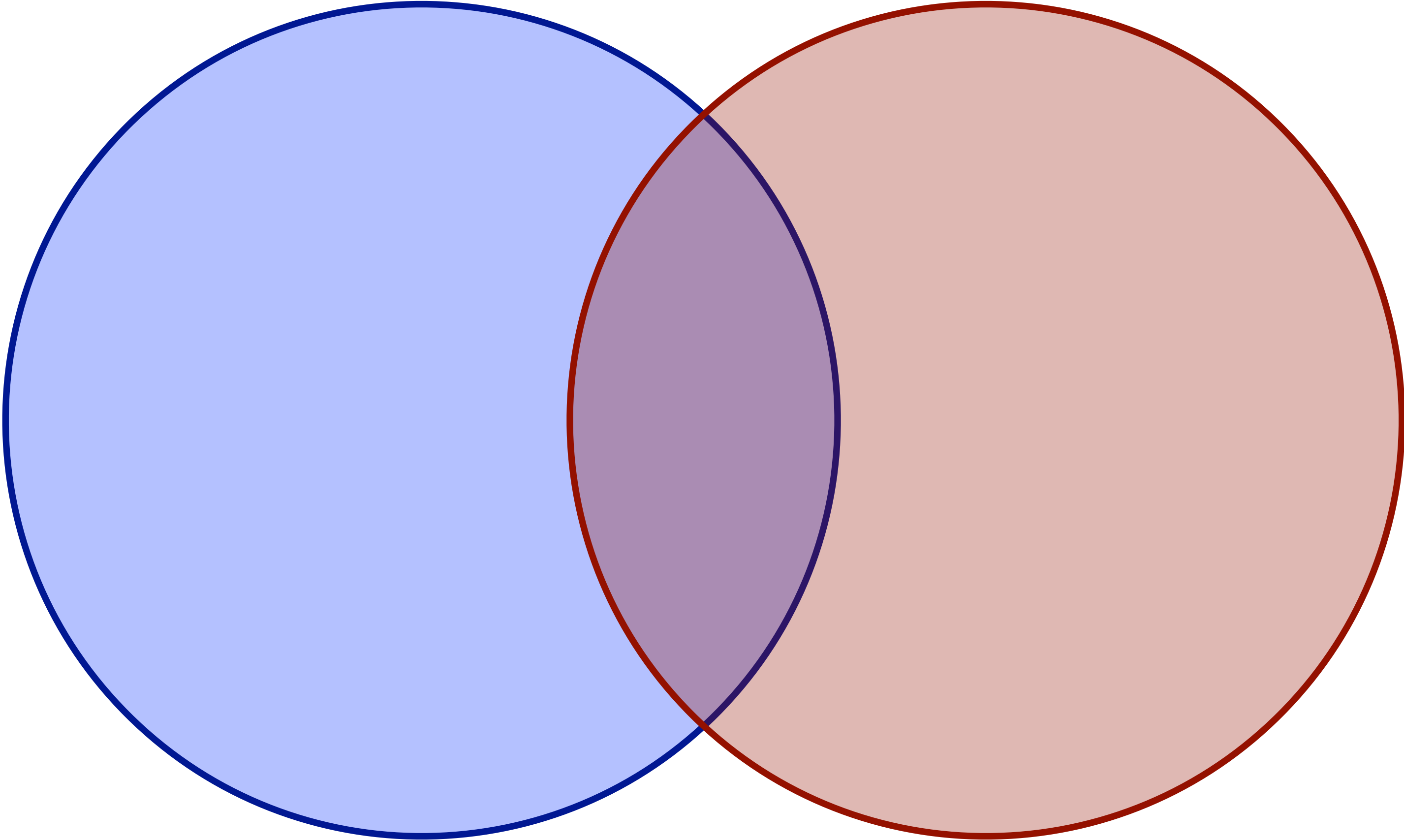


# Problem 5: **KAQCCHIKEL**

**Dan-Mircea Mirea**

# Psycholinguistics

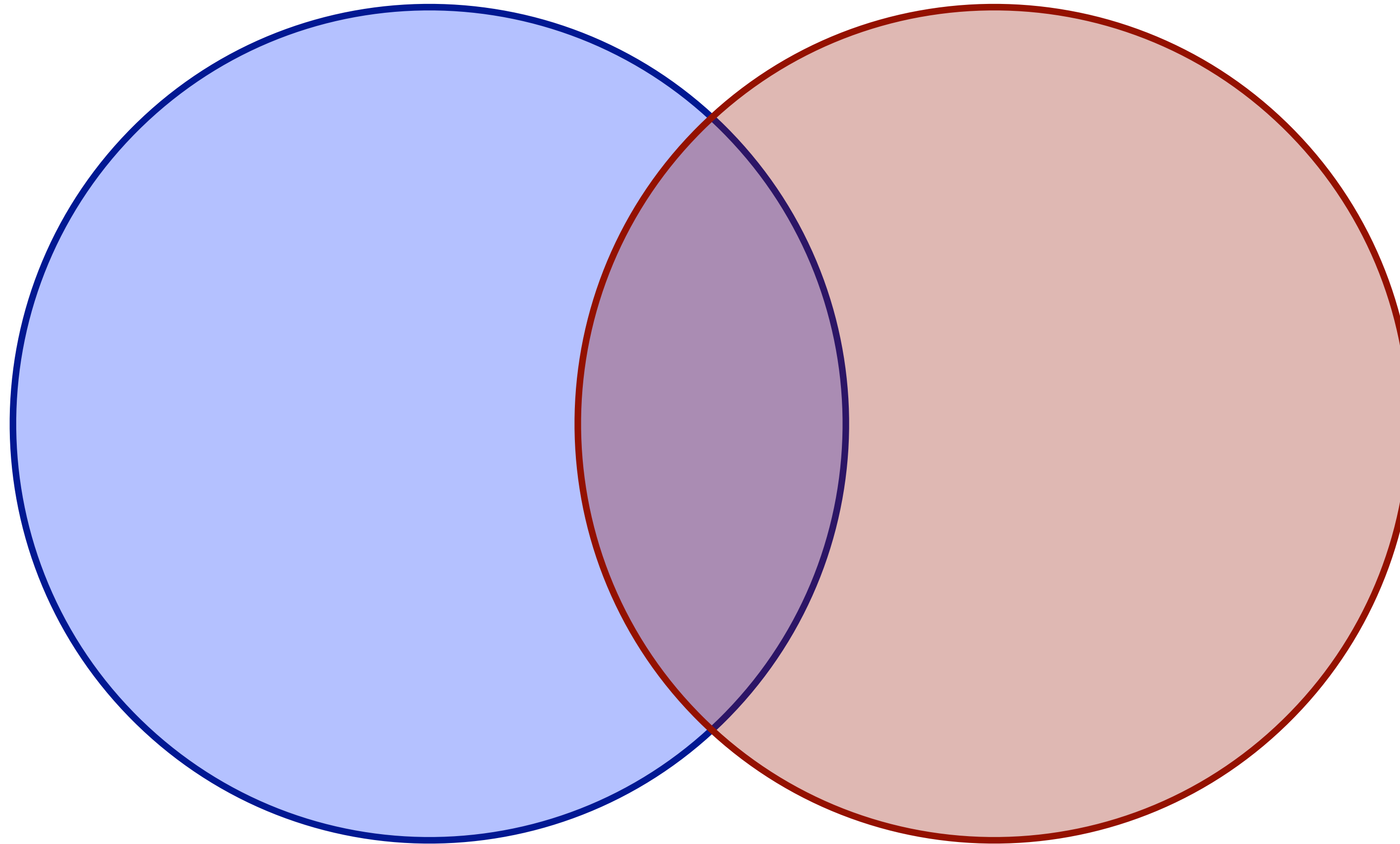
**Psychology**



**Linguistics**

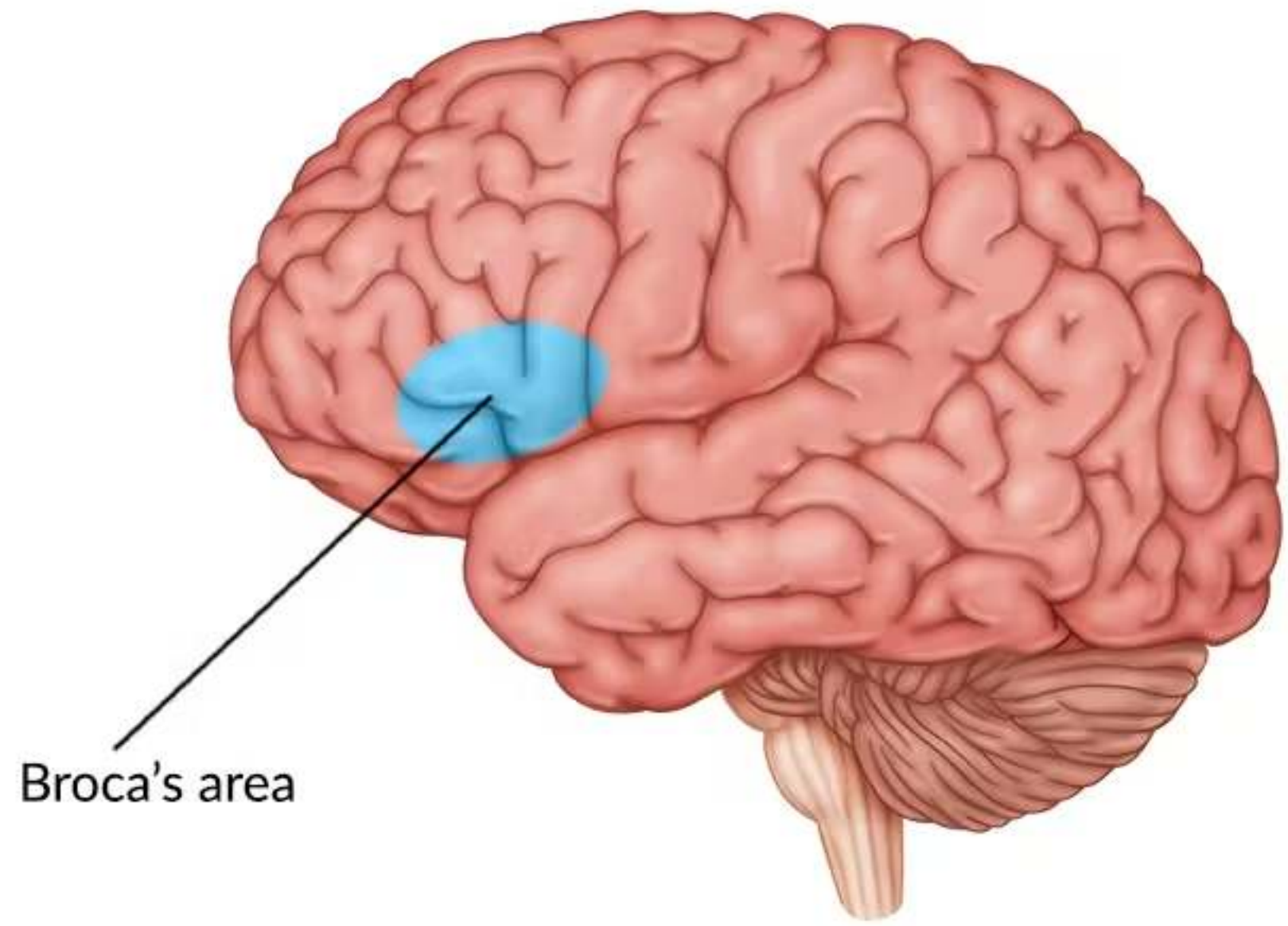
# Psycholinguistics

**Psychology**

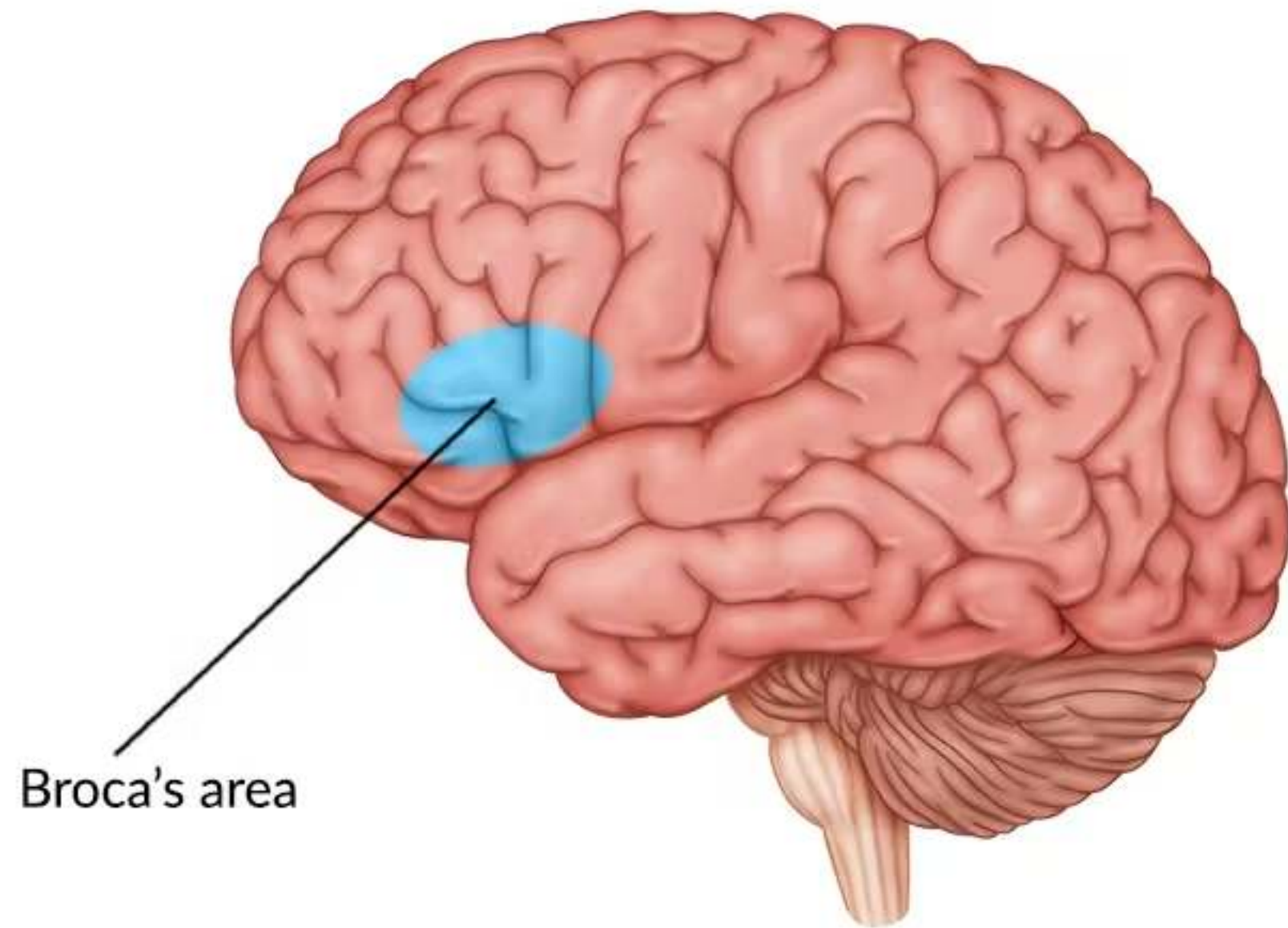


**Linguistics**

How the mind understands  
and produces language









Broca's area



RESEARCH ARTICLE | PSYCHOLOGICAL AND COGNITIVE SCIENCES



# Constructed languages are processed by the same brain mechanisms as natural languages

Saima Malik-Moraleda  , Maya Taliaferro, Steve Shannon,   +8, and Evelina Fedorenko   [Authors Info & Affiliations](#)

Edited by Susan Goldin-Meadow, The University of Chicago, Chicago, IL; received September 14, 2023; accepted January 4, 2025

March 17, 2025 | 122 (12) e2313473122 | <https://doi.org/10.1073/pnas.2313473122>

# Psycholinguistics at IOL

**Problem #5 (20 points).** In a series of experiments run in Carnegie Mellon University (Pittsburgh, USA) in 2010, volunteers were first shown some English words, while activity was being registered in different locations of their brains. Then the volunteers were asked to think of some other words from a preselected list of 60 words, while the researchers were measuring their brain activity again. Using the obtained data, the researchers were able to determine the words the volunteers were thinking of quite successfully.

Below you can find some data on the activity levels for four brain locations depending on which word the volunteers were thinking of.

Word	Translation	Location A	Location B	Location C	Location D
<i>airplane</i>	airplane	high	low	low	high
<i>apartment</i>	apartment	high	low	low	high
<i>arm</i>	arm	low	high	low	low
<i>corn</i>	corn	low	low	high	low
<i>cup</i>	cup	low	low	high	low
<i>igloo</i>	igloo	high	low	low	low
<i>key</i>	key	high	high	low	low
<i>lettuce</i>	lettuce	low	low	high	high
<i>screwdriver</i>	screwdriver	low	high	low	high

The same information is given below on six more words the volunteers were thinking of: *bed* ‘bed’, *butterfly* ‘butterfly’, *cat* ‘cat’, *cow* ‘cow’, *refrigerator* ‘refrigerator’, *spoon* ‘spoon’.

Word	Location A	Location B	Location C	Location D
1	low	low	high	high
2	low	low	high	low
3	high	low	low	low
4	low	low	low	high
5	low	high	high	low
6	low	low	low	low

Determine the correct correspondences.

—*Boris Iomdin*

# My aims for this problem

**1. Focus on `syntax`**

**2. Feature an `IOL-style language`**




# Syntax psycholinguistics in Kaqchikel

Articles

## Is the subject-before-object preference universal? An event-related potential study in the Kaqchikel Mayan language

Daichi Yasunaga , Masataka Yano , Yoshiho Yasugi & Masatoshi Koizumi 

Pages 1209-1229 | Received 30 Jun 2013, Accepted 30 Jul 2015, Published online: 23 Sep 2015

 Cite this article  <https://doi.org/10.1080/23273798.2015.1080372> 

ORIGINAL RESEARCH article

Front. Psychol., 09 May 2017

Sec. Psychology of Language

Volume 8 - 2017 |

<https://doi.org/10.3389/fpsyg.2017.00748>

This article is part of the Research Topic  
Approaches to Language: Data, Theory, and  
Explanation

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## Dissociating Effects of Scrambling and Topicalization within the Left Frontal and Temporal Language Areas: An fMRI Study in Kaqchikel Maya

 Shinri Ohta<sup>1,2†</sup>  Masatoshi Koizumi<sup>3</sup>  Kuniyoshi L. Sakai<sup>1,2\*</sup>

<sup>1</sup> Department of Basic Science, Graduate School of Arts and Sciences, The University of Tokyo, Tokyo, Japan

<sup>2</sup> Core Research for Evolutionary Science and Technology, Japan Science and Technology Agency, Tokyo, Japan

<sup>3</sup> Department of Linguistics, Graduate School of Arts and Letters, Tohoku University, Sendai, Japan

LANGUAGE, COGNITION AND NEUROSCIENCE  
2020, VOL. 35, NO. 2, 137–150  
<https://doi.org/10.1080/23273798.2019.1650945>

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REGULAR ARTICLE

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## Cognitive loads and time courses related to word order preference in Kaqchikel sentence production: an NIRS and eye-tracking study

Masatoshi Koizumi <sup>a,b,c</sup>, Yasuhiro Takeshima<sup>d</sup>, Ryo Tachibana<sup>e</sup>, Riku Asaoka<sup>f</sup>, Godai Saito<sup>g</sup>, Keiyu Niikuni<sup>h</sup> and Jiro Gyoba<sup>g</sup>

[Open Journal of Modern Linguistics](#) > Vol.3 No.3, September 2013

## Effect of Animacy on Word Order Processing in Kaqchikel Maya

Sachiko Kiyama, Katsuo Tamaoka, Jung-ho Kim, Masatoshi Koizumi



Functional Brain Imaging Lab, National Center for Geriatrics and Gerontology, Ohbu, Japan.

Graduate School of Arts and Letters, Tohoku University, Sendai, Japan.

Graduate School of Languages and Cultures, Nagoya University, Nagoya, Japan.

DOI: [10.4236/ojml.2013.33027](https://doi.org/10.4236/ojml.2013.33027) PDF HTML 4,163 Downloads 6,707 Views [Citations](#)

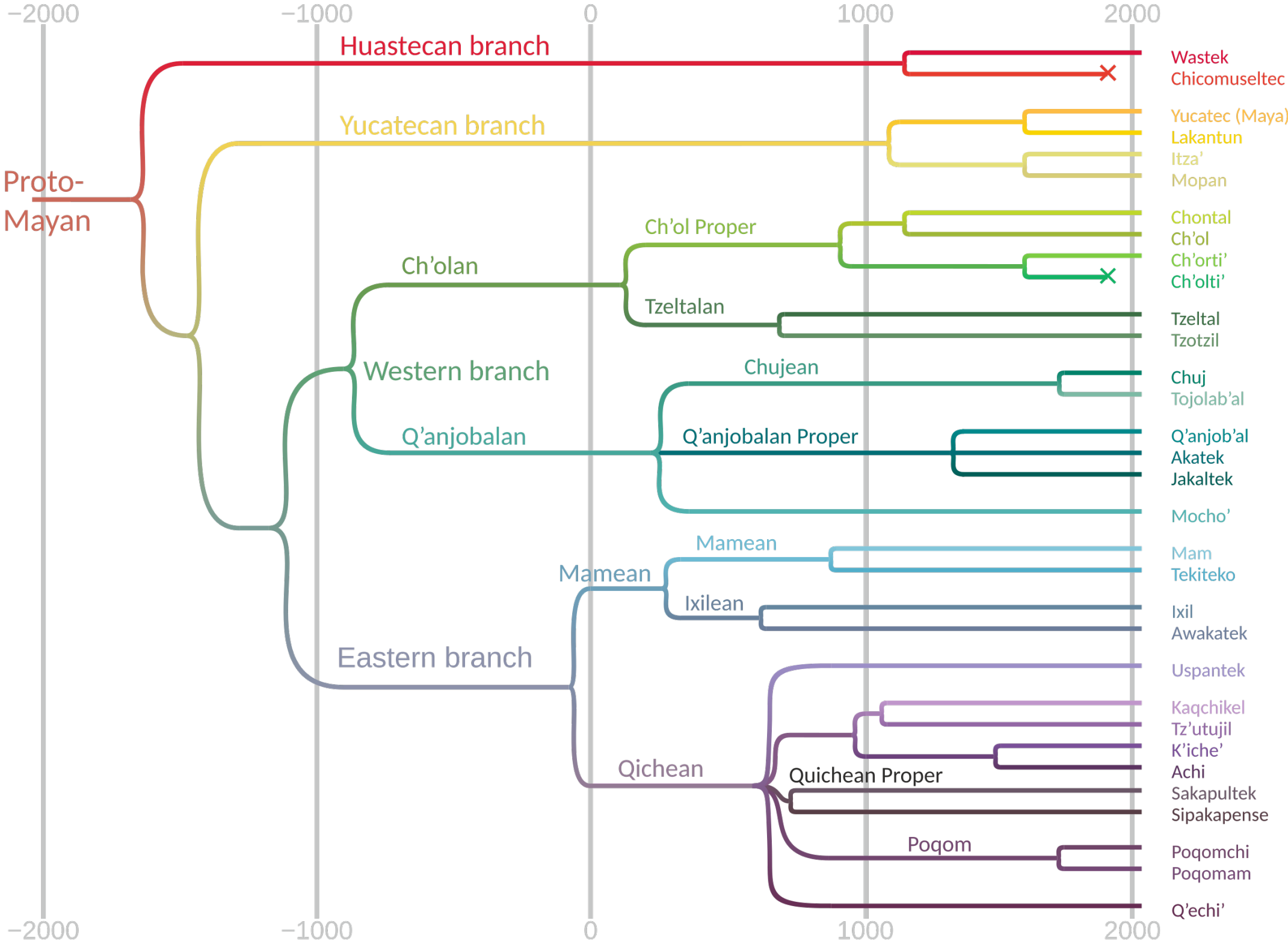
## Greater Left Inferior Frontal Activation for SVO than VOS during Sentence Comprehension in Kaqchikel

 Masatoshi Koizumi<sup>1\*</sup>  Jung-ho Kim<sup>2</sup>

<sup>1</sup> Department of Linguistics, Graduate School of Arts and Letters, Tohoku University, Sendai, Japan

<sup>2</sup> Department of Foreign Languages, Kyoto Women's University, Kyoto, Japan

# Kaqchikel





# The study

ORIGINAL RESEARCH article

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Sec. Psychology of Language

Volume 8 - 2017 |

<https://doi.org/10.3389/fpsyg.2017.00748>

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Kuniyoshi L. Sakai<sup>1,2\*</sup>

<sup>1</sup> Department of Basic Science, Graduate School of Arts and Sciences, The University of Tokyo, Tokyo, Japan

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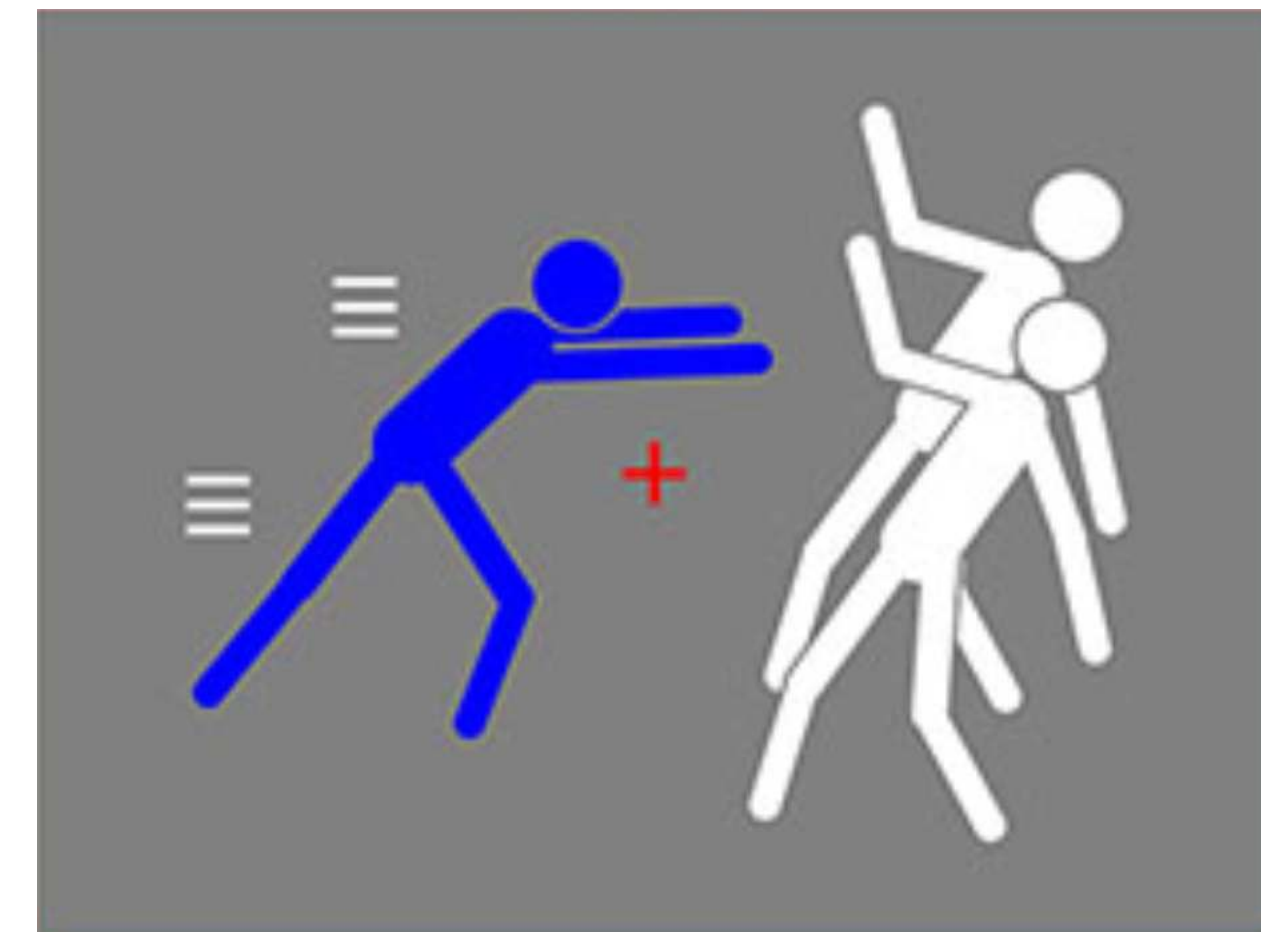
<sup>3</sup> Department of Linguistics, Graduate School of Arts and Letters, Tohoku University, Sendai, Japan

# The study



**functional Magnetic Resonance  
Imaging (fMRI) scanner**

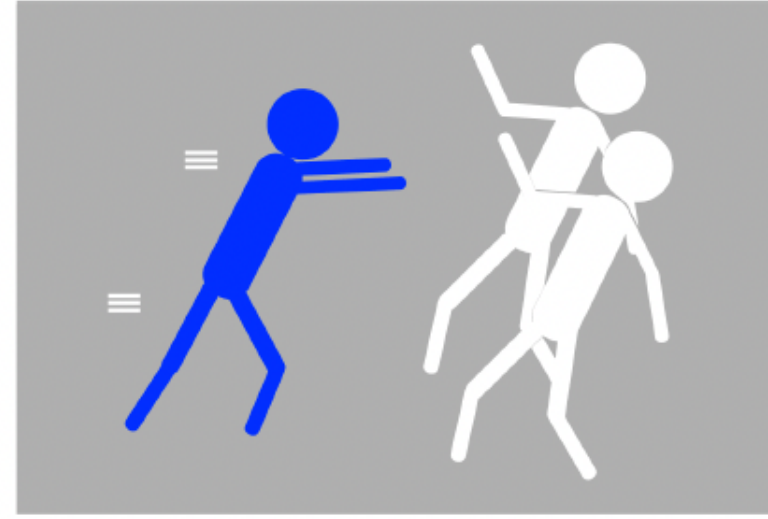
**N = 17 participants**



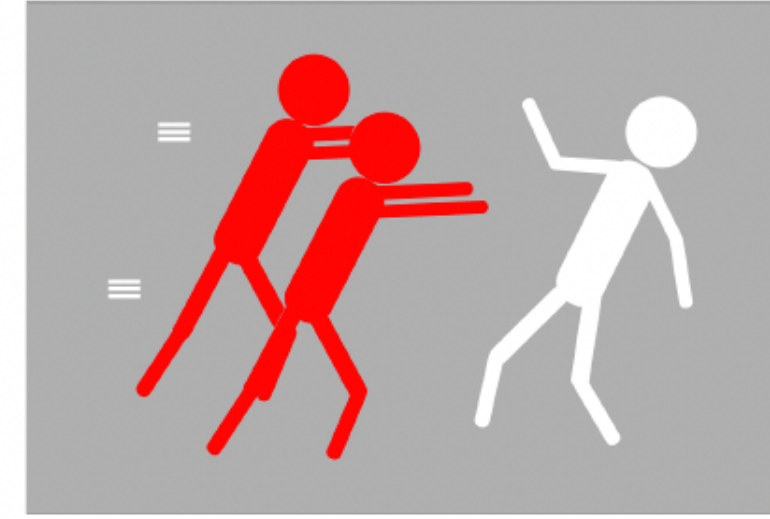
**Ri xar xerunim xi taq säq**



1. Xerunim ri taq saq ri xar



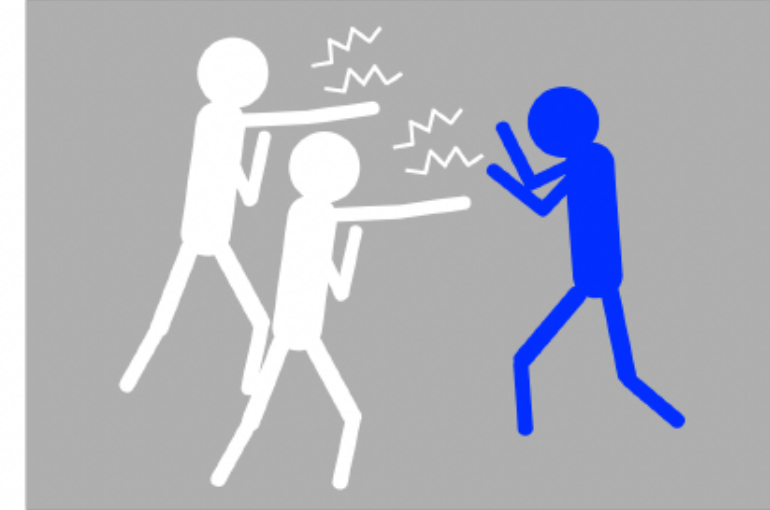
5. [E] ri saq



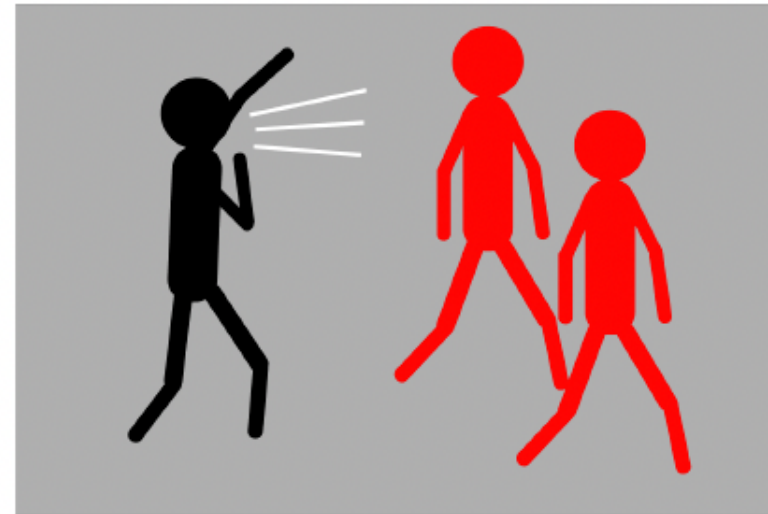
2. Ri taq [A] xkich'ay [B] kaq



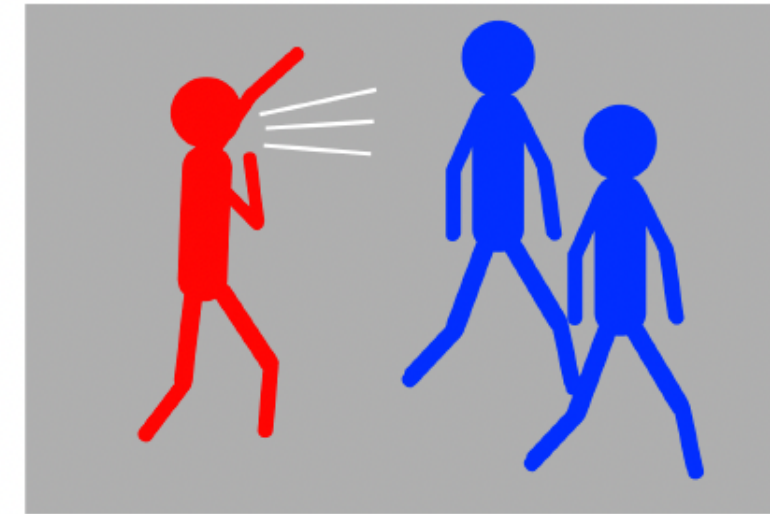
6. Xkich'ay [F]



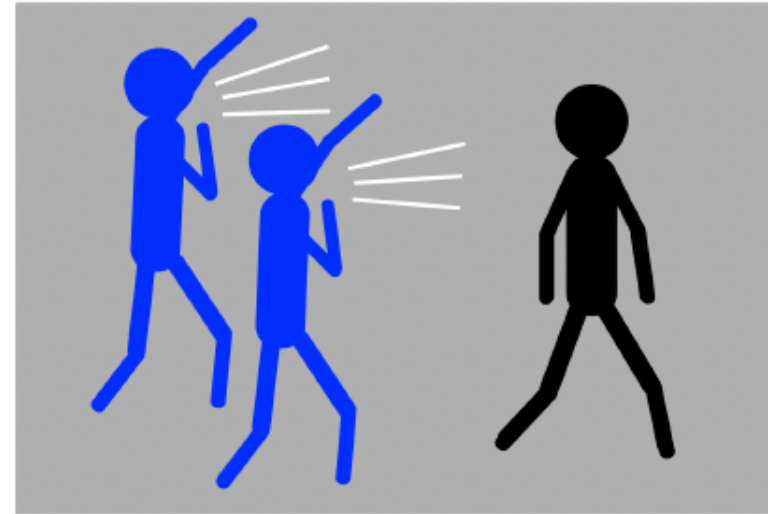
3. [C] ri q'eq ri taq kaq



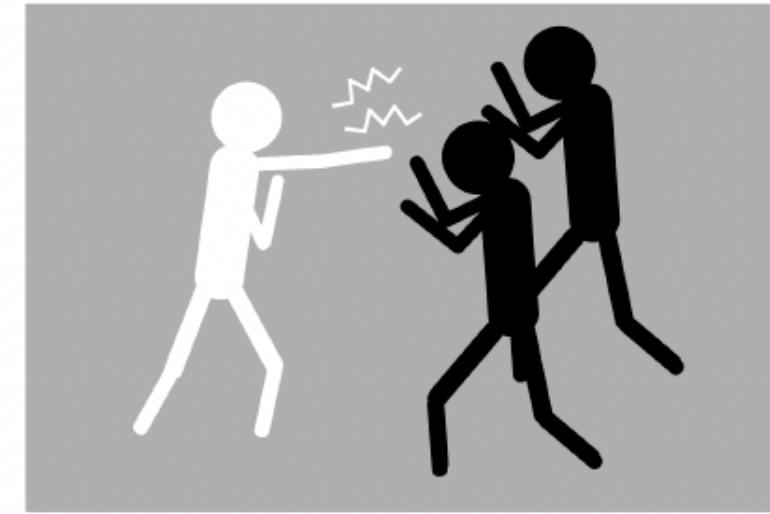
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]

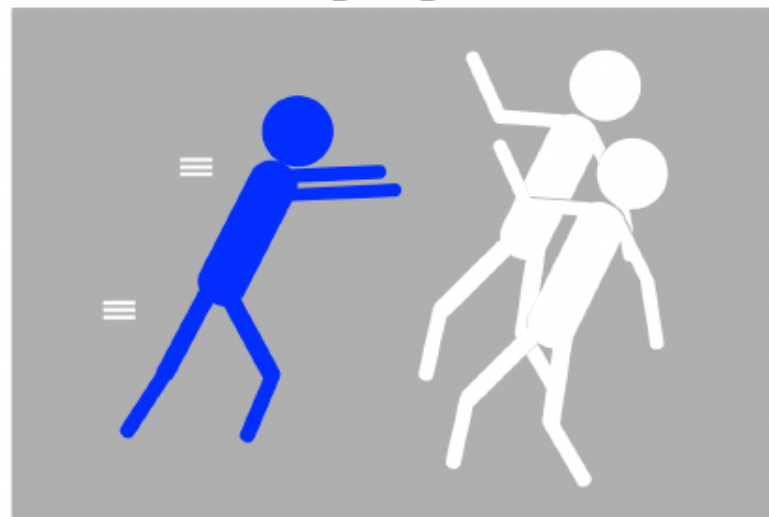


8. [I]

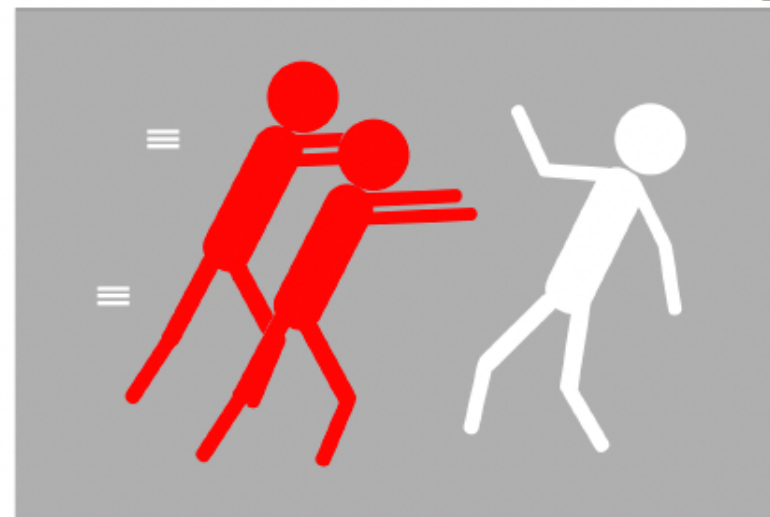


This problem

1. Xerunim ri taq saq ri xar



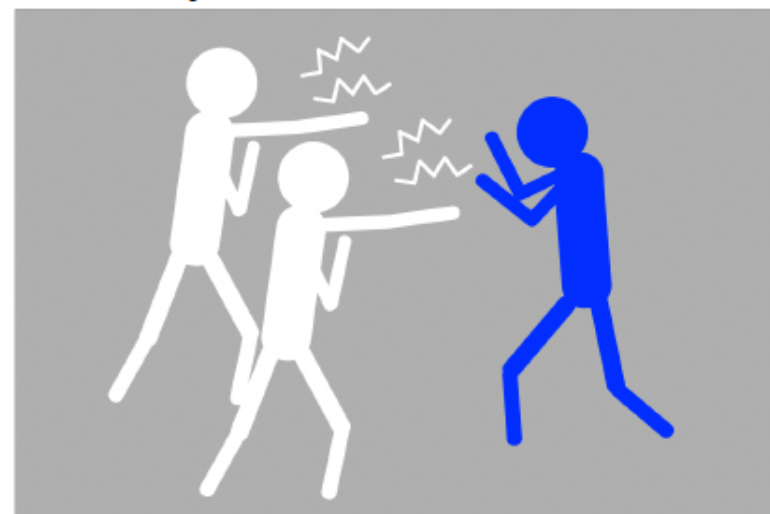
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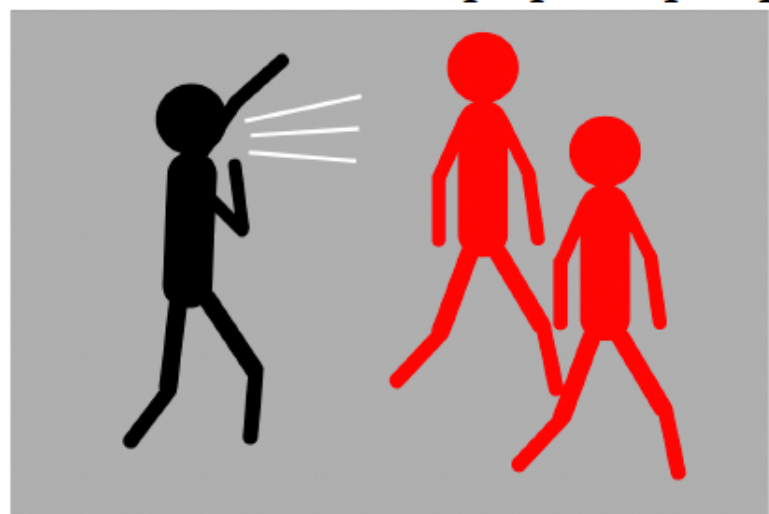
2. Ri taq [A] xkich'ay [B] kaq



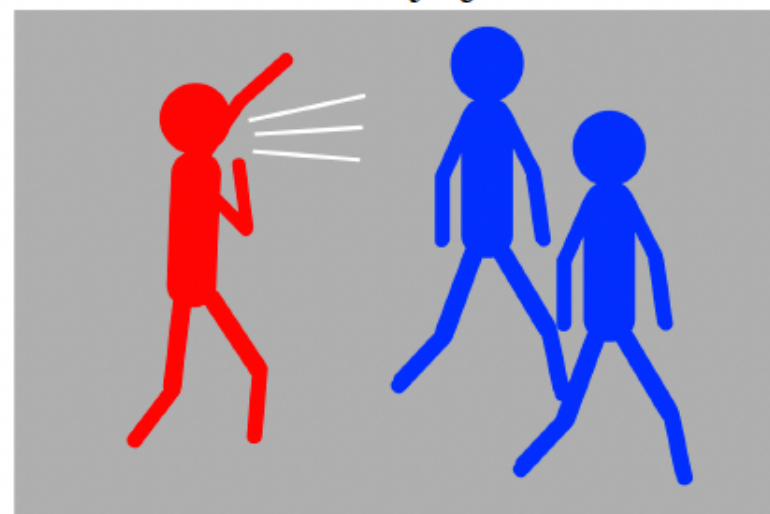
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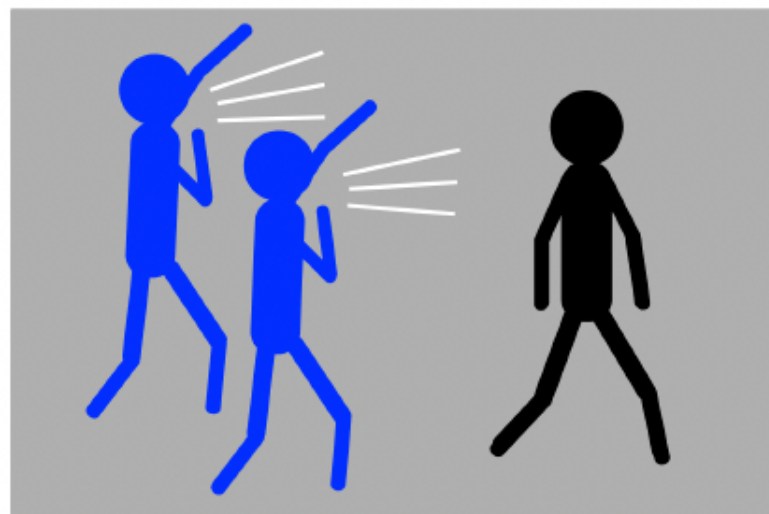
3. [C] ri q'eq ri taq kaq



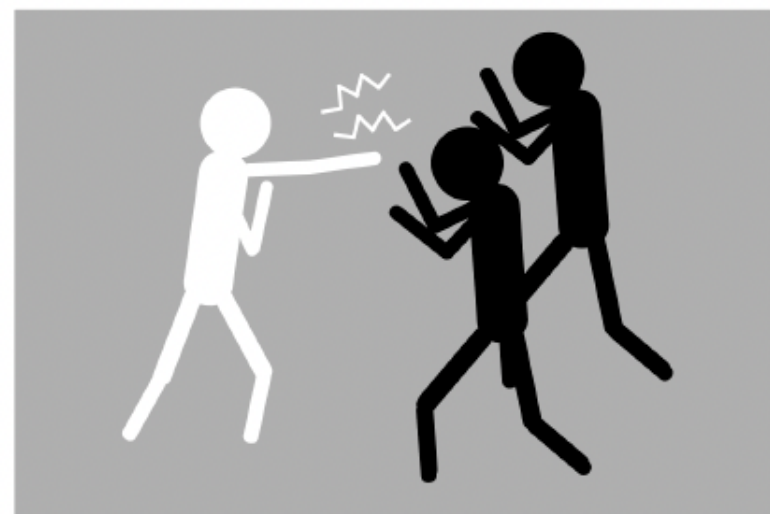
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]



8. [I]

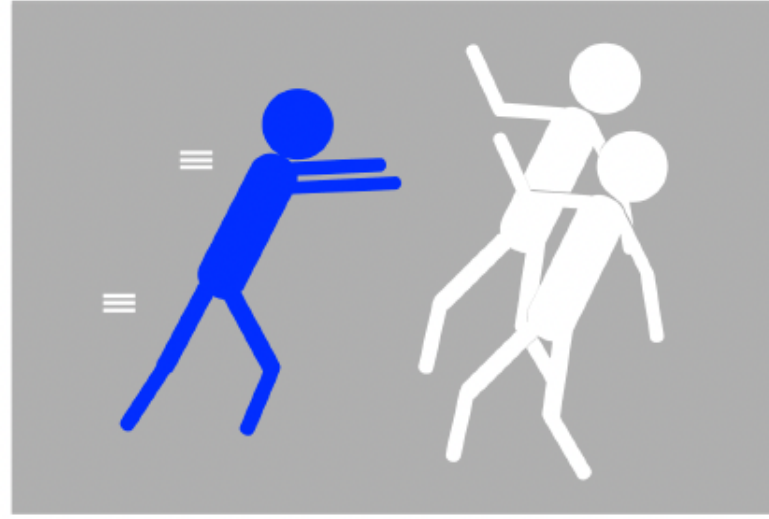


# This problem

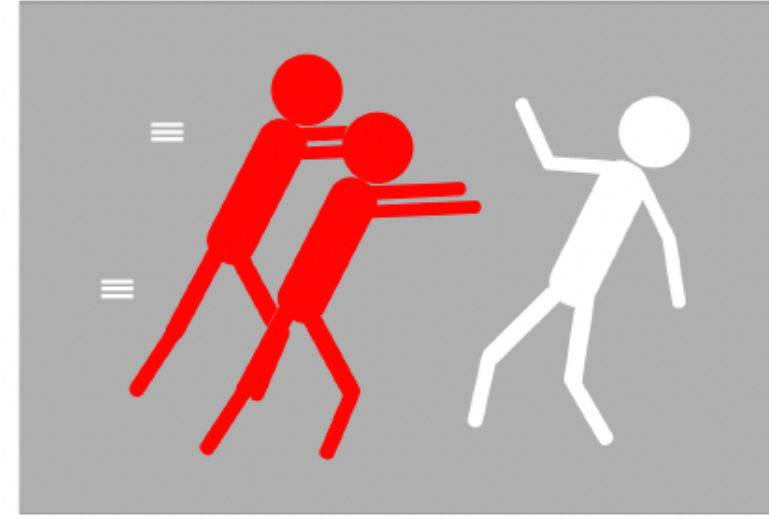
Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower
5	higher	higher
6	lower	higher
7	higher	lower
8	lower	lower

# This problem

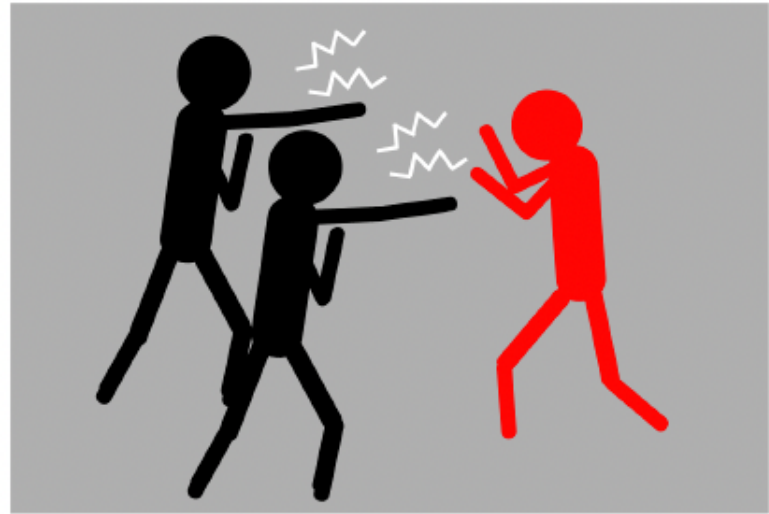
1. Xerunim ri taq säq ri xar



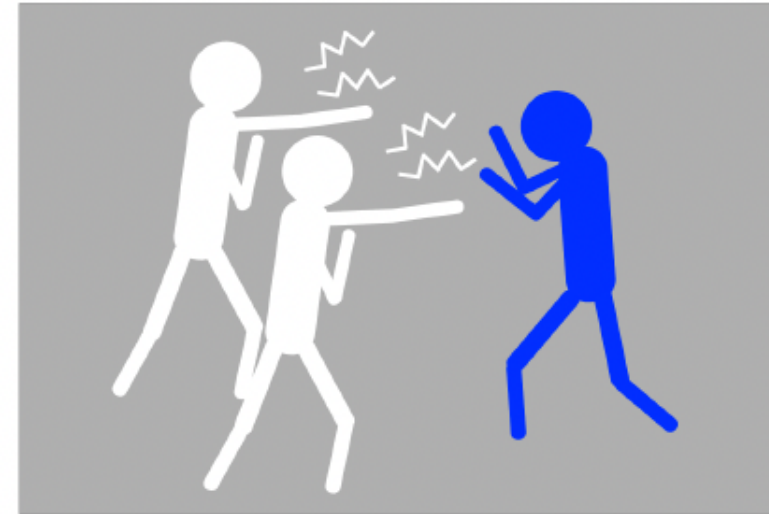
5. [E] ri säq



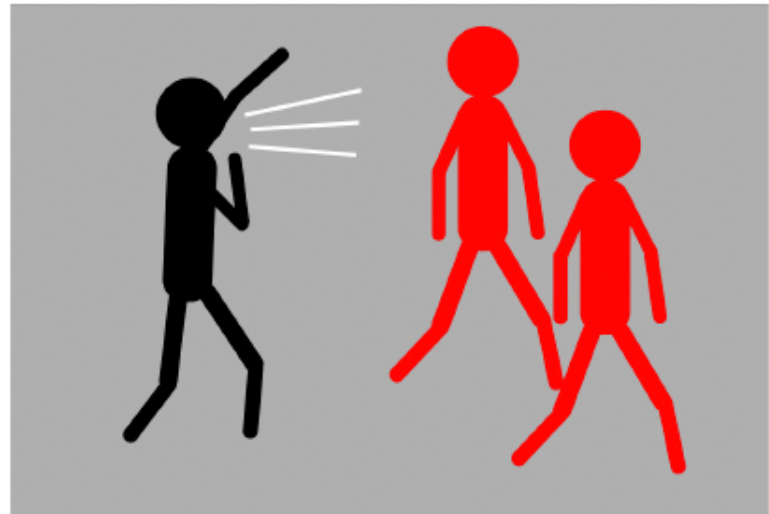
2. Ri taq [A] xkich'äy [B] käq



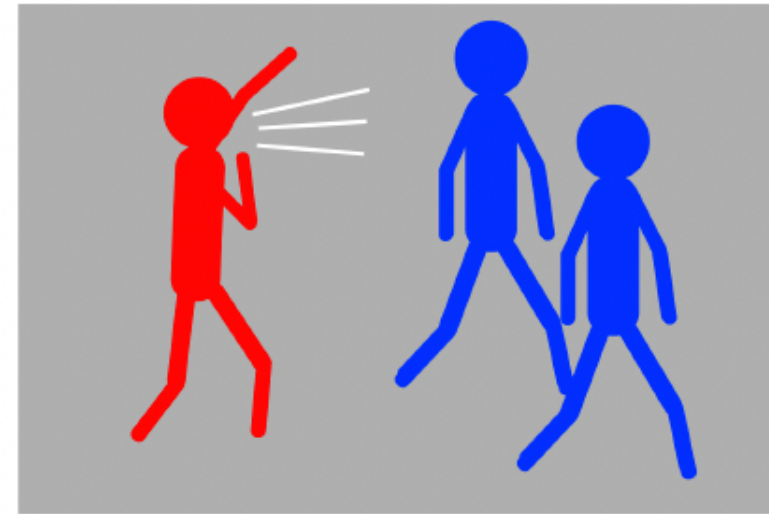
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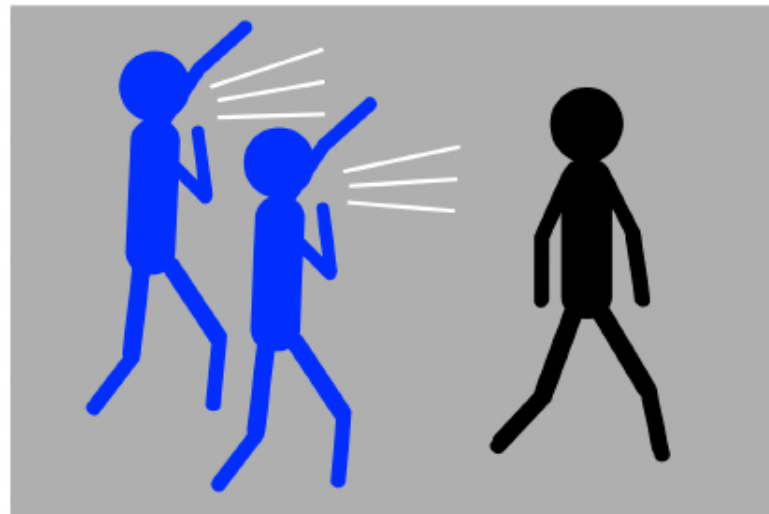
3. [C] ri q'ëq ri taq käq



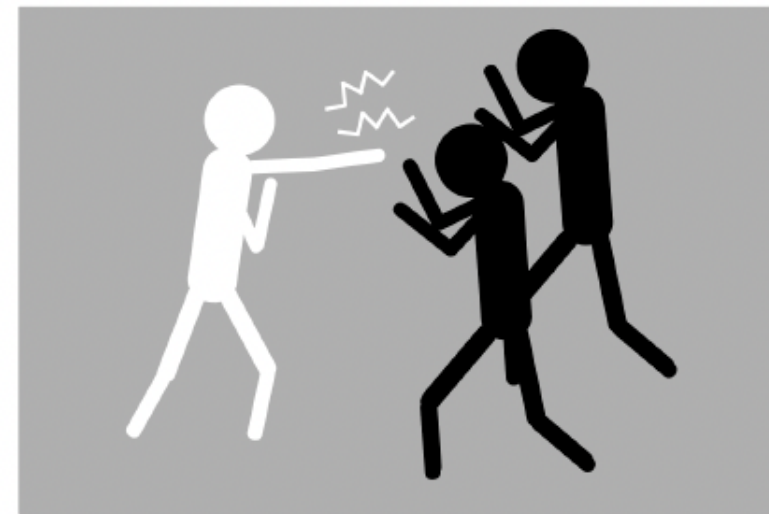
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



8. [I]



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

9. Ri taq säq xkinim ri q'ëq

10. Xekich'äy ri taq xar ri taq käq

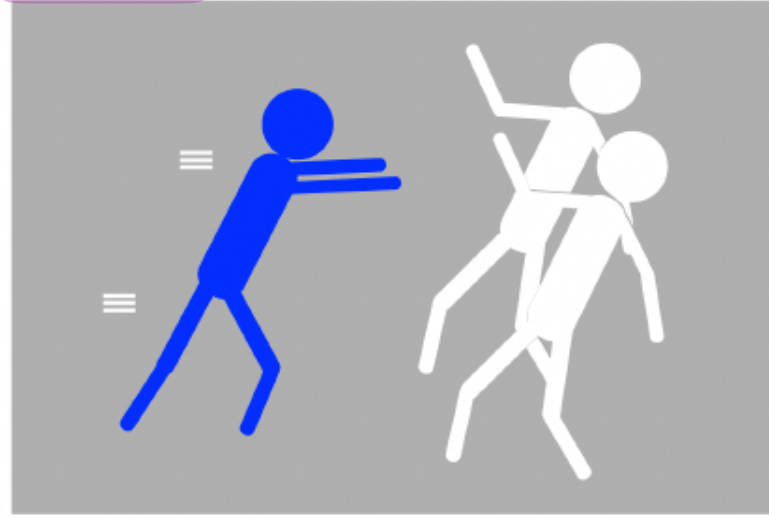
11. Xeruq'etey ri käq ri taq q'ëq

12. Xerachik'aj ri taq säq ri xar

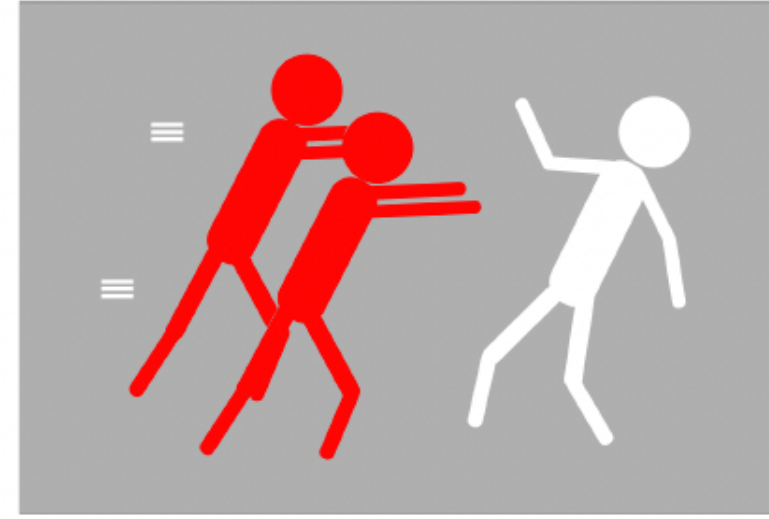
13. Ri taq q'ëq xekitz'ët ri taq säq

# Parsing the sentences

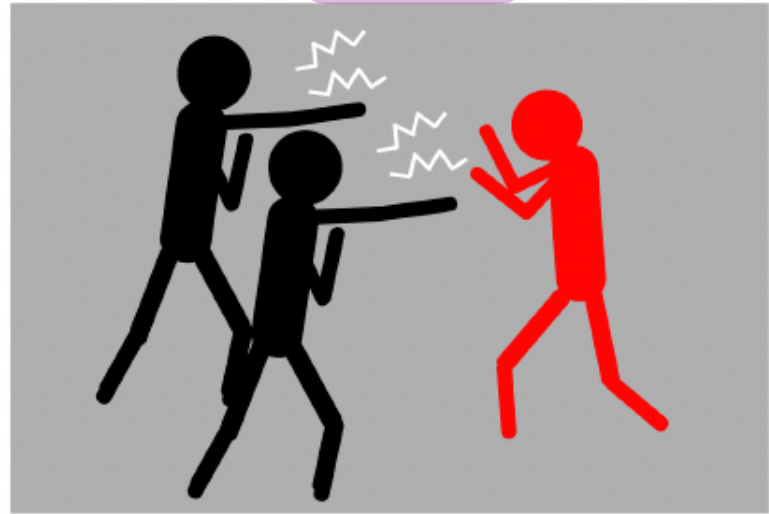
1. Xerunim ri taq säq ri xar



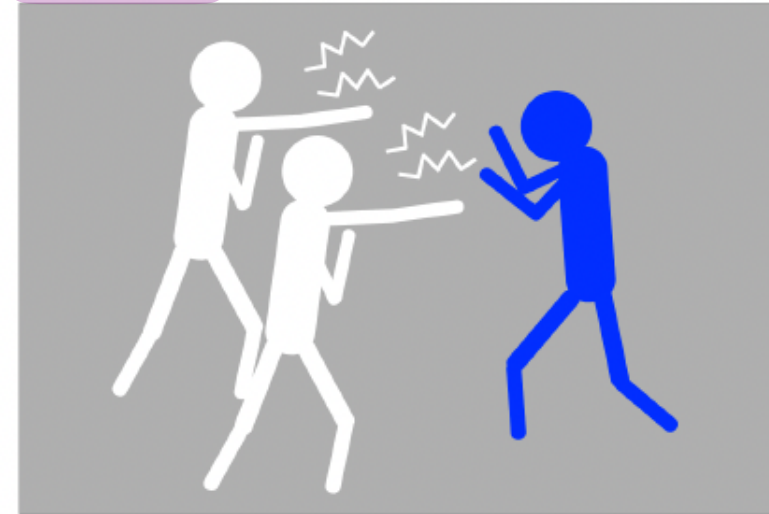
5. [E] ri säq



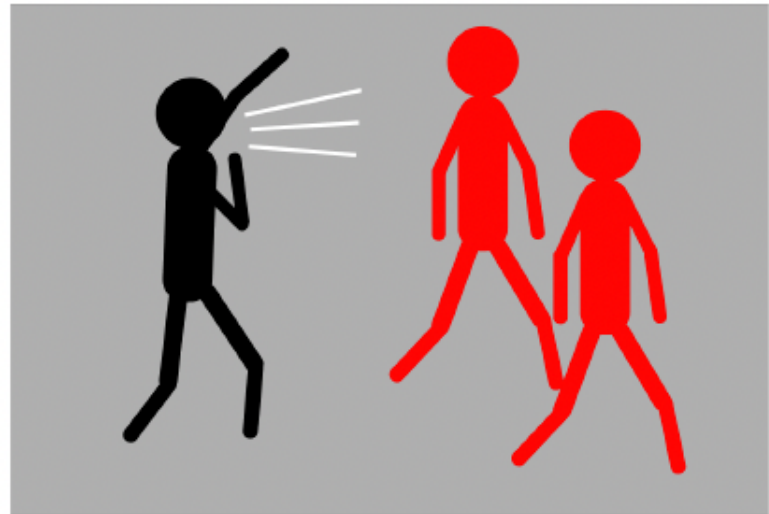
2. Ri taq [A] xkich'äy [B] käq



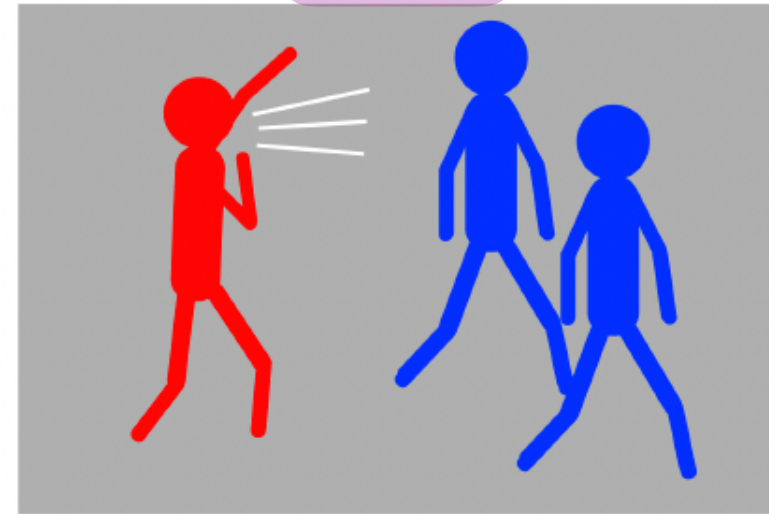
6. Xkich'äy [F]



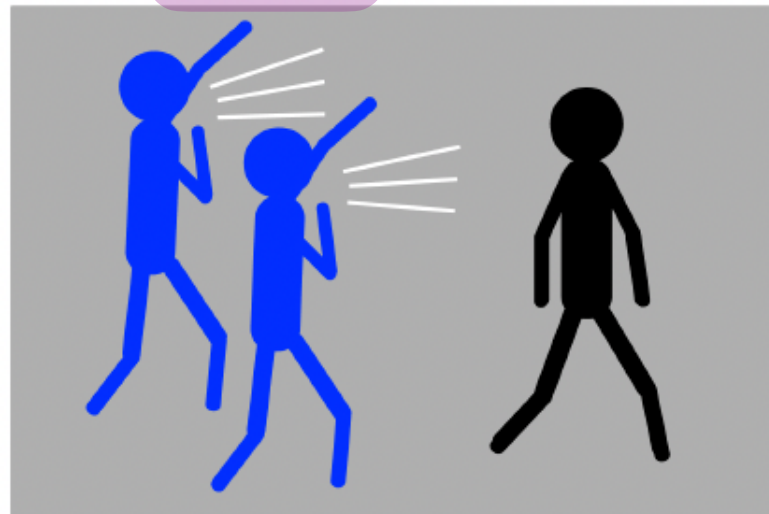
3. [C] ri q'ëq ri taq käq



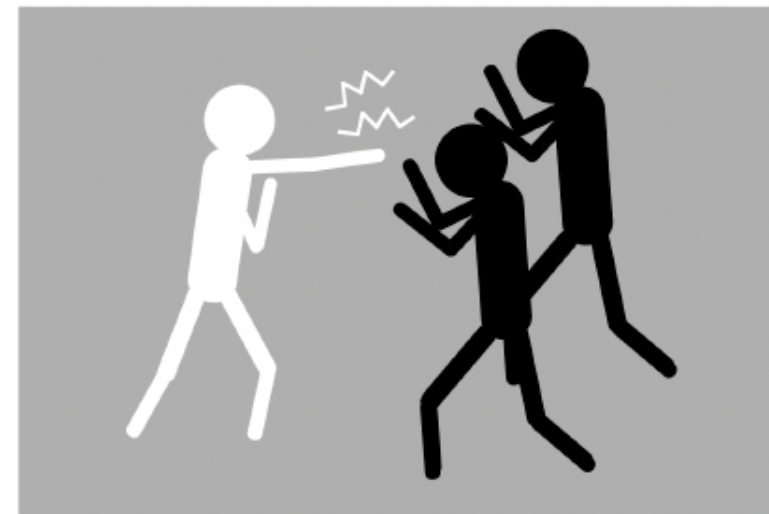
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



8. [I]



Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
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6	lower	higher
7	higher	lower
8	lower	lower

9. Ri taq säq xkinim ri q'ëq

10. Xekich'äy ri taq xar ri taq käq

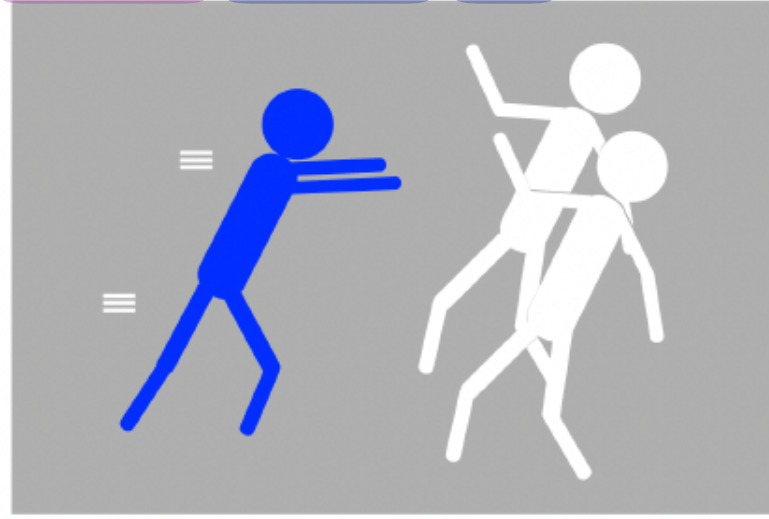
11. Xeruq'etey ri käq ri taq q'ëq

12. Xerachik'aj ri taq säq ri xar

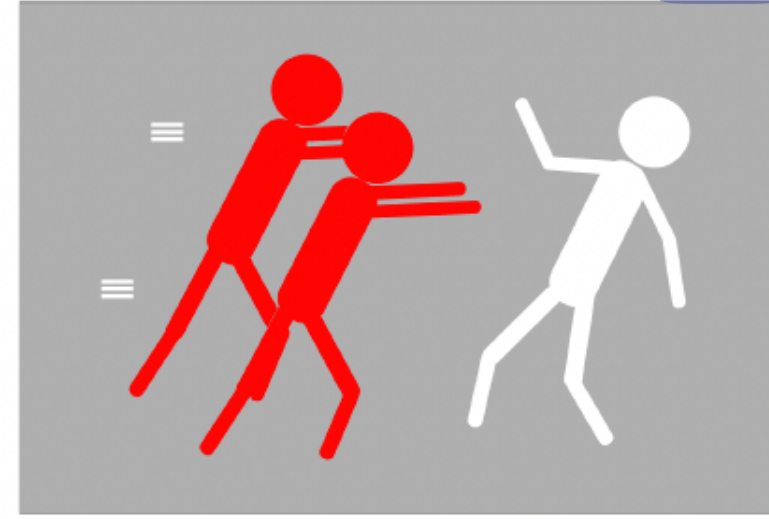
13. Ri taq q'ëq xekitz'ët ri taq säq

# Parsing the sentences

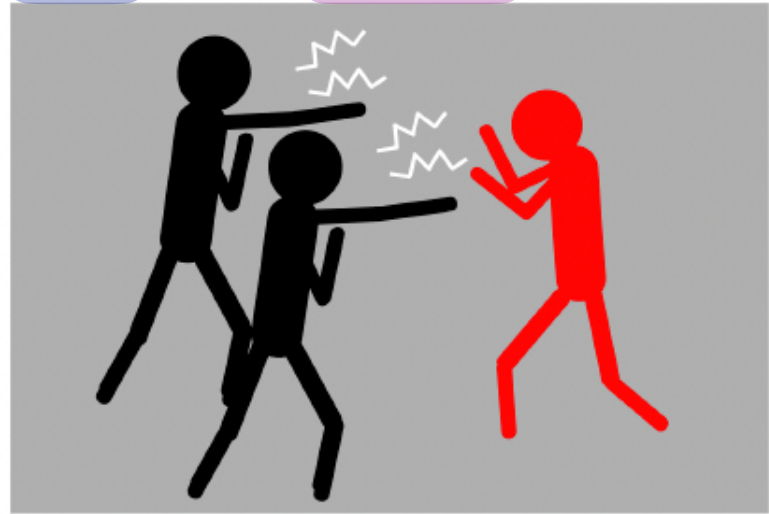
1. Xerunim ri taq säq ri xar



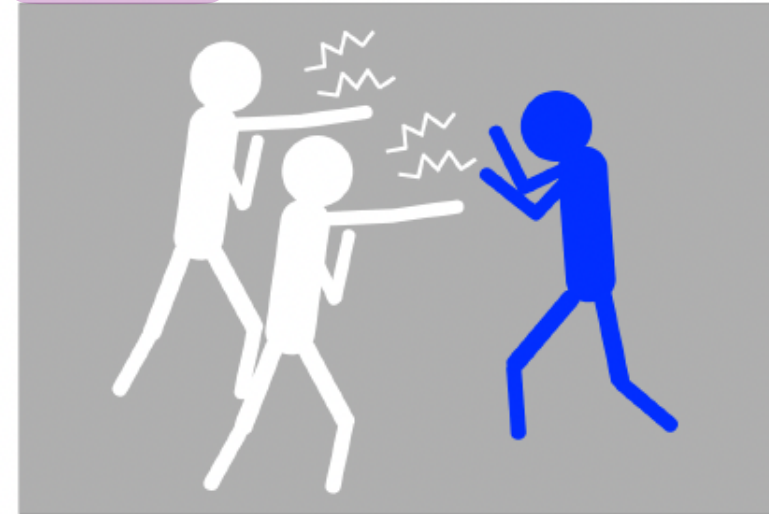
5. [E] ri säq



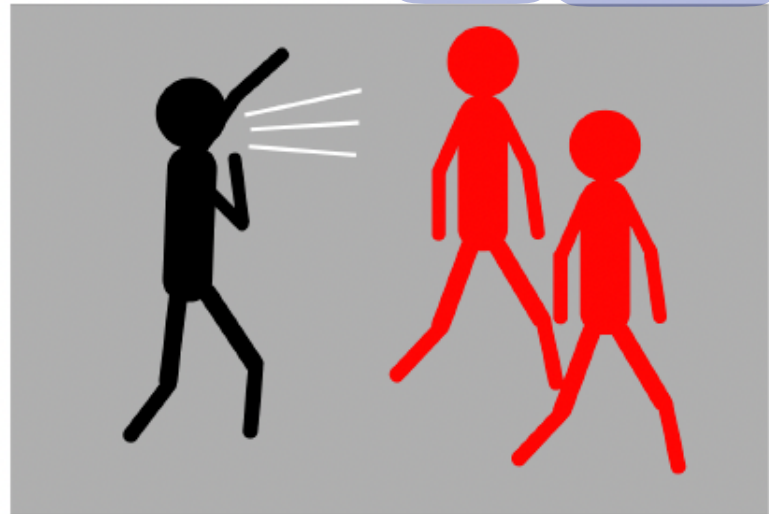
2. Ri taq [A] xkich'äy [B] käh



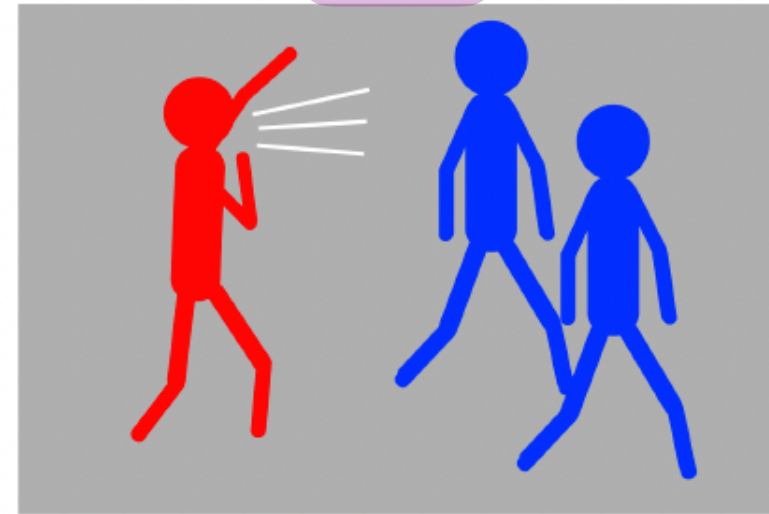
6. Xkich'äy [F]



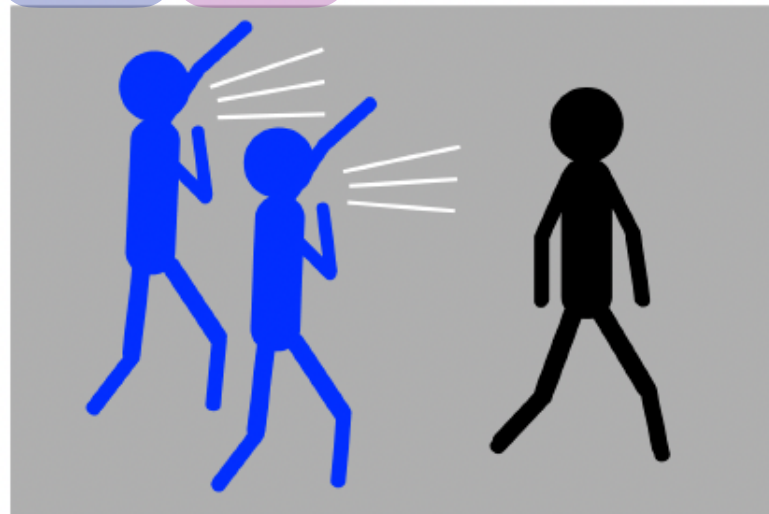
3. [C] ri q'ëq ri taq käh



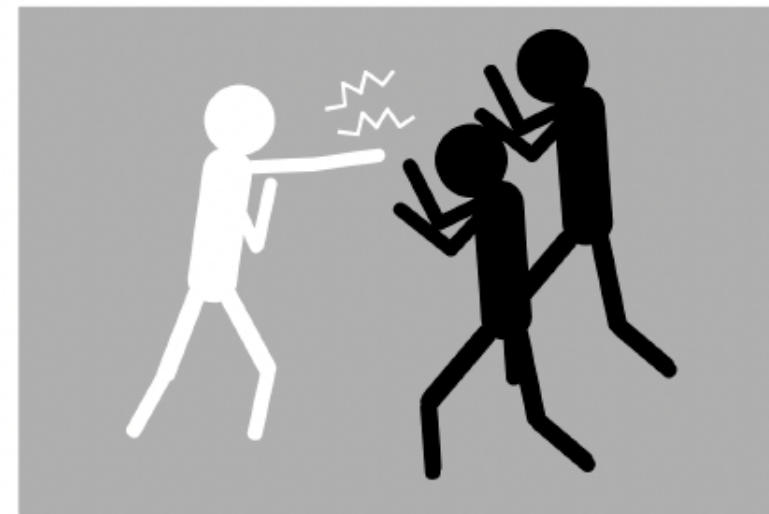
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



8. [I]



Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
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4	higher	lower
5	higher	higher
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9. Ri taq säq xkinim ri q'ëq

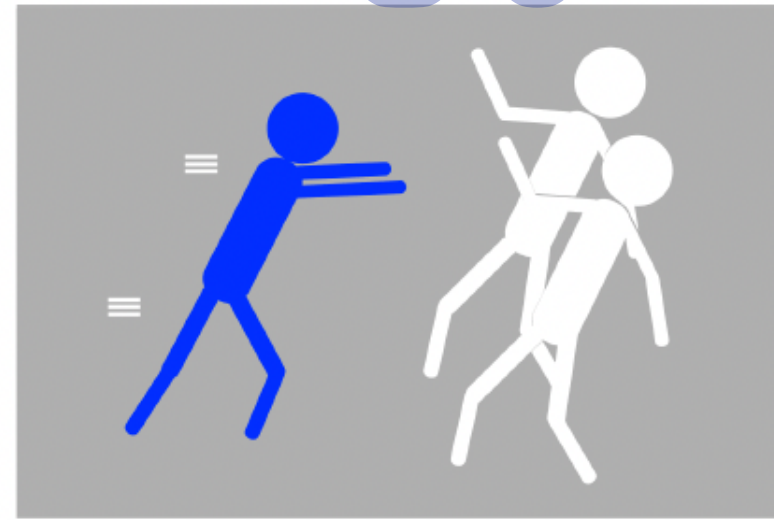
10. Xekich'äy ri taq xar ri taq käh

11. Xeruq'etey ri käh ri taq q'ëq

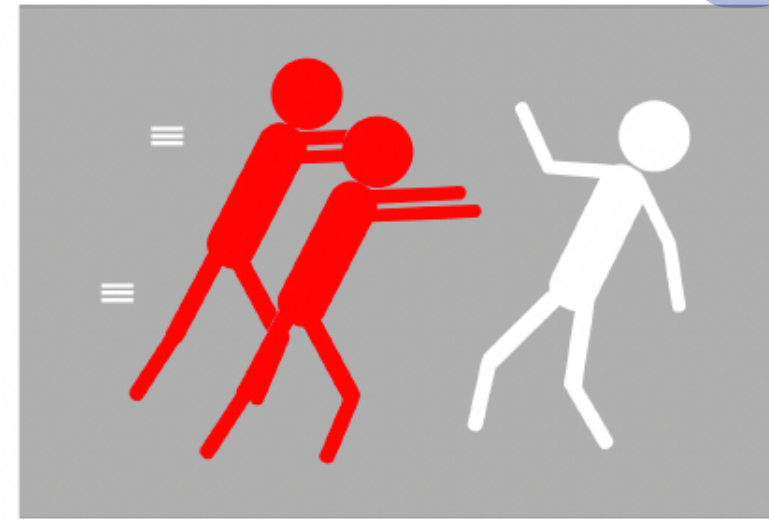
12. Xerachik'aj ri taq säq ri xar

13. Ri taq q'ëq xekitz'ët ri taq säq

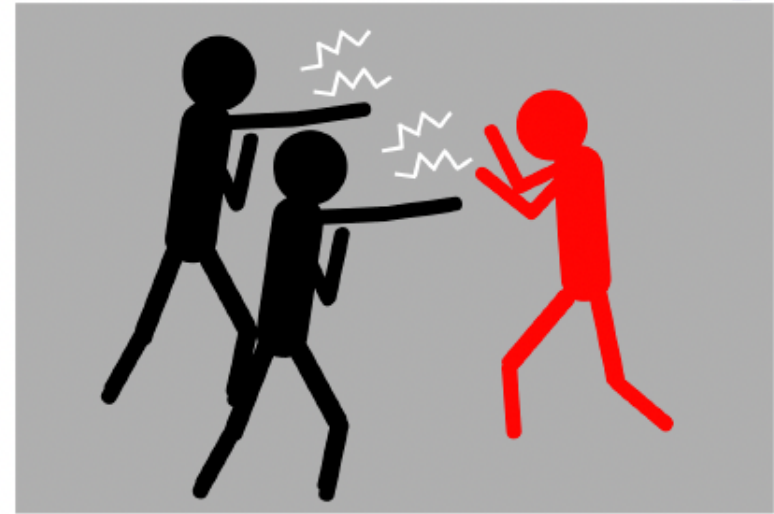
1. Xerunim ri taq säq ri xar



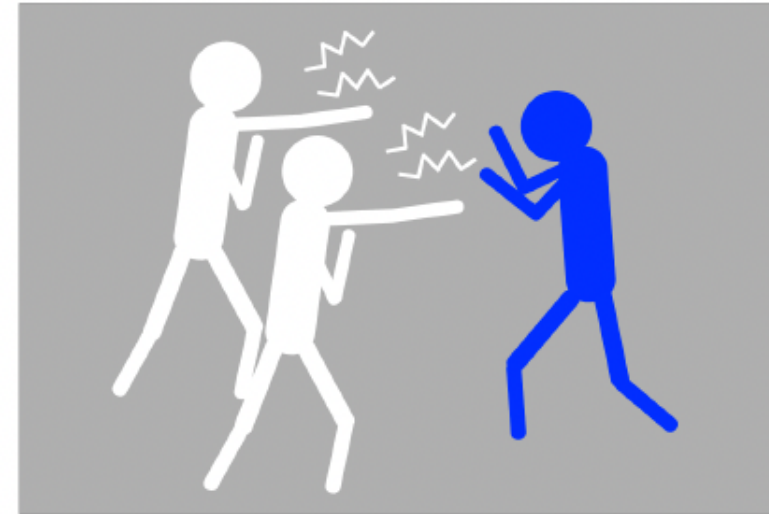
5. [E] ri säq



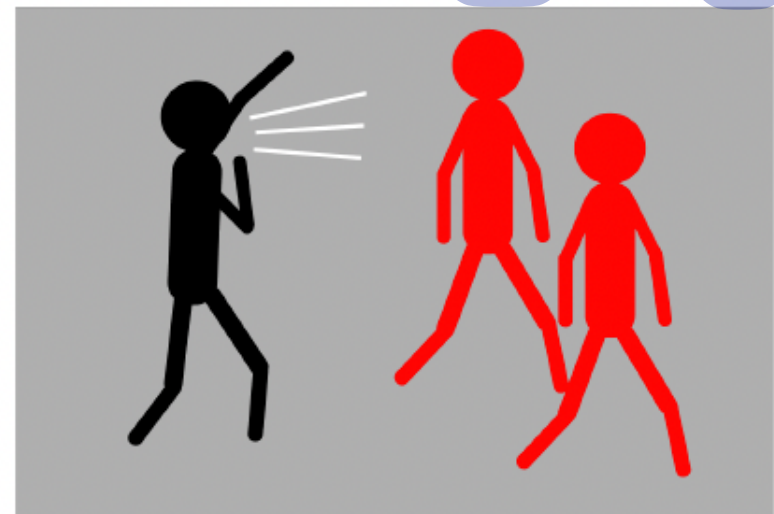
2. Ri taq [A] xkich'äy [B] käq



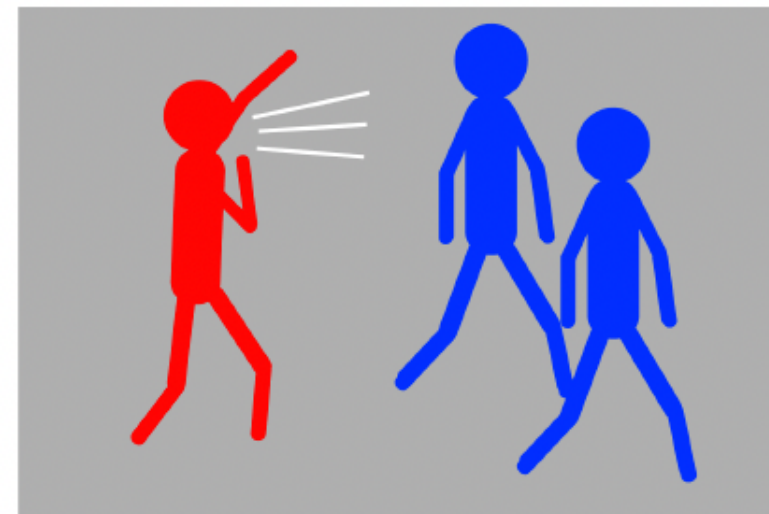
6. Xkich'äy [F]



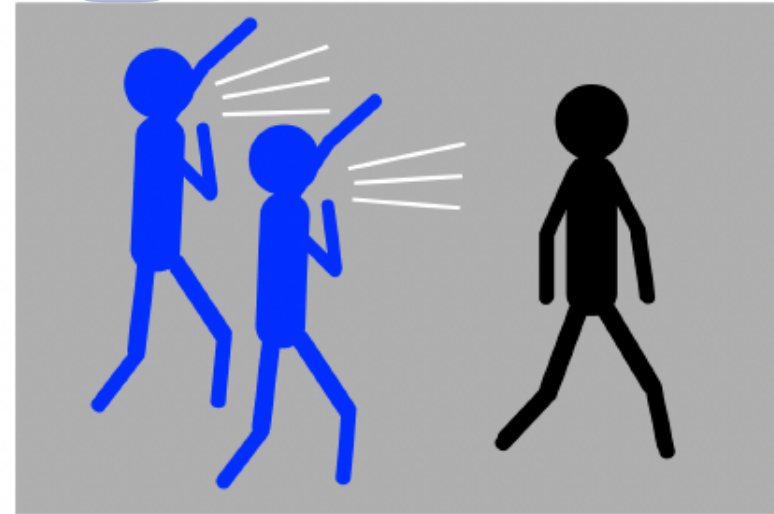
3. [C] ri q'ëq ri taq käq



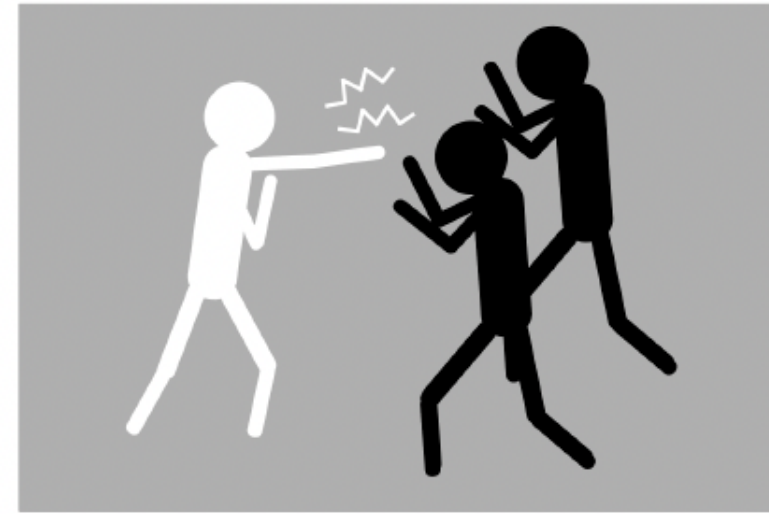
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



8. [I]

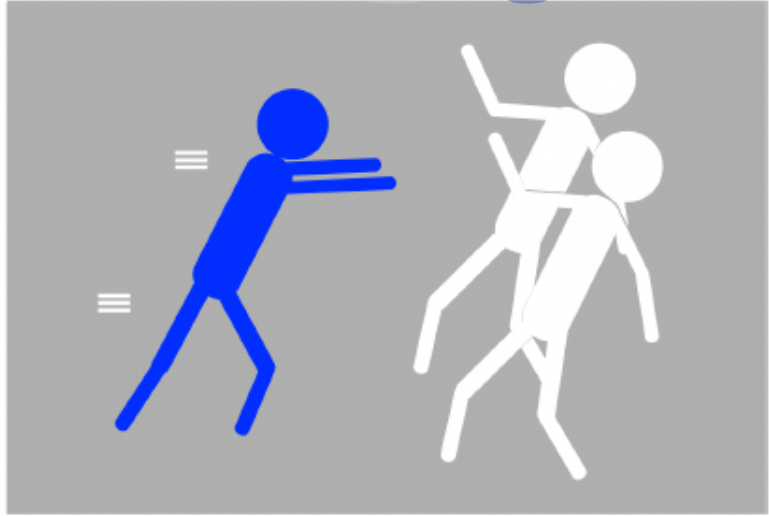


# The noun phrase

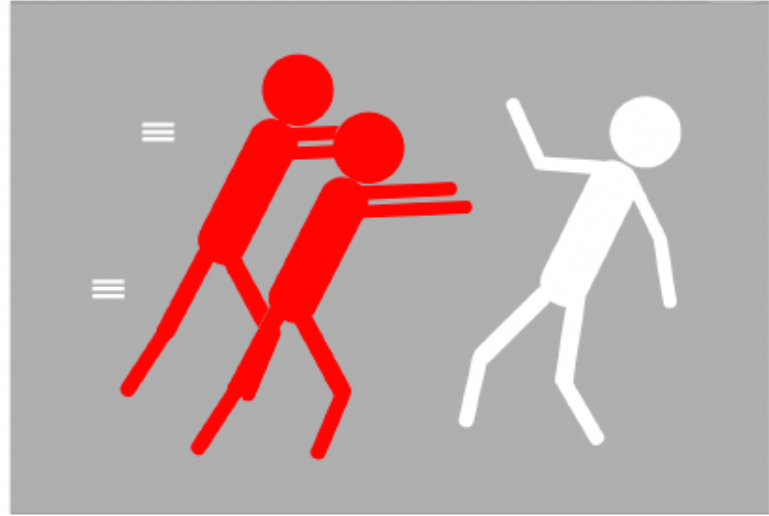
- säq
- xar
- käq
- q'ëq

# The noun phrase

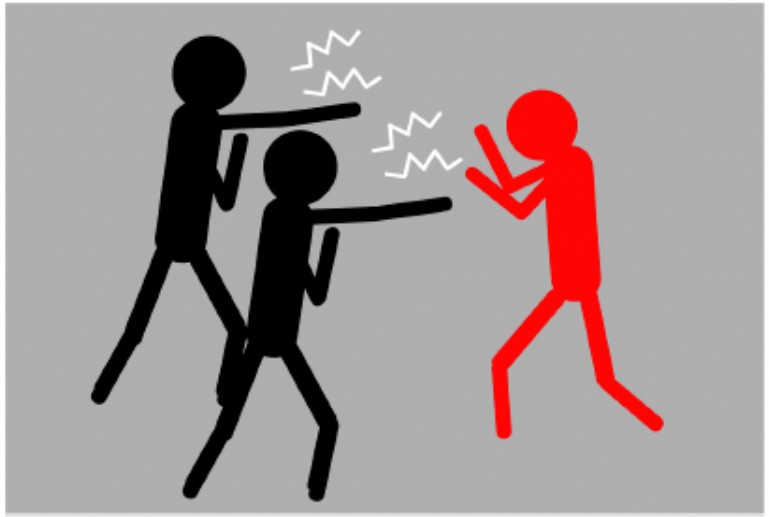
1. Xerunim ri taq säq ri xar



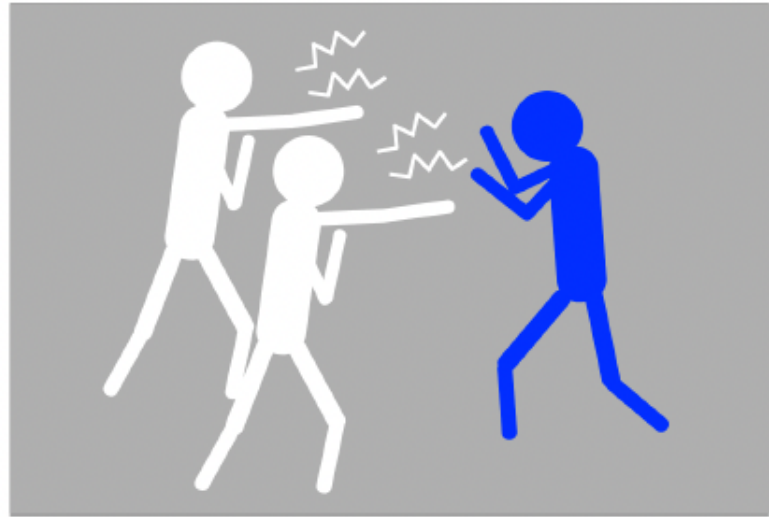
5. [E] ri säq



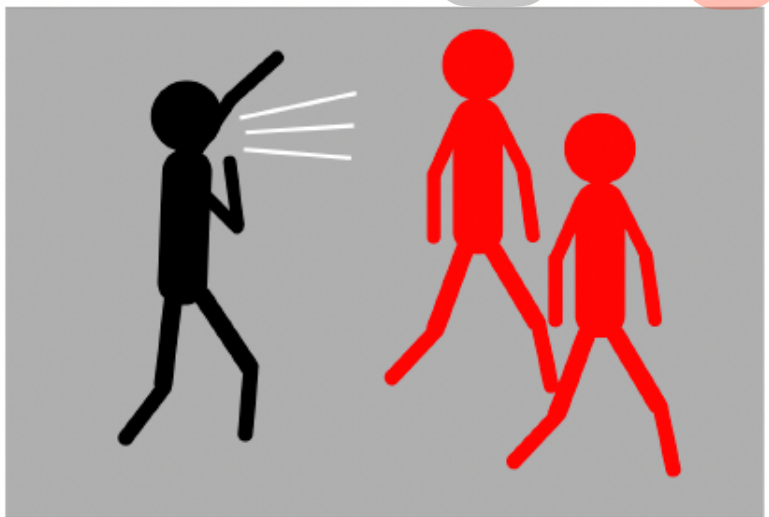
2. Ri taq [A] xkich'äy [B] käq



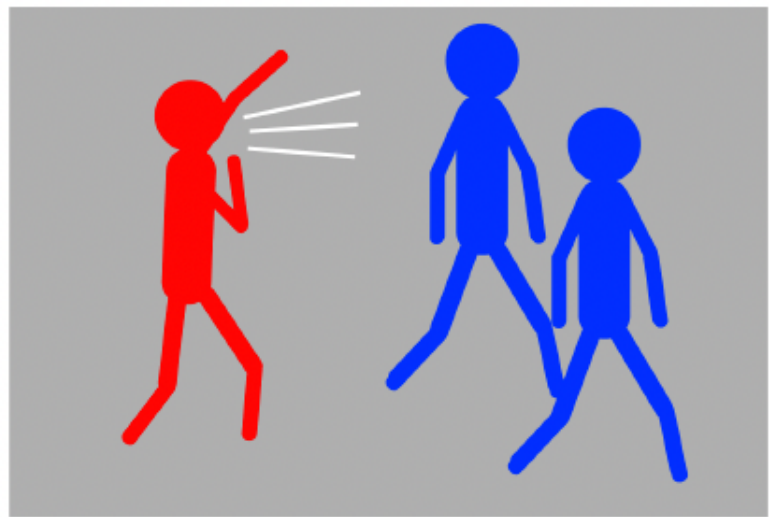
6. Xkich'äy [F]



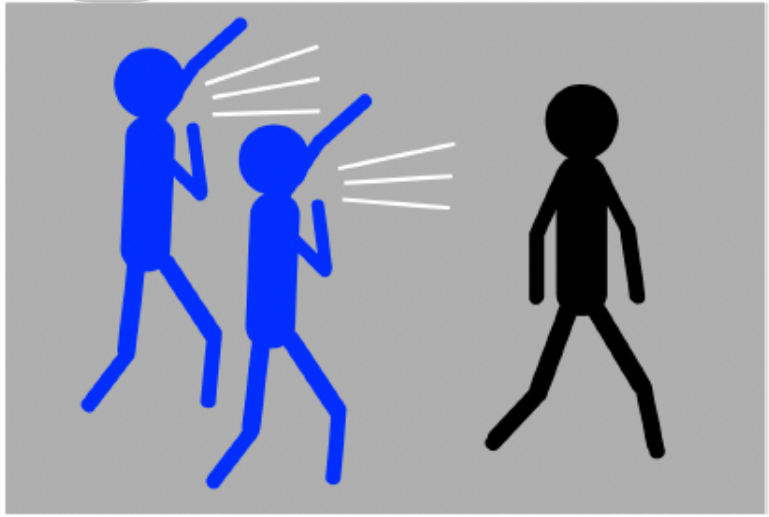
3. [C] ri q'ëq ri taq käq



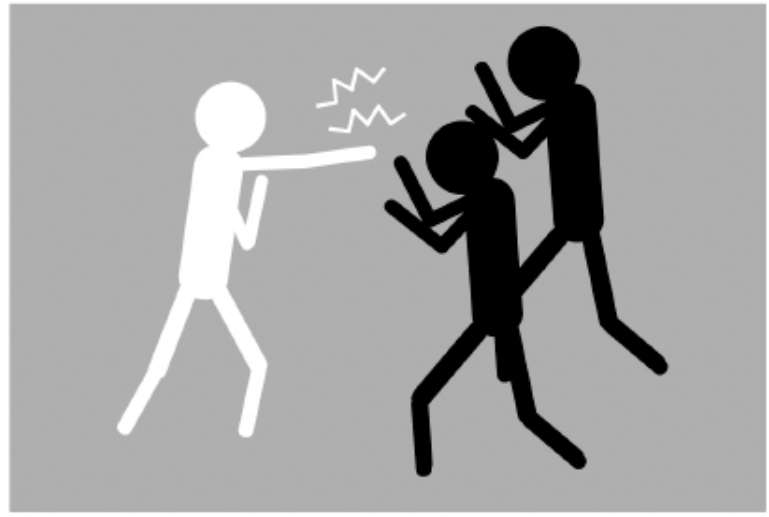
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



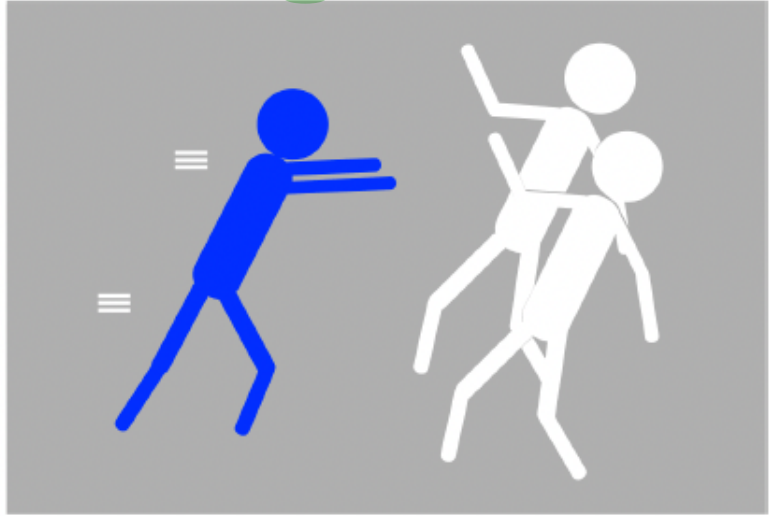
8. [I]



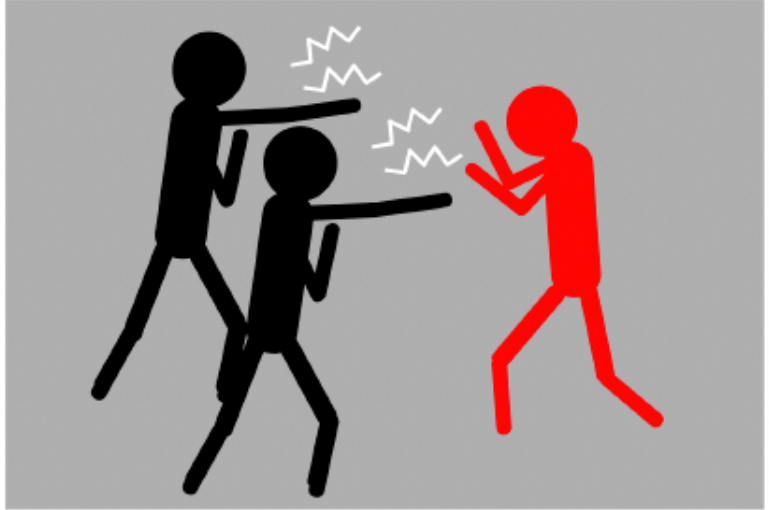
säq  
xar  
käq  
q'ëq

# The noun phrase

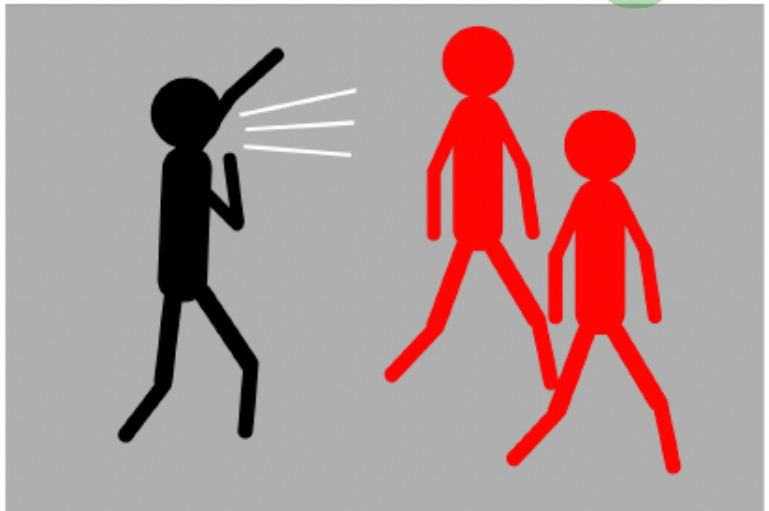
1. Xerunim ri taq säq ri xar



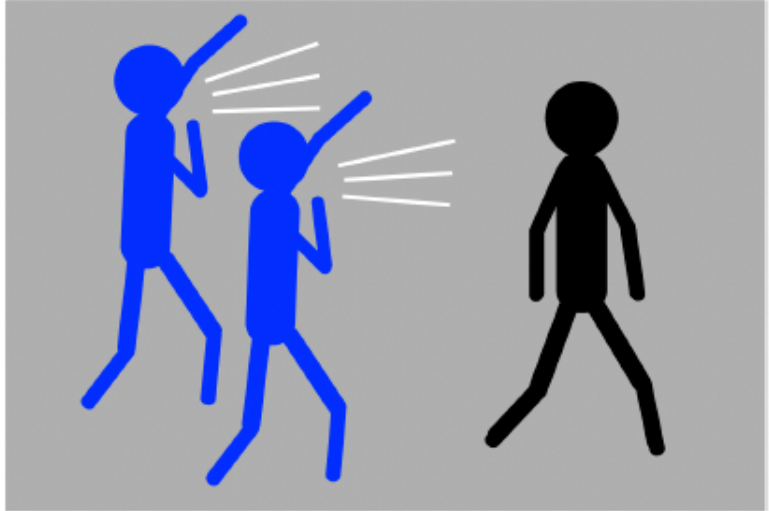
2. Ri taq [A] xkich'äy [B] käq



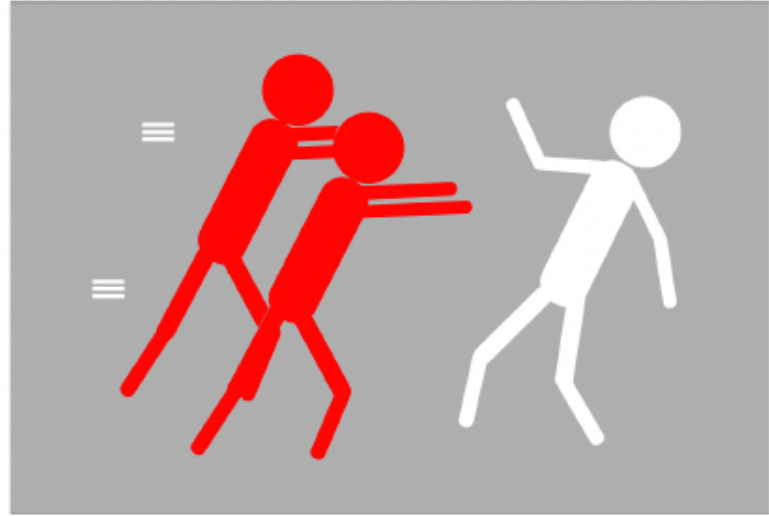
3. [C] ri q'ëq ri taq käq



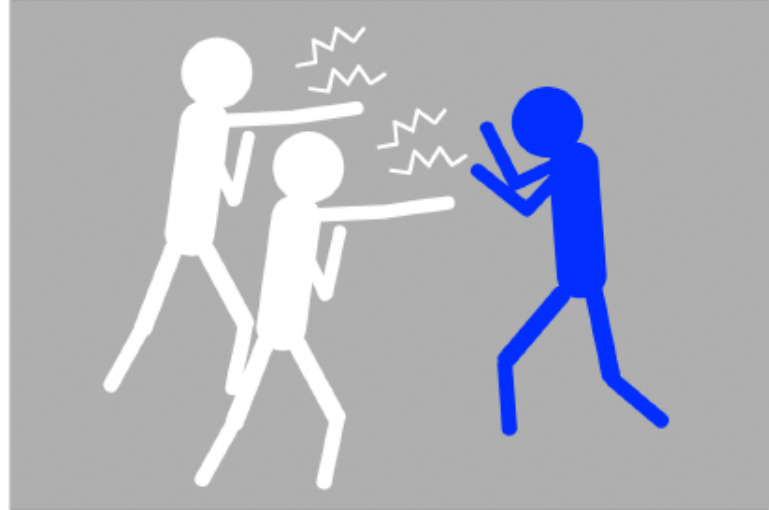
4. Ri q'ëq xkoyoj [D]



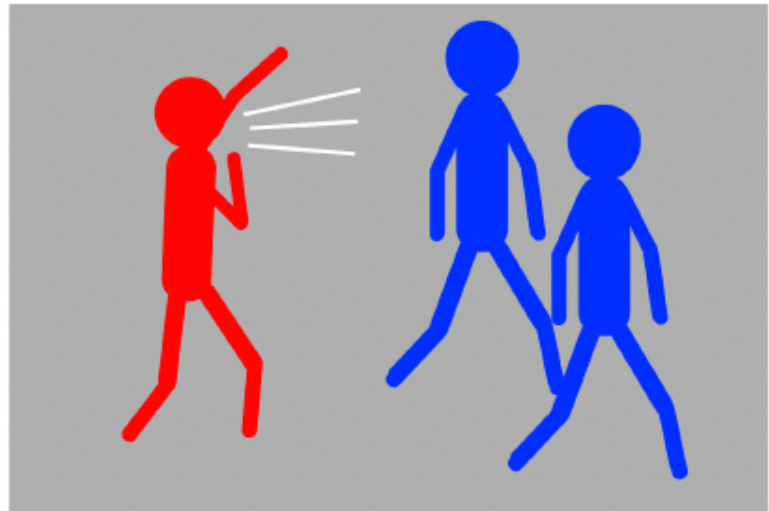
5. [E] ri säq



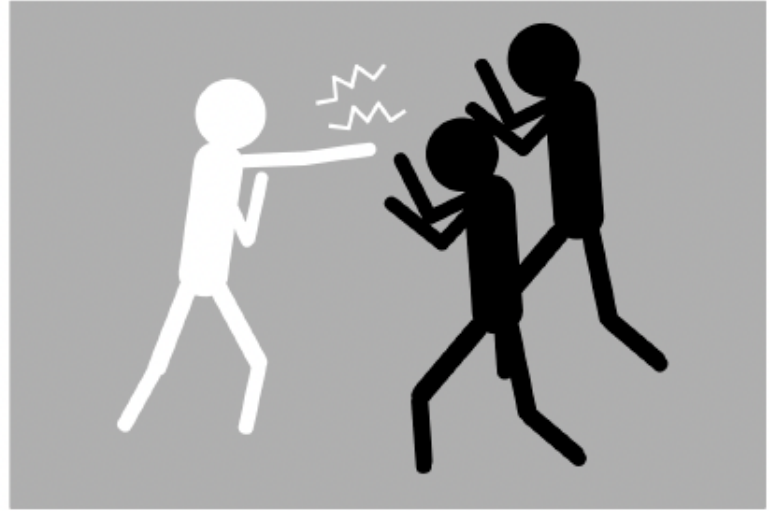
6. Xkich'äy [F]



7. [G] xeroyoj [H]

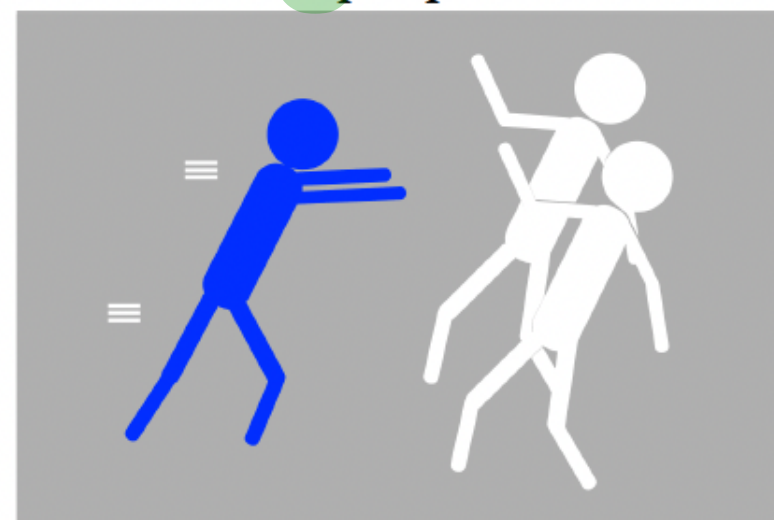


8. [I]

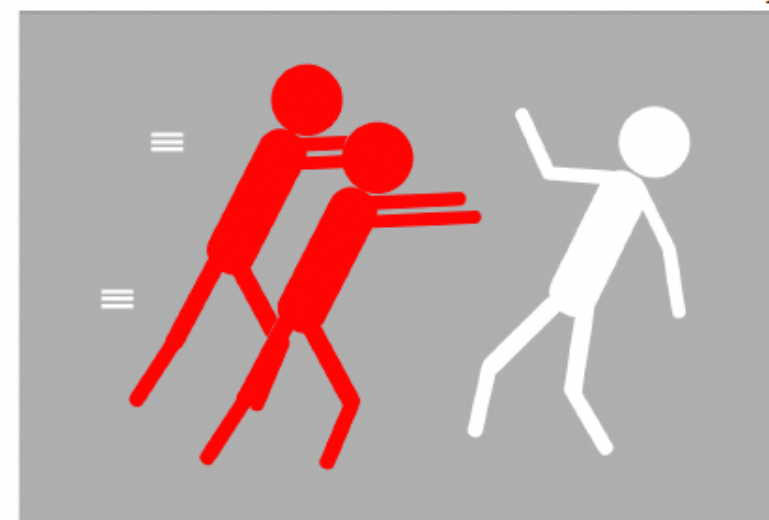


säq  
 xar  
 taq  
 käq  
 q'ëq

1. Xerunim ri taq säq ri xar



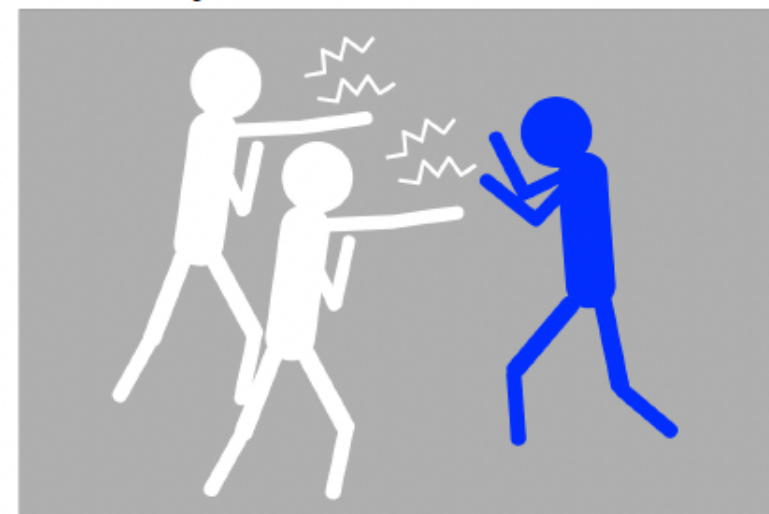
5. [E] ri säq



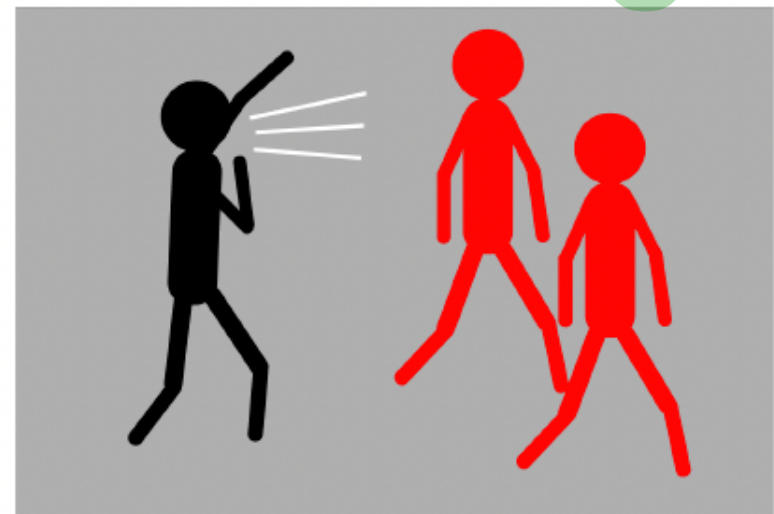
2. Ri taq [A] xkich'äy [B] käq



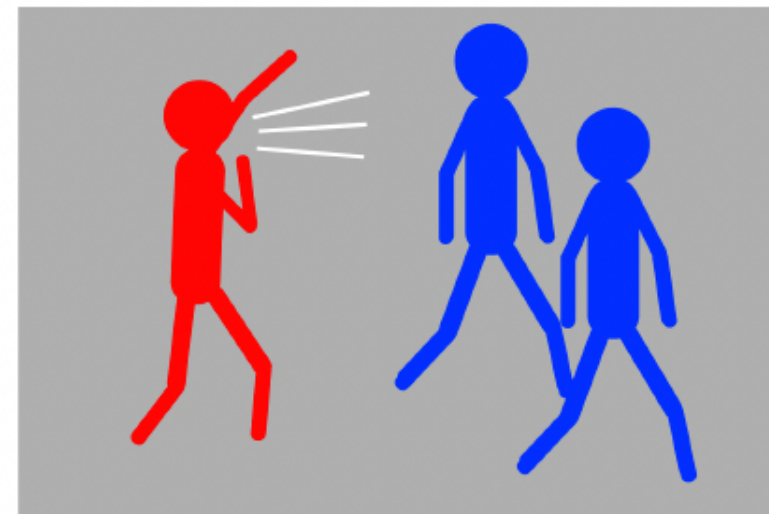
6. Xkich'äy [F]



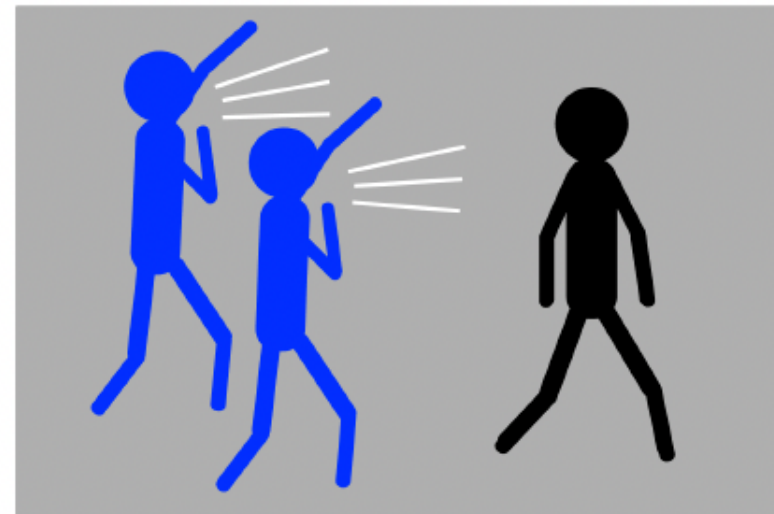
3. [C] ri q'ëq ri taq käq



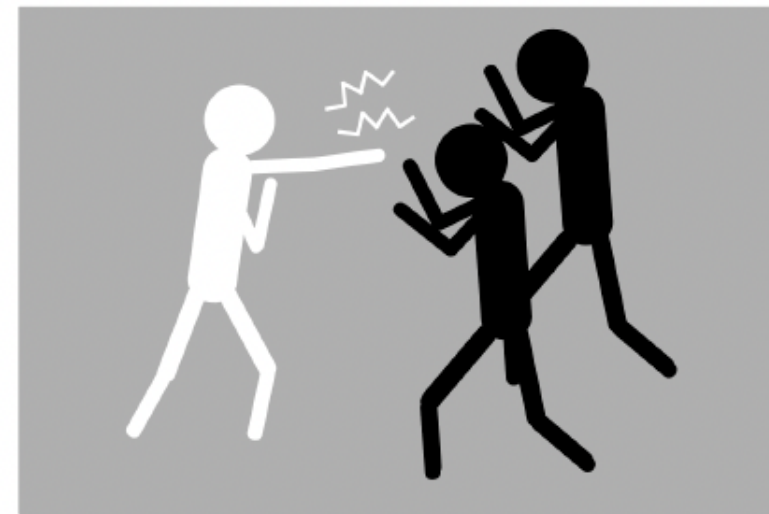
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



8. [I]

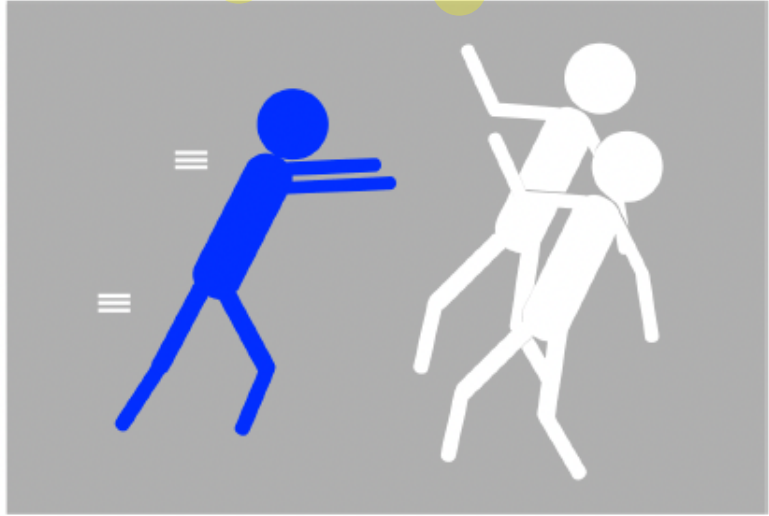


# The noun phrase

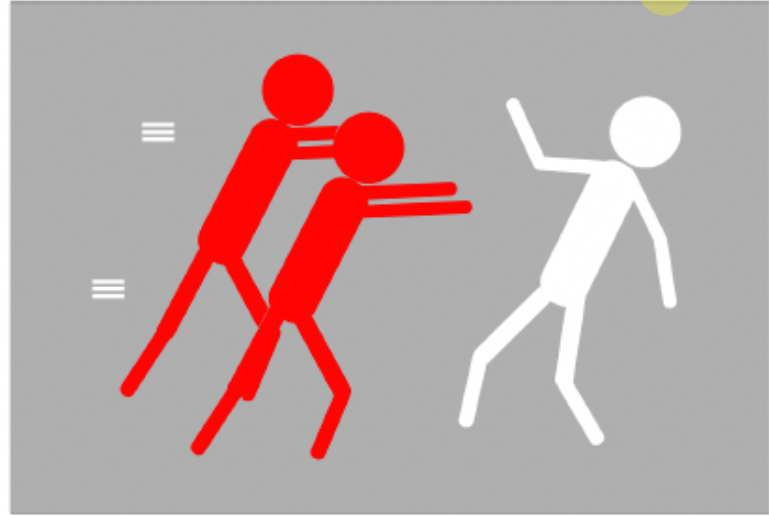
	säq
	xar
taq	käq
plural	q'ëq

# The noun phrase

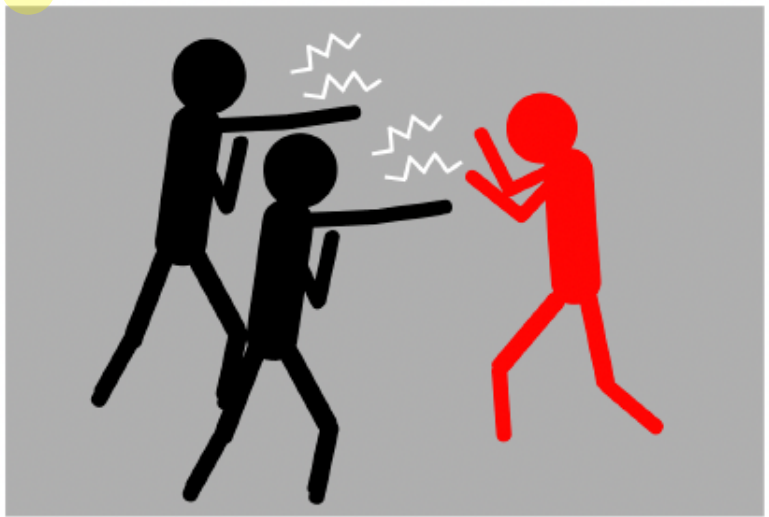
1. Xerunim ri taq säq ri xar



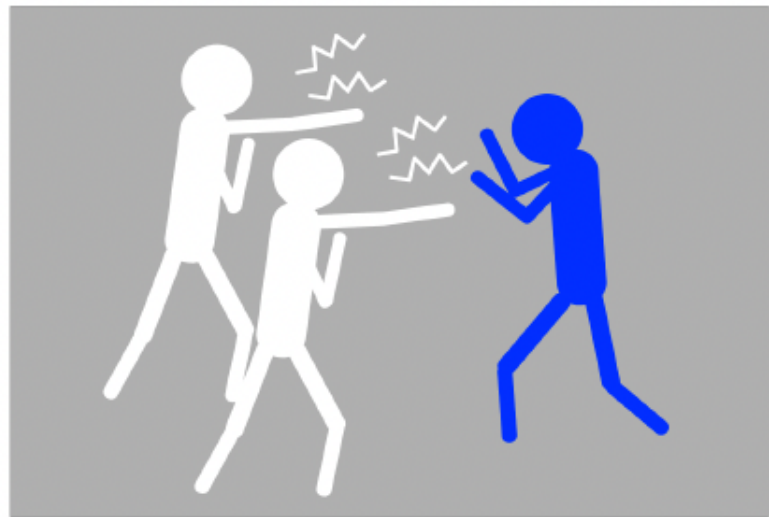
5. [E] ri säq



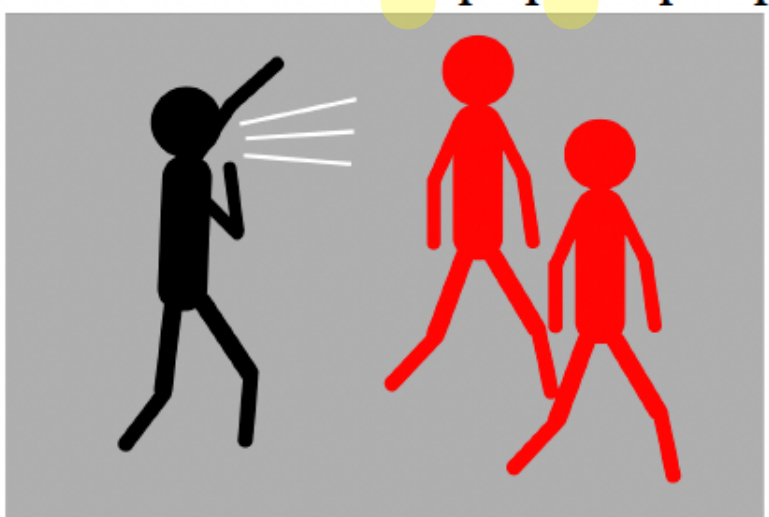
2. Ri taq [A] xkich'äy [B] käq



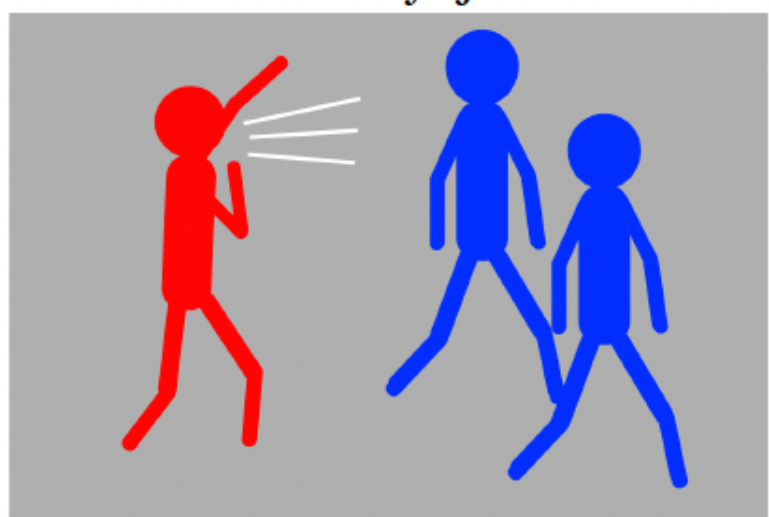
6. Xkich'äy [F]



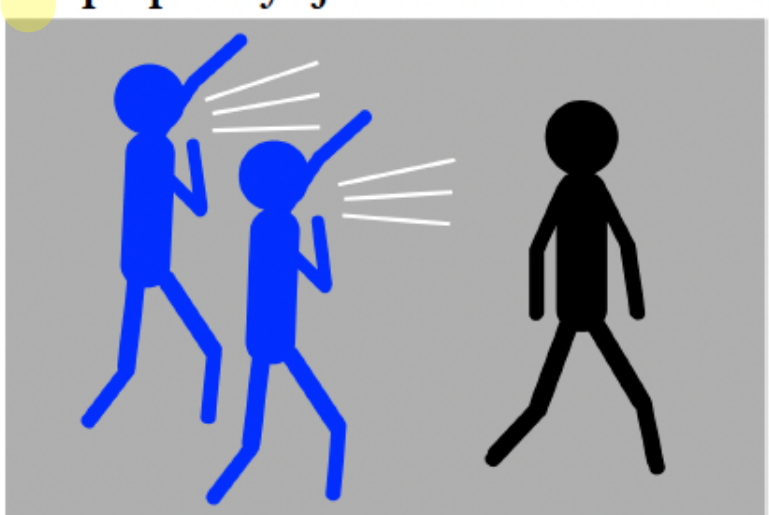
3. [C] ri q'ëq ri taq käq



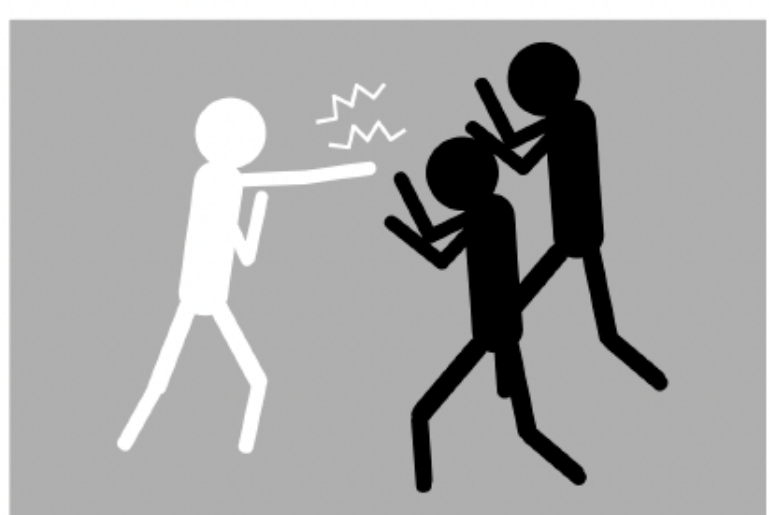
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



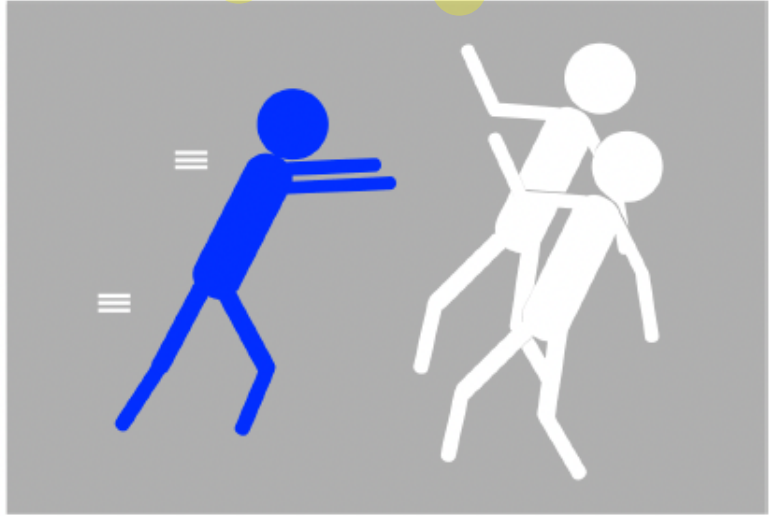
8. [I]



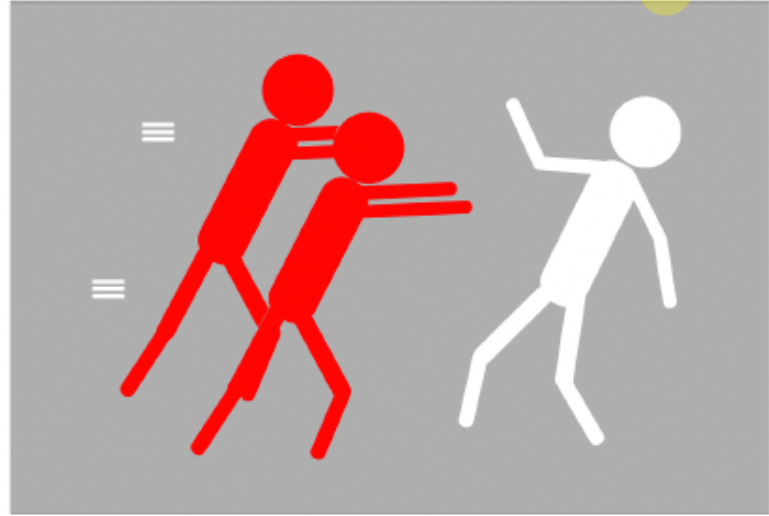
ri taq plural  
säq  
xar  
käq  
q'ëq

# The noun phrase

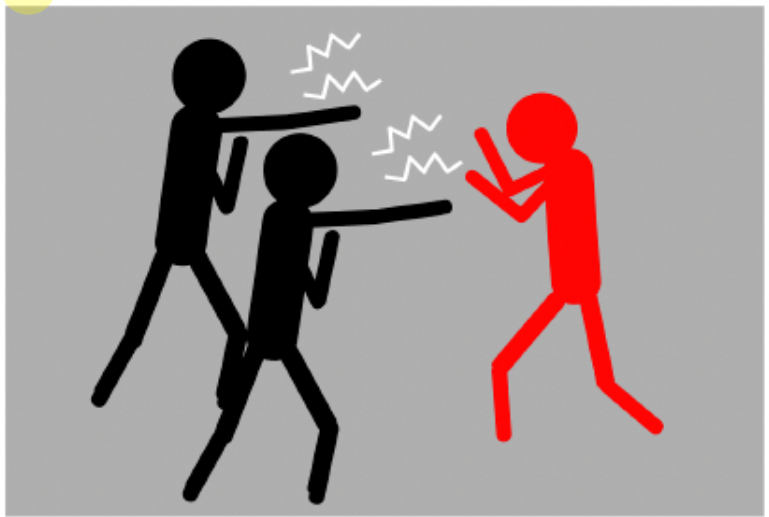
1. Xerunim ri taq säq ri xar



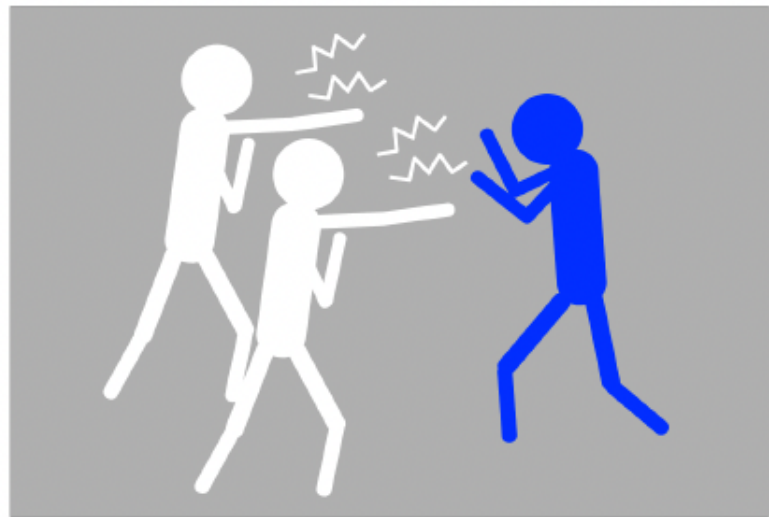
5. [E] ri säq



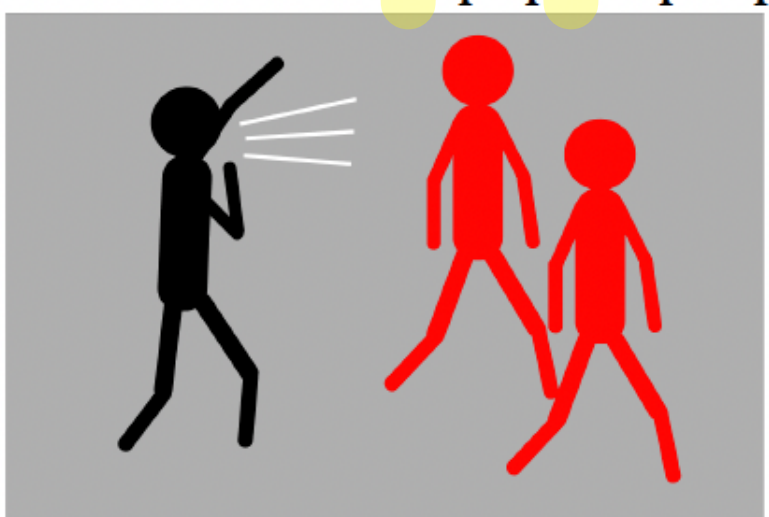
2. Ri taq [A] xkich'äy [B] käq



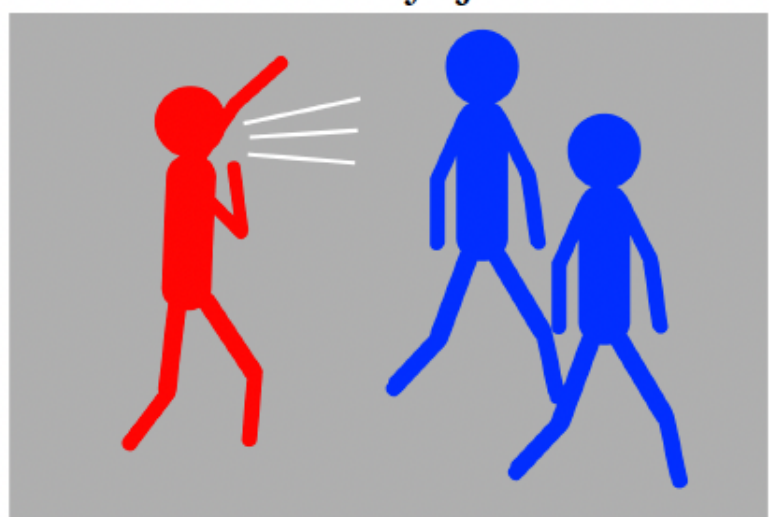
6. Xkich'äy [F]



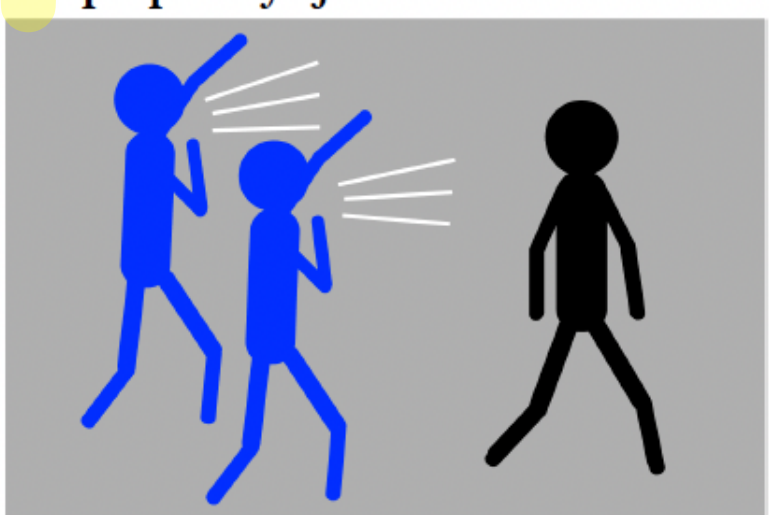
3. [C] ri q'ëq ri taq käq



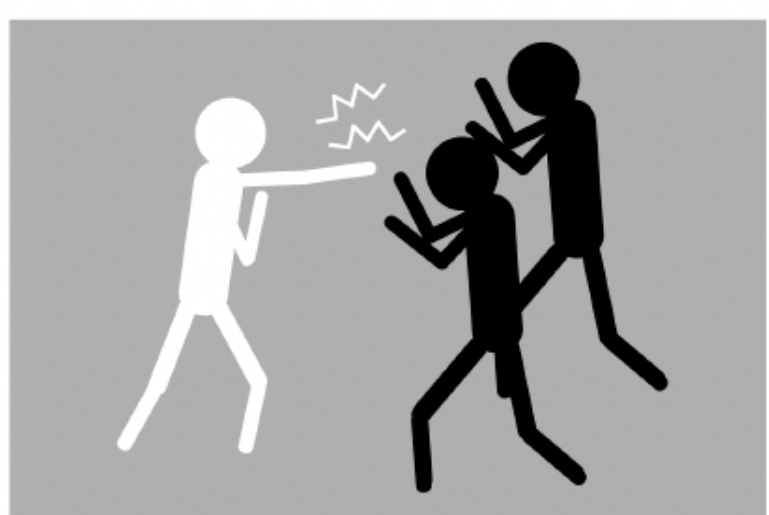
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



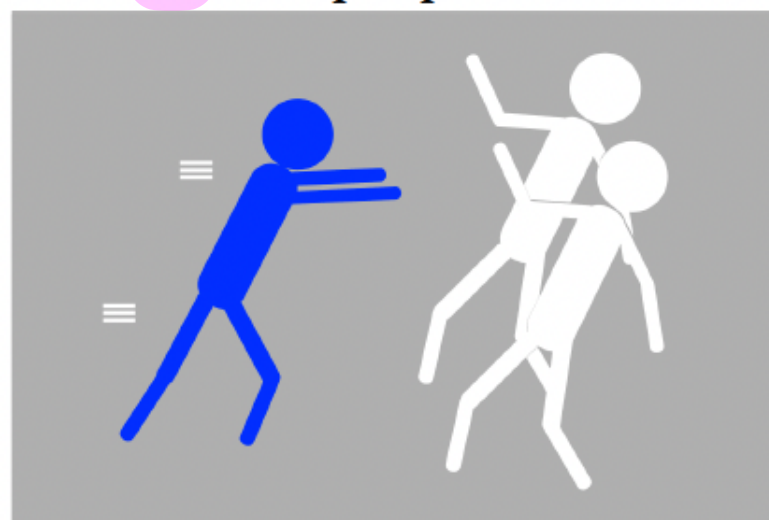
8. [I]



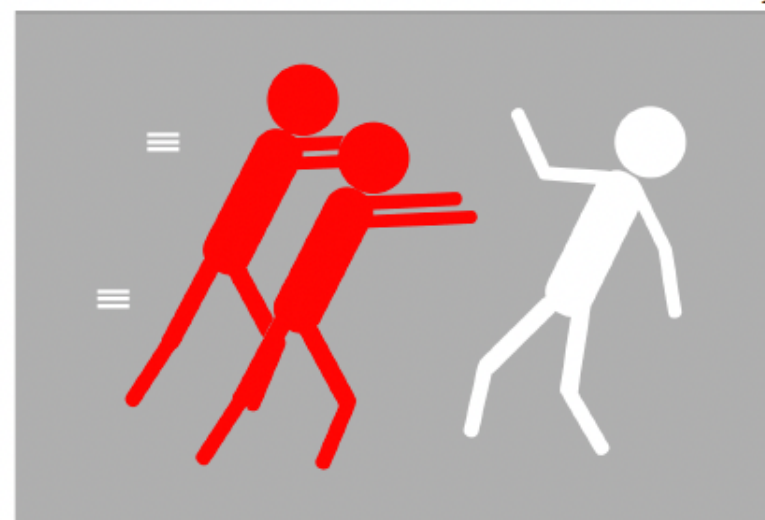
ri article      taq plural      säq  
xar  
käq  
q'ëq

# The verb

1. Xerunim ri taq säq ri xar



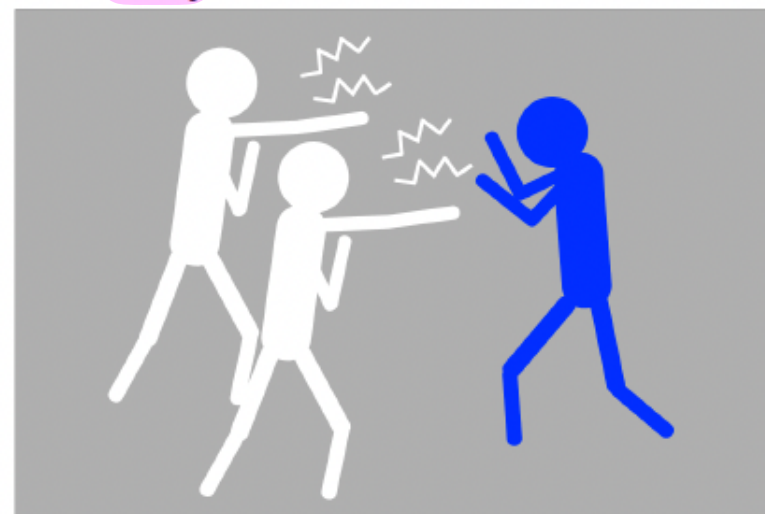
5. [E] ri säq



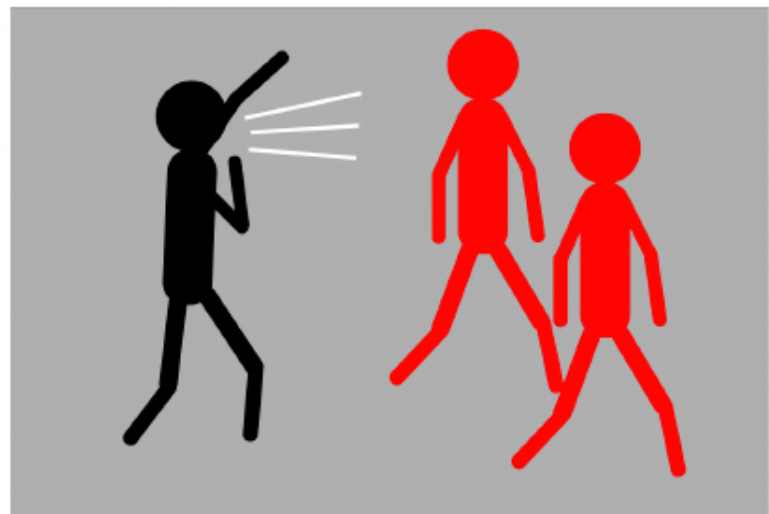
2. Ri taq [A] xkich'äy [B] käq



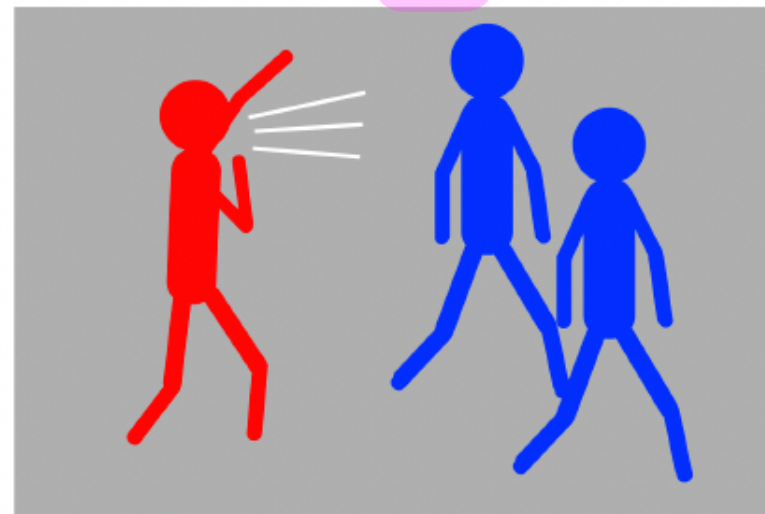
6. Xkich'äy [F]



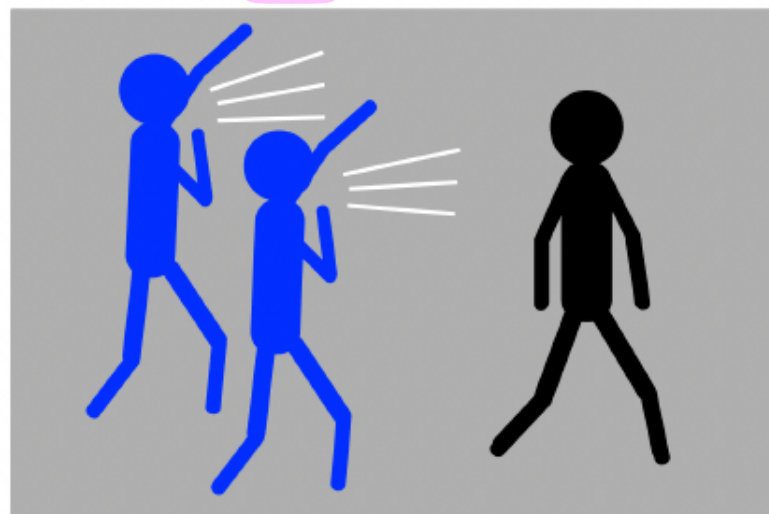
3. [C] ri q'ëq ri taq käq



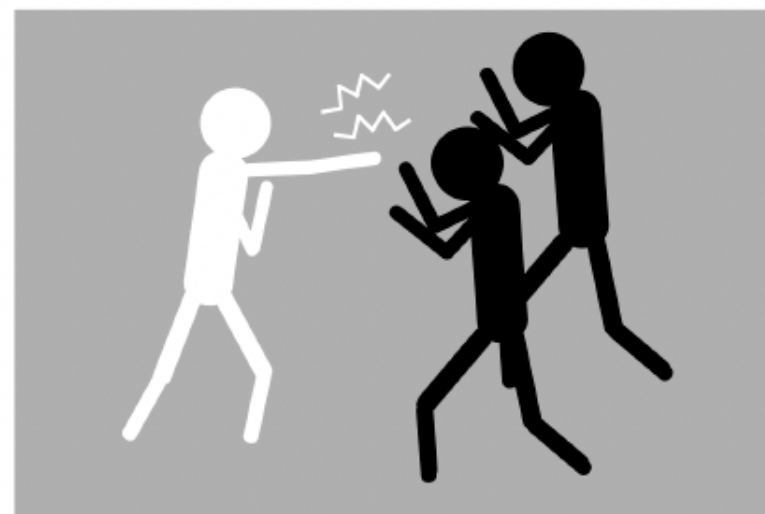
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



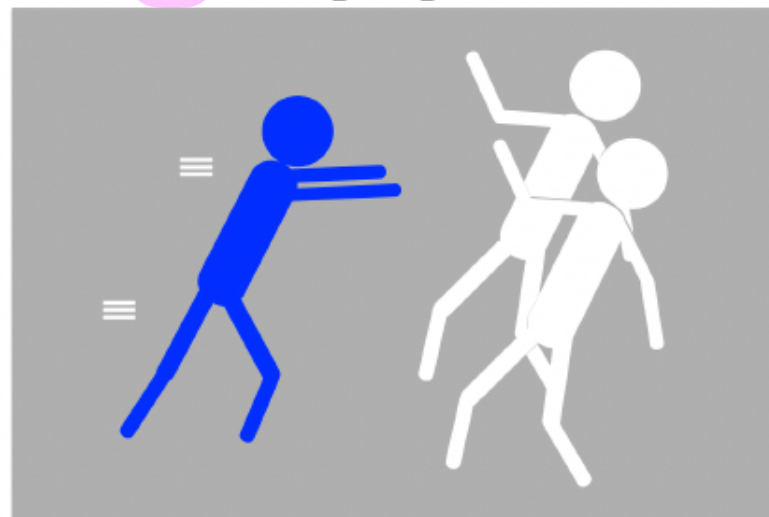
8. [I]



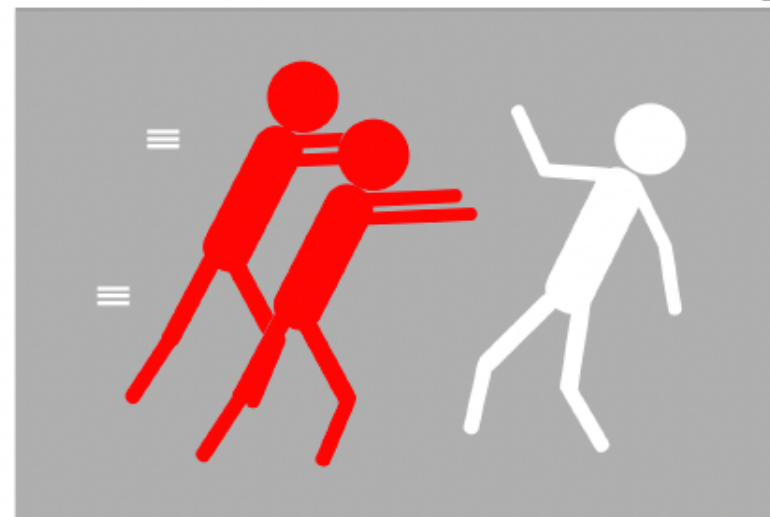
- 9. Ri taq säq xkinim ri q'ëq
- 10. Xekich'äy ri taq xar ri taq käq

# The verb

1. Xerunim ri taq säq ri xar



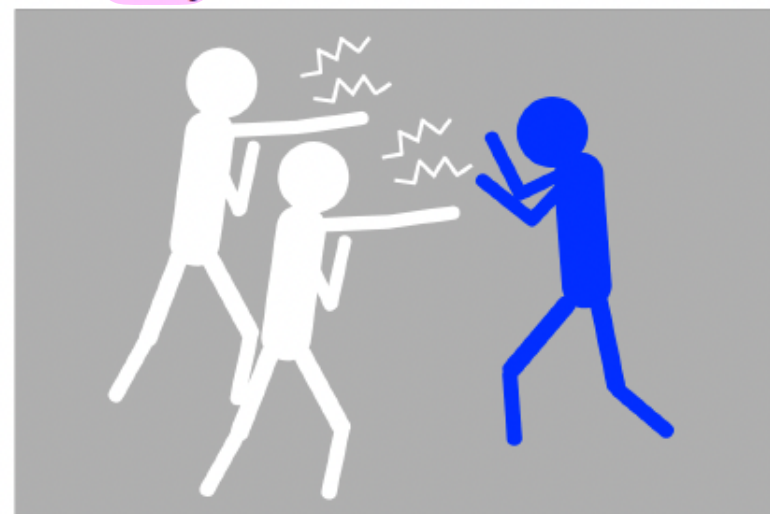
5. [E] ri säq



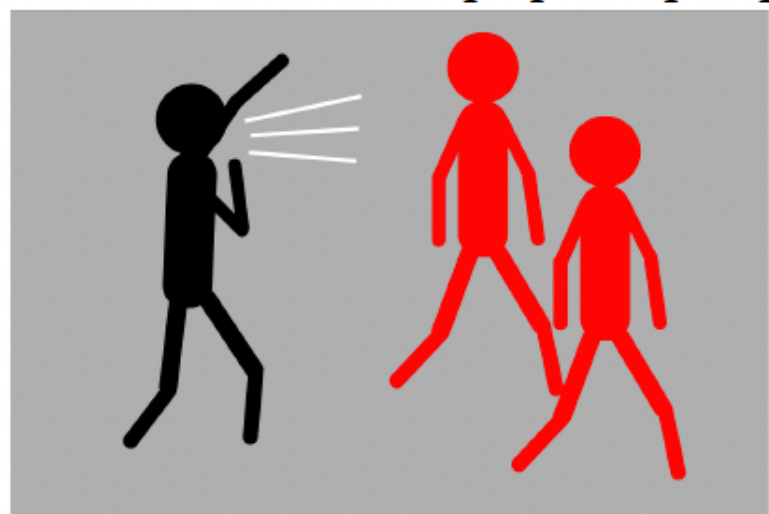
2. Ri taq [A] xkich'äy [B] käq



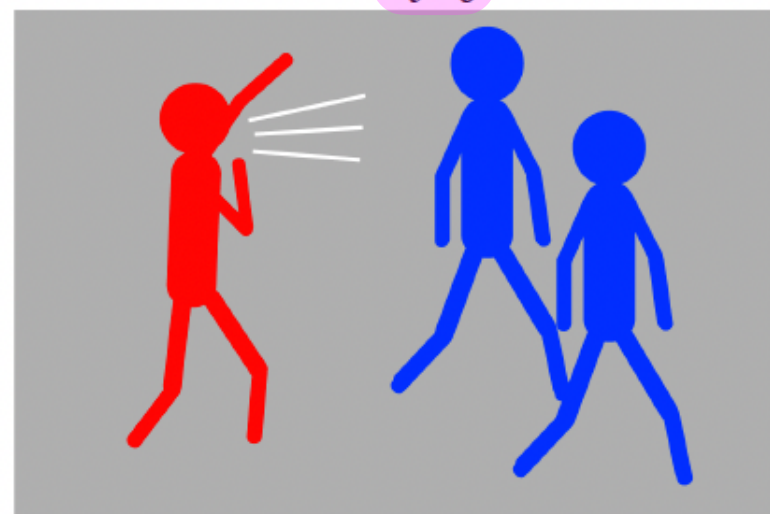
6. Xkich'äy [F]



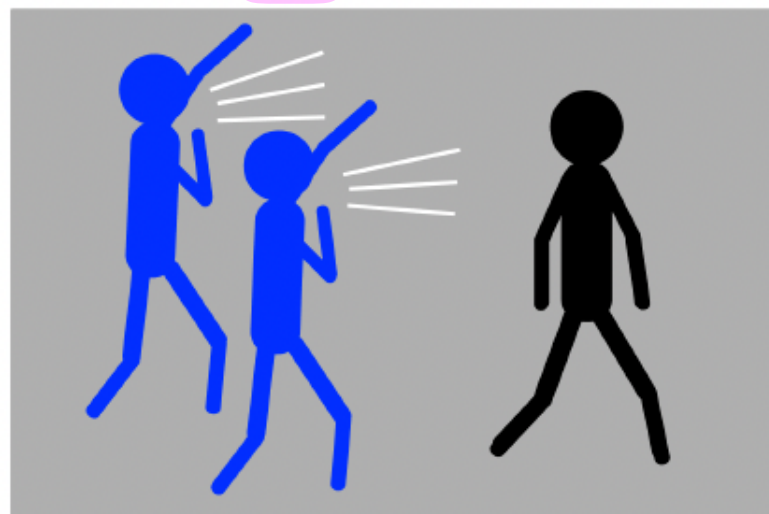
3. [C] ri q'ëq ri taq käq



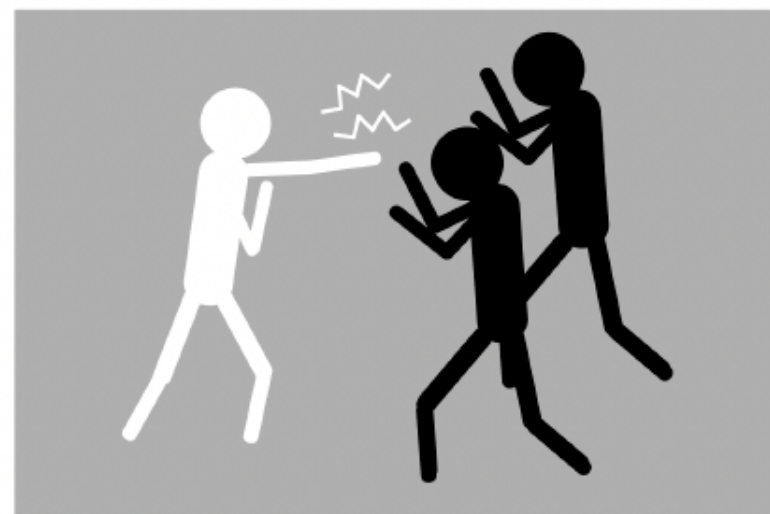
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



8. [I]



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

≡ 'push'

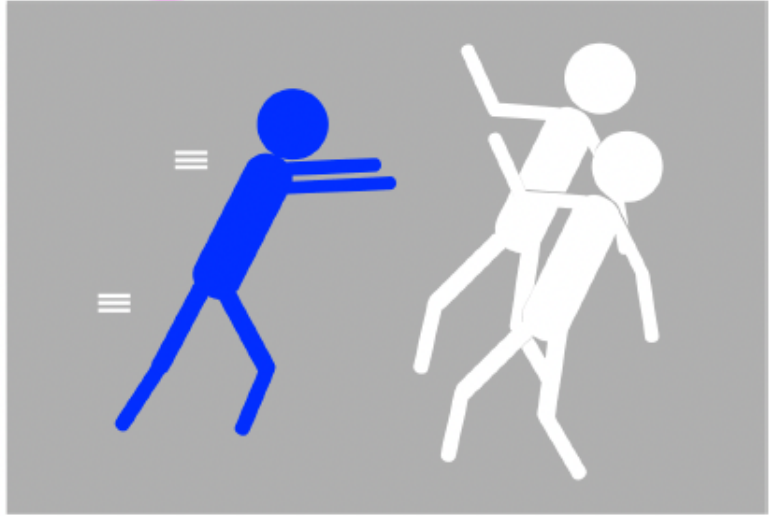
⚡ 'hit'

≡≡≡ 'call'

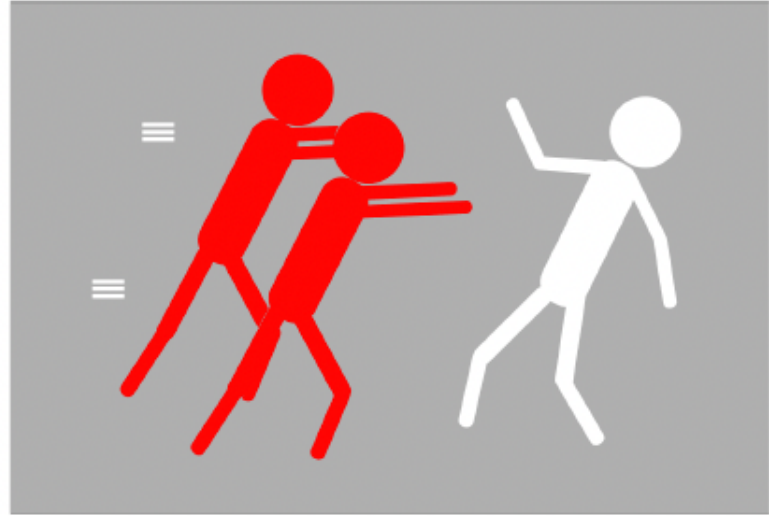
# The verb

**verb**  
**root**

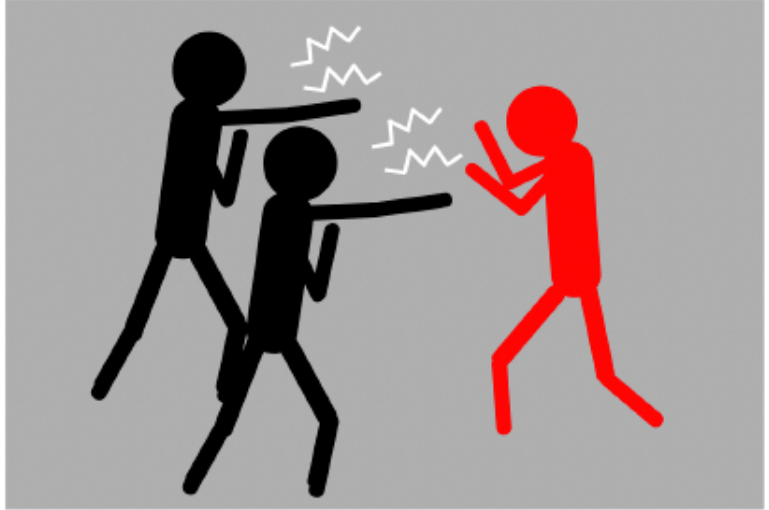
1. Xerunim ri taq säq ri xar



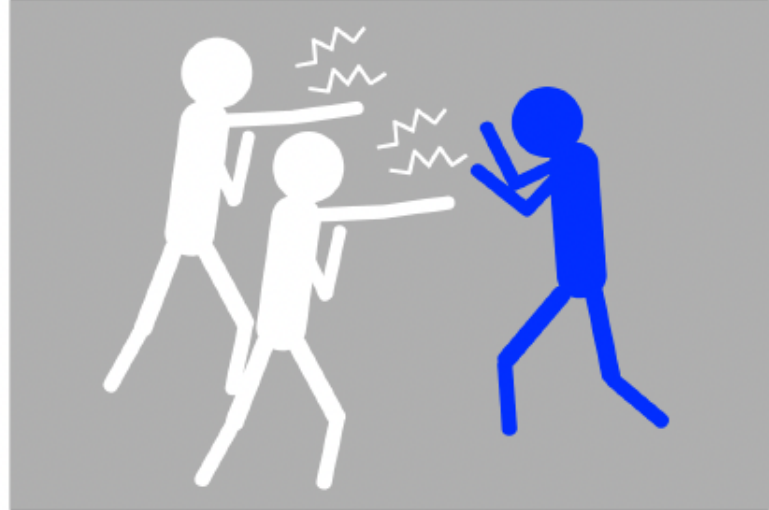
5. [E] ri säq



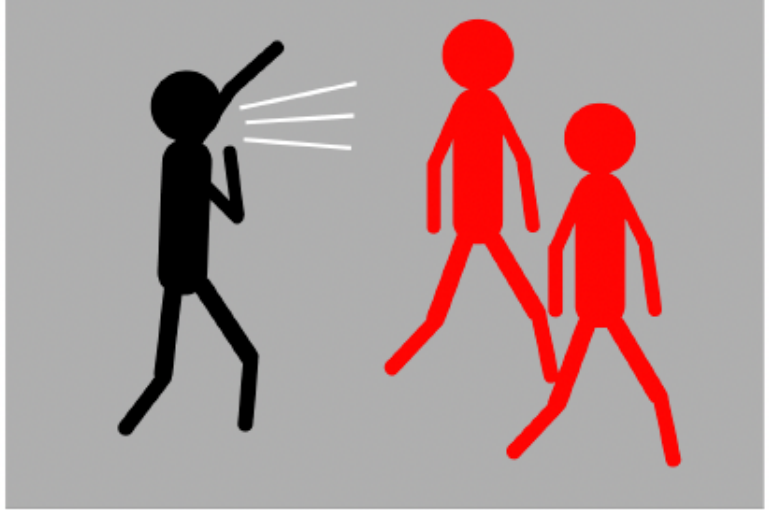
2. Ri taq [A] xkich'äy [B] käq



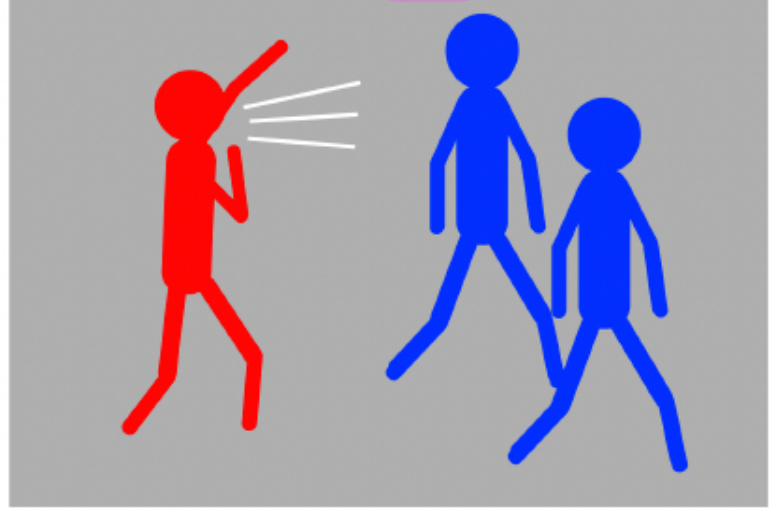
6. Xkich'äy [F]



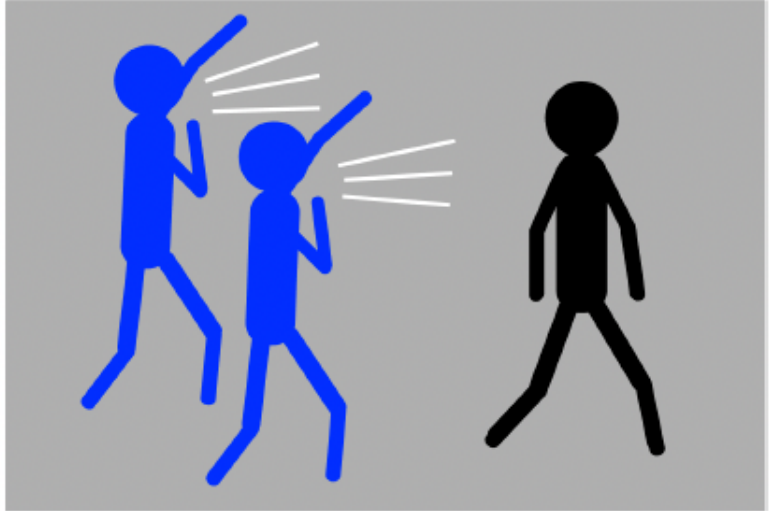
3. [C] ri q'ëq ri taq käq



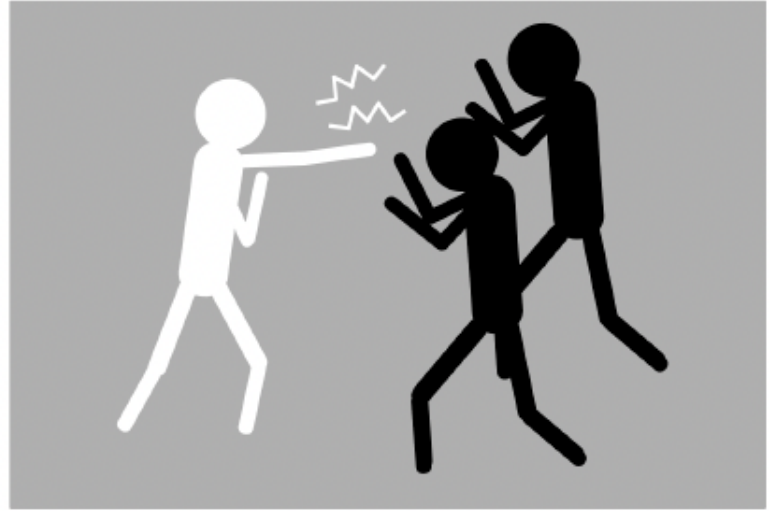
7. [G] xeroyoj [H]



4. Ri q'ëq xkoyoj [D]



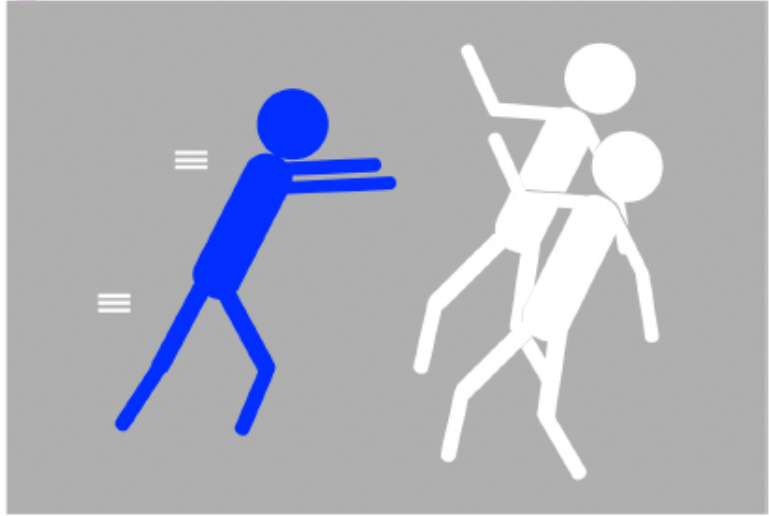
8. [I]



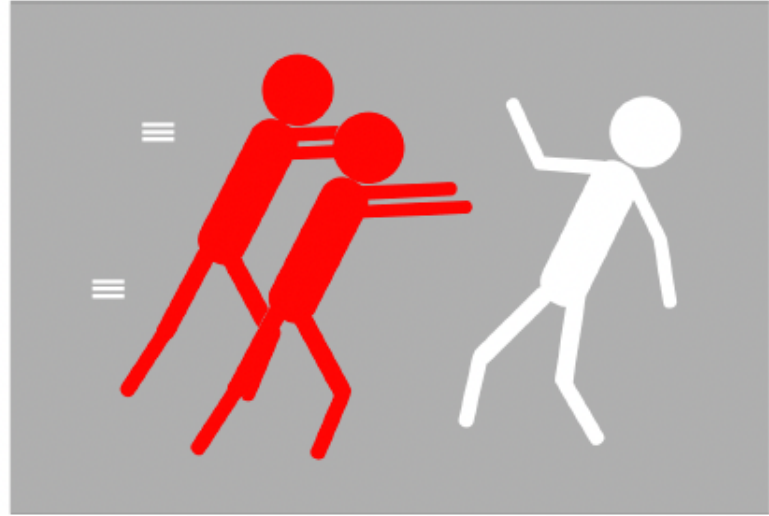
- 9. Ri taq säq xkinim ri q'ëq
- 10. Xekich'äy ri taq xar ri taq käq

# The verb

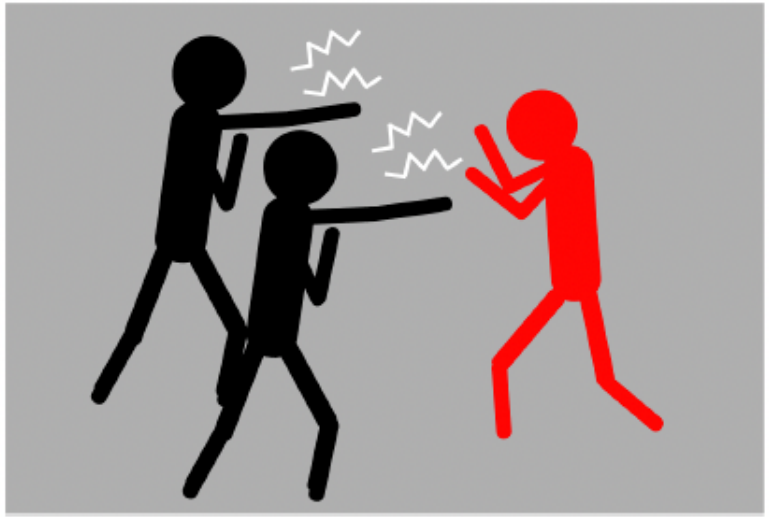
1. Xerunim ri taq saq ri xar



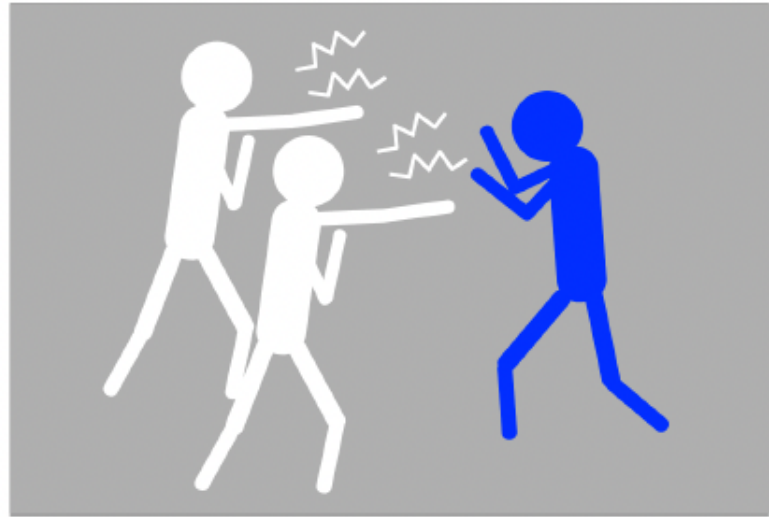
5. [E] \_\_\_\_\_ ri saq



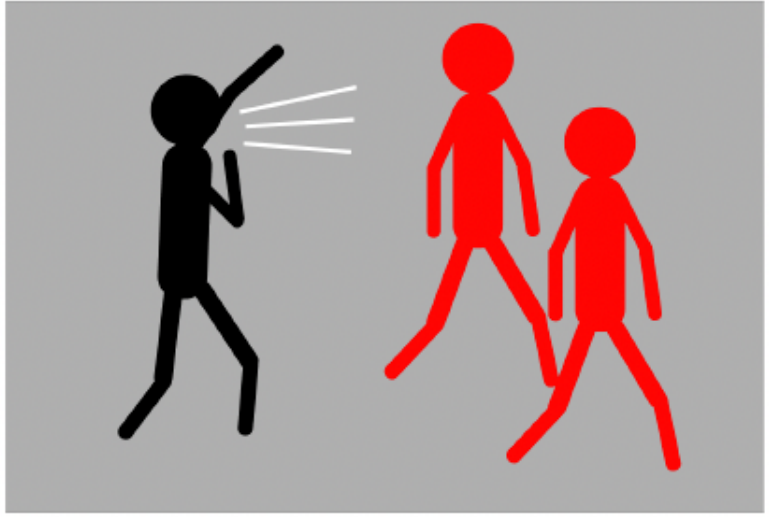
2. Ri taq [A] xkich'ay [B] kaq



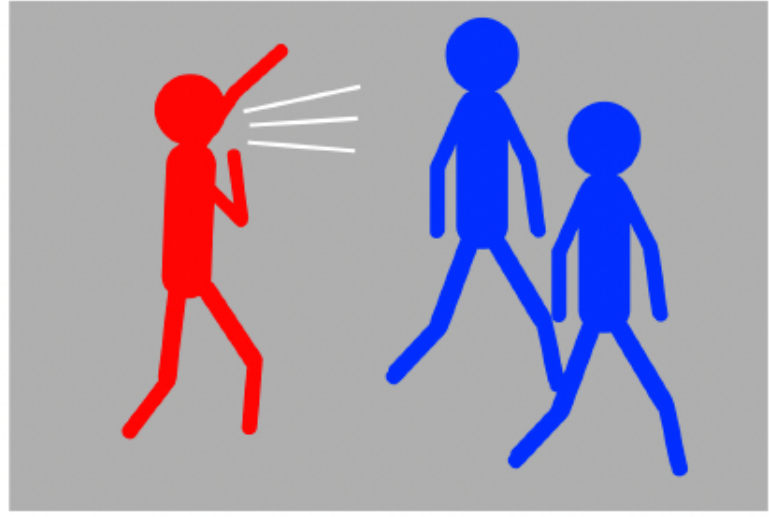
6. Xkich'ay [F] \_\_\_\_\_



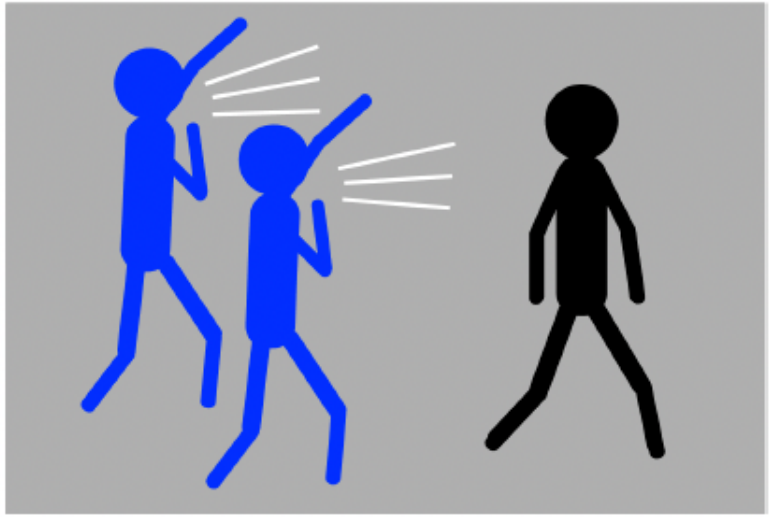
3. [C] \_\_\_\_\_ ri q'eq ri taq kaq



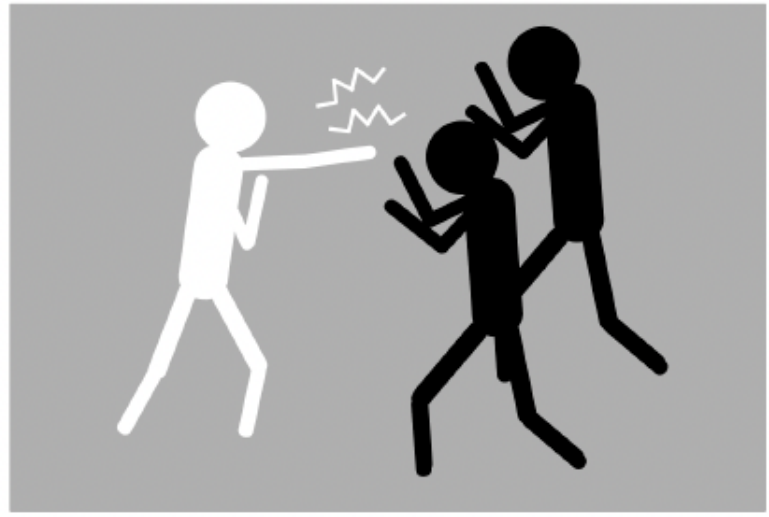
7. [G] xeroyoj [H] \_\_\_\_\_



4. Ri q'eq xkoyoj [D] \_\_\_\_\_



8. [I] \_\_\_\_\_



X-

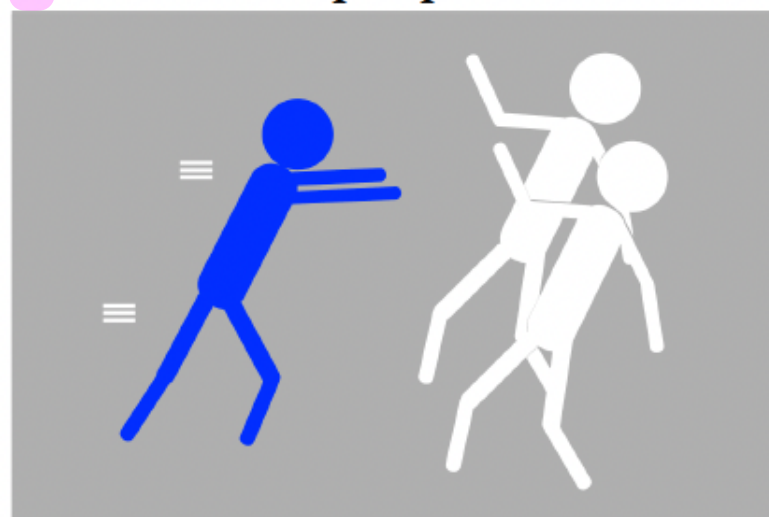
verb  
root

- 9. Ri taq saq xkinim ri q'eq
- 10. Xekich'ay ri taq xar ri taq kaq

# The verb

**verb**  
**root**

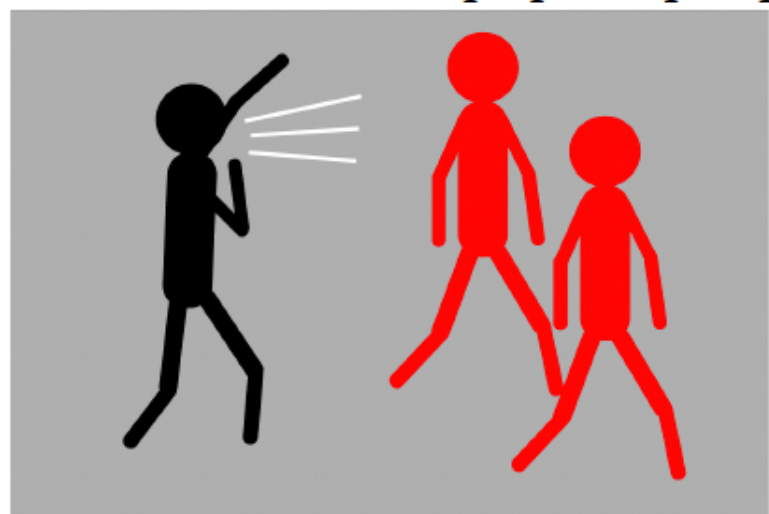
1. Xerunim ri taq säq ri xar



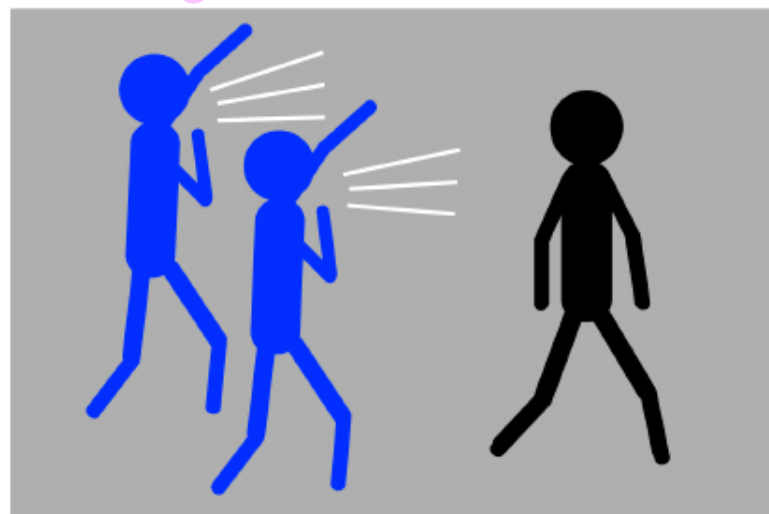
2. Ri taq [A] xkich'äy [B] käq



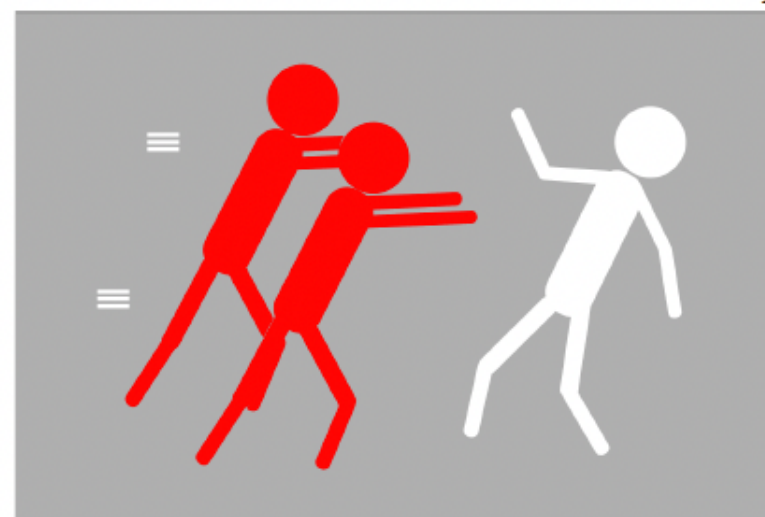
3. [C] ri q'ëq ri taq käq



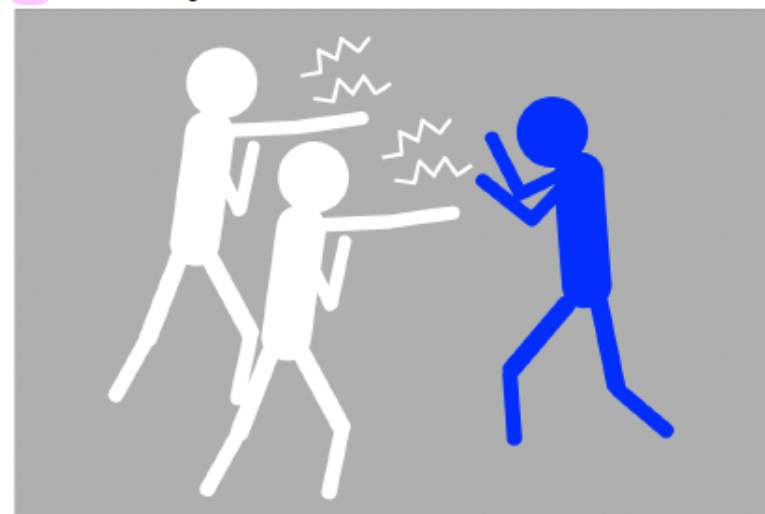
4. Ri q'ëq xkoyoj [D]



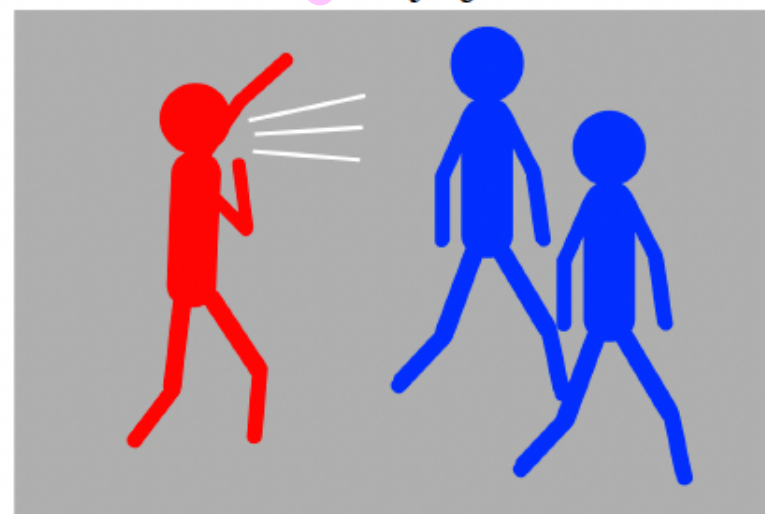
5. [E] ri säq



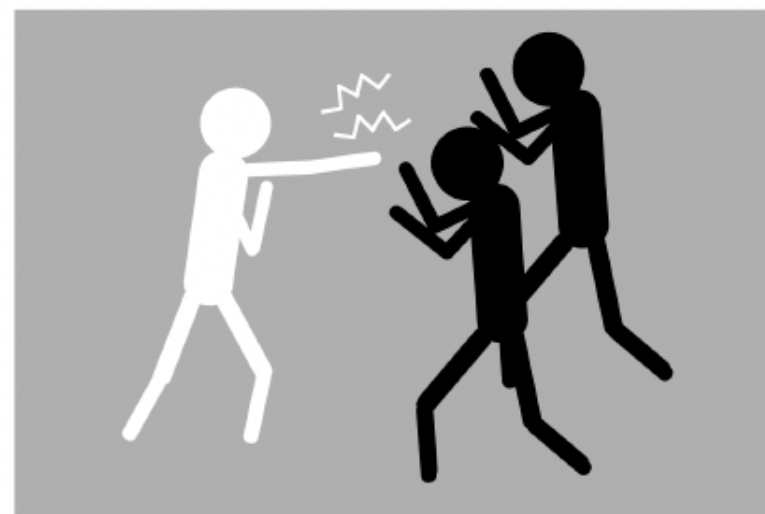
6. Xkich'äy [F]



7. [G] xeroyoj [H]



8. [I]



X-

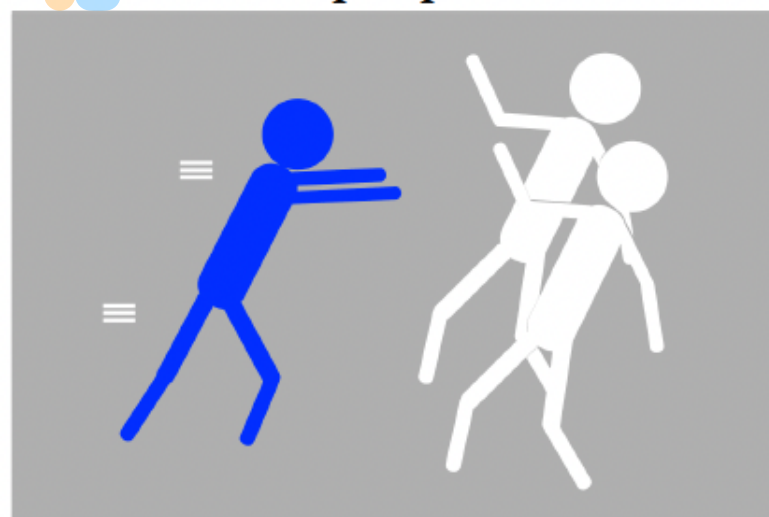
past tense  
(but you couldn't  
have known that)

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

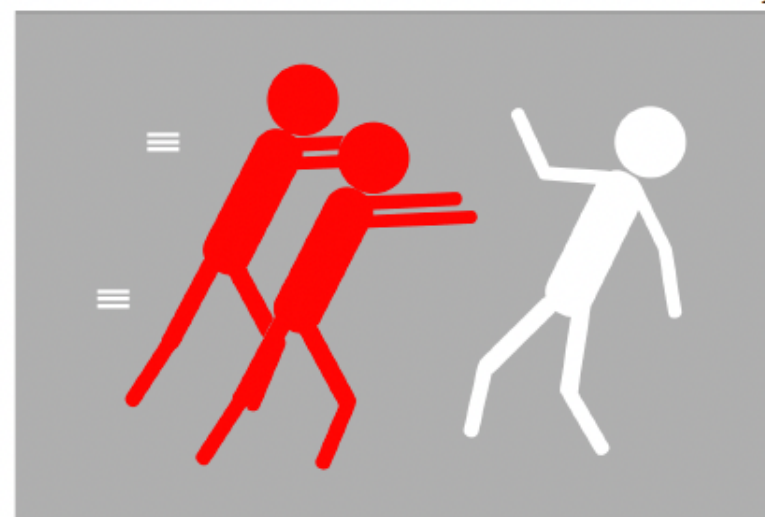
# The verb

**verb**  
**root**

1. Xerunim ri taq säq ri xar



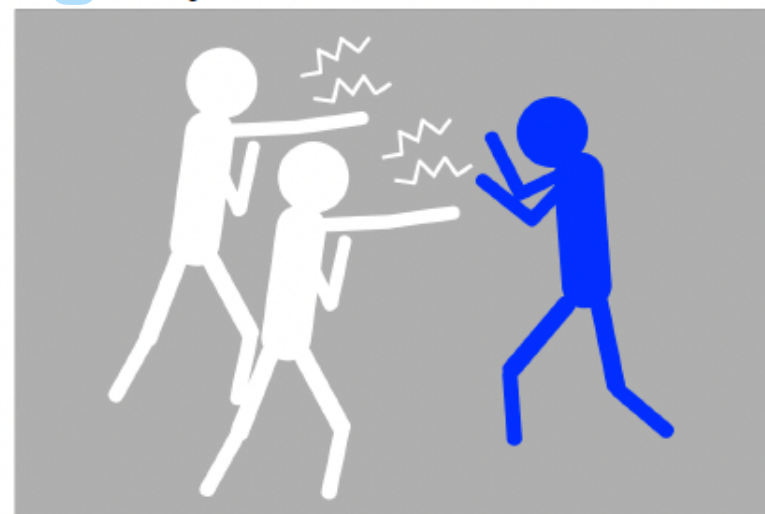
5. [E] \_\_\_\_\_ ri säq



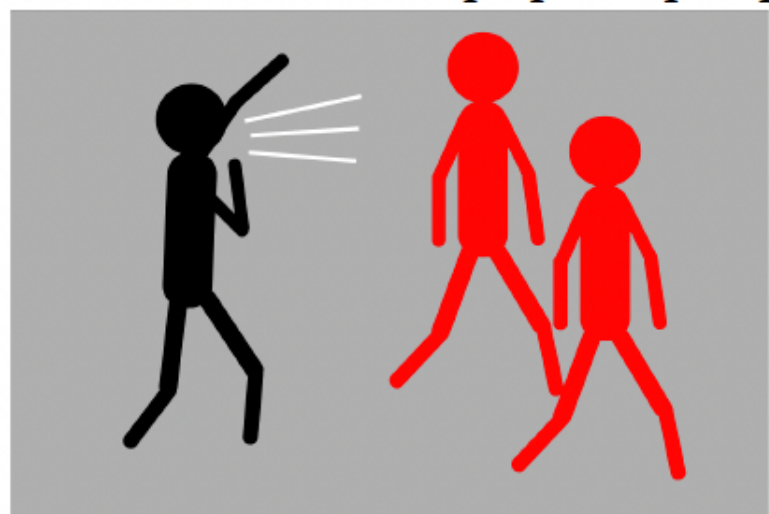
2. Ri taq [A] xkich'äy [B] käq



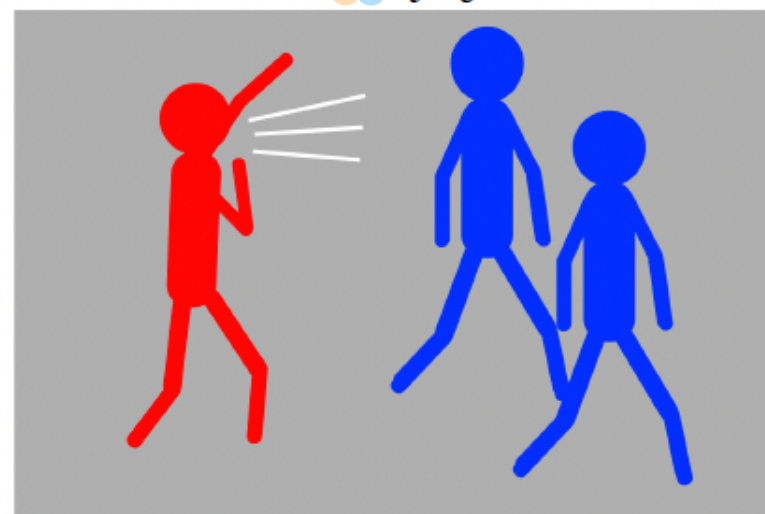
6. Xkich'äy [F] \_\_\_\_\_



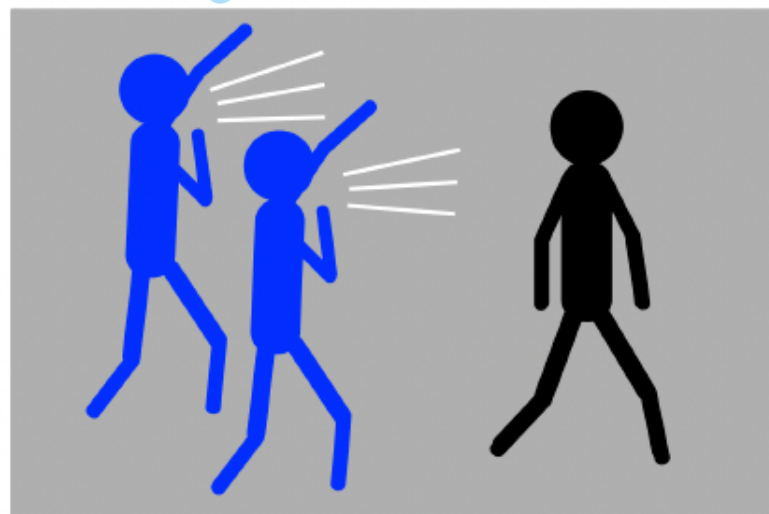
3. [C] \_\_\_\_\_ ri q'ëq ri taq käq



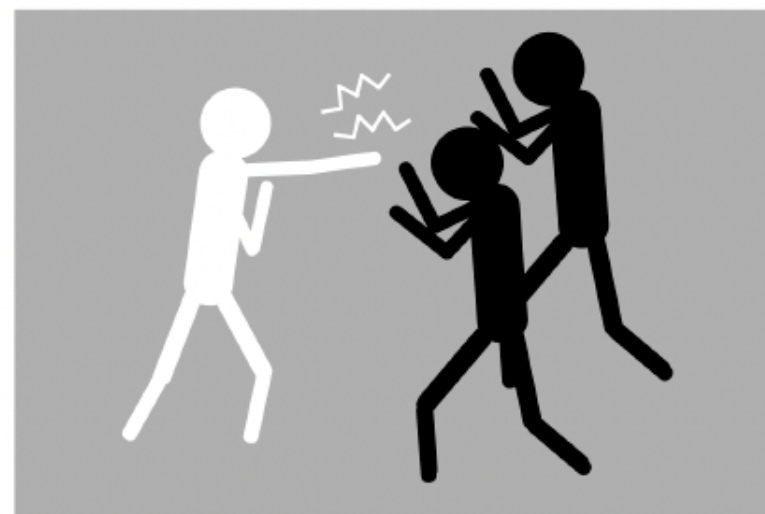
7. [G] xeroyoj [H] \_\_\_\_\_



4. Ri q'ëq xkoyoj [D] \_\_\_\_\_



8. [I] \_\_\_\_\_



X-

past tense  
(but you couldn't  
have known that)

9. Ri taq säq xkinim ri q'ëq

10. Xekich'äy ri taq xar ri taq käq

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

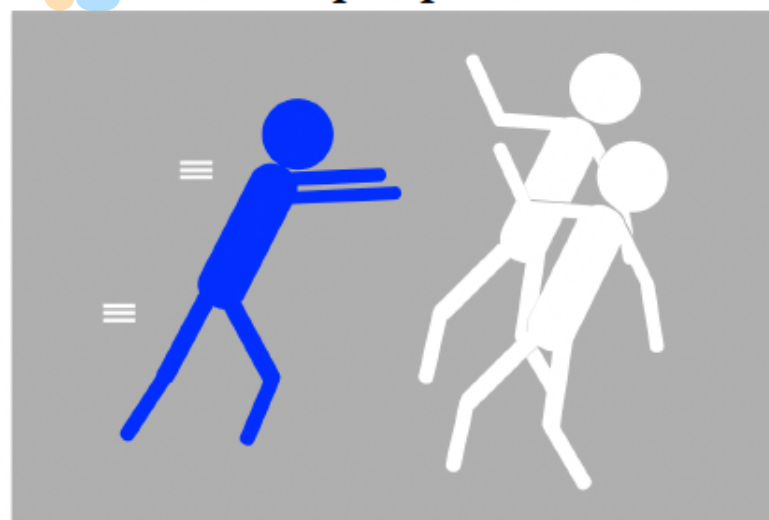
# The verb

## Subject marker

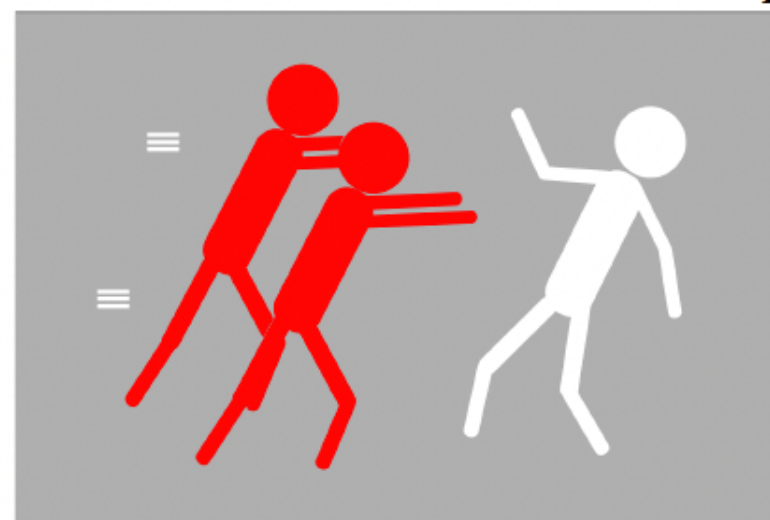
**-r(u)-**      **sg.**

**-k(i)-**      **pl.**

1. Xerunim ri taq säq ri xar



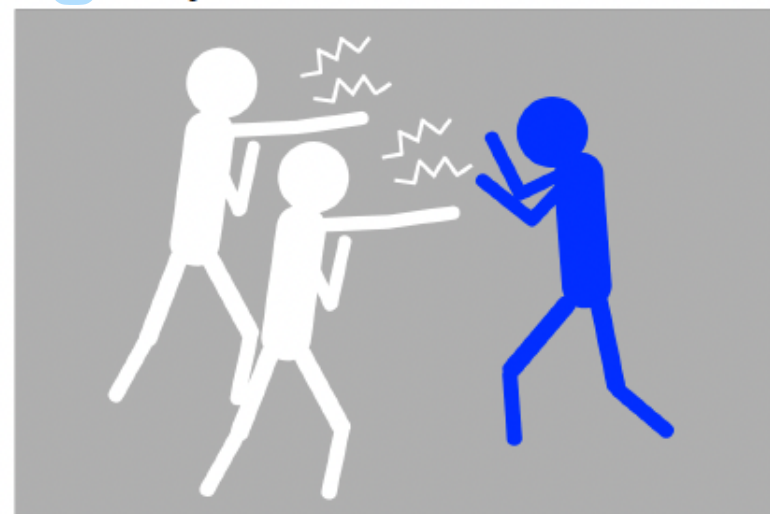
5. [E] \_\_\_\_\_ ri säq



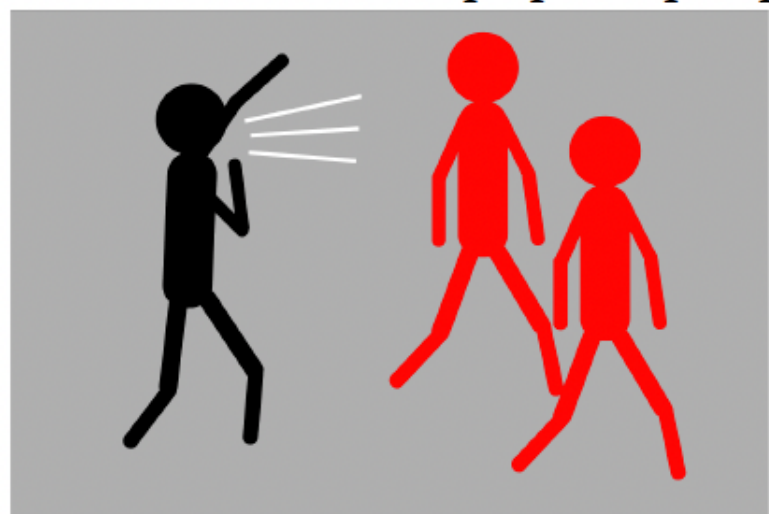
2. Ri taq [A] xkich'äy [B] käq



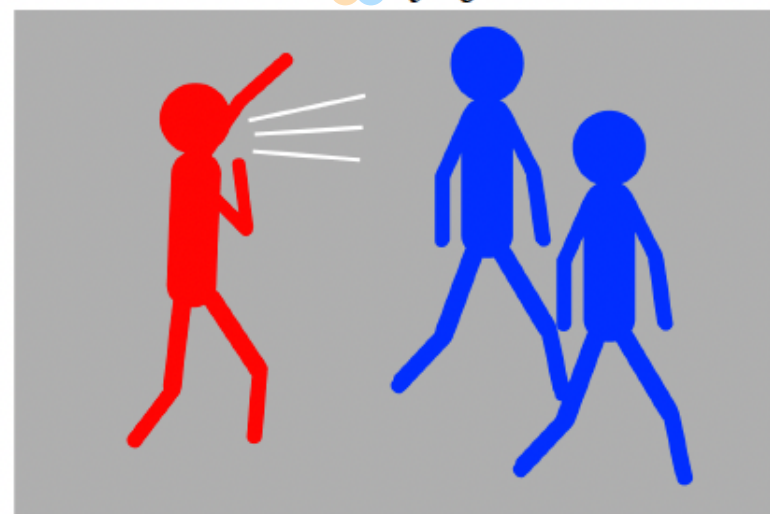
6. Xkich'äy [F] \_\_\_\_\_



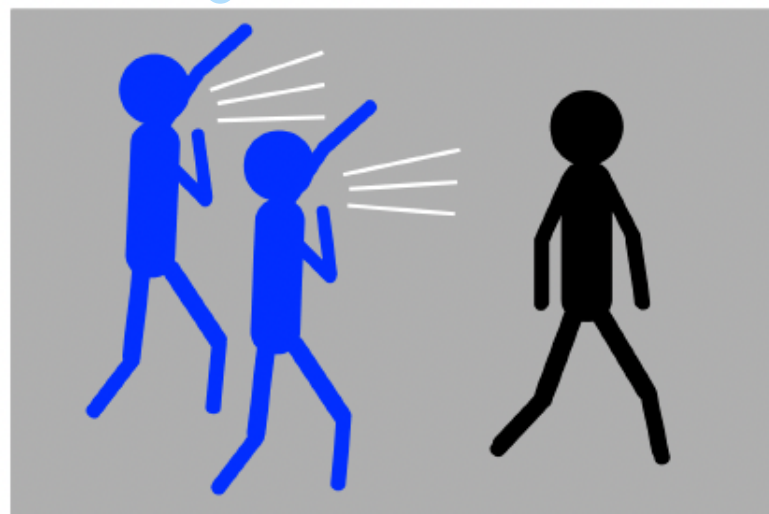
3. [C] \_\_\_\_\_ ri q'ëq ri taq käq



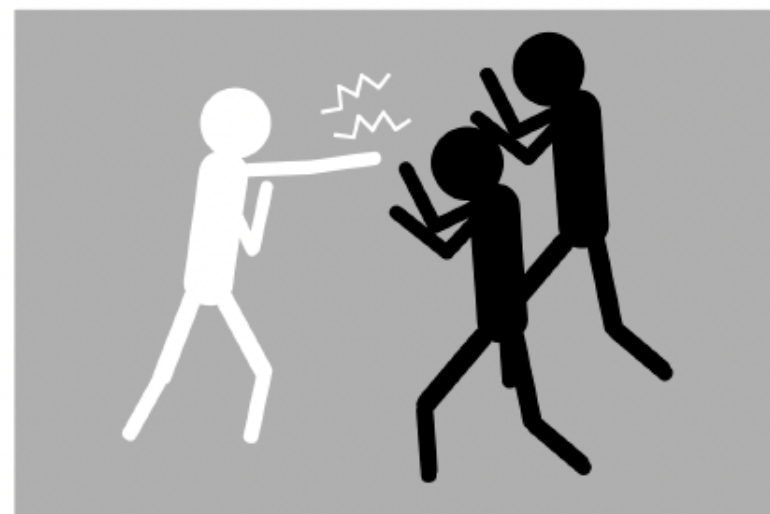
7. [G] xeroyoj [H] \_\_\_\_\_



4. Ri q'ëq xkoyoj [D] \_\_\_\_\_



8. [I] \_\_\_\_\_



9. Ri taq säq xkinim ri q'ëq

10. Xekich'äy ri taq xar ri taq käq

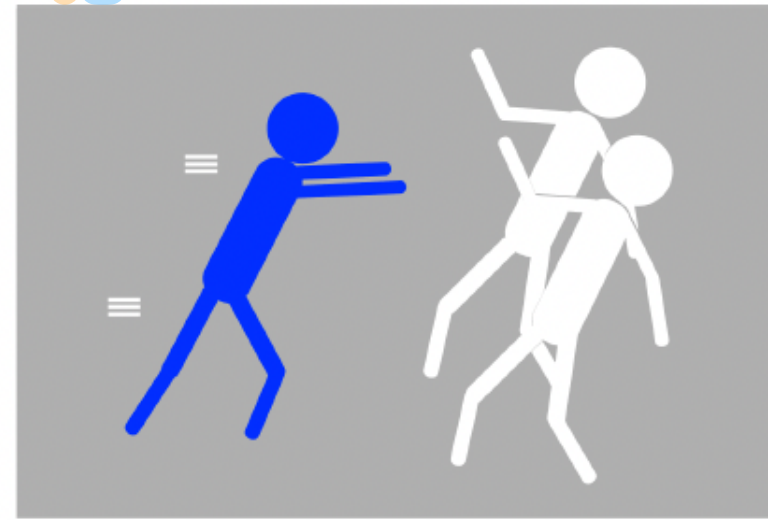
11. Xeruq'etey ri käq ri taq q'ëq

12. Xerachik'aj ri taq säq ri xar

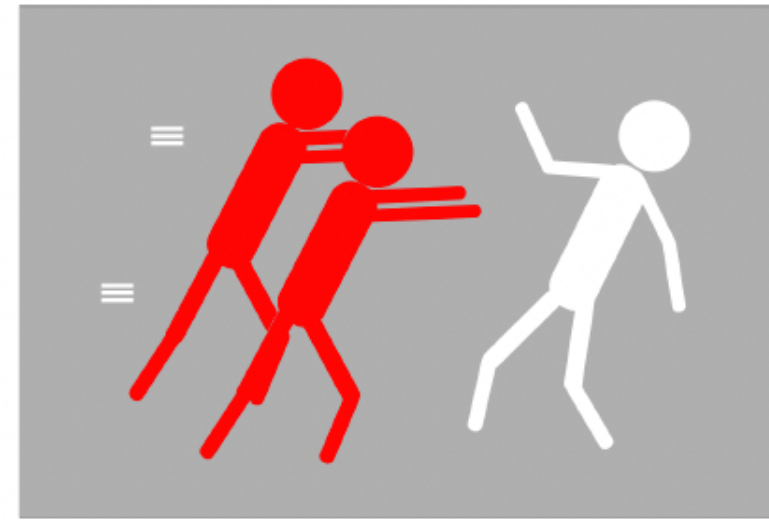
13. Ri taq q'ëq xekitz'ët ri taq säq

# The verb

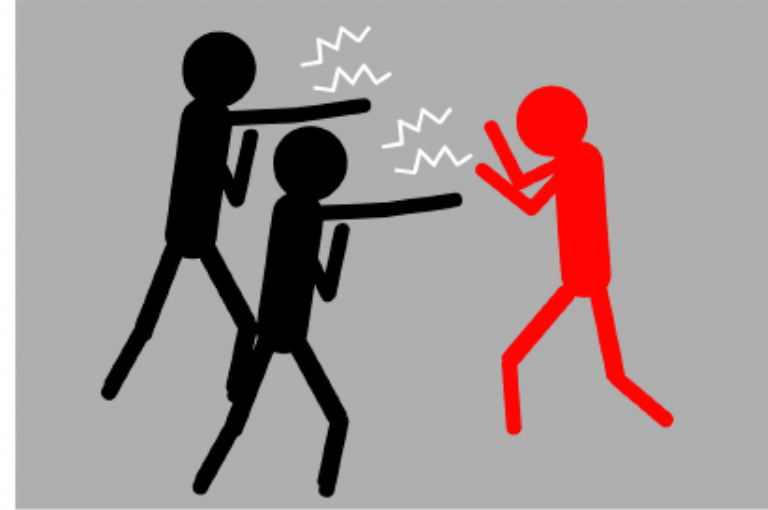
1. Xerunim ri taq säq ri xar



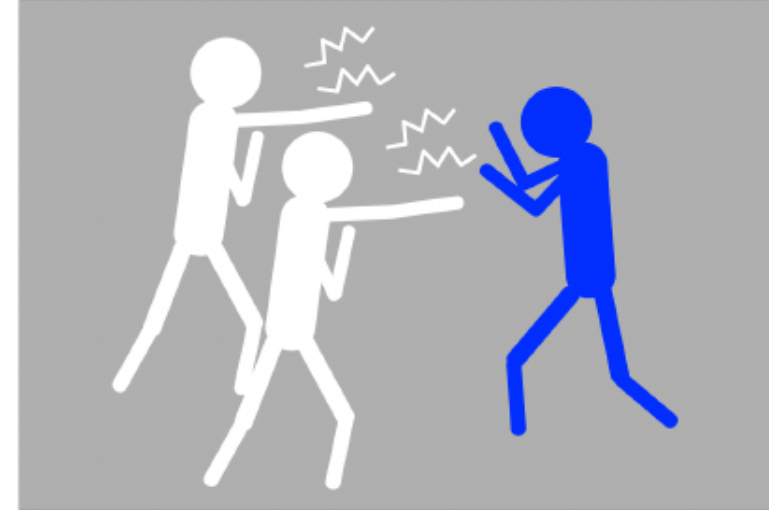
5. [E] \_\_\_\_\_ ri säq



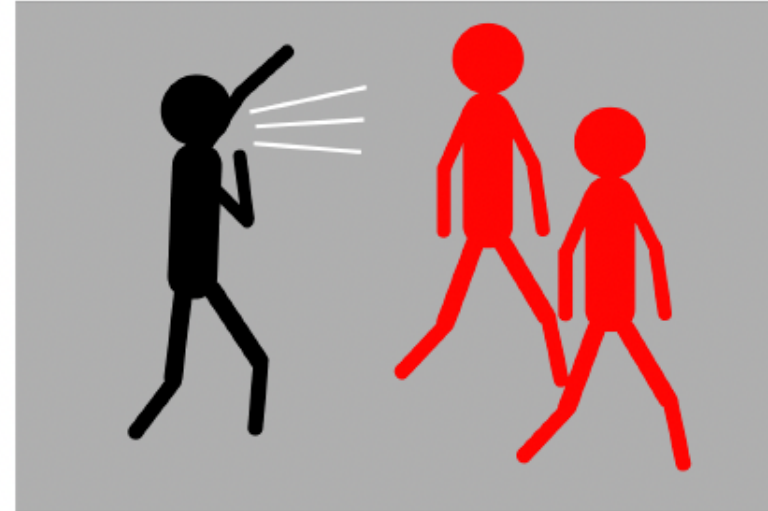
2. Ri taq [A] xkich'äy [B] käq



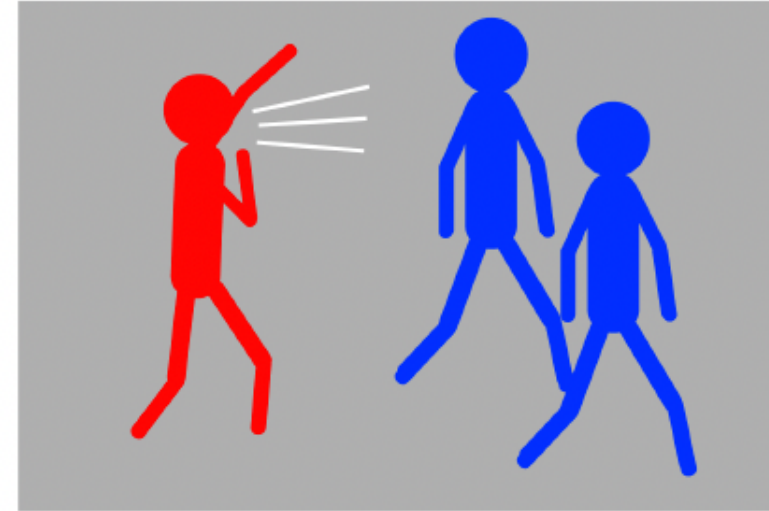
6. Xkich'äy [F] \_\_\_\_\_



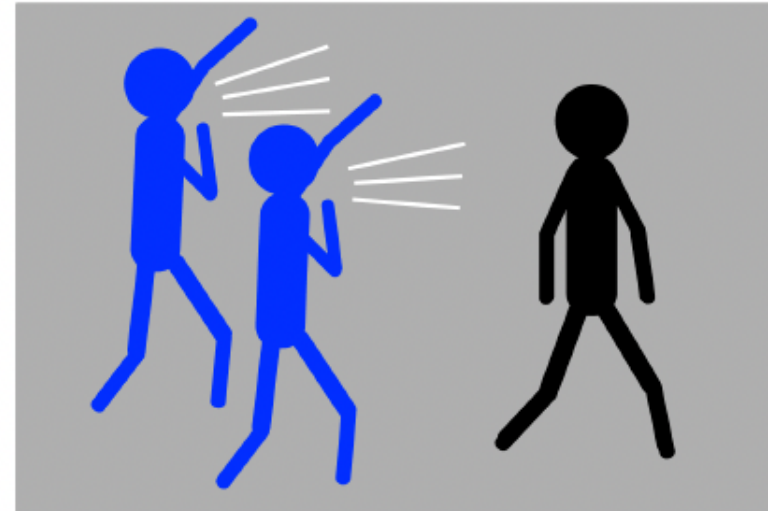
3. [C] \_\_\_\_\_ ri q'ëq ri taq käq



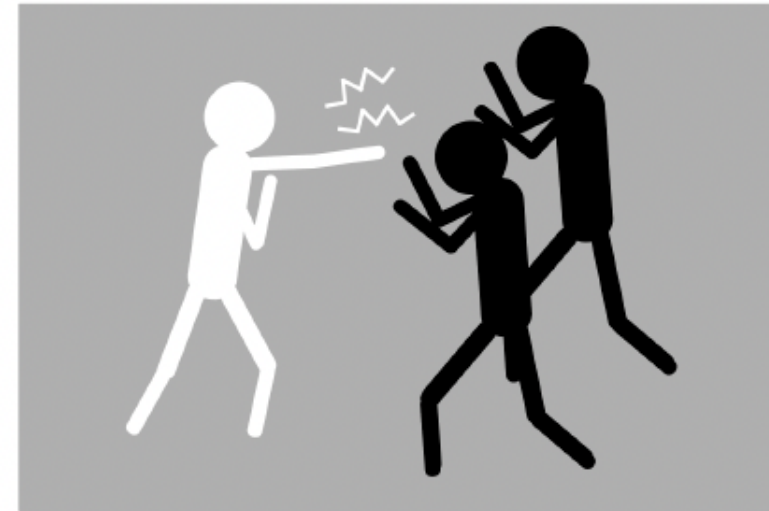
7. [G] xeroyoj [H] \_\_\_\_\_



4. Ri q'ëq xkoyoj [D] \_\_\_\_\_



8. [I] \_\_\_\_\_



**Object  
marker**

**Subject  
marker**

—

**-r(u)-**

**sg.**

**-e-**

**-k(i)-**

**pl.**

actually:

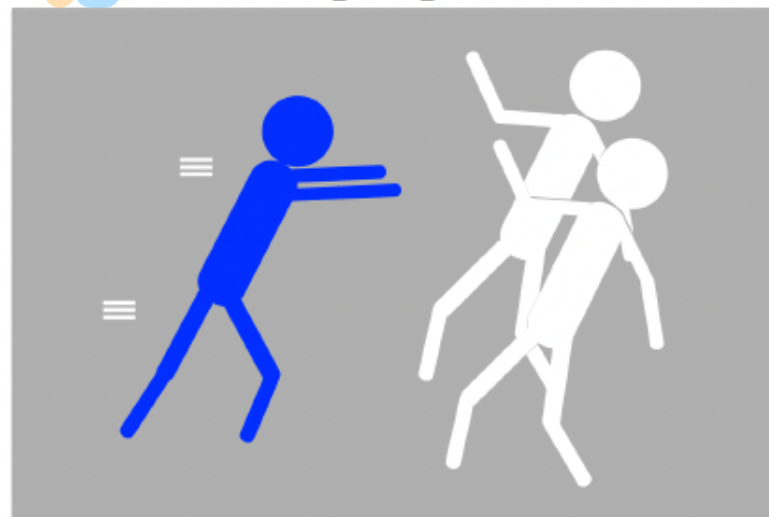
**absolutive**

**ergative**

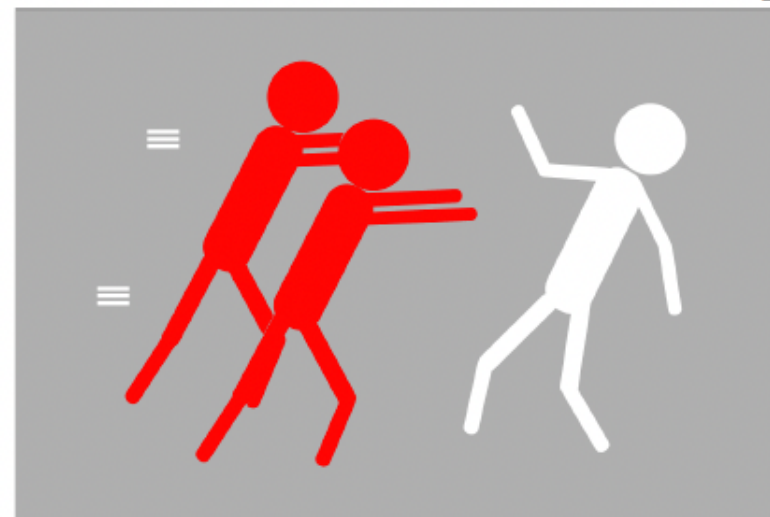
(but you couldn't  
have known that)

# The verb

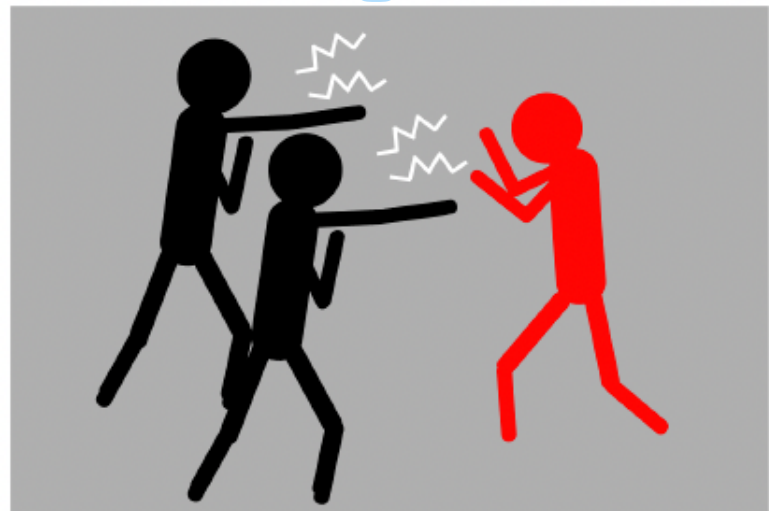
1. Xerunim ri taq saq ri xar



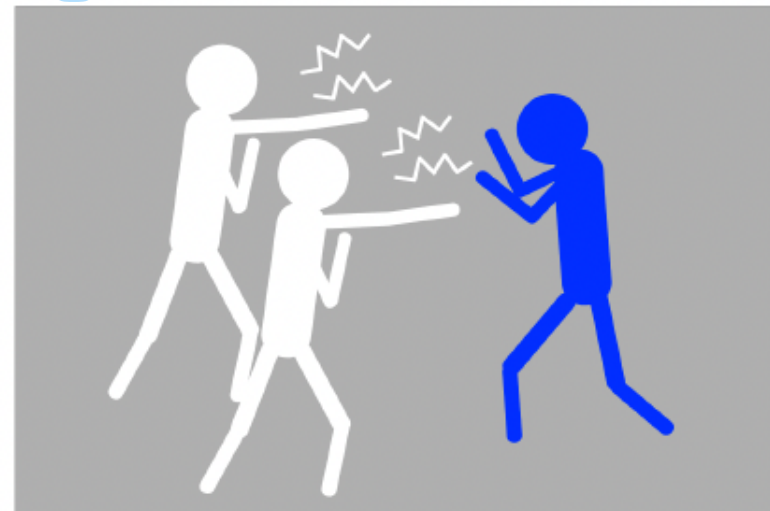
5. [E] ri saq



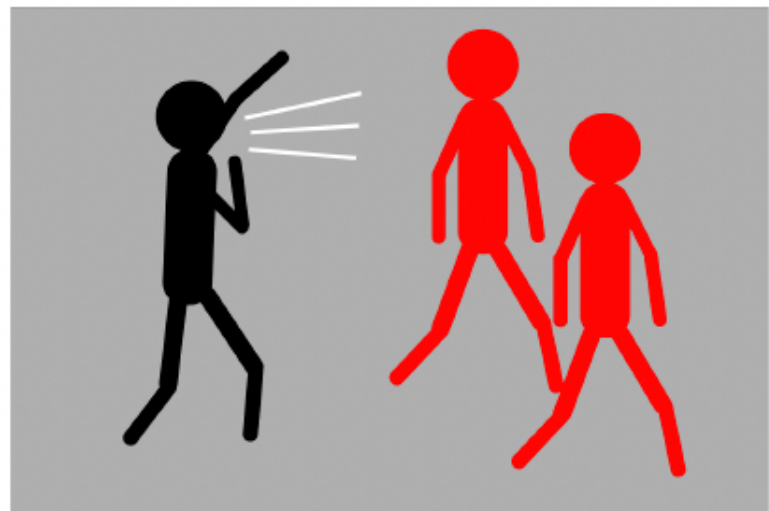
2. Ri taq [A] xkich'ay [B] kaq



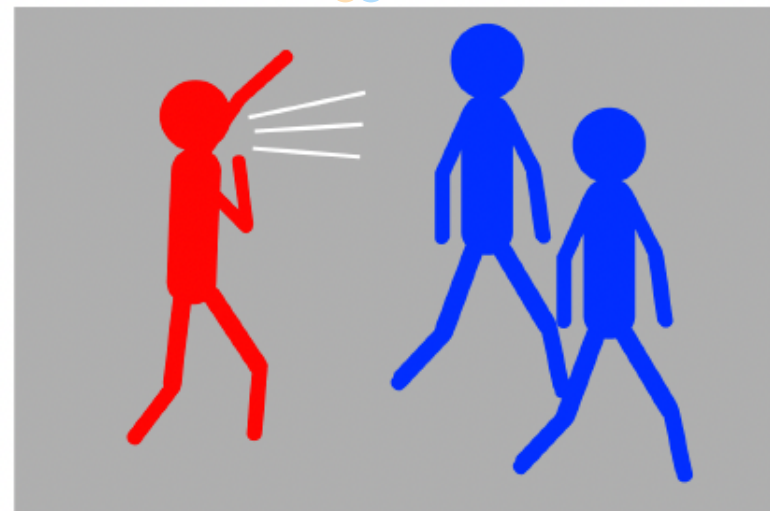
6. Xkich'ay [F]



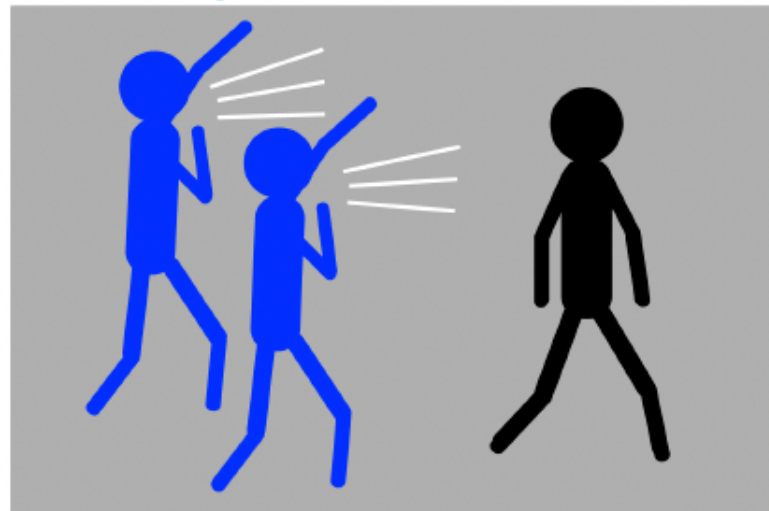
3. [C] ri q'eq ri taq kaq



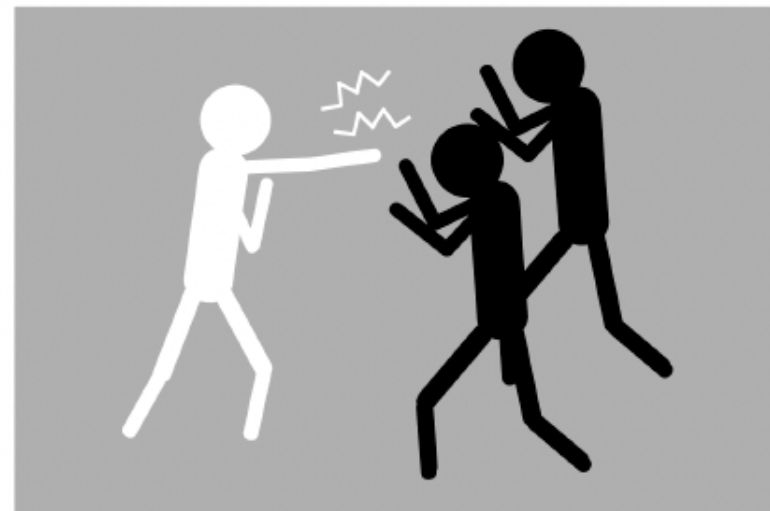
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]



8. [I]



**Object  
marker**

**Subject  
marker**

—

**-r(u)-**

**sg.**

**X-**

**-e-**

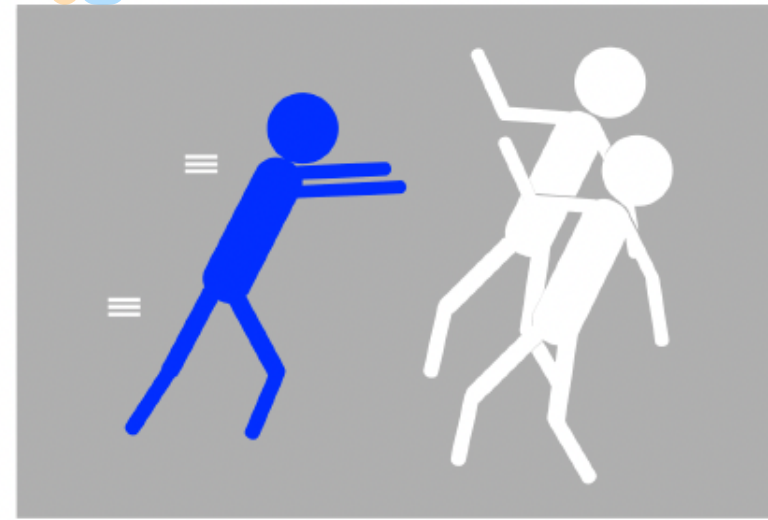
**-k(i)-**

**pl.**

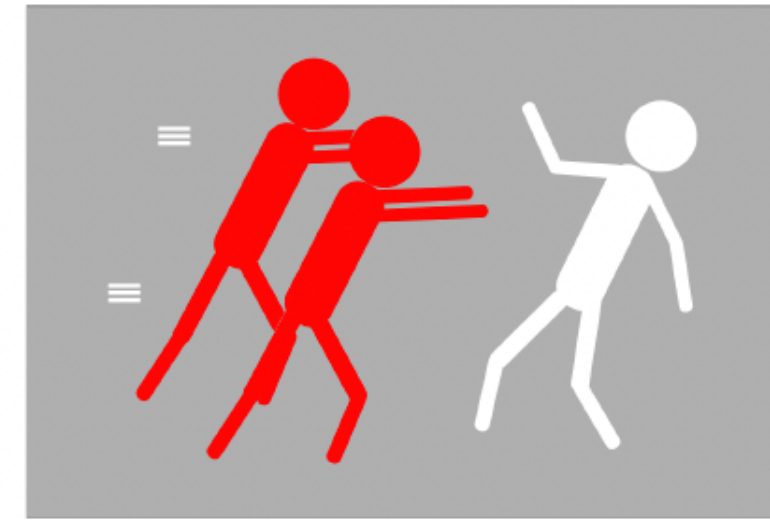
past tense

# Phonological rule

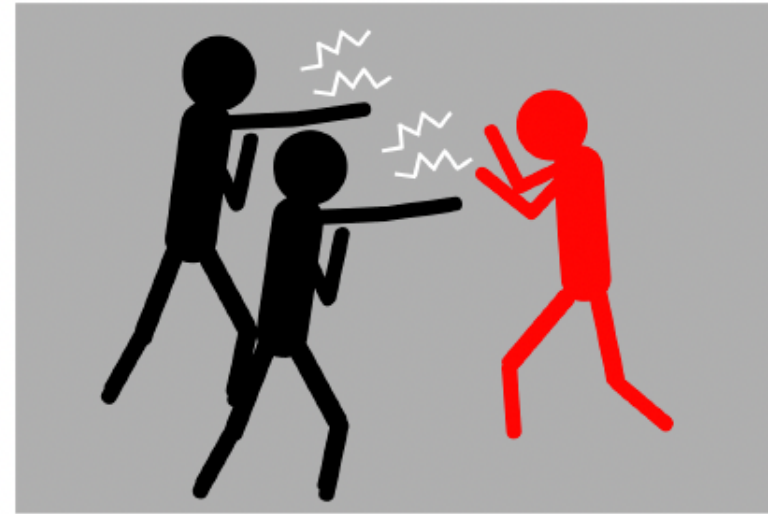
1. Xerunim ri taq saq ri xar



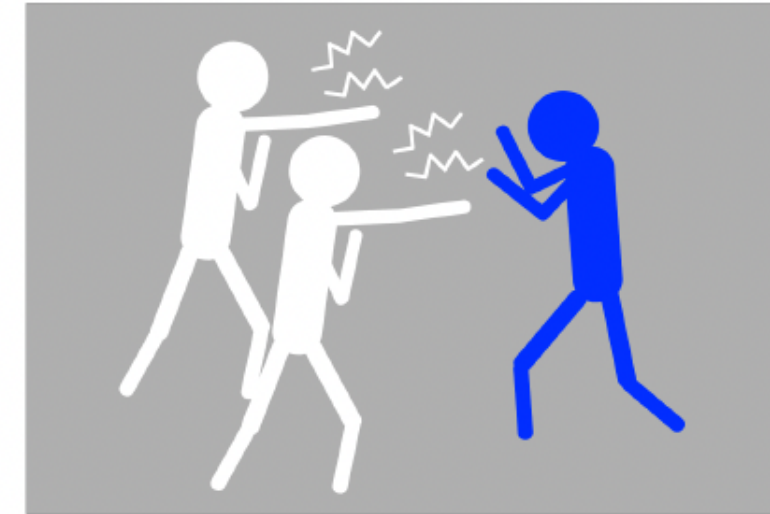
5. [E] ri saq



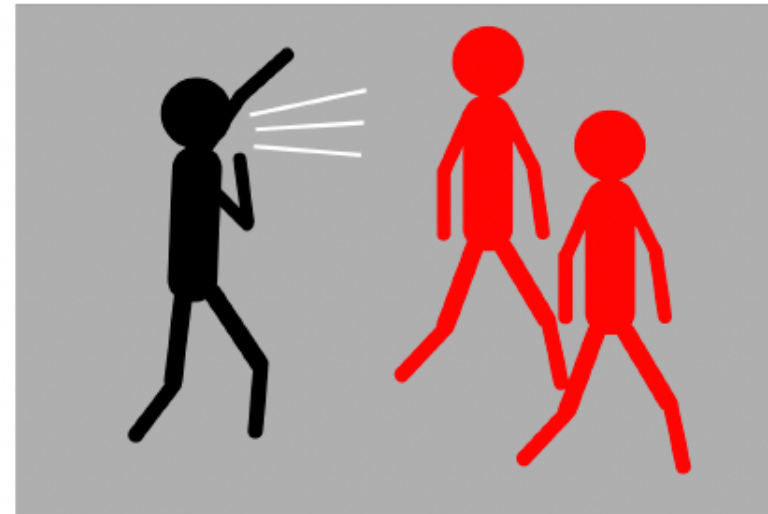
2. Ri taq [A] xkich'ay [B] kaq



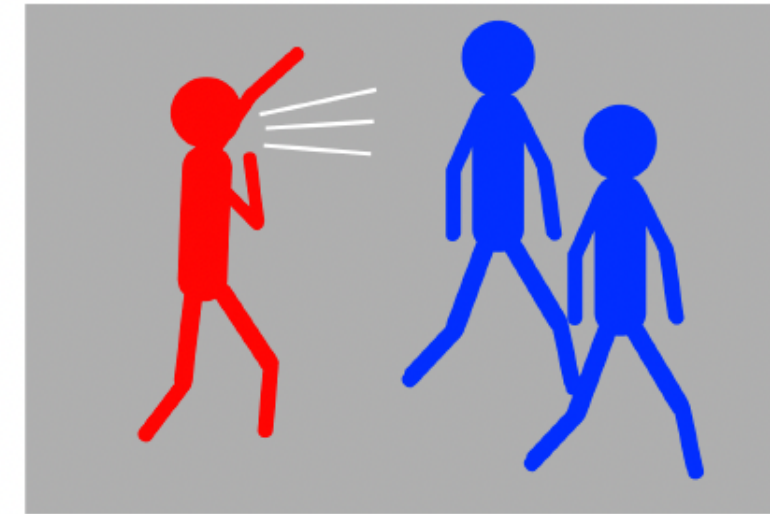
6. Xkich'ay [F]



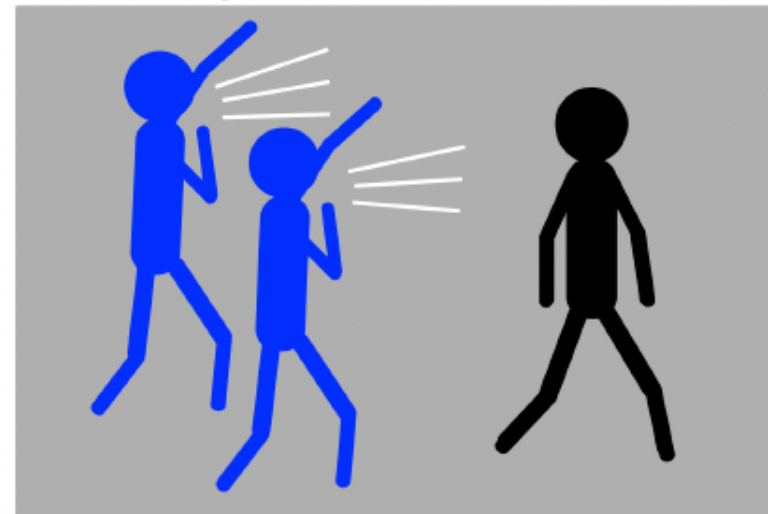
3. [C] ri q'eq ri taq kaq



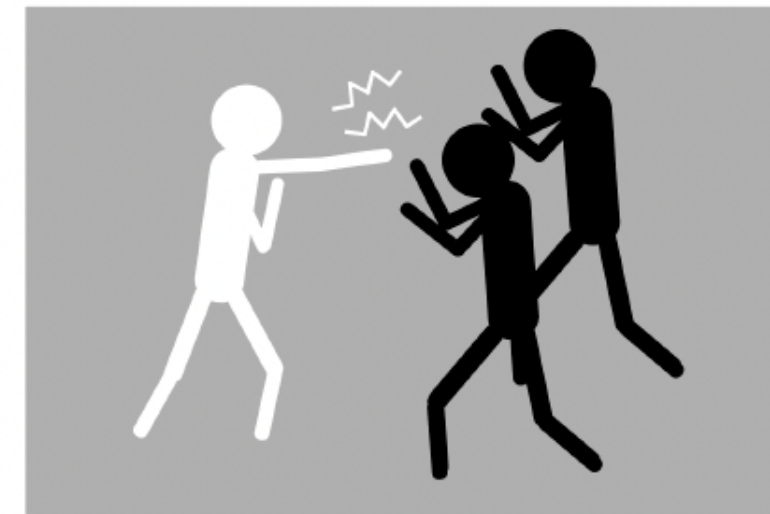
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]



8. [I]



**Object  
marker**

**Subject  
marker**

—

**-r(u)-**

**sg.**

**X-**

**-e-**

**-k(i)-**

**pl.**

past tense

**-ruV**

(before a  
**vowel**)

**-kiV**

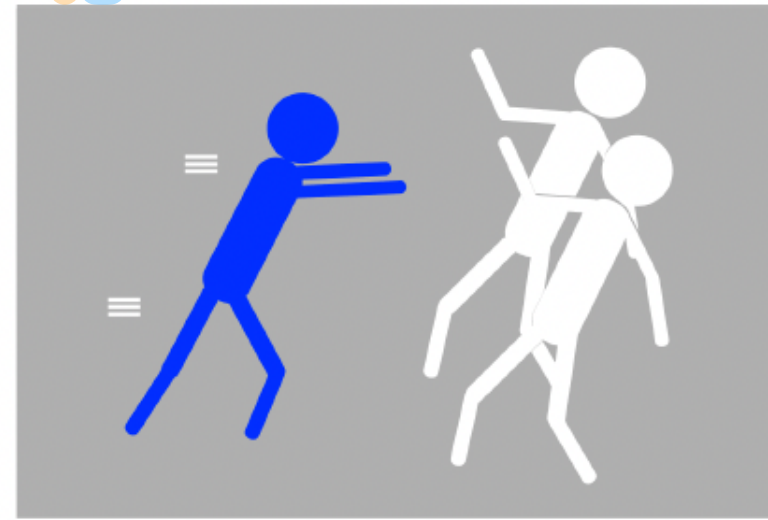
**-rC**

(before a  
**consonant**)

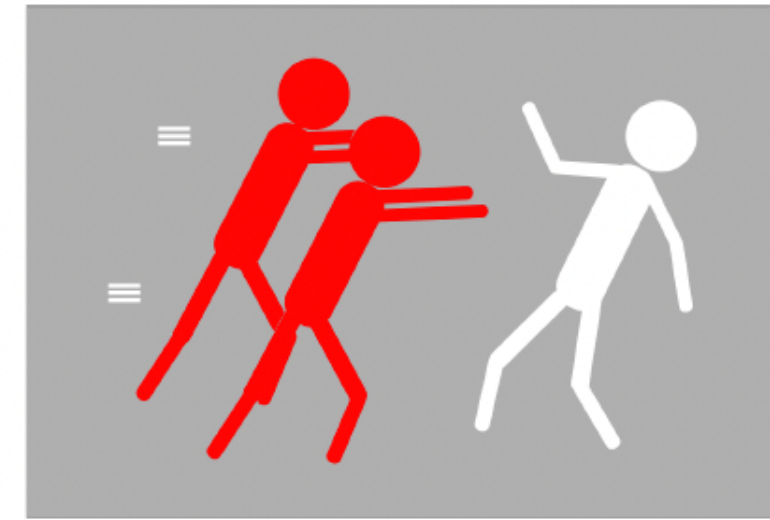
**-kC**

# Phonological rule

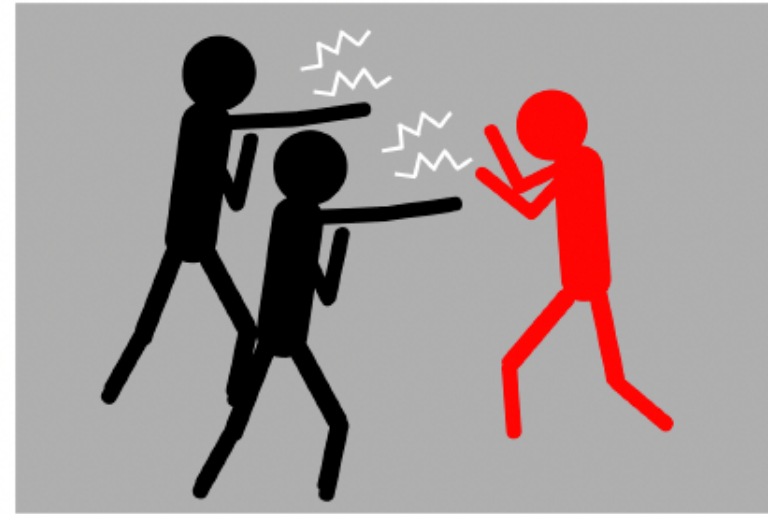
1. Xerunim ri taq saq ri xar



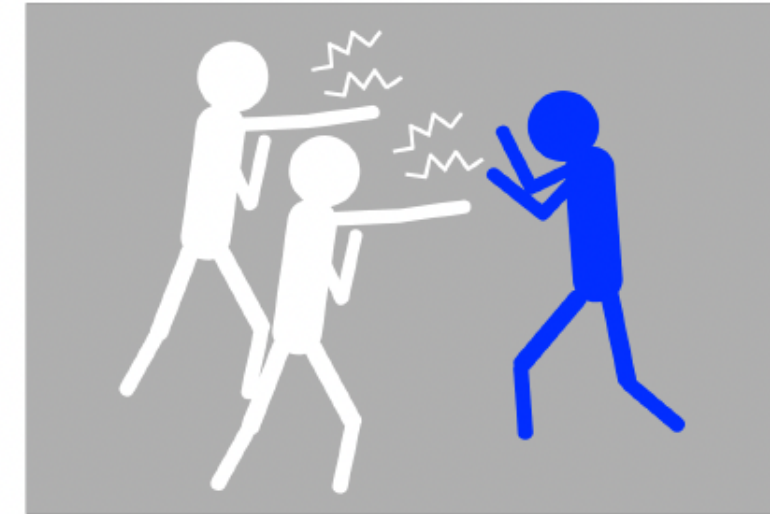
5. [E] ri saq



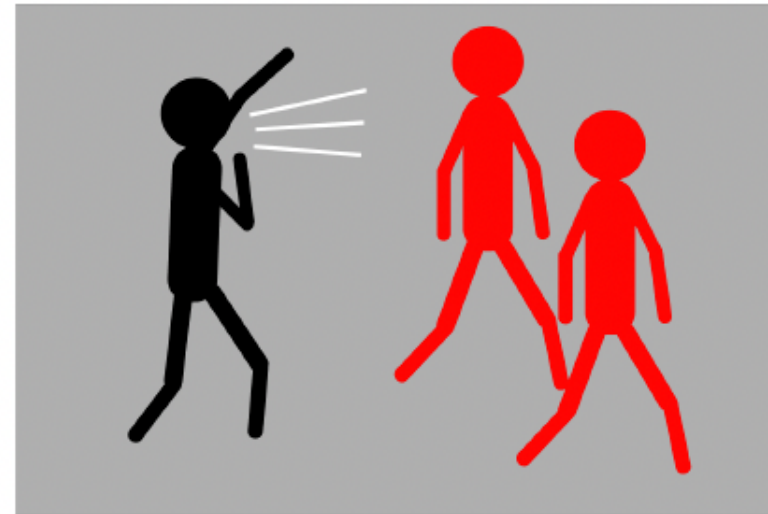
2. Ri taq [A] xkich'ay [B] kaq



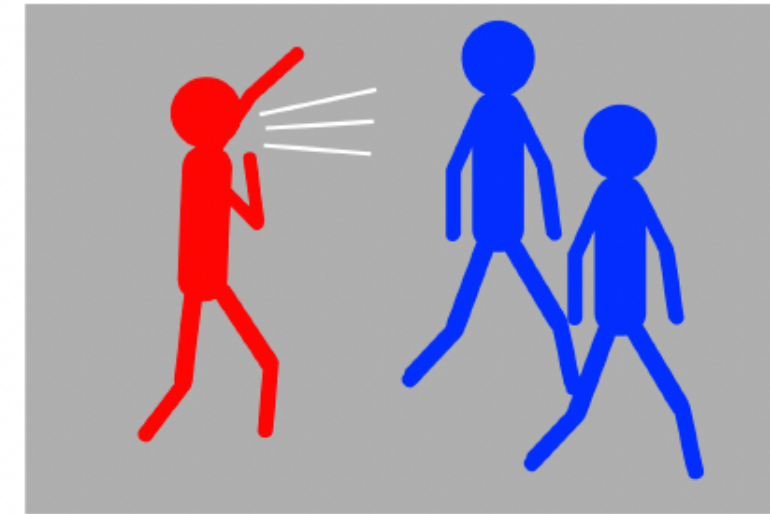
6. Xkich'ay [F]



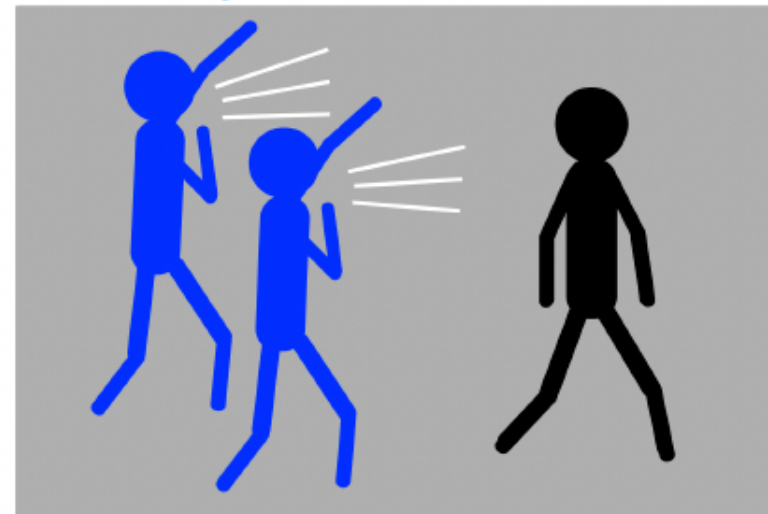
3. [C] ri q'eq ri taq kaq



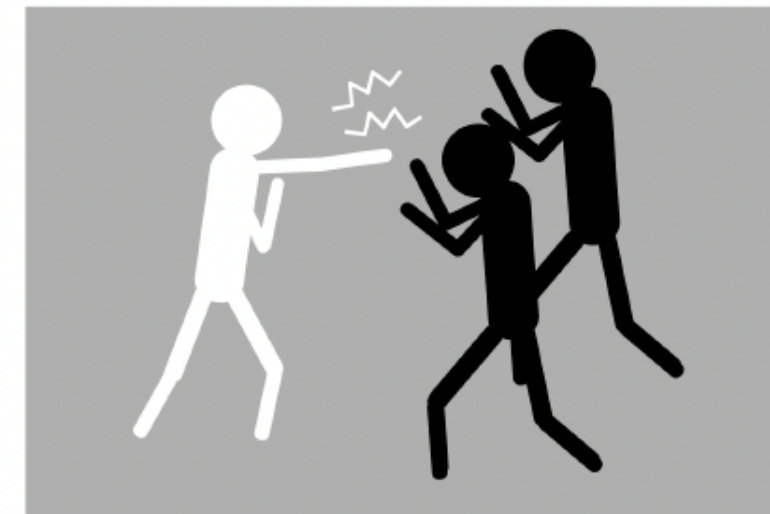
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]



8. [I]



**Object  
marker**

**Subject  
marker**

—

**-r(u)-**

**sg.**

**X-**

past tense

**-e-**

**-k(i)-**

**pl.**

**-(r)uV**

(before a  
**vowel**)

**-kiV**

actually: r is an  
epenthetic consonant  
(but you couldn't  
have known)

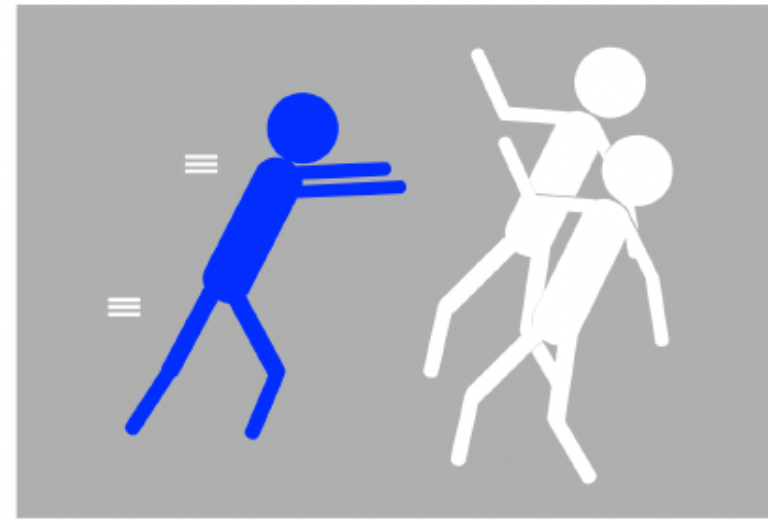
**-rC**

(before a  
**consonant**)

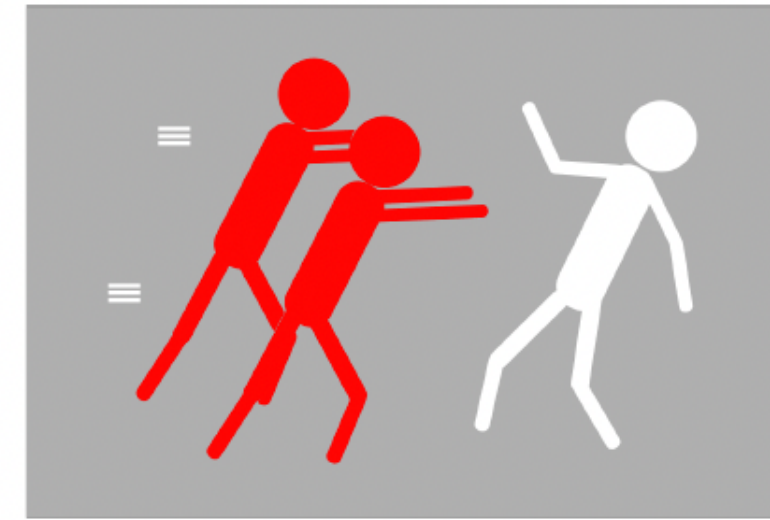
**-kC**

# Psycholinguistics

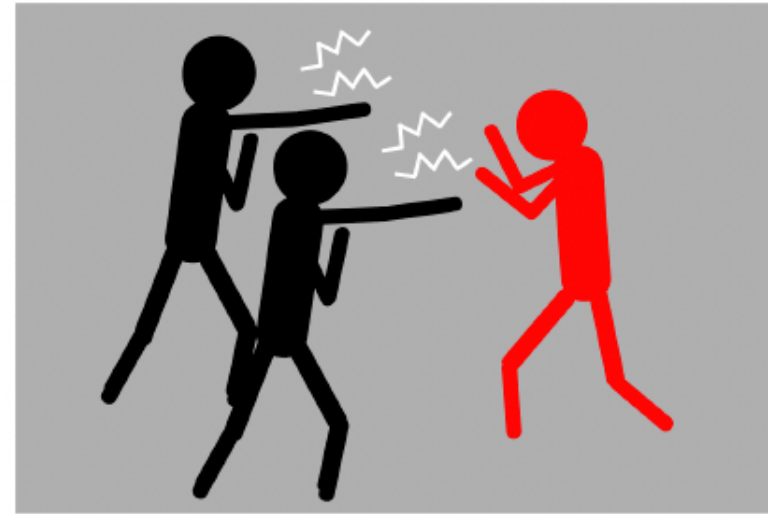
1. Xerunim ri taq saq ri xar



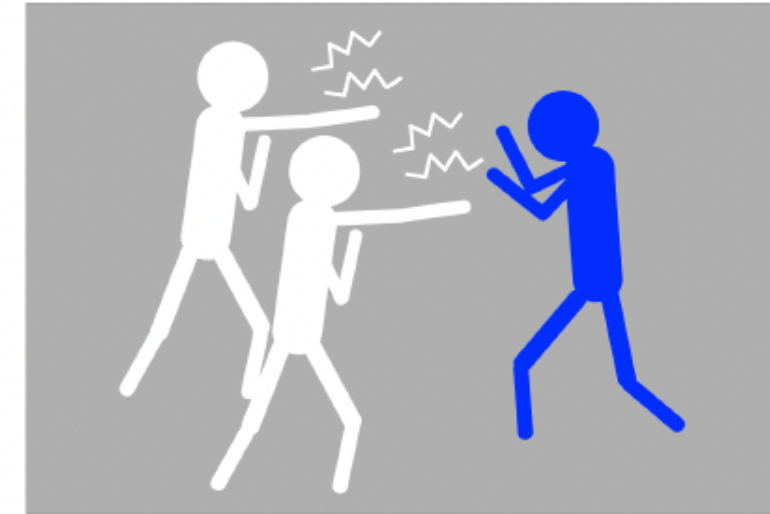
5. [E] ri saq



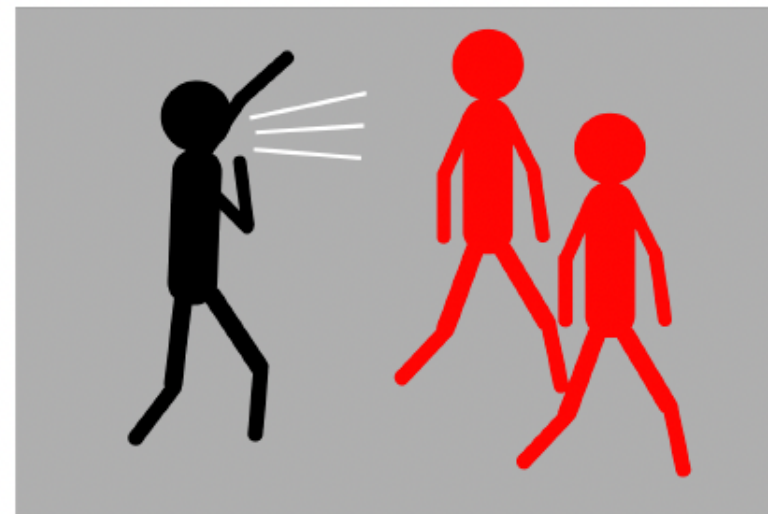
2. Ri taq [A] xkich'ay [B] kaq



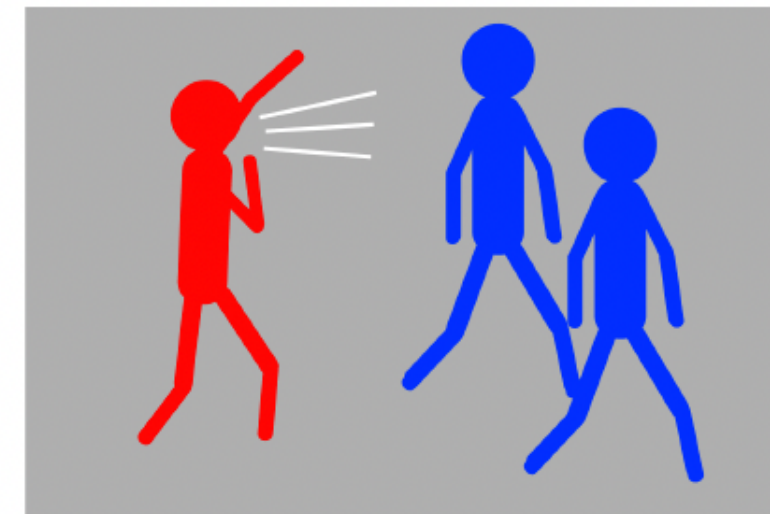
6. Xkich'ay [F]



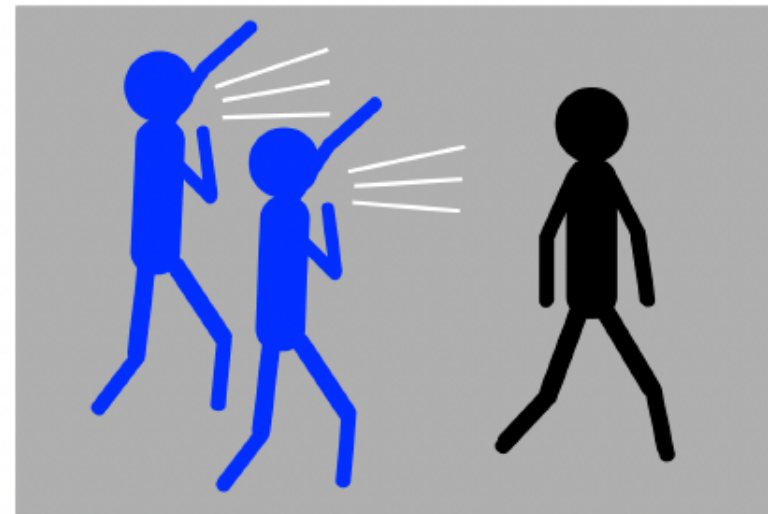
3. [C] ri q'eq ri taq kaq



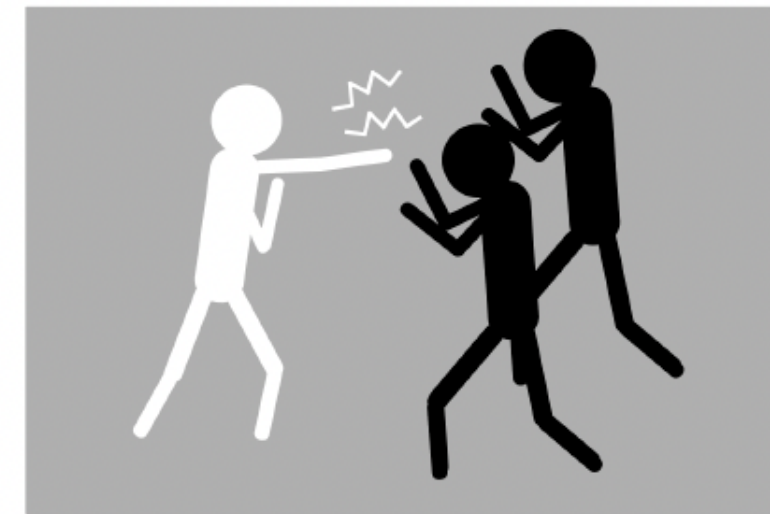
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]



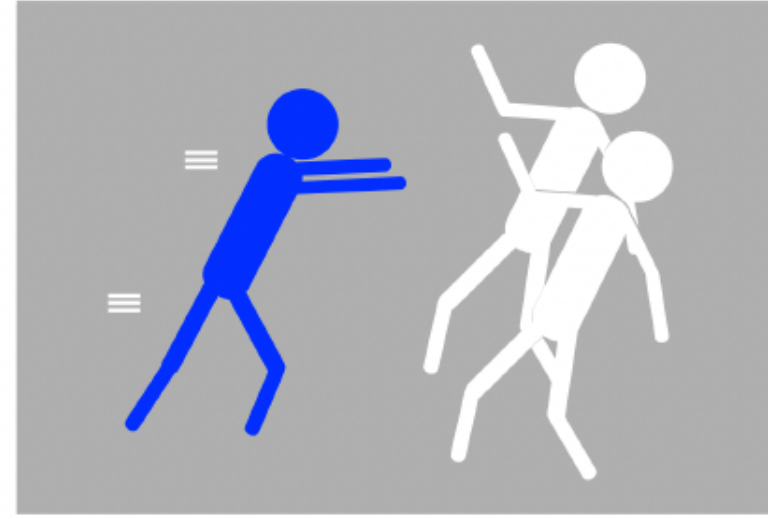
8. [I]



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

# Psycholinguistics

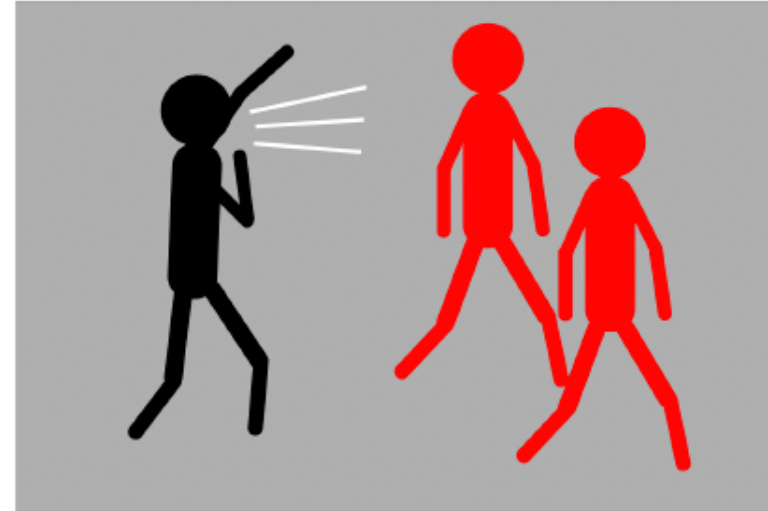
1. Xerunim ri taq säq ri xar



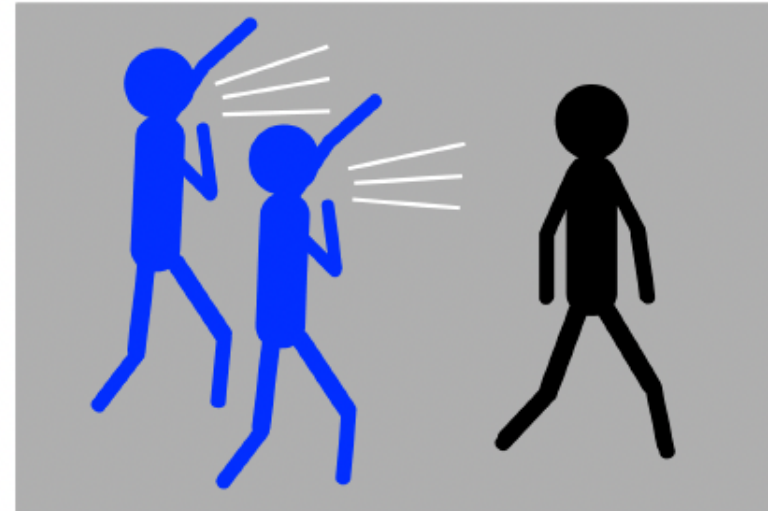
2. Ri taq [A] xkich'äy [B] käq



3. [C] ri q'ëq ri taq käq



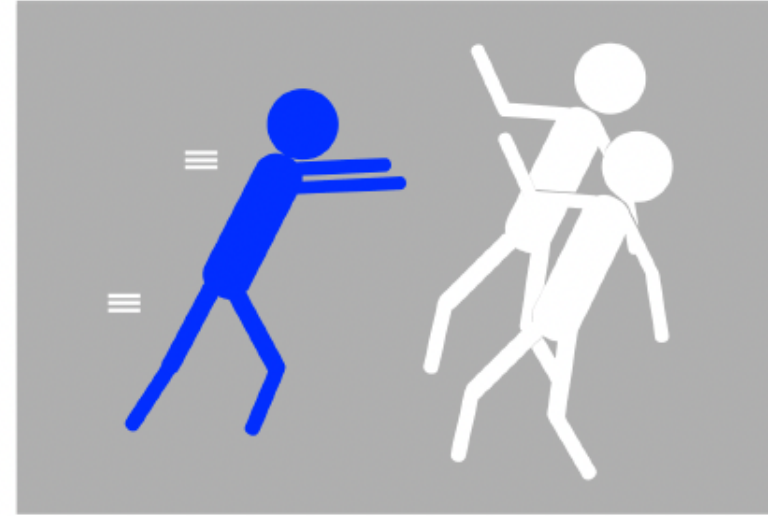
4. Ri q'ëq xkoyoj [D]



Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower

# Psycholinguistics

1. Xerunim ri taq säq ri xar



verb subject

**V-O-S**

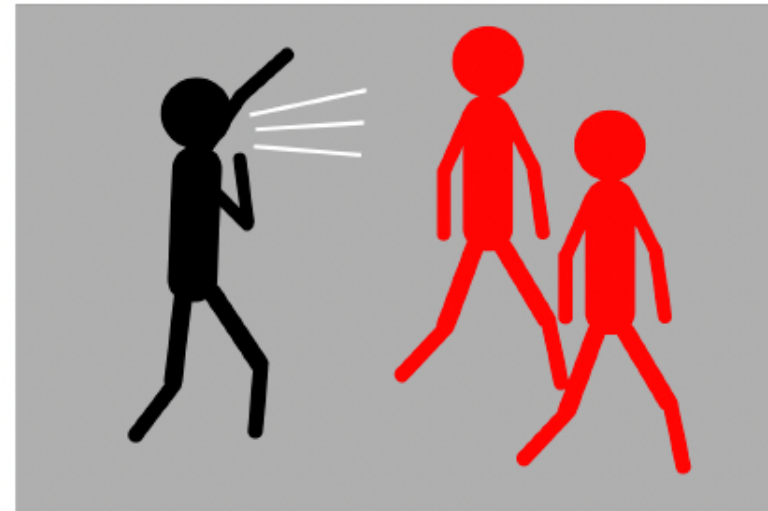
object

2. Ri taq [A] xkich'äy [B] käq



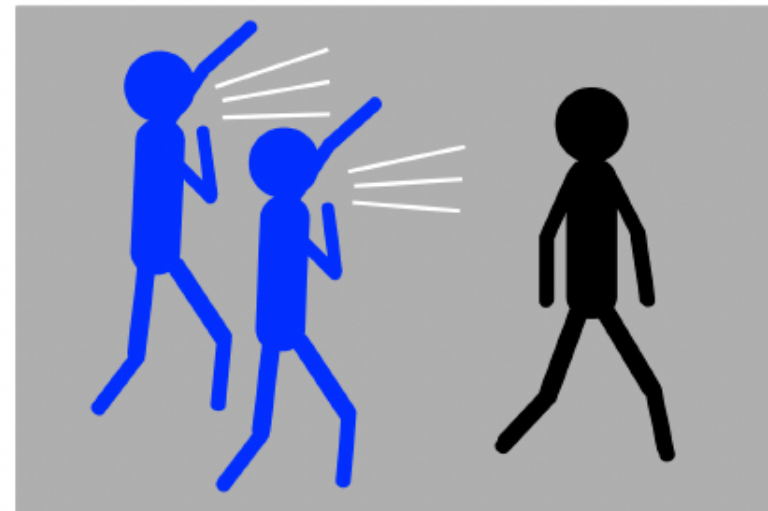
**S-V-O**

3. [C] ri q'ëq ri taq käq



**V-S-O**

4. Ri q'ëq xkoyoj [D]



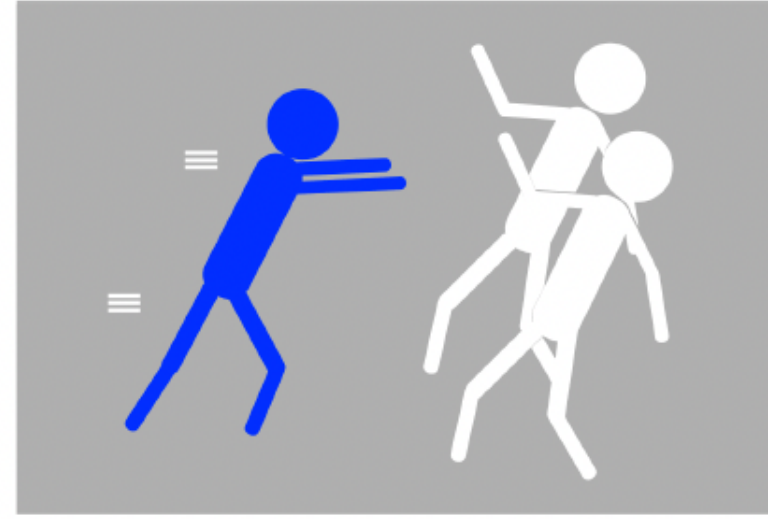
**O-V-S**

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower

**Different word orders!**

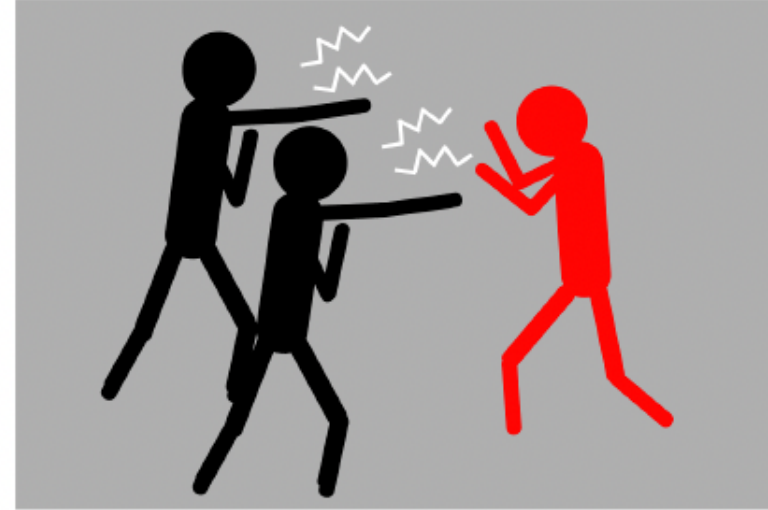
# Psycholinguistics

1. Xerunim ri taq saq ri xar



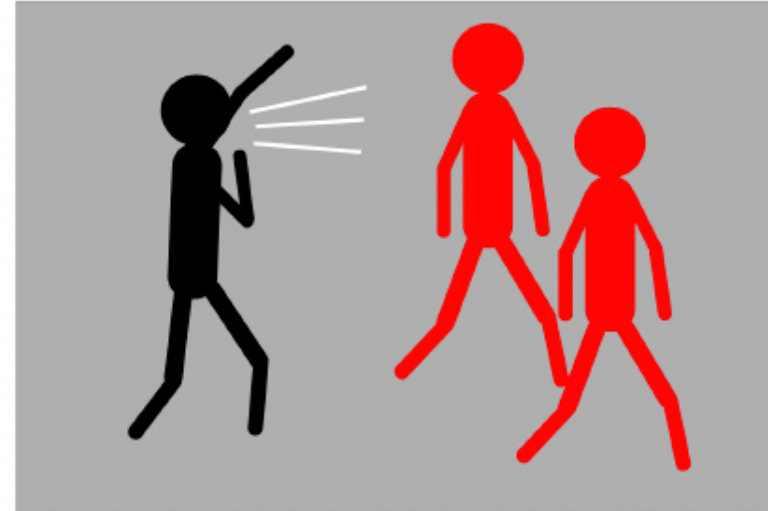
**V-O-S**

2. Ri taq [A] xkich'ay [B] kaq



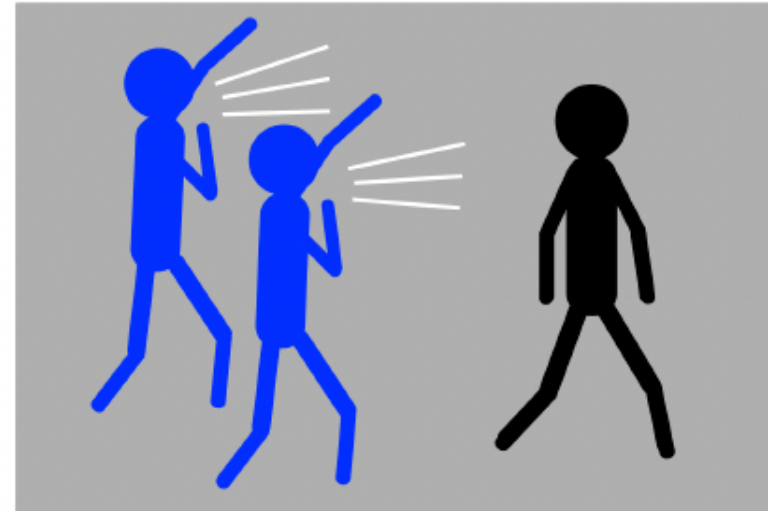
**S-V-O**

3. [C] ri q'eq ri taq kaq



**V-S-O**

4. Ri q'eq xkoyoj [D]

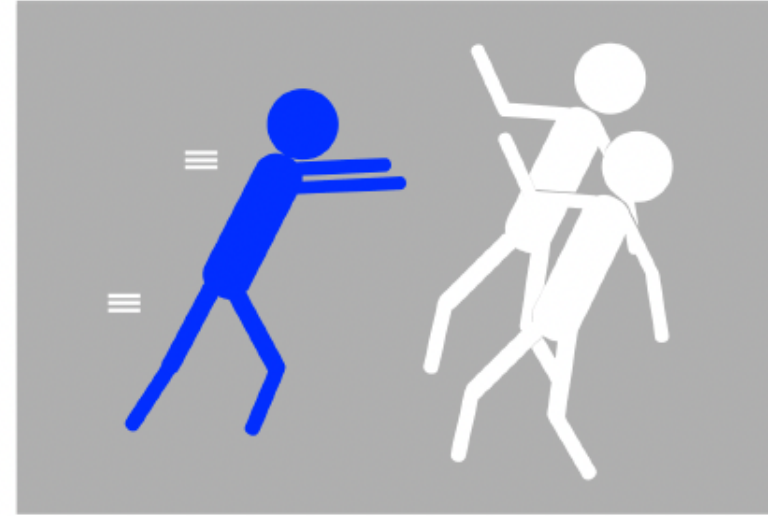


**O-V-S**

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower

# Psycholinguistics

1. Xerunim ri taq säq ri xar



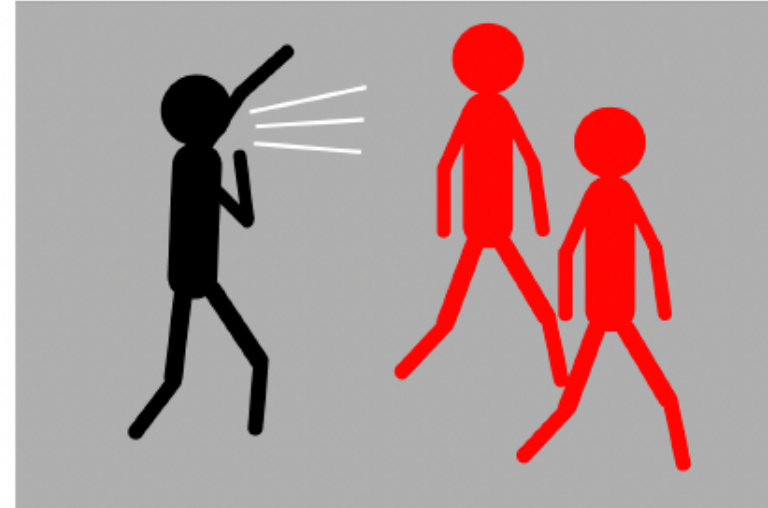
**V-O-S**

2. Ri taq [A] xkich'äy [B] käq



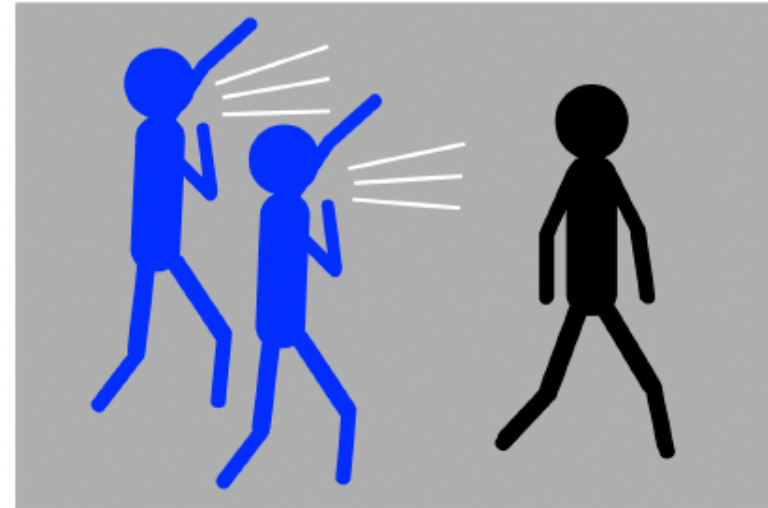
**S-V-O**

3. [C] ri q'ëq ri taq käq



**V-S-O**

4. Ri q'ëq xkoyoj [D]



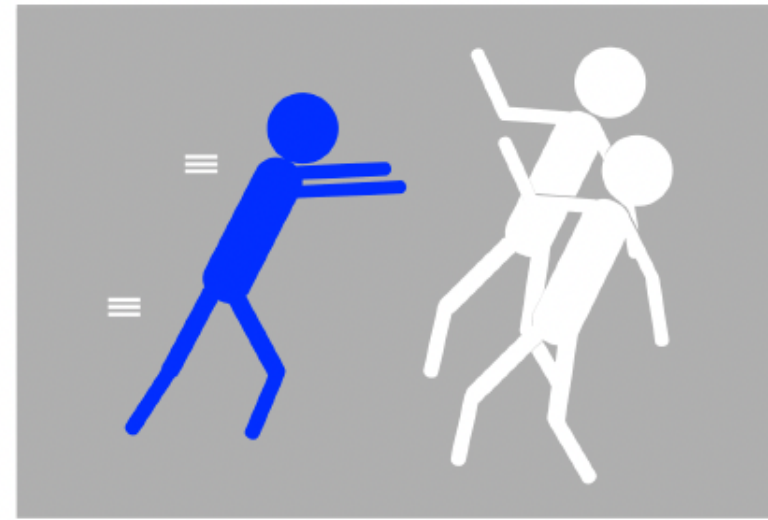
**O-V-S**

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower

**Auditory cortex** activity is **higher** if sentence is **V-initial**

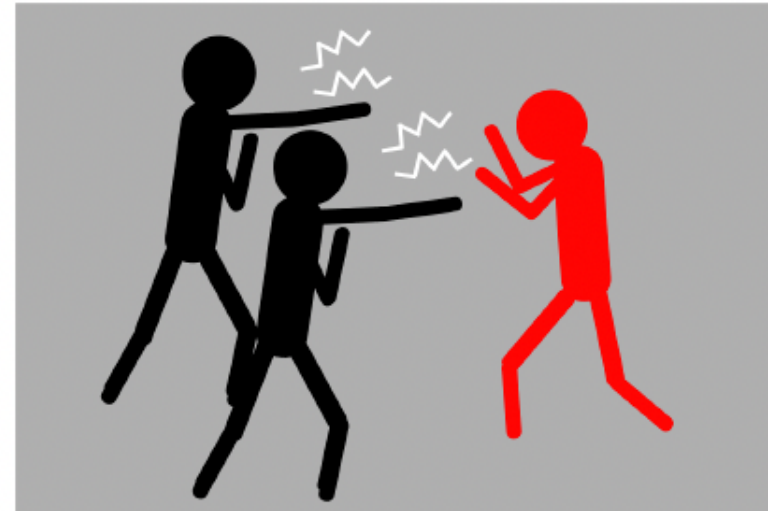
# Psycholinguistics

1. Xerunim ri taq säq ri xar



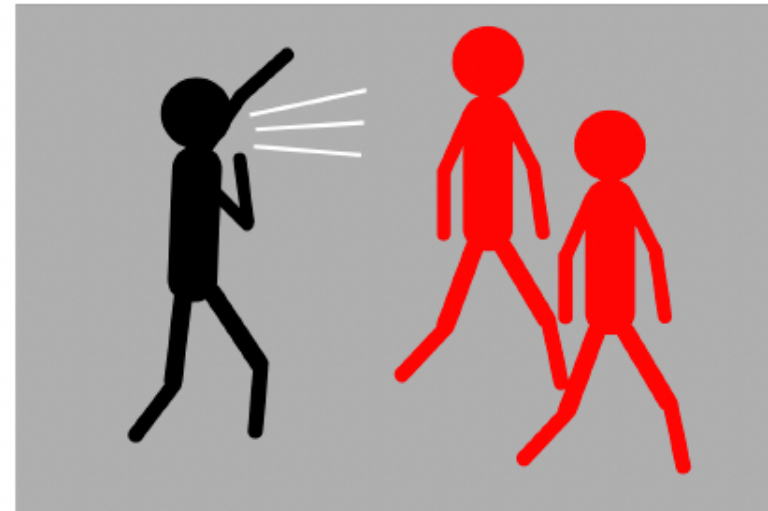
**V-O-S**

2. Ri taq [A] xkich'äy [B] käq



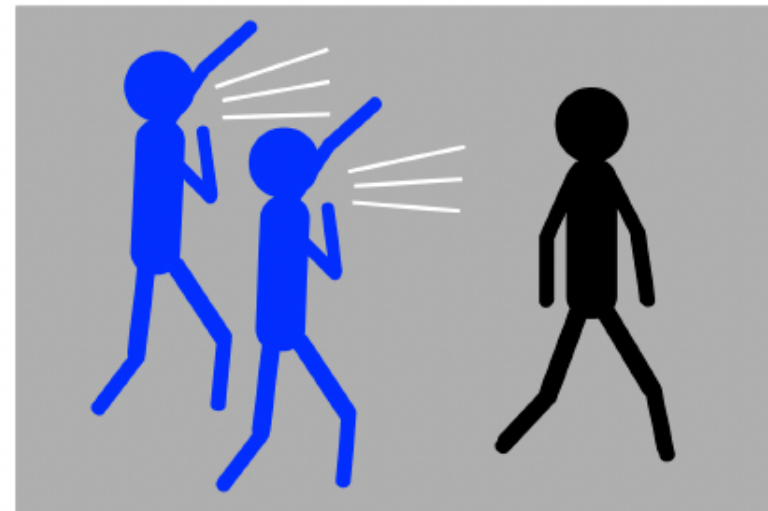
**S-V-O**

3. [C] ri q'ëq ri taq käq



**V-S-O**

4. Ri q'ëq xkoyoj [D]



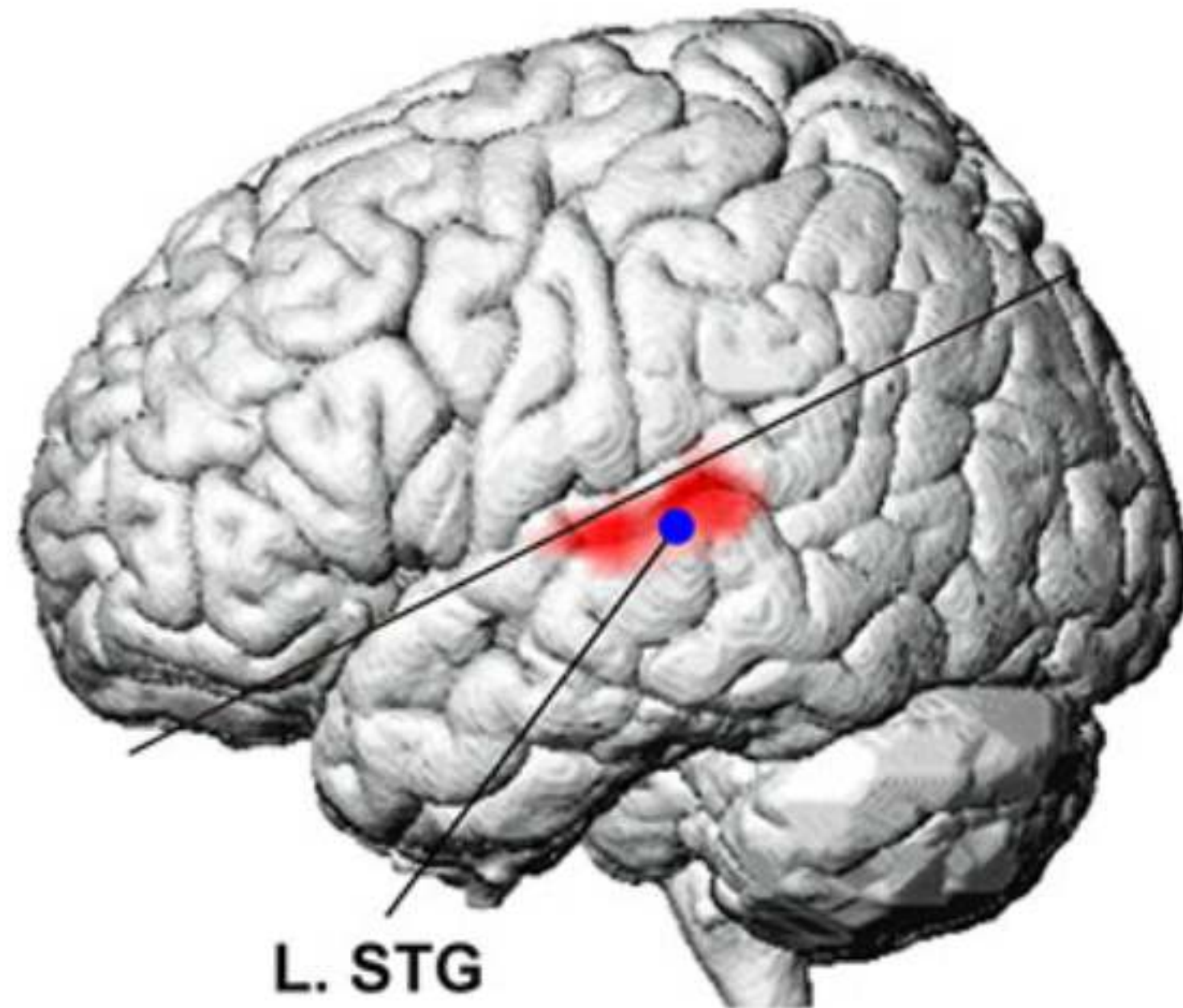
**O-V-S**

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower

**Auditory cortex** activity is **higher** if sentence is **V-initial**

Hearing the verb (action) first is **more surprising** *a noun is expected first*

# Psycholinguistics



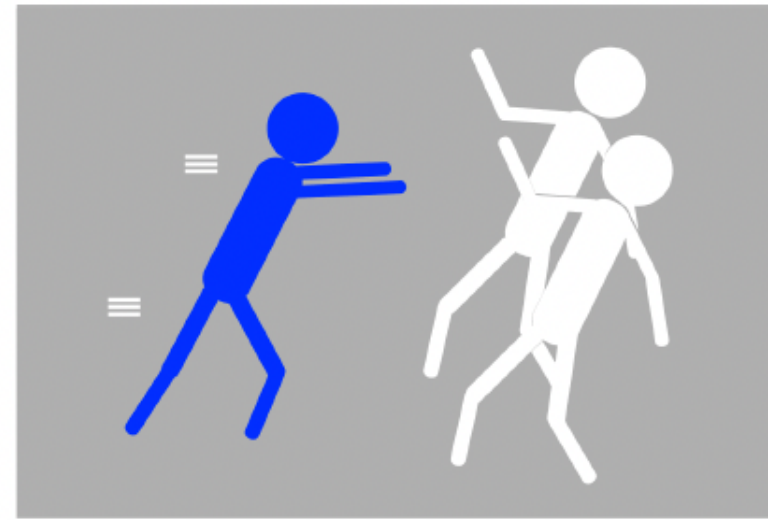
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# Psycholinguistics

1. Xerunim ri taq saq ri xar



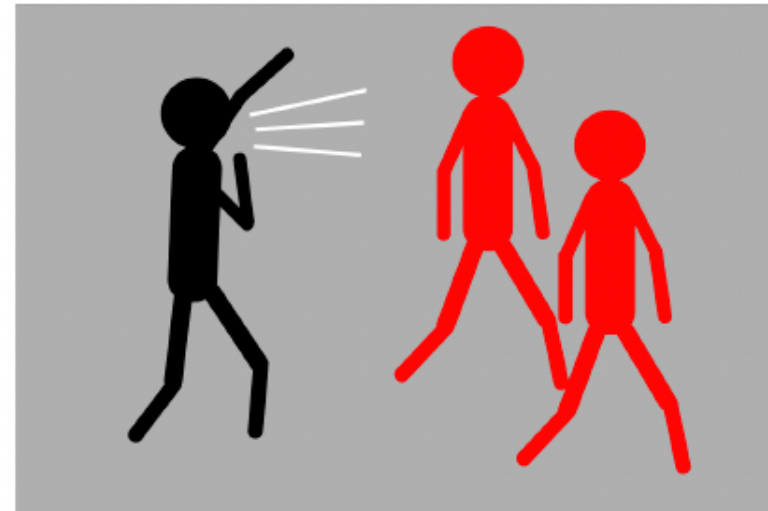
**V-O-S**

2. Ri taq [A] xkich'ay [B] kaq



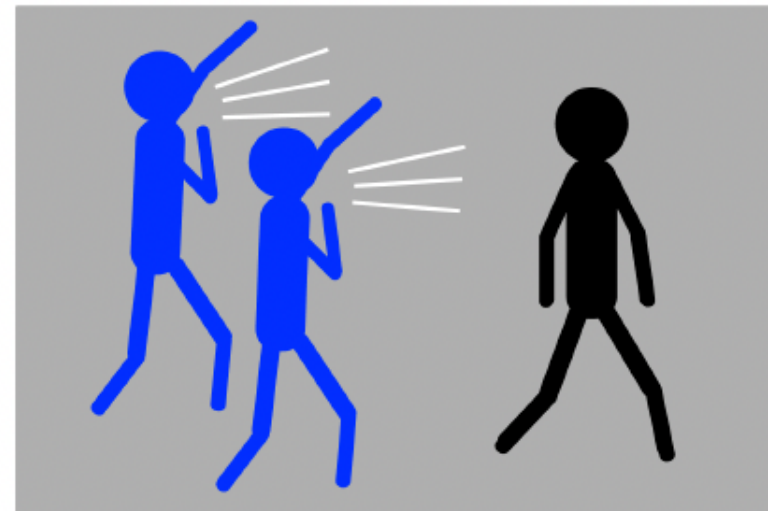
**S-V-O**

3. [C] ri q'eq ri taq kaq



**V-S-O**

4. Ri q'eq xkoyoj [D]



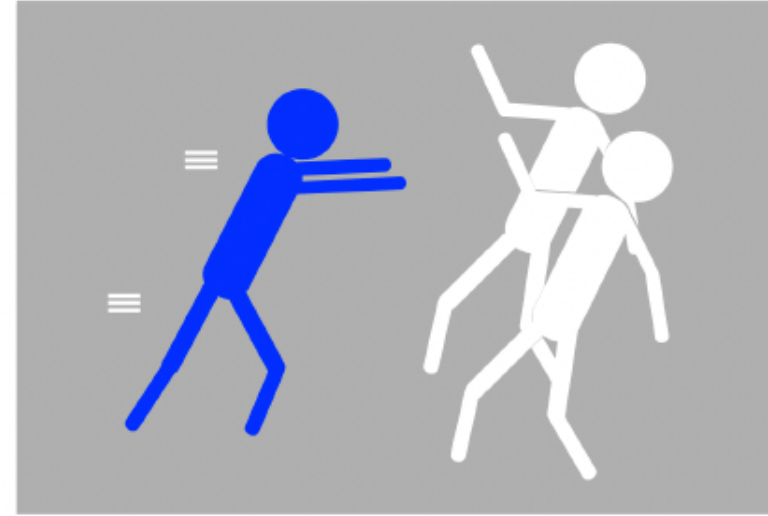
**O-V-S**

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
1	lower	higher
2	lower	lower
3	higher	higher
4	higher	lower

**Frontal cortex** activity is **higher** if object **does not follow** the verb

# Psycholinguistics

1. Xerunim ri taq saq ri xar



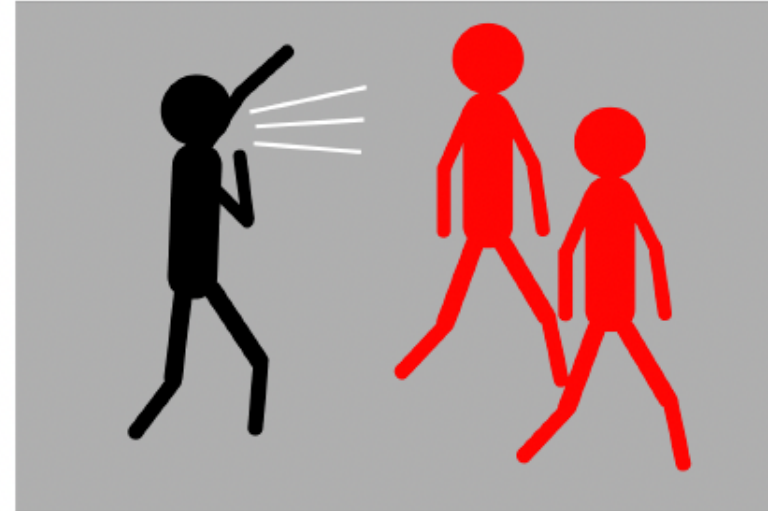
**V-O-S**

2. Ri taq [A] xkich'ay [B] kaq



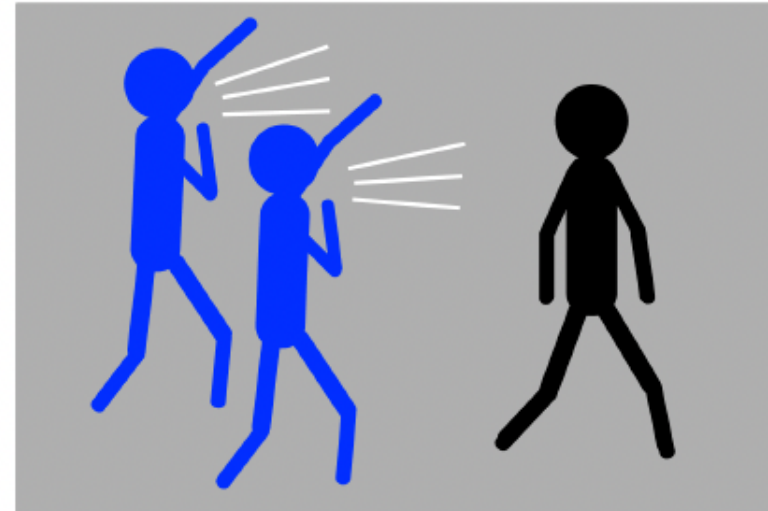
**S-V-O**

3. [C] ri q'eq ri taq kaq



**V-S-O**

4. Ri q'eq xkoyoj [D]



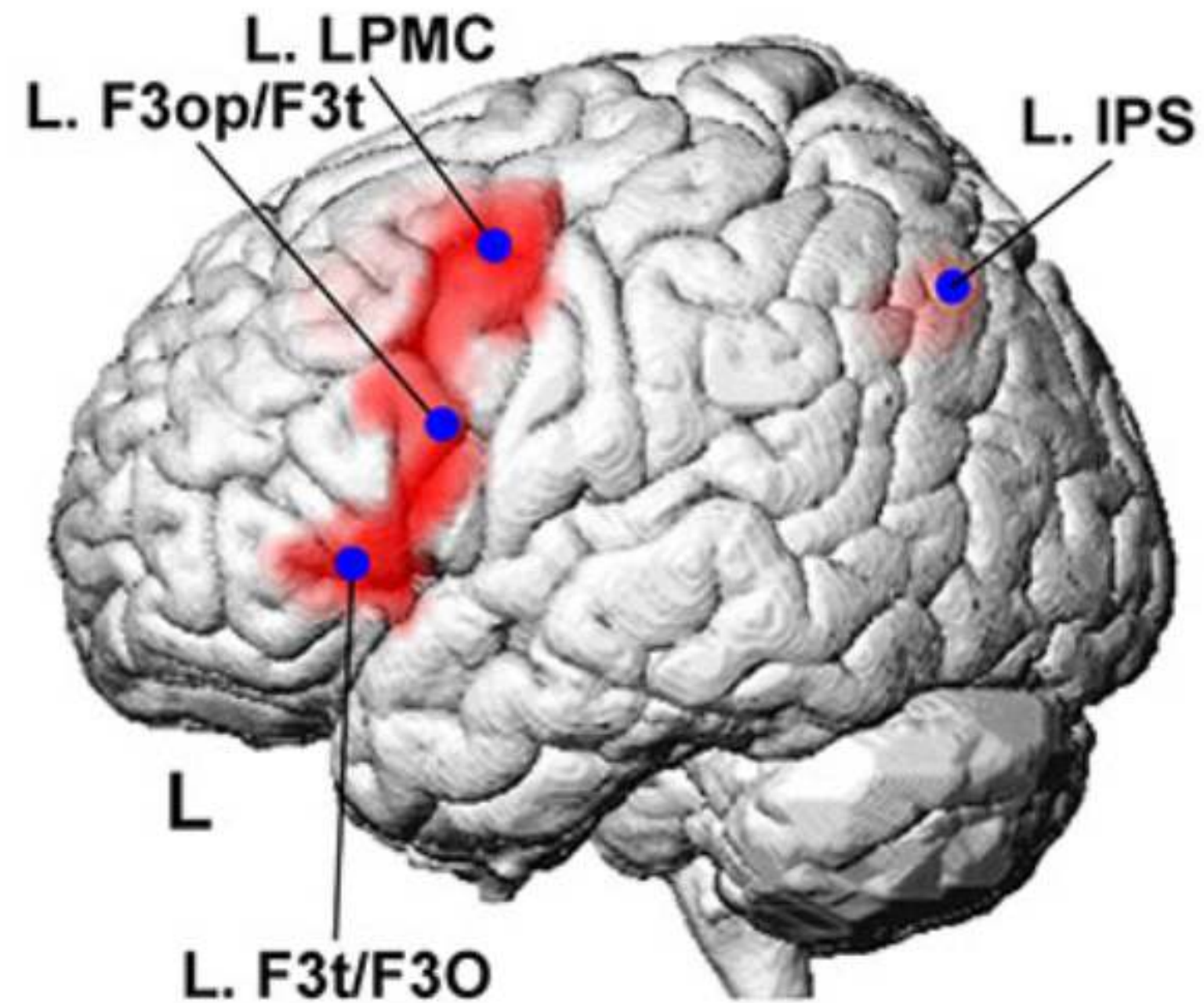
**O-V-S**

Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
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Frontal cortex activity is **higher** if object **does not follow** the verb

These sentences are **more difficult to process**

# Psycholinguistics



Sentence number	Frontal Cortex (activity)	Auditory Cortex (activity)
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# Psycholinguistics

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1	lower	higher
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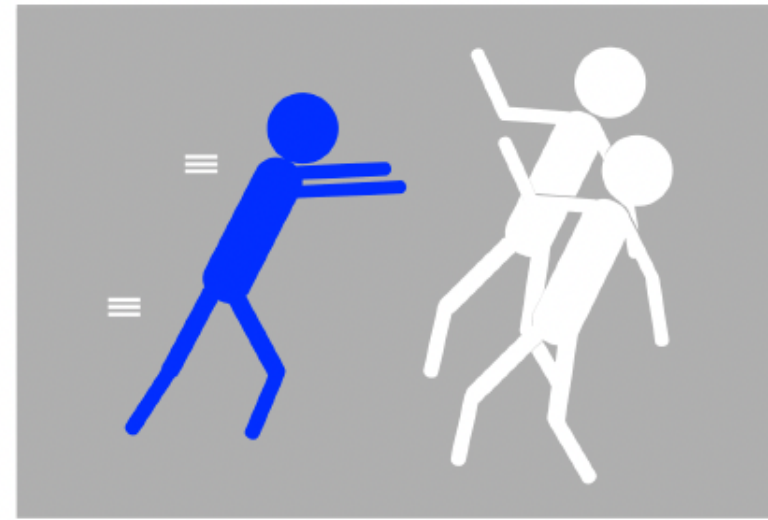
**VOS** is considered the **canonical** word order, but **SVO** is more **common**

Frontal cortex activity is **higher** if object **does not follow** the verb

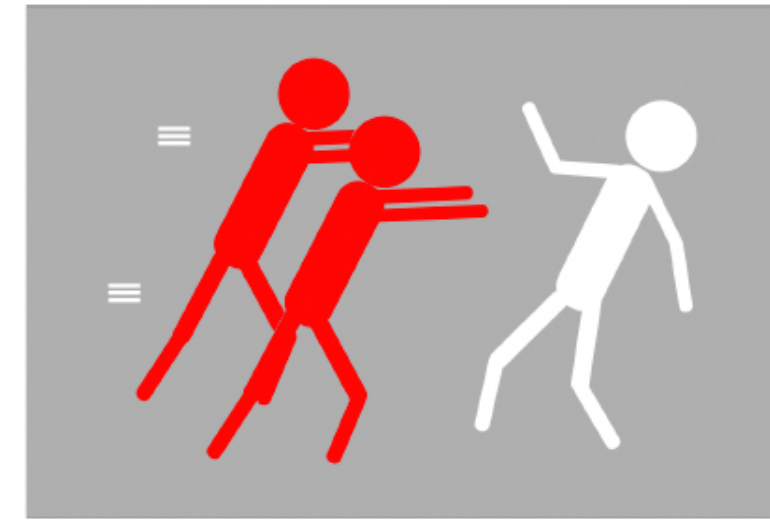
These sentences are **more difficult to process**

# Assignment (a)

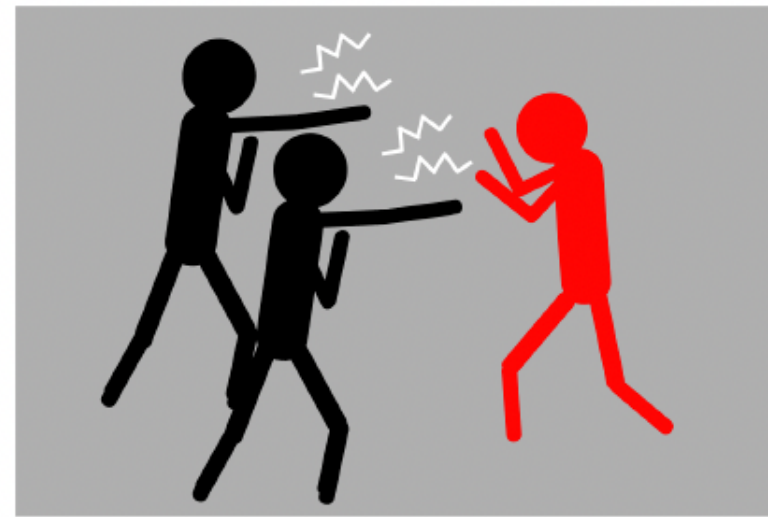
1. Xerunim ri taq saq ri xar



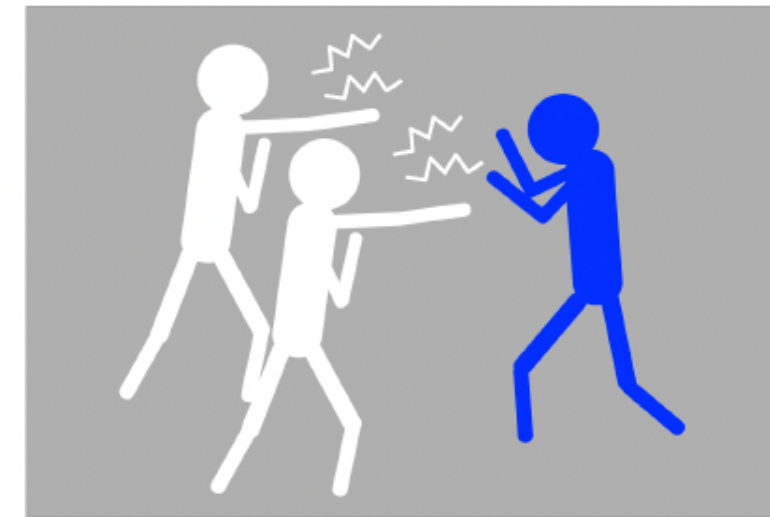
5. [E] ri saq



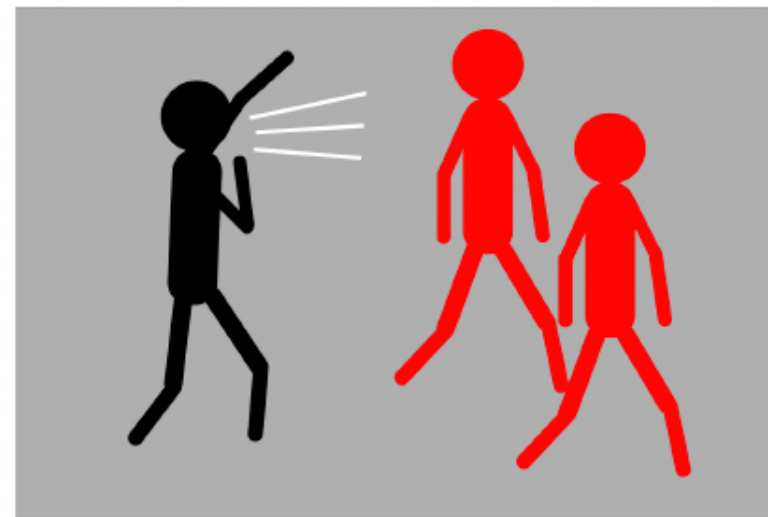
2. Ri taq [A] xkich'ay [B] kaq



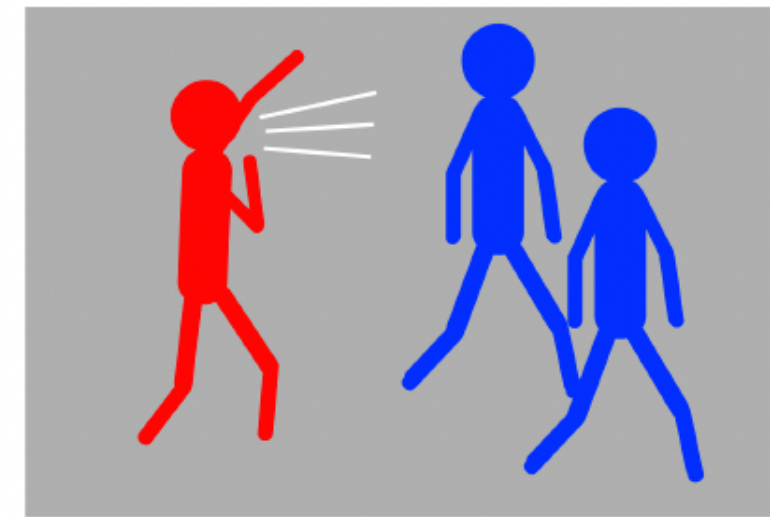
6. Xkich'ay [F]



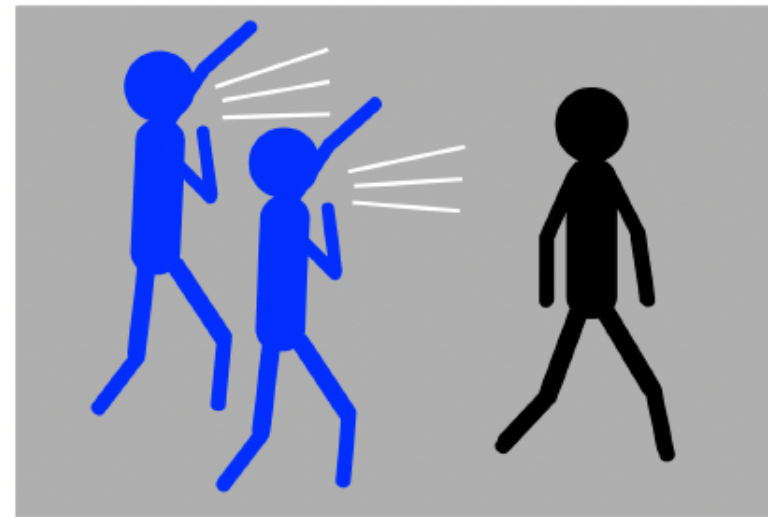
3. [C] ri q'eq ri taq kaq



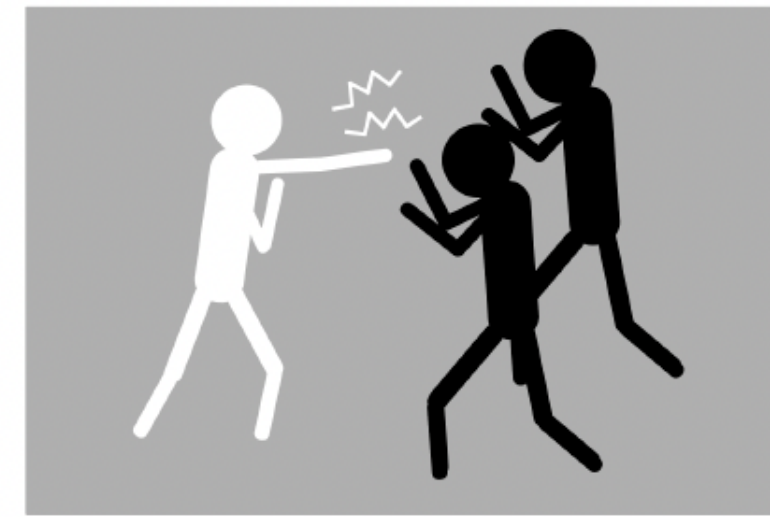
7. [G] xeroyoj [H]



4. Ri q'eq xkoyoj [D]

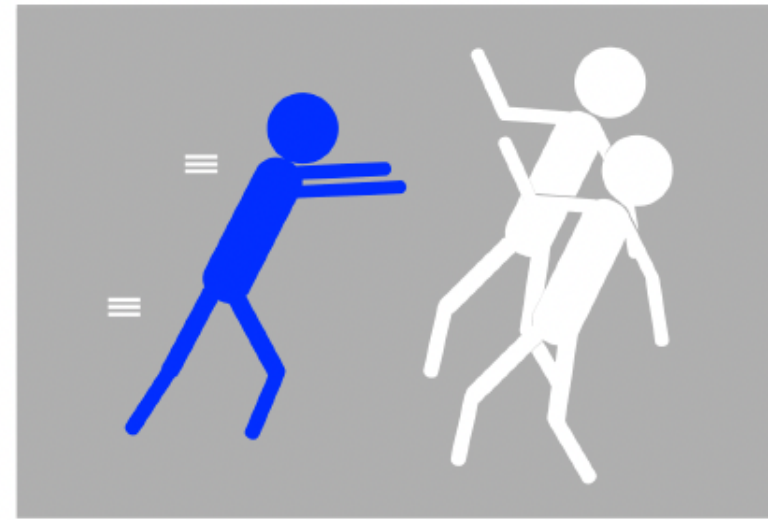


8. [I]

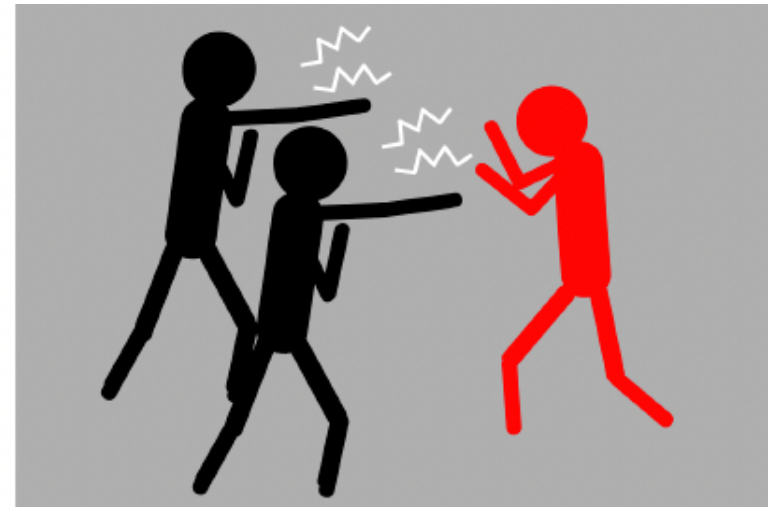


# Assignment (a)

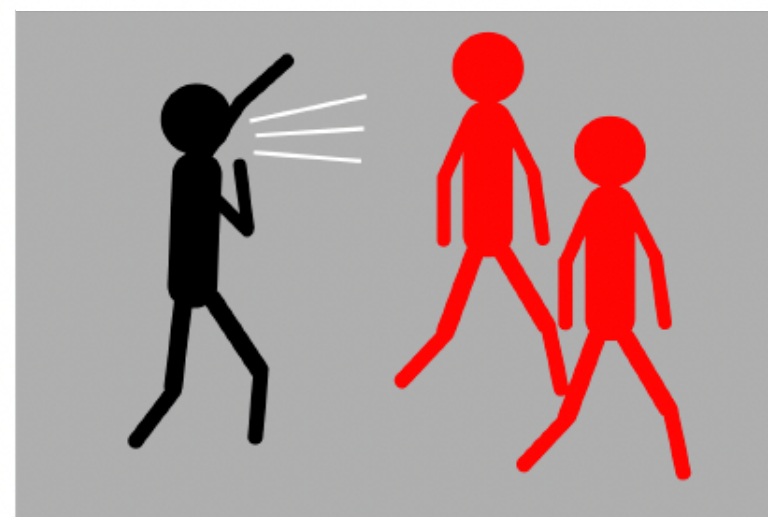
1. Xerunim ri taq säq ri xar



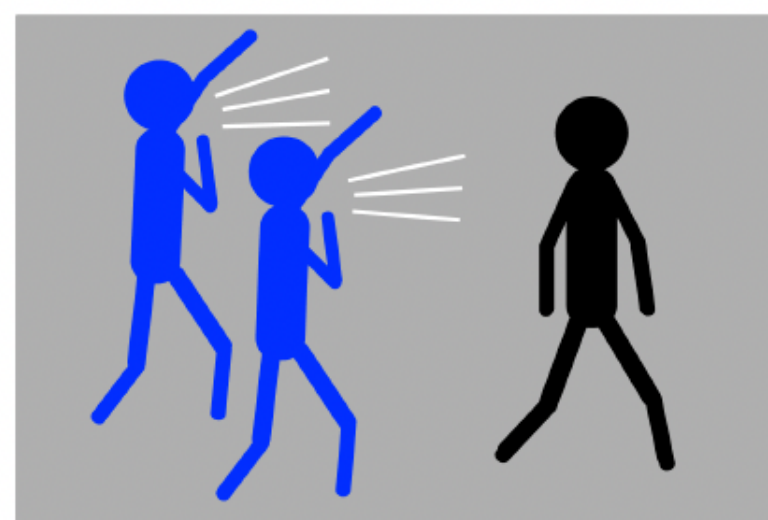
2. Ri taq [xar]<sub>A</sub> xkich'äy [ri]<sub>B</sub> käq



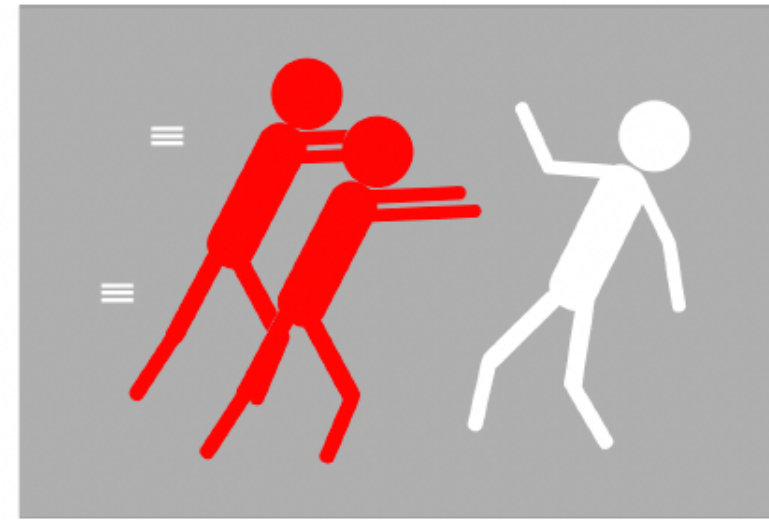
3. [Xkinim]<sub>C</sub> ri q'ëq ri taq käq



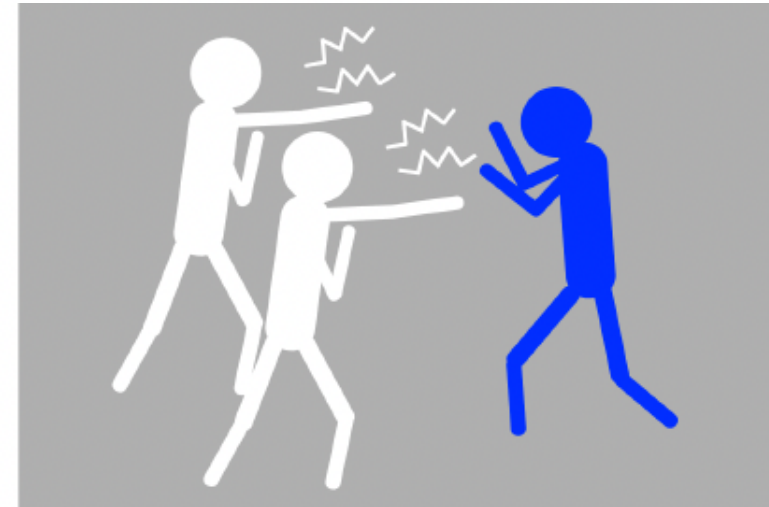
4. Ri q'ëq xkoyoj [ri taq käq]<sub>D</sub>



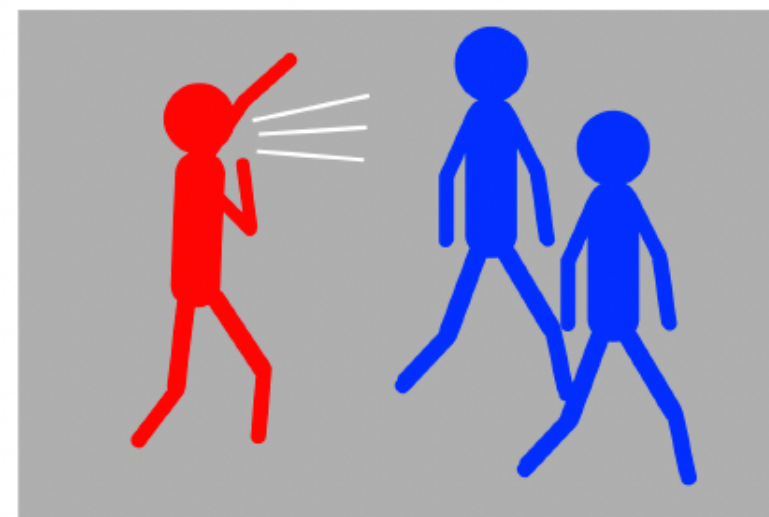
5. [Xeroyoj ri q'ëq]<sub>E</sub> ri säq



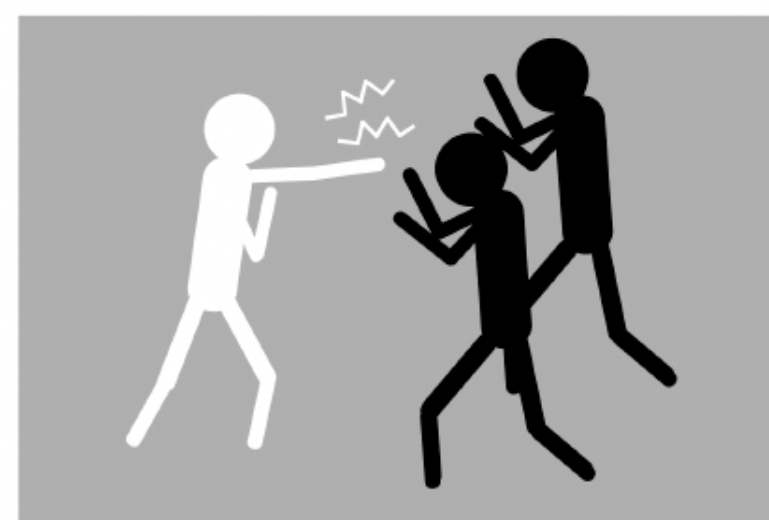
6. Xkich'äy [ri xar ri taq säq]<sub>F</sub>



7. [Ri taq q'ëq]<sub>G</sub> xeroyoj [ri säq]<sub>H</sub>



8. [Ri käq xeruch'äy ri taq xar]<sub>I</sub>



# Assignment (b)

9. Ri taq säq xkinim ri q'ëq

# Assignment (b)

## 9. Ri taq säq xkinim ri q'ëq



## Assignment (b)

10. **Xekich'äy ri taq xar ri taq käq**

## Assignment (b)



10. Xekich'äy ri taq xar ri taq käq

# Assignment (b)

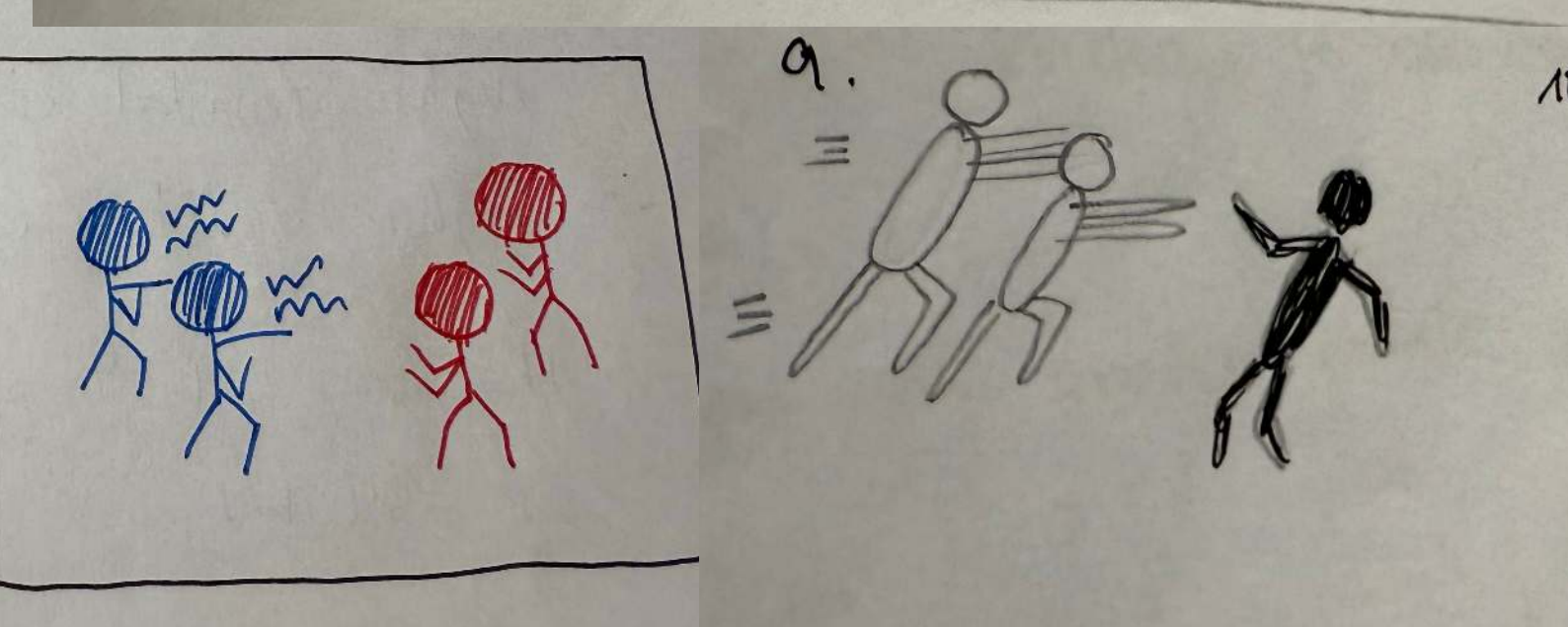
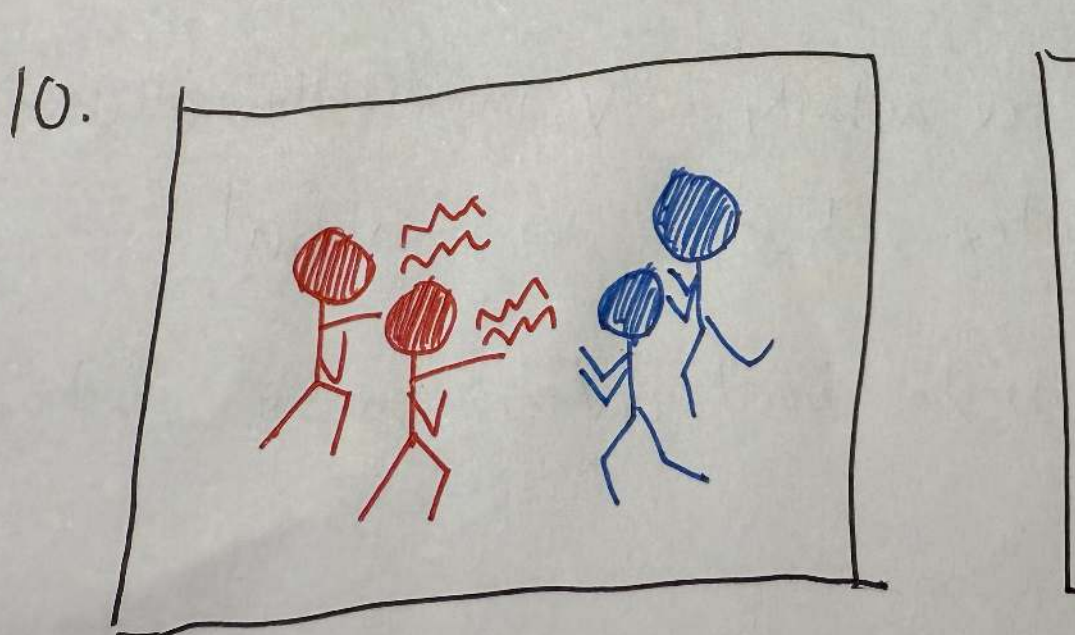
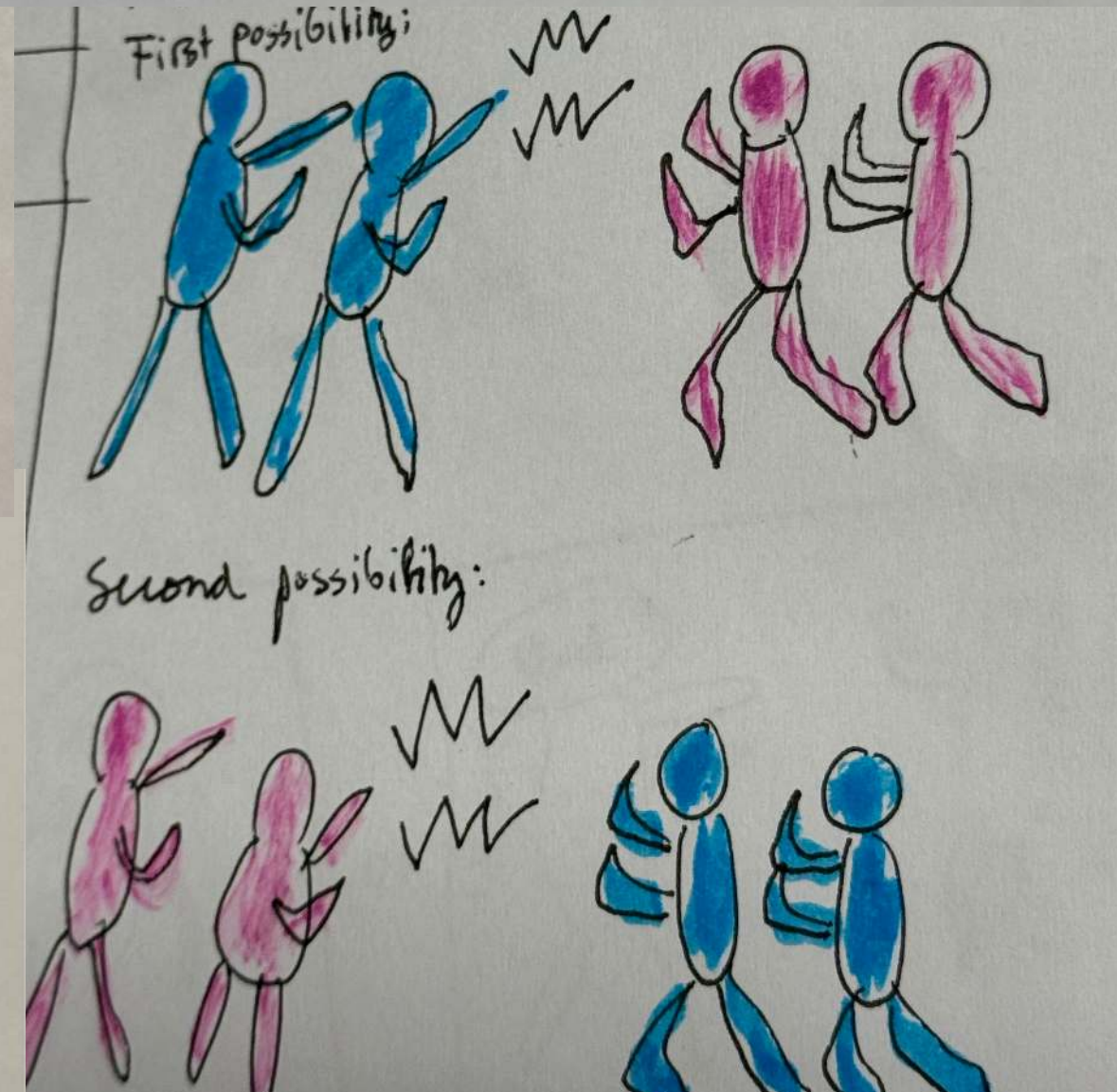
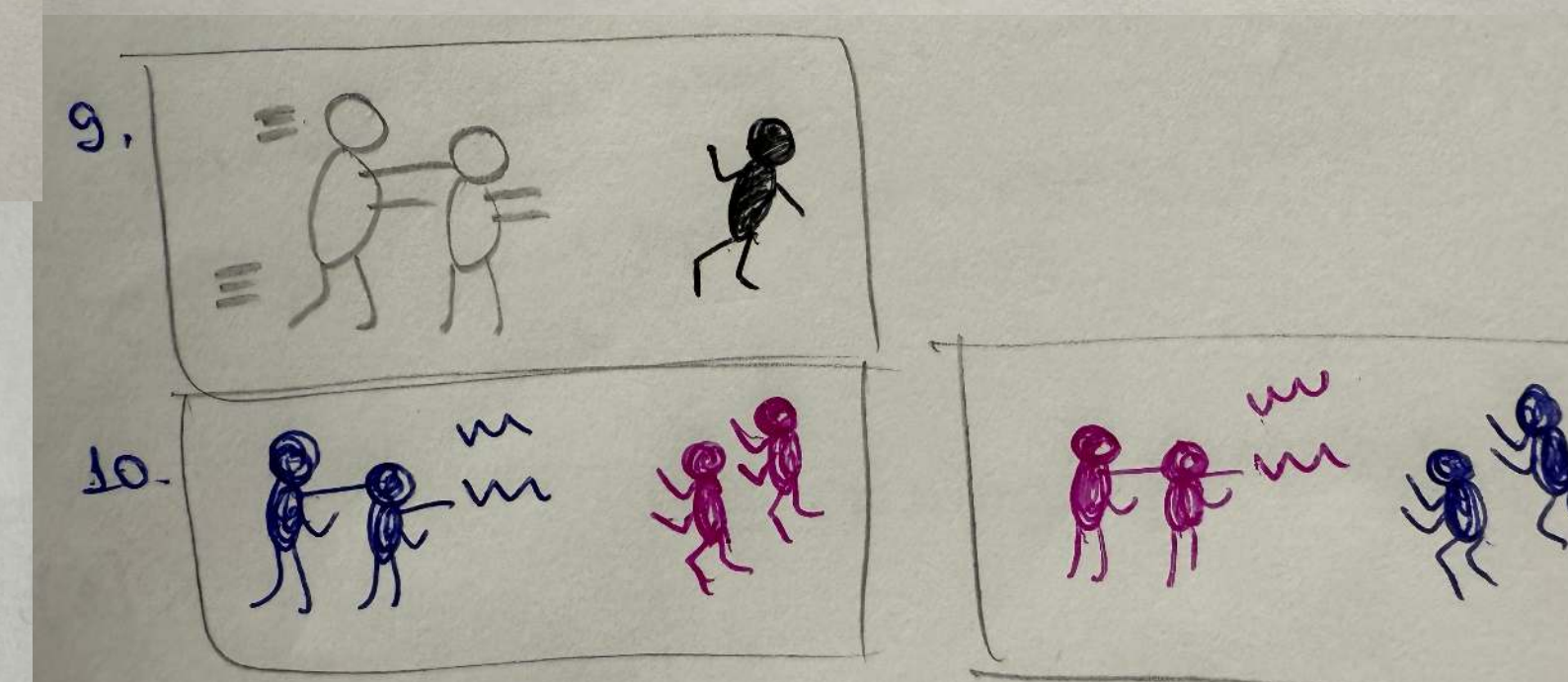
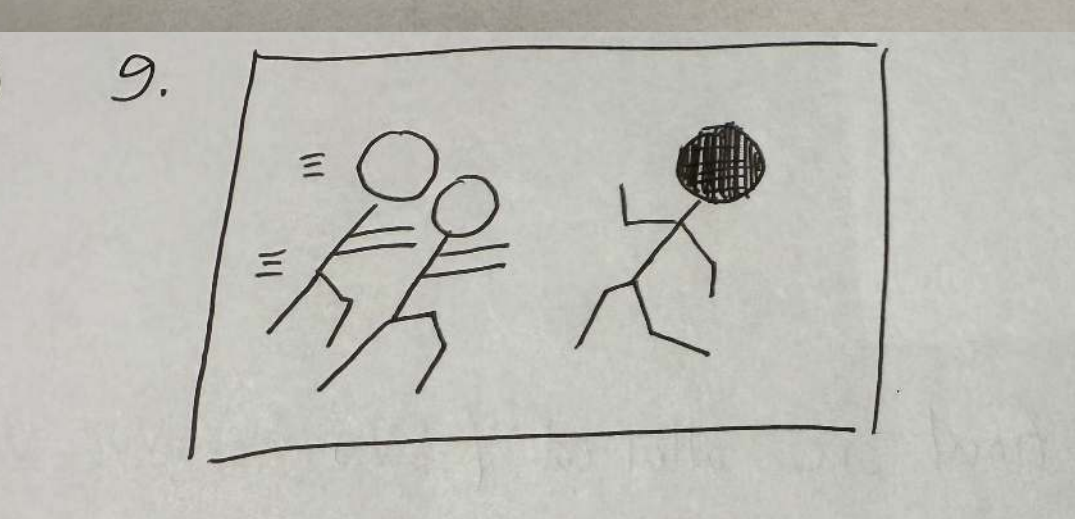
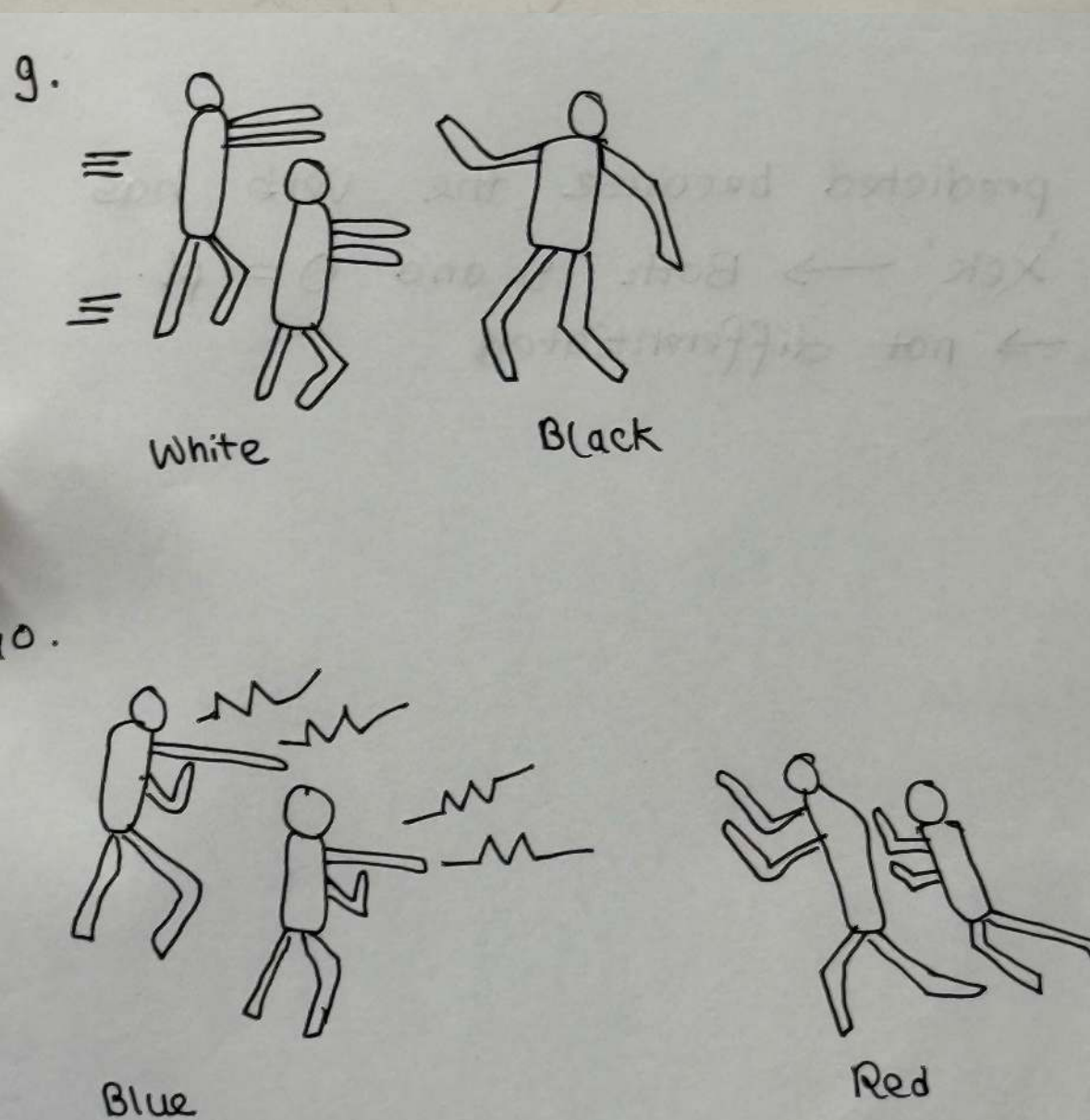
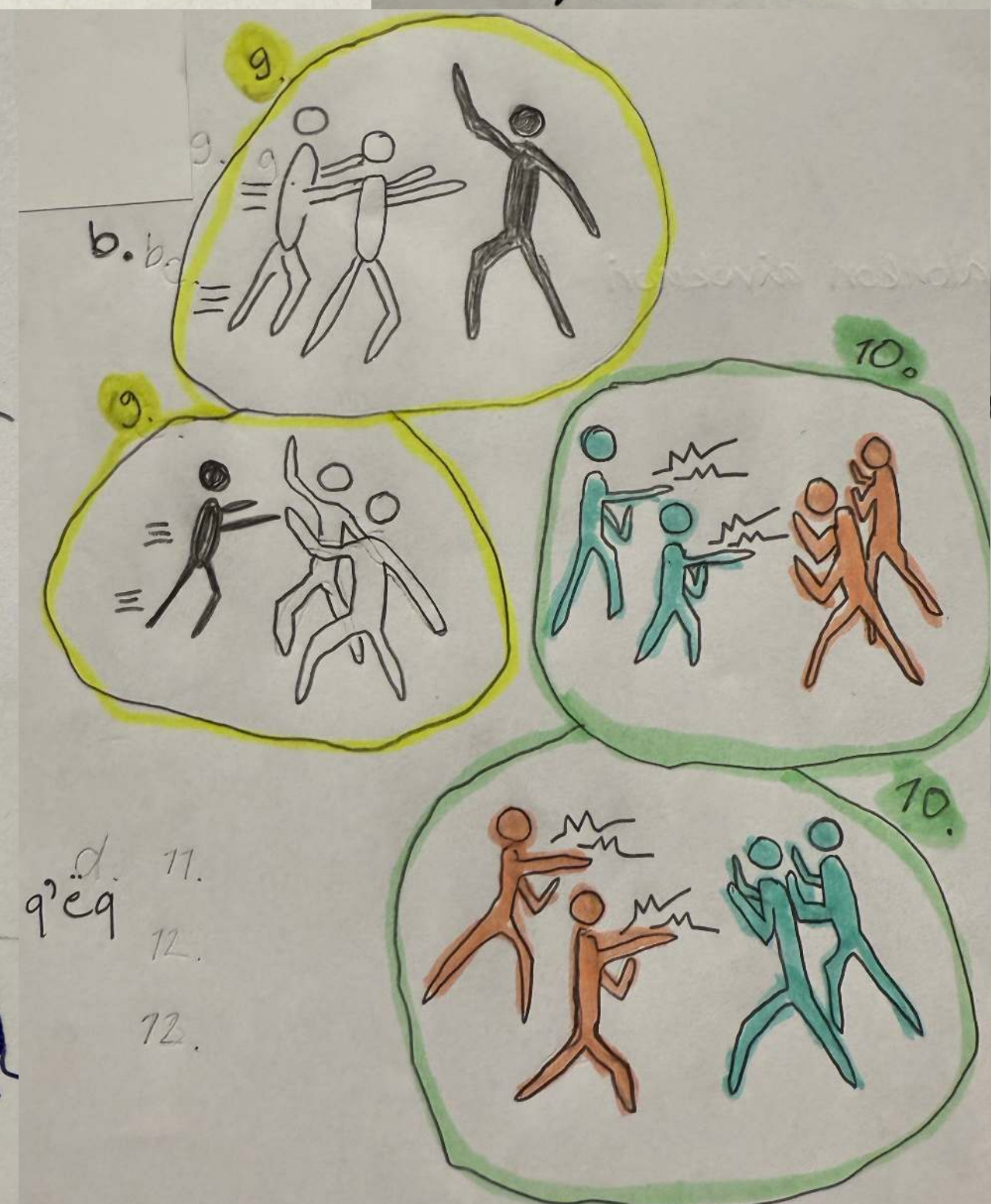
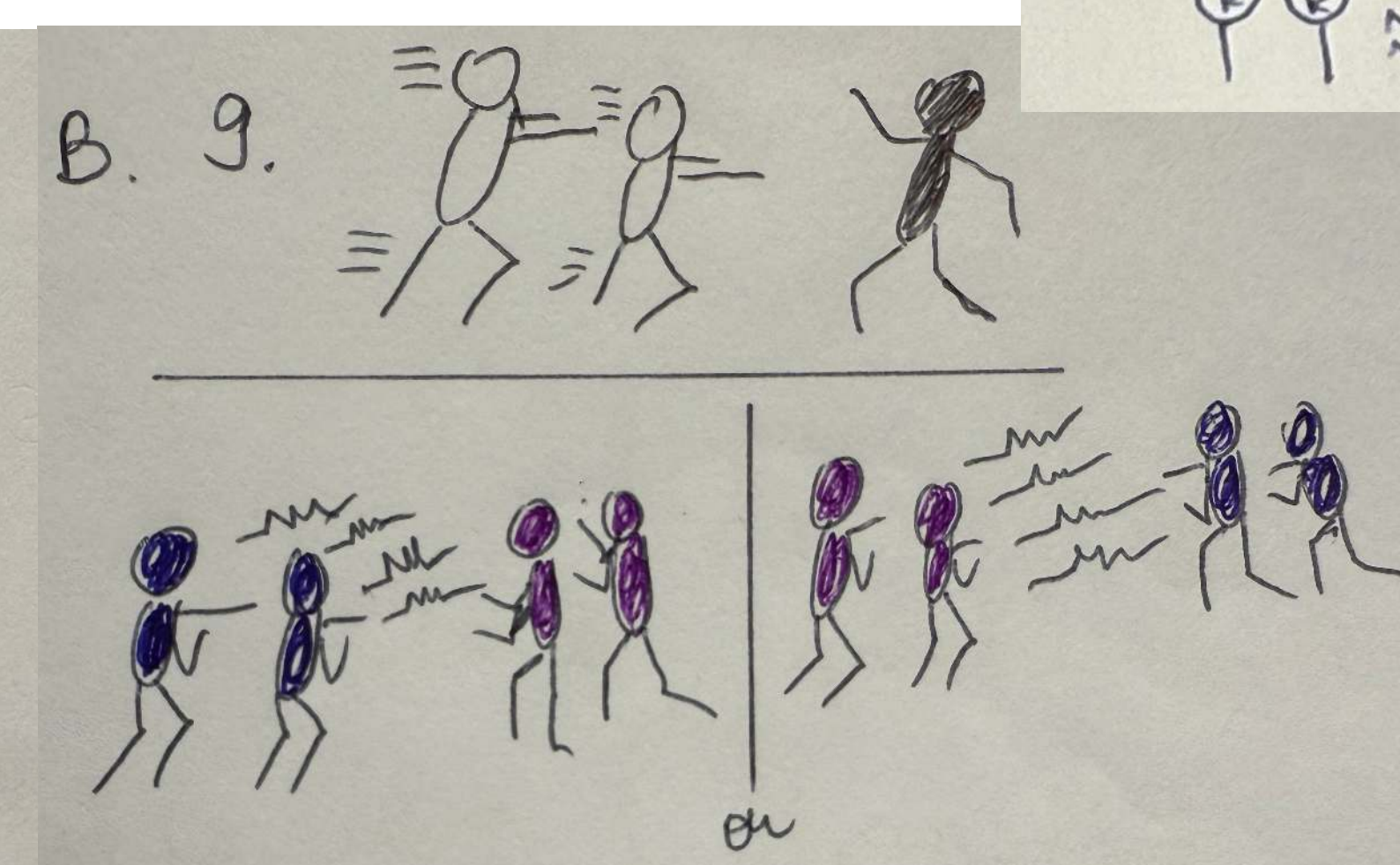
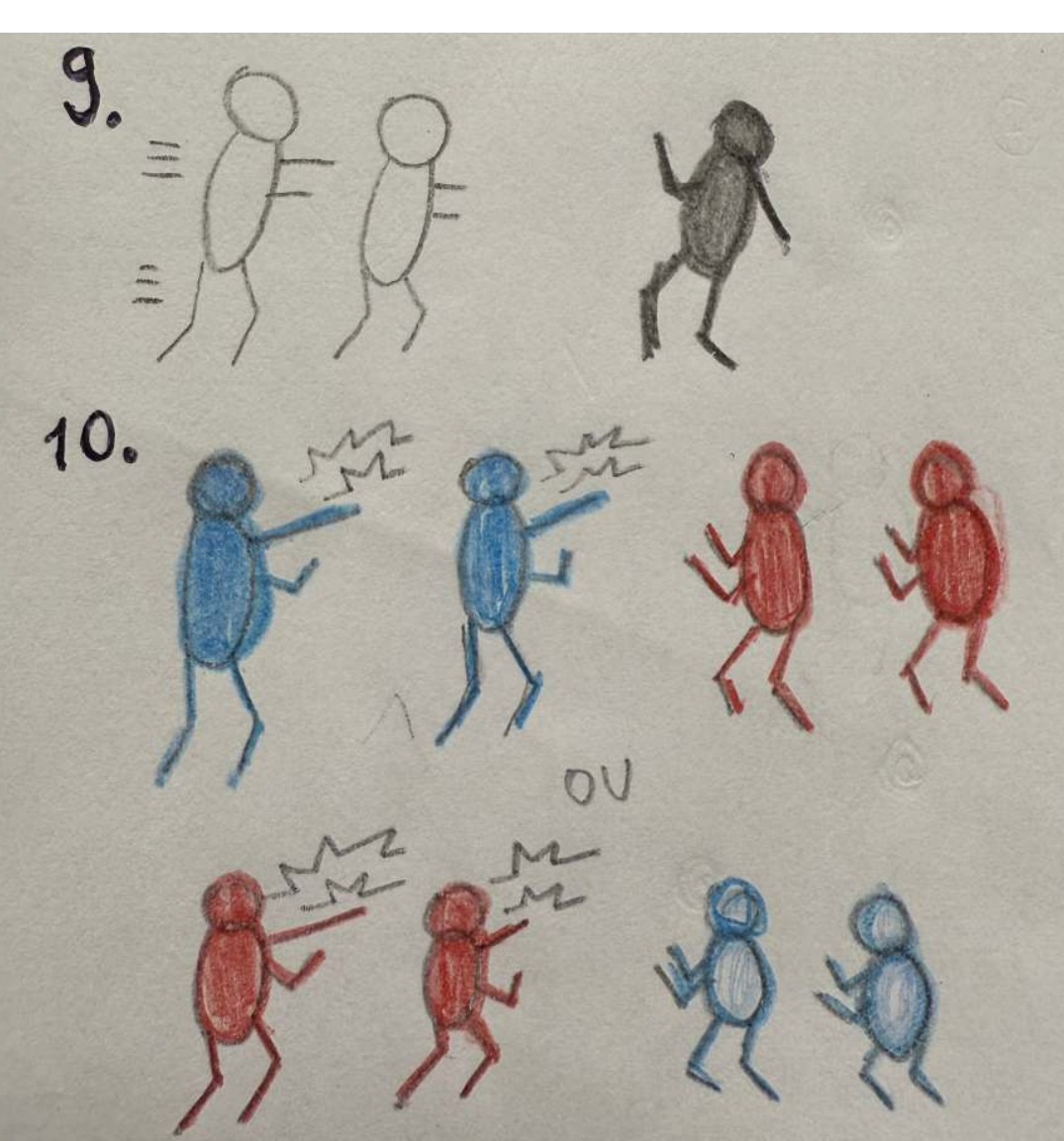
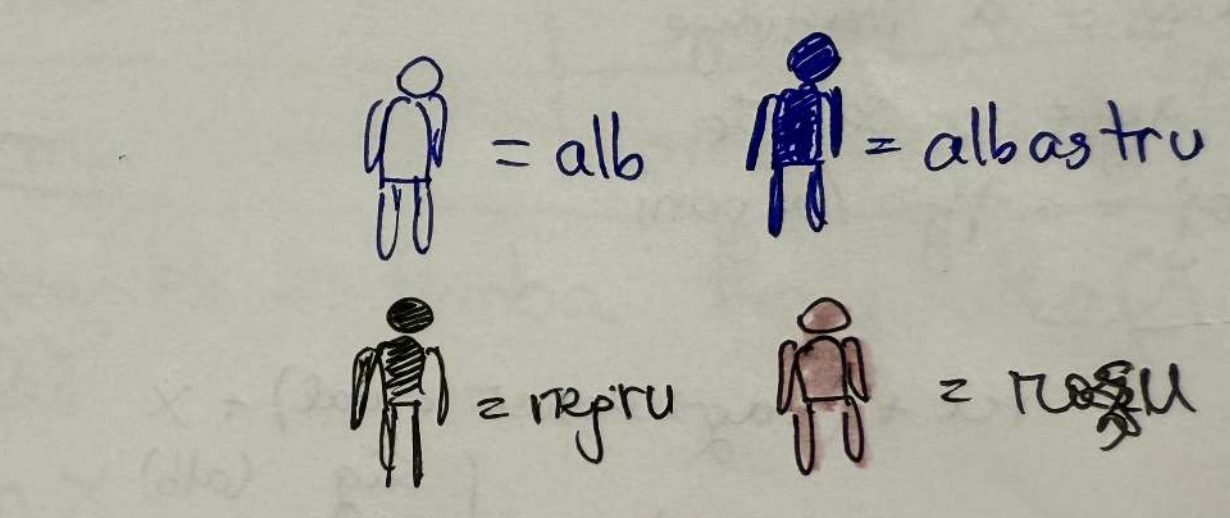
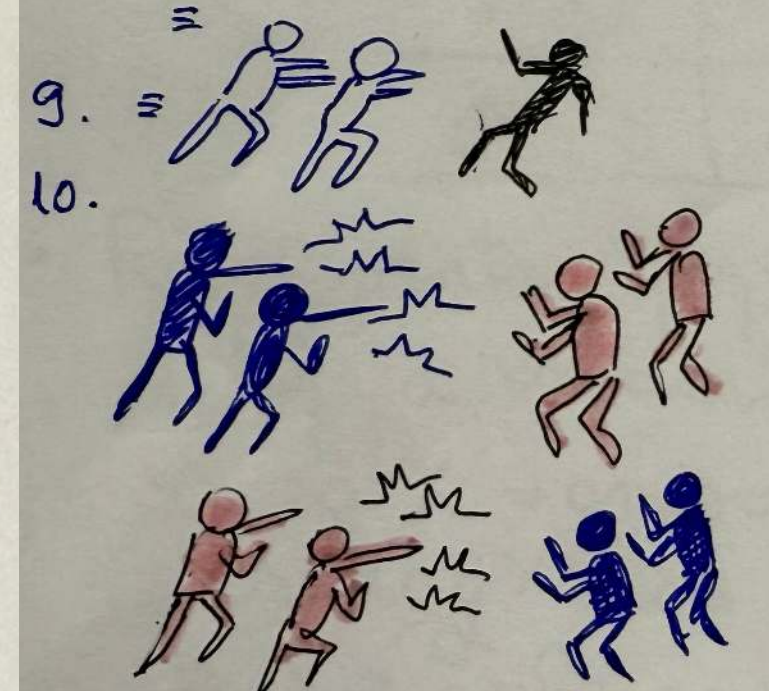
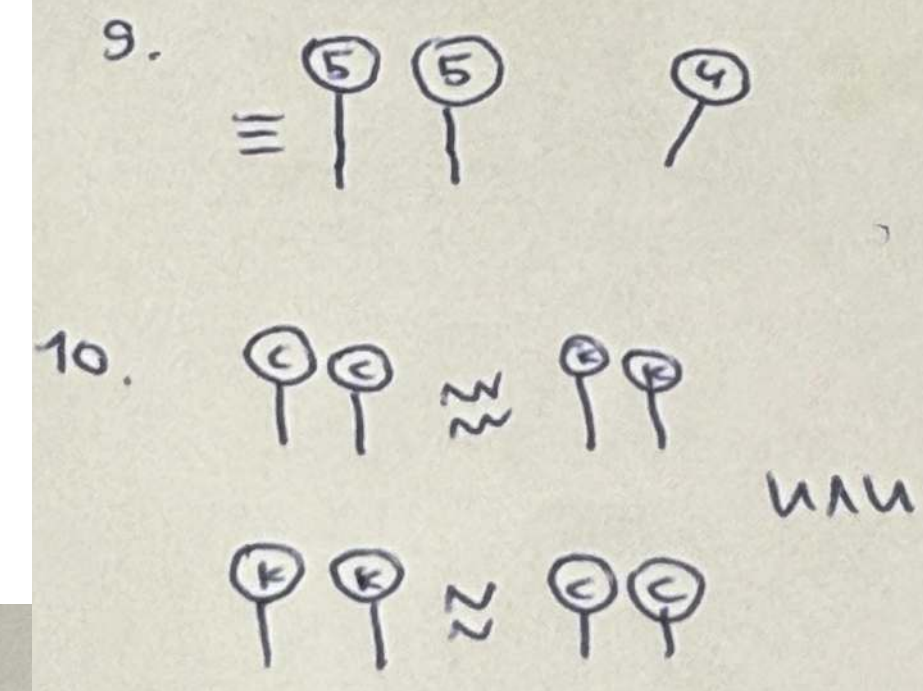


# 10. Xekich'äy ri taq xar ri taq käq



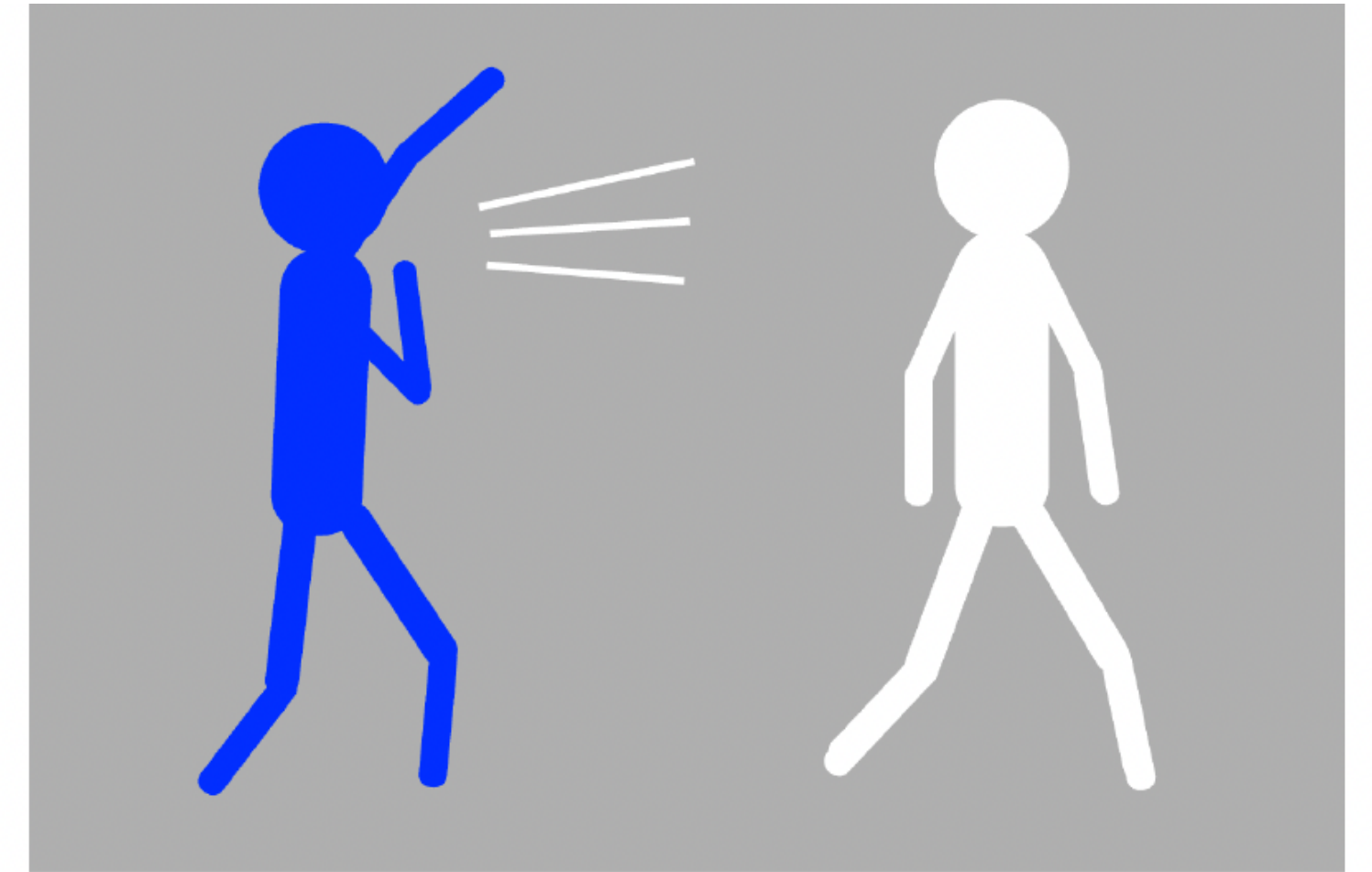
# Drawing gallery

# Drawing gallery



(oranžová = červená)

# Assignment (c)



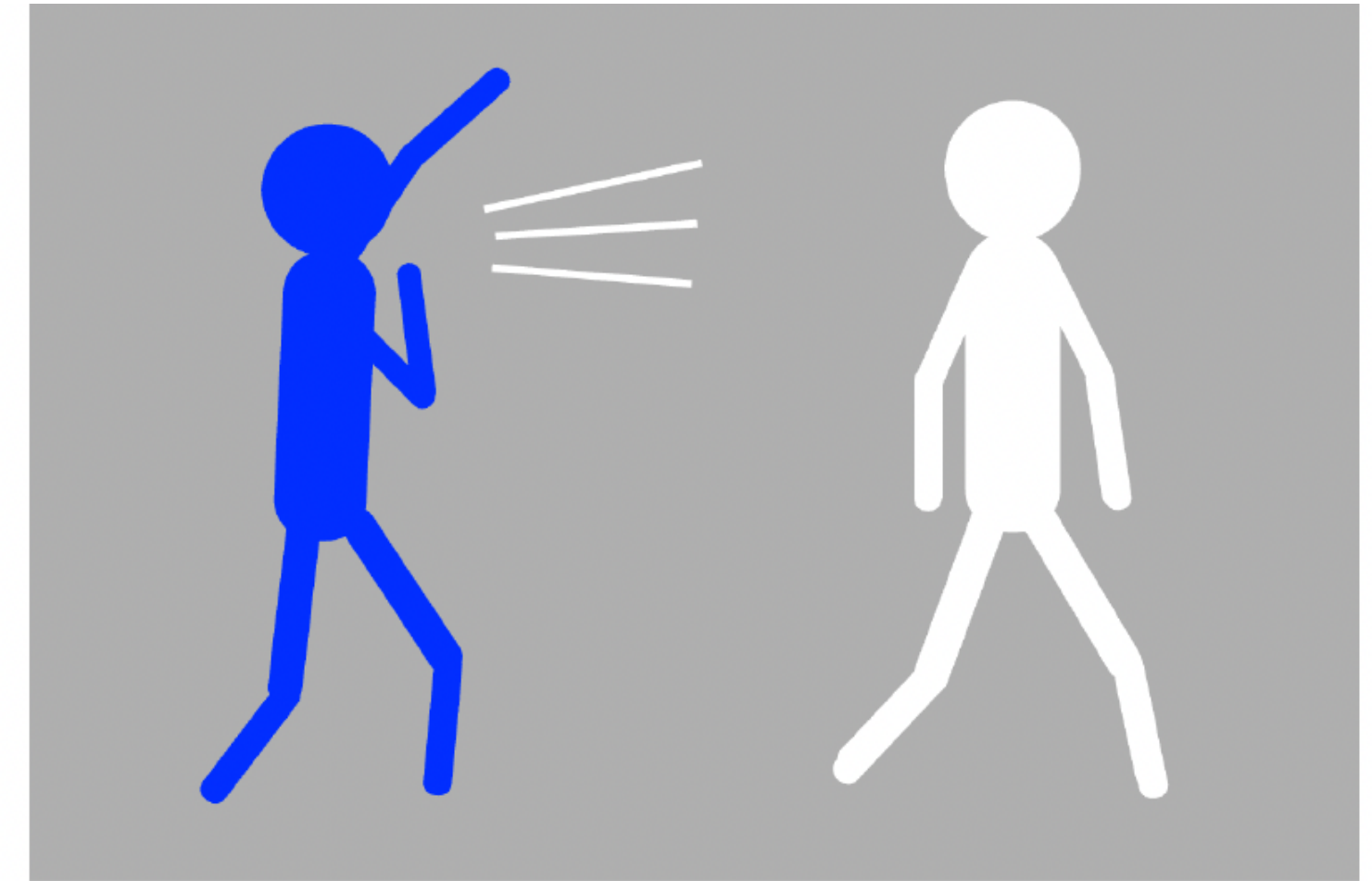
## Assignment (c)

**Xroyoj ri säq ri xar**

**Xroyoj ri xar ri säq**

**Ri xar xroyoj ri säq**

**Ri säq xroyoj ri xar**



## Assignment (d)

		Frontal Cortex (activity)	Auditory Cortex (activity)
11	Xeruuq'etey ri kääq ri taq q'ëq		
12	Xerachik'aj ri taq säq ri xar		
13	Ri taq q'ëq xekitz'ët ri taq säq		

## Assignment (d)

		Frontal Cortex (activity)	Auditory Cortex (activity)
11	Xeruuq'etey ri kääq ri taq q'ëq	higher	higher
12	Xerachik'aj ri taq säq ri xar	lower	higher
13	Ri taq q'ëq xekitz'ët ri taq säq	?	lower

## Assignment (d)

		Frontal Cortex (activity)	Auditory Cortex (activity)
11	Xeruuq'etey ri kääq ri taq q'ëq	higher	higher
12	Xerachik'aj ri taq säq ri xar	lower	higher
13	Ri taq q'ëq xekitz'ët ri taq säq	?	lower

Cannot tell if it's  
**SVO** or **OSV**

# Who graded your papers?

Ákos Blaskovics

Elysia Warner



Dan-Mircea  
Mirea (me)

Alexander  
Piperski

# Your questionnaire ratings

You rated Problem 5 the...

# Your questionnaire ratings

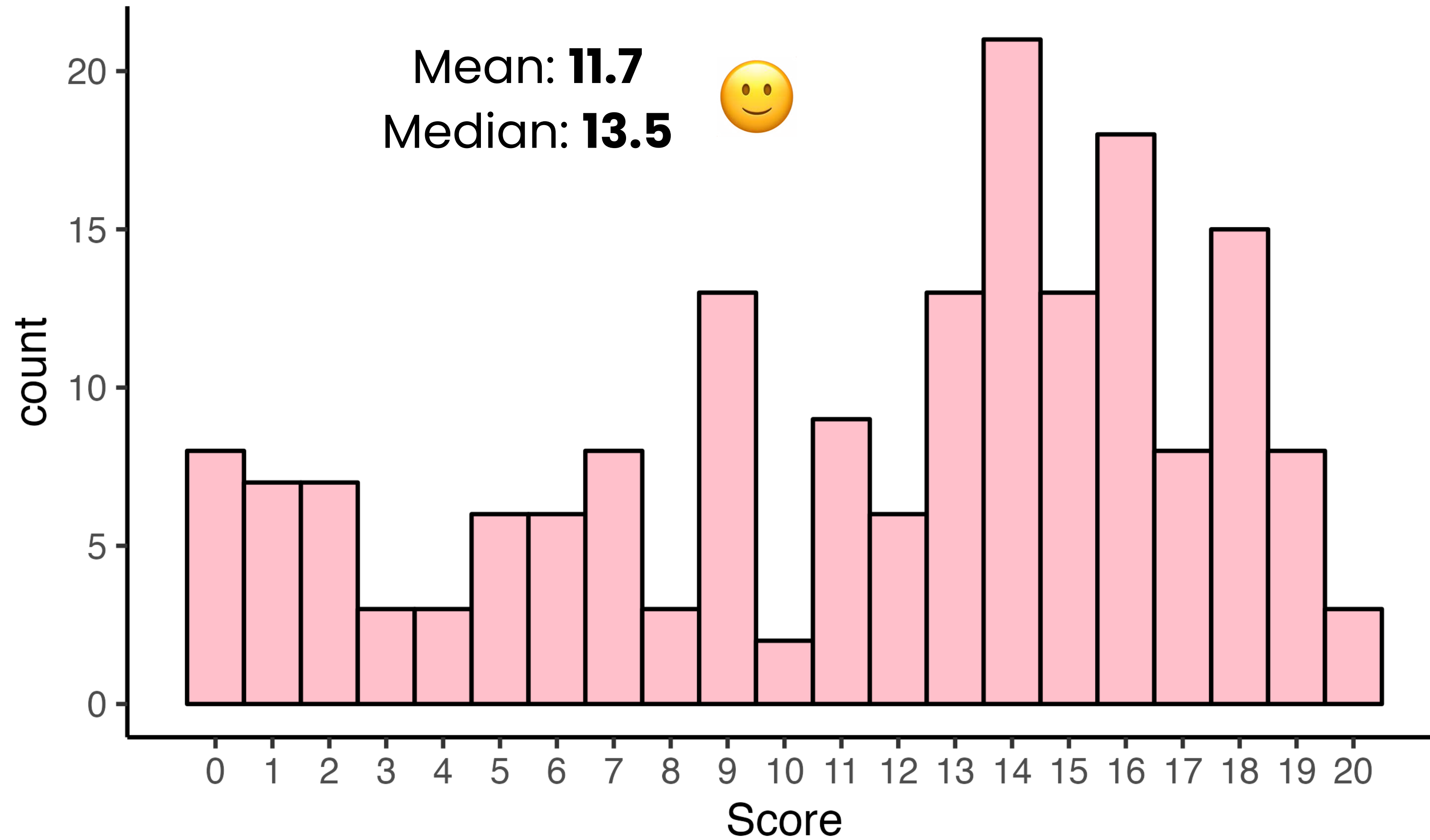
You rated Problem 5 the...

**#2** easiest (66 votes, 33.7%)

**#3** hardest (40 votes, 19.8%)

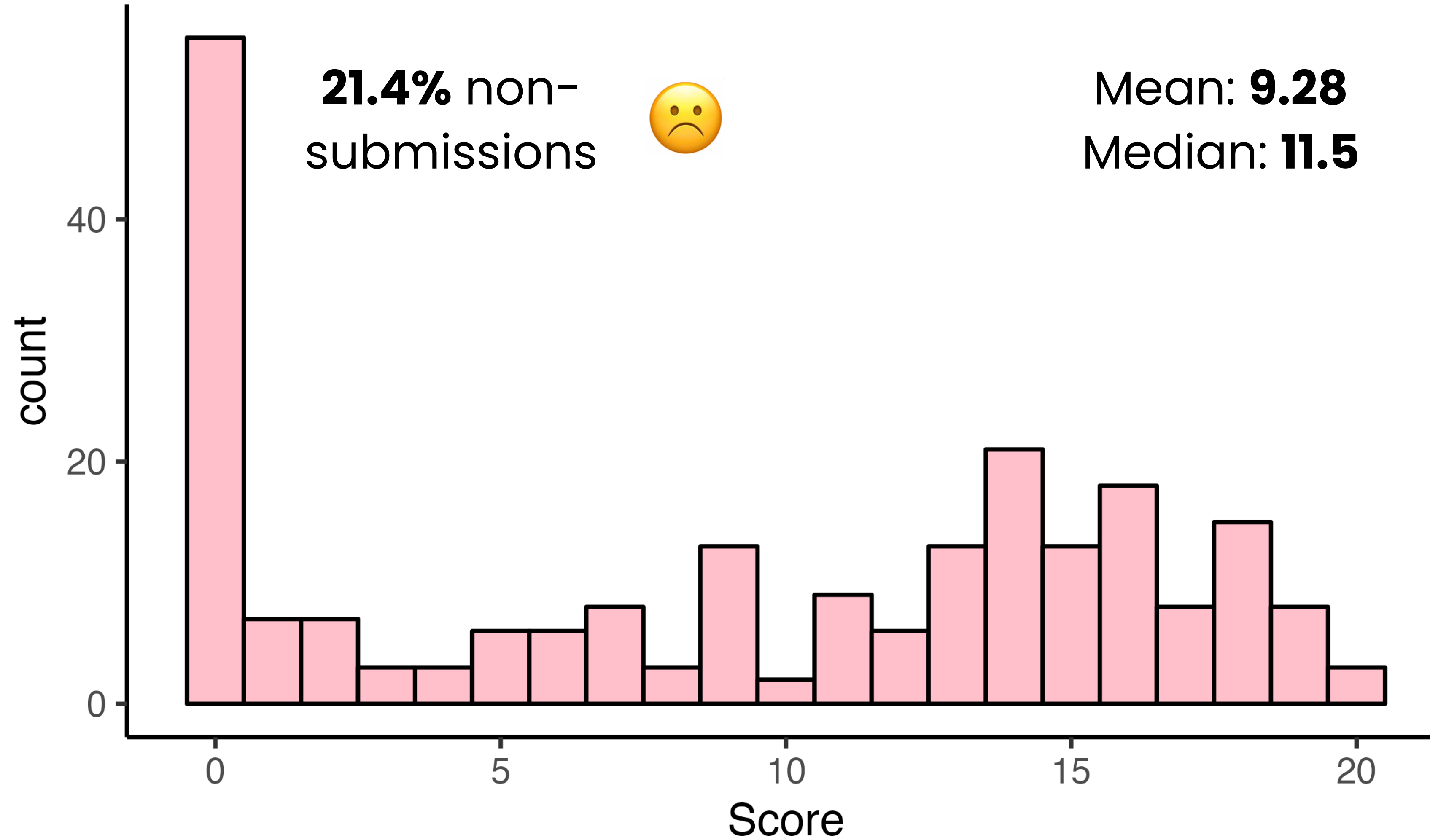
# Results

Without non-submissions



# Results

With non-submissions



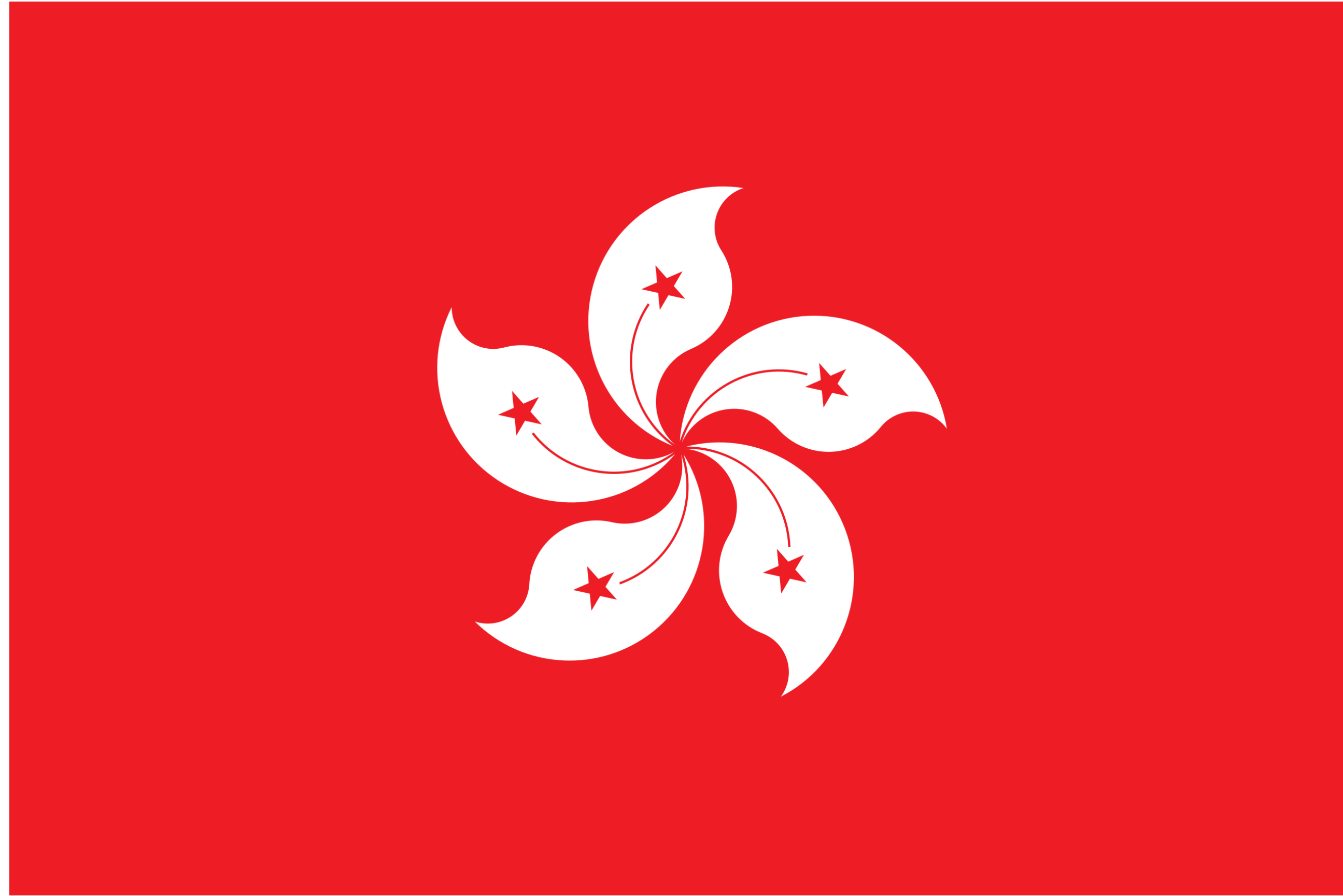
**21.4%** non-submissions



Mean: **9.28**  
Median: **11.5**

So 3rd hardest/  
easiest

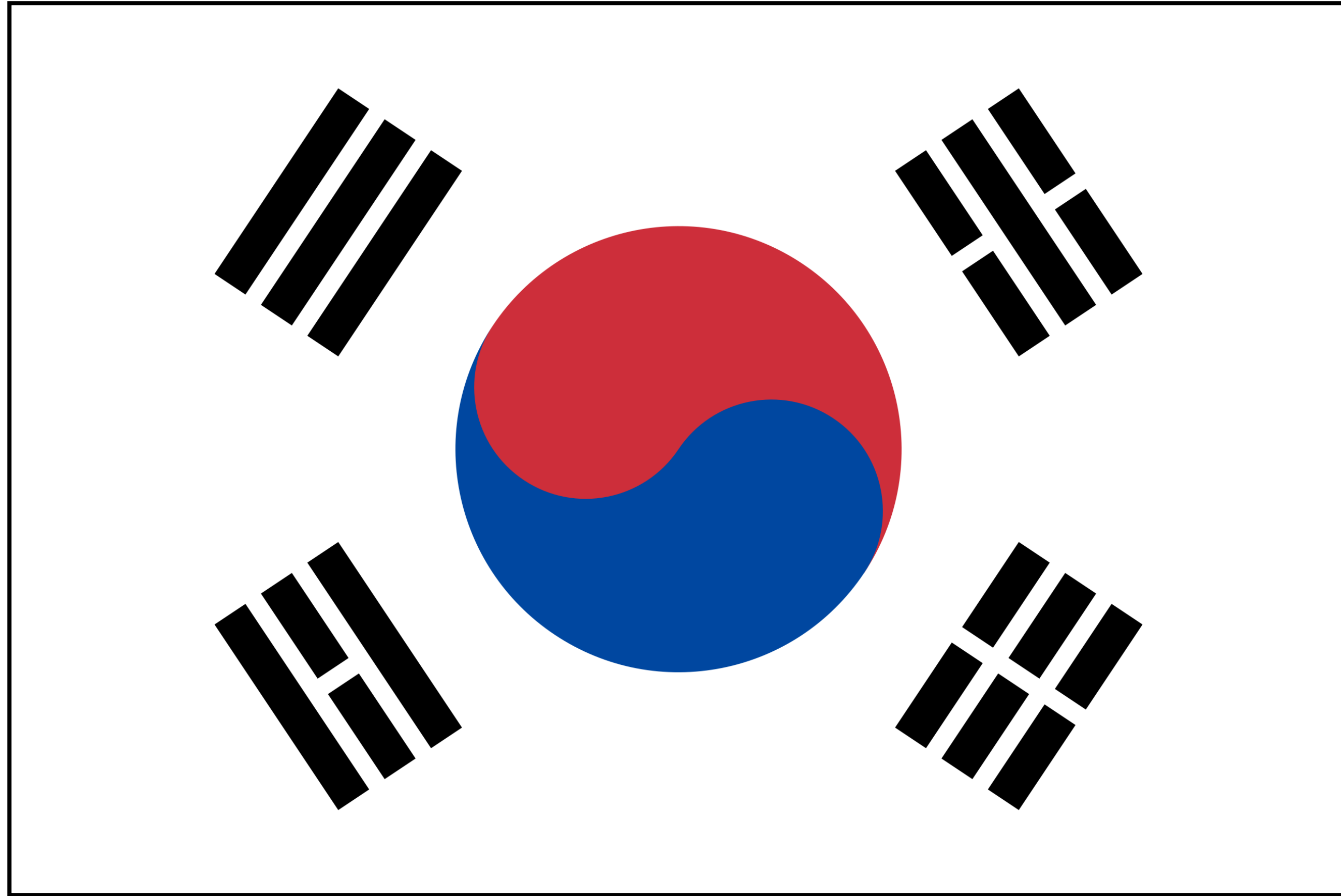
**And the best solution goes to...**



 **Ji Shu Ching** 

Hong Kong

...and the **second best** solution goes to...



 **Jaehyun Lee** 

South Korea

# IOI interviews – today!

**Sign up here:**

