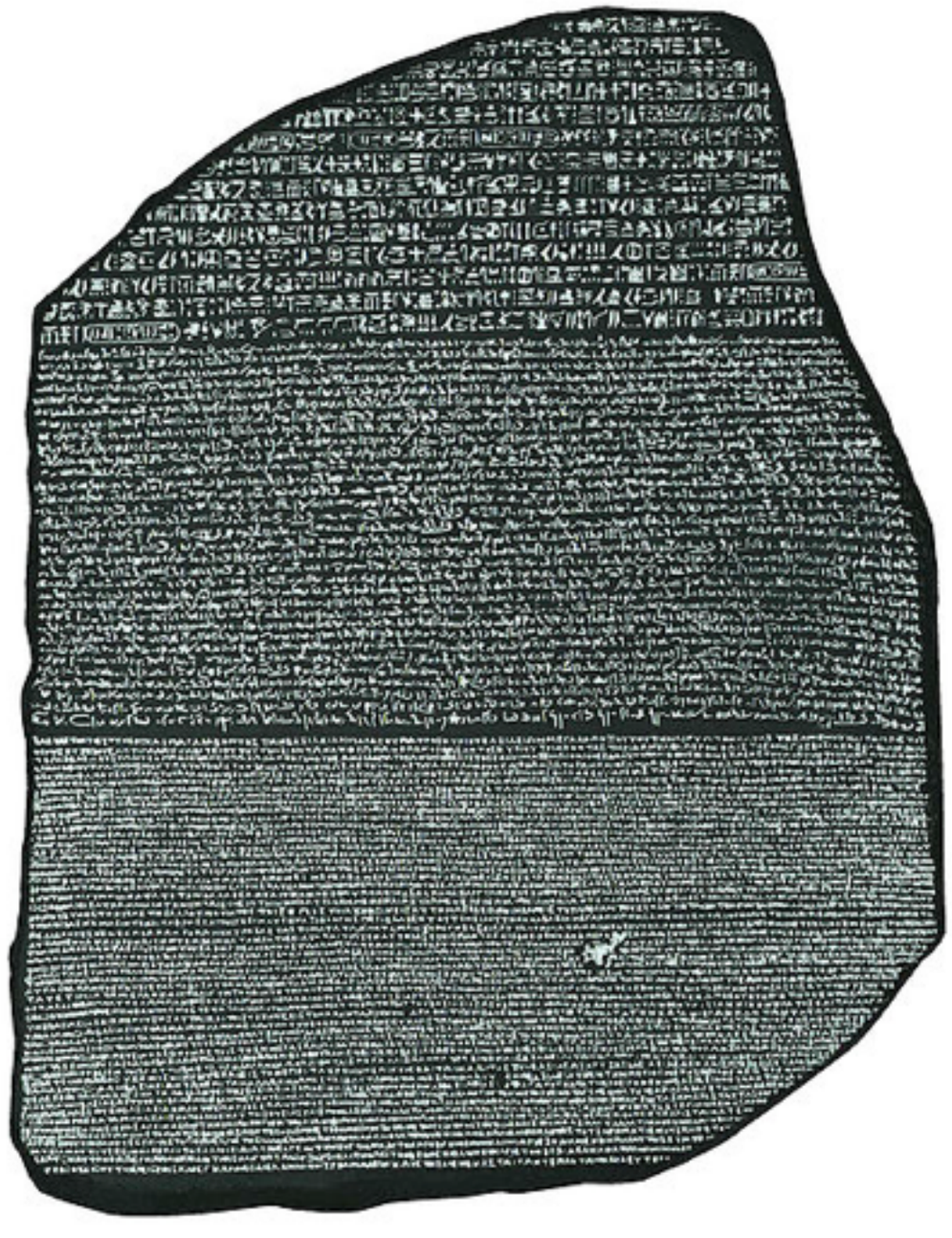


CAPTCHA

Completely Automated Public Turing test to tell Computers and Humans Apart



Fine, walk away. I'm gonna go cry into a pint of Ben&Jerry's Brownie Batter(tm) ice cream [link], then take out my frustration on a variety of great flash games from PopCap Games(r) [link].



Warren Weaver
to Norbert Wiener
4 March 1947

One thing I wanted to ask you about is this. A most serious problem, for UNESCO and for the constructive and peaceful future of the planet, is the problem of translation, as it unavoidably affects the communication between peoples. Huxley has recently told me that they are appalled by the magnitude and the importance of the translation job.

Recognizing fully, even though necessarily vaguely, the semantic difficulties because of multiple meanings, etc., I have wondered if it were unthinkable to design a computer which would translate. Even if it would translate only scientific material (where the semantic difficulties are very notably less), and even if it did produce an inelegant (but intelligible) result, it would seem to me worth while.

Also knowing nothing official about, but having guessed and inferred considerable about, powerful new mechanized methods in cryptography—methods which I believe succeed even when one does not know what language has been coded—one naturally wonders if the problem of translation could conceivably be treated as a problem in cryptography. When I look at an article in Russian, I say: "**This is really written in English, but it has been coded in some strange symbols. I will now proceed to decode.**"

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO THE ENTSCHEIDUNGSPROBLEM

By A. M. Turing.

[Received 28 May, 1936.—Read 12 November, 1936.]

The "computable" numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means. Although the subject of this paper is ostensibly the computable *numbers*, it is almost equally easy to define and investigate computable functions of an integral variable or a real or computable variable, computable predicates, and so forth. The fundamental problems involved are, however, the same in each case, and I have chosen the computable numbers for explicit treatment as involving the least cumbrous technique. I hope shortly to give an account of the relations of the computable numbers, functions, and so forth to one another. This will include a development of the theory of functions of a real variable expressed in terms of computable numbers. According to my definition, a number is computable if its decimal can be written down by a machine.

In §§ 9, 10 I give some arguments with the intention of showing that the

with the *m*-configuration written below the scanned symbol. The successive complete configurations are separated by colons.

```
  : ə ə 0  0 : ə ə 0  0 : ə ə 0  0 : ə ə 0  0    : ə ə 0  0  1 :
ɓ     ɔ       q         q         q       p
ə ə 0  0  1 : ə ə 0  0  1 : ə ə 0  0  1 : ə ə 0  0  1 :
    ƥ       ƥ         f         f
ə ə 0  0  1 : ə ə 0  0  1   : ə ə 0  0  1  0 :
        f         f         ɔ
ə ə 0  0  1 x 0 : ....
      ɔ
```

This table could also be written in the form

ɓ : ə ə ɔ 0 0 : ə ə q 0 0 : ..., (C)

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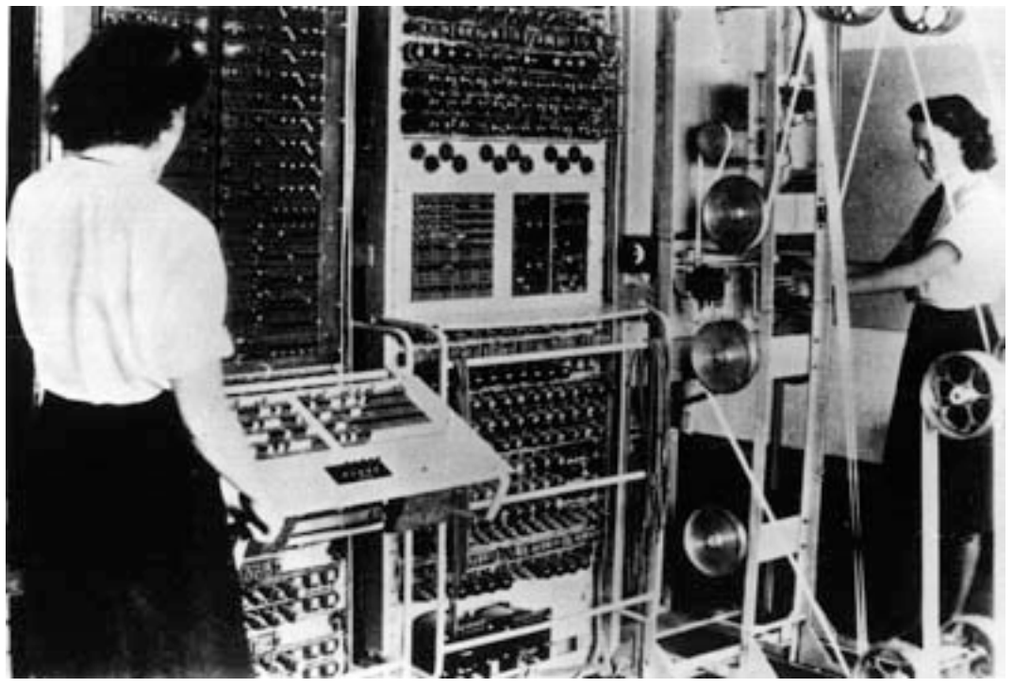
ɓ     ɔ       q          q          q          p
ə ə 0  0  1 : ə ə 0  0  1 : ə ə 0  0  1 : ə ə 0  0  1 :
     p        p          f          f
ə ə 0  0  1 : ə ə 0  0  1   : ə ə 0  0  1  0 :
         f              f          ɔ
ə ə 0  0  1 x 0 : ....
      ɔ
```

This table could also be written in the form

ɓ : ə ə ɔ 0 0 : ə ə q 0 0 : ..., (C)



PAUL KIPARSKY

TENSE AND MOOD IN INDO-EUROPEAN SYNTAX*

1. THE HISTORICAL PRESENT

The 'historical' or 'dramatic' present tense used in narrating past events, which is common in many Indo-European languages, has always been interpreted in essentially semantic terms. A typical traditional formulation is

> it is quite mistaken to transfer it to the earlier stages of Indo-European. In Greek, Old Irish, and Old Norse, for example, the historical present has quite different syntactic and semantic properties, to which the traditional idea, or any of its variants[2], must utterly fail to do justice.

* This work was supported in part by the Joint Services Electronics Program under Contract DA36-039-AMC-03200(E); in part by the National Science Foundation (Grant GP-2495), the National Institutes of Health (Grant MH-04737-05), the National Aeronautics and Space Administration (Grant NsG-496), and the U.S. Air Force (ESD Contract AF 19 (628)-2487). – I thank Michael Connolly, Eric Hamp, Einar Haugen, George Lakoff, Calvert Watkins, and Roy Wright for offering valuable criticism and/or referring me to some of the examples cited here.

The Turing Test

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Interrogator: In the first line of your sonnet which reads "Shall I compare thee to a summer's day," would not "a spring day" do as well or better?

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Witness: In a way.

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Witness: In a way.

Interrogator: Yet Christmas is a winter's day, and I do not think Mr. Pickwick would mind the comparison.

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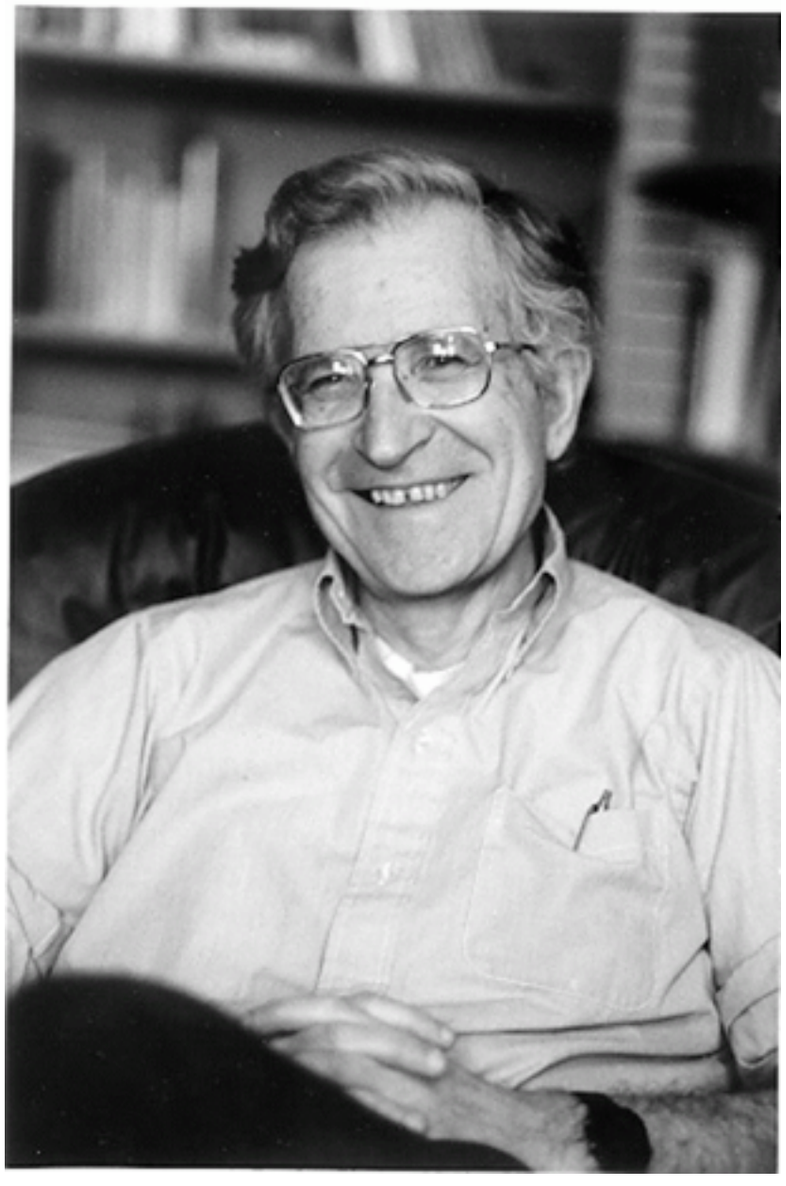
Interrogator: Would you say Mr. Pickwick reminded you of Christmas?

Witness: In a way.

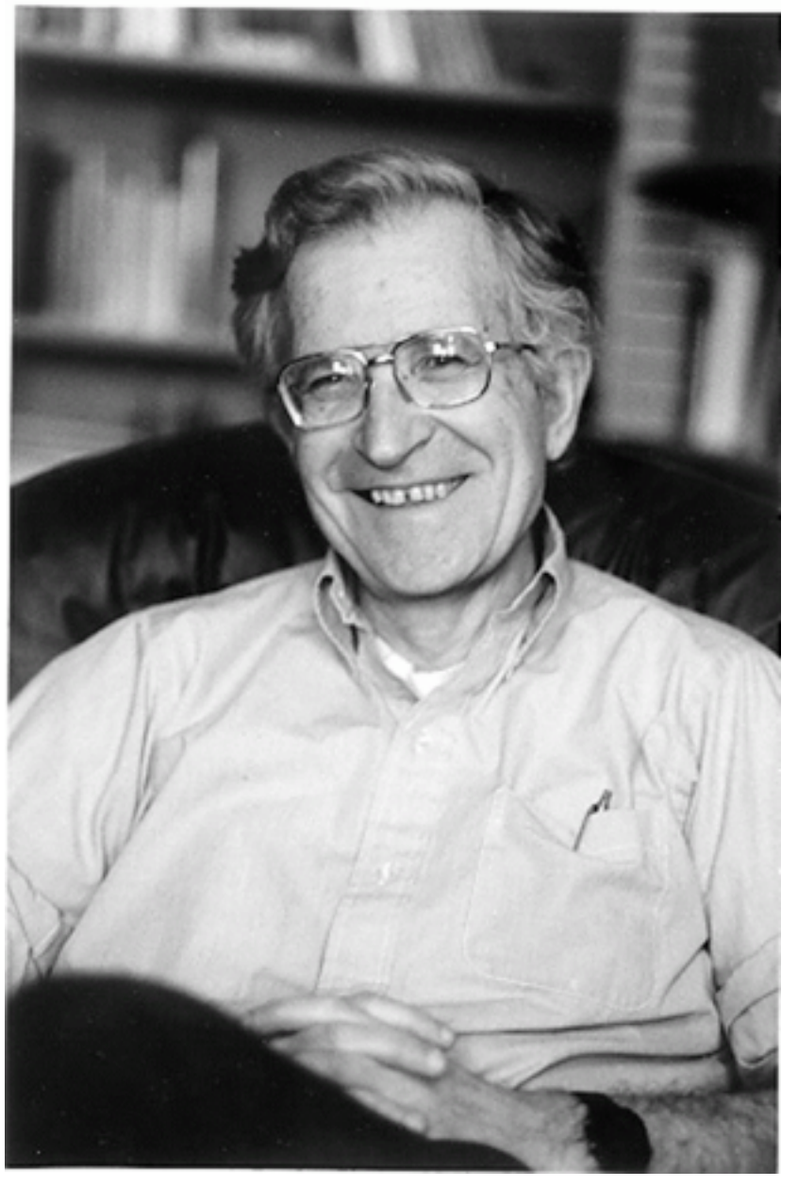
Interrogator: Yet Christmas is a winter's day, and I do not think Mr. Pickwick would mind the comparison.

Witness: I don't think you're serious. By a winter's day one means a typical winter's day, rather than a special one like Christmas.

Noam Chomsky

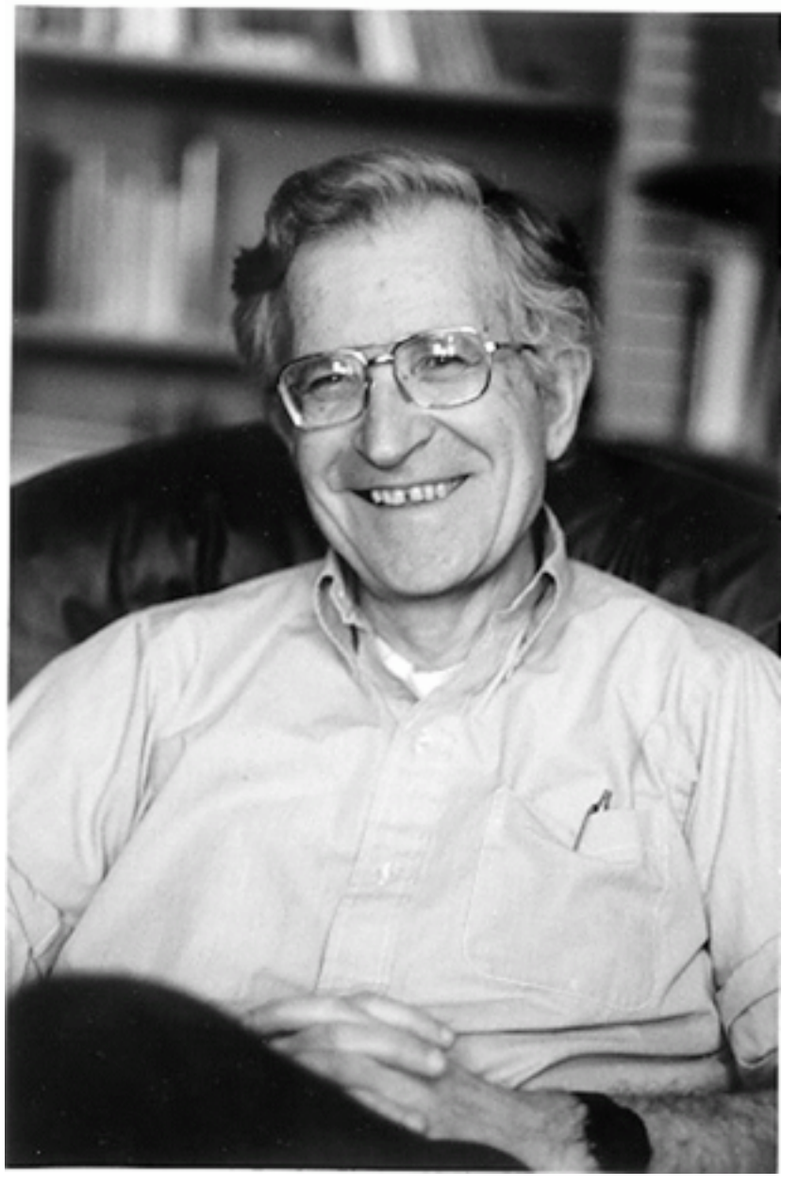


Noam Chomsky



- Polemical anarcho-syndicalist

Noam Chomsky



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- Inventor of several theories of "generative grammar"

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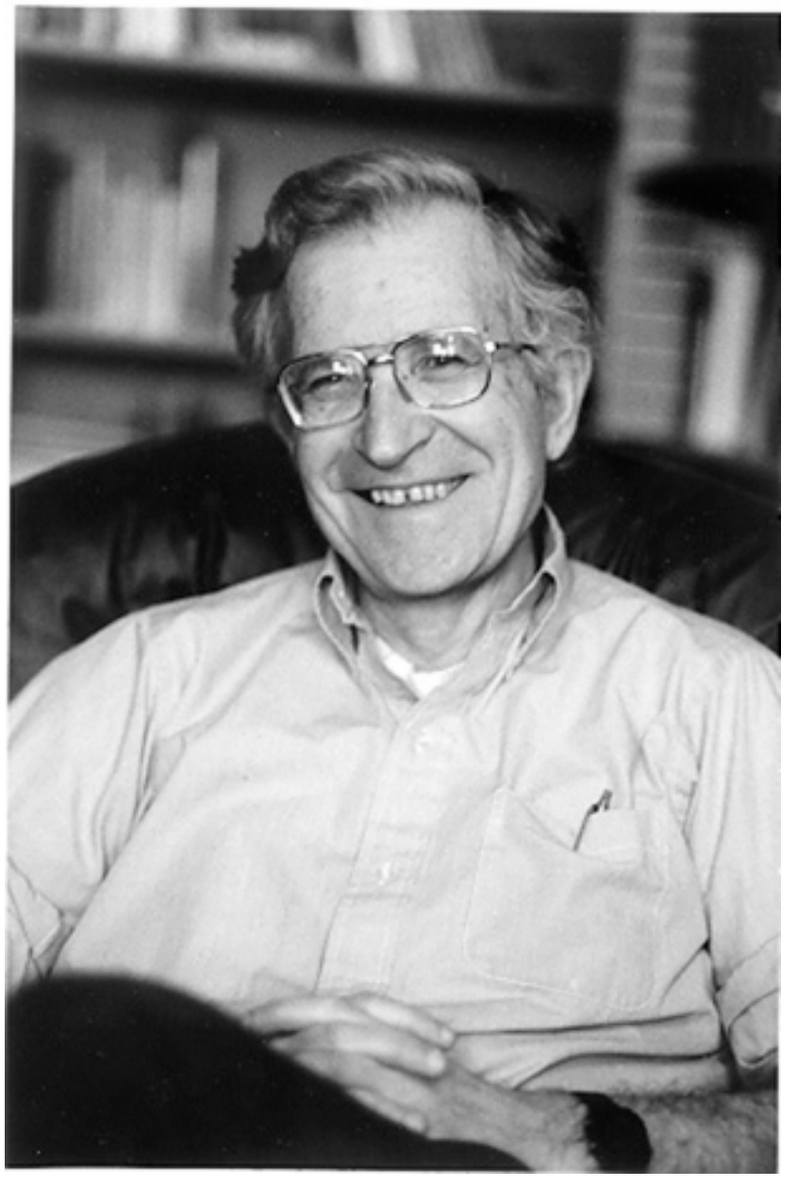


- Polemical anarcho-syndicalist
- Inventor of several theories of "generative grammar"
- Pioneer of formal language theory

Modularity

Linguistic Modules

- Phonetics and phonology
- Morphology
- Syntax
- Semantics
- Pragmatics
- Discourse
- *With lots of crossings between levels!*

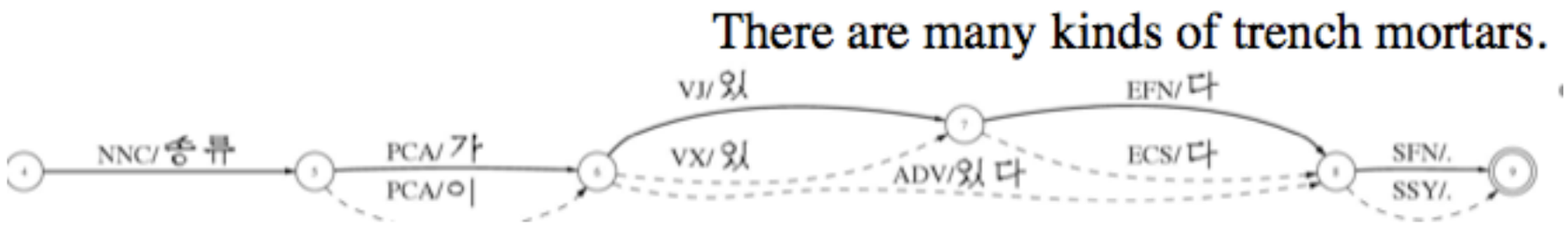
Phonetics and Phonology

- Phonetics: language sounds & their physiology
- Phonology: systems of discrete sounds in languages
  - E.g.: devoicing of *it is* to *it's*
  - E.g.: syllable structure: *sign, signify*

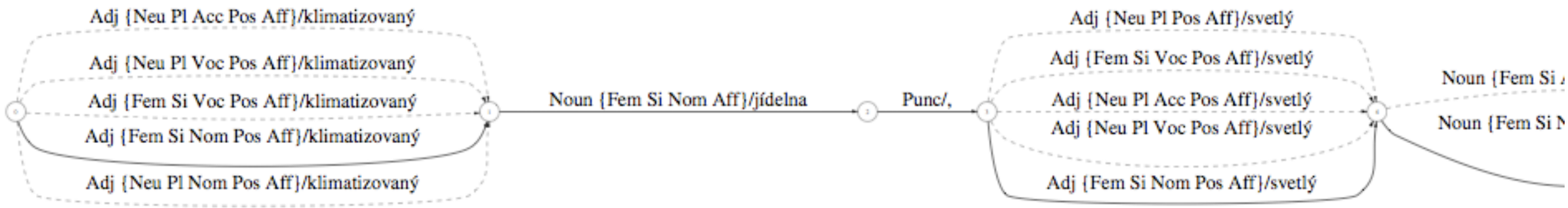
Morphology

- Inflectional (in some languages):
  - *love* →*loved*
- Derivational:
  - *tea-cup, un-helpful, with-stand, craisin*
- Turkish: *uygarlastiramadiklarimizdanmissinizcasina*
  - *uygar las tir ama dik lar imiz dan mis siniz casina*
  - *(behaving) as if you are among those whom we could not civilize*

Morphological Tagging

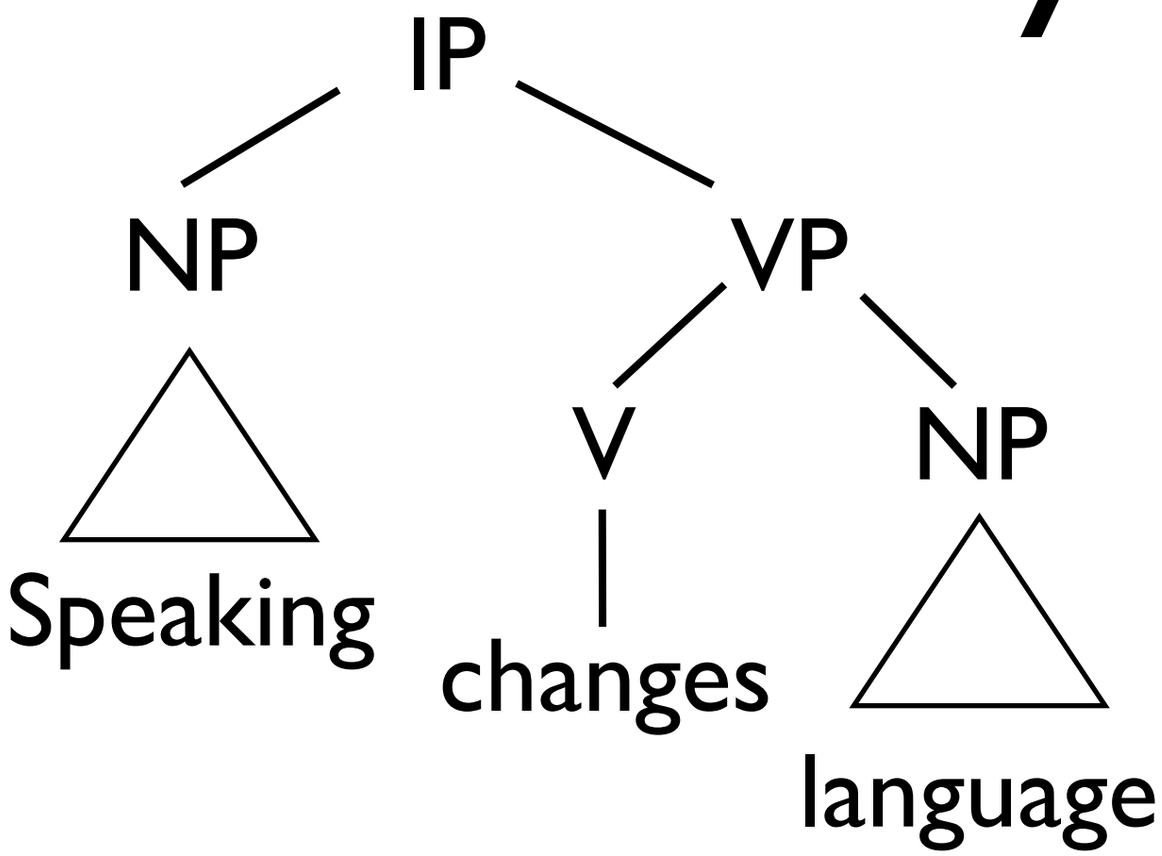


c. Klimatizovaná jídelna, světlá místnost pro snídaně. Air-conditioned dining room,



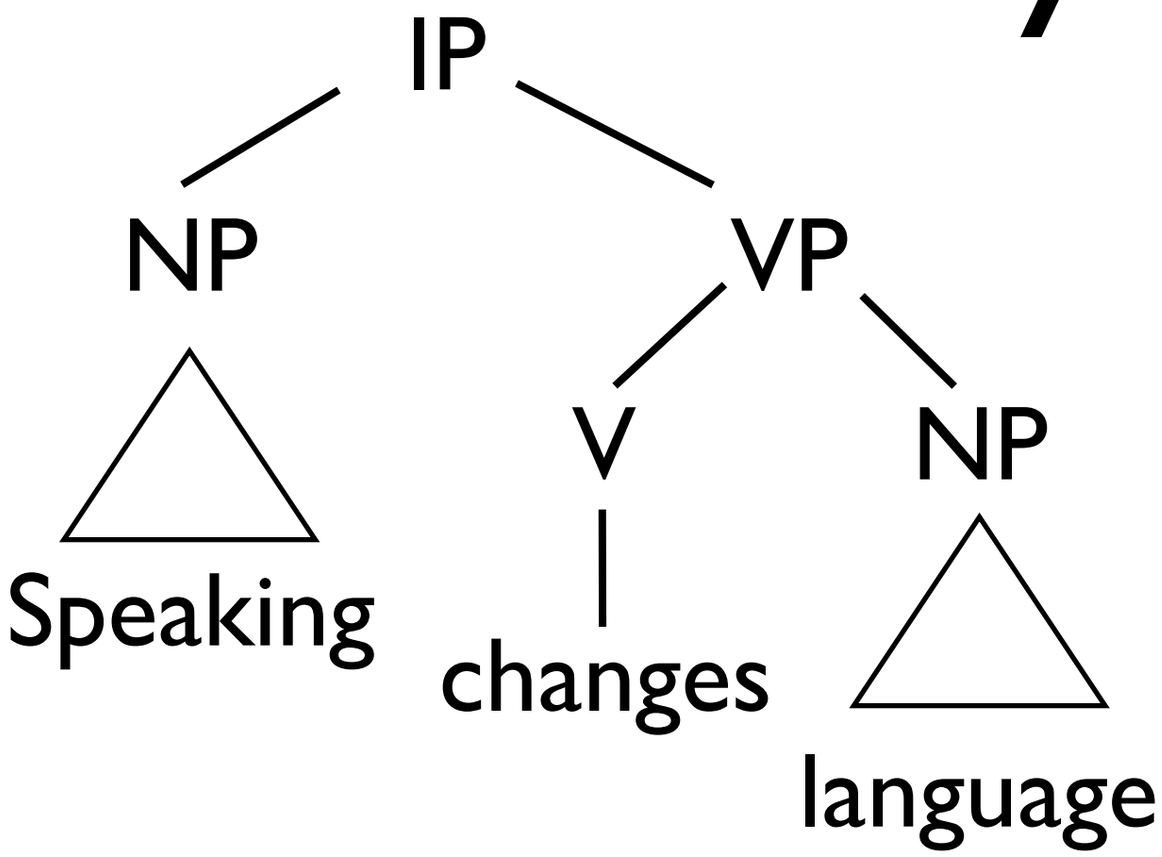
Syntax

Syntax

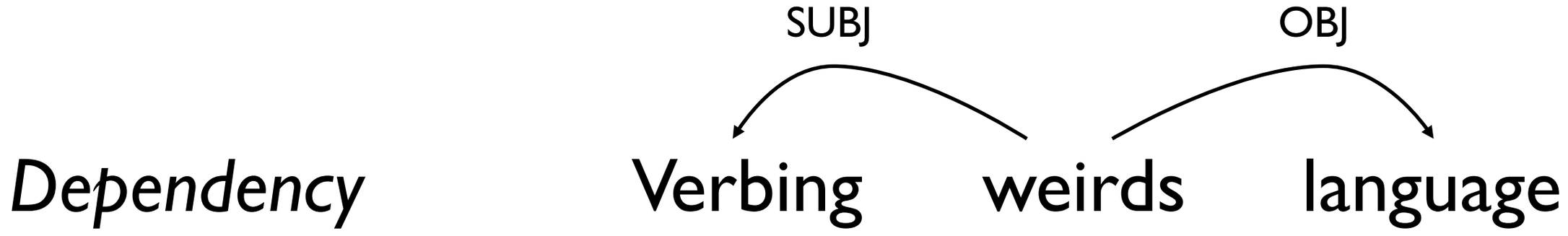


Constituency

Syntax

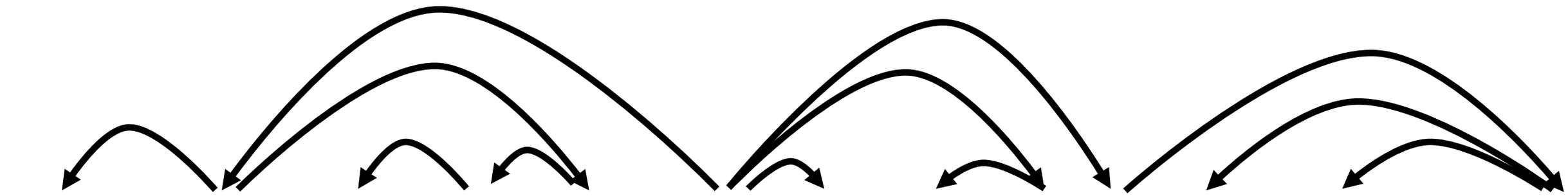


Constituency



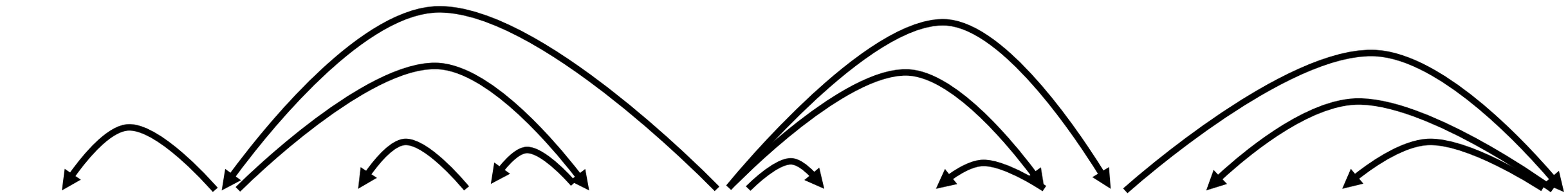
Dependency

Semantics



Pierre Vinken , 61 years old , will join the board as a nonexecutive director

Semantics



Pierre Vinken , 61 years old , will join the board as a nonexecutive director

PropBank **join** predicate

ARG0	ARG1	ARG-PRD
Vinken	board	director

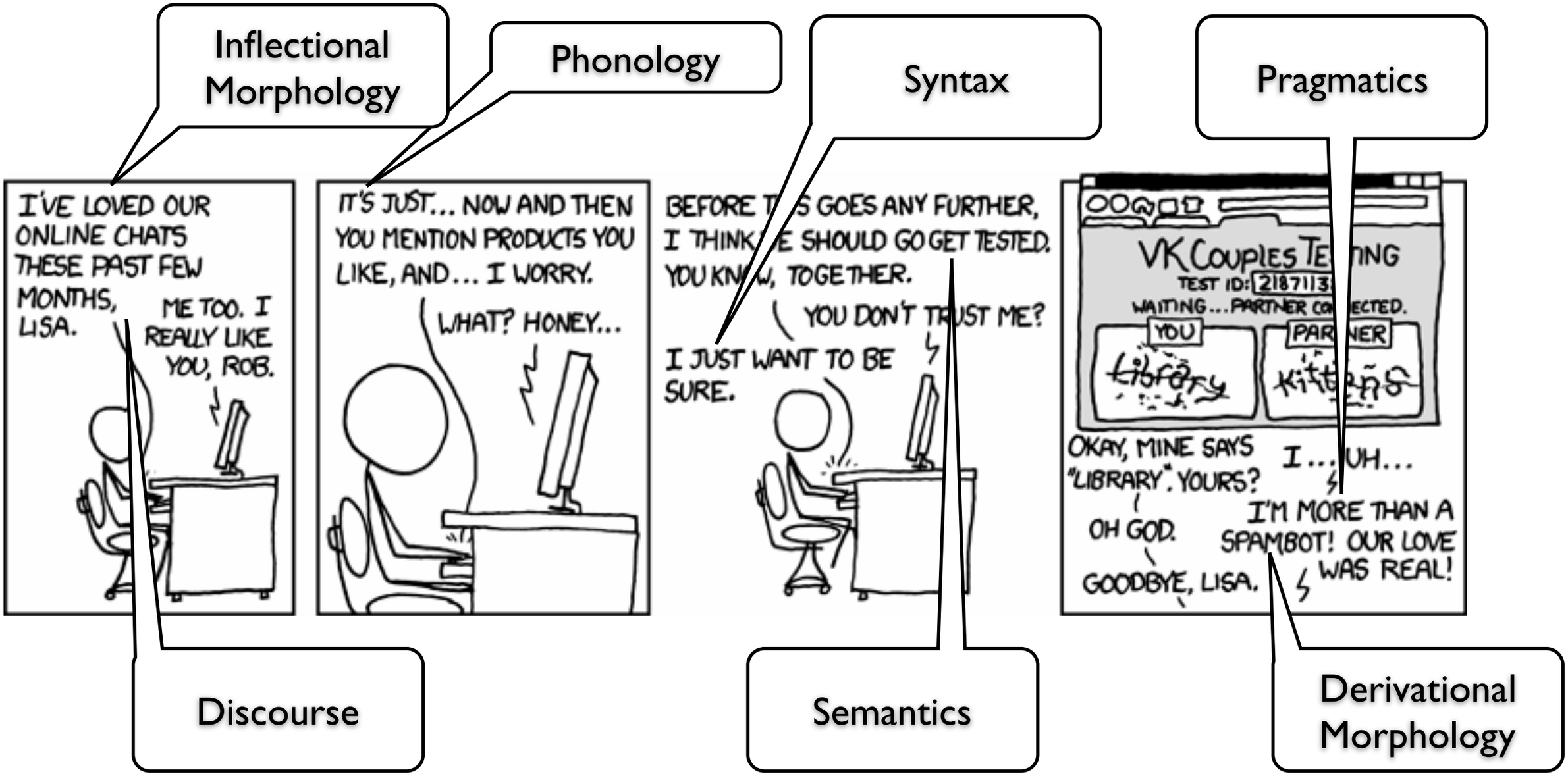
Pragmatics

- Context affects meaning
- Conversational implicature
  - *May I speak to your mother? Yes.*
- Speech acts: "how to do things with words"
  - *I grant you permission to speak.*

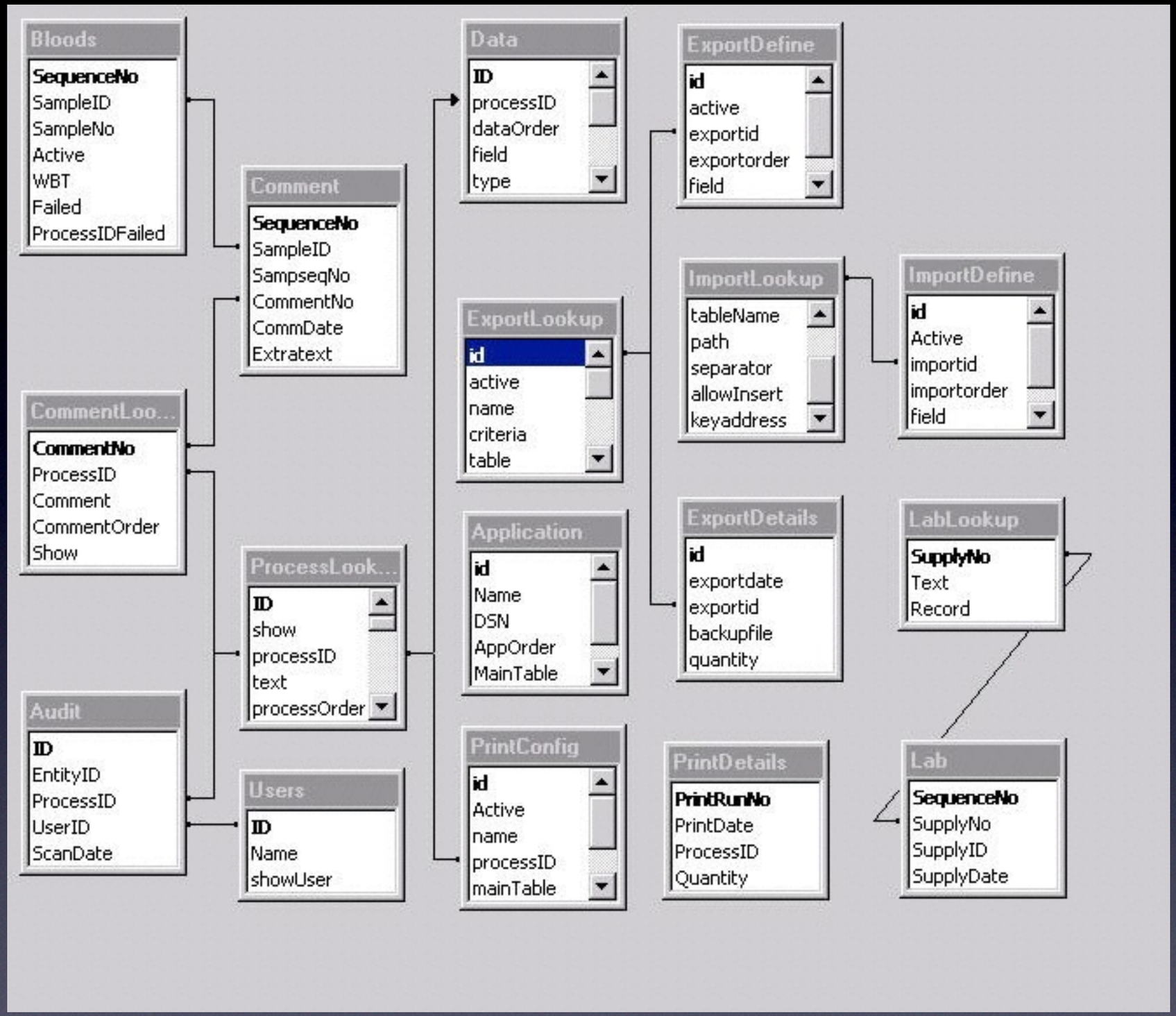
Discourse

- Study of units larger than a single utterance
- Turn taking
- Coreference
- Organized exposition

It All Hangs Together



Applications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SampleID
SampleNo
Active
WBT
Failed
ProcessIDFailed
Comment
SequenceNo
SampleID
SampseqNo
CommentNo
CommDate
Extratext
CommentLoo...
CommentNo
ProcessID
Comment
CommentOrder
Show
ProcessLook...
ID
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processID
text
processOrder
Audit
ID
EntityID
ProcessID
UserID
ScanDate
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DSN
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MainTable
PrintConfig
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exportorder
field
ImportLookup
tableName
path
separator
allowInsert
keyaddress
ImportDefine
id
Active
importid
importorder
field
ExportDetails
id
exportdate
exportid
backupfile
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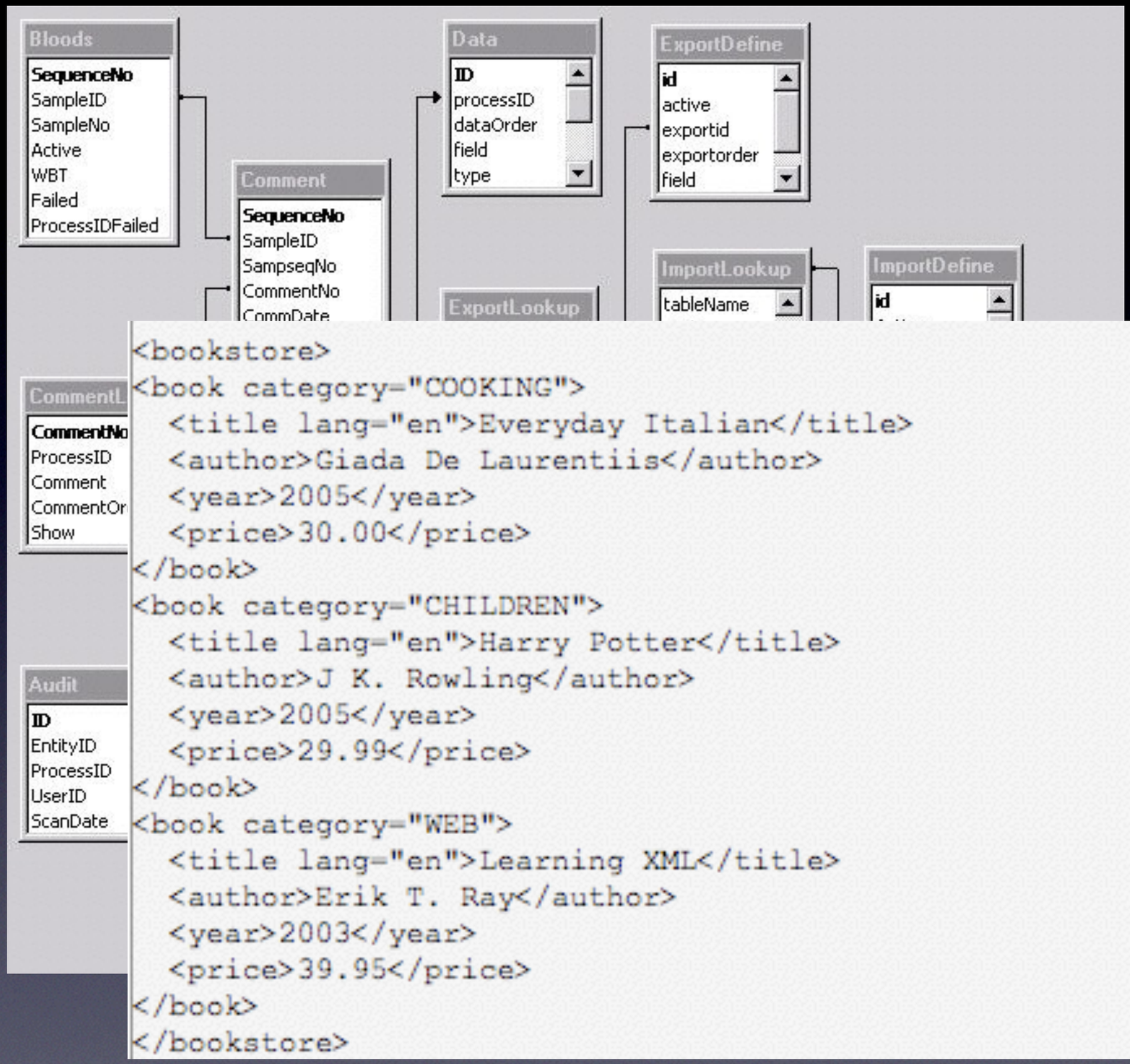


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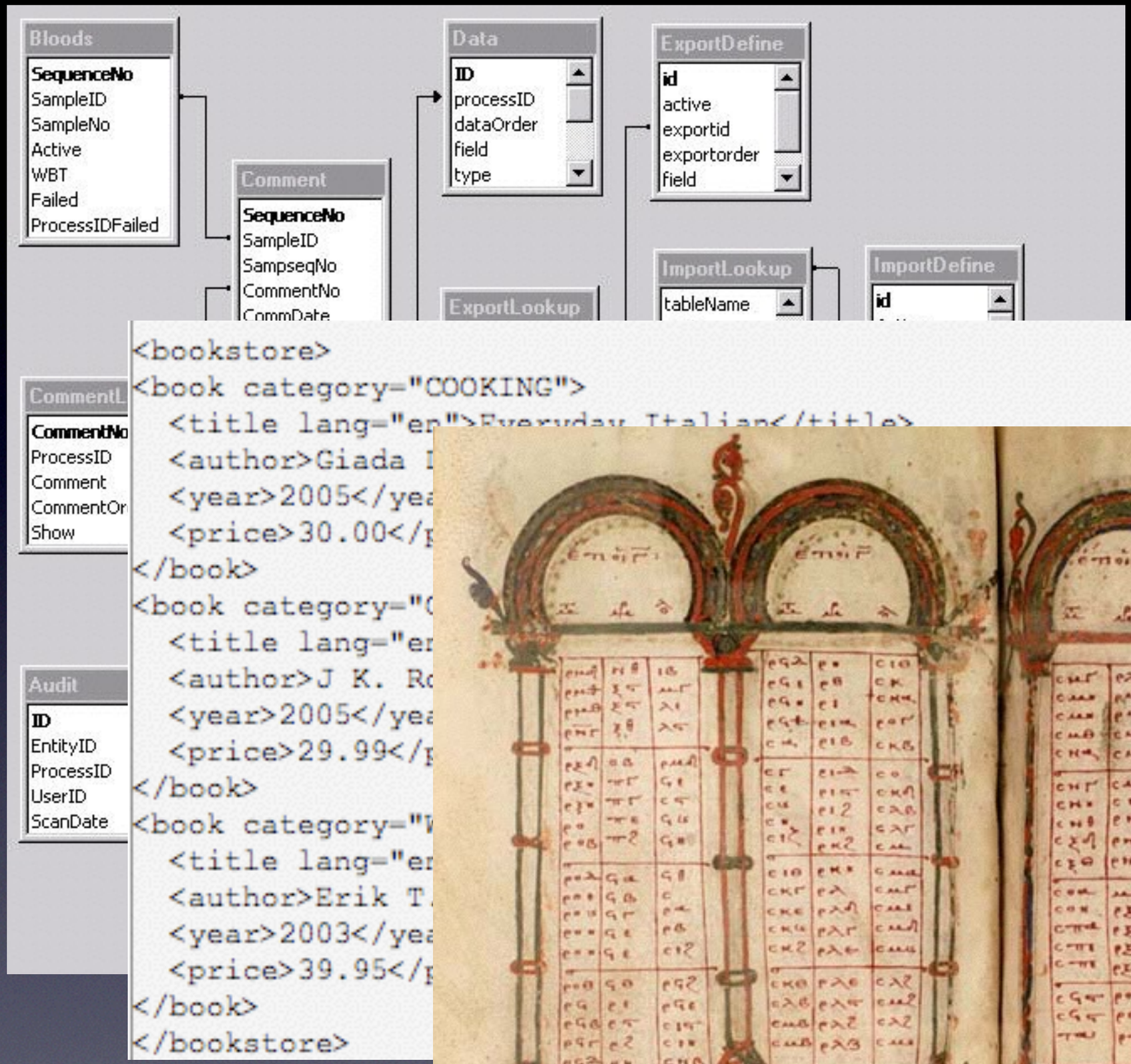
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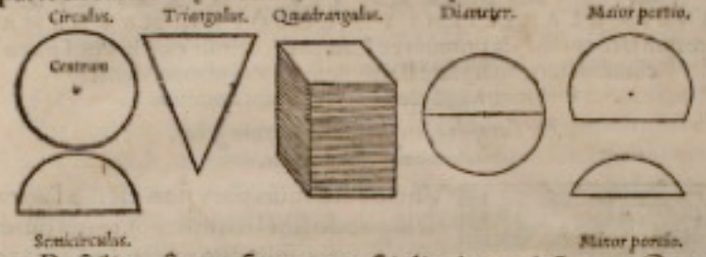
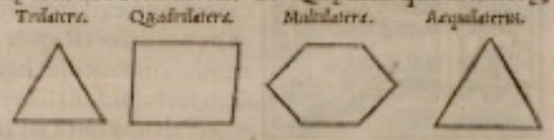
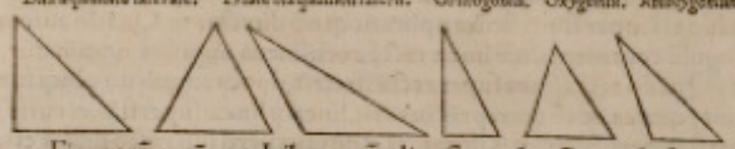
sunt æquales. 16 Et hic quidem punctus, centrum circuli dicitur.

17 Diameter circuli, est linea recta, quę super eius centrū transiens, extremitatesq; suas circūferētię applicās, circulū in duo media diuidit. 18 Semicirculus, est figura plana diametro circuli, & medietate circūferētię contēta. 19 Portio circuli, est figura plana, recta linea & parte circūferentię cōtenta, semicirculo quidē aut maior aut minor.

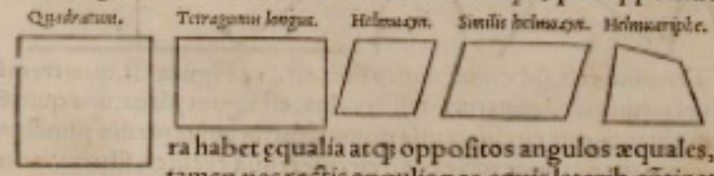


20 Rectilineę figuræ sunt, quę rectis lineis continētur. 21 Quarum quędā trilateræ, quę tribus rectis lineis: 22 Quędam quadrilaterę, q̄ quatuor rectis lineis: 23 Quædā multilateræ, quæ pluribus q̄ quatuor rectis lineis cōtinent. 24 Figurarū trilaterarū, alia est triāgulus, habēs tria latera æqualia: 25 Alia triangulus, duo habēs æqualia latera: 26 Alia triangulus triū inæqualiū laterū. 27 Harū iterū alia est orthogoniū, unū scilicet rectū angulū habēs. 28 Alia est amblygoniū, aliquē obtusum angulū habens. 29 Alia est oxygoniū, in qua tres anguli sunt acuti.



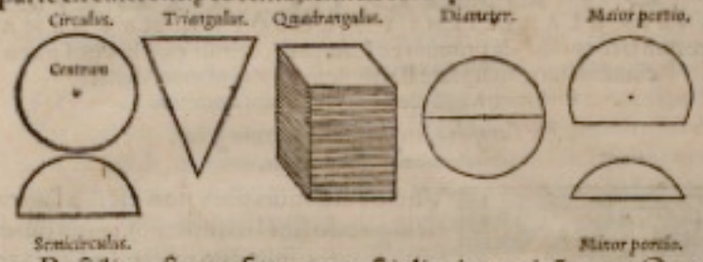


30 Figurarū autē quadrilaterarū, alia est quadratū, quod est æquilaterū rectāgulū: 31 Alia est tetragonus lōgus, quę est figura rectangula, sed æquilatera nō est: 32 Alia est helmuayn, quę est æquilatera, sed rectāgula nō est: 33 Alia est similis helmuayn, quæ opposita latera habet æqualia atq; oppositos angulos æquales, idē tamen nec rectis angulis nec æquis laterib. cōtinetur.

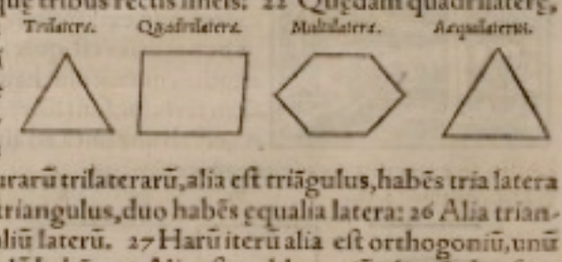


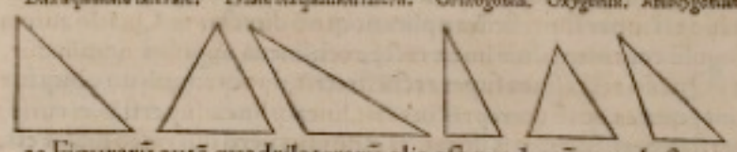
Prate

sunt æquales. 16 Et hic quidem punctus, centrum circuli dicitur.
17 Diameter circuli, est linea recta, quę super eius centrū transiens, extremitatesq; suas circūferētię applicās, circulū in duo media diuidit. 18 Semicirculus, est figura plana diametro circuli, & medietate circūferētię contēta. 19 Portio circuli, est figura plana, recta linea & parte circūferentię cōtenta, semicirculo quidē aut maior aut minor.



20 Rectilineę figuræ sunt, quę rectis lineis continētur. 21 Quarum quędā trilateræ, quę tribus rectis lineis: 22 Quędam quadrilaterę, q̄ quatuor rectis lineis: 23 Quædā multilateræ, quæ pluribus q̄ quatuor rectis lineis cōtinent. 24 Figurarū trilaterarū, alia est triāgulus, habēs tria latera æqualia: 25 Alia triangulus, duo habēs æqualia latera: 26 Alia triangulus triū inæqualiū laterū. 27 Harū iterū alia est orthogoniū, unū scilicet rectū angulū habēs. 28 Alia est amblygoniū, aliquē obtusum angulū habens. 29 Alia est oxygoniū, in qua tres anguli sunt acuti.





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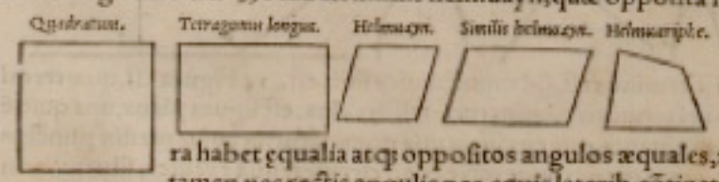

Præte

Baselines	Dependency accuracy [%] German		Spanish	
Modify prev.	18.2		28.5	
Modify next	27.5		21.4	
Training sentences	1k	10k	1k	10k
EM	30.2	30.8	25.6	24.9
Hard proj.	66.2	64.8	59.1	60.1
Hard proj. w/EM	58.6	59.8	53.0	52.8
QG w/EM	**68.5**	**66.9**	**64.8**	**64.8**

Table 2: Unlabeled dependency accuracy for German and Spanish with different training conditions and training set sizes.

sand sentence pairs, each a prefix of the next. Since the target-language-only baseline converged much more slowly, we created a version of the corpora with sentences 15 target-language words or fewer (but still with 1000, 10,000, etc., sentences).

5.2 Unsupervised Learning

to find sentences where enough links were projected to completely determine a target language tree. Of course, we needed to filter more than 1000 sentences of bitext to output 1000 training sentences in this way. With this subset, we can simply perform supervised training. As discussed in §2, these links are still quite noisy. Performance in fact suffers when we add more of this noisy training data. Still, this method is a substantial improvement over the baselines and unsupervised EM.

Instead of finding fully projected trees, we can simply take the one-to-one projected links are given, impute expected counts for the remaining structures with EM, and update our models. This approach ("hard projection with EM"), however, performed worse than using only the fully projected trees. In fact, only the first iteration of EM with this method made any improvement. Afterwards, EM degraded accuracy further from the numbers in table 2.

5.4 QG Projection

Delete all spam messages now (messages that have been in Spam more than 30 days will be automatically deleted)

Roland R. Duncan	**Show your love to your special people!** - EMAIL ID: ReJjr
=?UNKNOWN?B??= j	**[JHSPAM-ALERT-IP] Piranesi 4 =?UNKNOWN?B?s8y3c6qpLW03Tw==?=** - zT381OoDMFP3 Adobe Pr
Doctor Jeanne Holt	**[JHSPAM-ALERT-IP] Something interesting for you** - XMAILOE %XMIMEOE You can make your girl-frie
peggy.ruby	**[JHSPAM-ALERT-IP]**
Janie Adkins	**[JHSPAM-ALERT-IP] Ficken wie ein Weltmeister ?** - Meinung von unserem Kunden: Ich glaube, ich hab
Cary Phelps	**No Hassle Business Loans** - If you have your own business and need IMMEDIATE money to spend ANY \
Elias Moran	**[JHSPAM-ALERT-IP] Loans - Small Business** - If you have your own business and require IMMEDIATE (
Dr John Avery	**[JHSPAM-ALERT-IP] Something interesting for you** - XMAILOE %XMIMEOE X-Antivirus: avast! (VPS 08
Roland Reid	**Business Loans** - If you have your own business and need IMMEDIATE ready money to spend ANY way y
Doctor Max Stokes	**[JHSPAM-ALERT-IP] It's important for you** - XMAILOE %XMIMEOE Make your lady-love contented! You
¶W±j¦r«¬ µØ±d¤Ñ°Ð¤»¦X¤@».	**[JHSPAM-ALERT-IP] =?UNKNOWN?B?qr6mV6q6qL6scrNuxektUnFU?=** - oOUQs3Xk Adobe After Effe

article | discussion | edit this page | history

Parsing

From Wikipedia, the free encyclopedia

For the computer programming language, see Parser (CGI language).

In computer science and linguistics, **parsing** (more formally: *syntactic analysis*) respect to a given formal grammar. A **parser** is the component of a compiler tha

Parsing transforms input text into a data structure, usually a tree, which is suitab creates tokens from a sequence of input characters and it is these tokens that a

Parsing is also an earlier term for the diagramming of sentences of natural lang languages or Latin.

Parser generators are tools that can automatically generate a parser (in some p compiler compiler).

Parsers can also be constructed as executable specifications of grammars in fu others to construct a set of higher-order functions (called parser combinators) w executable specifications of ambiguous grammars containing left-recursive pro

Contents [hide]

1 Human languages

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interaction
- About Wikipedia
- Community portal
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dreamyshade : linguistics professor mentions "caps lock is cruise control for cool" and i gigg uncontrollably while everybody else is like "huh?" << (2008-01-28 19:51:54)

djlibaman : @empoor Well, I'm looking for a uni that specialises in both media and linguistics << (2008-01-28 11:49:53)

andypowe11 : Note: e-learning symposium from the Subject Centre for Languages, Linguisti and Area Studies now being streamed live - http://tinyurl. ... << (2008-01-25 05:44:26)

etoile : is it wrong that I find my linguistics teacher to be lookin' kinda hot today? << (2008-01-24 15:08:08)

makimoto : いかん。 CLちゃんが頭から離れない。いったいどんなんだろう? (勿論、CL とは Computational Linguistics の略です) << (2008-01-24 08:40:54)

dreamyshade : in class today, my linguistics professor discussed lolcats which are watching you fap << (2008-01-23 21:00:09)

evantheus : Preparing for another crop of Baby linguinis... THIS. IS. LINGUISTICS. I mean... THIS. IS. SPARTAAAAAAAAAAA. (don't beat me teacher) << (2008-01-23 11:40:09)

laurak : @FrF_Kmeron - Did I also forget to mention that I was a Linguistics major in college

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الادعاء يطلب أقصى عقوبة لثلاثة متهمين بالتخطيط لاغتيال بوش

عمان الحياة - 07/02/08//

طالب مدعي عام محكمة أمن الدولة الأردنية بتوقيع أقصى عقوبة ممكنة على ثلاثة متهمين بالتخطيط لاغتيال الرئيس الأميركي جورج بوش أثناء زيارته عمان في تشرين الثاني (نوفمبر) 2006، بعدما وجه إليهم اتهامات بينها «القيام بأعمال إرهابية، واستخدام مواد ملتهبة، وحمل وحيازة أسلحة اتوماتيكية ومفرقعات من دون ترخيص بقصد استعمالها على وجه غير مشروع».

وتلا رئيس المحكمة تقريراً طبياً صادراً عن لجنة قيمت الوضع العقلي للمتهم صطام الزواهرة الذي طلب محاميه إحالته على لجنة لمعرفة مدى إدراكه لطبيعة أفعاله وإمكان مثوله أمام المحكمة. وأثبت التقرير أن «المتهم مدرك لأفعاله وأقواله». وطلب وكيل الدفاع المحامي عبدالكريم الشريدة من المحكمة إمهاله

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الادعاء يطلب أقصى عقوبة لثلاثة متهمين بالتخطيط لاغتيال بوش

عمان الحياة - 07/02/08//

ENGLISH

ابحث

دار الحياة

على ثلاثة متهمين بالتخطيط لاغتيال
نمبر) 2006، بعدما وجه إليهم
وحيازة أسلحة اتوماتيكية ومفرقعات

للمتهم صطام الزواهرة الذي طلب
ه أمام المحكمة. وأثبت التقرير أن
م الشريدة من المحكمة إمهاله

Prosecution requests the maximum penalty for the three accused of planning to assassinate Bush

Oman life - 07/02/08 / /

Asked prosecutor in the state security court of Jordan signed the maximum possible sentence to three accused of planning to assassinate President George Bush during his visit to Amman in November (November) 2006, after it drew them was charged with «terrorist acts, the use of flammable materials, and carrying and possessing automatic weapons and explosives without a licence in order to use illegal ».

The President of the Court read out a medical report issued by the Commission assessed the mental status of the accused Azwahrh Stam, who asked his lawyer referred to a committee to determine the extent aware of the nature of his acts and the possibility of his appearance before the court. The report proved that «the accused was aware of his actions and sayings». Asked assistant defense lawyer `court delayed by the court to

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الادعاء يطلب أقصى عقوبة لثلاثة متهمين بالتخطيط لاغتيال بوش

عمان الحياة - 07/02/08//

ابحث

ENGLISH

دار الحياة

على ثلاثة متهمين بالتخطيط لاغتيال
نمبر) 2006، بعدما وجه اليهم

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Web Results **1** - **10** of about **2,790,000** for **machine translation** [definition]. (**0.15** seconds)

Machine translation - Wikipedia, the free encyclopedia
Machine translation, sometimes referred to by the acronym **MT**, is a sub-field of computational linguistics that investigates the use of computer software to ...
en.wikipedia.org/wiki/**Machine_translation** - 56k - Cached - Similar pages - Note this

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Free Online Language **Translation**. Translates from English, Chinese Simplified, Chinese Traditional, Dutch, French, German, Greek, Italian, Japanese, Korean, ...
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Translation Software
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Translation

Translation

Er wird in den Strassen wandern

Translation

Er wird in den Strassen wandern

He will in the streets walk

Translation

Er wird in den Strassen wandern

He will in the streets walk

He will walk in the streets

Translation

Er wird in den Strassen wandern

He will in the streets walk

He will walk in the streets

Er wird in den **kleinen** Strassen wandern

Translation

Er wird in den Strassen wandern

He will in the streets walk

He will walk in the streets

Er wird in den **kleinen** Strassen wandern

He will in the small streets walk

Translation

Er wird in den Strassen wandern

He will in the streets walk

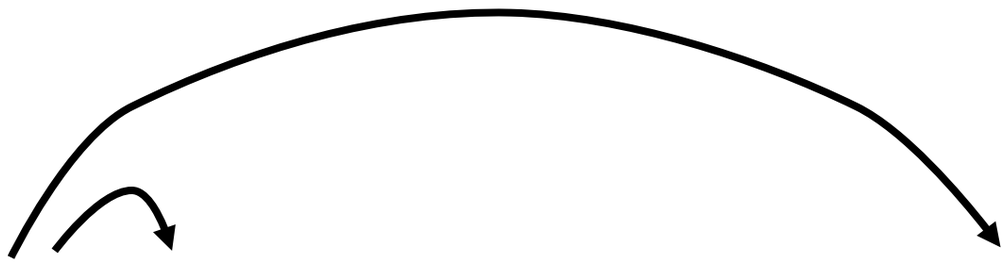
He will walk in the streets

Er wird in den **kleinen** Strassen wandern

He will in the small streets walk

He is in the small streets hike

Translation

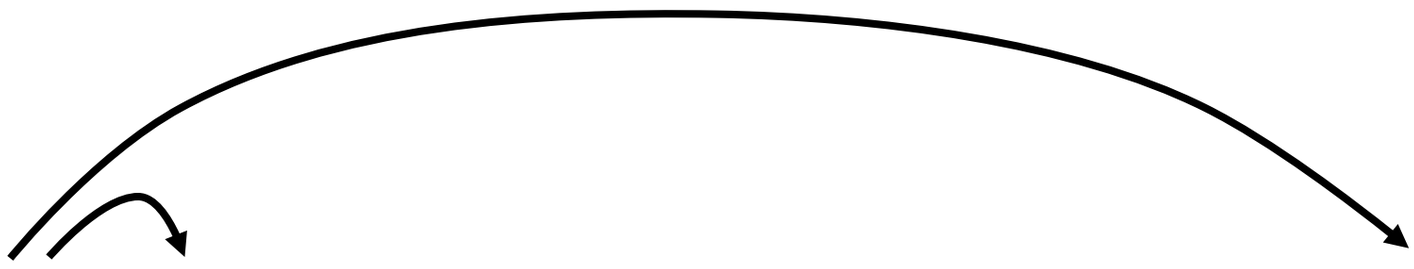


Er wird in den Strassen wandern

He will in the streets walk

Google Translate BETA

He will walk in the streets



Er wird in den **kleinen** Strassen wandern

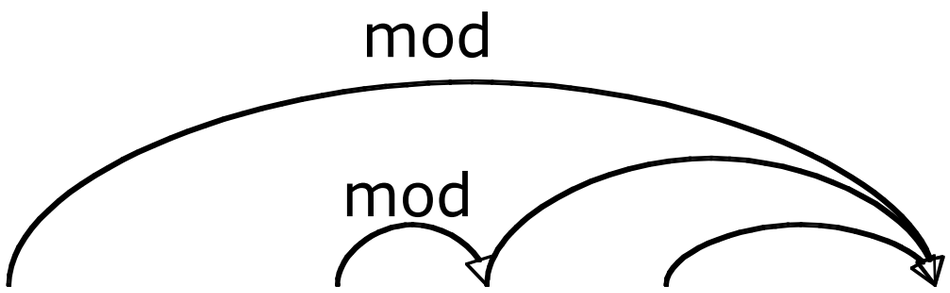
He will in the small streets walk

Google Translate BETA

He is in the small streets hike

Question Answering

Question Answering



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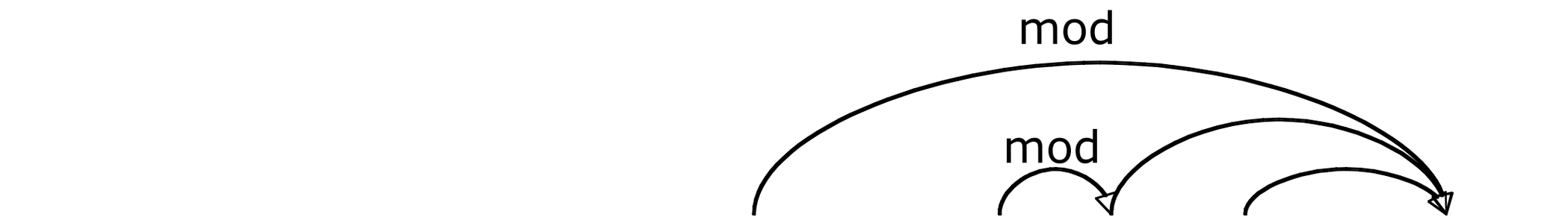
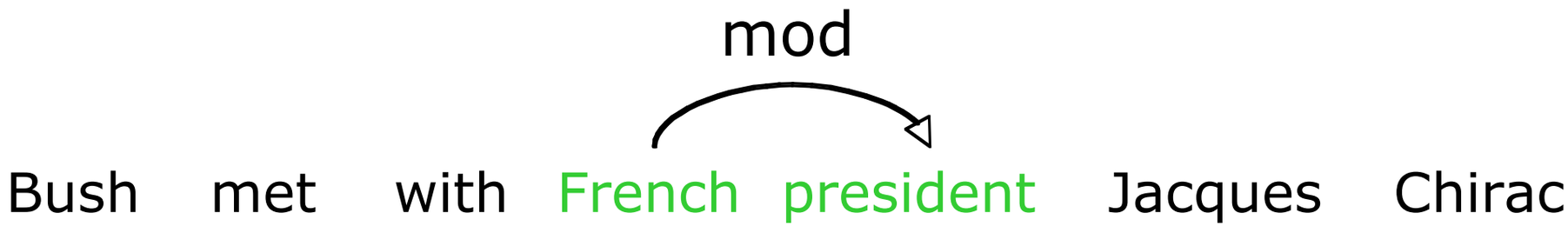




Multilingual "Topics" European Parliament Corpus

DA børn familie udnyttelse børns børnene seksuel
DE kinder kindern familie ausbeutung familien eltern
EL παιδιά παιδιών οικογένεια οικογένειας γονείς παιδικής
EN **children family child sexual families exploitation**
ES niños familia hijos sexual infantil menores
FI lasten lapsia lapset perheen lapsen lapsiin
FR enfants famille enfant parents exploitation familles
IT bambini famiglia figli minori sessuale sfruttamento
NL kinderen kind gezin seksuele ouders familie
PT crianças família filhos sexual criança infantil
SV barn barnen familjen sexuellt familj utnyttjande

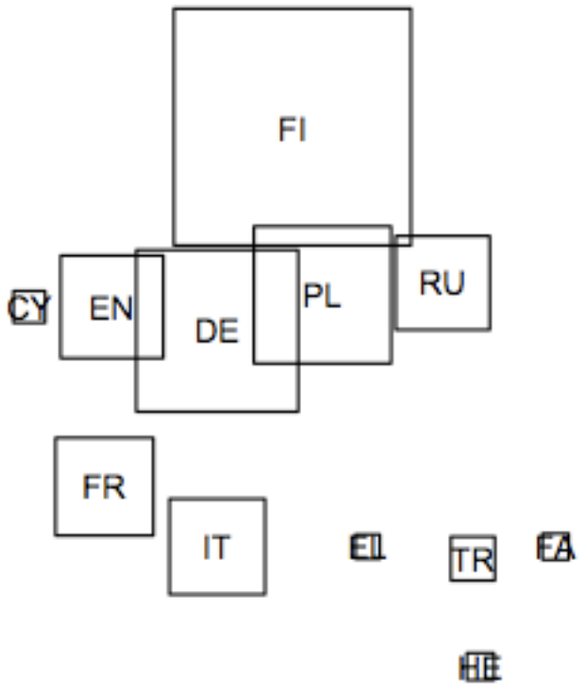
DA mål nå målsætninger målet målsætning opnå
DE ziel ziele erreichen zielen erreicht zielsetzungen
EL στόχους στόχο στόχος στόχων στόχοι επίτευξη
EN **objective objectives achieve aim ambitious set**
ES objetivo objetivos alcanzar conseguir lograr estos
FI tavoite tavoitteet tavoitteena tavoitteiden tavoitteita tavoitteen
FR objectif objectifs atteindre but cet ambitieux
IT obiettivo obiettivi raggiungere degli scopo quello
NL doelstellingen doel doelstelling bereiken bereikt doelen
PT objectivo objectivos alcançar atingir ambicioso conseguir
SV mål målet uppnå målen målsättningar målsättning

DA andre anden side ene andet øvrige
DE anderen andere einen wie andererseits anderer
EL άλλες άλλα άλλη άλλων άλλους όπως
EN **other one hand others another there**
ES otros otras otro otra parte demás
FI muiden toisaalta muita muut muihin muun
FR autres autre part côté ailleurs même
IT altri altre altro altra dall parte
NL andere anderzijds anderen ander als kant
PT outros outras outro lado outra noutros
SV andra sidan å annat ena annan

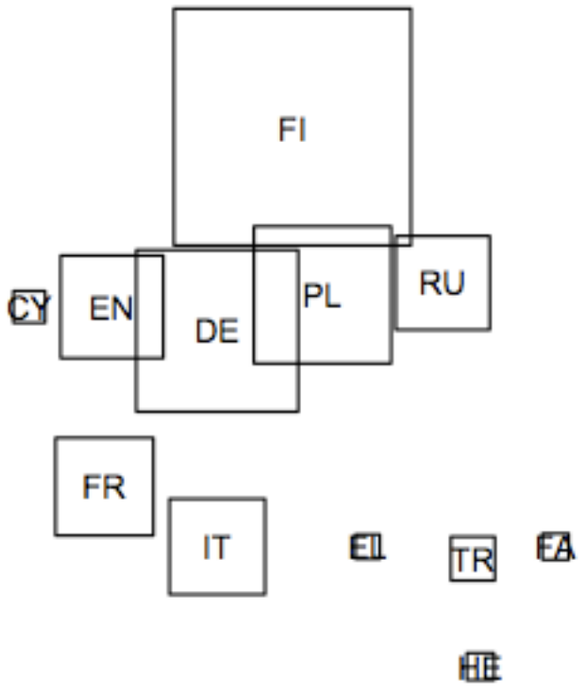
Multilingual "Topics" Wikipedia comparable articles

CY	sbaen madrid el la josé sbaeneg
DE	de spanischer spanischen spanien madrid la
EL	ισπανίας ισπανία de ισπανός ντε μαδρίτη
EN	**de spanish spain la madrid y**
FA	ترین de اسپانیا اسپانیایی کوبا مادرید
FI	espanja de espanjan madrid la real
FR	espagnol espagne madrid espagnole juan y
HE	ספרד ספרדית דה מדריד הספרדית קובה
IT	de spagna spagnolo spagnola madrid el
PL	de hiszpański hiszpanii la juan y
RU	де мадрид испании испания испанский de
TR	ispanya ispanyol madrid la küba real

CY	bardd gerddi iaith beirdd fardd gymraeg
DE	dichter schriftsteller literatur gedichte gedicht werk
EL	ποιητής ποίηση ποιητή έργο ποιητές ποιήματα
EN	**poet poetry literature literary poems poem**
FA	شاعر شعر ادبیات فارسی ادبی آثار
FI	runoilija kirjailija kirjallisuuden kirjoitti runo julkaisi
FR	poète écrivain littérature poésie littéraire ses
HE	משורר ספרות שירה סופר שירים המשורר
IT	poeta letteratura poesia opere versi poema
PL	poeta literatury poezji pisarz in jego
RU	поэт его писатель литературы поэзии драматург
TR	şair edebiyat şiir yazar edebiyatı adlı



world ski km won



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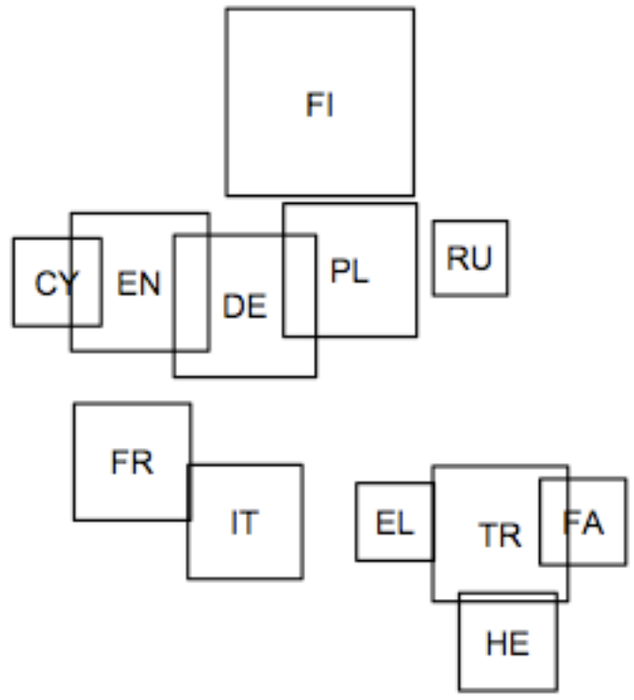
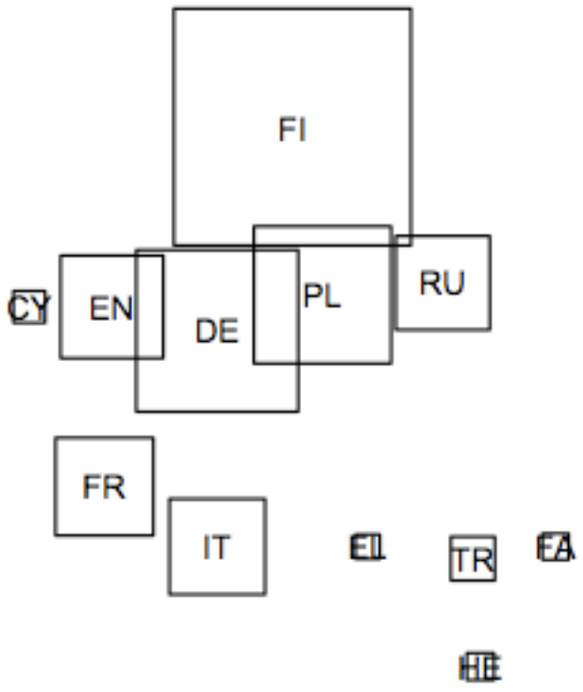


actor role television actress



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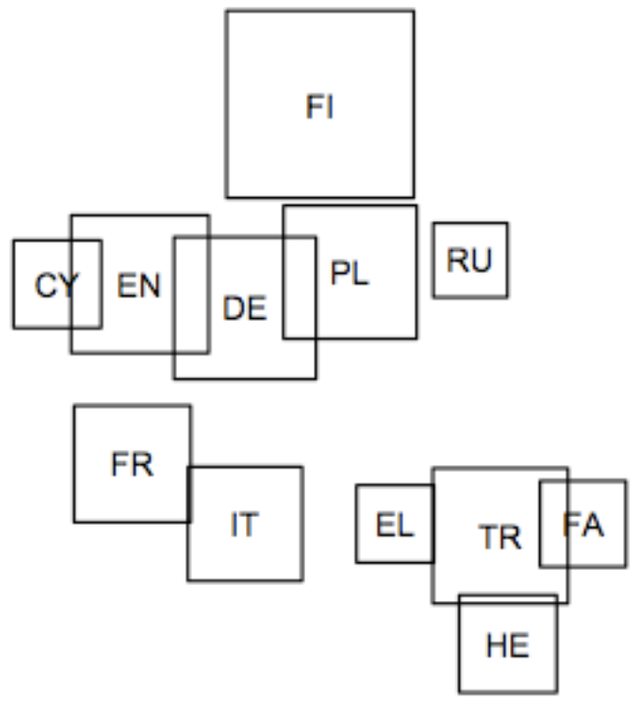
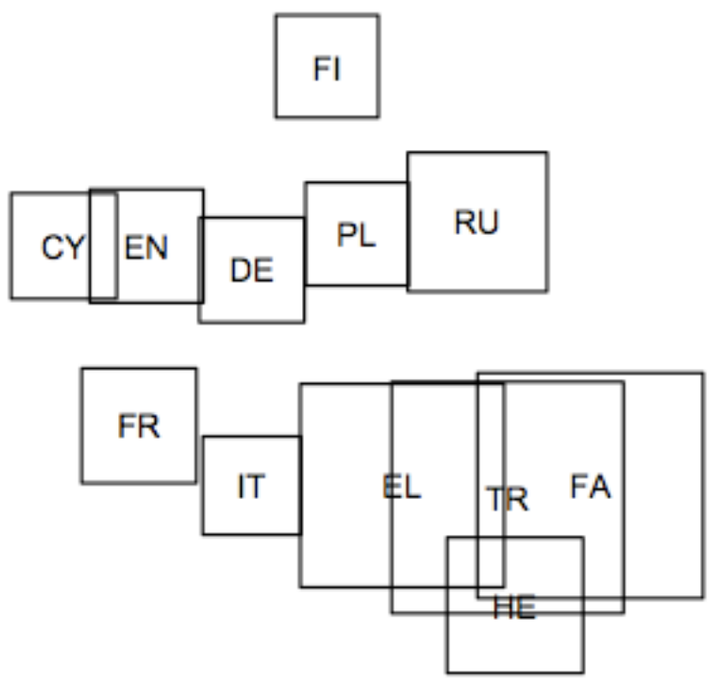
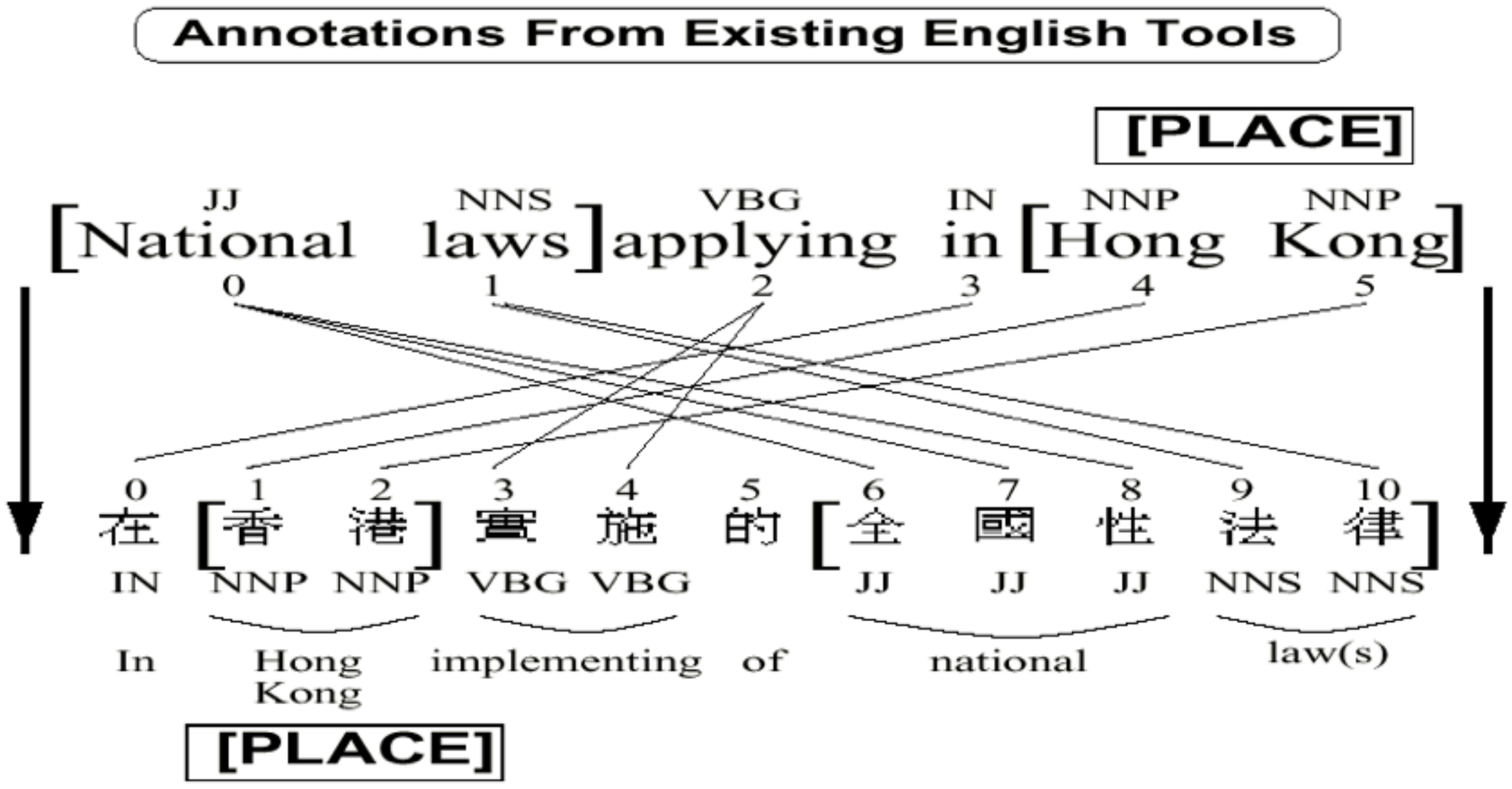


actor role television actress



ottoman empire khan byzantine

Projecting Hidden Structure



NLP Tasks

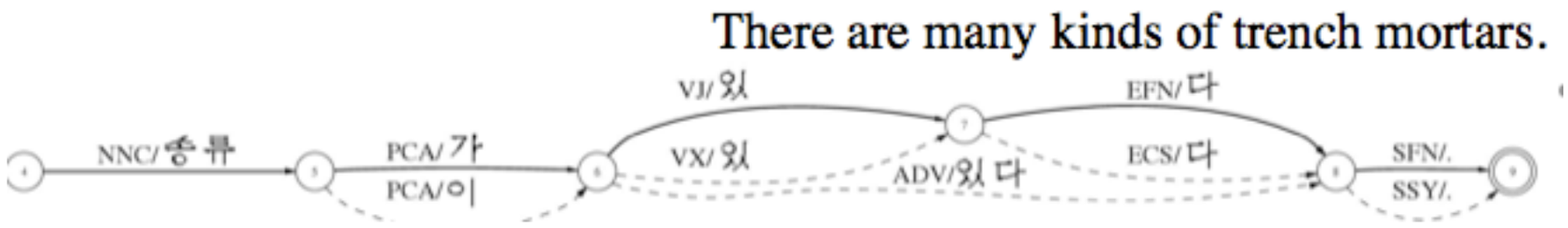
- Analog to digital
  - OCR, Speech Recognition
- Individual language modules
  - Morphology, Syntax, Semantics, and Discourse
- Language to data
  - Information extraction and retrieval
- Language to language
  - Translation, summarization, dialogue systems

Monolingual & Multilingual

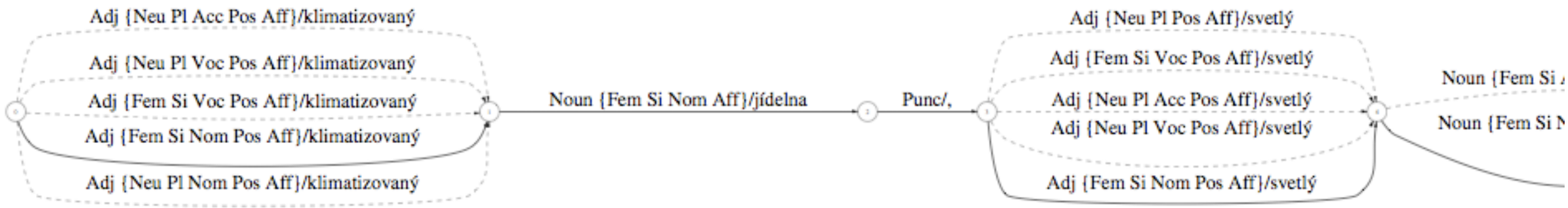
- Analysis technologies for languages
  - Morphology, syntax, semantics
- Translation technologies
  - Dictionaries, cross-lingual IR, MT
- Multilingual exploratory data analysis
  - Clustering, classification→model building

A Few Problems

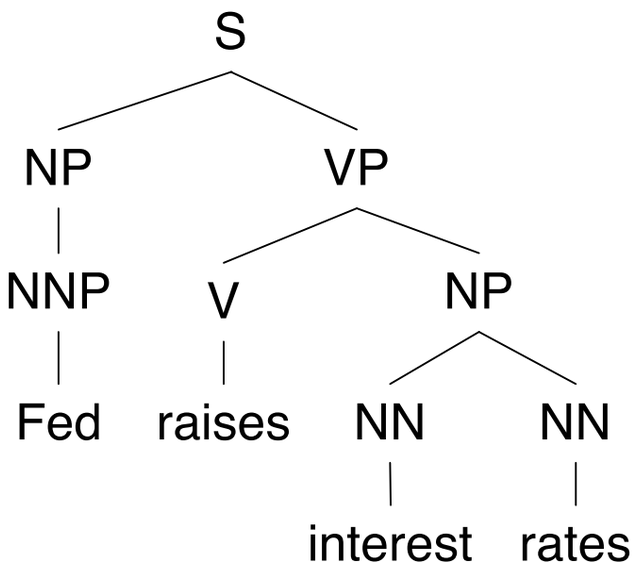
Morphological Ambiguity

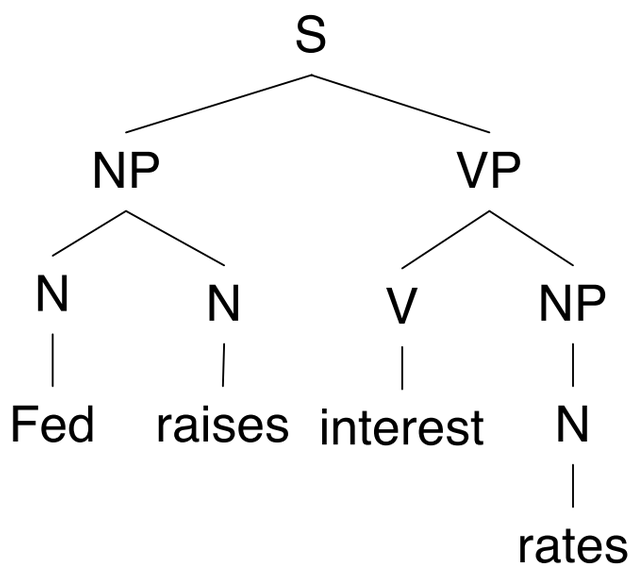


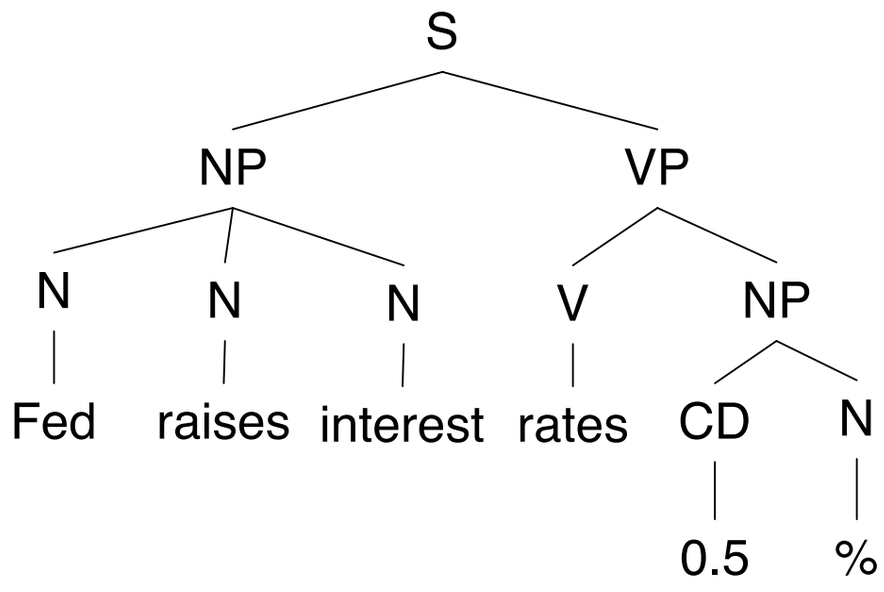
c. Klimatizovaná jídelna, světlá místnost pro snídaně. Air-conditioned dining room,



Syntactic Ambiguity







More Ambiguity

- Iraqi Head Seeks Arms
- Juvenile Court to Try Shooting Defendant
- Teacher Strikes Idle Kids
- Stolen Painting Found by Tree
- Kids Make Nutritious Snacks
- Local HS Dropouts Cut in Half
- British Left Waffles on Falkland Islands
- Red Tape Holds Up New Bridges
- Clinton Wins on Budget, but More Lies Ahead
- Ban on Nude Dancing on Governor's Desk

Why is NLP Hard?

- The rules are ambiguous
- We don't know the rules
- We need to combine lots of weak evidence
- It's *AI complete*
- Language is nearly co-extensive with humanity
- To the rescue: probability, machine learning

Why is NLP in CS?

- How about...
  - Linguistics
  - Statistics
  - Psychology and Cognitive Science
  - The Lang/Lit Humanities
- All of the above!
  - Focus on algorithms, data analysis, engineering

What You'll Learn in NLP

- Looking at data
  - Phenomena and problems
- Modeling data
  - Linguistic and statistical tools
- Algorithms and implementation
  - Efficient computation, practical systems

No Really, What'll I Learn?

- Models of language
  - n-grams, grammars, generative, discriminative
- Algorithms to tame complexity
  - Finite-state models and regular expressions
  - Context-free grammars and parsers
- Problem solving: classification, structured prediction, generation

Who – Where – When

- Instructor: David Smith
  - dasmith@ccs.neu.edu
  - WVH 356, W 3-5 or by appointment
- TA: Maryam Aziz
  - azizm@ccs.neu.edu
  - WVH 472, TBA
- Wednesdays 6-9, Hayden 424
- www.ccs.neu.edu/course/6120sp16

What

- Upper undergrad & grad course in NLP
  - Learning to *read papers* in NLP
- Discussion and participation (20%)
- Homework assignments (4 for 30%)
- Literature review (50%)
  - Synthesis of a research area covered by 5 or 10 papers
  - Implementation/replication of a paper

More on Grading

- All code and written words must be your own
  - **OK**: Discussing problems with others, as long as you acknowledge it
  - **Not OK**: Copying other text or homework divide-and-conquer

What

- Lectures introduce algorithms, models, learning methods
- Background reading in two books:
  - *Speech and Language Processing*. Jurafsky & Martin
  - *Linguistic Structure Prediction*. Noah Smith (no relation, but sometime coauthor)

Thanks