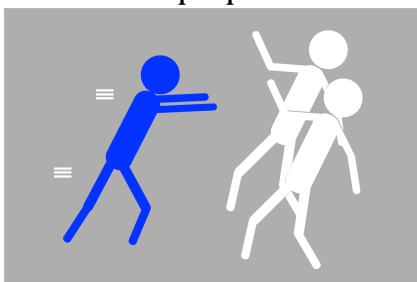


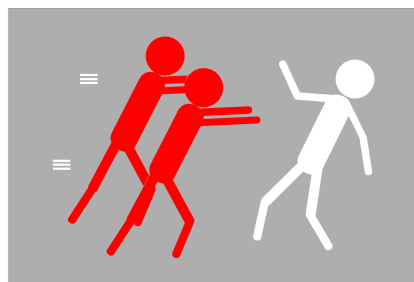
Problem 5 (20 points). In one psycholinguistics study, native speakers of Kaqchikel undertook a task in which they repeatedly had to judge whether a sentence they heard accurately described a picture they saw. While participants were listening to the sentences, their brain activity was recorded using functional Magnetic Resonance Imaging (fMRI). The researchers were interested in measuring activity in two brain regions: the frontal cortex and the auditory cortex. Higher activity in the frontal cortex can signal that the sentence is more difficult to process. Higher activity in the auditory cortex can signal that the sound is surprising or unexpected.

Below are some pictures similar to the ones participants saw paired with Kaqchikel sentences that accurately describe the pictures. Some parts of the sentences have been replaced with gaps.

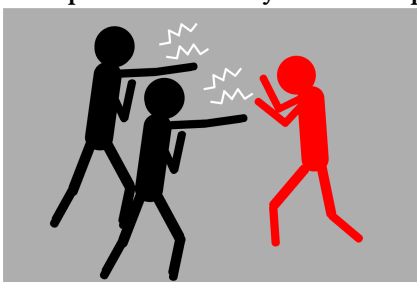
1. Xerunīm ri taq sāq ri xar



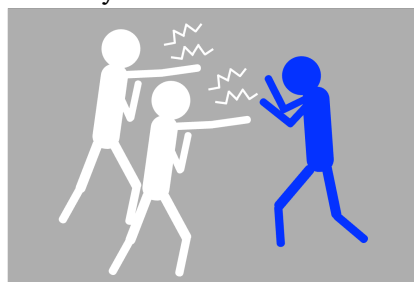
5. _____ [E] _____ ri sāq



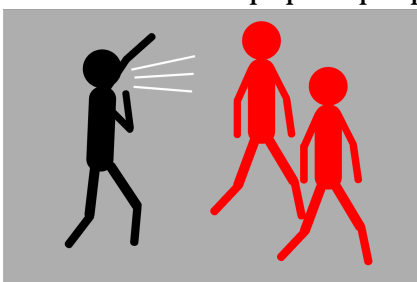
2. Ri taq _____ [A] _____ xkich'āy _____ [B] _____ kāq



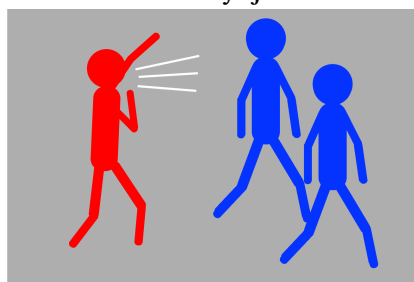
6. Xkich'āy _____ [F] _____



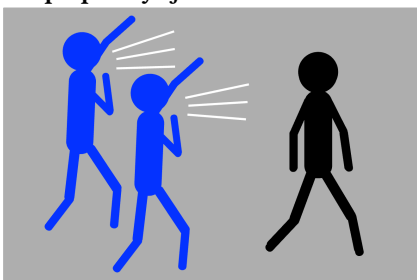
3. _____ [C] _____ ri q'ëq ri taq kāq



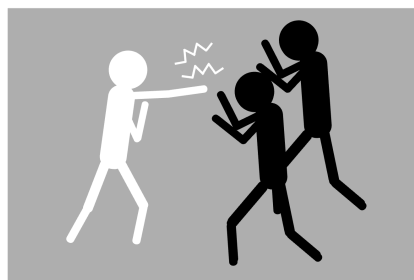
7. _____ [G] _____ xeroyoj _____ [H] _____



4. Ri q'ëq xkoyoj _____ [D] _____



8. _____ [I] _____



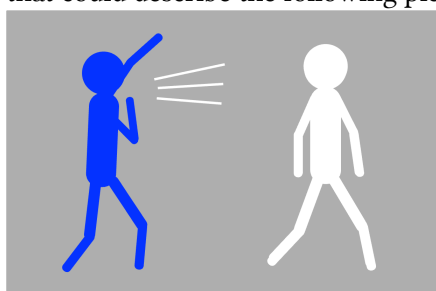
Below is a table containing the brain activity pattern one would expect for the sentence–picture pairs above, based on the results of the original study.

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower
5	higher	higher
6	lower	higher
7	higher	lower
8	lower	lower

- (a) Fill in the blanks A–I.
- (b) Draw all the possible pictures that the following sentences could describe, or write equivalent verbal descriptions:

9. Ri taq säq xkinīm ri q'ëq
10. Xekich'äy ri taq xar ri taq käq

- (c) Write all the possible Kaqchikel sentences that could describe the following picture:



- (d) What activity levels in the frontal and auditory cortices do you predict for the following sentences? If there is an activity level you cannot predict, explain why not.

11. Xeruq'etey ri käq ri taq q'ëq
12. Xerachik'aj ri taq säq ri xar
13. Ri taq q'ëq xekitz'ët ri taq säq

△ The Kaqchikel language belongs to the Quichean-Mamean branch of the Mayan family. It is spoken by approx. 500,000 people in central Guatemala. **ch'**, **k'**, **q'** and **tz'** are consonants. **ä**, **ë** and **ĩ** are vowels.

—Dan-Mircea Mirea

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Good luck!

Twenty-second International Linguistics Olympiad

Taipei (Taiwan), July 20–27, 2025

Answer sheet: Problem 2

(a)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

(b)

• $\bar{\epsilon}$ tááǎ — _____

• $\bar{\epsilon}$ mǎǎ — _____

(c)

21. $\bar{a}g$ bǎǎrǎāg — _____

22. $\bar{d}\bar{o}\bar{r}\bar{\epsilon}\bar{e}g$ āyǎg — _____

23. $\bar{\epsilon}$ bǎǎrǎāg — _____

24. \bar{o} túndúlǐg — _____

25. \acute{o} máām — _____

(d)

26. *my grindstone* — _____

27. *their cheeks* — _____

28. *your_{pl} anchor* — _____

29. *our uncle* — _____

30. *your_{sg} dogs* — _____

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Answer sheet: **Problem 4**

⚠ No additional explanation besides the answers is required, nor will be marked.

(a)

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

- (b) 40. *repena* — _____
 41. *agaa* — _____
 42. *iri* — _____
 43. *yagaa* — _____
 44. *nida dia* — _____
 45. *yaa-iri* — _____
 46. *nogo-naaki* — _____

- (c) 47. *white man* — _____
 48. *bone* — _____
 49. *seed of a tree* — _____
 50. *hole* — _____
 51. *very big* — _____
 52. *pandanus* — _____
 53. *old woman's eye* — _____