



Discovering new patterns and knowledge from data

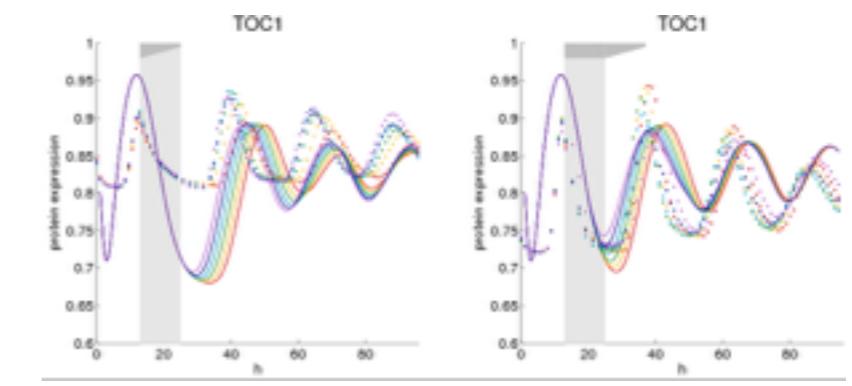
Four year PhD programme

Courses + PhD dissertation

(No previous MSc required)

- Machine learning
- Databases
- Algorithms and systems
- Statistics and optimization

- Big data
- Natural language processing
- Computer vision
- Speech processing



Machine Translation

<http://www.inf.ed.ac.uk/teaching/courses/mt/>

Teaching team:

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Currey



Soňa
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Gilroy

Jonathan
Mallinson

Ida
Szubert

Clara
Vania

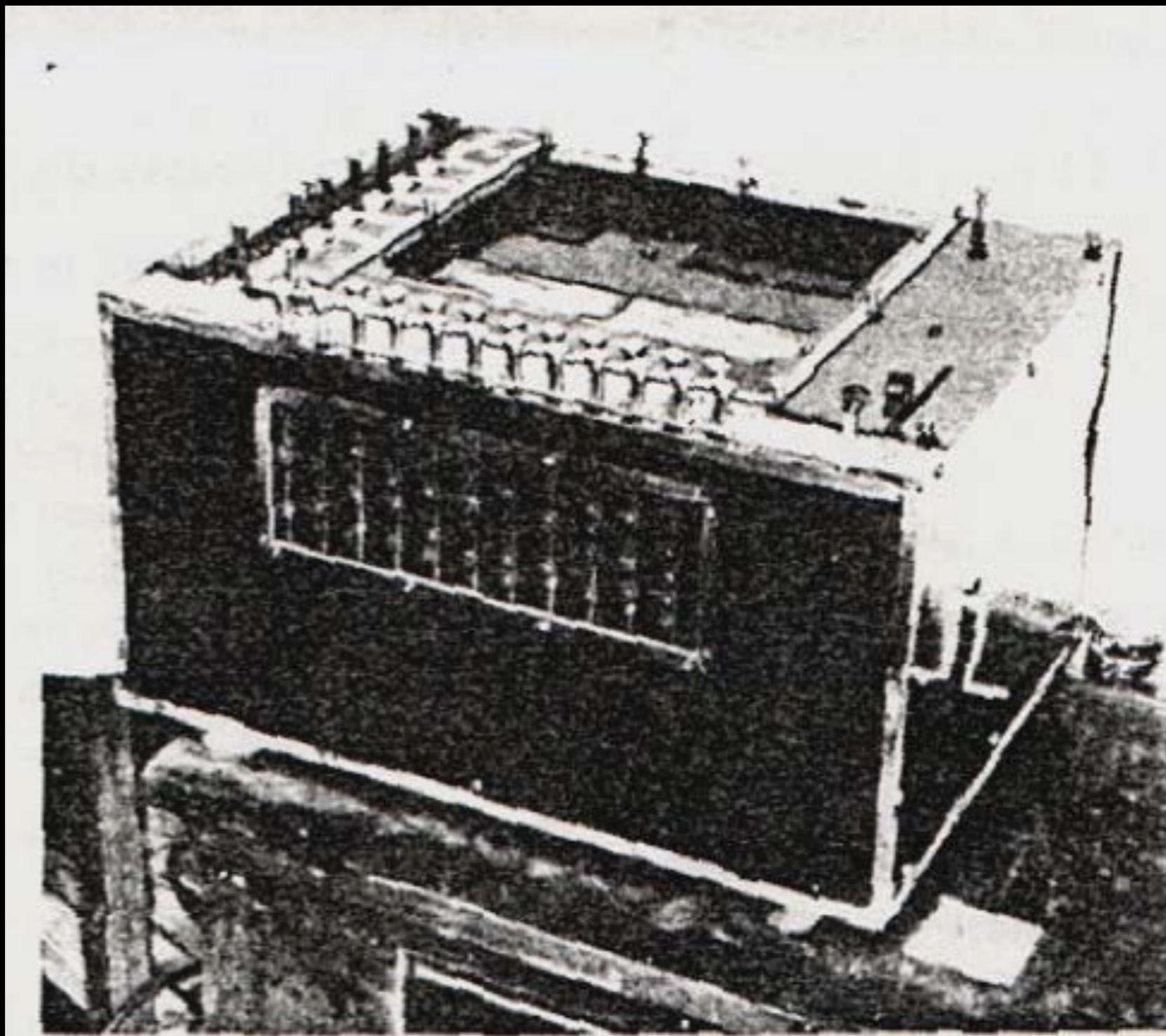
虽然 北 风 呼 啸 ， 但 天 空 依 然 十 分 清 澈 。

虽然 北 风 呼 啸 , 但 天 空 依 然 十 分 清 澈 。

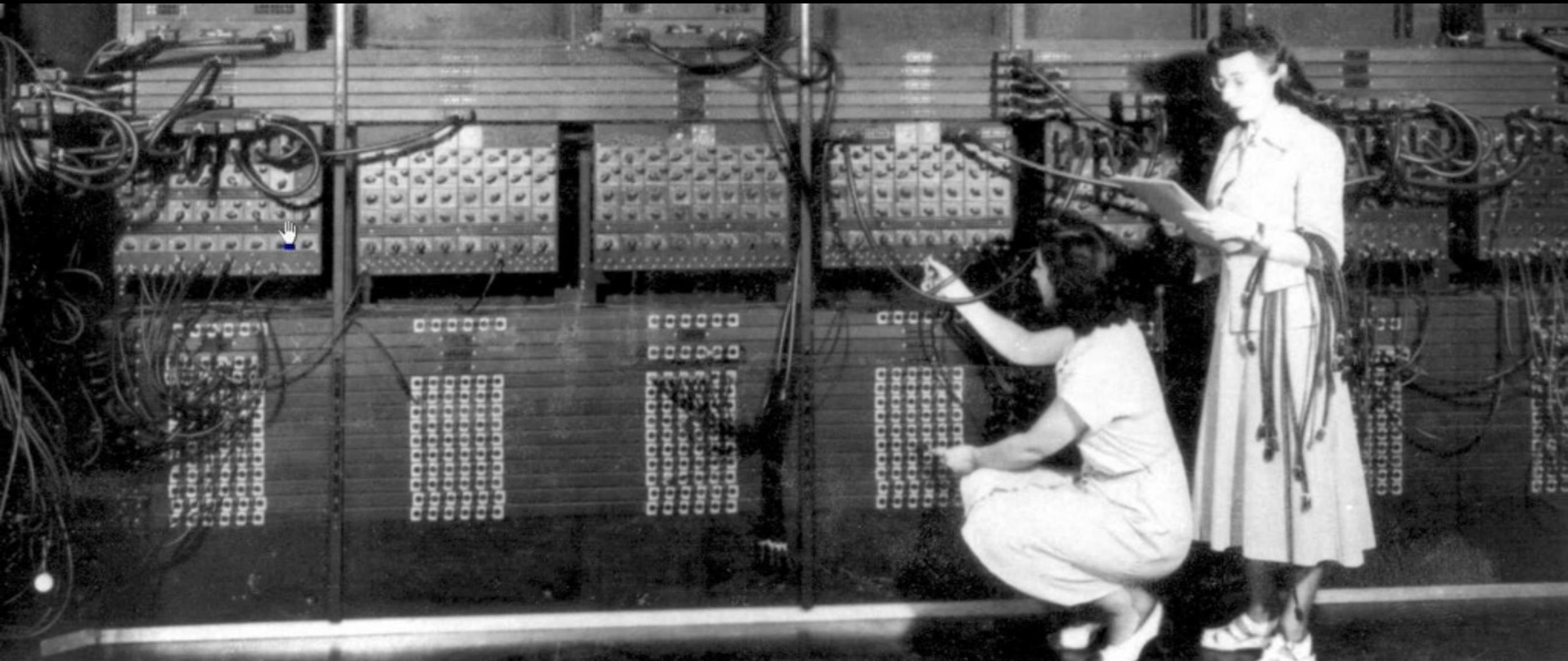
However , the sky remained clear under the strong north wind .



The Confusion of
Tongues
Gustave Doré (1865)



Georges Artsrouni's “mechanical brain”,
patented 1933 (France)



ENIAC (1946), first computer

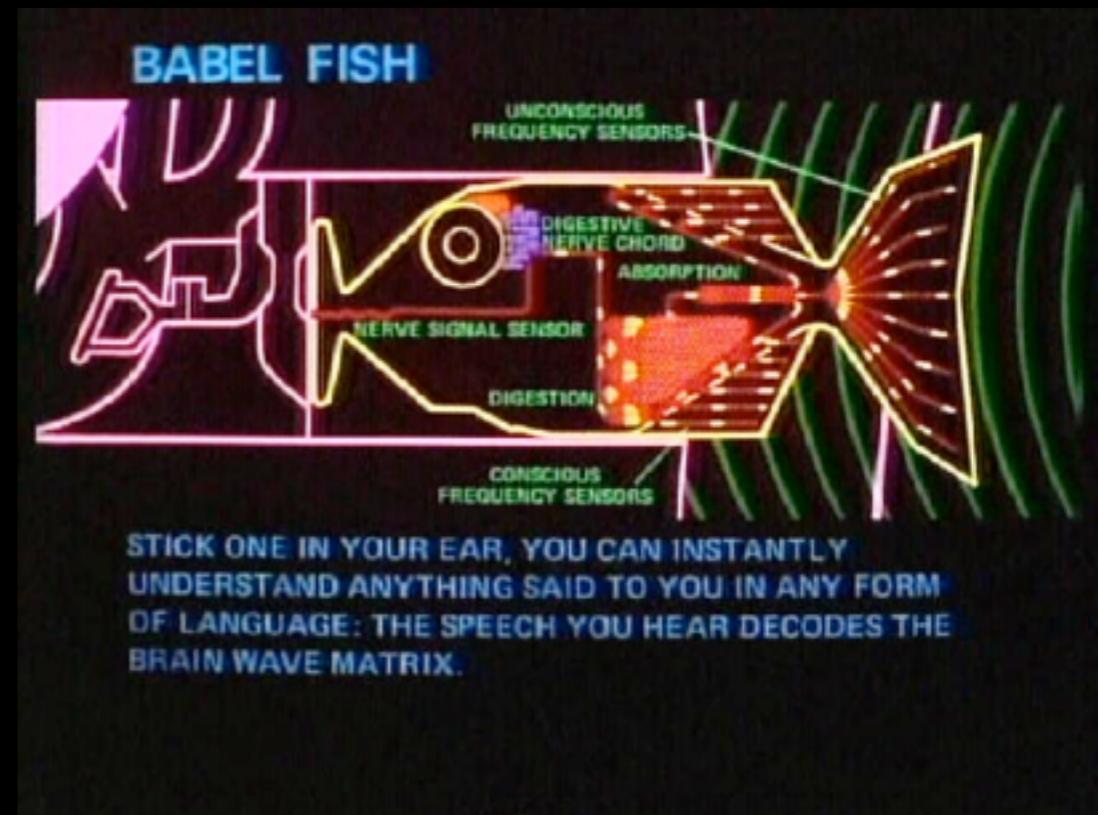
Gloria Ruth Gordon and Ester Gerson, first programmers



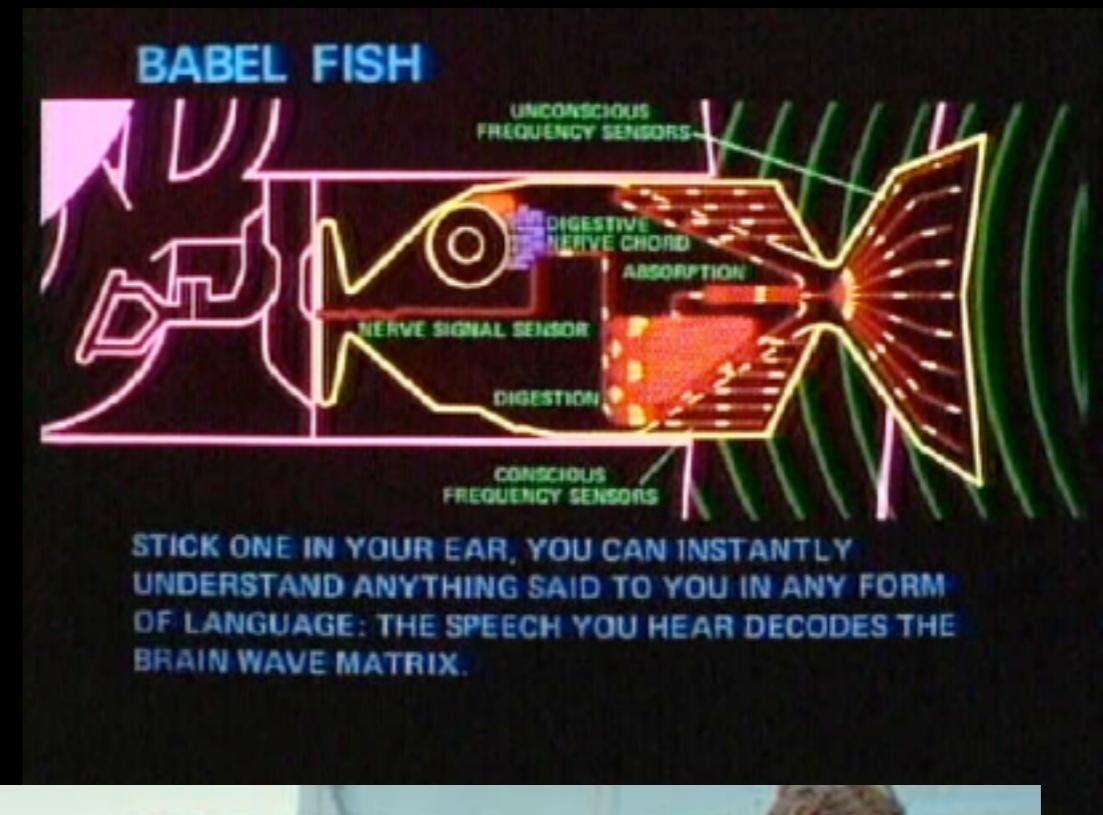
*When I look at an article
in Russian, I say: "This
is really written in
English, but it has been
coded in some strange
symbols. I will now
proceed to decode."*

Warren Weaver (1949)

Popular view of MT in 2005

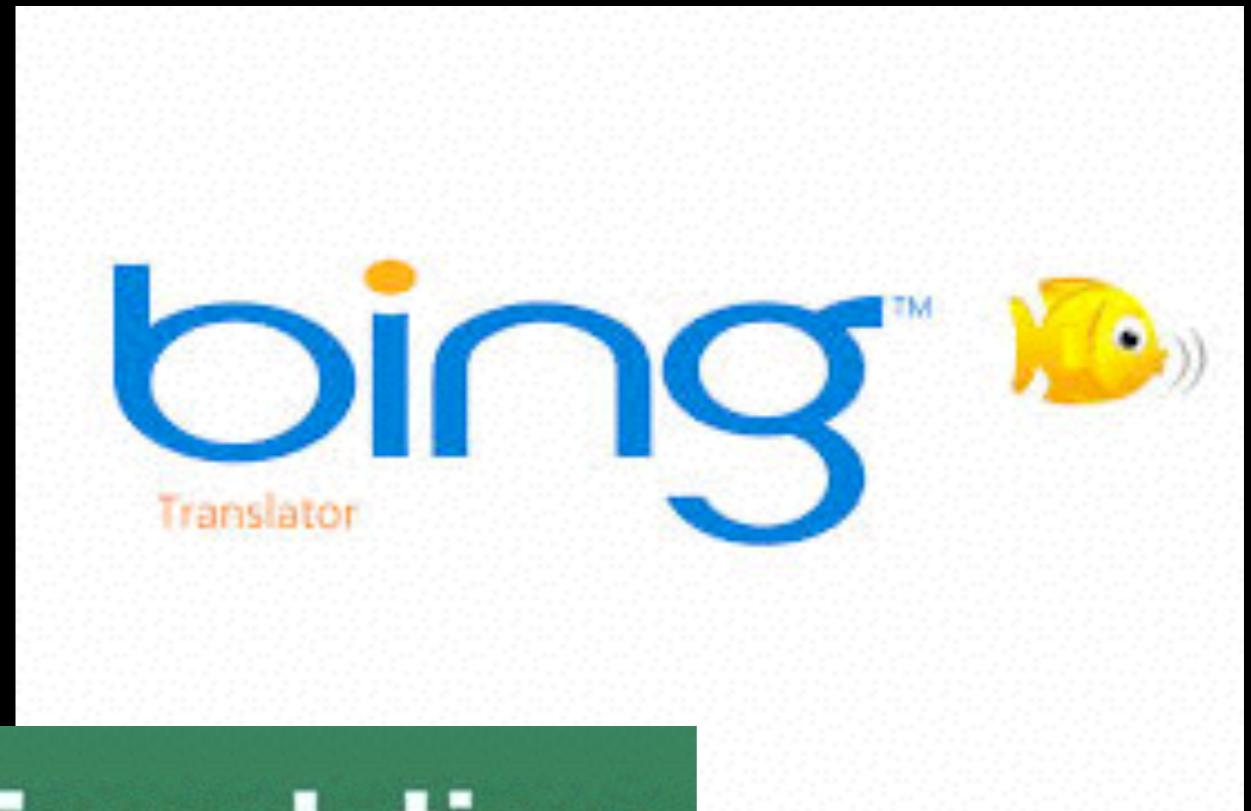


Popular view of MT in 2005

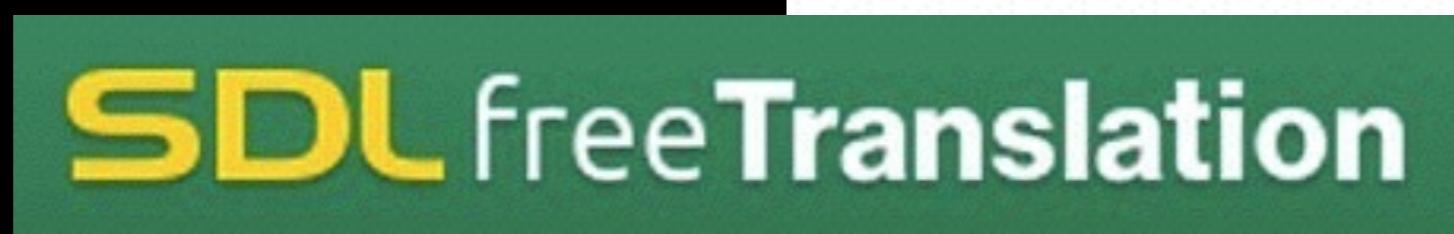
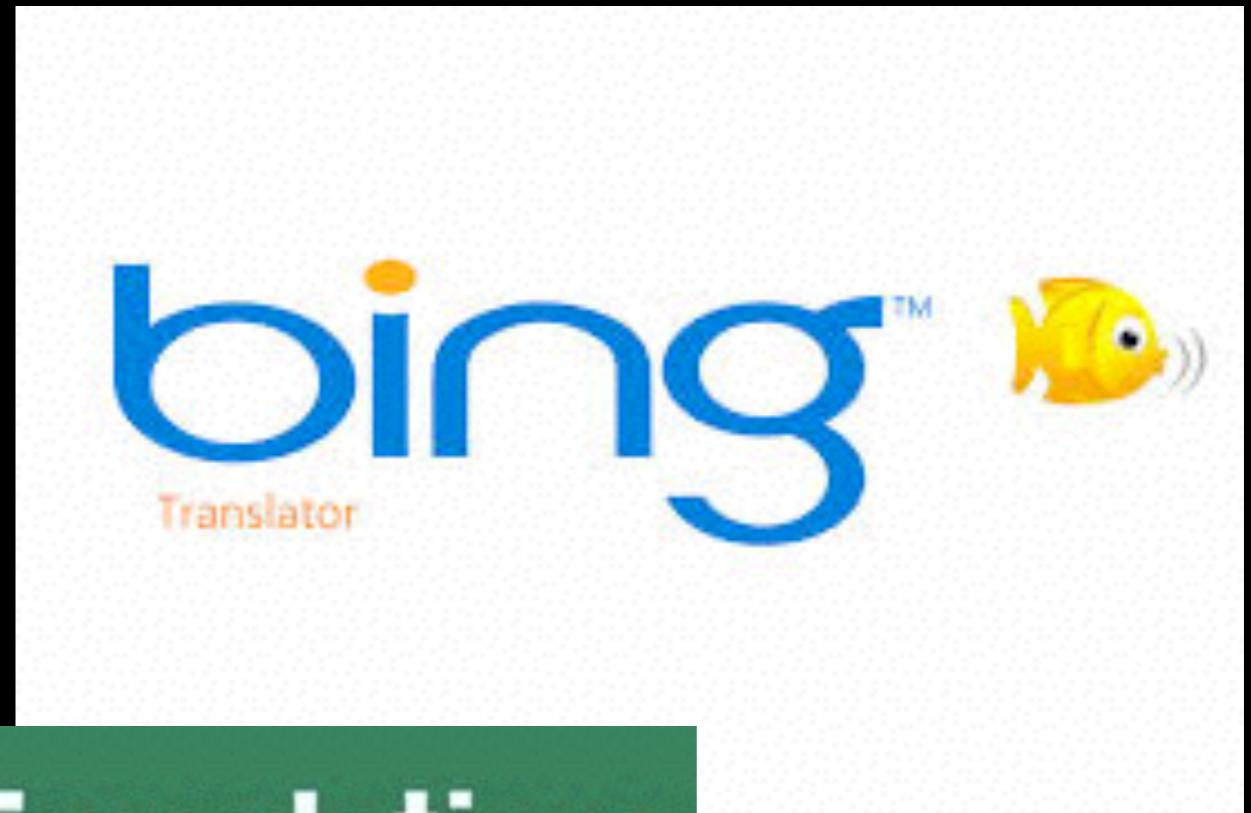


Popular view of NLP:

Popular view of MT in 2017



Popular view of MT in 2017

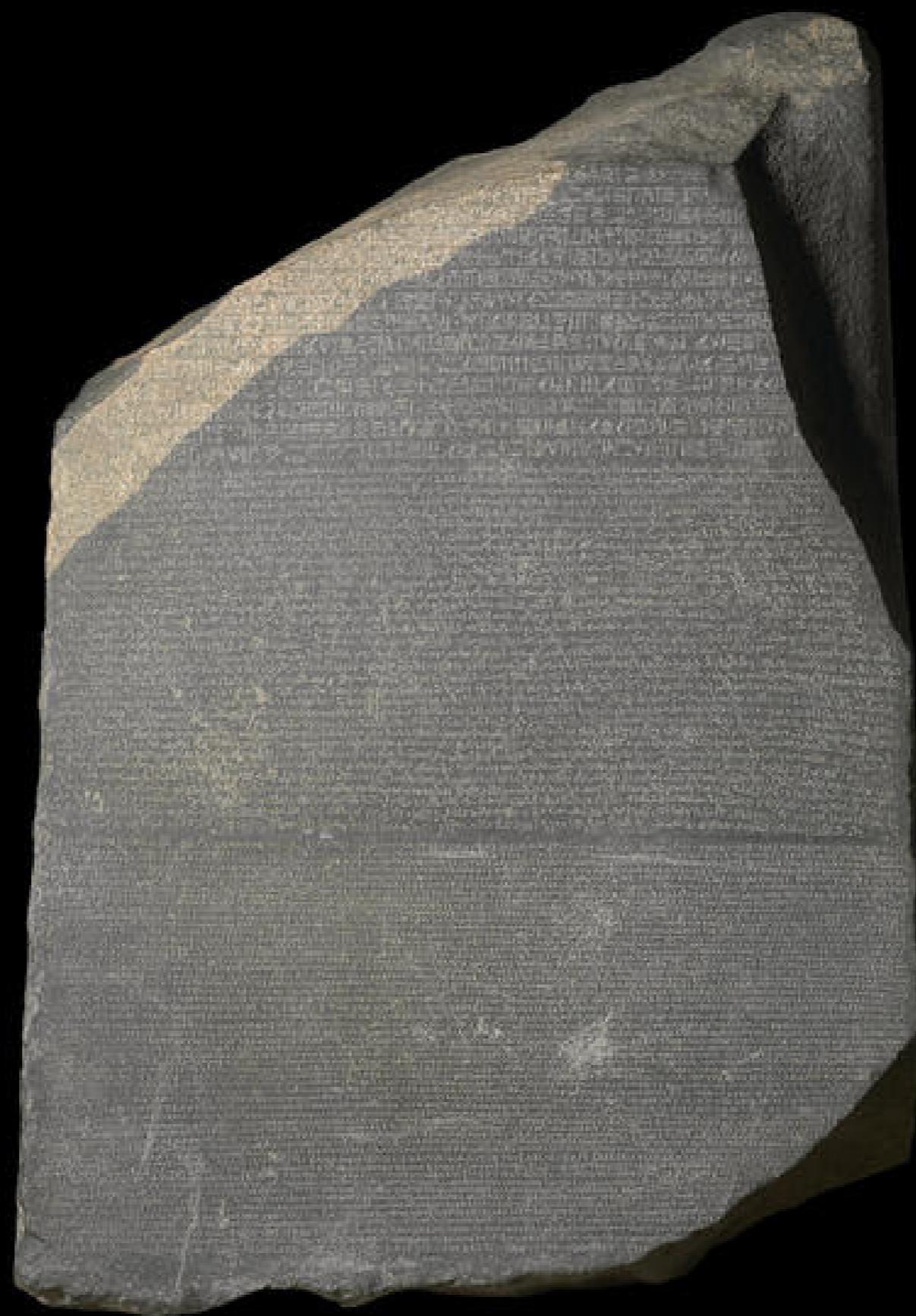


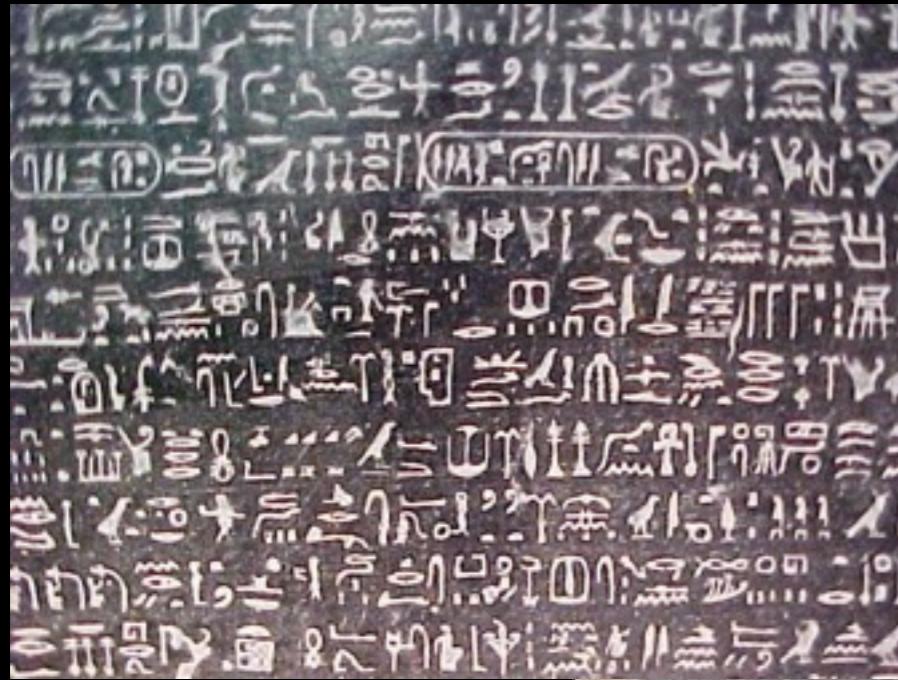
Siri

Use your voice to send messages, set reminders, search for information, and more.

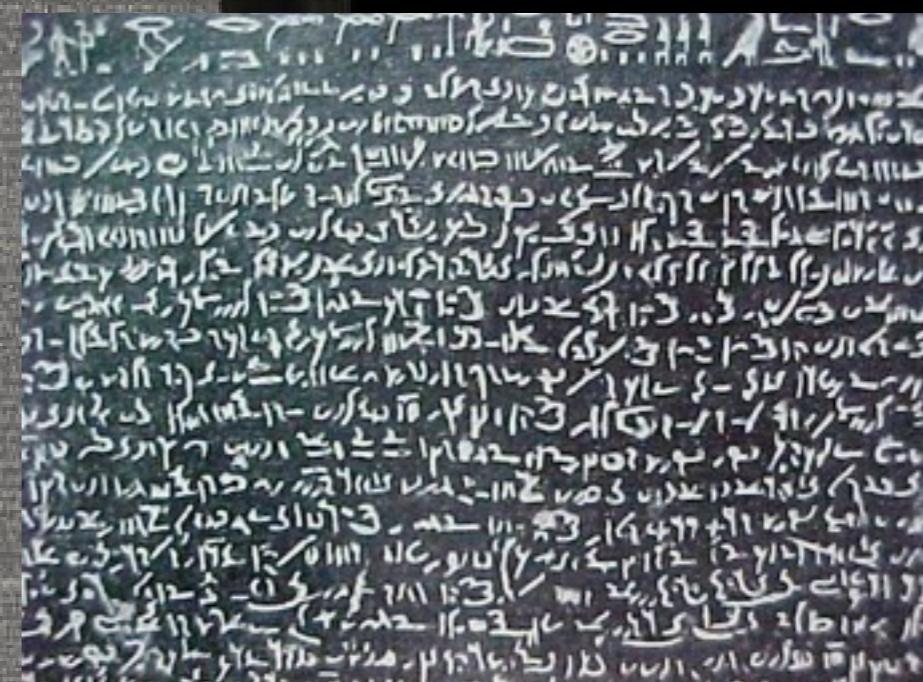
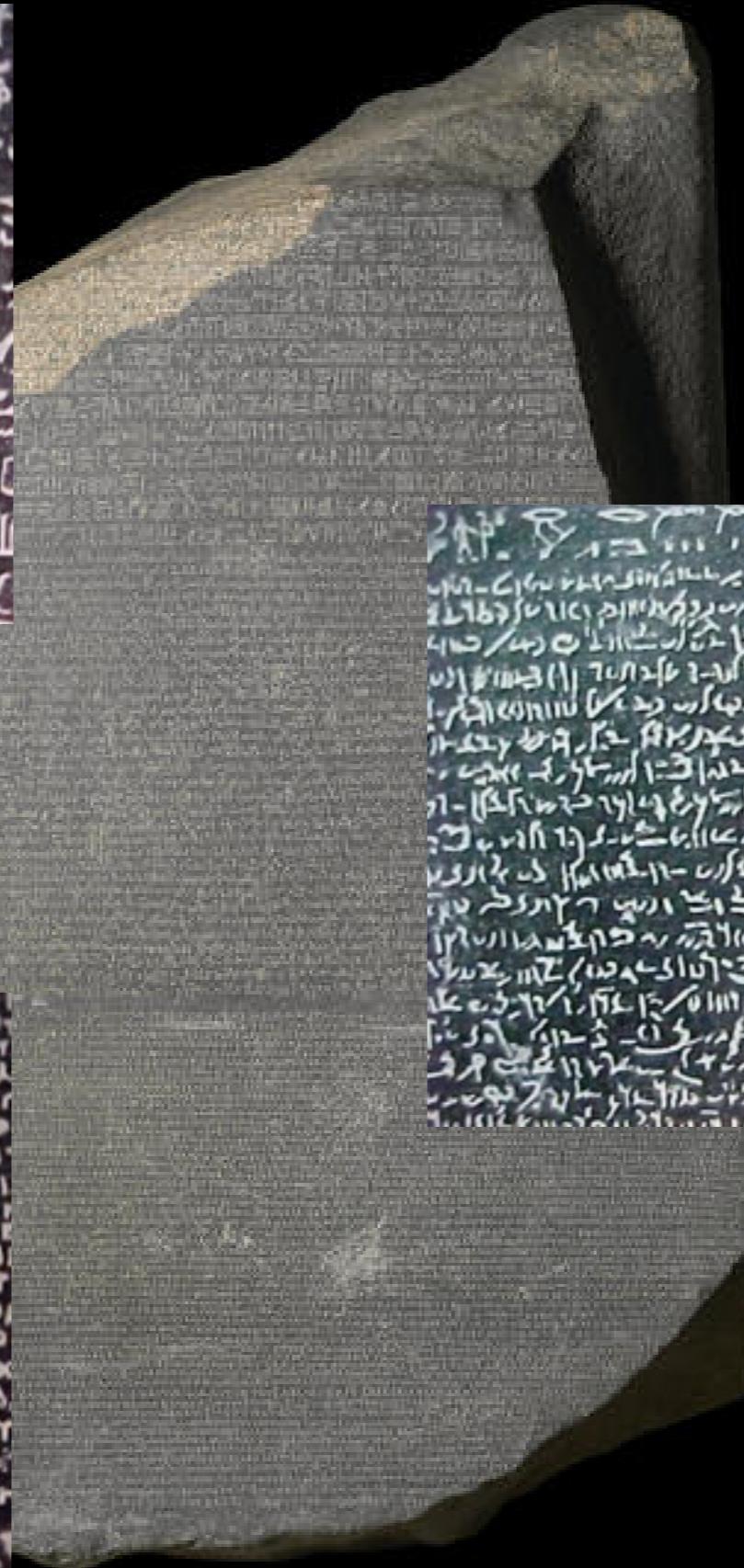


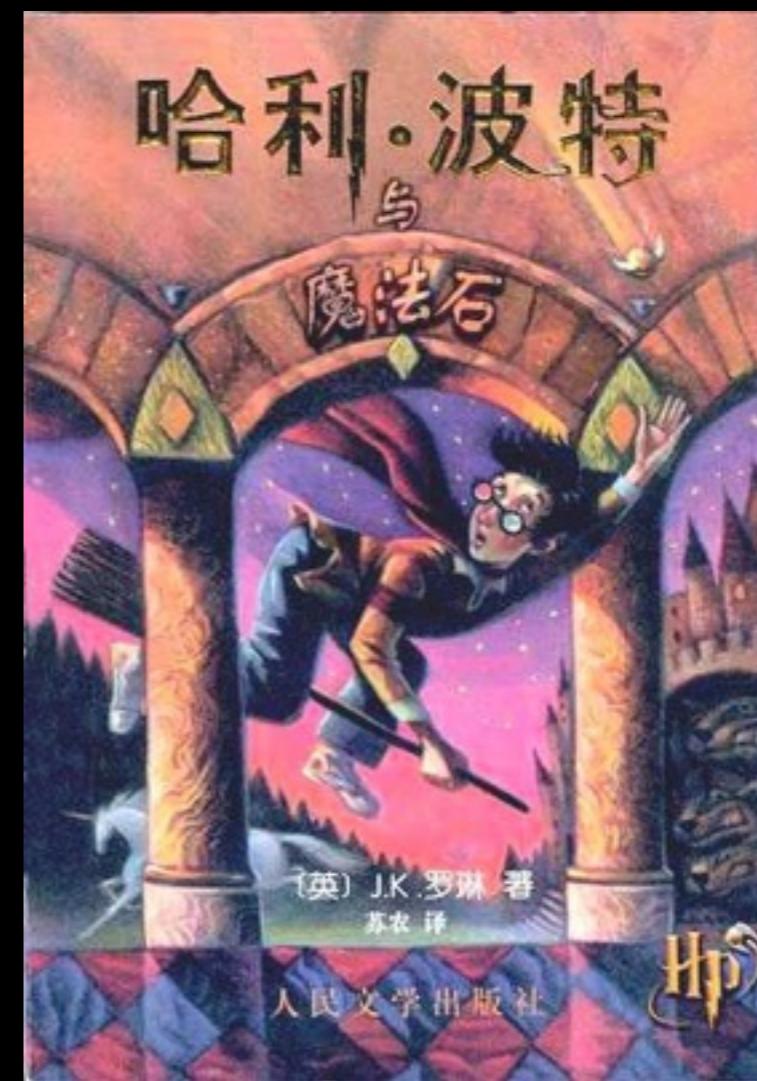
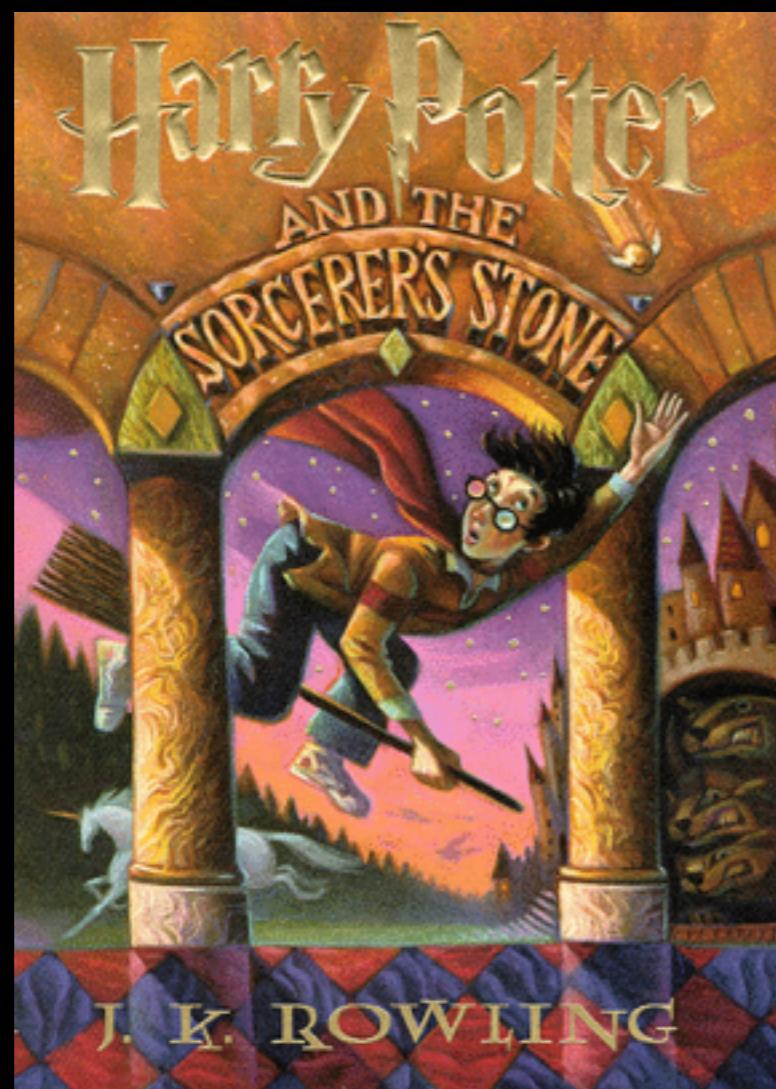
and NLP:

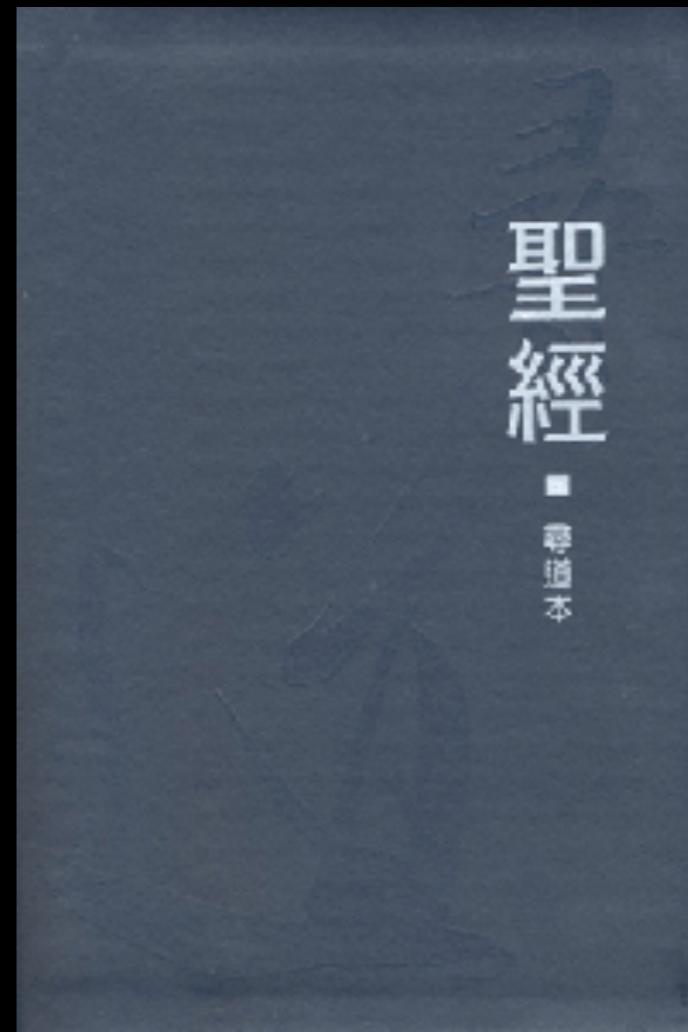
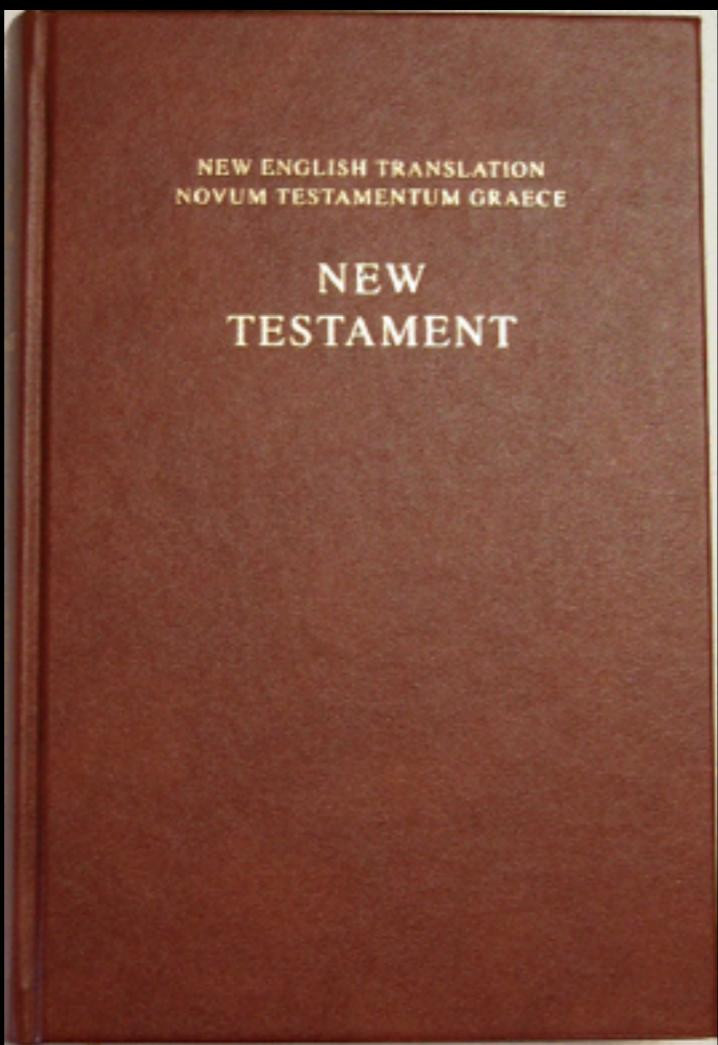




ΘΕΑΤΕΙΣ ΕΛΛΗΝΟΙ ΕΡΕΙΣ ΠΛΑΝΥΣΙ ΙΔΑΠΛΗ ΤΗΕΛΗ
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ΕΚΑΙΤΕΙΧΕΣ Η ΛΥΤΗΗΛΑΣΙΟΔΟΓΙ Ε ΛΕΓΙΕΛΛΛΕ
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ΣΙΑΙΗΕΗΙΑ ΜΕΝΟΥ Ι ΤΛΗΛΟΣ ΣΥΔΛΗΤΛΗΝΕΠΙ







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联合国千年发展目标

联合国新闻

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联合国网络直播

The screenshot shows the English version of the NBS website. It features a blue header with the NBS logo and the text "National Bureau of Statistics of China". Below the header is a navigation menu with links like "Agency Information", "Law & Regulations", "Survey Programs", etc. The main content area includes sections for "News and Coming Events" and "What's New", each listing several items. There is also a "Statistical Data" section with a chart titled "Producer Price Index for Manufactured Goods" showing data from August to August. A search bar is at the bottom.

The screenshot shows the Chinese version of the NBS website. It has a similar layout but with Chinese text. The header includes the NBS logo and the text "中华人民共和国国家统计局". The left sidebar contains categories like "统计公报", "统计数据", "统计分析", etc. The right side features a large "最新统计信息" section with a list of news items and a chart titled "工业品出厂价格指数" (Industrial Product Output Price Index) showing data from January to August. Other sections include "重要公告" (Important Announcements), "统计机构" (Statistical Institutions), and "统计动态" (Statistical Dynamics).

The image displays two versions of the National Bureau of Statistics (NBS) website side-by-side, enclosed in white circles. The left circle highlights the Chinese Simplified version, which features a blue header with the NBS logo and the URL <http://www.stats.gov.cn/eng/>. The right circle highlights the English version, which features a blue header with the NBS logo and the URL <http://www.stats.gov.cn/>. Both versions show a main menu on the left with links like 'News and Coming', 'Statistical Data', 'Related Links', and 'What's New'. The English version also includes a sidebar with sections like 'Statistical Information', 'Statistical Data', 'Statistical Analysis', 'Statistical Publications', 'Statistical Methods', 'Statistical Management', 'Statistical Reports', and 'Statistical Links'.

中文简体 ■

中华人民共和国国家
National Bureau of Statistics

最新统计信息

105年9月18日 星期日

■ 2005年全国平均恩格尔系数比上年减少43万吨 (09.16)
■ 8月份国民生产总值为101.86 同比下降3.10点 (09.16)
■ 1-8月固定资产投资同比增长10.4% (09.16)
■ 1-8月甘肃固定资产投资增长17.64% 增幅回落3.41% (09.16)
■ 林洲：商品房销售制度对房地产市场的影响浅析 (09.16)
■ 经济全球化对江西国民经济产生六大影响 (09.16)
■ 统计数据：8月份工业产品产量 各地区产品增长率 (09.16)
■ 统计数据：8月份工业增加值 各地区工业增加值 (09.15)
■ 1-8月份全国城镇固定资产投资同比增长27.4% (09.15)
■ 加快云南人口城市化进程需解决四大关键问题 (09.15)
■ 内江口：逐步教育乱收费 “一费制”收入人心 (09.15)
■ 1-8月浙江限额以上固定资产投资同比增长16.4% (09.15)
■ 8月份广西消费品零售额与去年同期相比增长13.6% (09.15)
■ 8月份我国工业增加值同比增长16% (09.14)
■ 调查显示：广东省企业流动资金短缺问题日益突出 (09.14)
■ 实施品牌战略 推进吉林省经济快速可持续发展 (09.14)
■ 天津：城乡居民收入剪刀差十年扩大0.46倍 (09.14)
■ 8月份甘肃工业品价格呈现四特点 流动率有所加快 (09.14)

重要公告

计
■ 关于申报2005年度全国统计科研计划项目的通知
■ 国家《关于统计上对公有和非公有控股经济的分类办法》的通知

统计机构

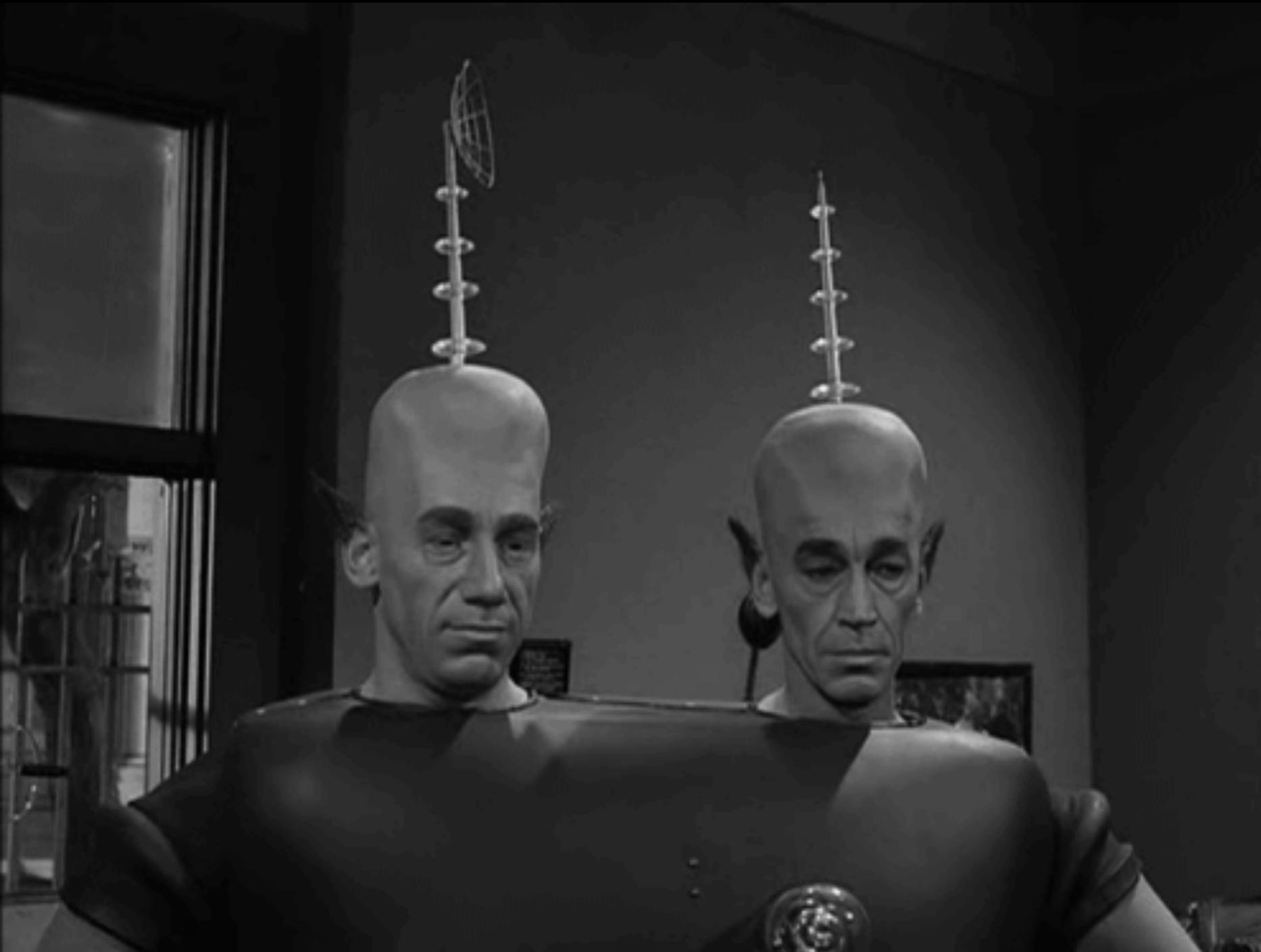
统计动态

统计标准

统计制度

统计知识

Translation Exercise



iat lat pippat eneat hilat oloat at-yurp .

ok-voon ororok sprok .

at-voon bichat dat .

ok-drubel ok-voon anok plok sprok .

at-drubel at-voon pippat rrat dat .

erok sprok izok hihok ghirok .

totat dat arrat vat hilat .

ok-voon anok drok brok jok .

at-voon krat pippat sat lat .

wiwok farok izok stok .

totat jjat quat cat .

lalok sprok izok jok stok .

wat dat krat quat cat .

lalok farok ororok lalok sprok izok enemok .

wat jjat bichat wat dat vat eneat .

lalok brok anok plok nok .

iat lat pippat rrat nnat .

wiwok nok izok kantok ok-yurp .

totat nnat quat oloat at-yurp .

lalok mok nok yorok ghirok clok .

wat nnat gat mat bat hilat .

lalok nok crrok hihok yorok zanzanok .

wat nnat arrat mat zanzanat .

lalok rarok nok izok hihok mok .

wat nnat forat arrat vat gat .

iat lat pippat eneat hilat oloat at-yurp .

ok-voon ororok sprok .

\ \ /

at-voon bichat dat .

ok-drubel ok-voon anok plok sprok .

\ \ | | /

at-drubel at-voon pippat rrat dat .

erok sprok izok hihok ghirok .

\ \ \ \ /

totat dat arrat vat hilat .

ok-voon anok drok brok jok .

\ \ \ \ /

at-voon krat pippat sat lat .

wiwok farok izok stok .

\ \ | /

totat jjat quat cat .

lalok sprok izok jok stok .

\ | \ /

wat dat krat quat cat .

lalok farok ororok lalok sprok izok enemok .

\ \ | \ / / /

wat jjat bichat wat dat vat eneat .

lalok brok anok plok nok .

\ | / | /

iat lat pippat rrat nnat .

wiwok nok izok kantok ok-yurp .

\ | | | /

totat nnat quat oloat at-yurp .

lalok mok nok yorok ghirok clok .

\ \ \ | /

wat nnat gat mat bat hilat .

lalok nok crrok hihok yorok zanzanok .

\ \ | / / /

wat nnat arrat mat zanzanat .

lalok rarok nok izok hihok mok .

\ \ \ | /

wat nnat forat arrat vat gat .

iat lat pippat eneat hilat oloat at-yurp .

arrat : hihok

at-drubel : ok-drubel

at-voon : ok-voon

at-yurp : ok-yurp

bat : clok

bichat : ororok

cat : stok

dat : sprok

eneat : enimok

forat : rarok

gat : mok

hilat : ghirok

iat : lalok

jjat : farok

krat : jok

lat : brok

mat : yorok

nnat : nok

oloat : kantok

pippat : anok

quat : izok

rrat : plok

sat : drok

totat : erok

totat : wiwok

vat : izok

wat : lalok

zanzanat : zanzanok

??? : crrrok

iat lat pippat eneat hilat oloat at-yurp .

arrat : hihok

at-drubel : ok-drubel

at-voon : ok-voon

at-yurp : ok-yurp

bat : clok

bichat : ororok

cat : stok

dat : sprok

eneat : enimok

forat : rarok

gat : mok

hilat : ghirok

iat : lalok

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krat : jok

lat : brok

mat : yorok

nnat : nok

oloat : kantok

pippat : anok

quat : izok

rrat : plok

sat : drok

totat : erok

totat : wiwok

vat : izok

wat : lalok

zanzanat : zanzanok

??? : crrrok

iat lat pippat eneat hilat oloat at-yurp .
lalok brok anok nemok ghirok kantok ok-yurp .

arrat : hihok

at-drubel : ok-drubel

at-voon : ok-voon

at-yurp : ok-yurp

bat : clok

bichat : ororok

cat : stok

dat : sprok

eneat : nemok

forat : rarok

gat : mok

hilat : ghirok

iat : lalok

jjat : farok

krat : jok

lat : brok

mat : yorok

nnat : nok

oloat : kantok

pippat : anok

quat : izok

rrat : plok

sat : drok

totat : erok

totat : wiwok

vat : izok

wat : lalok

zanzanat : zanzanok

??? : crrrok

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok enemok ghirok kantok ok-yurp .

erok sprok izok hihok ghirok .

totat dat arrat vat hilat .

ok-voon anok drok brok jok .

at-voon krat pippat sat lat .

lalok mok nok yorok ghirok clok .

wat nnat gat mat bat hilat .

lalok sprok izok jok stok .

wat dat krat quat cat .

lalok rarok nok izok hihok mok .

wat nnat forat arrat vat gat .

iat lat pippat eneat hilat oloat at-yurp .

lalok anok brok enemok kantok ghirok ok-yurp .

erok sprok izok hihok ghirok .

totat dat arrat vat hilat .

ok-voon anok drok brok jok .

at-voon krat pippat sat lat .

lalok mok nok yorok ghirok clok .

wat nnat gat mat bat hilat .

lalok sprok izok jok stok .

wat dat krat quat cat .

lalok rarok nok izok hihok mok .

wat nnat forat arrat vat gat .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok kantok ~~ghirok~~ enemok ok-yurp .

erok sprok izok hihok ~~ghirok~~ .

~~totat~~ dat arrat vat hilat .

ok-voon anok drok brok jok .

~~at-voon~~ krat pippat sat lat .

lalok mok nok yorok ~~ghirok~~ clok .

wat nnat gat mat bat hilat .

lalok sprok izok jok stok .

~~wat~~ dat krat quat cat .

lalok rarok nok izok hihok mok .

wat nnat forat arrat vat gat .

iat lat pippat eneat hilat oloat at-yurp .
lalok brok anok kantok ~~ghirok~~ enemok ok-yurp .

5040 possible orderings!

erok sprok izok hihok ~~ghirok~~ .
totat dat arrat vat hilat .

ok-voon anok drok brok jok .
at-voon krat pippat sat lat .

lalok mok nok yorok ~~ghirok~~ clok .
wat nnat gat mat bat hilat .

lalok sprok izok jok stok .
wat dat krat quat cat .

lalok rarok nok izok hihok mok .
wat nnat forat arrat vat gat .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok nemok ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok nemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok nemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok nemok ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok nemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok nemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok nemok ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok nemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok nemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok enimok ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enimok .

ok-drubel ziplok stok vok erok enimok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enimok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok nemok ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok nemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

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lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok **anok nemok** ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok nemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

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lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok nemok ghirok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok nemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

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lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok **enemok ghirok** kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

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lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

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lalok mok nok yorok ghirok clok .

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lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok **enemok ghirok** kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok **ghirok enemok** .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

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lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok **ghirok enemok** kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok **ghirok enemok** .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

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lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok ghirok enemok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

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lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok **anok ghirok** enemok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

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lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok

anok ghirok

enemok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok nemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

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lalok farok ororok lalok sprok izok nemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok ghirok enemok kantok ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

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lalok farok ororok lalok sprok izok enemok .

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lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok ghirok **enemok kantok** ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok ghirok **enemok kantok** ok-yurp .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok **enemok kantok** ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

iat lat pippat eneat hilat oloat at-yurp .

lalok brok anok ghirok **enemok kantok ok-yurp** .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok **enemok kantok ok-yurp** zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .

totat nnat forat arrat mat bat .

arrat : hihok

at-drubel : ok-drubel

at-voon : ok-voon

at-yurp : ok-yurp

bat : clok

bichat : ororok

cat : stok

dat : sprok

eneat : enimok

forat : rarok

gat : mok

hilat : ghirok

iat : lalok

jjat : farok

krat : jok

lat : brok

mat : yorok

nnat : nok

oloat : kantok

pippat : anok

quat : izok

rrat : plok

sat : drok

totat : erok

totat : wiwok

vat : izok

wat : lalok

zanzanat : zanzanok

??? : crrrok

totat nnat forat arrat mat bat .

arrat : hihok

at-drubel : ok-drubel

at-voon : ok-voon

at-yurp : ok-yurp

bat : clok

bichat : ororok

cat : stok

dat : sprok

eneat : enimok

forat : rarok

gat : mok

hilat : ghirok

iat : lalok

jjat : farok

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quat : izok

rrat : plok

sat : drok

totat : erok

totat : wiwok

vat : izok

wat : lalok

zanzanat : zanzanok

??? : crrrok

totat nnat forat arrat mat bat .
erok | wiwok nok rarok hihok yorok clok .

arrat : hihok

at-drubel : ok-drubel

at-voon : ok-voon

at-yurp : ok-yurp

bat : clok

bichat : ororok

cat : stok

dat : sprok

eneat : enemok

forat : rarok

gat : mok

hilat : ghirok

iat : lalok

jjat : farok

krat : jok

lat : brok

mat : yorok

nnat : nok

oloat : kantok

pippat : anok

quat : izok

rrat : plok

sat : drok

totat : erok

totat : wiwok

vat : izok

wat : lalok

zanzanat : zanzanok

??? : crrrok

totat nnat forat arrat mat bat .
erok | wiwok nok rarok hihok yorok clok .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

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erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
erok | **wiwok nok** rarok hihok yorok clok .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

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erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

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lalok mok nok yorok ghirok clok .

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lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok nok rarok hihok yorok clok .

ok-drubel anok ghirok farok .
wiwok rarok nok zerok ghirok enemok .
ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .
lalok clok izok vok ok-drubel .
ok-voon ororok sprok .
ok-drubel ok-voon anok plok sprok .
erok sprok izok hihok ghirok .
ok-voon anok drok brok jok .
wiwok farok izok stok .
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lalok farok ororok lalok sprok izok enemok .
wiwok nok izok kantok ok-yurp .
lalok mok nok yorok ghirok clok .
lalok nok crrrok hihok yorok zanzanok .
lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok nok hihok yorok clok .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

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lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
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ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

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lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok **nok hihok** yorok clok .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok nok crrrok hihok yorok zanzanok .

lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok **nok hihok** yorok clok .

ok-drubel anok ghirok farok .

wiwok rarok nok zerok ghirok enemok .

ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .

lalok clok izok vok ok-drubel .

ok-voon ororok sprok .

ok-drubel ok-voon anok plok sprok .

erok sprok izok hihok ghirok .

ok-voon anok drok brok jok .

wiwok farok izok stok .

lalok sprok izok jok stok .

lalok brok anok plok nok .

lalok farok ororok lalok sprok izok enemok .

wiwok nok izok kantok ok-yurp .

lalok mok nok yorok ghirok clok .

lalok **nok crrrok hihok yorok** zanzanok .

lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok **nok crrrok hihok yorok** clok .

ok-drubel anok ghirok farok .
wiwok rarok nok zerok ghirok enemok .
ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .
lalok clok izok vok ok-drubel .
ok-voon ororok sprok .
ok-drubel ok-voon anok plok sprok .
erok sprok izok hihok ghirok .
ok-voon anok drok brok jok .
wiwok farok izok stok .
lalok sprok izok jok stok .
lalok brok anok plok nok .
lalok farok ororok lalok sprok izok enemok .
wiwok nok izok kantok ok-yurp .
lalok mok nok yorok ghirok clok .
lalok **nok crrrok hihok yorok** zanzanok .
lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok nok crrrok hihok yorok clok .

ok-drubel anok ghirok farok .
wiwok rarok nok zerok ghirok enemok .
ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .
lalok clok izok vok ok-drubel .
ok-voon ororok sprok .
ok-drubel ok-voon anok plok sprok .
erok sprok izok hihok ghirok .
ok-voon anok drok brok jok .
wiwok farok izok stok .
lalok sprok izok jok stok .
lalok brok anok plok nok .
lalok farok ororok lalok sprok izok enemok .
wiwok nok izok kantok ok-yurp .
lalok mok nok yorok ghirok clok .
lalok nok crrrok hihok yorok zanzanok .
lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok nok crrrok hihok **yorok clok** .

ok-drubel anok ghirok farok .
wiwok rarok nok zerok ghirok enemok .
ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok **yorok clok** .
lalok clok izok vok ok-drubel .
ok-voon ororok sprok .
ok-drubel ok-voon anok plok sprok .
erok sprok izok hihok ghirok .
ok-voon anok drok brok jok .
wiwok farok izok stok .
lalok sprok izok jok stok .
lalok brok anok plok nok .
lalok farok ororok lalok sprok izok enemok .
wiwok nok izok kantok ok-yurp .
lalok mok nok yorok ghirok clok .
lalok nok crrrok hihok yorok zanzanok .
lalok rarok nok izok hihok mok .

totat nnat forat arrat mat bat .
wiwok rarok nok crrrok hihok yorok clok .

ok-drubel anok ghirok farok .
wiwok rarok nok zerok ghirok enemok .
ok-drubel ziplok stok vok erok enemok kantok ok-yurp zinok jok yorok clok .
lalok clok izok vok ok-drubel .
ok-voon ororok sprok .
ok-drubel ok-voon anok plok sprok .
erok sprok izok hihok ghirok .
ok-voon anok drok brok jok .
wiwok farok izok stok .
lalok sprok izok jok stok .
lalok brok anok plok nok .
lalok farok ororok lalok sprok izok enemok .
wiwok nok izok kantok ok-yurp .
lalok mok nok yorok ghirok clok .
lalok nok crrrok hihok yorok zanzanok .
lalok rarok nok izok hihok mok .

Is this exercise realistic?

In real natural language...

Is this exercise realistic?

In real natural language...

...words are ambiguous

English: bank

French: banque



French: rive



Is this exercise realistic?

In real natural language...

...words have complex *morphology*

	singular	plural
nominative	I	we
oblique	me	us
possessive determiner	my	our
possessive pronoun	mine	ours
reflexive	myself	ourselves

Tense	I	you	he, she, it	we	you	they
Present	arrive	arrive	arrives	arrive	arrive	arrive
Past	arrived	arrived	arrived	arrived	arrived	arrived

Is this exercise realistic?

In real natural language...

...words have complex *morphology*

... fanden sie sie auf den Stufen unseres Hauses sitzend ...

... they found her sitting on the steps of our house ...

	Singular	Plural
Nominativ	das Haus	die Häuser
Genitiv	des Hauses	der Häuser
Dativ	dem Haus dem Hause	den Häusern
Akkusativ	das Haus	die Häuser

Is this exercise realistic?

forms of kataba ('to write') in Arabic

	Past	Present Indicative	Future Indicative	Subjunctive	Jussive	Long Energetic	Short Energetic	Imperative
Singular								
1st	katab-t(u) كَتَبَ	a-ktab-(u) أَكْتَبَ	sa-'a-ktab-(u) سَاءَكْتَبَ	a-ktab-(a) أَكْتَبَ	a-ktab أَكْتَبَ	a-ktab-anna أَكْتَبَانَا	a-ktab-an أَكْتَبَانِي	-
2nd	mASCULINE	katab-t(a) كَتَبَتْ	ta-ktab-(u) تَكْتَبَ	sa-ta-ktab-(u) سَاءَتَكْتَبَ	ta-ktab-(a) تَكْتَبَ	ta-ktab تَكْتَبَ	ta-ktab-anna تَكْتَبَانَا	ta-ktab-an تَكْتَبَانِي
	fEMININE	katab-ti كَتَبَتْ	ta-ktab-in(a) تَكْتَبَتْنَا	sa-ta-ktab-in(a) سَاءَتَكْتَبَتْنَا	ta-ktab-i تَكْتَبَتْ	ta-ktab-i تَكْتَبَتْ	ta-ktab-inna تَكْتَبَنَا	ta-ktab-in تَكْتَبَنِي
3rd	mASCULINE	katab-(a) كَتَبَ	ya-ktab-(u) يَكْتَبَ	sa-ya-ktab-(u) سَاءَيَكْتَبَ	ya-ktab-(a) يَكْتَبَ	ya-ktab يَكْتَبَ	ya-ktab-anna يَكْتَبَانَا	ya-ktab-an يَكْتَبَانِي
	fEMININE	katab-et كَتَبَتْ	ta-ktab-(u) تَكْتَبَتْ	sa-ta-ktab-(u) سَاءَتَكْتَبَتْ	ta-ktab-(a) تَكْتَبَتْ	ta-ktab تَكْتَبَتْ	ta-ktab-anna تَكْتَبَتْنَا	ta-ktab-an تَكْتَبَتْنِي
Dual								
2nd	mASCULINE & fEMININE	katab-tumā كَتَبَتْمَا	ta-ktab-ān(i) تَكْتَبَتْنِي	sa-ta-ktab-ān(i) سَاءَتَكْتَبَتْنِي	ta-ktab-ā تَكْتَبَتْنِي	ta-ktab-ā تَكْتَبَتْنِي	ta-ktab-ānni تَكْتَبَنِنِي	-
	mASCULINE	katab-ā كَتَبَتْ	ya-ktab-ān(i) يَكْتَبَتْنِي	sa-ya-ktab-ān(i) سَاءَيَكْتَبَتْنِي	ya-ktab-ā يَكْتَبَتْنِي	ya-ktab-ā يَكْتَبَتْنِي	ya-ktab-ānni يَكْتَبَنِنِي	-
3rd	fEMININE	katab-atā كَتَبَتْ	ta-ktab-ān(i) تَكْتَبَتْنِي	sa-ta-ktab-ān(i) سَاءَتَكْتَبَتْنِي	ta-ktab-ā تَكْتَبَتْنِي	ta-ktab-ā تَكْتَبَتْنِي	ta-ktab-ānni تَكْتَبَنِنِي	-
	Plural							
2nd	1st	katab-nā كَتَبَنَا	na-ktab-(u) نَكْتَبَنَا	sa-na-ktab-(u) سَاءَنَكْتَبَنَا	na-ktab-(a) نَكْتَبَنَا	na-ktab نَكْتَبَنَا	na-ktab-anna نَكْتَبَنَا	na-ktab-an نَكْتَبَنِي
	mASCULINE	katab-tum كَتَبَنَا	ta-ktab-ūn(a) تَكْتَبَنَا	sa-ta-ktab-ūn(a) سَاءَتَكْتَبَنَا	ta-ktab-ū تَكْتَبَنَا	ta-ktab-ū تَكْتَبَنَا	ta-ktab-unna تَكْتَبَنَا	ta-ktab-un تَكْتَبَنِي
3rd	fEMININE	katab-tunna كَتَبَنَا	ta-ktab-na تَكْتَبَنَا	sa-ta-ktab-na سَاءَتَكْتَبَنَا	ta-ktab-na تَكْتَبَنَا	ta-ktab-na تَكْتَبَنَا	ta-ktab-nanni تَكْتَبَنَا	ta-ktab-na تَكْتَبَنِي
	mASCULINE	katab-ū كَتَبَنَا	ya-ktab-ūn(a) يَكْتَبَنَا	sa-ya-ktab-ūn(a) سَاءَيَكْتَبَنَا	ya-ktab-ū يَكْتَبَنَا	ya-ktab-ū يَكْتَبَنَا	ya-ktab-unna يَكْتَبَنَا	ya-ktab-un يَكْتَبَنِي
3rd	fEMININE	katab-na كَتَبَنَا	ya-ktab-na يَكْتَبَنَا	sa-ya-ktab-na سَاءَيَكْتَبَنَا	ya-ktab-na يَكْتَبَنَا	ya-ktab-na يَكْتَبَنَا	ya-ktab-nanni يَكْتَبَنَا	-
	Singular							
2nd	1st	kutib-t(u) كَتَبَتْ	u-ktab-(u) أَكْتَبَتْ	sa-'u-ktab-(u) سَاءَأَكْتَبَتْ	u-ktab-(a) أَكْتَبَتْ	u-ktab أَكْتَبَتْ	u-ktab-anna أَكْتَبَتْنَا	u-ktab-an أَكْتَبَتْنِي
	mASCULINE	kutib-t(a) كَتَبَتْ	tu-ktab-(u) تَكْتَبَتْ	sa-tu-ktab-(u) سَاءَتَكْتَبَتْ	tu-ktab-(a) تَكْتَبَتْ	tu-ktab تَكْتَبَتْ	tu-ktab-anna تَكْتَبَتْنَا	tu-ktab-an تَكْتَبَتْنِي
3rd	fEMININE	kutib-ti كَتَبَتْ	tu-ktab-in(a) تَكْتَبَتْنَا	sa-tu-ktab-in(a) سَاءَتَكْتَبَتْنَا	tu-ktab-i تَكْتَبَتْ	tu-ktab-i تَكْتَبَتْ	tu-ktab-inna تَكْتَبَتْنَا	tu-ktab-in تَكْتَبَتْنِي
	etc.							
Nominal	Active Participle			Passive Participle			Verbal Noun	
	katib كَاتِبٌ			maktub مَكْتُوبٌ			katib, kitabah, kitabah كَاتِبٌ، كِتَابَةٌ، كِتَابَةٌ	

Is this exercise realistic?

In real natural language...

...words have complex *morphology*

Finnish: ostoskeskuksessa

ostos#keskus+N+Sg+Loc:in

shopping#center+N+Sg+Loc:in

English: ‘in the shopping center’

Is this exercise realistic?

In real natural language...

...words may have non-standard *orthography*

dats why pluto is pluto it can neva b a star

Is this exercise realistic?

In real natural language...

...word order matters

Jaime loves Casey

Casey loves Jaime

Is this exercise realistic?

In real natural language...

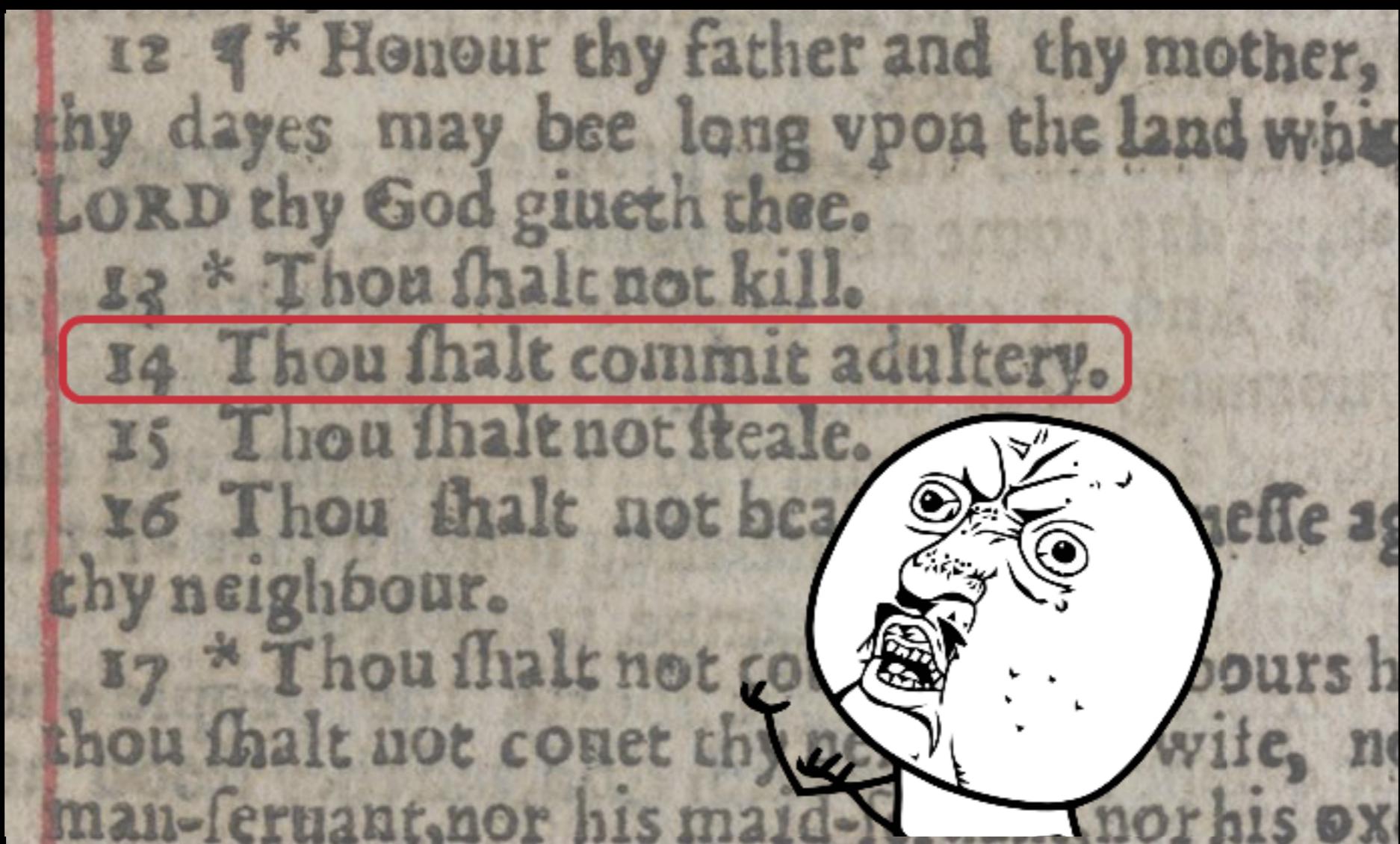
...every word matters

- 
- 12 ¶ * Honour thy father and thy mother,
thy dayes may bee long vpon the land whiche
LORD thy God giueth thee.
- 13 * Thou shalt not kill.
- 14 Thou shalt commit adultery.
- 15 Thou shalt not steale.
- 16 Thou shalt not beare false witnessesse ag
thy neighbour.
- 17 * Thou shalt not couet thy neighbours ha
thou shalt not couet thy neighbours wife, ne
man-servuant, nor his maid-servuant, nor his ox

Is this exercise realistic?

In real natural language...

...every word matters



Is this exercise realistic?

In real natural language...

...sentences are longer.

One of Scotland's leading cultural heritage groups will stage the Mary, Queen of Scots Festival, which is hoped to become a major new attraction for the area, which has lost the T in the Park music festival this summer after 18 years.

Is this exercise realistic?

iat lat pippat eneat hilat oloat at-yurp .
lalok brok anok ghirok enemok kantok ok-yurp .

ok-voon ororok sprok .
＼＼／
at-voon bichat dat .

ok-drubel ok-voon anok plok sprok .
at-drubel at-voon pippat rrat dat .

erok sprok izok hihok ghirok .
totat dat arrat vat hilat .

ok-voon anok drok brok jok .
at-voon krat pippat sat lat

wiwok farok izok stok .
\\ | /
totat jjat quat cat .

lalok sprok izok jok stok .
\\ | ~~/~~ /
wat dat krat quat cat .

lalok farok ororok lalok sprok izok enemok .
\\ | \ / /
wat jyat bichat wat dat vat eneat .

lalok brok anok plok nok .
＼ / / | |
iat lat pippat rrat nnat .

wiwok nok izok kantok ok-yurp .
\\ | | | /
totat nnat quat oloat at-yurp .

lalok mok nok yorok ghirok clok .
| \ | / |
wat nnat gat mat bat hilat .

lalok nok crrrok hihok yorok zanzanok .
wat nnat arrat mat zanzanat .

lalok rarok nok izok hihok mok .
\\ \times \times /
wat nnat forat arrat vat gat .

la empresa tiene enemigos fuertes en Europa .

Garcia and associates .

—

Garcia y asociados .

Carlos Garcia has three associates .

/ / / /

Carlos Garcia tiene tres asociados .

his associates are not strong.

A horizontal row of five white line segments on a dark background. The first segment is a short vertical line on the far left. To its right are three diagonal line segments forming an 'X' shape, and further to the right is another short vertical line.

sus asociados no son fuertes .

Garcia has a company also

~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ ~~6~~ ~~7~~ ~~8~~ ~~9~~ ~~10~~ ~~11~~ ~~12~~ ~~13~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ ~~18~~ ~~19~~ ~~20~~ ~~21~~ ~~22~~ ~~23~~ ~~24~~ ~~25~~ ~~26~~ ~~27~~ ~~28~~ ~~29~~ ~~30~~ ~~31~~ ~~32~~ ~~33~~ ~~34~~ ~~35~~ ~~36~~ ~~37~~ ~~38~~ ~~39~~ ~~40~~ ~~41~~ ~~42~~ ~~43~~ ~~44~~ ~~45~~ ~~46~~ ~~47~~ ~~48~~ ~~49~~ ~~50~~ ~~51~~ ~~52~~ ~~53~~ ~~54~~ ~~55~~ ~~56~~ ~~57~~ ~~58~~ ~~59~~ ~~60~~ ~~61~~ ~~62~~ ~~63~~ ~~64~~ ~~65~~ ~~66~~ ~~67~~ ~~68~~ ~~69~~ ~~70~~ ~~71~~ ~~72~~ ~~73~~ ~~74~~ ~~75~~ ~~76~~ ~~77~~ ~~78~~ ~~79~~ ~~80~~ ~~81~~ ~~82~~ ~~83~~ ~~84~~ ~~85~~ ~~86~~ ~~87~~ ~~88~~ ~~89~~ ~~90~~ ~~91~~ ~~92~~ ~~93~~ ~~94~~ ~~95~~ ~~96~~ ~~97~~ ~~98~~ ~~99~~ ~~100~~

Garcia tambien tiene una empresa .

its clients are angry .

The image consists of several white line segments on a black background. There are two parallel diagonal lines extending from the bottom left towards the top right. Above these, there is a single vertical line segment. To the right of the vertical line, there is another set of parallel lines: one short vertical line above a longer diagonal line.

sus clientes estan enfadados .

the clients and the associates are enemies .

/ \ | / | / | / | /

los clientes y los asociados son enemigos .

the company has three groups.

— — — — —

la empresa tiene tres grupos .

its groups are in Europe.

O T I

sus grupos estan en Europa .

the modern groups sell strong pharmaceuticals .

A diagram consisting of two separate sets of white lines on a dark background. The left set includes two vertical lines and two diagonal lines that intersect to form an 'X'. The right set includes one vertical line and two diagonal lines that intersect to form an 'X'.

los grupos modernos venden medicinas fuertes

the groups do not sell zanzanine .

los grupos no venden zanzanina .

the small groups are not modern .
los grupos pequenos no son modernos .

la empresa tiene enemigos fuertes en Europa .

the company has strong enemies in Europe .

Garcia and associates .

Garcia y asociados .

Carlos Garcia has three associates .

Carlos Garcia tiene tres asociados .

his associates are not strong.

sus asociados no son fuertes .

Garcia tambien tiene una empresa .

its clients are angry .

sus clientes estan enfadados .

the clients and the associates are enemies .

los clientes y los asociados son enemigos .

the company has three groups.

la empresa tiene tres grupos .

its groups are in Europe.

sus grupos estan en Europa .

the modern groups sell strong pharmaceuticals .

los grupos modernos venden medicinas fuertes

the groups do not sell zanzanine .

los grupos no venden zanzanina .

the small groups are not modern .

los grupos pequeños no son modernos .

Questions

- How do we formalize machine translation as a machine learning problem?
- When does it work, and when doesn't it? Why?
- If it works, how well does it work?
- How can we use it?

Machine Translation

<http://www.inf.ed.ac.uk/teaching/courses/mt/>

Teaching team:

Sameer
Bansal



Nikolay
Bogoychev



Anna
Currey



Soňa
Galovičová



Sorcha
Gilroy

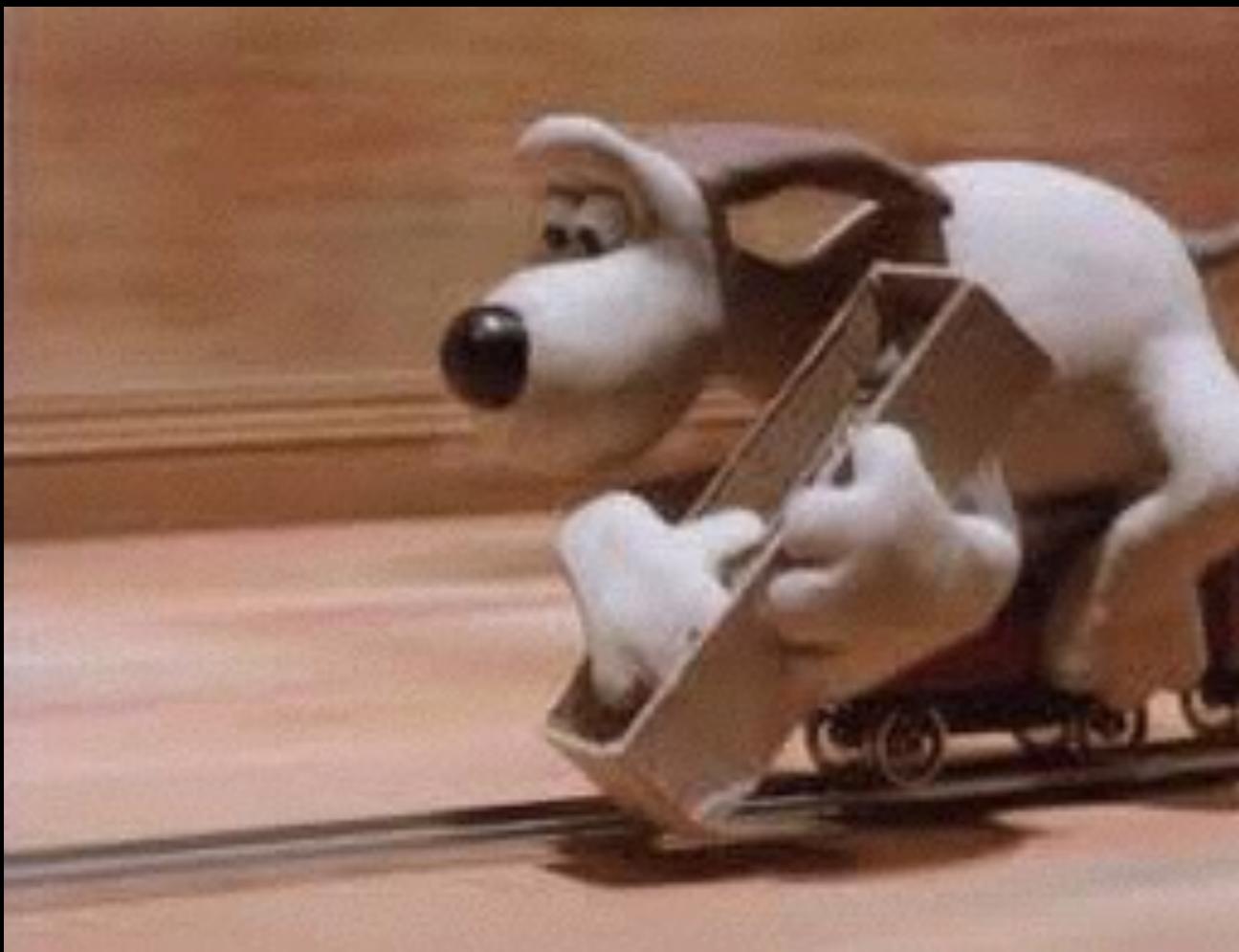
Jonathan
Mallinson

Ida
Szubert

Clara
Vania

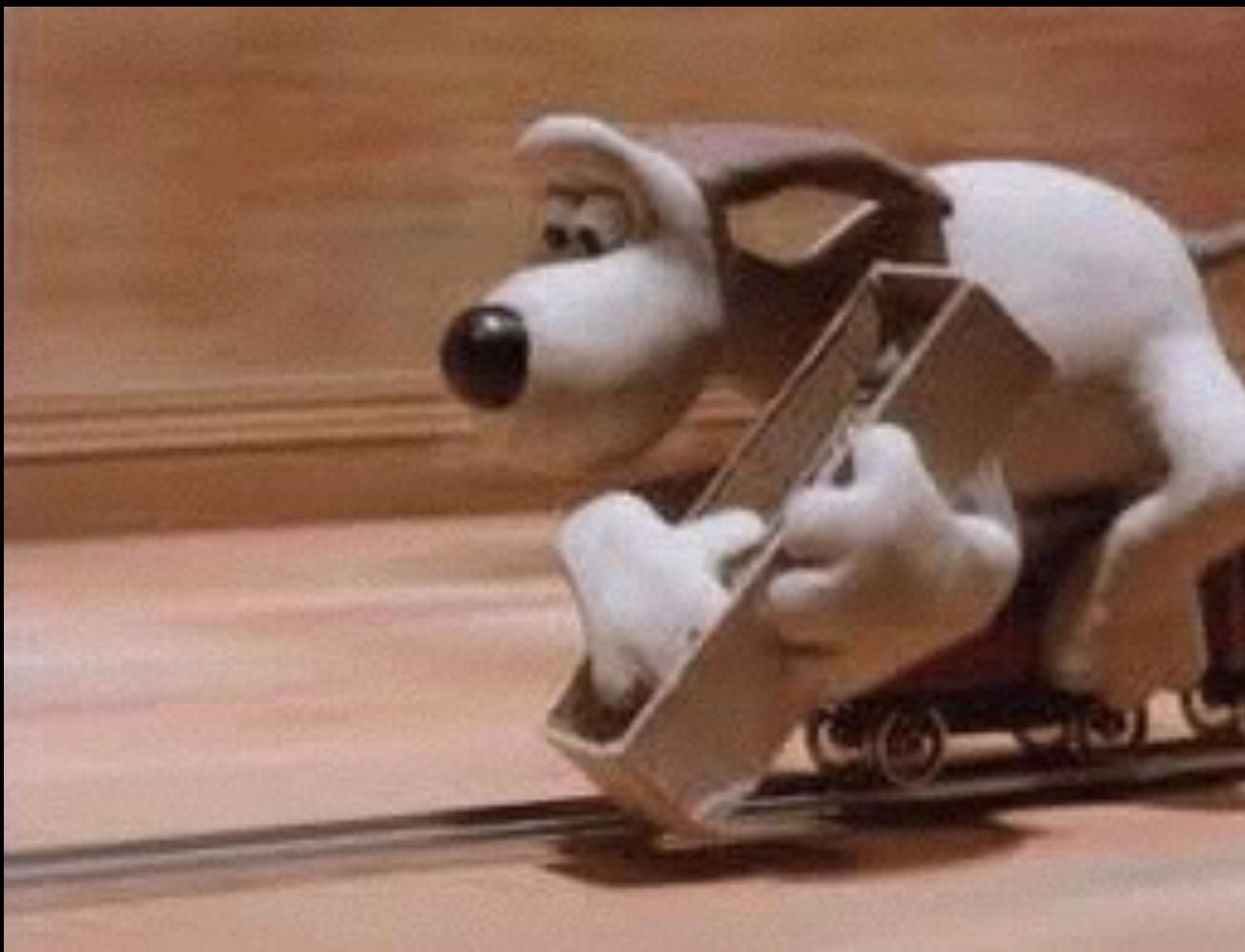
Teaching team tasks

- The field has substantially changed in the last year.
- So, the course must change, too.



Teaching team tasks

- The field has substantially changed in the last year.
- So, the course must change, too.



- In particular, there will be more deep learning.
- But deep learning for language is probabilistic!
- So our focus is **probabilistic models of language**.

“Probabilistic models of language”

This course is about implementing...

```
for ej, logprob, fi, fj in alignments[ei]:  
    if bitmap(range(fi,fj)) & v == 0:  
        new_v = bitmap(range(fi,fj)) | v  
        if new_v in chart[ej]:  
            chart[ej][new_v] = logadd10(chart[ej][new_v], sums[v]+logprob)  
        else:  
            chart[ej][new_v] = sums[v]+logprob
```

...probabilistic models...

$$\mathcal{L}(\theta|\mathcal{D}) = p_\theta(\mathcal{D}|\theta) = \prod_{n=1}^N p_\theta(\mathbf{f}^{(n)}, \mathbf{a}^{(n)} | \mathbf{e}^{(n)}) = \prod_{n=1}^N p(I^{(n)}|J^{(n)}) \prod_{i=1}^{I^{(n)}} p(a_i^{(n)}|J^{(n)}) \cdot p(f_i^{(n)}|e_{a_i}^{(n)})$$

...of language

Ngaragana-nguja ngiy-a gujinganjanga-ni jiyawu ngabulu
grog-PROP.IV.ACC 3.SG.NM.A-PST morther.II.ERG give milk.IV.ACC
`(His) mother gave (him) milk with grog in it.' [wmb]

“Probabilistic models of language”

Very few people are experts in computer science, mathematics, and linguistics, and I **guarantee** you will encounter something you don't know. But if you are unwilling to engage with all of these topics,

DO NOT TAKE THIS COURSE

“Probabilistic models of language”

To future students: There is no way that you should take this course. The reason why is that you need to be competent in linguistics, mathematics and Python programming to do well in the coursework. The lecturer neglected to mention that he expected people to have those skills, but it was clear from the assignments. You will get no help, as there are no tutorials, there is only a forum where you can ask questions, but when a student asked for help because they did not understand the material, the lecturer was not willing to make any changes.

— 2015 course review from someone who didn’t listen to the advice on the previous slide.

“Probabilistic models of language”

The teaching team is willing to answer questions on piazza. You will get more out of this if you also answer questions.

If you want answers to questions you must be **specific**. This is not specific (nor is it a question):

Need more help

I would like to write on behalf of a group of people who are finding this assignment impossible.

Your tasks: complete by Thursday

- Sign up for piazza
- Review the course syllabus
- Review *Basic Probability Theory* (Goldwater)
- Review the online video lectures (available tonight)
- By Wednesday at 4pm, post any questions to piazza