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 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

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https://en.wikipedia.org/wiki/List_of_languages_by_total_number_of_speakers

List of Languages by Total Numbers of Speakers. Retrieved from
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[2] (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	**Mandarin Chinese**(incl. Standard Chinese)	Sino-Tibetan, Sinitic	897 million	1	193 million	4	**1.09 billion**
2	**English**	Indo-European, Germanic	371 million	3	611 million	1	**983 million**
3	**Hindustani (Hindi/Urdu)**[Note 1]	Indo-European, Indo-Aryan	329 million	4	215 million	2	**544 million**
4	**Spanish**	Indo-European, Romance	436 million	2	91 million	8	**527 million**
5	**Arabic**	Afro-Asiatic, Semitic	290 million (2017)	5	132 million	6	**422 million**[5][6]

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

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[11]	11	**121 million**[11]
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	**Marathi**	Indo-European, Indo-Aryan	71 million (2001)	20	3 million in India	17	**74 million**
23	**Yue Chinese** (incl. Cantonese)	Sino-Tibetan, Chinese	72 million	19	?	?	**72 million**
24	**Turkish**	Turkic, Oghuz	71 million	21	<1 million	20	**71 million**
25	**Vietnamese**	Austroasiatic, Viet–Muong	68 million	22	?	?	**68 million**
26	**Italian**	Indo-European, Romance	63 million	24	3 million	17	**66 million**

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.[3] 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.[4] 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.[4]

References

1. *Crystal, David (March 2008). "Two thousand million?". English Today. doi:10.1017/S0266078408000023.*

2. *"Summary by language size". Ethnologue. Retrieved 2016-04-06.*

3. Abdul Jamil Khan (2006). Urdu/Hindi: an artificial divide. Algora. p. 290. ISBN 978-0-87586-437-2.

4. Abstract of speakers' strength of languages and mother tongues – 2000, Census of India, 2001

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. Retrieved 2017-07-14.*

7. Indonesia 258 million (World Bank, 2015); Malaysia 19.4 million Bumiputera (Dept of Statistics, Malaysia, 2016); Brunei 0.43 million (World Bank, 2015); Singapore 0.5 million (University of Hawaii 2012); Thailand 3 million (University of Hawaii, 2012)

8. *"Hausa speakers in Nigeria now 120m– Communique - Vanguard News". vanguardngr.com. Retrieved 2017-04-26.*

9. Lahnda/Western Punjabi 116.6 million Pakistan (c. 2014). Eastern Punjabi: 28.2 million India (2001), other countries: 1.1 million. *Ethnologue* 19.

10. *"Japanese". Ethnologue. Retrieved 2016-03-07.*

11. Windfuhr, Gernot: *The Aryan Languages*, Routledge 2009,

2018 年 MCM
问题 B：多少种语言？

背景：目前地球上约有 6,900 种语言。普通话（包括标准中文），西班牙文，英文，印度文，阿拉伯文，孟加拉文，葡萄牙文，俄文，旁遮普文和日文，大约有一半的世界人口是以下十种语言中的一种。但是，全世界的许多人口也会说第二种语言。当考虑特定语言（母语人士，第二或第三等语言使用者）的总发言人数时，语言及其顺序会从提供的母语列表中变化。一种语言的说话人总数可能随着时间的推移而增加或减少，原因来自于各种影响，包括但不限于语言在一国政府使用和/或推广的影响，语言在用于学校，社会压力，文化团体的移民和同化，以及与讲其他语言的国家的移民中的影响。并且在我们这个全球化的，相互联系的世界里，还有另外的因素让地理上遥远的语言能够互动。这些因素包括国际商业关系，日益增长的全球旅游业，电子通讯和社交媒体的使用，以及利用技术来协助快速和简单的翻译。

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
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于 2018 年 1 月 17 日从 https://en.wikipedia.org/wiki/List_of_languages_by_total_number_of_speakers 取得

问题：一家在美国纽约市和中国上海设有办事处的大型跨国服务公司正在不断拓展，将要成为真正的国际化公司。该公司正在调查开设更多的国际办事处，并希望每个办事处的员工都能用英语和一种或多种其他语言讲话。该公司的首席运营官已经聘请了你的团队来调查全球语言的发展趋势以及新办公室的位置选择。

第一部分：

A.考虑上述背景段落中描述的影响和因素，以及您的小组可能识别的其他因素。根据预测的趋势，以及这些影响和因素中的一些或全部，随着时间的推移，模拟各种语言使用者的分布。

B.用你的模型来预测未来 50 年母语人士和总语言使用者（包括母语和非母语）会发生什么变化。您是否预测当前十大名单中的任何一种语言（母语人士或总语言使用者）将被另一种语言所取代？试着解释这个现象。

C.鉴于未来 50 年预测的全球人口和人口迁移模式，这些语言的地理分布是否在同一时期发生变化？如果是这样，请描述这个变化。

第二部分：

答：根据第一部分的建模，假设您的客户公司想要开设六个新的国际办事处，您可以在哪里找到这些办事处以及办公室将使用哪种语言？你的建议在短期和长期上会有所不同吗？解释你的选择。

B.考虑到全球通讯性质的不断变化，为了挽救您的客户公司资源，您是否可以建议公司开设少于六个国际办事处？指出您需要哪些附加信息，并描述如何分析此选项以便为您的客户提供建议。

第三部分：

向服务公司的首席运营官写一个 1-2 页的 Memo（备忘录），总结你的结果和建议。

注意：在您的分析中，请忽略不可预测的或高影响的低概率事件，例如小行星碰撞。这种小概率事件随着时间的推移会导致语言的演化趋势发生灾难性的下跌，并可能使所有语言都灭绝。

您的提交应该包括：

·单页汇总表，

·两页 Memo（备忘录），

·您的解决方案不超过 20 页，最多 23 页，包含摘要和 Memo（备忘录）。

·注意：参考文献列表和任何附录不计入 23 页的限制，应该写在完成的解决方案后。

附件： List of Languages by Total Numbers of Speakers

参考文献：

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

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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

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民族志（2017年第20版）

以下26种语言在2017年"民族志" 一书中具有5000万以上的总讲话者被列出来，这是由SIL International在美国出版的一版语言参考文献[2]（尽管民族语言也列出了不止26种语言， 总共有超过百万人以上讲话者，例如，Tagalog语言的维基百科页面早在2000年就报告了7千多万人，到2013年为止超过7千3百万人：2007年为2千8百万人，截至2013年为2千5百万人; 主要基于民族学的报道，例如，除非进一步更新，否则将其作为语言，将其作为第二十一位最大的发言者，第二十三位发言者和第二十三位最多的发言者。 演讲者总数通常是不可靠的，因为他们将来自不同日期的估计值（通常是未被引用的）来源加在一起；大多数国家人口普查都不收集语言信息。

<u>此处省略表格</u>

注释：

1.指现代标准<u>印地语</u>和现代标准<u>乌尔都语</u>。 现代印度语和乌尔都语是相互理解的， 被语言学家认为是同一种语言的方言; 两个不同的登记册是民族主义倾向的结果。[3] <u>印度人口普查</u>在宽松和广泛的基础上定义了印度语。 除标准印地语之外，还包括一系列以梵文文字编写的<u>其他印度语 - 雅利安语言</u>，其中包括在<u>印地语小组</u>中使用的<u>Awadhi</u>，<u>Bhojpuri</u>，<u>Haryanvi</u>，<u>Dhundhari</u>等，2001年有超过4.22亿以英语为母语的人。[4] 然而，人口普查也承认标准印地语，上述语言和其他语言是独立的印地语母语，并提供所有这些语言的个人数字。

References

1. *Crystal, David (March 2008). "Two thousand million?". English Today. doi:10.1017/S0266078408000023.*

2. *"Summary by language size". Ethnologue. Retrieved 2016-04-06.*

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7. Indonesia 258 million (World Bank, 2015); Malaysia 19.4 million Bumiputera (Dept of Statistics, Malaysia, 2016); Brunei 0.43 million (World Bank, 2015); Singapore 0.5 million (University of Hawaii 2012); Thailand 3 million (University of Hawaii, 2012)

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