# Crowdsourcing Translation

**Chris Callison-Burch**

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with Rui Yan, Mingkun Gao, Ellie Pavlick, Matt Post, Dmitry Kachaev, Ann Irvine, Omar Zaidan, Scott Novotney, and 10clouds

amazonmechanical turk beta
Artificial Artificial Intelligence

Your Account | HITs | Qualifications

Already have an account?
Sign in as a Worker | Requester

Introduction | **Dashboard** | **Status** | **Account Settings**

# Mechanical Turk is a marketplace for work.

We give businesses and developers access to an on-demand, scalable workforce.
Workers select from thousands of tasks and work whenever it's convenient.

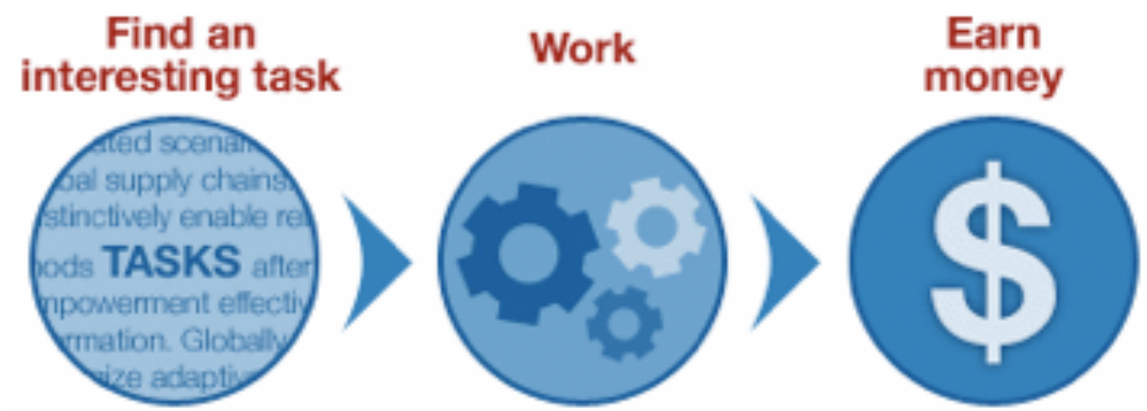
**37,649 HITs** available. View them now.

## Make Money
### by working on HITs

HITs - *Human Intelligence Tasks* - are individual tasks that you work on. Find HITs now.

**As a Mechanical Turk Worker you:**

- Can work from home
- Choose your own work hours
- Get paid for doing good work




Find HITs Now

or learn more about being a **Worker**

## Get Results
### from Mechanical Turk Workers

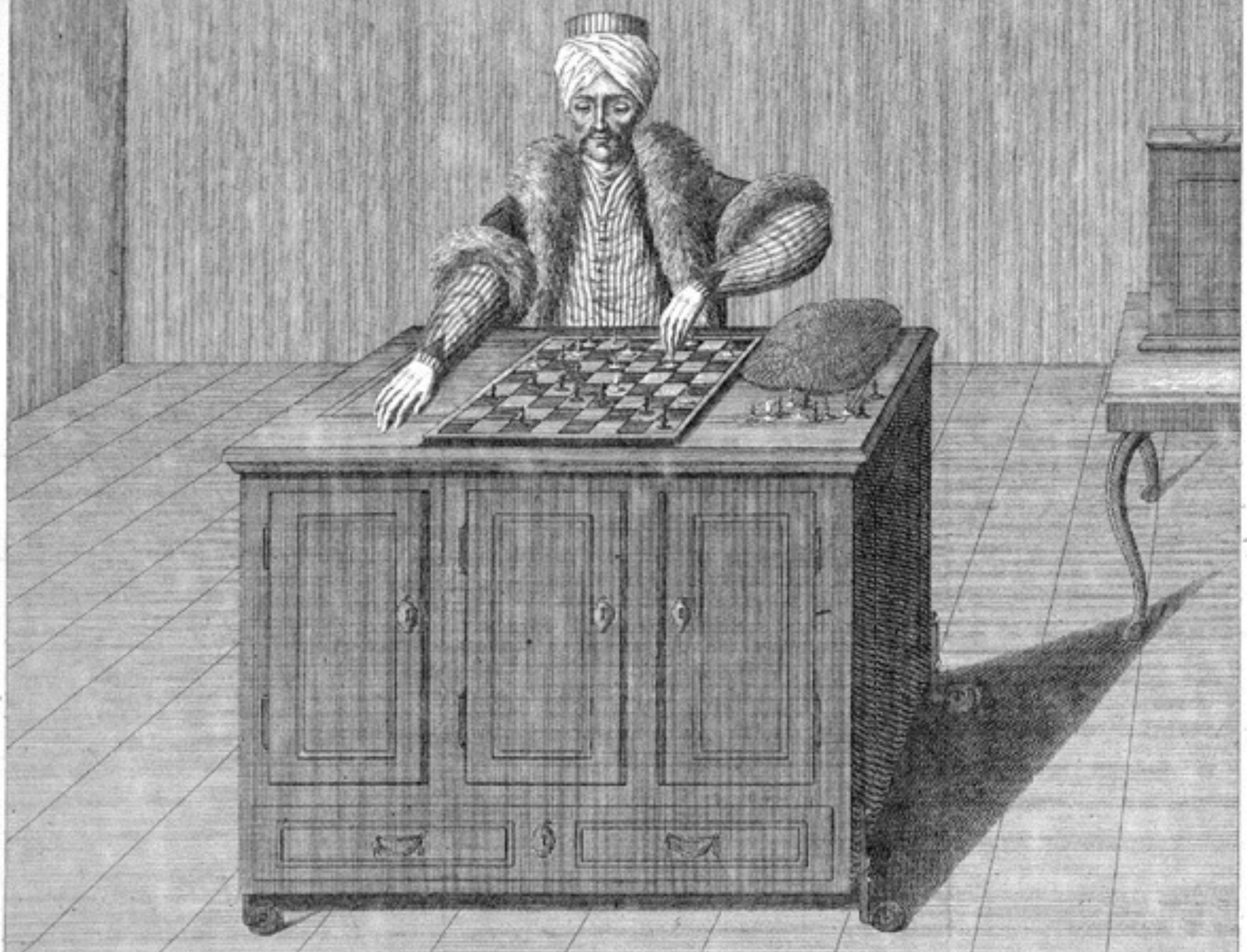
Ask workers to complete HITs - *Human Intelligence Tasks* - and get results using Mechanical Turk. Register Now

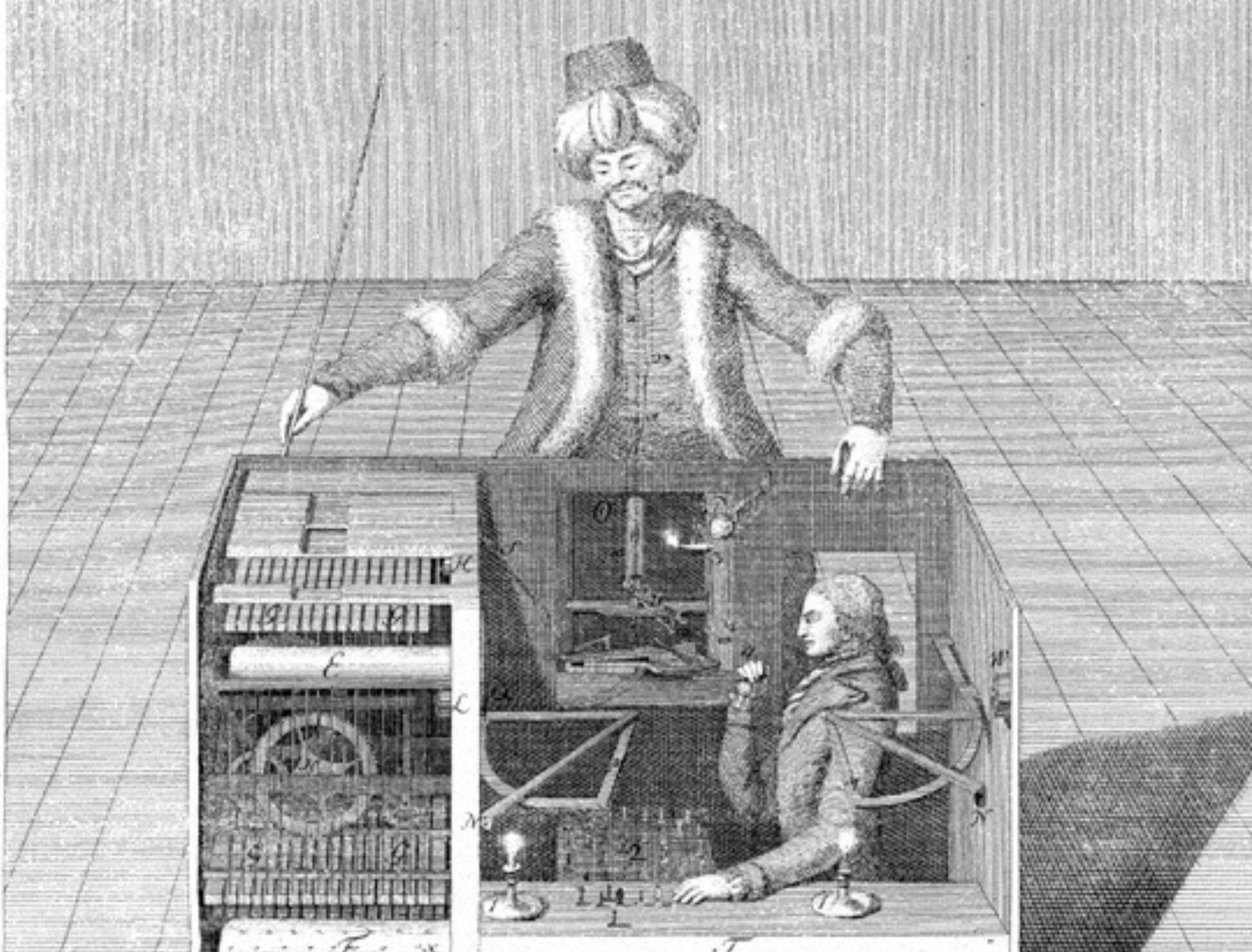
**As a Mechanical Turk Requester you:**

- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results


Get Started

or learn more about being a **Requester**





**Timer:** 00:00:00 of 5 minutes

Want to work on this HIT? Accept HIT

Want to see other HITs? Skip HIT

**Total Earned:** Unavail

**Total HITs Submitted:** 0

Enter Postmark & Stamp Information for a Postcard

**Requester:** Cardcow **Reward:** $0.01 per HIT **HITs Available:** 2 **Duration:** 5 minutes

**Qualifications Required:** Data Entry for Postcards has been granted

## Enter Postmark & Stamp Information for this card


**Postmark City:**

**Postmark State:** (or Country)

**Postmark Date:** (Ex: Nov-09) (month & day)

**Postmark Year:** (Ex: 1909)

**Stamp:** (Ex: 1c, 2c, half penny)


**Postmark City:** Barre

**Postmark State:** MA

**Postmark Date:** Oct-11

**Postmark Year:** 1886

**Stamp:** 1c

$ 0.01

# Who are the Turkers?

- Requesters are given very little information about Turkers - basically just a serial number
- No names, no demographic information (like what languages they speak)
- Cannot assume that they have a particular set of skills
- They should be treated as non-experts
- Quality control is a major challenge
- It important to design tasks to be simple and easy to understand

# MTurk for Natural Language Processing

*Snow, O'Connor, Jurafsky and Ng's EMNLP 2008 paper pioneered the use of Mechanical Turk for NLP*

- Affect Recognition

fear("Tropical storm threatens NYC") > fear("Awesome goal for Beckham")

- Word Similarity

sim(man, boy) > sim(rooster, noon)

- Textual Entailment

if "Microsoft was established in Italy in 1985" then "Microsoft was established in 1985"?

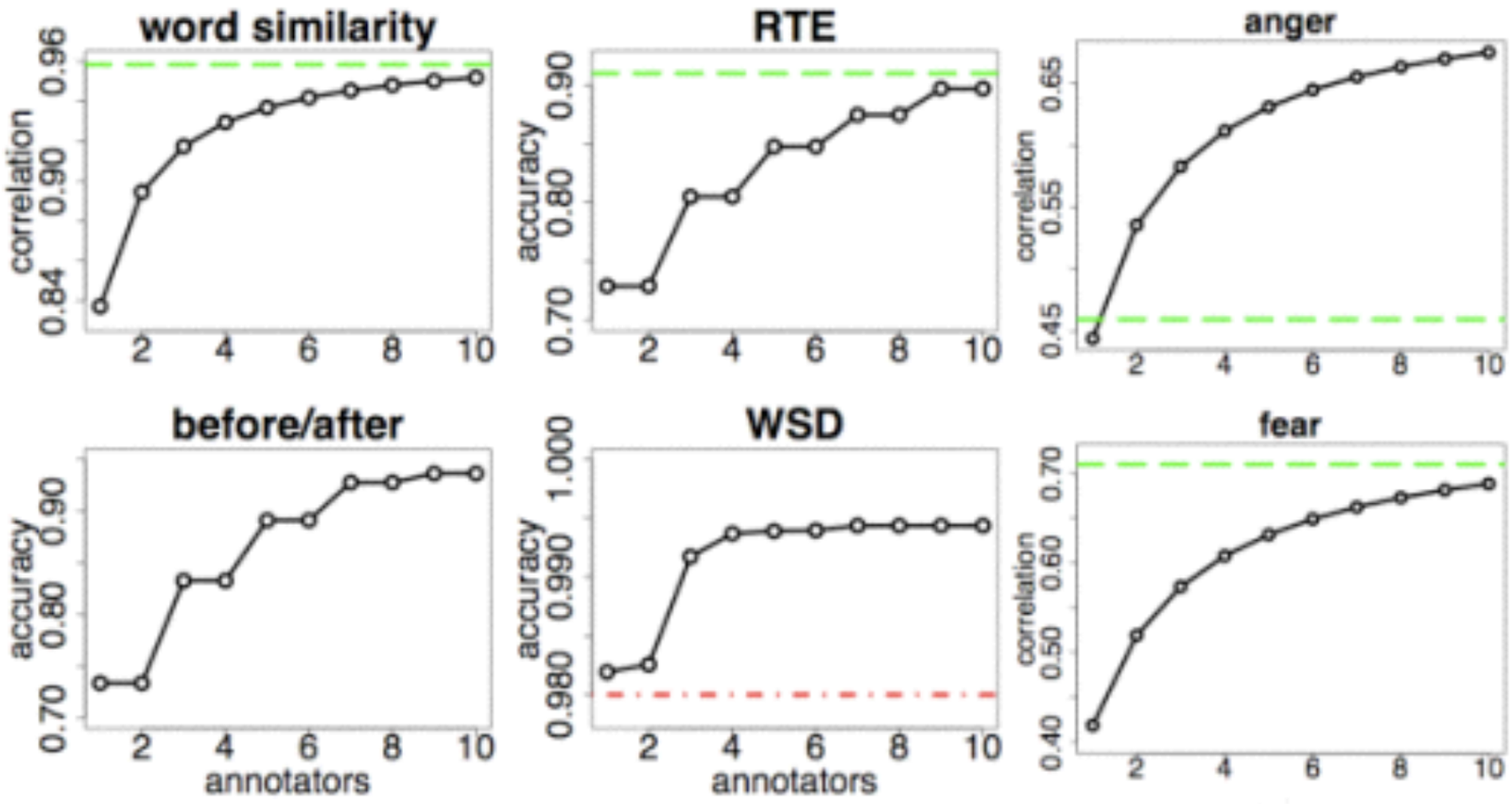
- Word Sense

"bass fishing" v. "bass guitar"

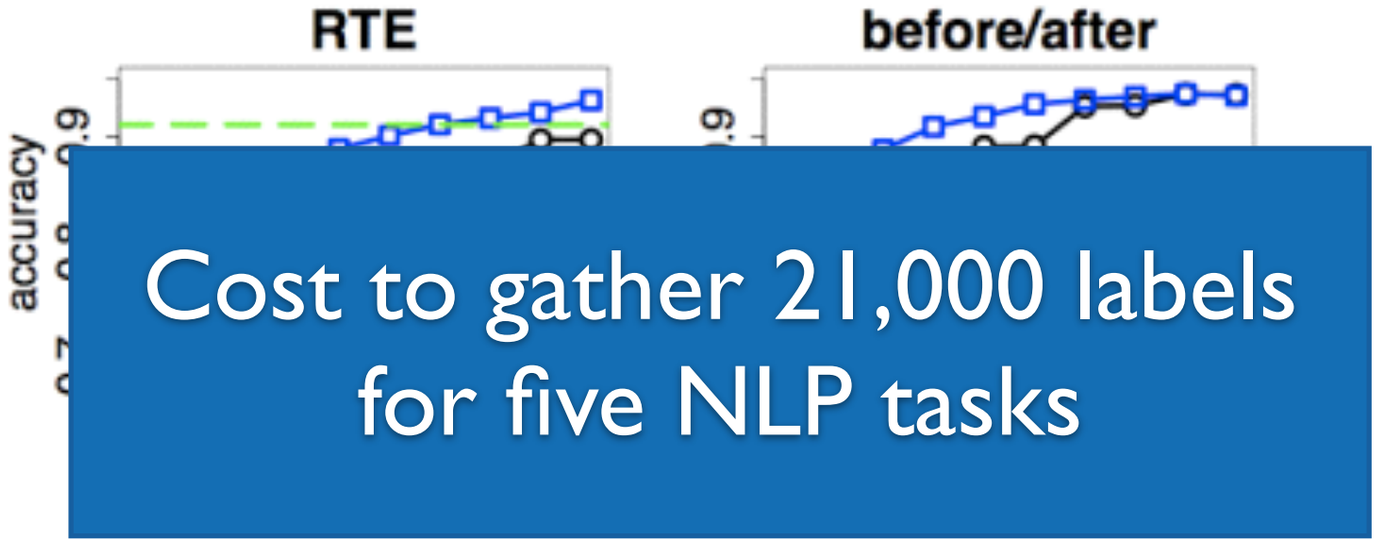
- Temporal Annotation

*denoted* happens before *collapsed* in: "The condemned building collapsed when the crew detonated the charge."

# NLP Annotation




Combine non-expert judgments for high correlation with experts




Cost to gather 21,000 labels for five NLP tasks

Weight w/ small amount of gold standard data for

**$25.82**

# Other NLP applications

NAACL HLT 2010 LOS ANGELES

- Workshop on Using Mechanical Turk for Speech and Language Applications
- 35 researchers spent $100, wrote papers, and distributed their data
- Mark Dredze and I wrote an overview paper digesting the results

# $100 Challenge

NAACL HLT 2010 LOS ANGELES

- Traditional NLP tasks
  - WSD, RTE, NLG, common sense knowledge
- Speech and Vision
  - Transcribed speech, accented speech, handwriting OCR
- Sentiment, Polarity, Bias
  - Cross language, blogs
- Information Retrieval
  - TREC style annotations
- Information Extraction
  - Relation extraction, NER
- Machine Translation
  - Paraphrases, alignments, training and eval sets, rule cleaning

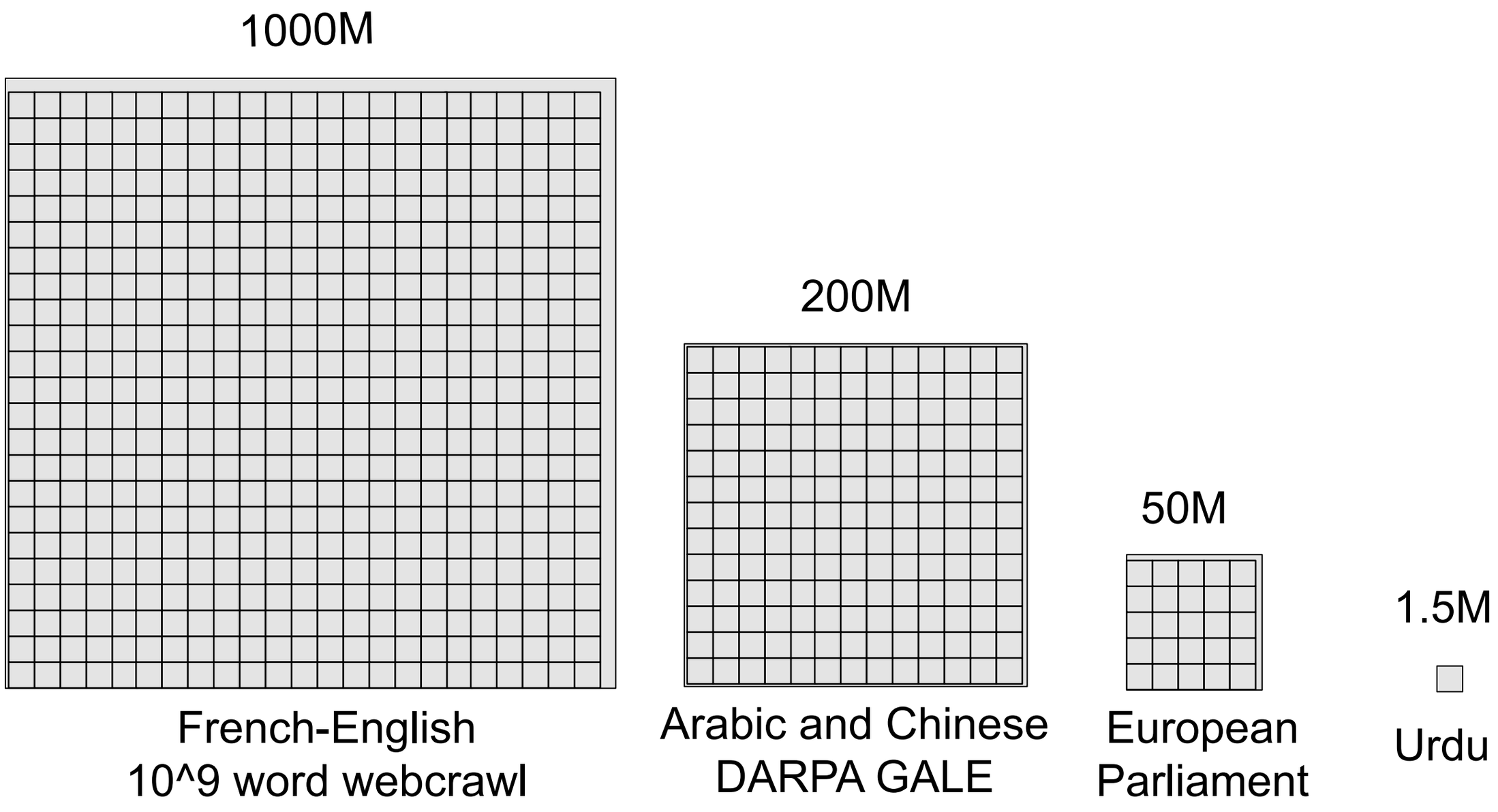
# Statistical machine translation

- Translation rules are learned bilingual texts using machine learning techniques

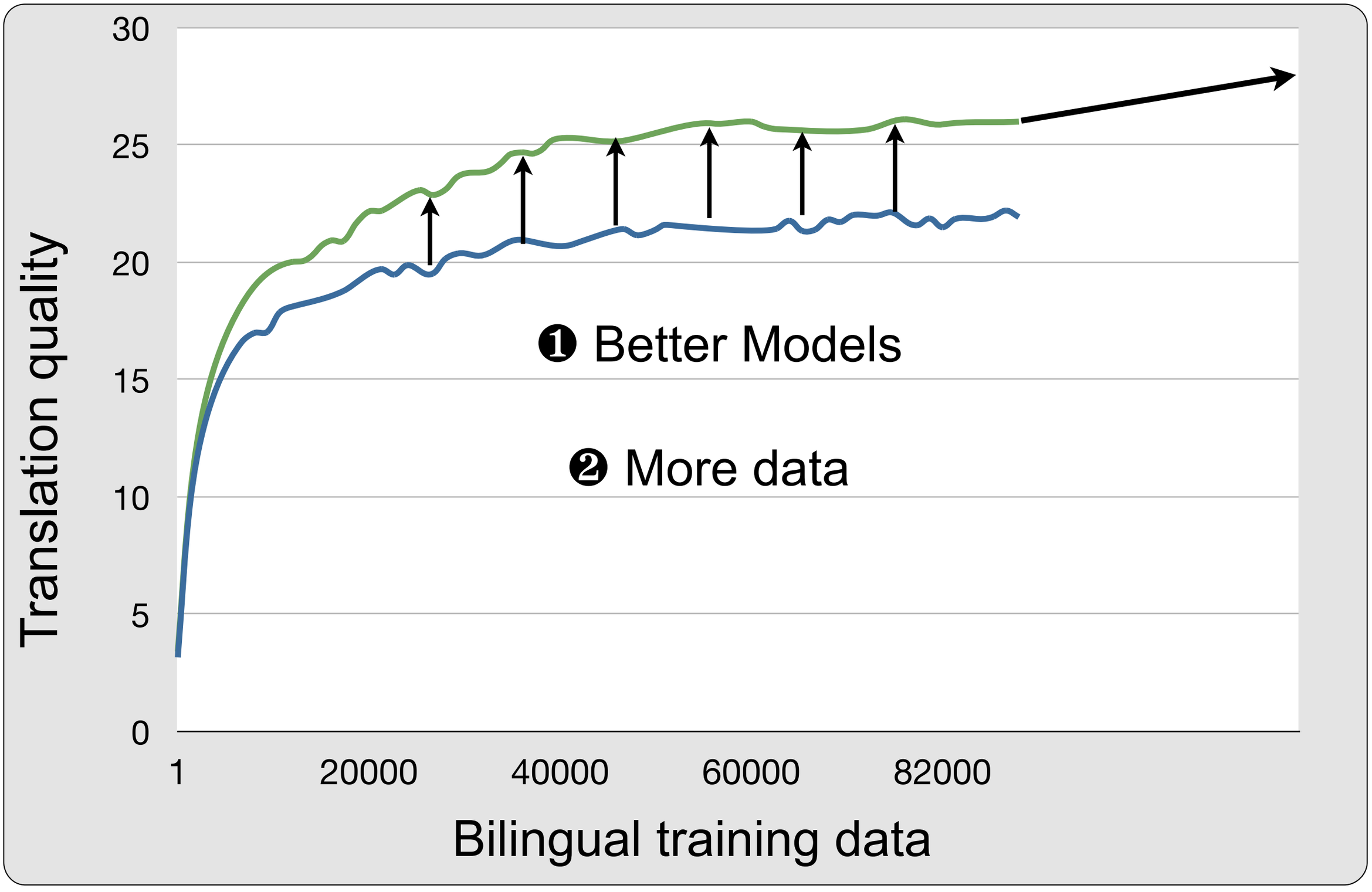
| **Arabic** | **English** |
| --- | --- |
| فالتعذيب لا يزال يمارس على نطاق واسع | Torture is still being practised on a wide scale. |
| وتتم عمليات الاعتقال والاحتجاز دون سبب بصورة روتينية | Arrest and detention without cause take place routinely. |
| وحان وقت التحلى بالبصيرة والشجاعة السياسية . | This is a time for vision and political courage |
| . . . | . . . |

| **Chinese** | **English** |
| --- | --- |
| 我国 能源 原材料 工业 生产 大幅度 增长 . | China's energy and raw materials production up. |
| 非国大 要求 阻止 更 多 被 拘留 人员 死亡 . | ANC calls for steps to prevent deaths in police custody . |
| . . . | . . . |

# Training data vaires by language



# How to Improve Machine Translation

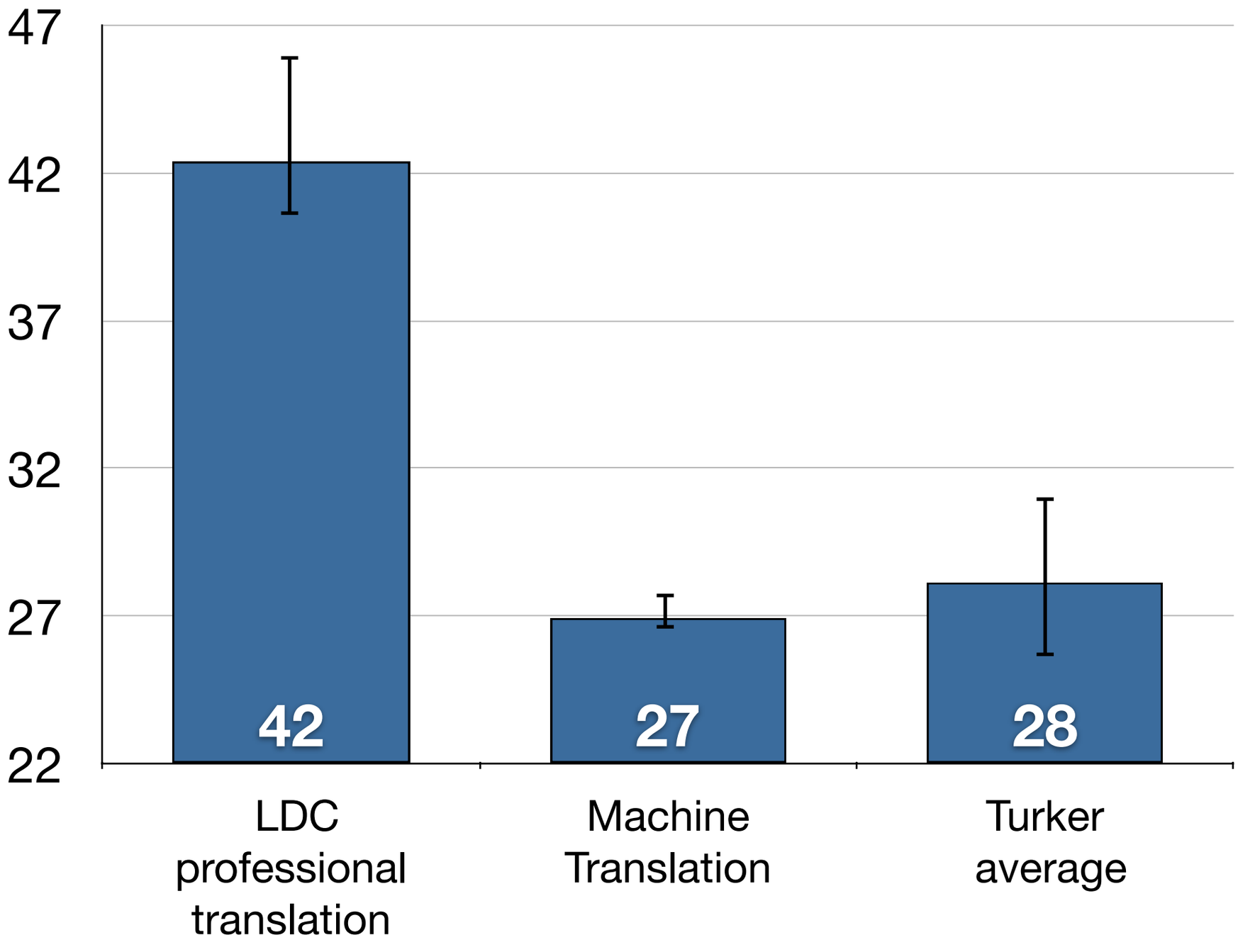


# Can Turkers Translate?

| Urdu | LDC Translation | Turk Translation |
| --- | --- | --- |
| میں اس خطے میں ابتدائی 1994 انسانوں کی باقیات جو تقریباً 8 لاکھ سال پرانی مانی جاتی ہے، دریافت کی گئیں جنہیں ہومو اینٹی سیسر یعنی 'بانی انسان' کا نام دیا گیا۔<br>اس سے قبل 6 لاکھ پرانے انسان جنہیں سائنسی اصطلاح میں ہومو ہیڈلبرجینسس کہا جاتا ہے، اس خطے کے قدیم ترین رہائشی مانے جاتے تھے۔<br>آثارِ قدیمہ کے ماہرین کا کہنا ہے کہ انہیں ایسے شواہد ملے ہیں جن سے پتہ چلتا ہے کہ اس خطے کے لوگ ڈھلائی کیے ہوئے اوزار بھی | In 1994, the remains of early human beings who were believed to be eight hundred thousand years old were discovered who were given the name homo antecessor meaning the 'founder man'.Prior to this, the six hundred thousand years old man, called homo heidelebergenisis in scientific terms, was believed to be the earliest resident of this area. | In 1994, the remains of pre-historic man, which are believed to be 800,000 years old were discovered and they were named 'Home Antecessor' meaning 'The Founding Man'. Prior to that 6 lac years old humans, named as Homogenisens in scientific terms, were beleived to be the oldest dewellers of this area. |

# Professionals versus Turkers*

*Without Quality Control



| | | | |
|---|---|---|---|
| Avoiding dieting to prevent from flu | abstention from dieting in order to avoid Flu | Abstain from decrease eating in order to escape from flue | In order to be safer from flu quit dieting |
| This research of American scientists came in front after experimenting on mice. | This research from the American Scientists have come up after the experiments on rats. | This research of American scientists was shown after many experiments on mouses. | According to the American Scientist this research has come out after much experimentations on rats. |
| Experiments proved that mice on a lower calorie diet had comparatively less ability to fight the flu virus. | in has been proven from experiments that rats put on diet with less calories had less ability to resist the Flu virus. | It was proved by experiments the low calories eaters mouses had low defending power for flue in ratio. | Experimentaions have proved that those rats on less calories diet have developed a tendency of not overcoming the flu virus. |
| research has proven this old myth wrong that its better to fast during fever. | Research disproved the old axiom that " It is better to fast during fever" | The research proved this old talk that decrease eating is useful in fever. | This Research has proved the very old saying wrong that it is good to starve while in fever. |

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| Abstain | | decrease eating | in order | to | | escape | | flue |
| quit | | dieting | | to | be | safer | from | flu |

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| Abstain | | decrease eating | in order | to | | escape | from | flue |
| quit | | dieting | | to | be | safer | from | flu |

# Translate Urdu into English

Help us translate Urdu articles into English. Your translations will be distributed with a Creative Commons license, so that other people can re-use it. This HIT is for people who speak both Urdu and English. Please **do not use** translation software or online machine translation systems like Google translate. Please make sure that your English translation:

- Does not add or delete any information from the original text
- Has the same meaning and style as the original
- Does not contain any spelling errors
- Is grammatical, natural-sounding English

First, please answer these questions about your language abilities:

Is Urdu your native language? ○ Yes ○ No

How many years have you spoken Urdu? _____ years

Is English your native language? ○ Yes ○ No

How many years have you spoken English? _____ years

**Informed Consent Form**

**Purpose of research study:** We are collecting translations to improve translation software and to make Wikipedia content accessible in all languages.

**Benefits:** Although it will not directly benefit you, this study may benefi society by improving how computers process human languages. This cou lead to better translation software, improved web searching, or new user interfaces for computers and mobile devices.

**Risks:**There are no risks for participating in this study.

**Voluntary participation:**You may stop participating at any time withou penalty by clicking on the "Return HIT" button, or closing your browser window.

**We may end your participation if** you do not have adequate knowledg of the language, or you are not following the instructions, or your answer significantly deviate from known translations.

**Confidentiality:** The only identifying information kept about you will b a WorkerID serial number and your IP address. This information may be disclosed to other researchers.

**Questions/concerns:** You may e-mail questions to the principle investigator, Chris Callison-Burch. If you feel you have been treated unfairly you many contact the Johns Hopkins University Institutional Review Board.

**Clicking on the "Accept HIT" button** indicates that you understand th information in this consent form. You have not waived any legal rights you otherwise would have as a participant in a research study.

| | |
|---|---|
| افغانستان ایشیاء کا ایک ملک ہے جس کا سرکاری نام اسلامی جمہوریہ افغانستان ہے۔ | Translation of the first sentence goes here. |
| اس کے جنوب اور مشرق میں پاکستان، مغرب میں ایران، شمال مشرق میں چین، شمال میں ترکمانستان، ازبکستان اور تاجکستان ہیں۔ | Translation of the second sentence goes here. |
| اردگرد کے تمام ممالک سے افغانستان کے تاریخی، مذہبی اور ثقافتی تعلق بہت گہرا ہے۔ | |
| اس کے بیشتر لوگ مسلمان ہیں۔ | |
| یہ ملک بالترتیب ایرانیوں، یونانیوں، عربوں، ترکوں، منگولوں، | |

# Quality Control Model

- **Sentence features**
  - Language model probability
  - Ratio of source / target sentence lengths
  - Web n-gram match percentage
  - Translation edit rate to other translators
- **Turker features**
  - Aggregate of sentence feature scores
  - Self-reported language abilities
    (Is native speaker? How long speaking?)
  - Worker location (Pakistan? India?)
- **Ranking features** (based on second pass vote)
- **Calibration feature** (Bleu against professionals)

# Vote for the best translation

Please read the sentences and vote on the one that you think is the best in each group. The sentences are translations that were produced by pe
who are not native English speakers.  Their translations are often ungrammatical, misspelled, disfluent, or bad in other ways. Your goal is to t
pick the best translation among the set. The one that you choose as the best will be forwarded on for editing, and it will undergo a variety of o
quality control mechanisms before it is published.

You should consider the following factors when selecting one translation as the best:

- Does it make more sense than the others?
- Is the English reasonably good?
- Do the grammar and spelling require only minimal correction?

| | |
|---|---|
| ○ | Experimentaions have proved that those rats on less calories diet have developed a tendency of not overcoming the flu virus . |
| ○ | in has been proven from experiments that rats put on diet with less calories had less ability to resist the Flu virus. |
| ○ | Experiments proved that mice on a lower calorie diet had comparatively less ability to fight the flu virus. |
| ○ | It was proved by experiments the low calories eaters mouses had low defending power for flue in ratio. |

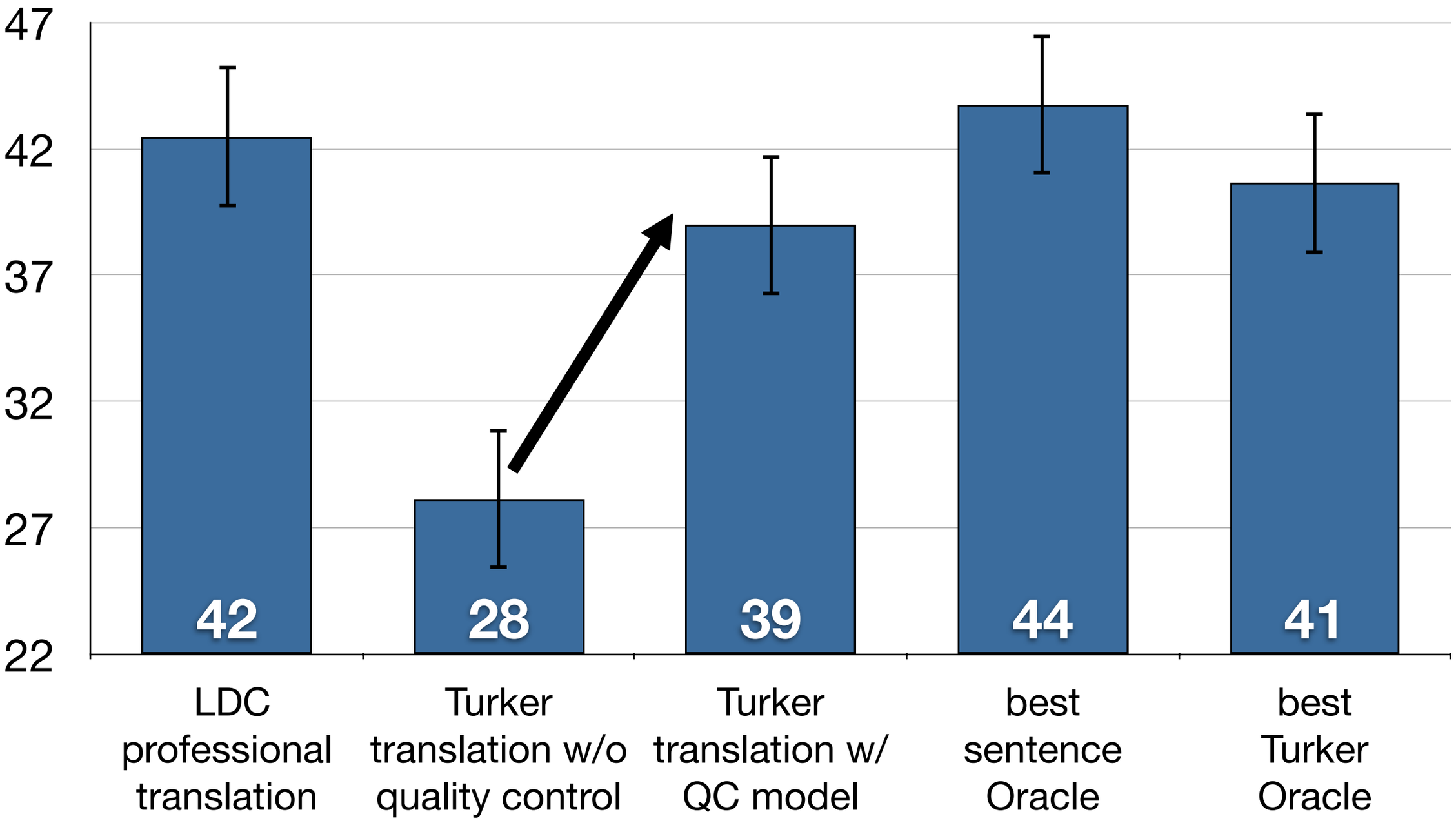
| | |
|---|---|
| ○ | The research proved this old talk that decrease eating is useful in fever. |
| ○ | Research disproved the old axiom that " It is better to fast during fever" |
| ○ | research has proven this old myth wrong that its better to fast during fever. |
| ○ | This Research has proved the very old saying wrong that it is good to starve while in fever. |

| | |
|---|---|
| ○ | According to the scientist a patient should eat more while in fever. |
| ○ | According to scientists, eat a lot during fever. |
| ○ | Eat and drink more in fever according to scientists. |
| ○ | according to the scientists one should eat a lot during fever. |

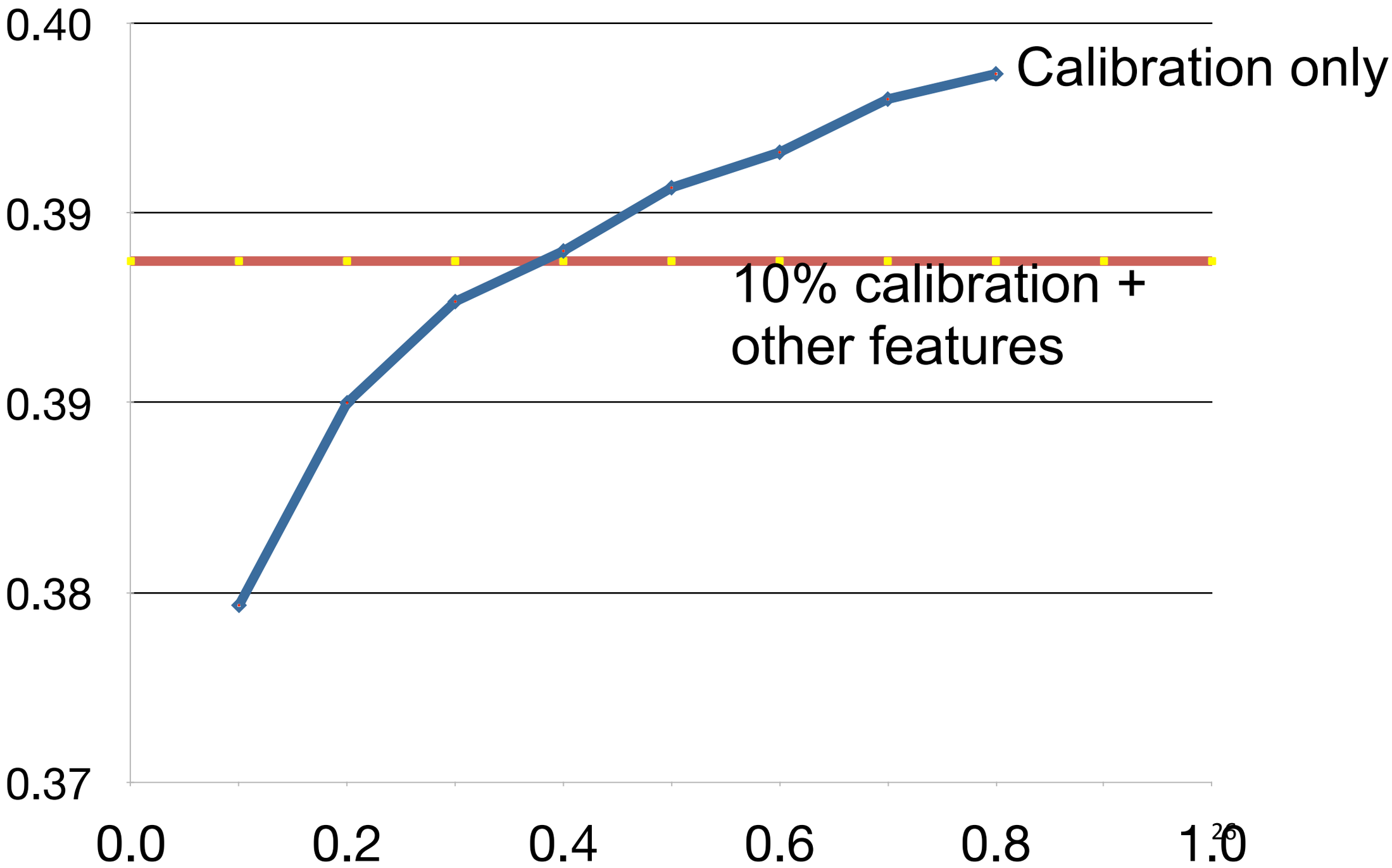
| | |
|---|---|
| ○ | According to the Researchers of the State of Michigan University diet taking rats have less strength to fight with the infection and also the chances of death increased whereas earlier those rats on common diet had more strength to fight with the flu virus. |

# Professional Quality from Non-Professionals

Full details in Zaidan and Callison-Burch (ACL 2011a) & Zaidan (PhD Thesis 2012)



# % of gold stadard data used for calibration



# ESL editing HIT

Sri Lanka 's forest region was destroyed by agriculture , ~~wooden works~~ forestry , ~~vetinary feeds~~ animal grazing , etc . ,

several commissions ~~where~~ were created to protect the remaining forest region

Sri Lanka is considered ~~as the~~ to be a bird 's sanctionary ~~place~~ .

For further information please see the article on bird sanctionary rights in ~~v~~the Indian Subcontinent

There is thousand of animals living in Sri Lanka which includes several Sri Lanka orignated animals .

When we compare the area of Sri lanka 's Island , birds are highly found here .

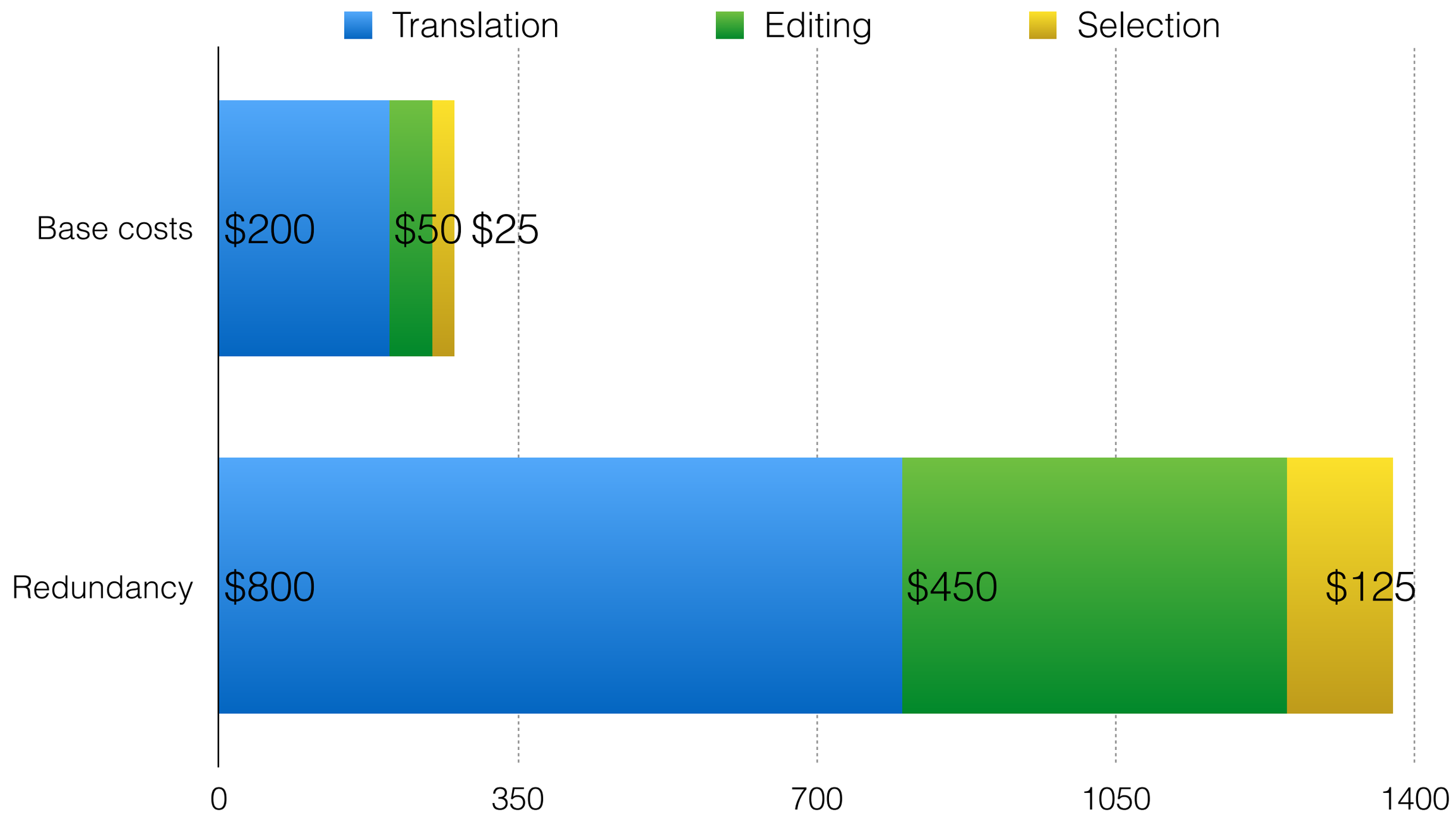
# ESL editing HIT

- Agreement no longer works for QC
  - Most agreement happens between lazy workers!
- Create a sentence with a known set of corrections:
  - Start with a grammatical English sentence
  - Make several transformations to it
    - Break subject-verb agreement / change prepositions / etc
  - Measure how many transformations are fixed
- Easier if we require structured corrections

# Quality wrap up

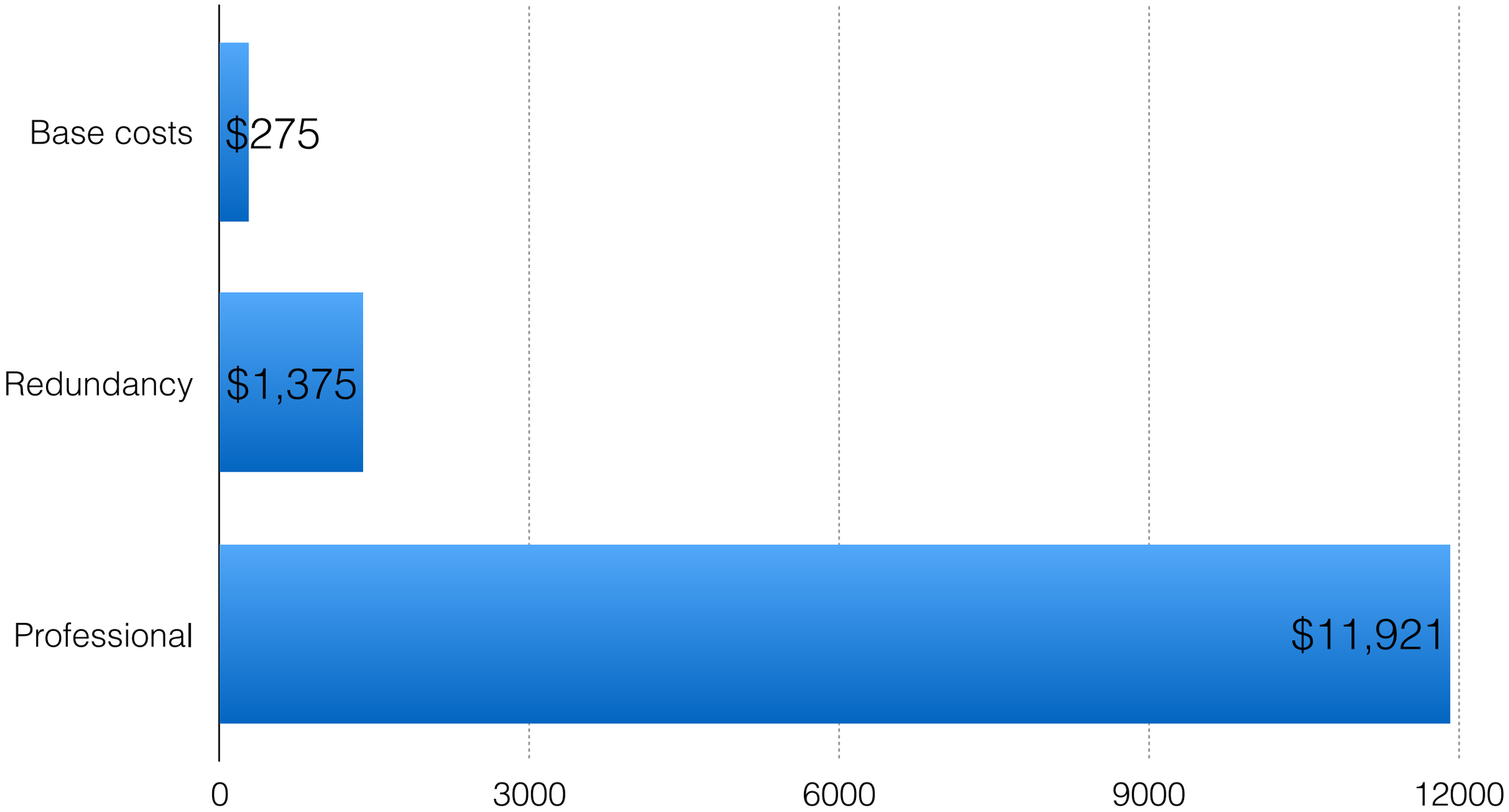
- Crowdsourced translations can reach high quality after quality control
  - Gather redundant translations
  - Calibrate against small amount of professional translations
  - Do second passes over the data where other Turkers select best translations
  - Post-edit the non-native translations
    - In the future: explicitly deal with ESL

# Cost of Translation on MTurk



# Cost of Translation on MTurk

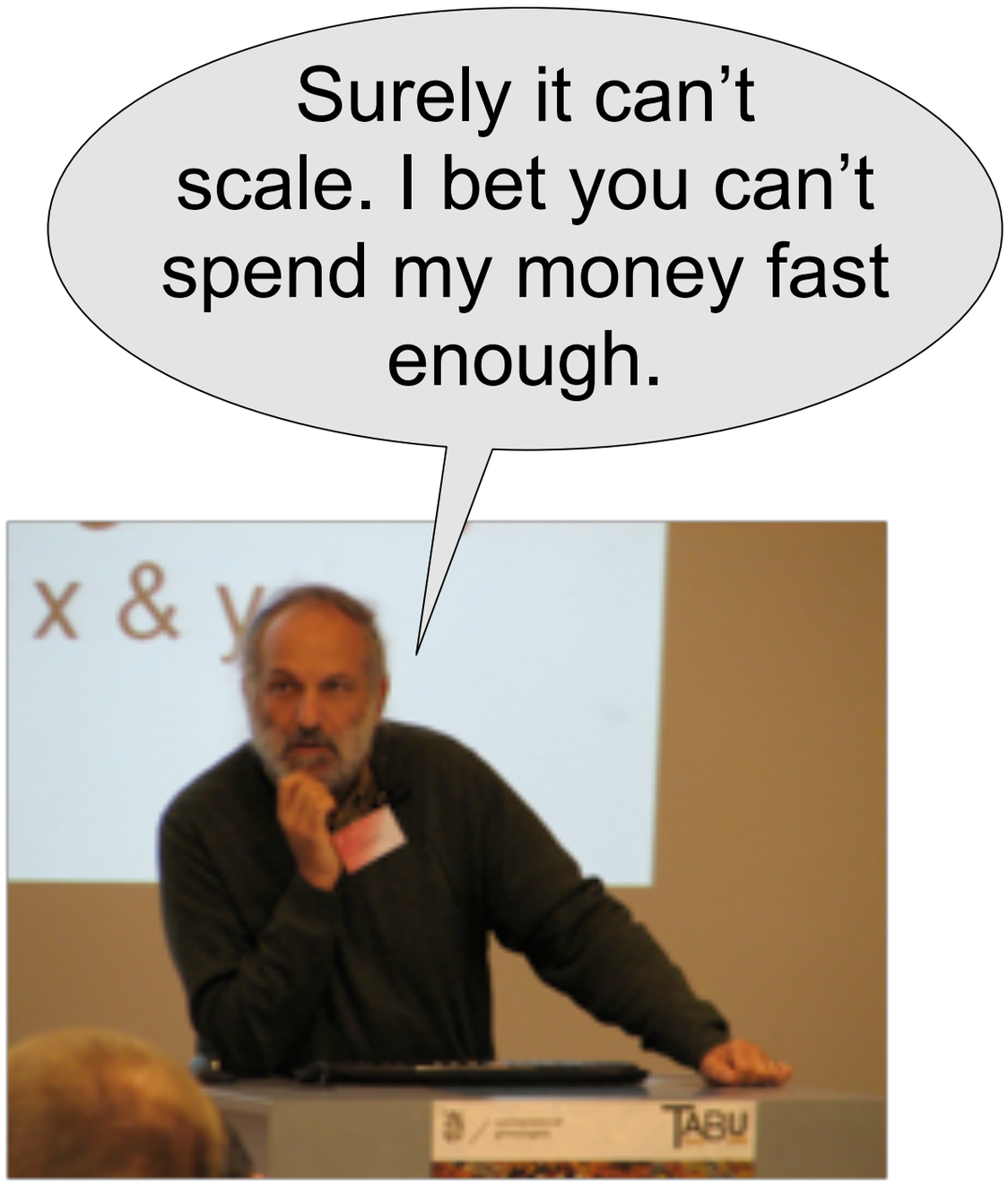
# Cost of Translation versus Professionals



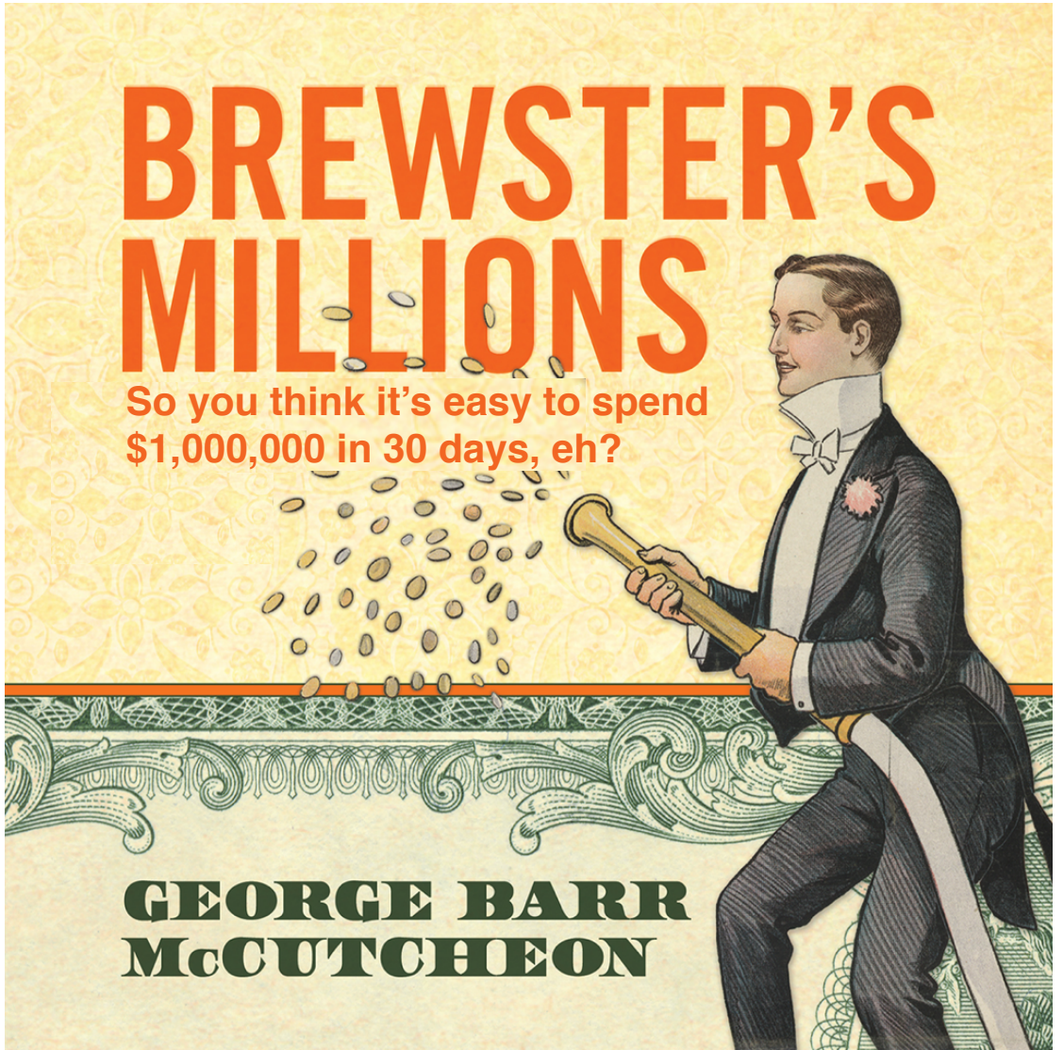
# Cost of Translation on MTurk

- Approximately an order of magnitude cheaper than the cost of professional translation
- Further reductions possible
  - reduce dependency on gold standard data
  - reduce amount of redundant translations collected
  - predict whether we need to get another translation
- It now seems feasible to collect enough data to train a statistical machine translation system

# $100,000 challenge




- Ken Church bet me $50k that I couldn't spend $50k on MTurk in two months



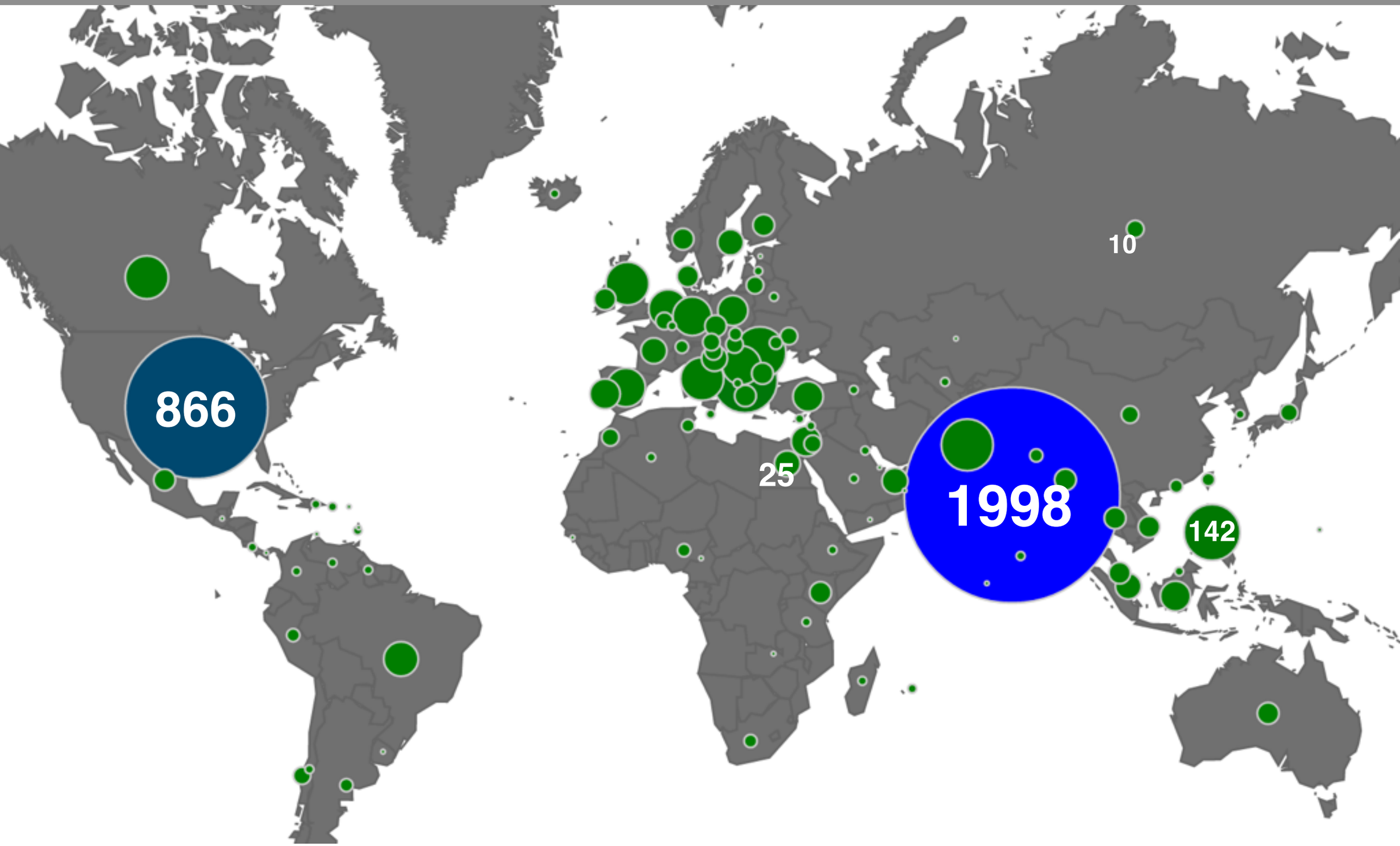
# Leaderboard

## Mechanical Turk Monitor: Top-1000 Recent Requesters

General | Top requesters | Arrivals | Completed | Search | About

| | Requester ID | Requester | #Task | #HITs | Rewards |
|---|---|---|---|---|---|
| 1 | Dolores Labs | A2IR7ETVOIULZU (RSS) | 470 | 317857 | 33084.24 |
| 2 | ContentGalore | A2XL3J4NH6JI12 (RSS) | 674 | 10622 | 17554.6 |
| 3 | SpeechInk | A1AQ7EJ5P7ME65 (RSS) | 9019 | 13613 | 12876.67 |
| 4 | CastingWords | A3MI6MIUNWCR7F (RSS) | 9454 | 14036 | 8947.02 |
| 5 | QuestionSwami | AD7C0BZNKYGYV (RSS) | 629 | 4116 | 4750.37 |
| 6 | Chris Callison-Burch | A32TTE4XXN6MQZ (RSS) | 11 | 9961 | 4458.02 |
| 7 | Smartsheet.com Clients | A1197OGL0WOQ3G (RSS) | 434 | 38212 | 3118.28 |
| 8 | retaildata | AD14NALRDOSN9 (RSS) | 8 | 50288 | 3110.85 |
| 9 | Classify This | A1CTI3ZAWTR5AZ (RSS) | 25 | 94590 | 1891.8 |
| 10 | Andrew Stephen | A1Y25F6MZCMQGY (RSS) | 3 | 22705 | 1131.25 |
| 11 | Dolores Labs 2 | A3JX8WONBL5N9X (RSS) | 34 | 8976 | 1043.27 |
| 12 | RelevanceQuest | A8RMEN71ICE57 (RSS) | 15 | 47881 | 1029.92 |
| 13 | Crowd Task | AFAOUHS65HNDS (RSS) | 4 | 2388 | 955.6 |
| 14 | nlds.soe.ucsc.edu | A1HI9DWCF794RE (RSS) | 4 | 4702 | 933.9 |

# Language Demographic Study



# Survey

Is `{language}` your native language?

How many years have you spoken `{language}`?

Is English your native language?

How many years have you spoken English?

What country do you live in?

# Self-reported Native Languages

| | | | | | |
|---|---|---|---|---|---|
| English | 689 | French | 63 | Vietnamese | 34 |
| Tamil | 253 | Polish | 61 | Macedonia | 31 |
| Malayalam | 210 | Urdu | 56 | Cebuano | 29 |
| Hindi | 149 | Tagalog | 54 | Swedish | 26 |
| Spanish | 131 | Marathi | 48 | Bulgarian | 25 |
| Telugu | 87 | Russian | 44 | Swahili | 23 |
| Chinese | 86 | Italian | 43 | Hungarian | 23 |
| Romanian | 85 | Bengali | 41 | Catalan | 22 |
| Portuguese | 82 | Gujarati | 39 | Thai | 22 |
| Arabic | 74 | Hebrew | 38 | Lithuanian | 21 |
| Kannada | 72 | Dutch | 37 | Punjabi | 21 |
| German | 66 | Turkish | 35 | Others | ≤ 20 |

# Translation Task

WIKIPEDIA

100 languages with the most articles

1,000 most viewed articles

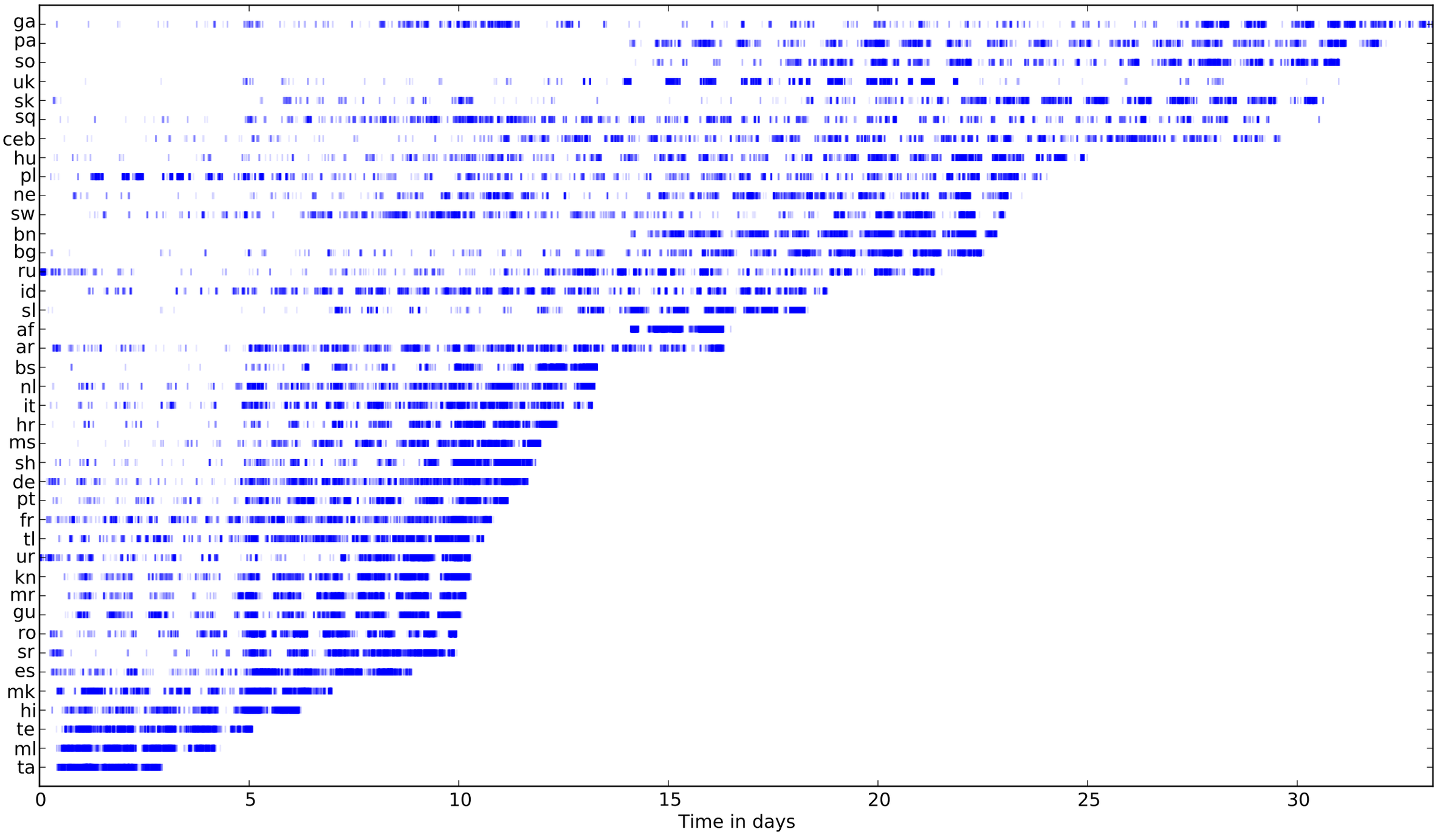
10,000 most frequent words

amazon mechanical turk™

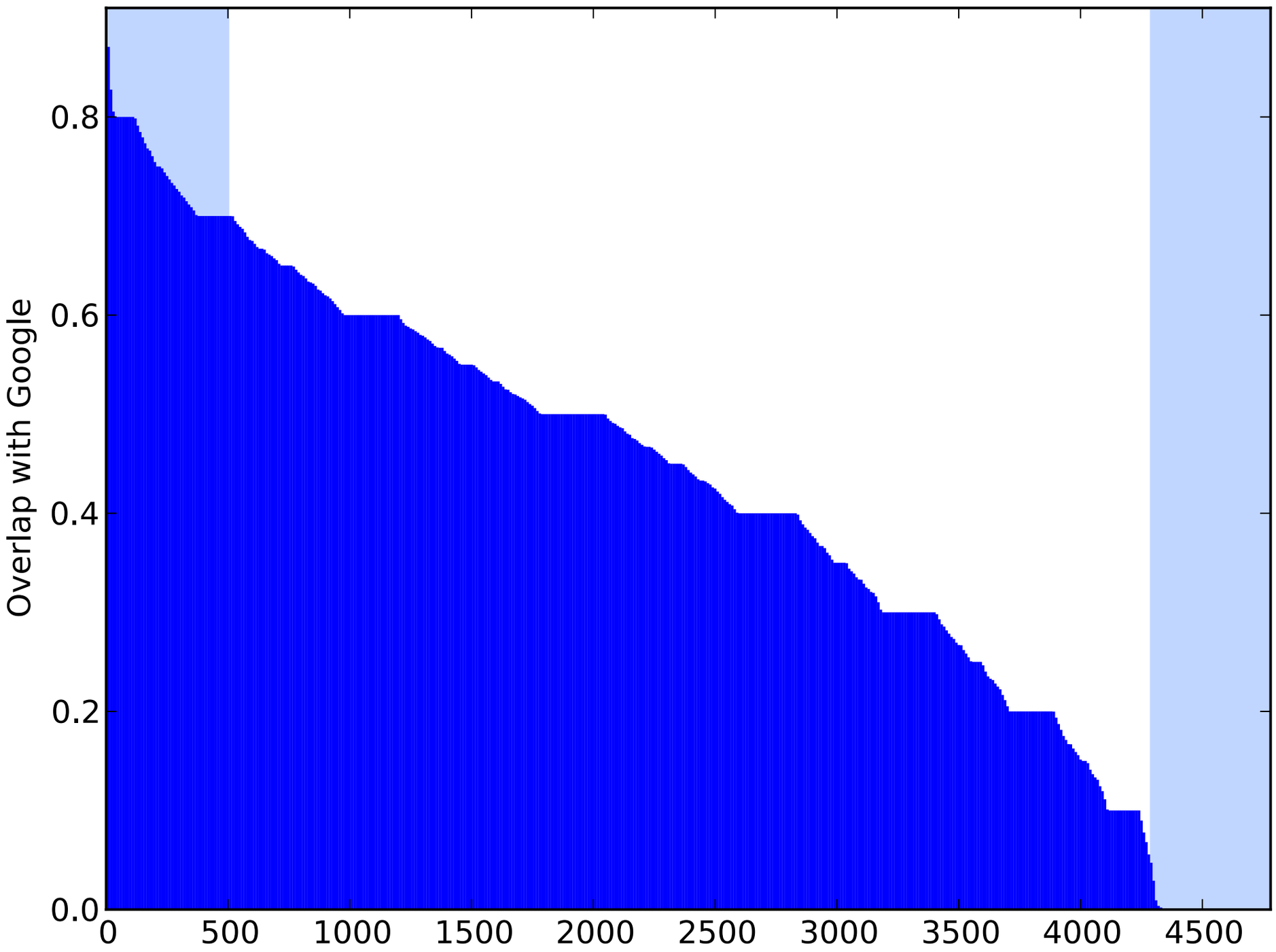
Artificial Artificial Intelligence

| | | | | |
|---|---|---|---|---|
| Afrikaans | Czech | Italian | Norwegian (bokmal) | Swahili |
| Albanian | Danish | Japanese | Norwegian (nynorsk) | Swedish |
| Amharic | Dutch | Javanese | Pashto | Tagalog |
| Arabic | Esperanto | Kannada | Persian | Tamil |
| Aragonese | Finnish | Kapampangan | Piedmontese | Tatar |
| Armenian | French | Kazakh | Polish | Telugu |
| Asturian | Galician | Korean | Portuguese | Thai |
| Azerbaijani | Georgian | Kurdish | Punjabi | Tibetan |
| Basque | German | Latvian | Quechua | Turkish |
| Belarusian | Greek | Lithuanian | Romanian | Ukrainian |
| Bengali | Gujarati | Low saxon | Russian | Urdu |
| Bishnupriya | Haitian | Luxembourgish | Serbian | Uzbek |
| Bosnian | Hebrew | Macedonian | Serbo-croatian | Vietnamese |
| Breton | Hindi | Malagasy | Sicilian | Walloon |
| Bulgarian | Hungarian | Malayalam | Sindhi | Waray-waray |
| Catalan | Icelandic | Malay | Slovak | Welsh |
| Cebuano | Ido | Marathi | Slovenian | West frisian |
| Central_bicolano | Ilokano | Neapolitan | Somali | Wolof |
| Chinese | Indonesian | Nepali | Spanish | Yoruba |
| Croatian | Irish | Newar/Nepal Bhasa | Sundanese | Zazaki |

# Time to complete 10,000 translations



# Cheating with Google Translate



# Quality Control

Wikipedia page titles connected by inter-language links, removing pairs for which

- either title was longer than a single word
- English word didn’t appear in Wordnet
- English Wikipedia page was a subcategory of person or place
- titles were identical or one was a substring of the other

# Quality Control

**Do these words have the same meaning?**

**copra** and **part of**
◯Yes ◯No ◯Related but not synonymous
☐ Word is misspelled

**lactation** and **lactiation**
◯Yes ◯No ◯Related but not synonymous
☐ Word is misspelled

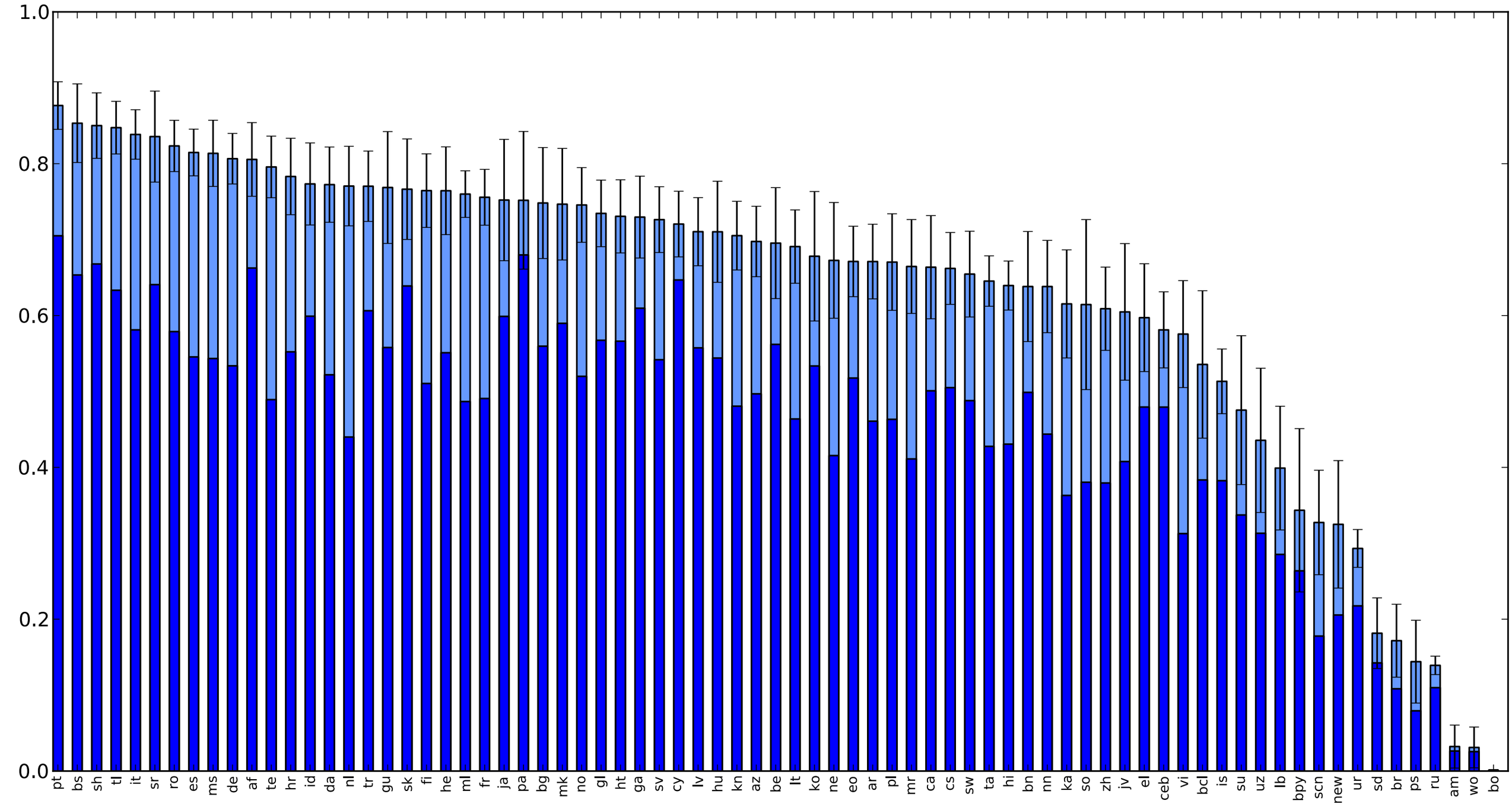
**loam** and **laterite, rich brick-colored soil containing iron and aluminum; loam, soil rich in decaying matter**
◯Yes ◯No ◯Related but not synonymous
☐ Word is misspelled

**salvia** and **salvia (plant)**
◯Yes ◯No ◯Related but not synonymous
☐ Word is misspelled

**demo** and **show**
◯Yes ◯No ◯Related but not synonymous
☐ Word is misspelled

# Translation Quality

$$\text{Quality}(l_i) = \frac{\sum_{t_j \in \texttt{turkers}[i]} \text{Quality}(t_j)}{|\,\texttt{turkers}[i]\,|}$$



# Translation Quality

| | Avg. Turker quality (# Ts) | | Primary locations | Primary locations |
|---|---|---|---|---|
| | In region | Out of region | of Turkers in region | of Turkers out of region |
| Hindi | 0.63 (296) | **0.69** (7) | India (284) UAE (5) UK (3) | Saudi Arabia (2) Russia (1) Oman (1) |
| Tamil | **0.65** (273) ** | 0.25 (2) | India (266) US (3) Canada (2) | Tunisia (1) Egypt (1) |
| Malayalam | 0.76 (234) | **0.83** (2) | India (223) UAE (6) US (3) | Saudi Arabia (1) Maldives (1) |
| Spanish | 0.81 (191) | **0.84** (18) | US (122) Mexico (16) Spain (14) | India (15) New Zealand (1) Brazil (1) |
| French | 0.75 (170) | **0.82** (11) | India (62) US (45) France (23) | Greece (2) Netherlands (1) Japan (1) |
| Chinese | **0.60** (116) | 0.55 (21) | US (75) Singapore (13) China (9) | Hong Kong (6) Australia (3) Germany (2) |
| German | **0.82** (91) | 0.77 (41) | Germany (48) US (25) Austria (7) | India (34) Netherlands (1) Greece (1) |
| Italian | **0.86** (90) * | 0.80 (42) | Italy (42) US (29) Romania (7) | India (33) Ireland (2) Spain (2) |
| Amharic | **0.14** (16) ** | 0.01 (99) | US (14) Ethiopia (2) | India (70) Georgia (9) Macedonia (5) |
| Kannada | 0.70 (105) | NA (0) | India (105) | |
| Arabic | **0.74** (60) ** | 0.60 (45) | Egypt (19) Jordan (16) Morocco (9) | US (19) India (11) Canada (3) |
| Sindhi | **0.19** (96) | 0.06 (9) | India (58) Pakistan (37) US (1) | Macedonia (4) Georgia (2) Indonesia (2) |
| Portuguese | 0.87 (101) | **0.96** (3) | Brazil (44) Portugal (31) US (15) | Romania (1) Japan (1) Israel (1) |
| Turkish | 0.76 (76) | **0.80** (27) | Turkey (38) US (18) Macedonia (8) | India (19) Pakistan (4) Taiwan (1) |
| Telugu | **0.80** (102) | 0.50 (1) | India (98) US (3) UAE (1) | Saudi Arabia (1) |
| Irish | **0.74** (54) | 0.71 (47) | US (39) Ireland (13) UK (2) | India (36) Romania (5) Macedonia (2) |
| Swedish | **0.73** (54) | 0.71 (45) | US (25) Sweden (22) Finland (3) | India (23) Macedonia (6) Croatia (2) |
| Czech | **0.71** (45) * | 0.61 (50) | US (17) Czech Republic (14) Serbia (5) | Macedonia (22) India (10) UK (5) |
| Russian | **0.15** (67) * | 0.12 (27) | US (36) Moldova (7) Russia (6) | India (14) Macedonia (4) UK (3) |
| Breton | 0.17 (3) | **0.18** (89) | US (3) | India (83) Macedonia (2) China (1) |

# Language Feasibility

| workers | quality | speed | |
|---|---|---|---|
| many | high | fast | Dutch, French, German, Gujarati, Italian, Portuguese, Romanian, Serbian, Spanish, Tagalog, Telugu |
| | | slow | Arabic, Hebrew, Irish, Punjabi, Swedish, Turkish |
| | medium or low | fast | Hindi, Marathi, Tamil, Urdu |
| | | slow | Bengali, Bishnupriya Manipuri, Cebuano, Chinese, Nepali, Newar, Polish, Russian, Sindhi, Tibetan |
| few | high | fast | Bosnia, Croatian, Macedonian, Malay, Serbo-Croatian |
| | | slow | Afrikaans, Albanian, Aragonese, Asturian, Basque, Belarusian, Bulgarian, Central Bicolano, Czech, Danish, Finnish, Galacian, Greek, Haitian, Hungarian, Icelandic, Ilokano, Indonesian, Japanese, Javanese, Kapampangan, Kazakh, Korean, Lithuanian, Low Saxon, Malagasy, Nor- wegian (Bokmal), Sicilian, Slovak, Slovenian, Thai, Ukranian, Uzbek, Waray-Waray, West Frisian, Yoruba |
| | medium or low | slow | Amharic, Armenian, Azerbaijani, Breton, Catalan, Georgian, Latvian, Luxembourgish, Neapolitian, Norwegian (Nynorsk), Pashto, Piedmontese, Somali, Sudanese, Swahili, Tatar, Vietnamese, Walloon, Welsh |
| none | | | Esperanto, Ido, Kurdish, Persian, Quechua, Wolof, Zazaki |

# Full Sentence Translations

पाकिस्तान ने भी प्रतिकार स्वरूप २८ मई १९९८ में छह परमाणु परीक्षण कर डाले।

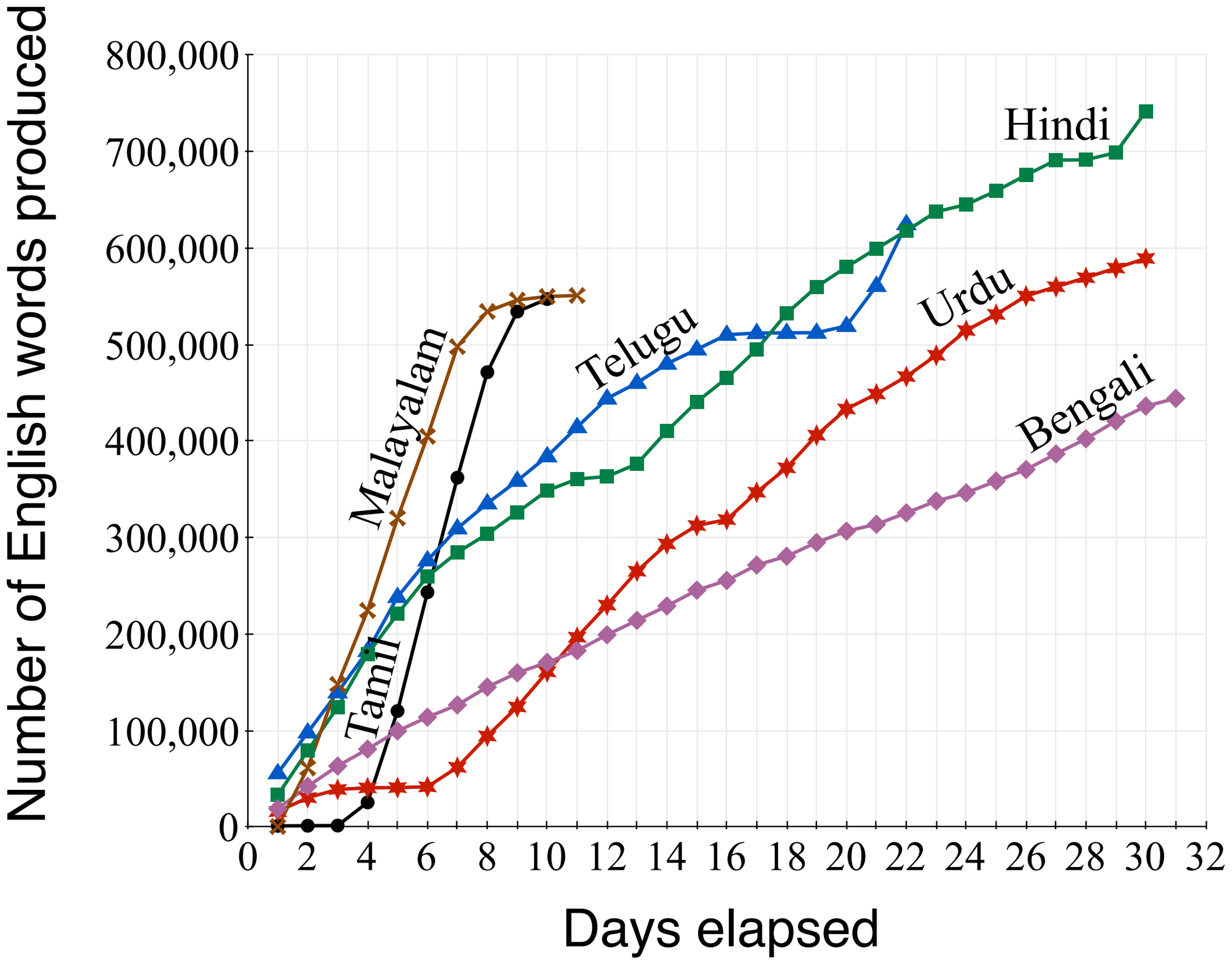
In retribution pakistan also did six nuclear tests on 28 may 1998.

On 28 May Pakistan also conducted six nuclear tests as an act of redressal.

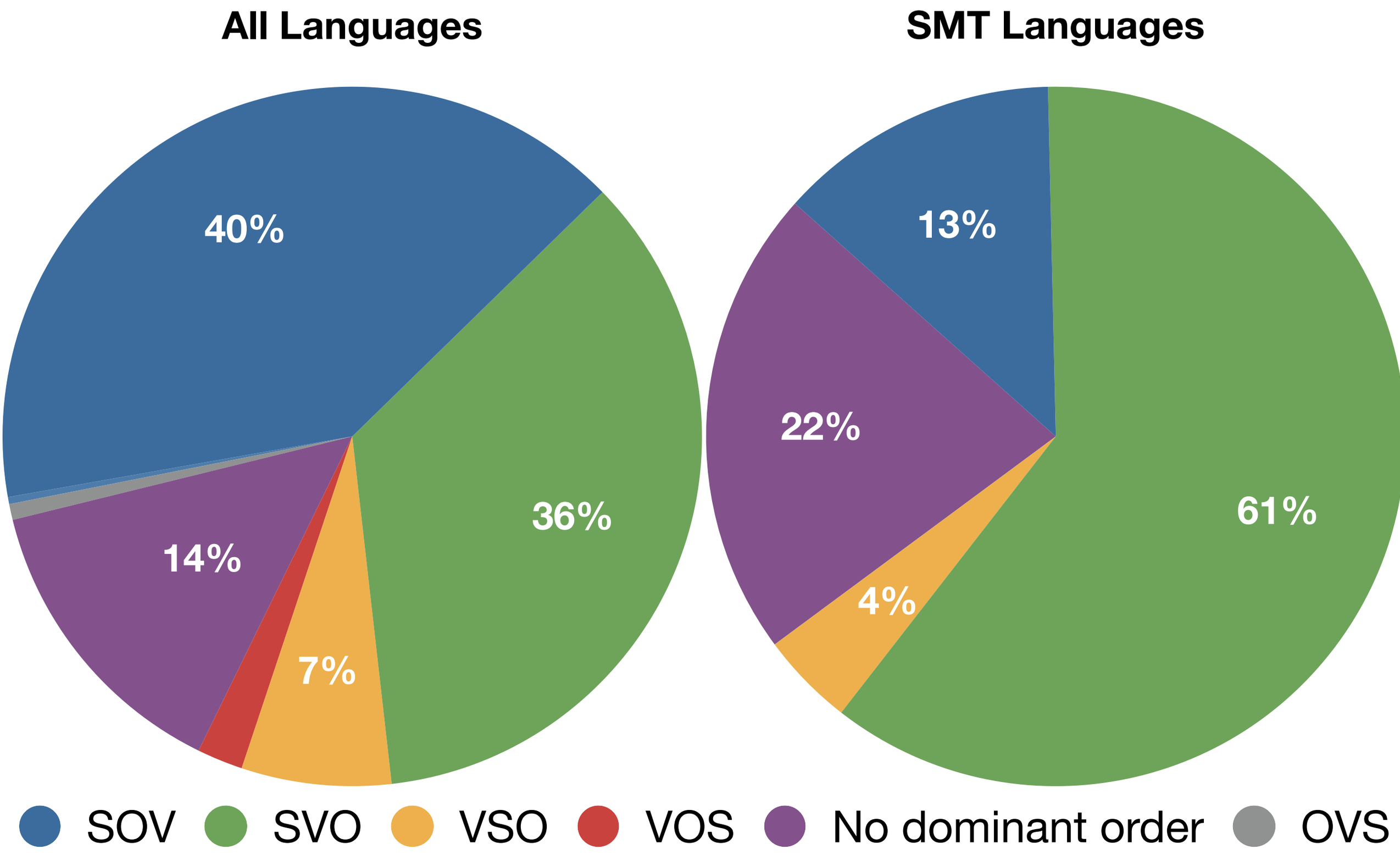
Retaliating on this ’Pakistan’ conducted Six(6) Nuclear Tests on 28 May, 1998.

pakistan also did 6 nuclear test in retribution on 28 may, 1998

# Rate of Translation

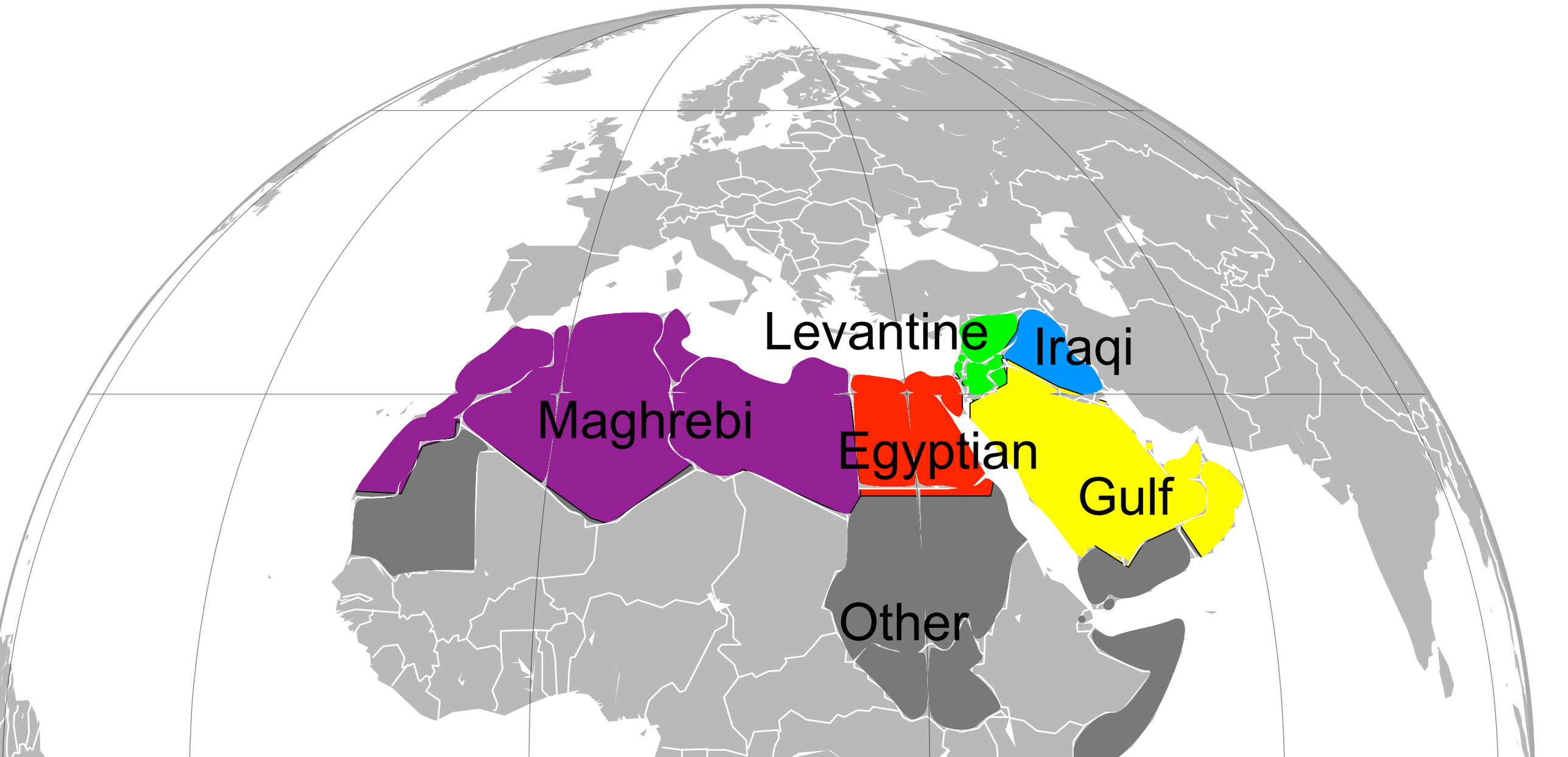


# Better Representation of Languages



# Gathering Data about Arabic Dialects

Arabic has different varieties.  MSA is the standardized form but there are many distinct regional dialects.



# Translating Dialects with MSA MT

MSA: متى سنرى هذه الثلة من المجرمين تخضع للمحاكمة ؟

*mtY snrY h*h Alvlp mn Almjrmyn txDE llmHAkmp ?*

Levantine: ايمتى رح نشوف هالشلة من المجرمين بتتحاكم ؟

*AvmtY rH n$wf hAl$lp mn Almjrmyn bttHAkm ?*

PT: Quando veremos esse grupo de criminosos serem julgados?
ES-EN: **Quando esse** group of criminals see **Serem julgados**?

# Written Arabic Dialect

## بلخادم: ما يجمع مصر والجزائر يجعل التقارب أكثر من ضرورى

الخميس 16 يونيو 2011 - 09:27

عبد العزيز بلخادم الممثل الشخصى للرئيس الجزائرى

الجزائر (أ.ش.أ)

أضف للخبر لى ... Google

أكد عبد العزيز بلخادم الممثل الشخصى للرئيس الجزائرى والأمين العام لحزب جبهة التحرير الوطنى ذات الأغلبية فى البرلمان والحكومة، أن العلاقات بين مصر والجزائر قديمة ومتجذرة علاوة على مصالح مشتركة قوية تربط بين البلدين.

وقال بلخادم إنه بالتالى فإن ما حدث من "سحابات الصيف" عقب مباراة كرة القدم بين فريقى البلدين فى تصفيات كأس العالم عام 2009 لا يؤثر على طبيعة العلاقة والأخوة والروابط بين الشقيقين، مشددا على ضرورة العمل على رفع سقف التعاون بين البلدين على المستوى الحكومى والجماهيرى والمؤسساتى

Article body (MSA)

---

**1 خليك فى حالك وابعد عننا**

بواسطة: bebooo

بتاريخ: الخميس، 16 يونيو 2011 - 09:39

EGY

خليك فى حالك انت وابعدوا عنا وانتم اخر ناس تتكلم عن التقارب والعروبة

**2 الجزائر إخوه أعزاء لنا وأهلاً ومرحباً بتقوية العلاقات معهم**

بواسطة: سامي شاهين

بتاريخ: الخميس، 16 يونيو 2011 - 09:55

MSA

التقارب بين مصر والجزائر يعتبر حاجة ملحة تستدعيه الظروف الراهنه التي يمر بيها الوطن العربي ، أهلاً ومرحباً بأي تقارب عربي عربي بين الأشقاء في الوطن والمصير ، يسقط الأستعمار الجديد المتمثل في أمريكا والناتو ومن ورائة آل صهيون

**3 هزلت**

بواسطة: مواطن مصري بسيط

بتاريخ: الخميس، 16 يونيو 2011 - 09:55

EGY

هزلت وعيلت ومشت سفينة نوح علي اليابس - الدنيا جري فيها ايه علشان نسمع دروس من امثالكم

**4 تنبيه**

بواسطة: علي

بتاريخ: الخميس، 16 يونيو 2011 - 09:57

MSA

انا الشعب الجزائرى يعمل جاهدا من اجل السعي لتوجيد العالم العربي وكدالك السعي ورا طموحات اكير وهي ، ان تكون كلمت العرب كلما واحدة امام الغرب

**5 أنت.....**

بواسطة: الفيلسوف

بتاريخ: الخميس، 16 يونيو 2011 - 10:14

EGY

أنت بتكلم مين يا بلخادم كل الأنضمة فاسدة و تابعة لأمريكا و إسرائيل، إن أردتم فعلا حل مشاكل العرب في البيت العربي فما على الحكام إلا تكوين جمعية و الذهاب لمنتجع الحكام المخلوعين بالمملكة السعودية وسيبوا الشعوب تبحث في قيام الولايات العربية المتحدة و عاصمتها القدس إنشاء الله (معلش حبيبي هو حلم يقظة يمكن يتحقق في يوم من الأيام من منا يعلم الغيب؟)

MSA

EGY

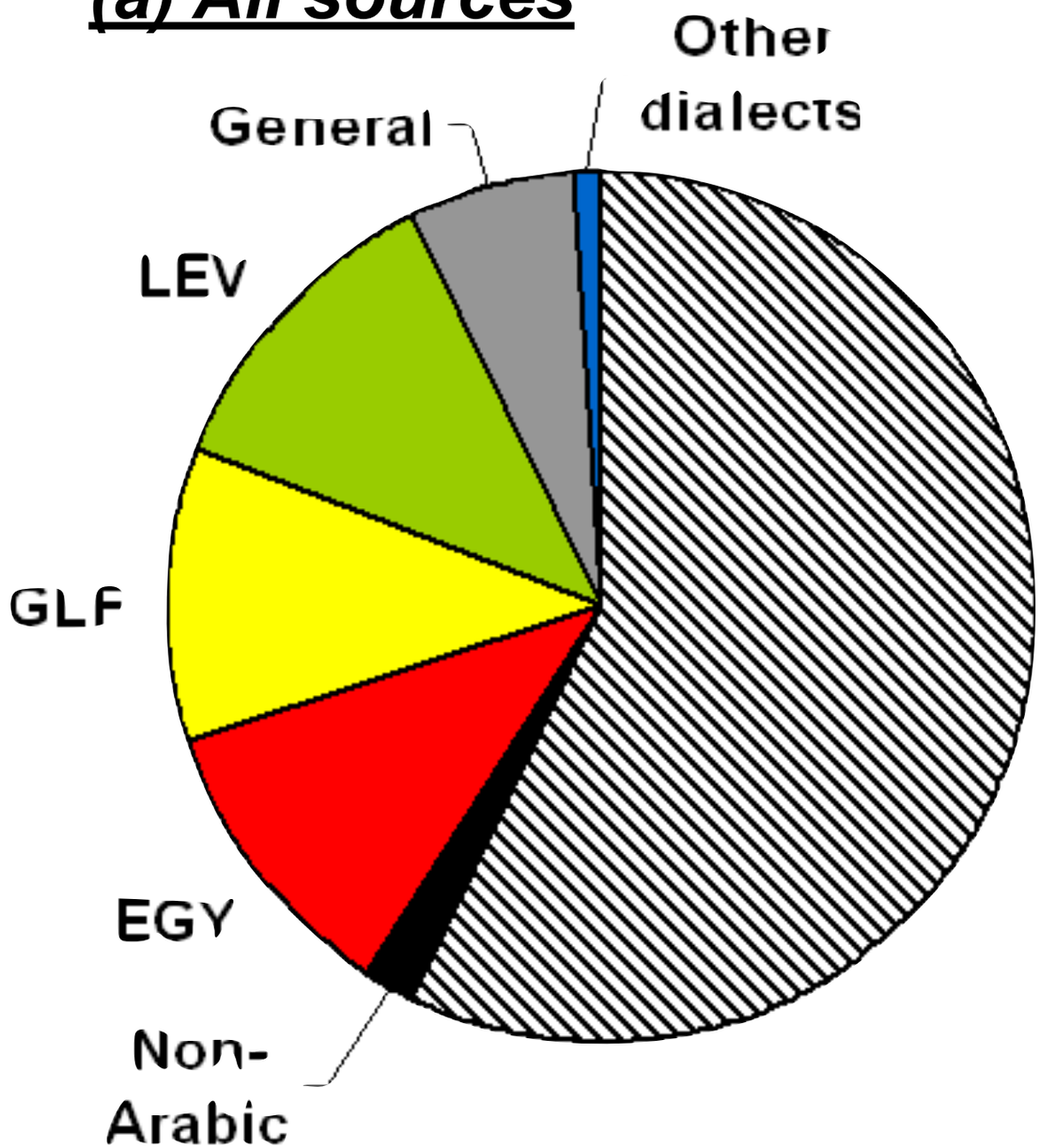
# Crowdsourcing Dialect ID

Full details in Zaidan and Callison-Burch (ACL 2011b)

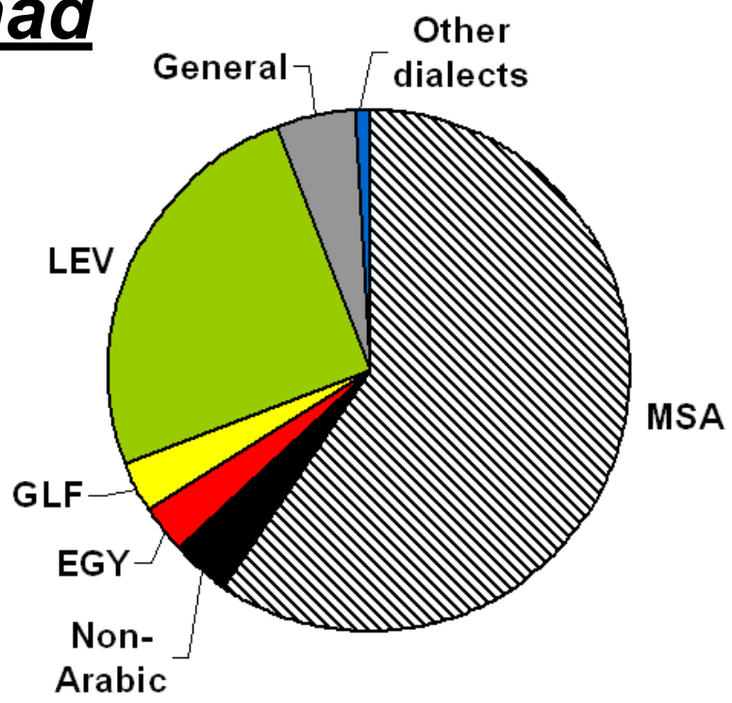
- Labeled 142k comments gathered from three online newspapers:
  - –Al-Ghad (الغد), a Jordanian newspaper LEV MSA
  - –Al-Riyadh (الرياض), a Saudi newspaper GLF MSA
  - –Al-Youm Al-Sabe' (اليوم السابع), an Egyptian newspaper EGY MSA
- 59% MSA, 41% dialect
- Trained classifiers with 80-90% accuracy

# Label Distribution

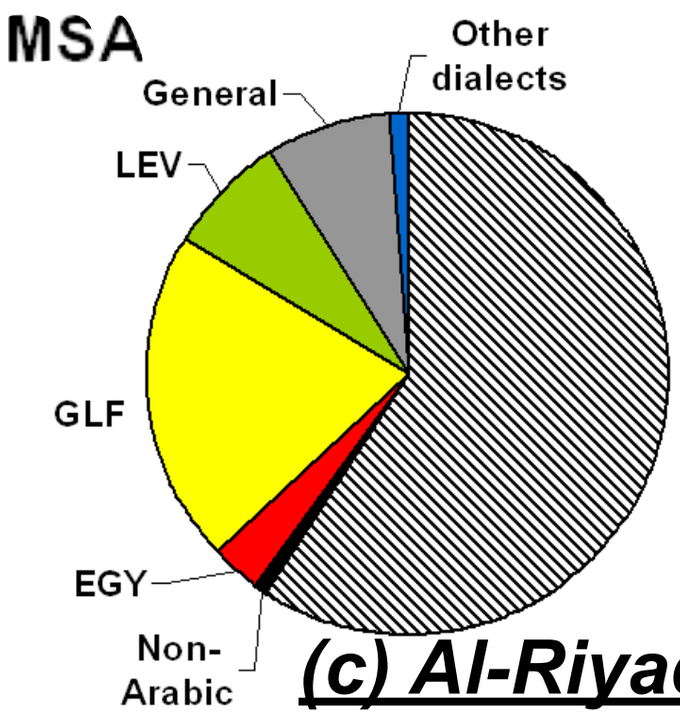
***(a) All sources***



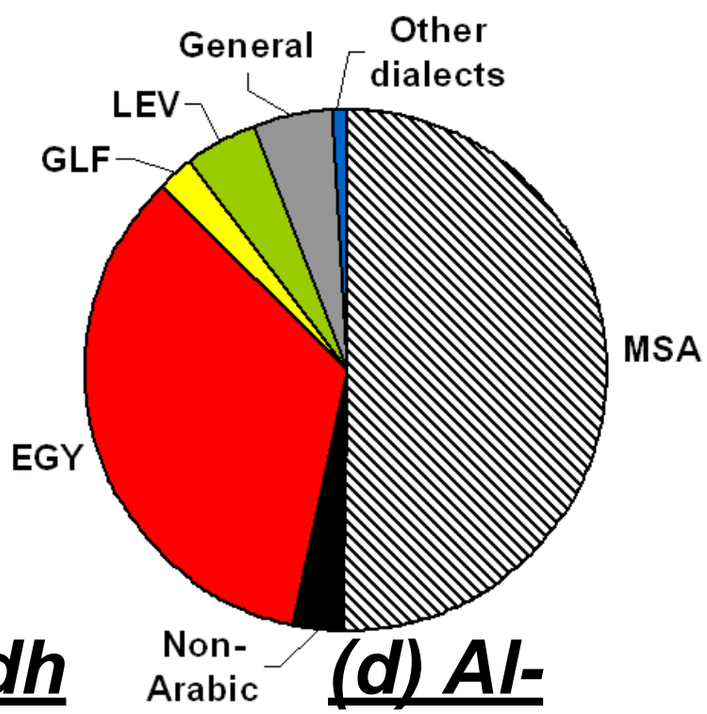

***(b) Al-Ghad***



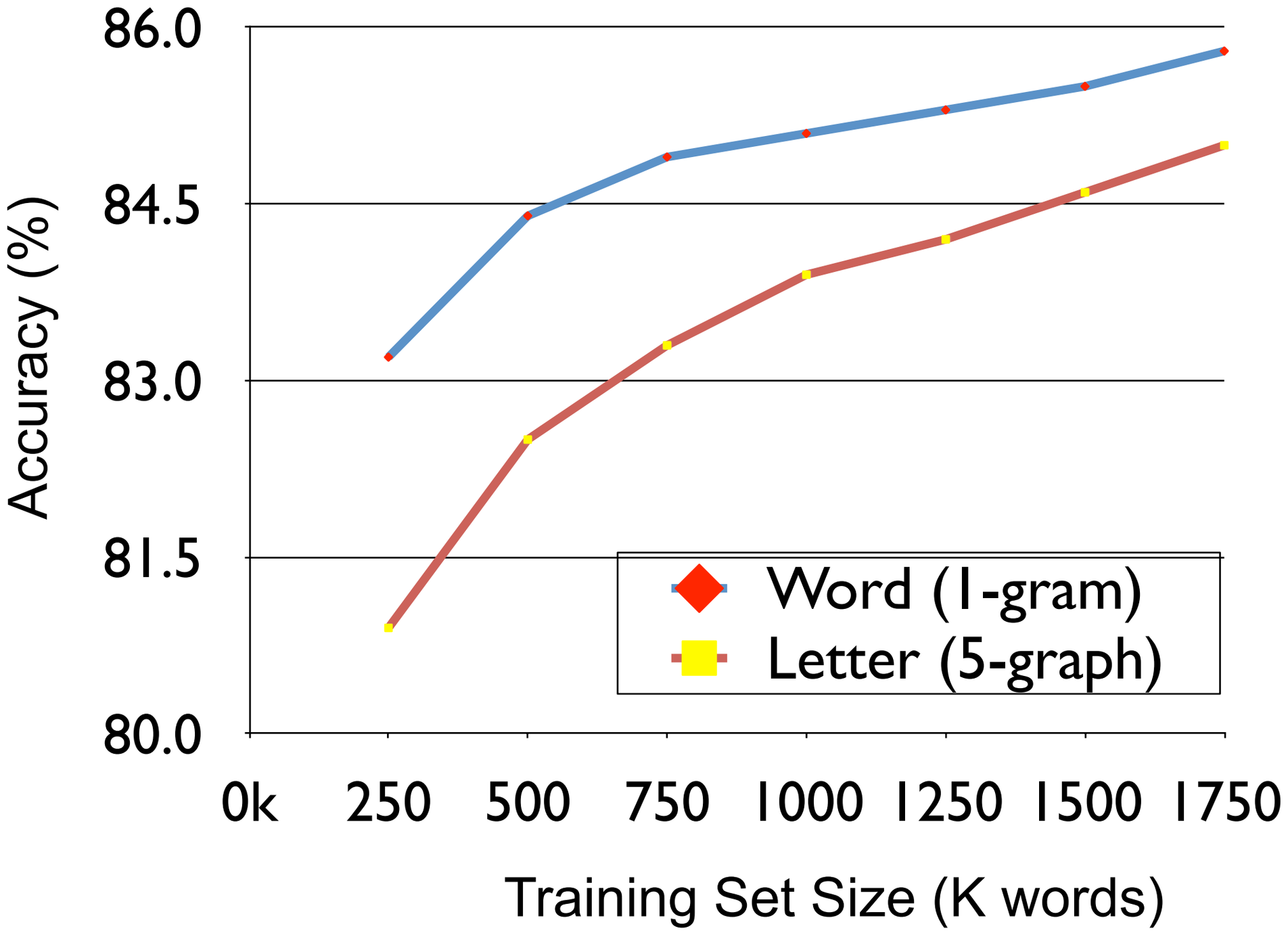

***(c) Al-Riyadh***




***(d) Al-Youm***



# Automatic dialect ID




**Baselines**

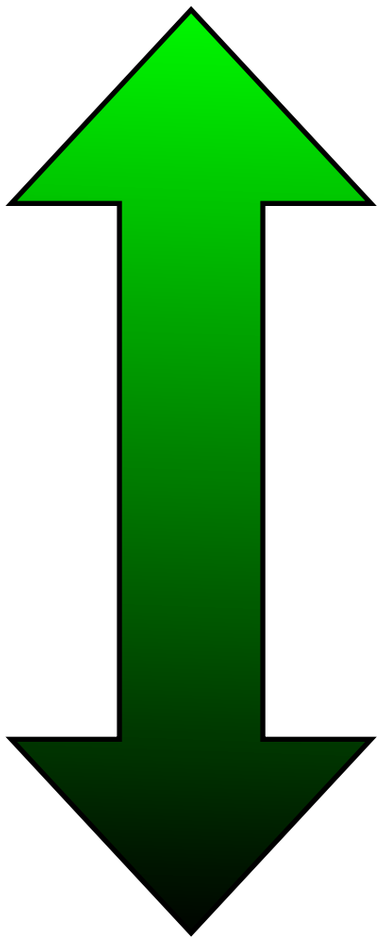
Majority class: **59%**

OOV wrt Arabic GigaWord: **66%**

1 letter model trained on our data: **68%**

# “Dialectness” quantified

Extremely dialectal Levantine words



Extremely MSA words (i.e. very unlikely in dialectal context)

| *Al-Ghad* | | | |
|---|---|---|---|
| *w* | | Gloss | $DF(w)$ |
| *$w* | شو | what | 139.0 |
| *xly* | خلي | let | 132.8 |
| *xlS* | خلص | enough | 117.5 |
| *AlHky* | الحكي | the-talk | 115.8 |
| *Endw* | عندو | he has | 95.3 |
| *bdy* | بدي | I will/want | 93.6 |
| *AzA* | ازا | if | 93.6 |
| *mnyH* | منيح | good | 93.6 |
| *$wy* | شوي | little | 92.8 |
| *<nw* | إنو | that | 90.2 |
| *hAy* | هاي | this (f.) | 80.0 |
| *bEdyn* | بعدين | then | 70.2 |
| *mw* | مو | not | 65.5 |
| *Ay$* | ايش | what | 63.8 |
| *bdw* | بدو | he will/wants | 60.3 |
| | . | | |
| | . | | |
| | . | | |
| *Ebr* | عبر | through | 0.146 |
| *w>n* | وأن | and-that | 0.145 |
| *Al<slAm* | الإسلام | Islam | 0.138 |
| *tEAlY* | تعالى | almighty | 0.138 |
| *SlY* | صلى | blessed | 0.127 |
| *AldymqrATyp* | الديمقراطية | democratic | 0.108 |
| *Alljnp* | اللجنة | the-committee | 0.095 |

$$DF(w) \stackrel{\text{def}}{=} \frac{f(w|D)}{f(w|MSA)}$$

“Dialectness” factor

# What is this useful for?

- Characterizing communicants
  - –What is this writer's native dialect?
  - –Where are they from?
  - –Informal relation with their interlocutor
- Harvesting written dialect from large web crawls
  - –Useful for training dialect language models for ASR?
- Identifying dialect sentence to then translate
  - –Training data for a statistical machine translation

# Crowdsourcing Arabic Dialects

- Translated dialect-labeled segments EGY LEV

| | |
|---|---|
| **Dialect Classification HIT** | $10,064 |
| **Sentence Segmentation HIT** | $1,940 |
| **Translation HIT** | $32,061 |
| **Total Cost** | $44,065 |
| **Num words translated** | 1,516,856 |
| **Cost per word** | 2.9 cents/word |

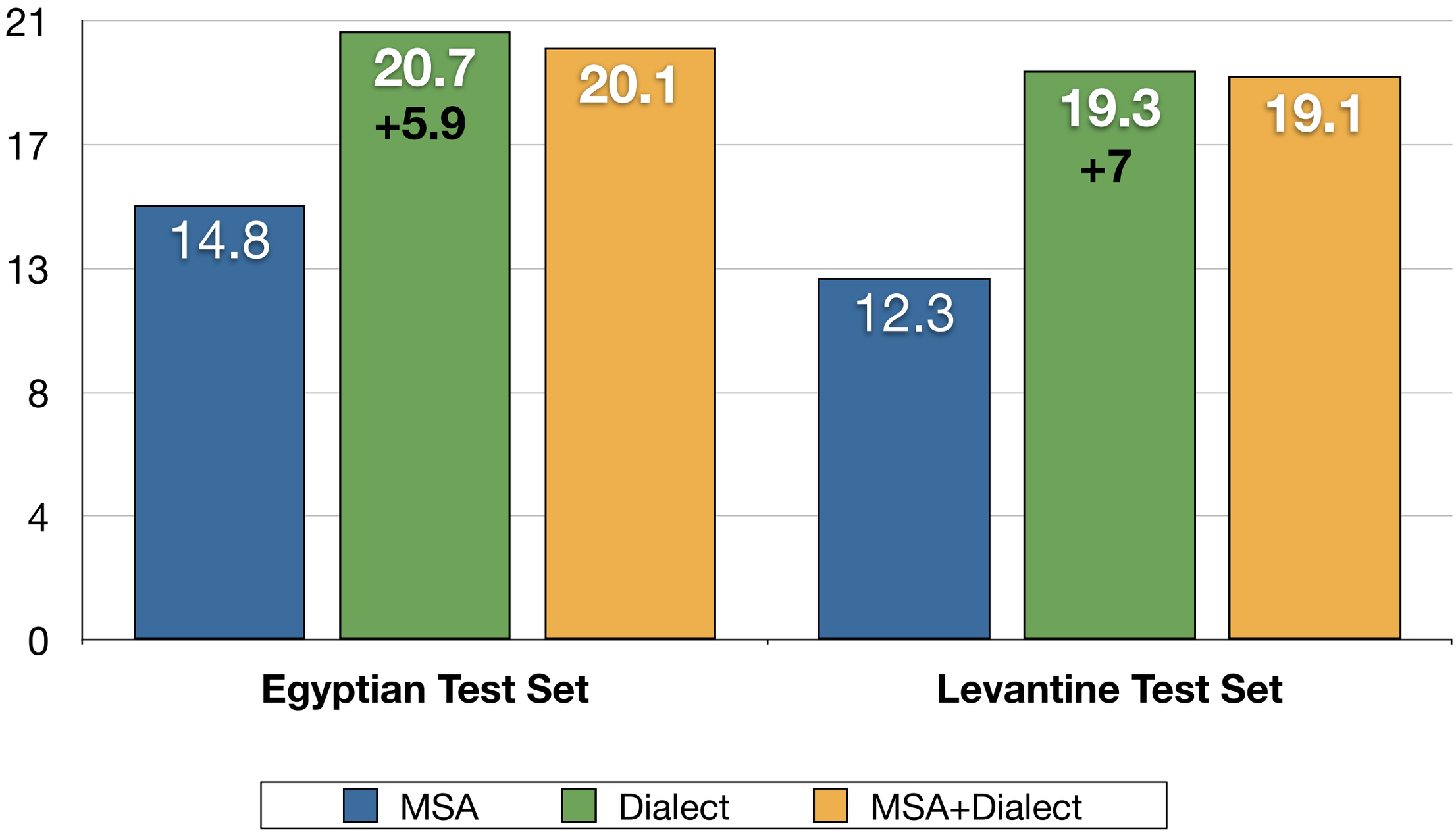
- 121 workers completed 20+ assignments
- 200,000 words translated per week
- Trained BBN's machine translation system

# Examples of Dialect Translation

| Dialect Input | MSA system | Dialect system | Reference |
|---|---|---|---|
| EGY انت بتعمــل لـه اعــلان ولا ايــه ؟ !! | You are working for a declaration and not? | You are making the advertisement for him or what? | Are you promoting it or what?!! |
| EGY نفسي اطمئن عليه بعد ما شاف الصوره دي | Myself feel to see this image. | I wish to check on him after he saw this picture. | I want to be sure that he is fine after he saw the images. |
| LEV لهيك الجو كتيير كوول | God you the atmosphere. | This is why the weather is so cool | This is why the weather is so cool |
| LEV طول بالك عم نمزح | Do you think about a joke long. | Calm down we are kidding | Calm down, we are only kidding |

# Dialect versus MSA

Full details in Zbib, Malchiodi, Devlin, Stallard, Matsoukas, Schwartz, Makhoul, Zaidan, & Callison-Burch (NAACL 2012)



# Dialect v. MSA data for MT

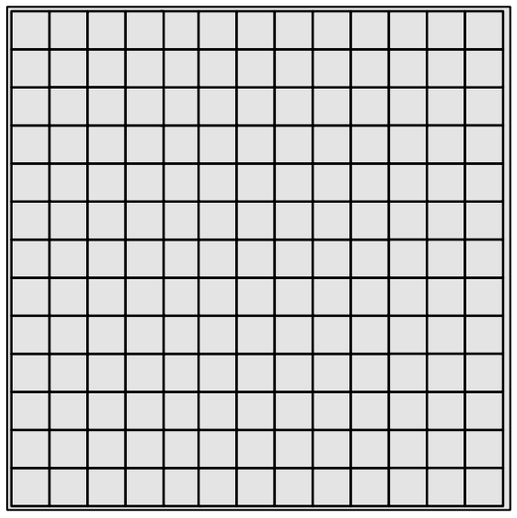
For machine translation of Arabic dialects

1.5M

Arabic
Dialect-English

>

200M+



MSA-English

2 months
$44k
+6 Bleu

5 years
$10s of millions
no added Bleu

# Implications of low cost, high quality translations for research

# We want to respond to a "Surprise Language"

The Los Angeles Times reported that at about 5:20 P.M. on Tuesday March 4, 2003, **a bomb** concealed in a backpack **exploded** at the airport in Davao City, the second largest city **in the Philippines**. At least 23 people were reported dead, with more than 140 injured, and President Arroyo of the Philippines characterized the blast as a terrorist act.

With the 13 hour time difference, it was then at 4:20 A.M on the same date in Washington, DC. **Twenty-four hours later**, at 4:13 A.M. on March 5, participants in the Translingual Information Detection, Extraction and Summarization (TIDES) program were notified that **Cebuano** had been chosen as the **language of interest** for a "surprise language" practice exercise that had been planned quite independently to begin on that date. The notification observed that Cebuano is spoken by 24% of the population of the Philippines and that it is the *lingua franca* in the south Philippines, where the event occurred.

# 100 languages

- Microsoft translator does 35 languages
- Google does 57 languages
- The DoD's Center for Applied MT does 64
- There is not enough data to reach acceptably high quality in new languages
- I want us to do 100 languages

Google bing

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# Individual researchers now have their own data production companies

✔ Parallel corpora for six Indian languages
✔ Arabic dialect ID dataset
✔ 1.5M word English-Arabic dialect corpus
✔ Bilingual dictionaries for ~100 languages
✔ English translation of 180 hrs of spoken Spanish
Corpus annotating and correcting ESL errors
Speech collection and transcription for new lang.
De-romanization / text normalization corpus

# Thanks!

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More info in Omar Zaidan's PhD thesis "Crowdsourcing Annotation for Machine Learning in Natural Language Processing Tasks" and our publications. Omar's thesis defense video is online at http://vimeo.com/clsp/omar-zaidan-thesis-defense-talk