

## P2: Gèèmg (Gaahmg; Gaam)

It's another possession problem: Now with tones!

David Hultman

IOL 2025, Taipei

# The grading group!

I would like to thank **Aleksejs Peguševs**, **Daniel Rucki**, **Kazune Sato**, and **Shinjini Ghosh** of the jury, who in addition to myself, graded your solutions to this problem.

# The grading group!

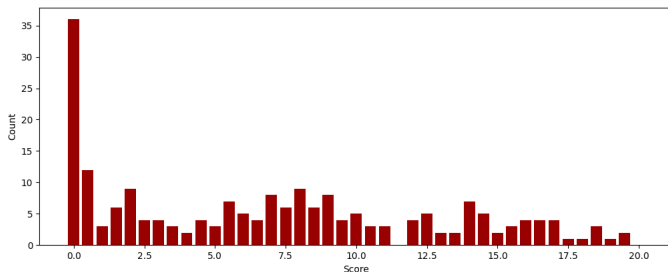
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204 out of 227 participants submitted an answer to P2.

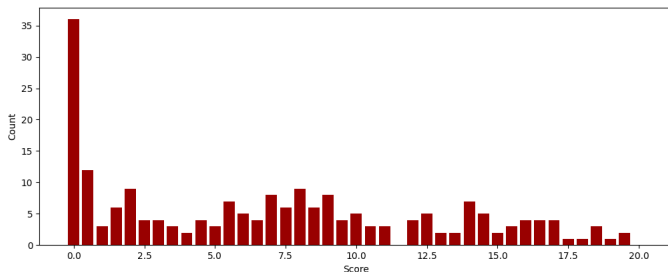
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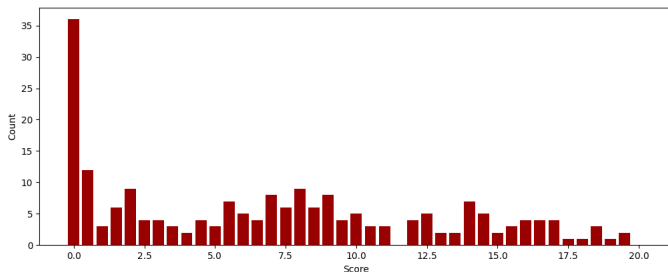
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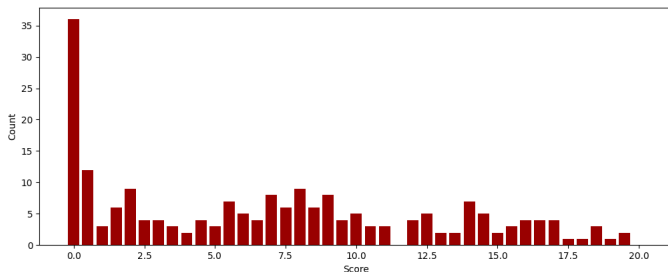
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- ▶ The average is 6.91

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The distribution of their scores is as follows:



- ▶ The median score is 6.75
- ▶ The average is 6.91
- ▶ No perfect score...



# Introduction to the solution

Now how might one solve this problem?

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ā fñdóg, á máámààd, á tááðà, áðág ūyùg, āg pèbārēēg, āg máàm, dṣ̄r  
ìinī, ē ìl, ē pēbārēēg, ēg ìlōg, ēg tááðàd, gùùr òyèn, gùùrììg ónòg, ó ābéé,  
ō bō̄ràà, ō ìlòg, ōg tùndùlīg, ōg mō̄ðó̄d, tṣ̄l ùùn, tṣ̄lààg ínìgī

? ? ?

*my aunts, his horn, your<sub>sg</sub> anchor, my grandmother, our ribs, his hammer,  
my grindstones, their grandmothers, your<sub>pl</sub> grandfathers, my cheeks, your<sub>sg</sub>  
horns, their horns, your<sub>sg</sub> uncle, our grindstone, your<sub>pl</sub> elbows, his ribs, your<sub>sg</sub>  
shoulder, his anchors, our aunt, your<sub>pl</sub> dogs*

# Types of possession

my aunts, his horn, your<sub>sg</sub> anchor, my grandmother, our ribs, his hammer, my grindstones, their grandmothers, your<sub>pl</sub> grandfathers, my cheeks, your<sub>sg</sub> horns, their horns, your<sub>sg</sub> uncle, our grindstone, your<sub>pl</sub> elbows, his ribs, your<sub>sg</sub> shoulder, his anchors, our aunt, your<sub>pl</sub> dogs

# Types of possession

Family	Body parts	Other
my aunts	his horn	your <sub>sg</sub> anchor
my grandmother	our ribs	his hammer
their grandmothers	my cheeks	my grindstones
your <sub>pl</sub> grandfathers	your <sub>sg</sub> horns	our grindstone
your <sub>sg</sub> uncle	their horns	his anchors
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- Possession of family terms and/or body parts is often special.

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our aunt	your <sub>pl</sub> elbows	your <sub>pl</sub> dogs
	his ribs	
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- ▶ Possession of family terms and/or body parts is often special.
- ▶ So too in Gaahmg.

# Types of possession

ā fīndég, á máámààd, á tááǎà, áǎág ūyùg, āg pèbārēēg, āg máàm, dṣṣr  
ìinī, ē îl, ē pēbārēēg, ēg ìlāg, ēg tááǎàd, gùùr āyèn, gùùrìig éng, ó ābéé, ɔ  
bṣṣràà, ɔ ìlāg, ɔg tùndùlīg, ɔg māǎǎǎd, tṣṣl ùùn, tṣṣlààg ínìgī



# Types of possession

ā fīndóg, á máámààd, á tááðà, āg pèbārēēg, āg máàm, ē îl, ē pēbārēēg, ēg  
ìlāg, ēg tááðàd, ́ ābéé, ̄ bōràà, ̄ ìlāg, ̄g tūndūlīg, ̄g mōāðāā  
áðág ūyùg, q̄ōr ìinī, gùùr āyèn, gùùrīg ánèg, t̄él úùn, t̄élààg ínigī

# Inalienable possession

ā f̃ndég, á máámààd, á tááðà, āg pèbàrēēg, āg máàm, ē îl, ē pēbārēēg, ēg  
ìlōg, ēg tááðàd, ́ ābéé, ̄ bōràà, ̄ ìlòg, ̄g tùndùlīg, ̄g mōōðōōd

? ? ?

my aunts, his horn, my grandmother, our ribs, their grandmothers,  
your<sub>pl</sub> grandfathers, my cheeks, your<sub>sg</sub> horns, their horns, your<sub>sg</sub> uncle,  
your<sub>pl</sub> elbows, his ribs, your<sub>sg</sub> shoulder, our aunt, your<sub>pl</sub> dogs

# Inalienable possession

ā f̄ndóg = my cheeks

á máámààd = my aunts

á tááðà = my grandma

ó ābéé ?

ō bōràà ?

ō ìlòèg = your<sub>sg</sub> horns

ē ìl = his horn

ē pēbārēēg = his ribs

āg pēbārēēg = our ribs

āg máàm = our aunt

ōg tūndùlīg ?

ōg mōōðóōd ?

ēg ìlōēg = their horns

ēg tááðàd = their grandmas

your<sub>sg</sub> shoulder; your<sub>sg</sub> uncle; your<sub>pl</sub> grandpas; your<sub>pl</sub> elbows

# Inalienable possession

ā fōndóg = my cheeks  
á máámààd = my aunts  
á tááðà = my grandma

ó ābéé ?  
ō bōōràà ?  
ō ìlèèg = your<sub>sg</sub> horns

ē ìl = his horn  
ē pēbārēēg = his ribs

āg pēbārēēg = our ribs  
āg máàm = our aunt

ōg tūndùlīg ?  
ōg mōōðōād ?

ēg ìlōēg = their horns  
ēg tááðàd = their grandmas

How to distinguish *your<sub>sg</sub> shoulder* and *your<sub>sg</sub> uncle*?

# Inalienable possession

ā fōndóg = my cheeks  
á máámààd = my aunts  
á tááǎà = my grandma

ó ābéé ?  
ō bōōràà ?  
ō ìlǎ̀g = your<sub>sg</sub> horns

ē ìl = his horn  
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āg pēbārēēg = our ribs  
āg máàm = our aunt

ōg tūndùlīg ?  
ōg mōōǎǎd ?

ēg ìlōg = their horns  
ēg tááǎàd = their grandmas

How to distinguish *your<sub>sg</sub> shoulder* and *your<sub>sg</sub> uncle*?

Singular pronouns have high tone before family terms. (With an exception noted in the assignments.)

# Inalienable possession

ā f̄ndóg = my cheeks

á máámààd = my aunts

á tááǎà = my grandma

ó ābéé = your<sub>sg</sub> uncle

ō bōōràà = your<sub>sg</sub> shoulder

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ā fōndóg = my cheeks

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ē pēbārēēg = his ribs

āg pèbàrēēg = our ribs

āg máàm = our aunt

ōg tùndùlīg ?

ōg mōōǎǎd ?

ēg ìlōg = their horns

ēg tááǎàd = their grandmas

Now how do we distinguish *your<sub>pl</sub> grandpas* and *your<sub>pl</sub> elbows*?

# Inalienable possession

ā fōndóg = my cheeks

á máámààd = my aunts

á tááǎà = my grandma

ó ābéé = your<sub>sg</sub> uncle

ō bōōràà = your<sub>sg</sub> shoulder

ō ílǎǎg = your<sub>sg</sub> horns

ē íl = his horn

ē pēbārēēg = his ribs

āg pēbārēēg = our ribs

āg máàm = our aunt

ōg tūndùlīg ?

ōg mōōǎǎd ?

ēg ílōōg = their horns

ēg tááǎàd = their grandmas

Now how do we distinguish *your<sub>pl</sub> grandpas* and *your<sub>pl</sub> elbows*?

Plural nouns normally end in -g (like the pronouns).



# Inalienable possession

ā f̄ndóg = my cheeks  
á **máámààd** = my aunts  
á tááðà = my grandma

ó ābéé = your<sub>sg</sub> uncle  
ō bōōràà = your<sub>sg</sub> shoulder  
ō ílèèg = your<sub>sg</sub> horns

ē ìl = his horn  
ē pēbārēēg = his ribs

āg pèbàrēēg = our ribs  
āg máàm = our aunt

ōg tūndùlīg ?  
ōg **mōōðóōd** ?

ēg ìlōg = their horns  
ēg **tááðàd** = their grandmas

Now how do we distinguish *your<sub>pl</sub> grandpas* and *your<sub>pl</sub> elbows*?

However, it seems that plural family terms end in *-d*.

# Inalienable possession

ā fōndóg = my cheeks

á máámààd = my aunts

á tááǎà = my grandma

ó ābéé = your<sub>sg</sub> uncle

ō bōràà = your<sub>sg</sub> shoulder

ō ìlèèg = your<sub>sg</sub> horns

ē ìl = his horn

ē pēbārēēg = his ribs

āg pèbārēēg = our ribs

āg máàm = our aunt

ōg tūndùlīg = your<sub>pl</sub> elbows

ōg mōōǎǎd = your<sub>pl</sub> grandpas

ēg ìlōg = their horns

ēg tááǎàd = their grandmas

# Alienable possession

So what about the remaining words?

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áďág ūyùg, q̣ṣṣr íinī, gùùr āyèṇ, gùùrììg éṇèg, ʈéèl úùn, ʈéélààg ínìgī

? ? ?

your<sub>sg</sub> anchor, his hammer, my grindstones, our grindstone, his anchors,  
your<sub>pl</sub> dogs

# Alienable possession

áǎág ūyùg, ɖǎ̃r ììní, gùùr ǎyǎn, gùùrììg ǎnǎg, ɬéèl úùn, ɬéélààg ínìgì

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? ? ?

your<sub>sg</sub> anchor, his hammer, my grindstones, our grindstone, his anchors,  
your<sub>pl</sub> dogs

- ▶ Unlike the inalienable possession, it's the *second* word that looks similar across these expressions.

# Alienable possession

áǎág ūyùg, ɖǎǎr ììní, gùùr ǎyǎn, gùùrììg ǎnǎg, ʦéèl úùn, ʦéèlààg íìgí

? ? ?

your<sub>sg</sub> anchor, his hammer, my grindstones, our grindstone, his anchors,  
your<sub>pl</sub> dogs

- ▶ Unlike the inalienable possession, it's the *second* word that looks similar across these expressions.
- ▶ The second word is the pronoun, i.e. the opposite word order.

# Alienable possession

áǎág ūyùg, ɖǎ̃r ìnī, gùr ǎyèn, gùrììg ǎnèg, ɖéèl úùn, ɖéèlààg ínìgī

? ? ?

your<sub>sg</sub> anchor, his hammer, my grindstones, our grindstone, his anchors,  
your<sub>pl</sub> dogs

- ▶ Unlike the inalienable possession, it's the *second* word that looks similar across these expressions.
- ▶ The second word is the pronoun, i.e. the opposite word order.
- ▶ Frequencies/plurality:  
áǎág ūyùg = your<sub>pl</sub> dogs; ɖǎ̃r ìnī = his hammer.



# Alienable possession

áǎág ūyùg, ǫǫǫr ììì, gùùr āyèn, gùùrììg éng, ǫéèl úùn, ǫéèlààg ínìg

? ? ?

your<sub>sg</sub> anchor, his hammer, my grindstones, our grindstone, his anchors,  
your<sub>pl</sub> dogs

- ▶ Unlike the inalienable possession, it's the *second* word that looks similar across these expressions.
- ▶ The second word is the pronoun, i.e. the opposite word order.
- ▶ Frequencies/plurality:  
áǎág ūyùg = your<sub>pl</sub> dogs; ǫǫǫr ììì = his hammer.
- ▶ In inalienable pronouns, different vowels correspond to different persons. We can see if the same is true in alienable pronouns.

The alienable vowels are raised versions of their inalienable counterparts.

	1 <sup>st</sup> person	2 <sup>nd</sup> person	3 <sup>rd</sup> person
Alienable	ə	u	i
Inalienable	a	ɔ	ɛ

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This makes the final matches easy:

áǎág ūyùg = your<sub>pl</sub> dogs

gùùr ēyèn = **my** grindstones

ǵèl úùn = **your**<sub>sg</sub> anchor

q̄ṣṣr ìnī = his hammer

gùùrìg ǎnèg = **our** grindstone

ǵéèlààg ínìgī = **his** anchors

# Are we done?

# Are we done?

Not quite...

# Alienable pronouns, again

We still don't fully understand the alienable pronouns.

ɖɔ̃ɔ̃r **ɪ̃nɪ** = his hammer; ʈéélààg **ɪ̃nɪgɪ** = his anchors

Why does *his* have two different forms?

# Alienable pronouns, again

We still don't fully understand the alienable pronouns.

ḑḑḑr **ìṇī** = his hammer; ʈéélààg **ínìgī** = his anchors

Why does *his* have two different forms?

	my	your <sub>sg</sub>	his	our	your <sub>pl</sub>
Singular noun		úùn	ìṇ-ī	āyèn	
Plural noun	ónèg		ínìg-ī		ūyùg



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Why does *his* have two different forms?

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Singular noun		<b>úùn</b>	<b>íin-ī</b>	<b>āyən</b>	
Plural noun	<b>ónə̀g</b>		<b>ínìg-ī</b>	<b>(āyə̀g)</b>	<b>ūyùg</b>

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	my	your <sub>sg</sub>	his	our	your <sub>pl</sub>
Singular noun	?	ùṇn	ùṇ-ī	āyàṇ	?
Plural noun	ánàg	?	ínìg-ī	āyàg	ūyùg

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	my	your <sub>sg</sub>	his	our	your <sub>pl</sub>
Singular noun	ɔ̃n	ún	ín-ī	ɔ̃yən	ūyùn
Plural noun	ɔ̃nəg	únùg	ínìg-ī	ɔ̃yèg	ūyùg

# Ready to try some translations?

	Gaahmg	English
21.	āg bòòrāāg	
22.	ḑṵṵréēg āyàg	
23.	ē bṵṵrààg	
24.	ṵ túndúliìg	
25.	ó máàm	
26.		my grindstone
27.		their cheeks
28.		your <sub>pl</sub> anchor
29.		our uncle
30.		your <sub>sg</sub> dogs

# Ready to try some translations?

	Gaahmg	English
21.	āg bòòrāāg	<i>our shoulders</i>
22.	ḑṵṵréēg āyàg	
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23.	ē bṵṵrààg	<i>his shoulders</i>
24.	ṵ túndúliìg	<i>your<sub>sg</sub> elbows</i>
25.	ó máàm	
26.		<i>my grindstone</i>
27.		<i>their cheeks</i>
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25.	ó máàm	<i>your<sub>sg</sub> aunt</i>
26.		<i>my grindstone</i>
27.		<i>their cheeks</i>
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22.	ḑḑ̄̄rēēg āyàg	<i>our hammers</i>	
23.	ē b̄̄̄rāàg	<i>his shoulders</i>	But wait, what's this?
24.	̄ t́́́ndúliìg	<i>your<sub>sg</sub> elbows</i>	
25.	́ máàm	<i>your<sub>sg</sub> aunt</i>	
26.		<i>my grindstone</i>	
27.		<i>their cheeks</i>	
28.		<i>your<sub>pl</sub> anchor</i>	
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# Body parts, for the last time

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‘ribs’	ē pēbārēēg	āg pēbàrēēg
‘horns’	ō ìlò̀̀g	ēg ìlṑ̀g
‘elbows’	ō túndùlììg	ōg tùndùlììg
‘shoulders’	ē bṑ̀rà̀̀g	āg bṑ̀rà̀̀g

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‘shoulders’	ē bōōrààg	āg bōòràāg

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‘elbows’	ō túndúlììg	ōg tùndùlīīg
‘shoulders’	ē bōōrààg	āg bōòràāg

- ▶ In the left-hand column, there is chaos. But in the right-hand column, every noun has a Low-(Low)-Mid tone pattern.
- ▶ This always happens when the possessor (of a body part) is plural.

# Finishing the translations

	Gaahmg	English
21.	āg bòṛāāg	<i>our shoulders</i>
22.	ḑṵṛéēg āyàg	<i>our hammers</i>
23.	ē bṵṛààg	<i>his shoulders</i>
24.	ṵ túndúliìg	<i>your<sub>sg</sub> elbows</i>
25.	ó máàm	<i>your<sub>sg</sub> aunt</i>
26.		<i>my grindstone</i>
27.		<i>their cheeks</i>
28.		<i>your<sub>pl</sub> anchor</i>
29.		<i>our uncle</i>
30.		<i>your<sub>sg</sub> dogs</i>

# Finishing the translations

	Gaahmg	English
21.	āg bòòrāāg	<i>our shoulders</i>
22.	ḑṵṵréēg āyàg	<i>our hammers</i>
23.	ē bṵṵrààg	<i>his shoulders</i>
24.	ō túndúliìg	<i>your<sub>sg</sub> elbows</i>
25.	ó máàm	<i>your<sub>sg</sub> aunt</i>
26.	<i>gùùr áàn</i>	<i>my grindstone</i>
27.		<i>their cheeks</i>
28.		<i>your<sub>pl</sub> anchor</i>
29.		<i>our uncle</i>
30.		<i>your<sub>sg</sub> dogs</i>



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	Gaahmg	English
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24.	ō túndúliìg	<i>your<sub>sg</sub> elbows</i>
25.	ó máàm	<i>your<sub>sg</sub> aunt</i>
26.	gùùr áàn	<i>my grindstone</i>
27.		<i>their cheeks</i> (ā fāndóg = my cheeks)
28.		<i>your<sub>pl</sub> anchor</i>
29.		<i>our uncle</i>
30.		<i>your<sub>sg</sub> dogs</i>

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24.	ṵ túndúliìg	<i>your<sub>sg</sub> elbows</i>
25.	ó máàm	<i>your<sub>sg</sub> aunt</i>
26.	gùùr áàn	<i>my grindstone</i>
27.	ēg fàndāg	<i>their cheeks</i> (ā fāndág = my cheeks)
28.		<i>your<sub>pl</sub> anchor</i>
29.		<i>our uncle</i>
30.		<i>your<sub>sg</sub> dogs</i>

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26.	gùùr áàn	<i>my grindstone</i>
27.	ēg fàndāg	<i>their cheeks</i>
28.	ṭéèl ūyùn	<i>your<sub>pl</sub> anchor</i>
29.		<i>our uncle</i>
30.		<i>your<sub>sg</sub> dogs</i>

# Finishing the translations

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26.	gùùr áàn	<i>my grindstone</i>
27.	ēg fàndāg	<i>their cheeks</i>
28.	ṭéèl ūyùn	<i>your<sub>pl</sub> anchor</i>
29.	āg ābéé	<i>our uncle</i>
30.		<i>your<sub>sg</sub> dogs</i>

# Finishing the translations

	Gaahmg	English
21.	āg bòṛāāg	<i>our shoulders</i>
22.	ḑṵṛéēg āyàg	<i>our hammers</i>
23.	ē bṵṛààg	<i>his shoulders</i>
24.	ṵ túndúliìg	<i>your<sub>sg</sub> elbows</i>
25.	ó máàm	<i>your<sub>sg</sub> aunt</i>
26.	gùùr áàn	<i>my grindstone</i>
27.	ēg fàndāg	<i>their cheeks</i>
28.	ṭéèl ūyùn	<i>your<sub>pl</sub> anchor</i>
29.	āg ābéé	<i>our uncle</i>
30.	áďág únùg	<i>your<sub>sg</sub> dogs</i>

# Best solution award for problem #2

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Max Fisher-Ayres



UK (Trap-Bath)