

# Lesson 11 — Connecting things

## Problem 1: Evolutionary tree

Construct an evolutionary tree for the following animals based on the following characteristics:

- Animals: Humans, gorillas, rhesus monkey, mouse, frog, tuna, goldfish, owl.
- Characteristics: Mammary glands, Live birth vs hatch from egg, four legs, has tail, lungs vs gills, has hair, can swim, can fly.

## Problem 2: Linguistic tree (Indo-European)

(a) Build a linguistic tree of the listed languages based on the vocabularies provided in the table. Various different answers are accepted as long as you justify your answer well.

(b) Justify your answer to (a).

English	Russian	Spanish	Latin	German	Ancient Greek	Polish	Sanskrit	Dutch
foot	под ( <i>pod</i> ), стопа ( <i>stopa</i> )	pie	<i>pēs</i> , <i>pedis</i>	Fuß	πούς, ποδός ( <i>poús</i> , <i>podós</i> )	podnóże, stopa	padah	fod
one	один ( <i>odin</i> )	uno	unus	eins	εἷς ( <i>eis</i> )	jeden	ekam	een
two	два ( <i>dva</i> )	dos	duo	zwei	δύο ( <i>duo</i> )	dwa	dvi	twee
three	три ( <i>tri</i> )	tres	<i>trēs</i>	drei	τρεῖς ( <i>treîs</i> )	trzy	trayas	drie
four	четыре ( <i>chetyre</i> )	cuatro	kuattuor	vier	τέσσαρες ( <i>tessares</i> )	cztery	chatuhr	vier
ten	десять ( <i>desjat'</i> )	diez	<i>decem</i>	zehn	δέκα ( <i>déka</i> )	dziesięć	dasham	<i>tien</i>
mother	матерь ( <i>materv</i> )	madre	<i>māter</i>	mutter ("muttah")	μήτηρ ( <i>mētēr</i> )	matka	mātṛ-	moeder ("mooder")
father	отец ( <i>otec</i> )	padre	<i>pater</i>	vater ("fattah")	πατήρ ( <i>pater</i> )	ojciec	pitṛ-	vader ("father")
brother	брат ( <i>brat</i> )	hermano	<i>frāter</i>	bruder	φρατήρ ( <i>phrātēr</i> )	brat	bhrātṛ	broeder

### Notes:

- *Four* in Mycenaean Greek is pronounced like "quatro".
- Entries partly from [https://en.wikipedia.org/wiki/Grimm's\\_law](https://en.wikipedia.org/wiki/Grimm's_law)

## Problem 3: Linguistic tree (Polynesian)

(a) Build a linguistic tree of the listed languages based on the vocabularies provided in the table. Various different answers are accepted as long as you justify your answer well.

(b) Justify your answer to (a).

Notes:

- ʔ denotes the glottal stop, as in the word *eaten* in American English gets pronounced as "EE-UN" and not "EE-TUN".
- φ has the same sound as "Phew!"

Gloss	one	two	three	four	five	man	sea	taboo	octopus	canoe	enter
Tongan	taha	ua	tolu	fā	nima	taŋata	tahi	tapu	feke	vaka	hū
Samoaan	tasi	lua	tolu	fā	lima	taŋata	tai	tapu	feʔe	vaʔa	ulu
Māori	tahi	rua	toru	φā	rima	taŋata	tai	tapu	φeke	waka	uru
Rapanui	-tahi	-rua	-toru	-ha	-rima	taŋata	tai	tapu	heke	vaka	uru
Rarotongan	taʔi	rua	toru	ʔā	rima	taŋata	tai	tapu	ʔeke	vaka	uru
Hawaiian	kahi	lua	kolu	hā	lima	kanaka	kai	kapu	heʔe	waʔa	ulu

## Problem 4: Little Red Riding Hood

Similar folk tales around the world tell of an animal luring children to eat them. Use the following traits to build a table to see how the various stories are related. Then build an evolutionary tree for how the stories may have been related.

### The traits:

- Antagonist disguises as a relative
- Victim is a human girl
- Victims are multiple children
- Rescued by another character
- Victim escapes by their own cleverness
- Antagonist eats a family member

### The stories:

- **Little Red Riding Hood** (France, Charles Perrault) A young girl is sent by her mother to deliver food to her sick grandmother. A wolf asks her where she's going and reaches the grandmother's house first, eats her, and disguises himself in her clothing. When the girl arrives, he eats her too. There is no rescue; the story ends as a warning to children not to talk to strangers.
- **Little Red Cap** (Germany, Brothers Grimm) A girl is sent to visit her grandmother. She meets a wolf, tells him where she's going, and he eats the grandmother and disguises himself. He eats the girl too. However, in this version, a passing hunter hears snoring, cuts open the wolf, and rescues both the girl and the grandmother.
- **The Wolf and the Seven Young Goats** (Germany, Brothers Grimm) A mother goat warns her kids not to open the door to strangers. A wolf tricks them by disguising his voice and paws. He eats all but the youngest, who hides. The mother returns, finds the sleeping wolf, cuts him open, rescues her children, and fills the wolf's belly with stones.
- **Aunt Tiger** (Taiwan) Two girls who are sisters. When the girls' mother goes out, the tigress comes to the girls' house and pretends to be their aunt, asking to come in. When finally the tigress gains entry, she eats the girl's sister. The girl comes up with a ruse to go outside and fetch some food for her aunt. The girl, now in the tree, tells the tigress that she will let her eat her, but first, she would like to feed her some

fruit from the tree. The tigress comes closer to eat the fruit, whereupon the girl pours boiling hot oil down her throat, killing her.

- **The False Grandmother** (Italy, traditional) A girl goes to visit her grandmother. An ogre has eaten the grandmother and is pretending to be her. At night, the girl notices strange things (e.g. the "grandmother" has strange hands or eats strange food). Realizing the danger, she escapes by asking to go to the bathroom and runs home.

## Problem 5: Seriation in archaeology

Sometimes we arrange things linearly and not into a tree. Each row below depicts pottery found in a given predynastic Egyptian burial site. Overall, there are seven burial sites, labelled A–G.

- (a) Use the principle that pottery design changes gradually over time to arrange A–G in chronological order.  
 (b) Explain why you think the ordering you gave in (a) is correct.

