

## 2018 MCM

### Problem B: How Many Languages?

**Background:** There are currently about 6,900 languages spoken on Earth. About half the world's population claim one of the following ten languages (in order of most speakers) as a native language: Mandarin (incl. Standard Chinese), Spanish, English, Hindi, Arabic, Bengali, Portuguese, Russian, Punjabi, and Japanese. However, much of the world's population also speaks a second language. When considering total numbers of speakers of a particular language (native speakers plus second or third, etc. language speakers), the languages and their order change from the native language list provided. The total number of speakers of a language may increase or decrease over time because of a variety of influences to include, but not limited to, the language(s) used and/or promoted by the government in a country, the language(s) used in schools, social pressures, migration and assimilation of cultural groups, and immigration and emigration with countries that speak other languages. Moreover, in our globalized, interconnected world there are additional factors that allow languages that are geographically distant to interact. These factors include international business relations, increased global tourism, the use of electronic communication and social media, and the use of technology to assist in quick and easy language translation.

Native Language Rank	Native Language	Family	Native Speakers	Second (or 3rd, etc) Language Speakers	Second Language Rank	Total
1	Mandarin Chinese (incl. Standard Chinese)	Sino-Tibetan, Sinitic	897 million	193 million	4	1.09 billion
2	Spanish	Indo-European, Romance	436 million	91 million	8	527 million
3	English	Indo-European, Germanic	371 million	611 million	1	983 million
4	Hindustani (Hindi/Urdu)	Indo-European, Indo-Aryan	329 million	215 million	2	544 million
5	Arabic	Afro-Asiatic, Semitic	290 million (2017)	132 million	6	422 million
6	Bengali	Indo-European, Indo-Aryan	242 million	19 million in Bangladesh (2011)	13	261 million
7	Portuguese	Indo-European, Romance	218 million	11 million	15	229 million
8	Russian	Indo-European, Slavic	153 million	113 million (2010)	7	267 million
9	Punjabi	Indo-European, Indo-Aryan	148 million	?	?	148 million
10	Japanese	Japonic	128 million	1 million (2010)	19	129 million

Retrieved from [https://en.wikipedia.org/wiki/List\\_of\\_languages\\_by\\_total\\_number\\_of\\_speakers](https://en.wikipedia.org/wiki/List_of_languages_by_total_number_of_speakers) on January 17, 2018.

**Problem:** A large multinational service company, with offices in New York City in the United States and Shanghai in China, is continuing to expand to become truly international. This company is investigating opening additional international offices and desires to have the employees of each office speak both in English and one or more additional languages. The Chief Operating Officer of the company has hired your team to investigate trends of global languages and location options for new offices.

#### Part I:

**A.** Consider the influences and factors described in the background paragraph above, as well as other factors your group may identify. Based on projected trends, and some or all of these influences and factors, **model the distribution of various language speakers over time.**

**B.** Use your model to predict what will happen to the numbers of native speakers and total language speakers in the next 50 years. Do you predict that any of the languages in the current top-ten lists (either native speakers or total speakers) will be replaced by another language? Explain.

**C.** Given the global population and human migration patterns predicted for the next 50 years, do the geographic distributions of these languages change over this same period of time? If so, describe the change.

## **Part II:**

**A.** Based on your modeling from **Part I**, and assuming your client company wants to open six new international offices, where might you locate these offices and what languages would be spoken in the offices? Would your recommendations be different in the short term versus the long term? Explain your choices.

**B.** Considering the changing nature of global communications, and in an effort to save your client company resources, might you suggest that the company open less than six international offices? Indicate what additional information you would need and describe how you would analyze this option in order to advise your client.

## **Part III:**

Write a 1-2 page memo to the Chief Operating Officer of the service company summarizing your results and recommendations.

**Note:** In your analysis, ignore unpredictable or high-impact, low probability events such as asteroid collisions that would cause a catastrophic jump in evolutionary trends over time, and possibly render all languages extinct.

Your submission should consist of:

- One-page Summary Sheet,
- Two-page memo,
- Your solution of no more than 20 pages, for a maximum of 23 pages with your summary and memo.
- Note: Reference list and any appendices do not count toward the 23-page limit and should appear after your completed solution.

## **Attachments:**

List of Languages by Total Numbers of Speakers

## **References:**

Lane, J. (2017). *The 10 Most Spoken Languages in the World*. Babbel Magazine. Retrieved from <https://www.babbel.com/en/magazine/the-10-most-spoken-languages-in-the-world>

Noack, R. and Gamio, L. (April 23, 2015). *The World's Languages in 7 Maps and Charts*. The Washington Post. Retrieved from [https://www.washingtonpost.com/news/worldviews/wp/2015/04/23/the-worlds-languages-in-7-maps-and-charts/?utm\\_term=.a993dc2a15cb](https://www.washingtonpost.com/news/worldviews/wp/2015/04/23/the-worlds-languages-in-7-maps-and-charts/?utm_term=.a993dc2a15cb)

List of Languages by Total Numbers of Speakers

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**List of Languages by Total Numbers of Speakers. Retrieved from**  
[https://en.wikipedia.org/wiki/List\\_of\\_languages\\_by\\_total\\_number\\_of\\_speakers](https://en.wikipedia.org/wiki/List_of_languages_by_total_number_of_speakers) on January 17, 2018.

### *Ethnologue* (2017 20th edition)

The following 26 languages are listed as having 50 million or more total speakers in the 2017 edition of *Ethnologue*, a language reference published by SIL International based in the United States<sup>[2]</sup> (although *Ethnologue* also lists more than only these 26 languages as having 50 million or more total speakers, e.g., the Wikipedia page for the Tagalog language reports 70+ million speakers by as early as 2000 and 73+ million speakers by 2013: 28 million L1 speakers as of 2007 and 45 million L2 speakers as of 2013; these are largely based on *Ethnologue* reports and would, e.g., unless further updated, rank it as the language with the 26th most L1 speakers, the 13th most L2 speakers, and the 23rd most speakers in total). Speaker totals are generally not reliable, as they add together estimates from different dates and (usually uncited) sources; language information is not collected on most national censuses.

Rank	Language	Family	L1 speakers	L1 Rank	L2 speakers	L2 Rank	Total
1	<b>Mandarin Chinese</b> (incl. Standard Chinese)	Sino-Tibetan, Sinitic	897 million	1	193 million	4	<b>1.09 billion</b>
2	<b>English</b>	Indo-European, Germanic	371 million	3	611 million	1	<b>983 million</b>
3	<b>Hindustani (Hindi/Urdu)</b> <sup>[Note 1]</sup>	Indo-European, Indo-Aryan	329 million	4	215 million	2	<b>544 million</b>
4	<b>Spanish</b>	Indo-European, Romance	436 million	2	91 million	8	<b>527 million</b>
5	<b>Arabic</b>	Afro-Asiatic, Semitic	290 million (2017)	5	132 million	6	<b>422 million</b> <sup>[5][6]</sup>

Rank	Language	Family	L1 speakers	L1 Rank	L2 speakers	L2 Rank	Total
6	<b>Malay</b> (incl. Indonesian and Malaysia n)	Austronesian, Malayo-Polynesian	77 million (2007)	15	204 million	3	<b>281 million</b> <sup>[7]</sup>
7	<b>Russian</b>	Indo-European, Slavic	153 million	8	113 million (2010)	7	<b>267 million</b>
8	<b>Bengali</b>	Indo-European, Indo-Aryan	242 million	6	19 million in Bangladesh (2011)	13	<b>261 million</b>
9	<b>Portuguese</b>	Indo-European, Romance	218 million	7	11 million	15	<b>229 million</b>
10	<b>French</b>	Indo-European, Romance	76 million	17	153 million	5	<b>229 million</b>
11	<b>Hausa</b>	Afro-Asiatic, Chadic	85 million	11	65 million	10	<b>150 million</b> <sup>[8]</sup>
12	<b>Punjabi</b>	Indo-European, Indo-Aryan	148 million <sup>[9]</sup>	9	?	?	<b>148 million</b>
13	<b>Japanese</b>	Japonic	128 million	10	1 million (2010) <sup>[10]</sup>	19	<b>129 million</b>

Rank	Language	Family	L1 speakers	L1 Rank	L2 speakers	L2 Rank	Total
14	German	Indo-European, Germanic	76 million	18	52 million	12	129 million
15	Persian	Indo-European, Iranian	60 million (2009)	25	61 million <sup>[11]</sup>	11	121 million <sup>[11]</sup>
16	Swahili	Niger–Congo language, Coastal Tanzanian, Bantu	16 million	26	91 million	8	107 million
17	Telugu	Dravidian	80 million (2011)	13	12 million in India (2011)	14	92 million
18	Javanese	Austronesian, Malayo- Polynesian	84 million (2000)	12	?	?	84 million
19	Wu Chinese (incl. Shanghainese)	Sino-Tibetan, Chinese	80 million (2013)	14	?	?	80 million
20	Korean	Koreanic	77 million (2008– 2010)	16	?	?	77 million
21	Tamil	Dravidian	67 million (2001)	23	8 million in India	16	75 million

Rank	Language	Family	L1 speakers	L1 Rank	L2 speakers	L2 Rank	Total
22	<b>Marathi</b>	Indo-European, Indo-Aryan	71 million (2001)	20	3 million in India	17	<b>74 million</b>
23	<b>Yue Chinese</b> (incl. Cantonese)	Sino-Tibetan, Chinese	72 million	19	?	?	<b>72 million</b>
24	<b>Turkish</b>	Turkic, Oghuz	71 million	21	<1 million	20	<b>71 million</b>
25	<b>Vietnamese</b>	Austroasiatic, Viet–Muong	68 million	22	?	?	<b>68 million</b>
26	<b>Italian</b>	Indo-European, Romance	63 million	24	3 million	17	<b>66 million</b>

## Notes

1. Refers to *Modern Standard Hindi* and *Modern Standard Urdu*. Modern Hindi and Urdu are mutually intelligible and are considered by linguists to be dialects of the same language; the two distinct registers are the outcome of nationalist tendencies.<sup>[3]</sup> The Census of India defines Hindi on a loose and broad basis. In addition to Standard Hindi, it incorporates a set of other Indo-Aryan languages written in Devanagari script including Awadhi, Bhojpuri, Haryanvi, Dhundhari etc. under Hindi group which have more than 422 million native speakers as on 2001.<sup>[4]</sup> However, the census also acknowledges Standard Hindi, the above mentioned languages and others as separate mother tongues of Hindi language and provides individual figures for all these languages.<sup>[4]</sup>

## References

1. Crystal, David (March 2008). *"Two thousand million?"*. *English Today*. doi:[10.1017/S0266078408000023](https://doi.org/10.1017/S0266078408000023).
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5. "Världens 100 största språk 2010" (The World's 100 Largest Languages in 2010), in Nationalencyklopedin
6. *"World Arabic Language Day / United Nations Educational, Scientific and Cultural Organization"*. [www.unesco.org](http://www.unesco.org). Retrieved 2017-07-14.
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