



Raiding the Wordhoard

*Statistical analysis of recurring
alliterative collocations in
Old Norse eddic poetry*

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Categorizing Old Norse Poetry

“*Eddic*”

- anonymous (*usually*)
- simpler meters (*usually*)
- mythological/legendary subject matter (*usually*)

“*Skaldic*”

- attributed to named poets (*usually*)
- more complex meters (*usually*)
- occasional topics (*usually*)

Eddic Poetry

COMPOSITION:

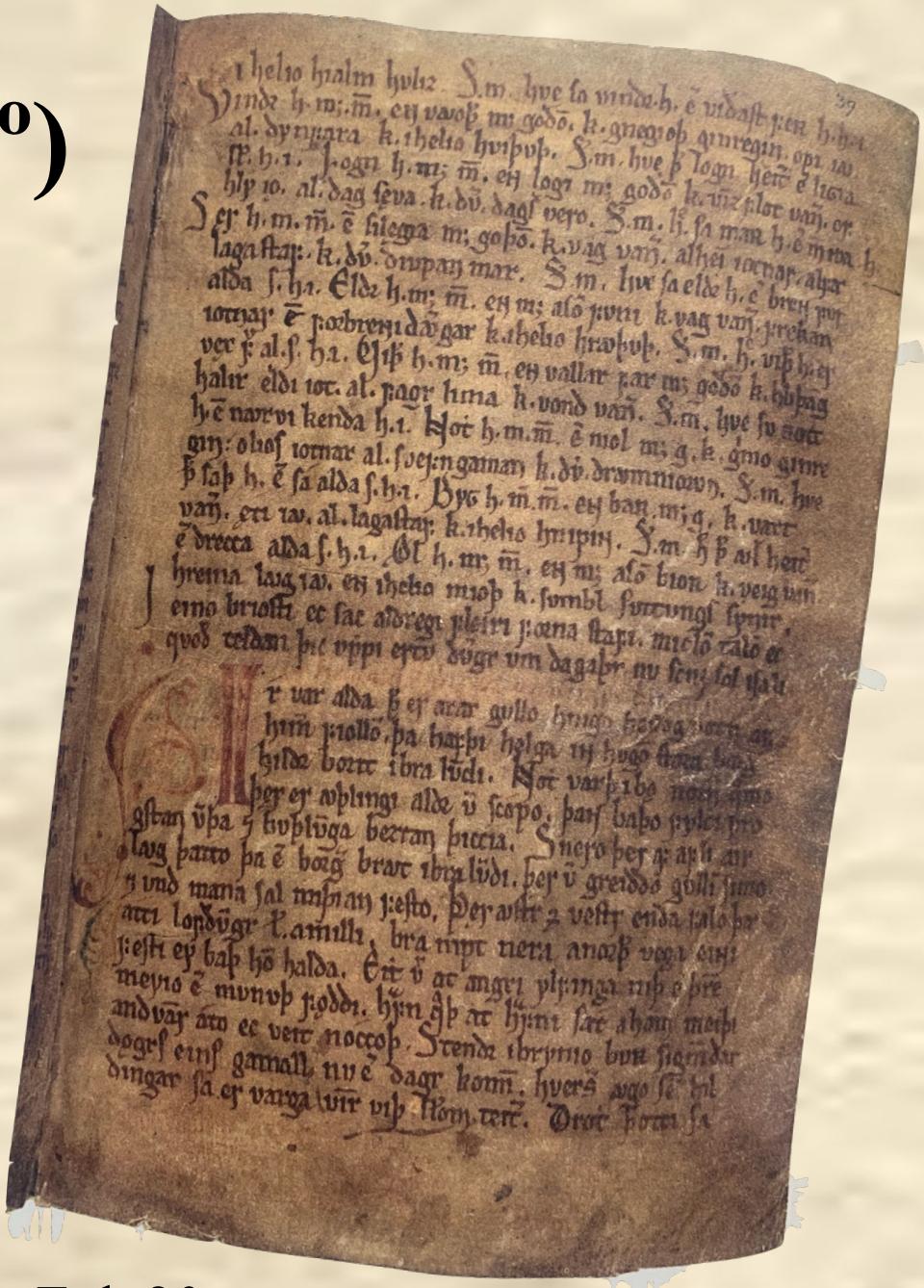
- Between 8th–14th centuries
- Anywhere Norse was spoken (Scandinavia and associated colonies)

PRESERVATION:

- **Codex Regius Manuscript (GKS 2365 4°)**
(13th-century Icelandic anthology manuscript)
- AM 748 I 4° (14th-century Icelandic anthology manuscript)
- Various prose sagas, historical texts, and poetic treatises; some runic inscriptions
- ~12,000 verses in total

Codex Regius (GKS 2365 4º)

- Written in Iceland c. 1270 CE
- Contains 29 poems/prosimetric compositions & two prose links
 - 11 mythological poems
 - 18 heroic-legendary poems
- 5511 total verses



Alliterative Verse

Steeds went *striding*,
stonefire glinted,
rocks were *ringing*,
roads resounding.

In *hoar forests*
harts were startled,
over *hill* and *valley*
hooves were beating.

JRR Tolkien, ‘Guðrúnarkviða en nýja’, 61/1–8:
The Legend of Sigurd and Gudrun (London:
HarperCollins, 2009).

Byrði betri
berrat maðr *brautu at*
en sé *manvit mikit*;
yegnest verra
vegra hann *velli at*
en sé *ofdrykkja öls*.

(*No better burden
can a man bear on the road
than a store of common sense;
a worse journey-provision
he could not carry over the land
than to be too drunk on ale.*)

Hávamál 11/1–6.

Verses collocating *bróðir* (brother) and *bani* (slayer):

Völuspá 44/1–2

Helgakviða Hundingsbana I 36/7–8

Sigrdrífumál 36/4

Skírnismál 16/6

Gripisspá 51/3–4

Atlamál 71/7

Lokasenna 17/6

Reginsmál 5/3–4

Guðrúnarhvöt 10/7–8

Extensions of the collocational set? b[+r]+V+ð[+V]+r

brúðr/bani (wife/slayer): *Völundarkviða* 32/9–10

báðir/bani (both/slayer): *Gripisspá* 11/5–6; *Reginsmál* 6/6; *Fáfnismál* 22/3

blíðr/bani (glad/slayer): *Oddrúnargrátr* 8/3–4

Beðr/bani (bed/slayer): *Hamðismál* 6/7–8

BUT – finite number of available words per initial letter

∴ over a given number of lines for each alliteration, some collocations could recur by chance

How can we tell whether a recurring collocation is a deliberate poetic device?

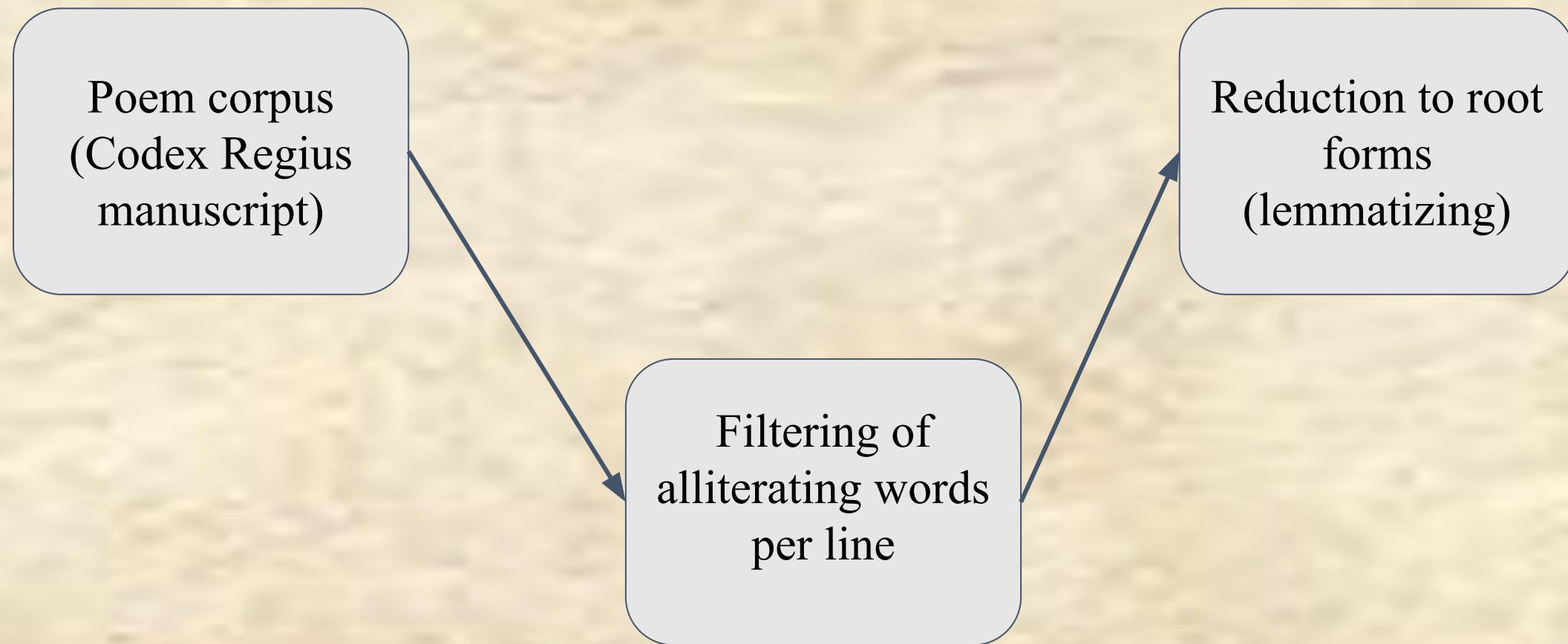
Fisher's exact test:

Gives the hypergeometric probability of a given observed distribution of two independent variables

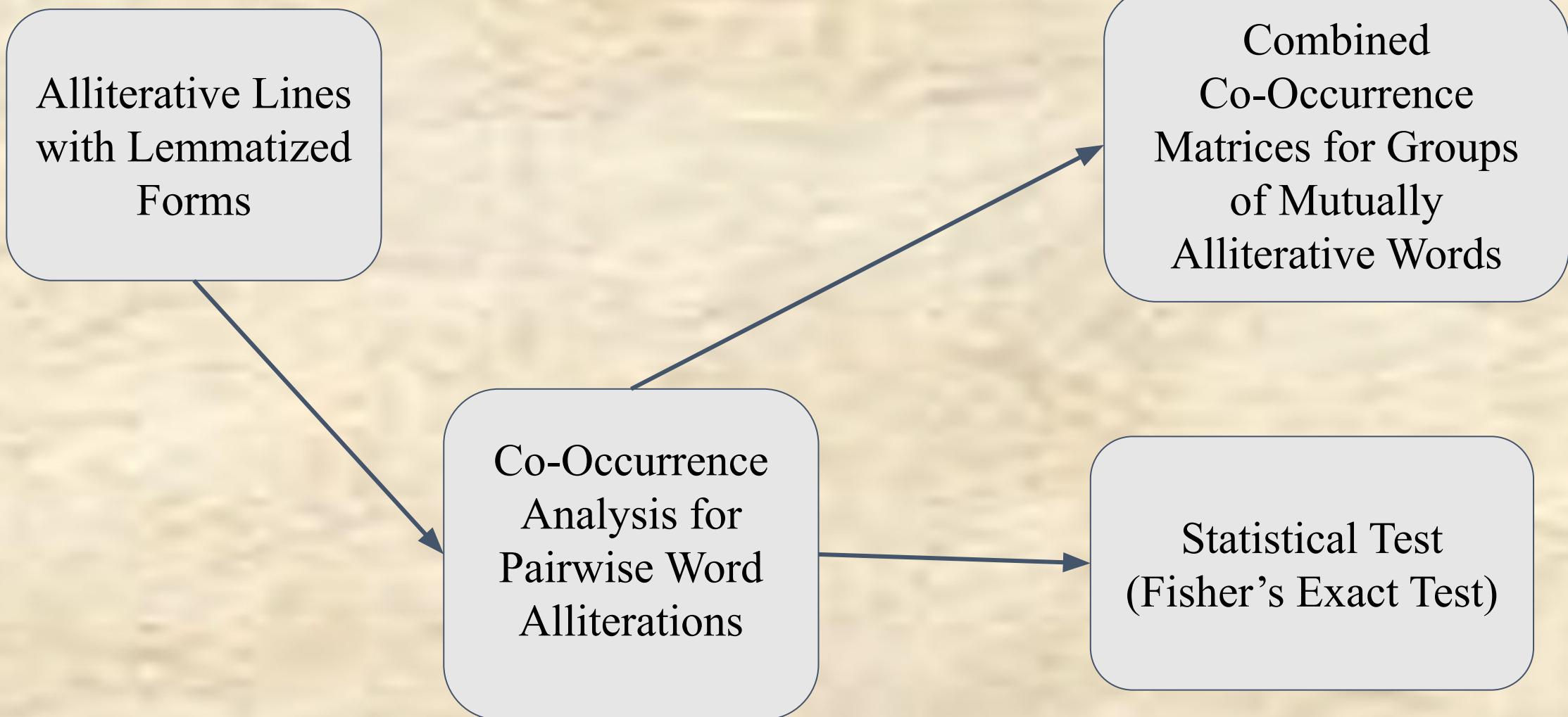
	Variable 2	Not variable 2	TOTAL
Variable 1	a	b	$a+b$
Not variable 1	c	d	$c+d$
TOTAL	$a+c$	$b+d$	$a+b+c+d$ $(=n)$

$$p = \frac{\binom{a+b}{a} \binom{c+d}{c}}{\binom{n}{a+c}} = \frac{\binom{a+b}{b} \binom{c+d}{d}}{\binom{n}{b+d}} = \frac{(a+b)! (c+d)! (a+c)! (b+d)!}{a! b! c! d! n!}$$

Manual Data Compilation Process



Automatic Analytic Pipeline



Visualization



Future Analysis and Visualization

- Further manual alterations of data to combine different lemmas derived from the same linguistic root
- Analytic Pipeline which includes the calculation of various other statistics
 - Barnard p test
 - Boschloo p test
- Improve visualization methods to be more descriptive of the data and better identify key features
 - Tools like Gephi and KH Coder for better network visualizations
 - Techniques like PCA and t-SNE for dimensionality reduction
 - Other word embedding visualizations with methods like SVD

skjöldungr (prince, warrior) — *sköp* (fate, destiny)

	sk-alliterating lines containing <i>skjöldungr</i>	sk-alliterating lines not containing <i>skjöldungr</i>	TOTAL
sk-alliterating lines containing <i>sköp</i>	3	4	7
sk-alliterating lines not containing <i>sköp</i>	1	67	68
TOTAL	4	71	75

$p < 0.002$

regin ('powers', gods) — *rök* (doom, fate)

	r-alliterating lines containing <i>regin</i>	r-alliterating lines not containing <i>regin</i>	TOTAL
r-alliterating lines containing <i>rök</i>	10	0	10
r-alliterating lines not containing <i>rök</i>	15	112	127
TOTAL	25	112	137

$p < 0.00001$

alsnotr (all-wise) — *ambót* (maidservant)

	vowel-alliterating lines containing <i>ambót</i>	vowel-alliterating lines not containing <i>ambót</i>	TOTAL
vowel-alliterating lines containing <i>alsnótr</i>	2	2	4
vowel-alliterating lines not containing <i>alsnótr</i>	1	1053	1054
TOTAL	3	1055	1058

p < 0.00001

vreiðr (angry) — *vega* (to fight)

	v-alliterating lines containing <i>vega</i>	v-alliterating lines not containing <i>vega</i>	TOTAL
v-alliterating lines containing <i>vreiðr</i>	7	1	8
v-alliterating lines not containing <i>vreiðr</i>	25	395	420
TOTAL	32	396	428

$p < 0.00001$

vega þú gakk, | ef þú **(v)reiðr** sér

Go and fight, | If you are angry
(*Lokasenna* 15/4–5)

vilkat ek at it **(v)reiðir vegisk.**

I don't want you two angry men to fight
(*Lokasenna* 18/6)

ok væri þá at þér **(v)reiðum vegit.**

And there would be furious fighting against you
(*Lokasenna* 27/6)

sæi maðr þik **(v)reiðan vega**

A man would see you fight fiercely
(*Fáfnismál* 7/3)

hvars skulu **(v)reiðir vega**

Whenever angry men should fight
(*Fáfnismál* 17/3)

hvars **(v)reiðir** skulu **vega**

Whenever angry men should fight
(*Fáfnismál* 30/3)

hvars skulu **(v)reiðir vega**

Whenever angry men should fight
(*Sigrdrífumal* 27/3)

Vreiðr stóð Vrøsku bróðir;

vá gagn faðir Magna.

Skelfra Pórs né Pjálfa

Þróttar steinn við ótta.

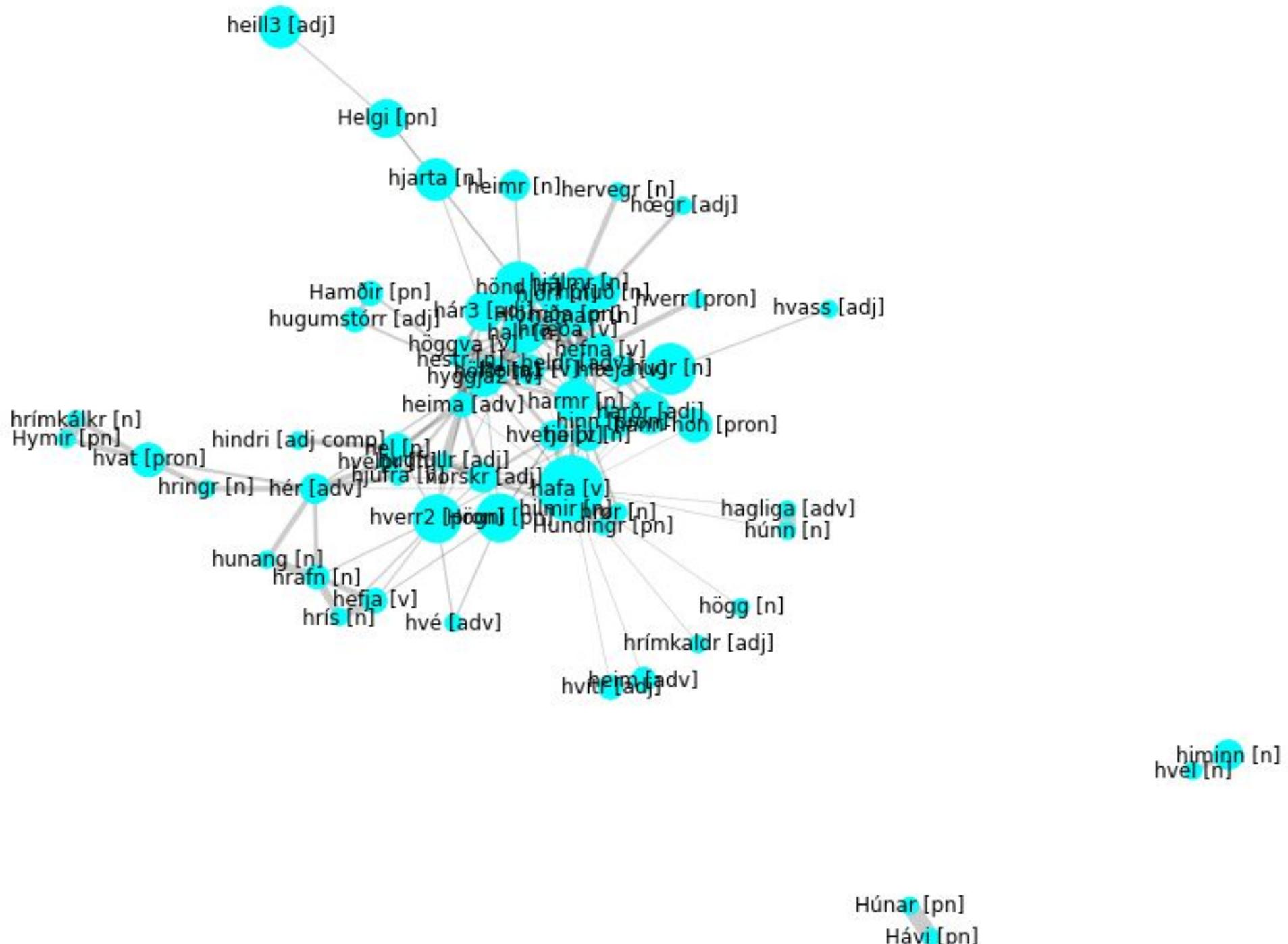
Enraged stood Røskva's brother [Pjálfi];

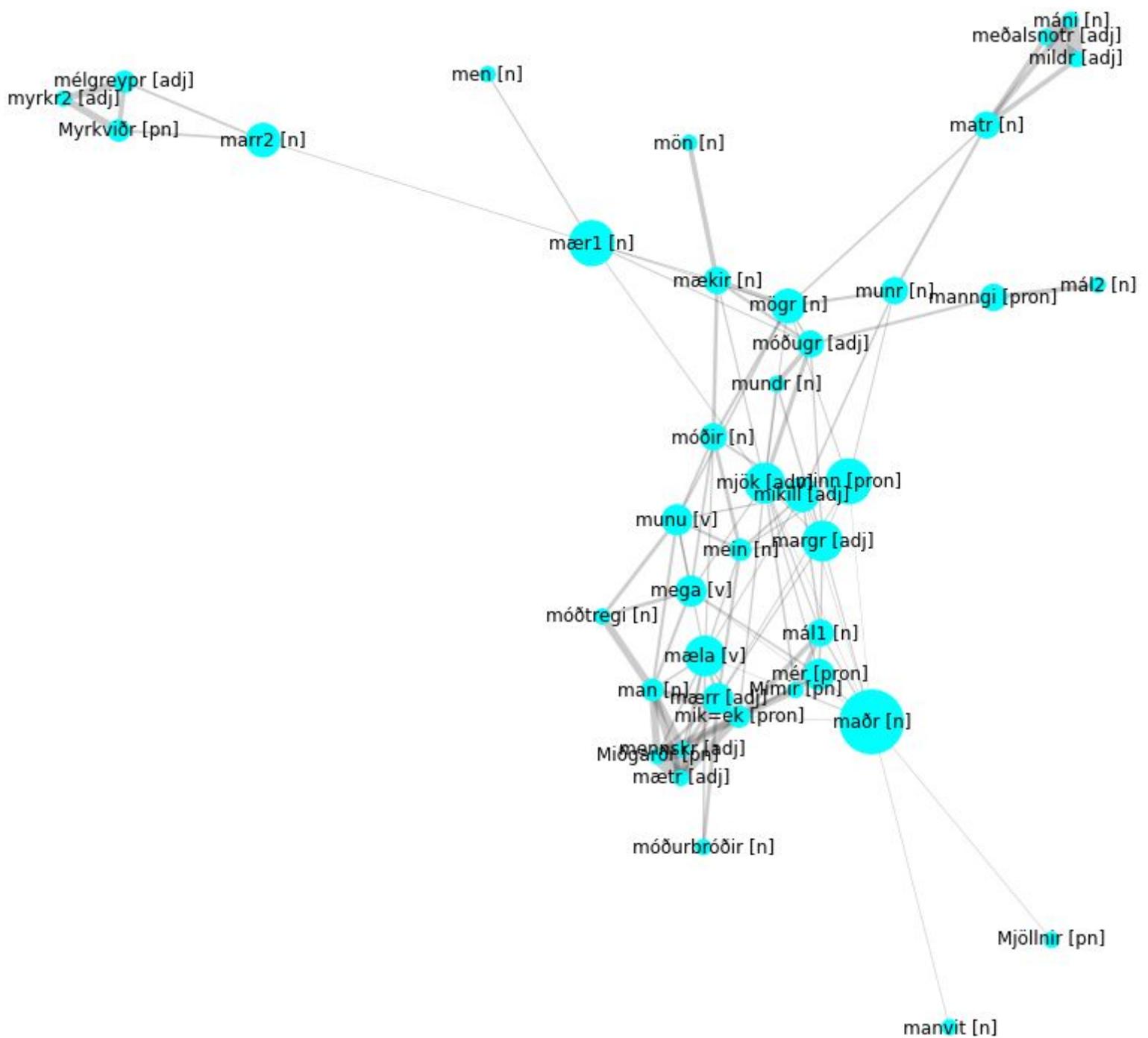
Magni's father [Pórr] struck victoriously.

Neither Pórr's nor Pjálfi's

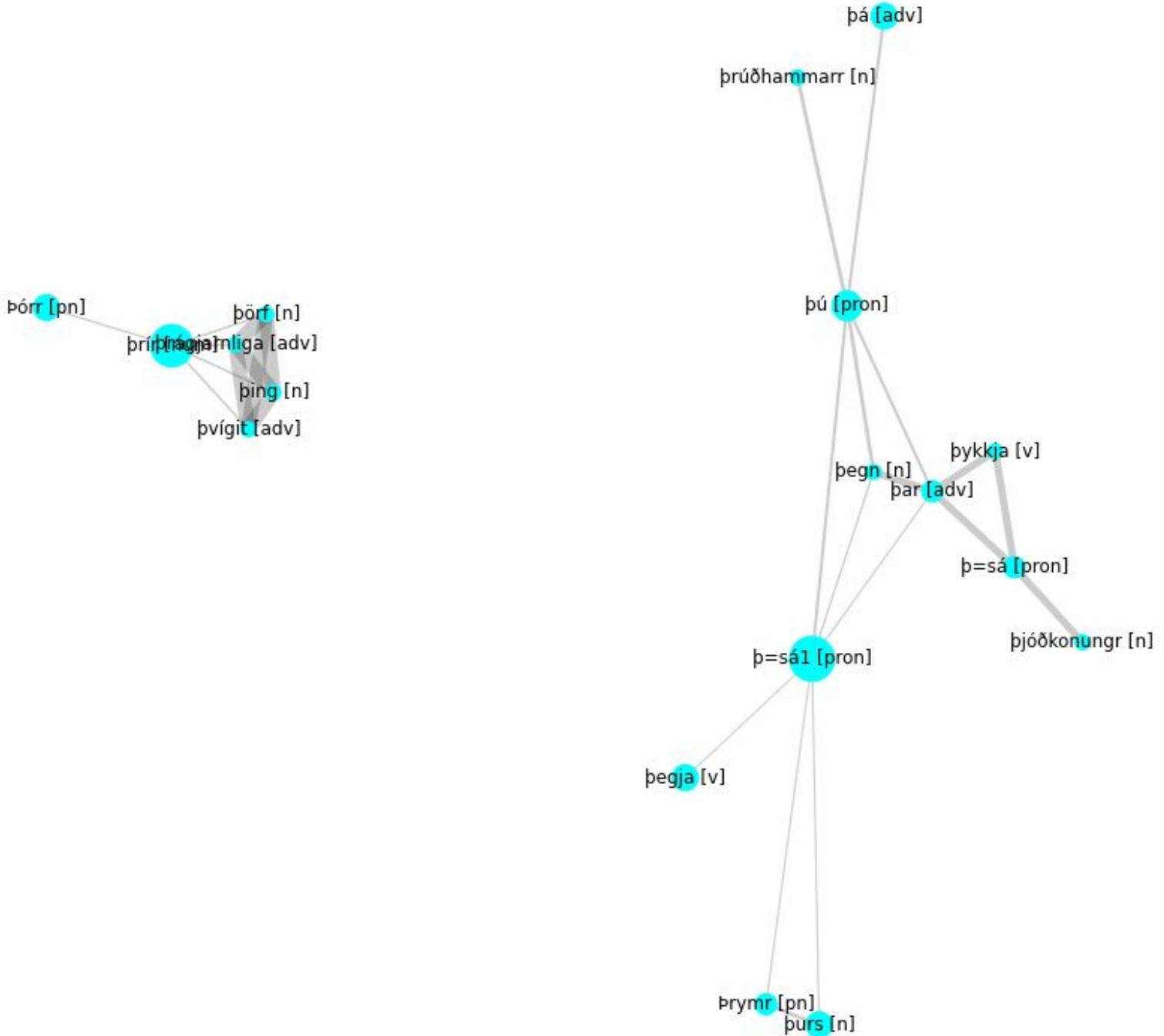
Power-stone [heart] shook with terror.

(Eilífr Goðrúnarson, *Pórsdrápa* 22/1–4)









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it a sumbl ar. iñ os loci qđi lasta stanjo egi haollo i. qđ
stap vñkra up i skenchi loca. en ap h' drycc i quaddi h' asoria.
Ig alir es hestar alymia i will gñghelos god. nea sa usas er.
mjar lær bgi bettio a. Mar i meki qđi ee h' minn i war. L.

gatc egi hv reis ser hyer veer huatj j;yr. Biþ ee bragez
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ta stanjo egil haollo i. Hęgihv iþvñ hic qbec alira qna
vgi arnassa ða. sitz tu arma pina lagd itr h'vegnia um
h'v broþur bana. Loca ec qþea lasta stanjo egil haollo i
h'ga ec h'yan h'ærstan mleac ec at ih reidur vegz. h'vi
ip es tverj stob mi h'lar yrþo sacaz. lopzci s' veit at h'
leikaz e i h' mægval fria. Hęgihv geyson pes mun ec nu

S mallr ero iſesi slato ſva gorā bgi bex feratv. vega bo
gatc egi hv reis ser hyer veer huatj j;yr. Biþ ee bragez
barnā synar dugā i allra ole maga. at hv loca qñira las
ta stanjo egil haollo i. Hęgihv iþvñ hic qbec alira qna
vgi arnassa ða. sitz tu arma pina lagd itr h'vegnia um
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vileat ec mi iþ reidur vegz.

sig. arta veer varco i; iorl ne h' kyr molcandi i comia i
h'gi hv par horie i hugda ec h' angl aþal. En hic ligia ho
ho somsepi i idþto avert se' uafæ. vrea hici jor tu
v h'iolk j;yr. i hugda ec h' angl aþal. Arvloga peto leflet
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riz e jorl rae jarar. Hęgihv j;g hv ett ricegyns mei
i h'gi i vgoan vþ. egi ha vea i vilia leca i þ vñbris quen
bada ibadm v felat. Gertv egi ee iiii etrac egis haollo
i badri licaz bvr. ut po ne quom i asa sonð i vi ha