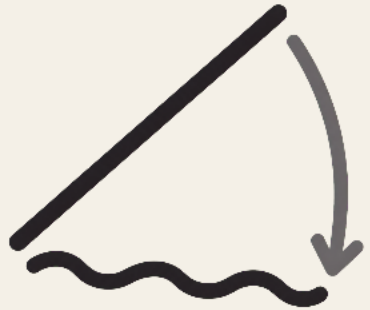
Measuring the Shift: Interlinear Baselines for Quantifying Translator Intervention in Vector Spaces

Maciej Rapacz

AGH University of Krakow



EADH2026 · Kraków · 16 September 2026

One passage, several translations



τὸν ἄρτον ἡμῶν τὸν ἐπιούσιον δὸς ἡμῖν σήμερον

Matthew 6:11

One passage, several translations



τὸν ἄρτον ἡμῶν τὸν ἐπιούσιον δὸς ἡμῖν σήμερον

Matthew 6:11

Give us this day our daily bread. — King James Version

Give us today our daily bread. — New International Version

One passage, several translations



τὸν ἄρτον ἡμῶν τὸν ἐπιούσιον δὸς ἡμῖν σήμερον

Matthew 6:11

Give us this day our daily bread.	King James Version
Give us today our daily bread.	New International Version
Give us today the food we need.	New Living Translation

One passage, several translations



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Matthew 6:11

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Give us today the food we need.	New Living Translation
Give us today our appointed bread.	Literal Standard Version
Give us this day our supersubstantial bread.	Douay-Rheims Bible

One passage, several translations



τὸν ἄρτον ἡμῶν τὸν ἐπιούσιον δὸς ἡμῖν σήμερον

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Keep us alive with three square meals.	The Message

Intervention in translation



“From the point of view of the target literature, all translation implies a degree of manipulation of the source text for a certain purpose.”

Theo Hermans · 1985

Intervention in translation



“From the point of view of the target literature, all translation implies a degree of manipulation of the source text for a certain purpose.”

Theo Hermans · 1985

add · omit · simplify · explain · reinterpret

What we are looking for



What we are looking for



Vinay & Darbelnet	procedures	borrowing · calque · literal translation · transposition modulation · equivalence · adaptation
Catford	shifts	level · structure · class · unit/rank · intra-system
Chesterman	strategies	syntactic · semantic · pragmatic · explicitness cultural filtering · information change · paraphrase
Molina & Hurtado Albir	techniques	amplification/reduction · compensation · description generalisation/particularisation · discursive creation · variation
Blum-Kulka · Baker · Laviosa	tendencies / “universals”	explicitation · simplification · normalisation · levelling-out

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taxonomy-independent

no predefined labels

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taxonomy-independent

no predefined labels

continuous

not discrete

corpus-independent

not corpus-relative

passage-level

one passage is enough

Literary translation



Literary translation



᾿Εγένετο ἄνθρωπος
ἀπεσταλμένος…

There came a man who
was sent…

Literary translation

ʾΕγένετο ἄνθρωπος ἀπεσταλμένος…

There came a man who was sent…



source



literary

Literary translation



source

literary

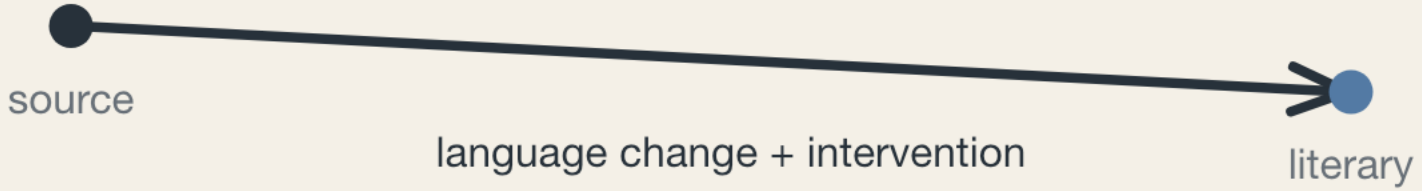
Literary translation



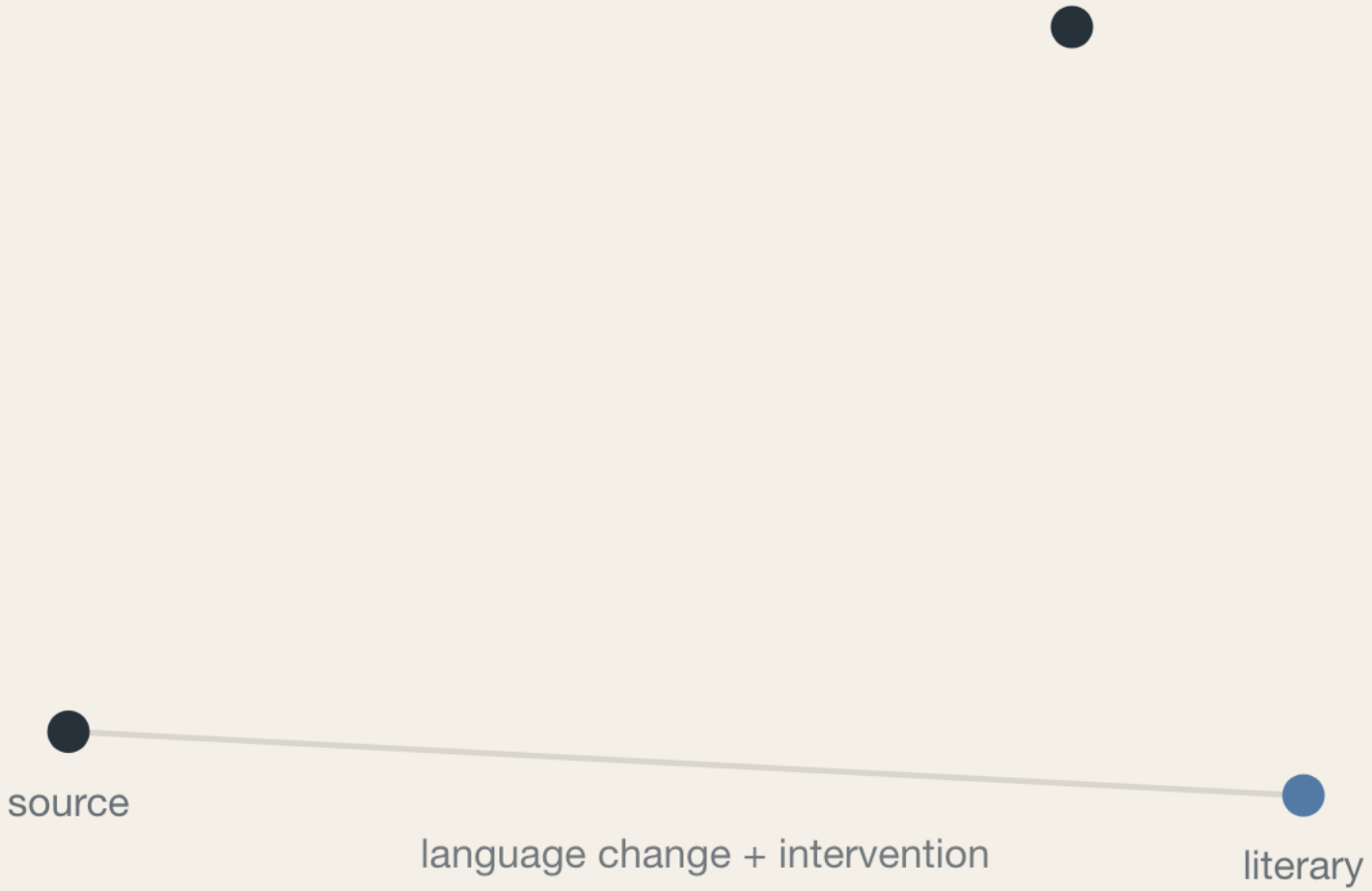
Literary translation as algebraic translation



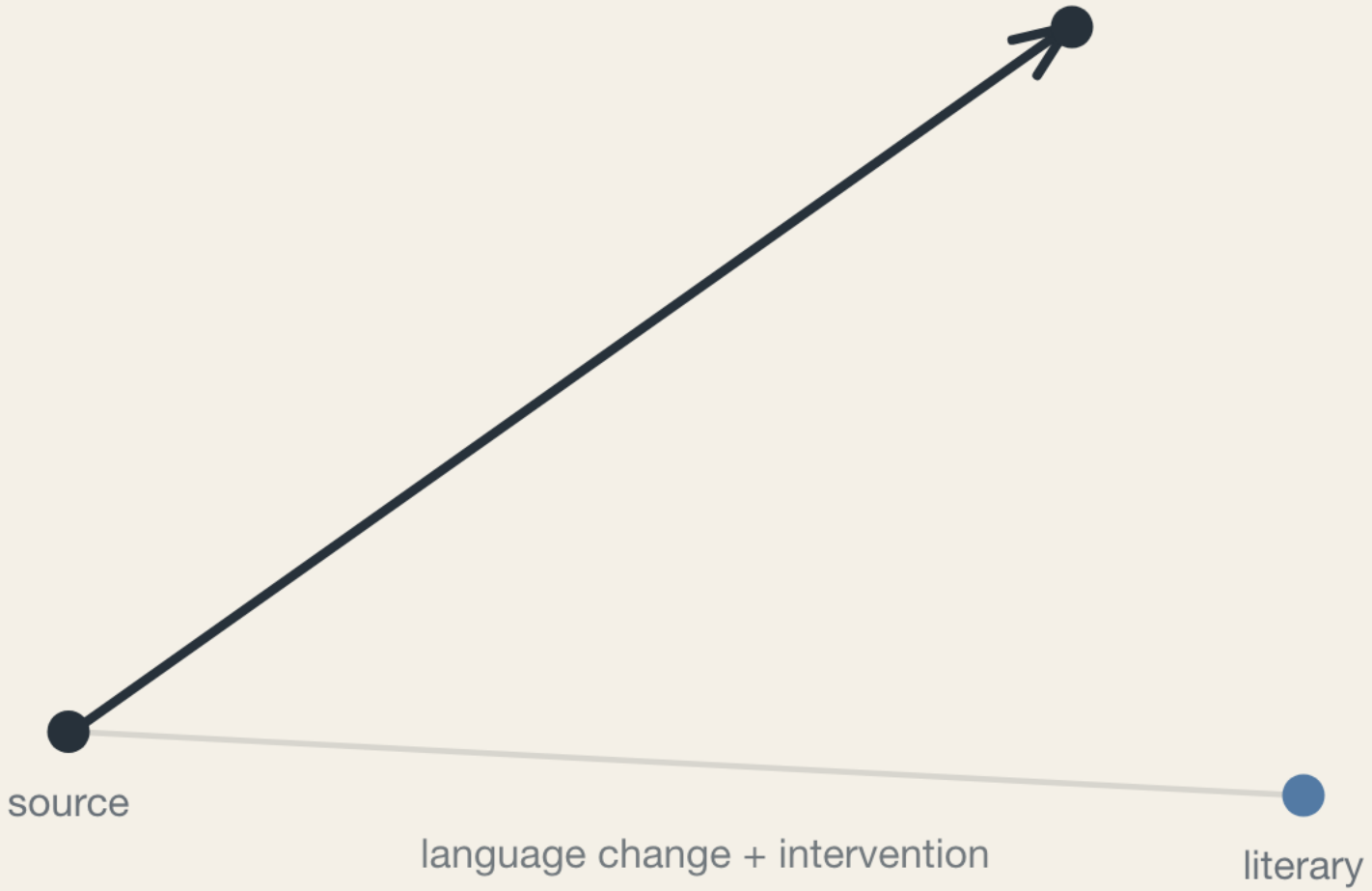
Literary translation as algebraic translation



Literary translation as algebraic translation



Literary translation as algebraic translation



Literary translation as algebraic translation



Literary translation as algebraic translation



Interlinear translation



Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became							

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**						

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**					

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**	**from**				

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**	**from**	**God**			

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**	**from**	**God**	**name**		

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**	**from**	**God**	**name**	**to him**	

John 1:6

Interlinear translation

Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**	**from**	**God**	**name**	**to him**	**John**

John 1:6

Interlinear translation



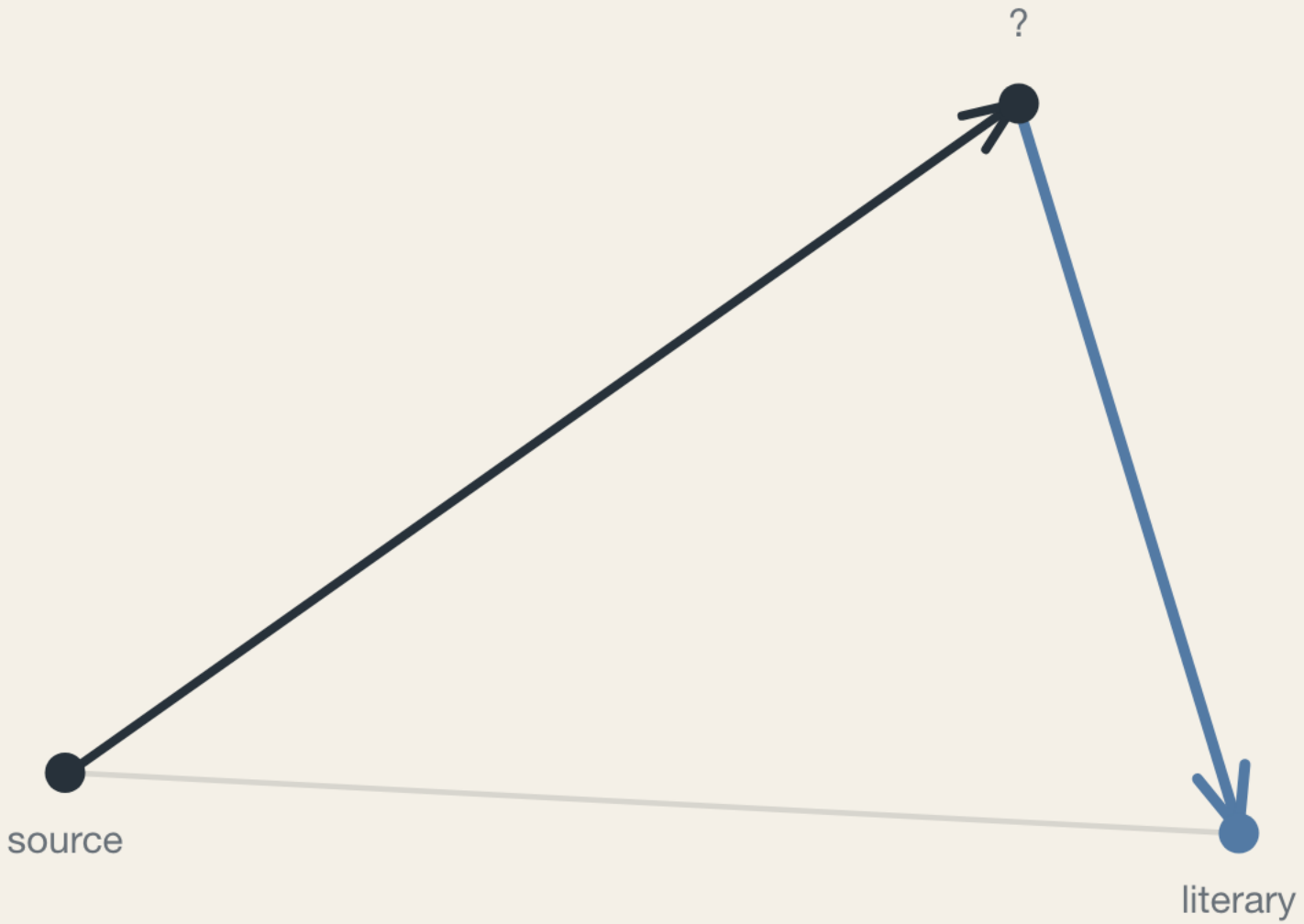
Ἐγένετο	ἄνθρωπος	ἀπεσταλμένος	παρὰ	θεοῦ	ὄνομα	αὐτῷ	Ἰωάννης
Became	**a man**	**sent**	**from**	**God**	**name**	**to him**	**John**

John 1:6

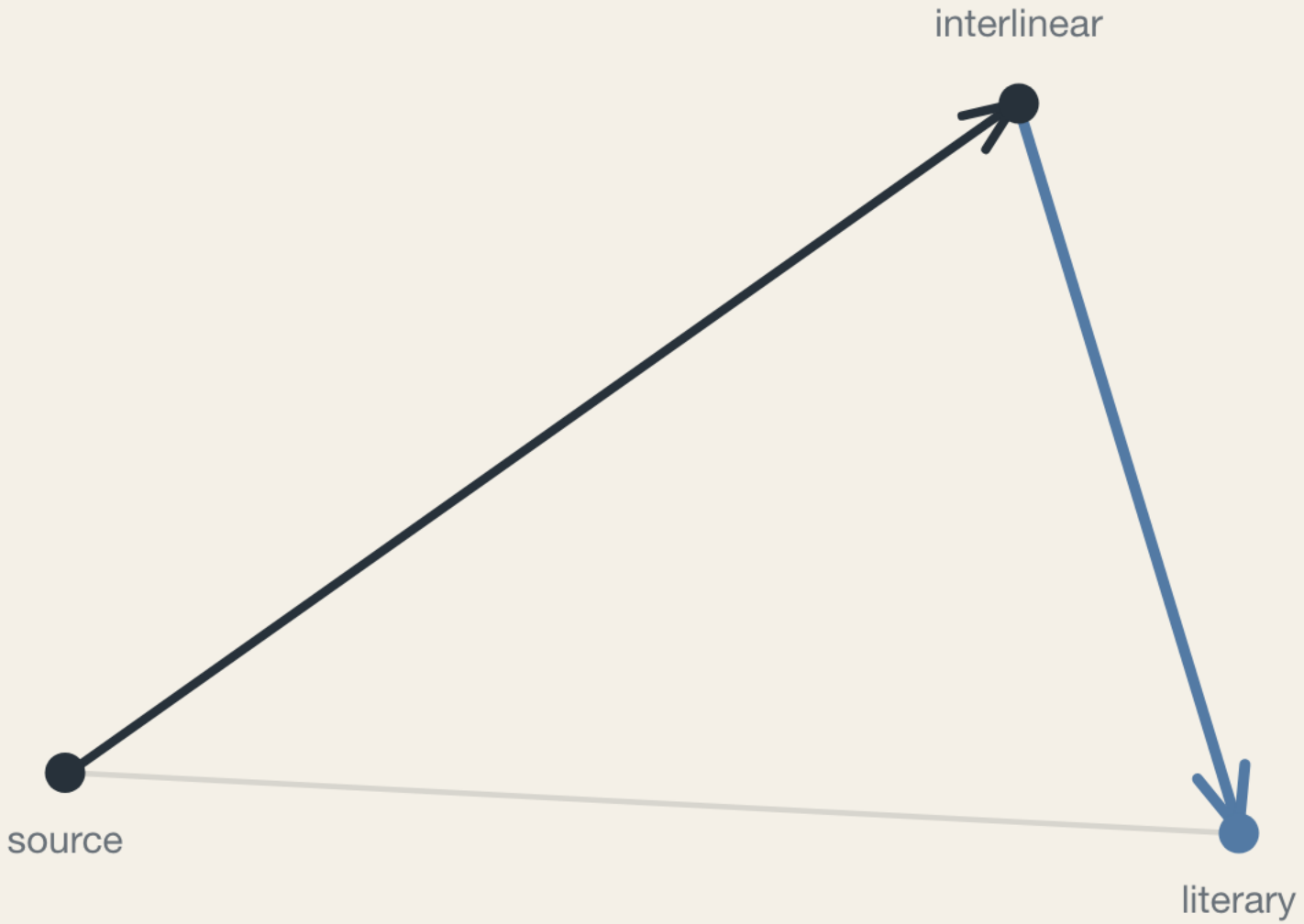
“The interlinear version of the Scriptures is the prototype or ideal of all translation.”

Walter Benjamin

The missing point



The missing point



The Intervention Vector

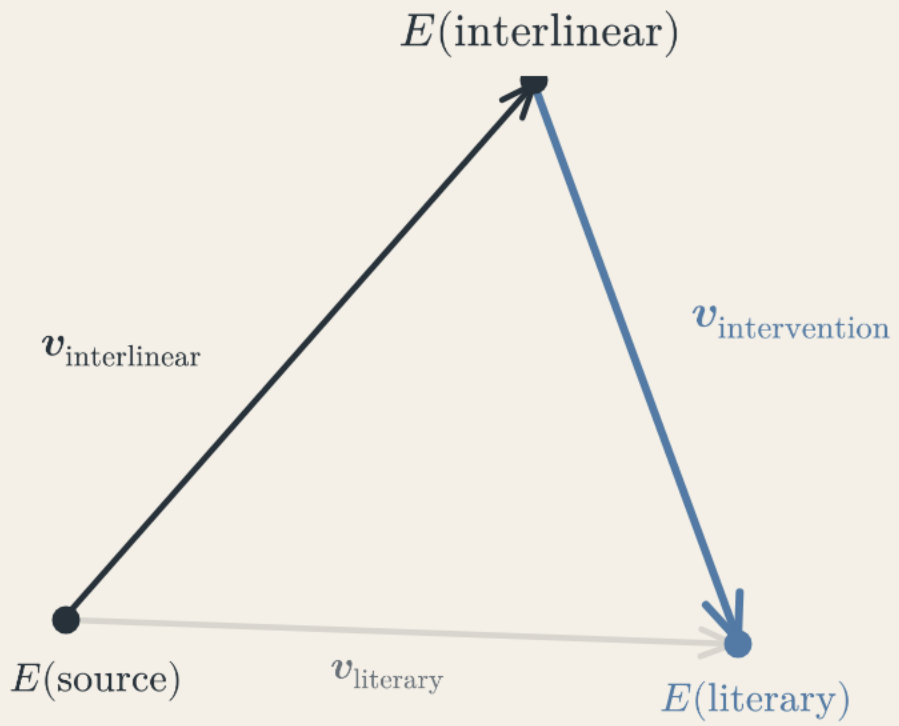


$$\boldsymbol{v}_{\text{intervention}} = \boldsymbol{v}_{\text{literary}} - \boldsymbol{v}_{\text{interlinear}}$$

The Intervention Vector

$$\boldsymbol{v}_{\text{intervention}} = \boldsymbol{v}_{\text{literary}} - \boldsymbol{v}_{\text{interlinear}}$$

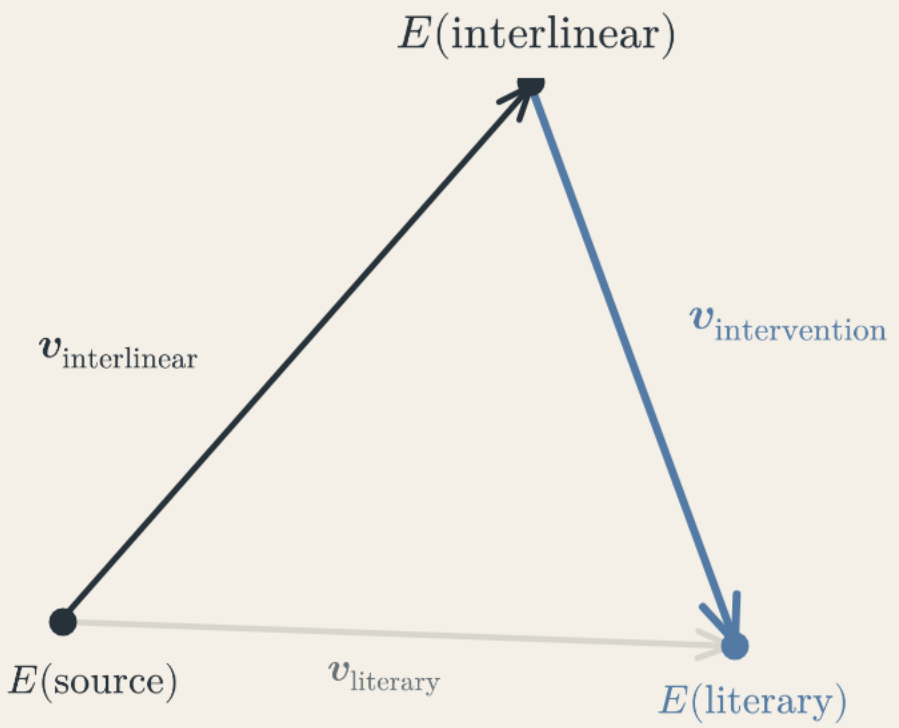
$$\begin{aligned}\boldsymbol{v}_{\text{intervention}} = &[E(\text{literary}) - E(\text{source})] \\ &-[E(\text{interlinear}) - E(\text{source})]\end{aligned}$$



The Intervention Vector

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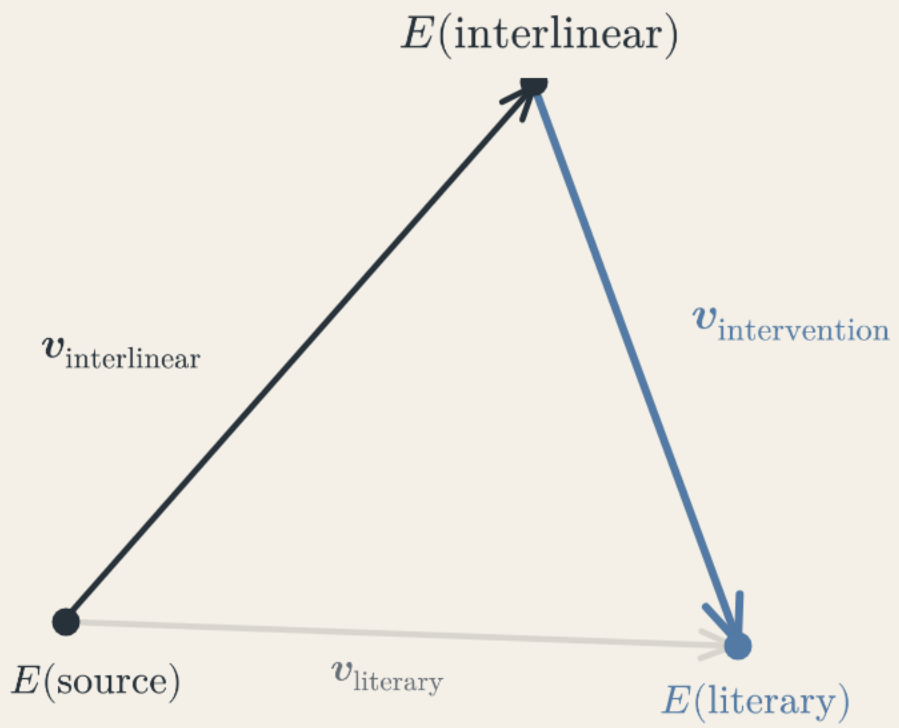
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$$\boldsymbol{v}_{\text{intervention}} = \boldsymbol{v}_{\text{literary}} - \boldsymbol{v}_{\text{interlinear}}$$

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$$\boldsymbol{v}_{\text{intervention}} = E(\text{literary}) - E(\text{interlinear})$$

target language only



Two hypotheses



$$\boldsymbol{v}_{\text{intervention}} = \boldsymbol{v}_{\text{literary}} - \boldsymbol{v}_{\text{interlinear}}$$

Two hypotheses



$$\boldsymbol{v}_{\text{intervention}} = \boldsymbol{v}_{\text{literary}} - \boldsymbol{v}_{\text{interlinear}}$$

$\|\boldsymbol{v}_{\text{intervention}}\|$ $\approx$ extent?

Two hypotheses



$$\boldsymbol{v}_{\text{intervention}} = \boldsymbol{v}_{\text{literary}} - \boldsymbol{v}_{\text{interlinear}}$$

$\|\boldsymbol{v}_{\text{intervention}}\| \approx$ extent?

$\dfrac{\boldsymbol{v}_{\text{intervention}}}{\|\boldsymbol{v}_{\text{intervention}}\|} \approx$ character?

Magnitude in practice



Greek

ὁ ἔχων ὦτα ἀκουέτω

Interlinear

The [one] having ears let him hear

Disciples' Literal New Testament

Let the one having ears, hear.



0.547

Matthew 13:9

Magnitude in practice



Greek

ὁ ἔχων ὦτα ἀκουέτω

Interlinear

The [one] having ears let him hear

Disciples' Literal New Testament

Let the one having ears, hear.



0.547

New World Translation

Let the one who has ears listen.



0.597

Matthew 13:9

Magnitude in practice



Greek

ὁ ἔχων ὦτα ἀκουέτω

Interlinear

The [one] having ears let him hear

Disciples' Literal New Testament

Let the one having ears, hear.



0.547

New World Translation

Let the one who has ears listen.



0.597

New Living Translation

Anyone with ears to hear should listen and understand.



0.656

Matthew 13:9

Magnitude in practice



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ὁ ἔχων ὦτα ἀκουέτω

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The [one] having ears let him hear

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Let the one having ears, hear.



0.547

New World Translation

Let the one who has ears listen.



0.597

New Living Translation

Anyone with ears to hear should listen and understand.



0.656

The Message

Are you listening to this? Really listening?



0.903

Matthew 13:9



Evaluation

Evaluation setup



Evaluation setup





targum.net

Evaluation setup



targum
תרגום

targum.net

74	5	260	5
translation records	languages	chapters	interlinear baselines

Evaluation setup



targum.net

74	5	260	5
translation records	languages	chapters	interlinear baselines

EN biblehub.com · FR editeurbpc.com · IT altervista.org · PL oblubienica.eu · ES bibliatodo.com

Evaluation setup



targum
תרגום

targum.net

Qwen3-Embedding-8B

74	5	260	5
translation records	languages	chapters	interlinear baselines

EN biblehub.com · FR editeurbpc.com · IT altervista.org · PL oblubienica.eu · ES bibliatodo.com

	Literal	Formal	Dynamic	Paraphrase
English	3	4	7	2
French	1	6	4	3
Italian	4	4	2	2
Polish	4	7	2	3
Spanish	3	2	5	6

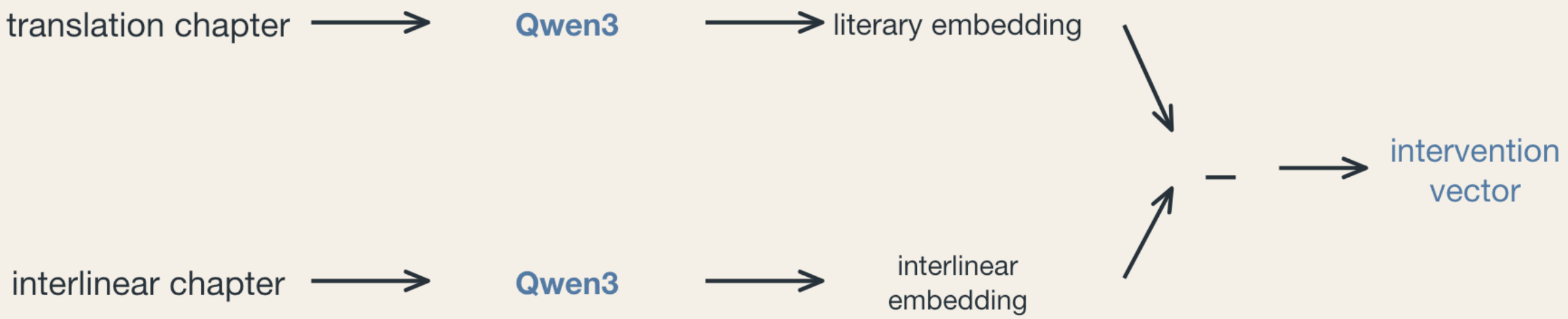
Calculating intervention vectors



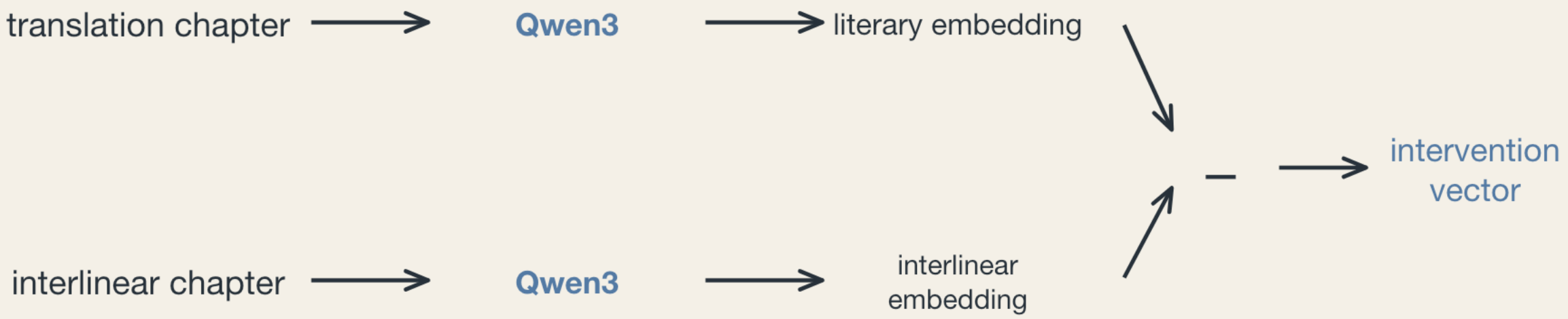
translation chapter → **Qwen3** → literary embedding

interlinear chapter → **Qwen3** → interlinear embedding

Calculating intervention vectors



Calculating intervention vectors

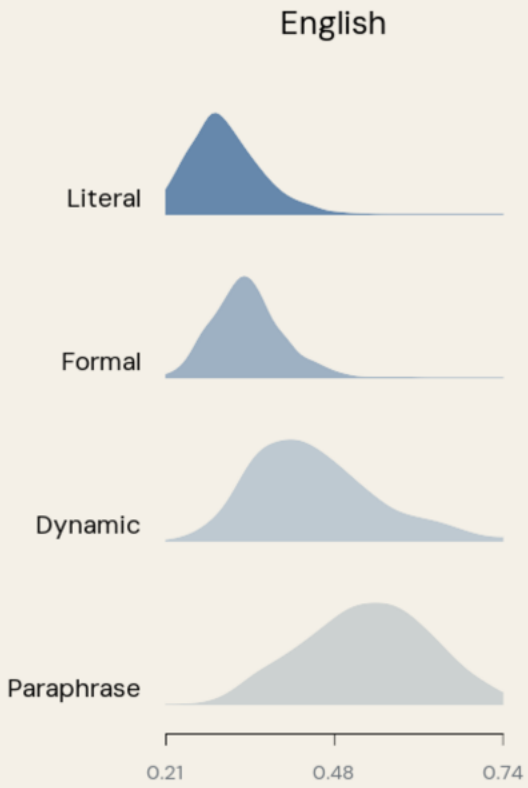


74 records × 260 chapters → ~19k vectors

Magnitude distributions

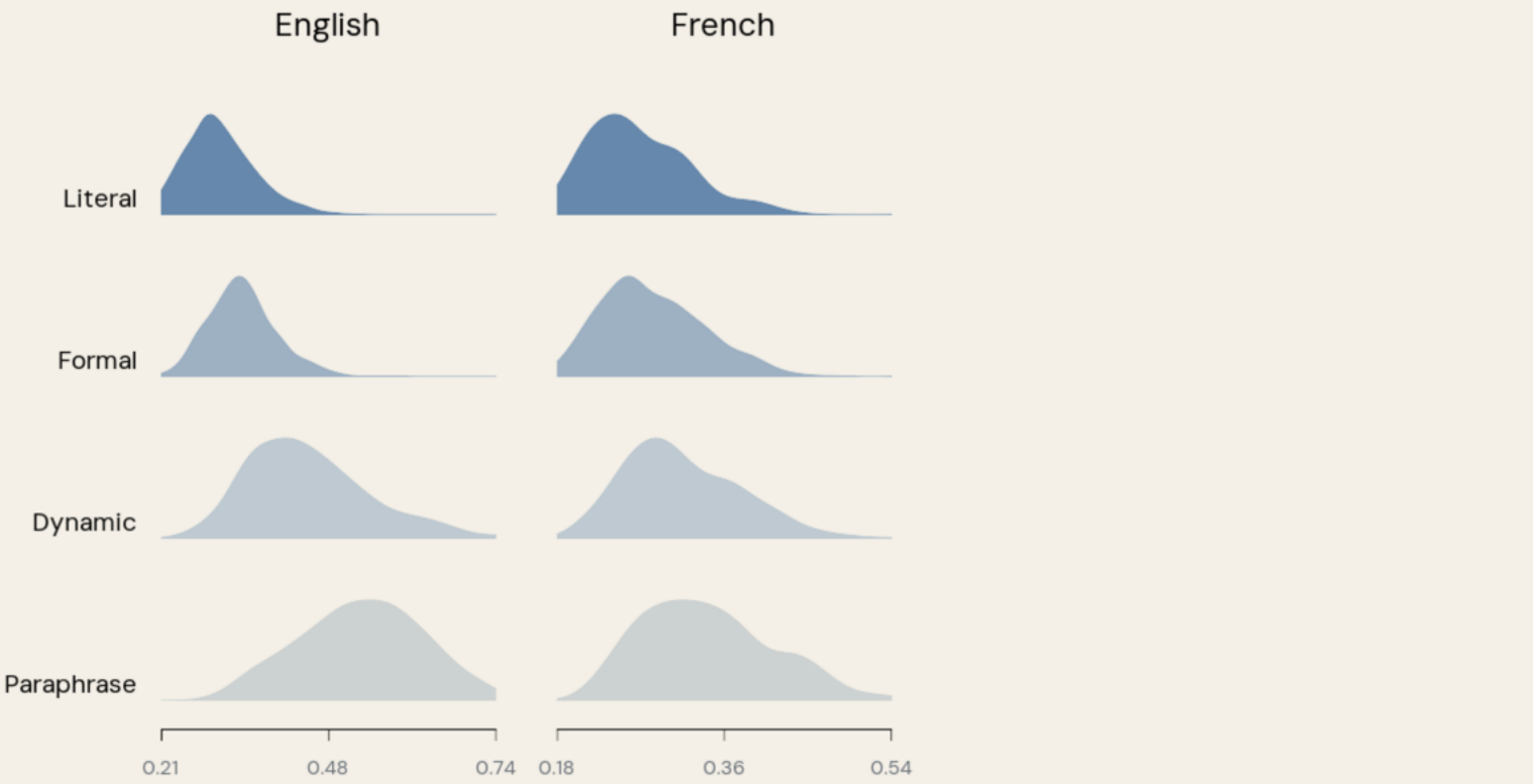


Magnitude distributions

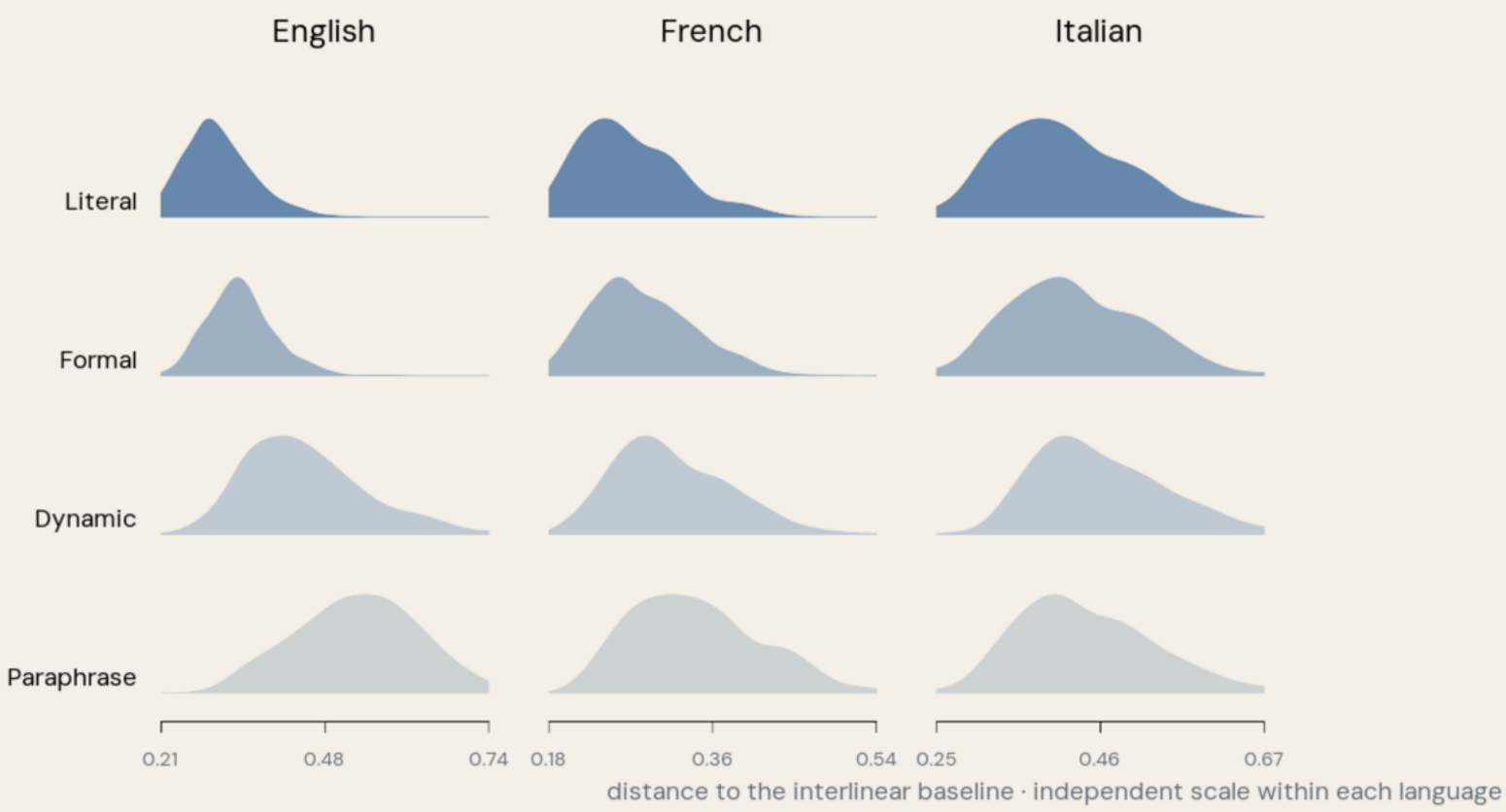


distance to the interlinear baseline · independent scale within each language

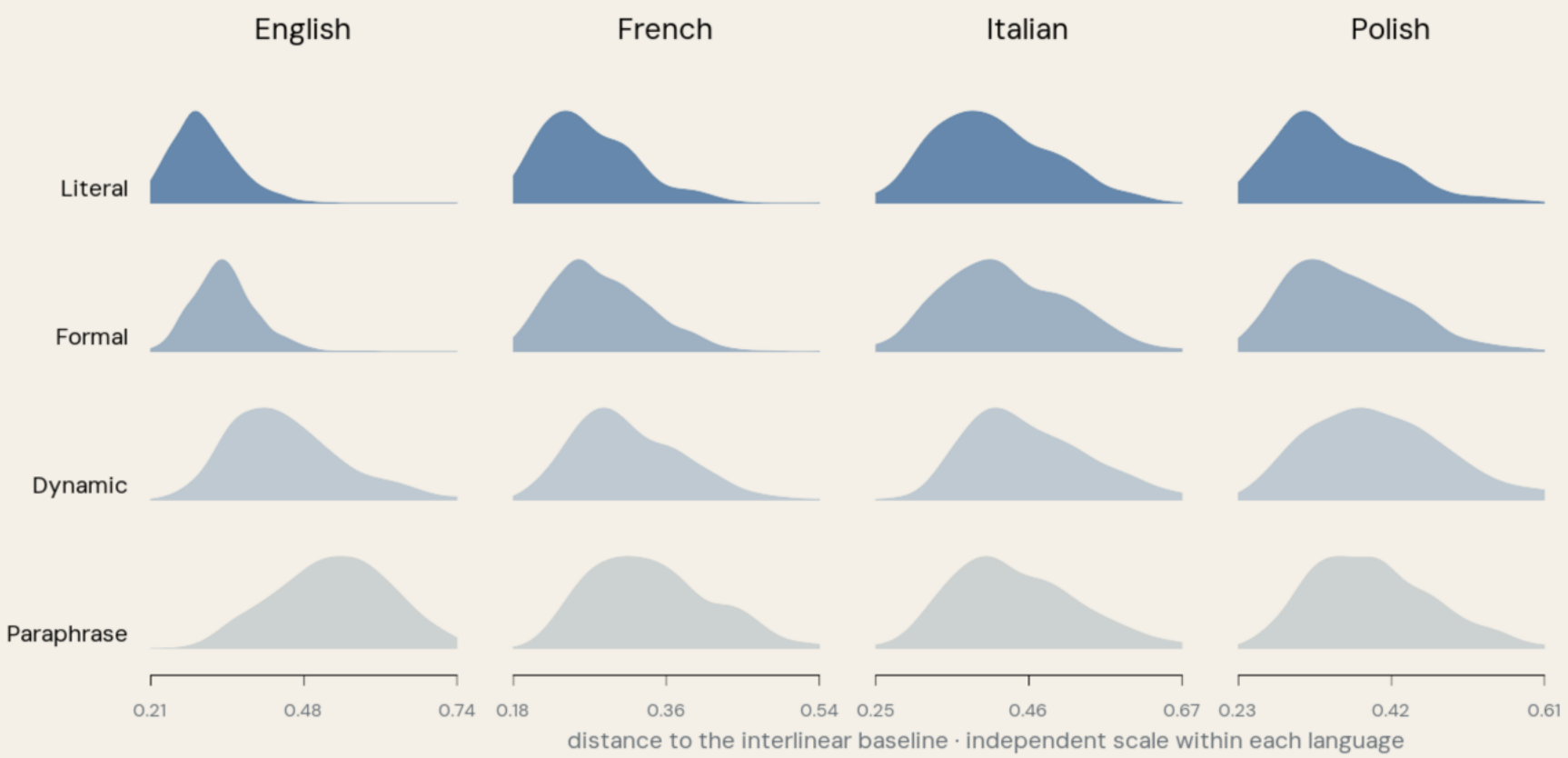
Magnitude distributions



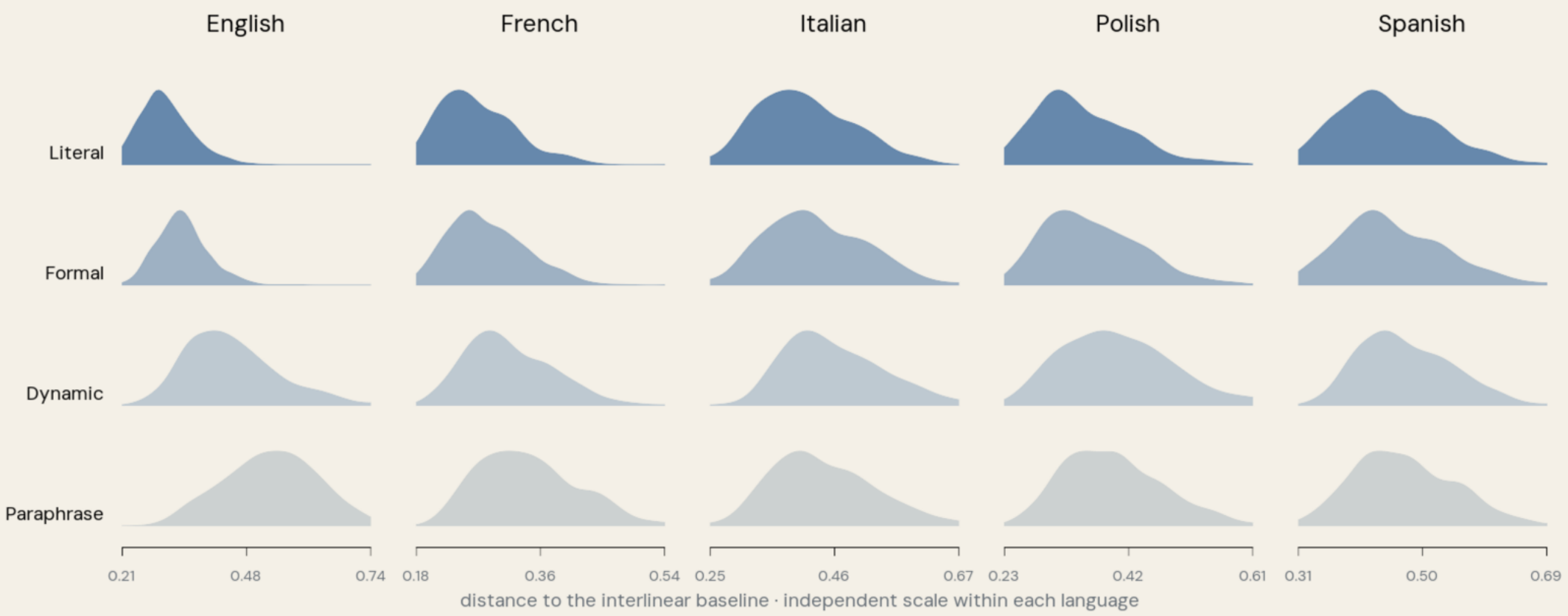
Magnitude distributions



Magnitude distributions



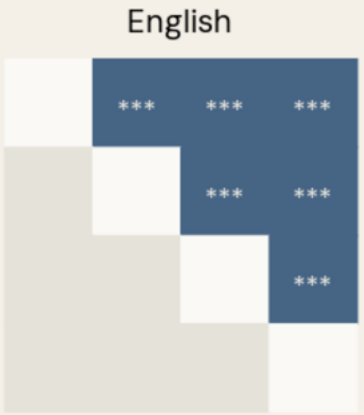
Magnitude distributions



Group comparisons



Group comparisons



one-sided Mann–Whitney U · Bonferroni corrected

row < column reverse n.s.

Group comparisons

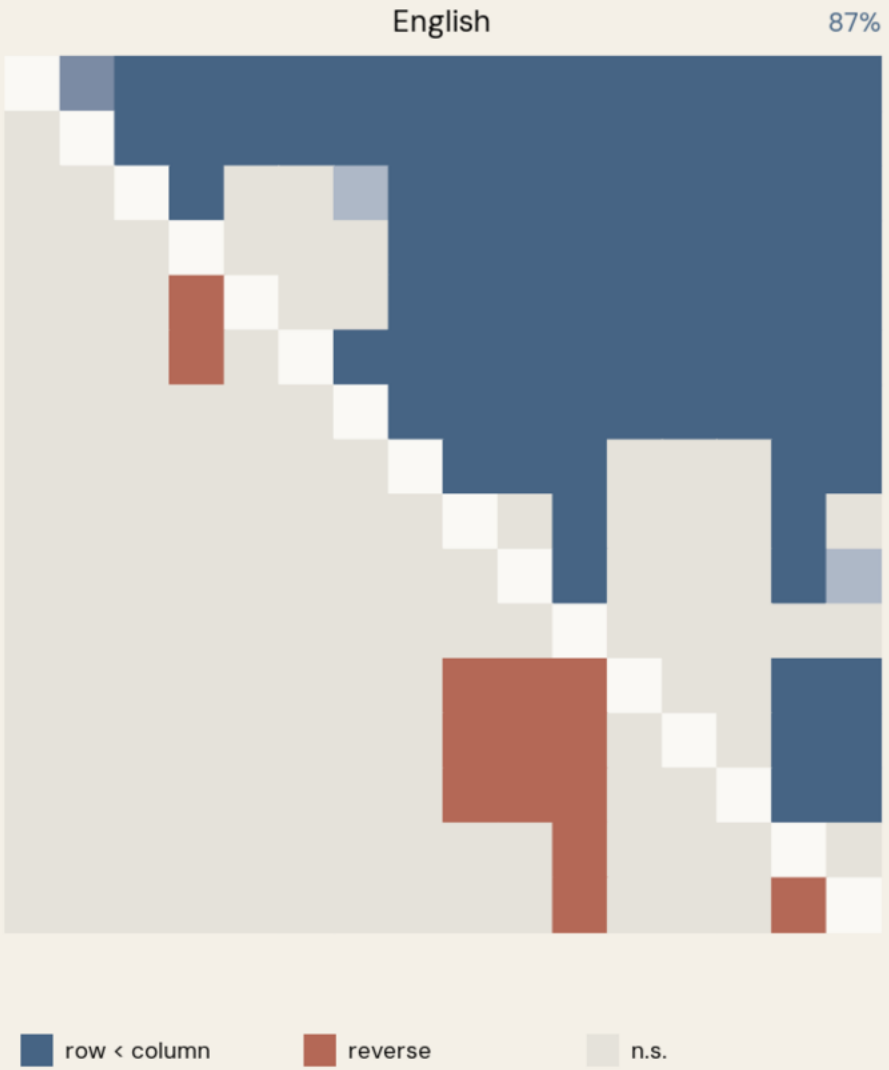


one-sided Mann–Whitney U · Bonferroni corrected

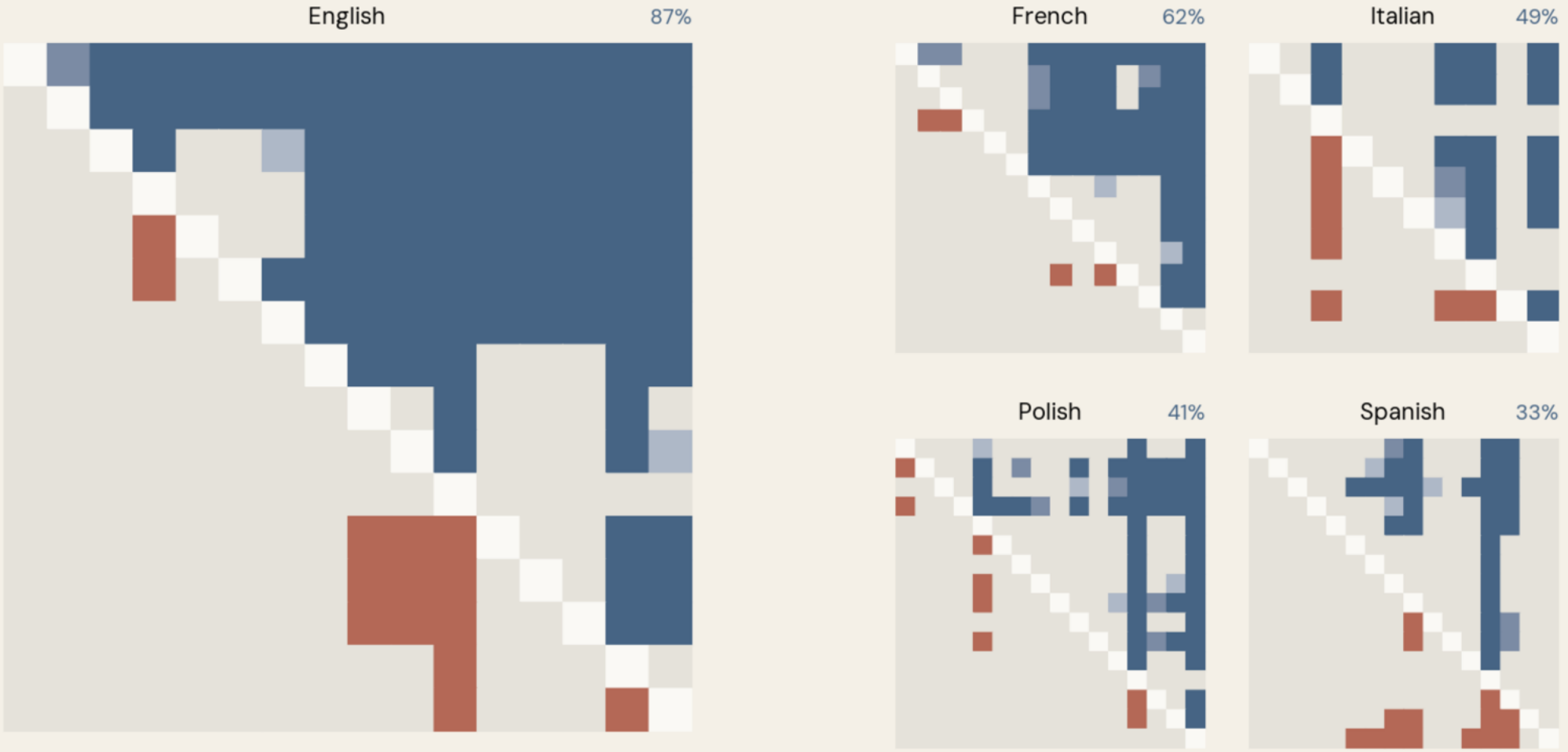
Translation comparisons



Translation comparisons



Translation comparisons



Three embedding models



Three embedding models



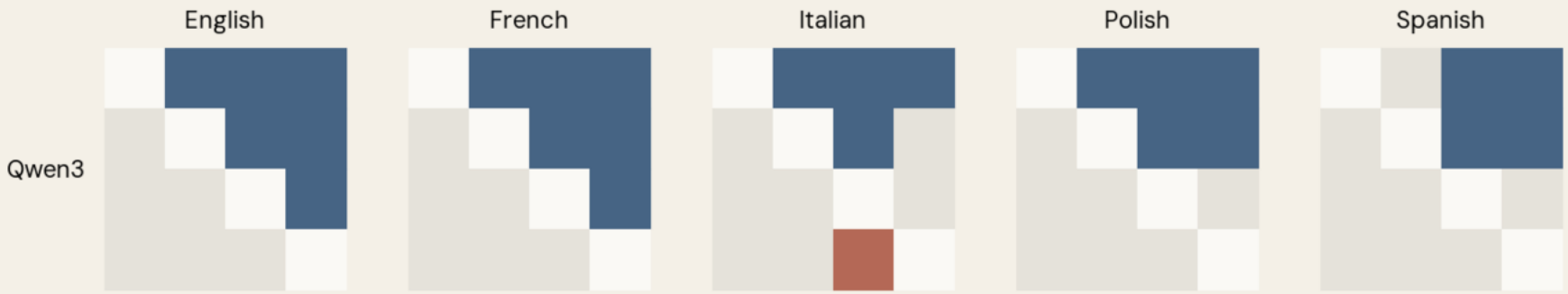
Model	Context window	Embedding size
Qwen3-Embedding-8B	32,768	4,096

Three embedding models

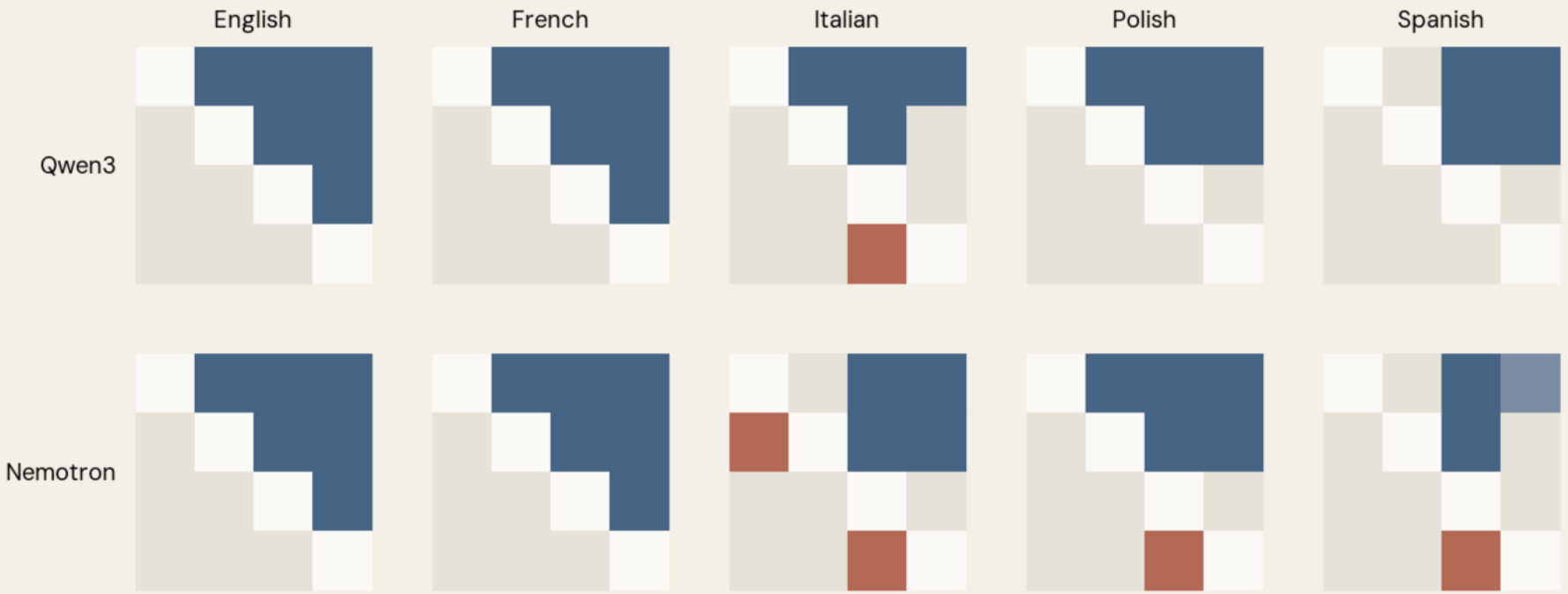


Model	Context window	Embedding size
Qwen3-Embedding-8B	32,768	4,096
llama-embed-nemotron-8b	32,768	4,096
LaBSE	up to 512	768

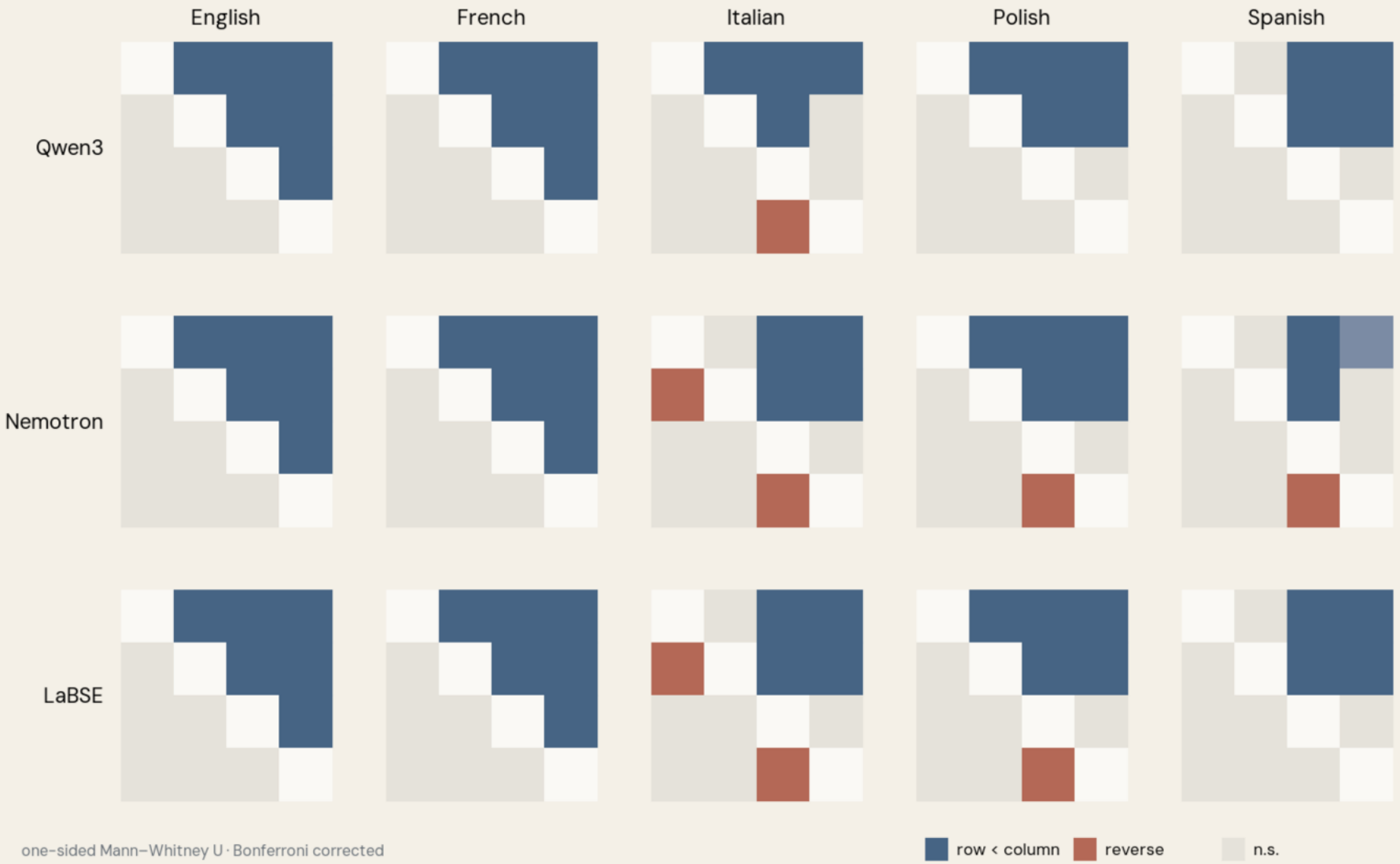
Group comparisons across models



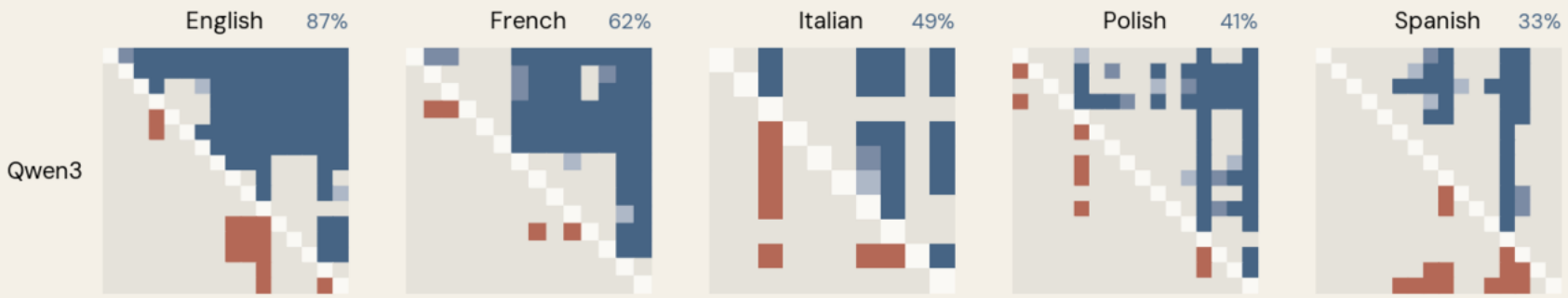
Group comparisons across models



Group comparisons across models



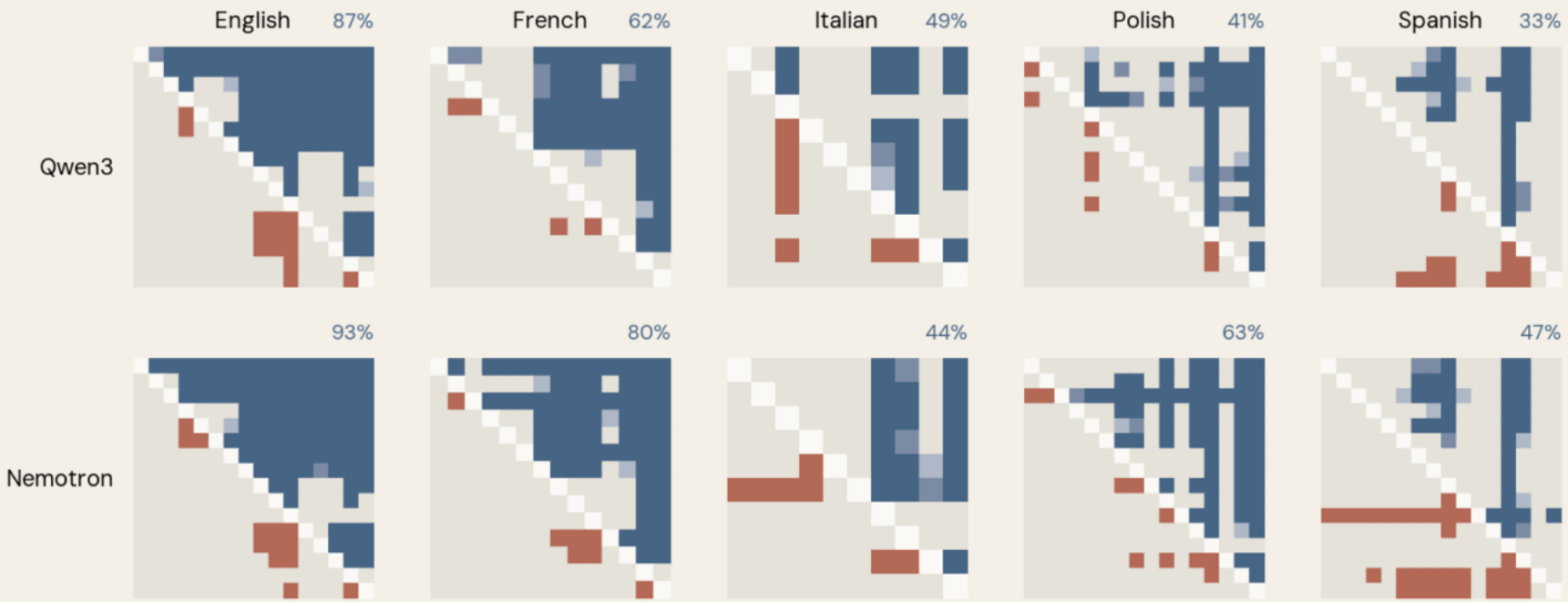
Translation comparisons across models



row < column reverse n.s.

% significant unordered pairs · adjusted p < 0.001

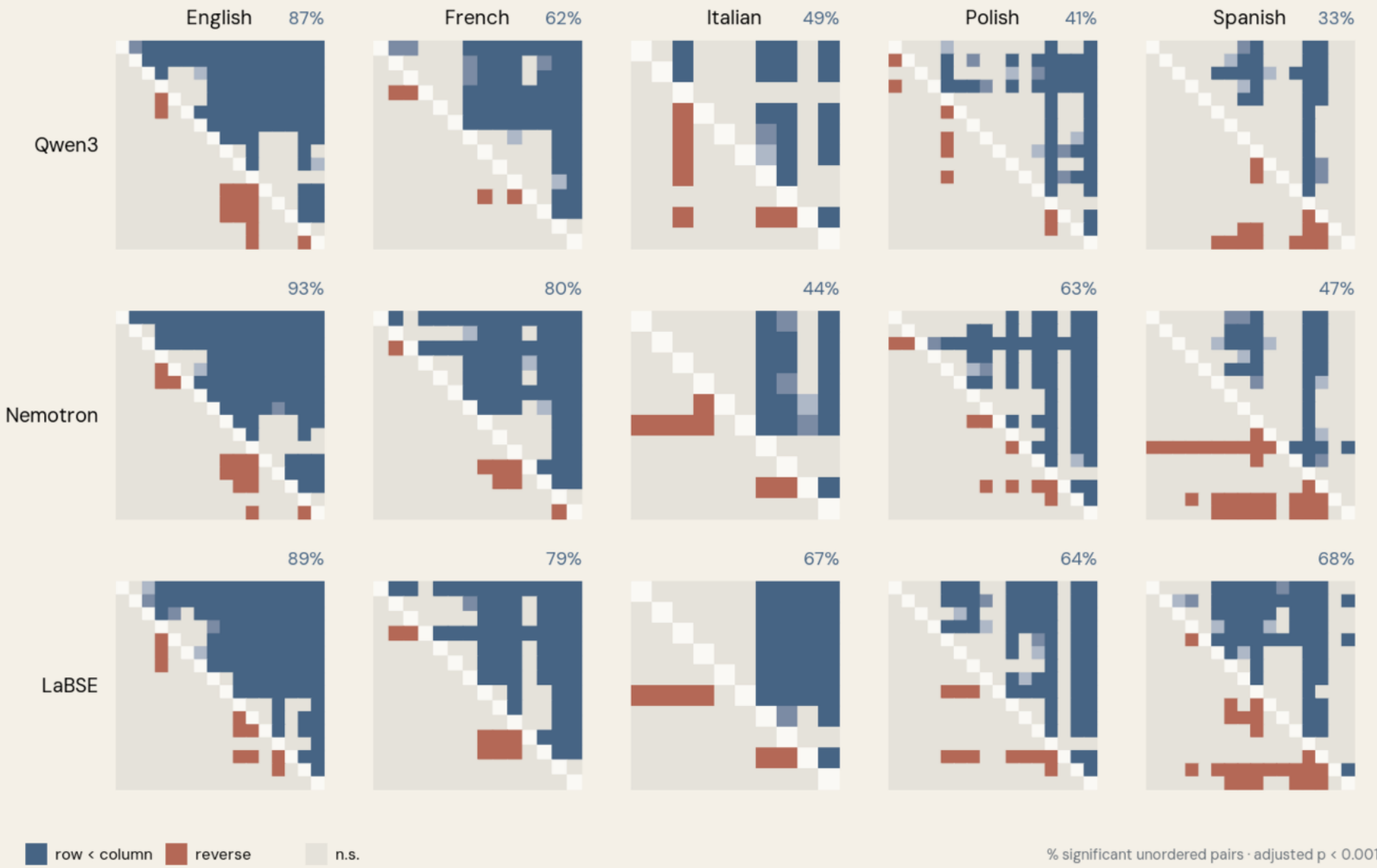
Translation comparisons across models



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Translation comparisons across models



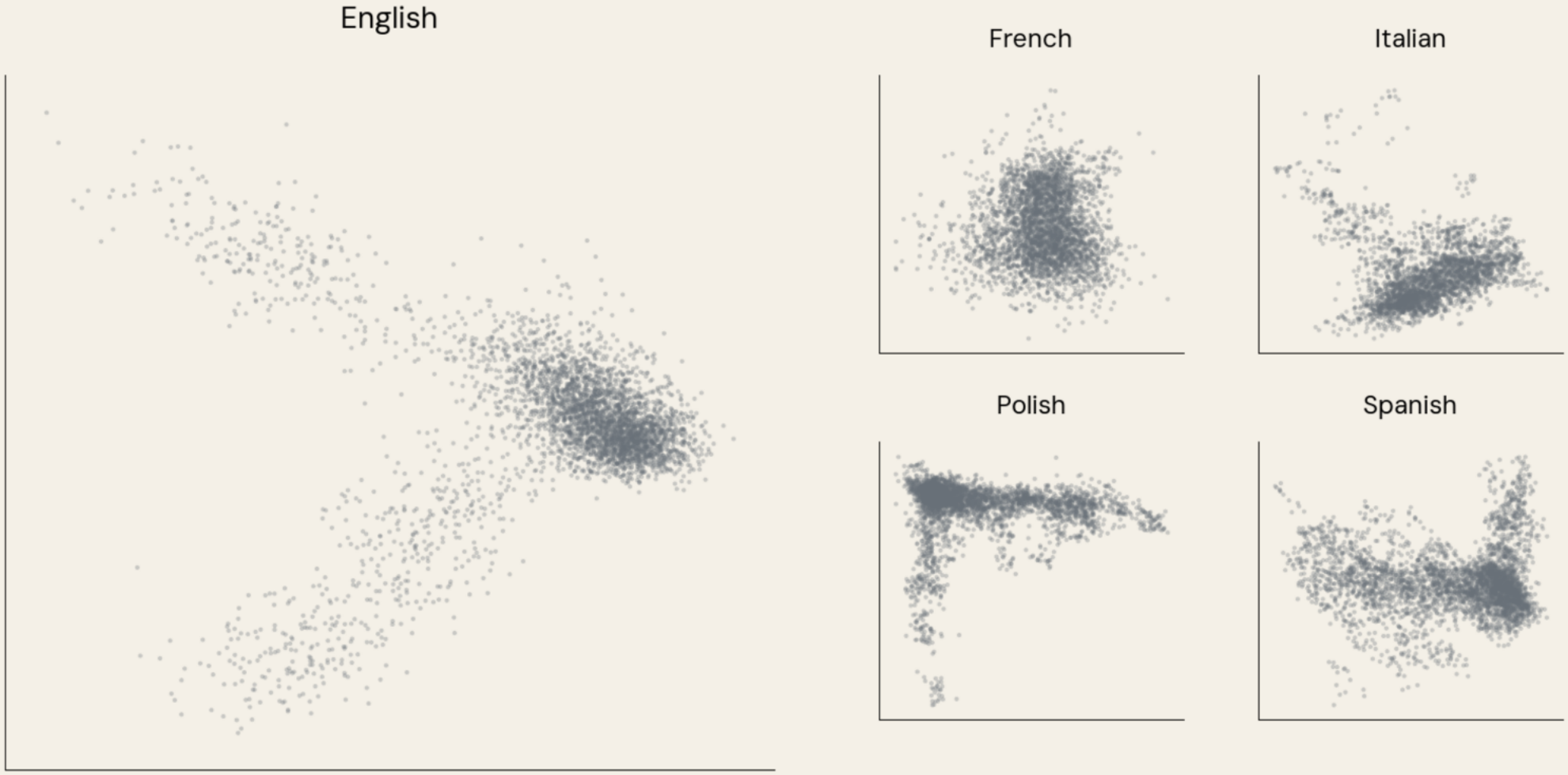


magnitude → direction

Intervention topology

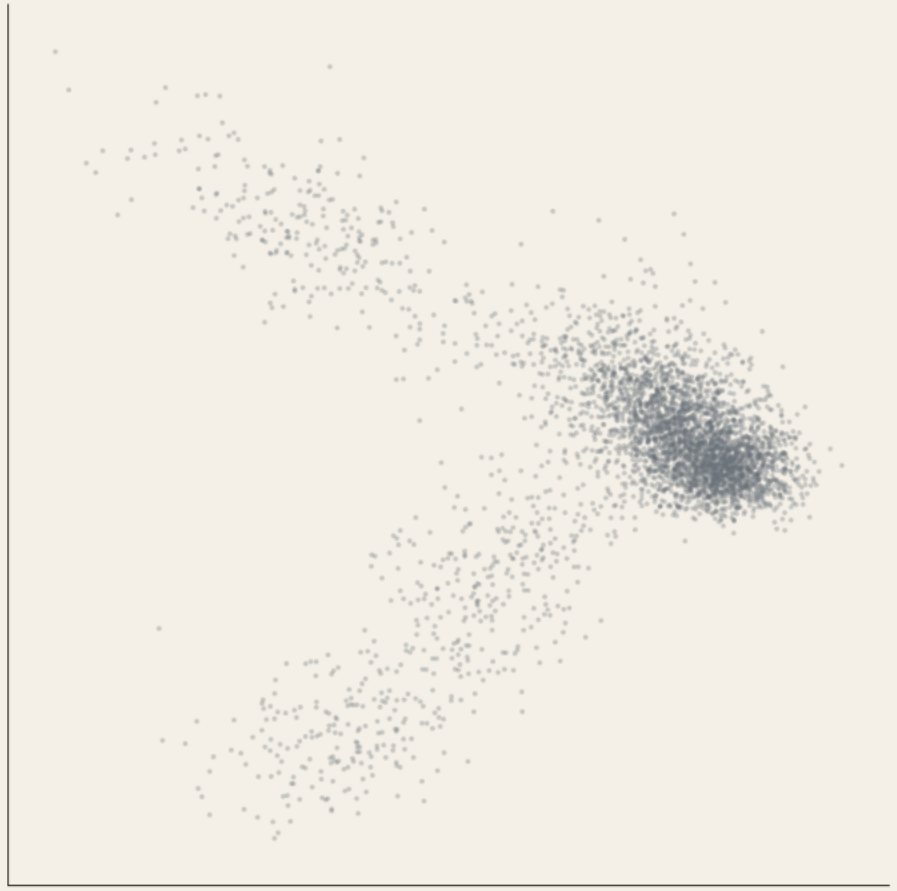


Intervention topology



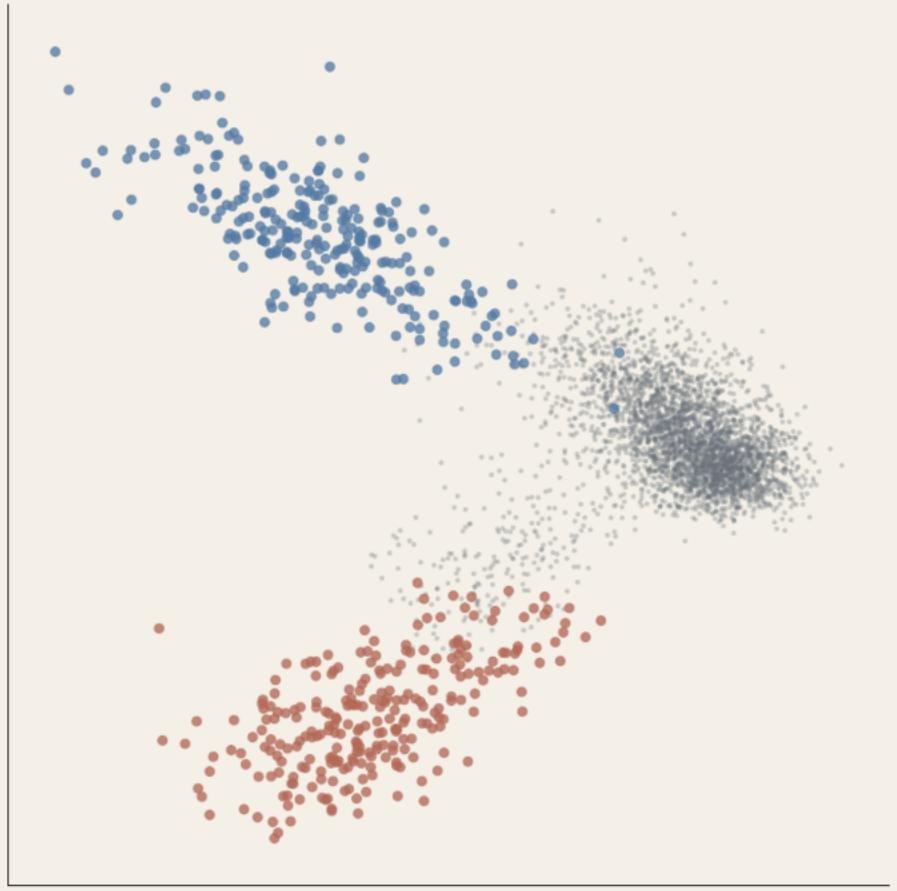
one point per translation × chapter · PCA fitted separately within each language

English topology



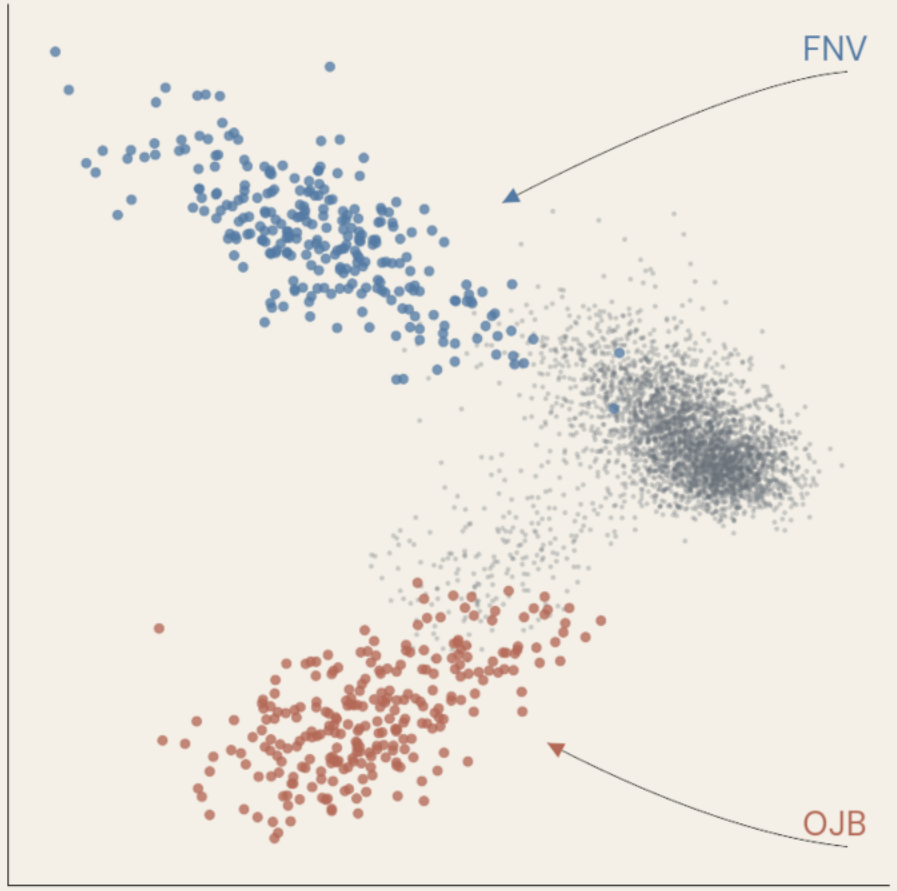
English chapter-level intervention topology · one point per translation × chapter

English topology



English chapter-level intervention topology · one point per translation × chapter

English topology

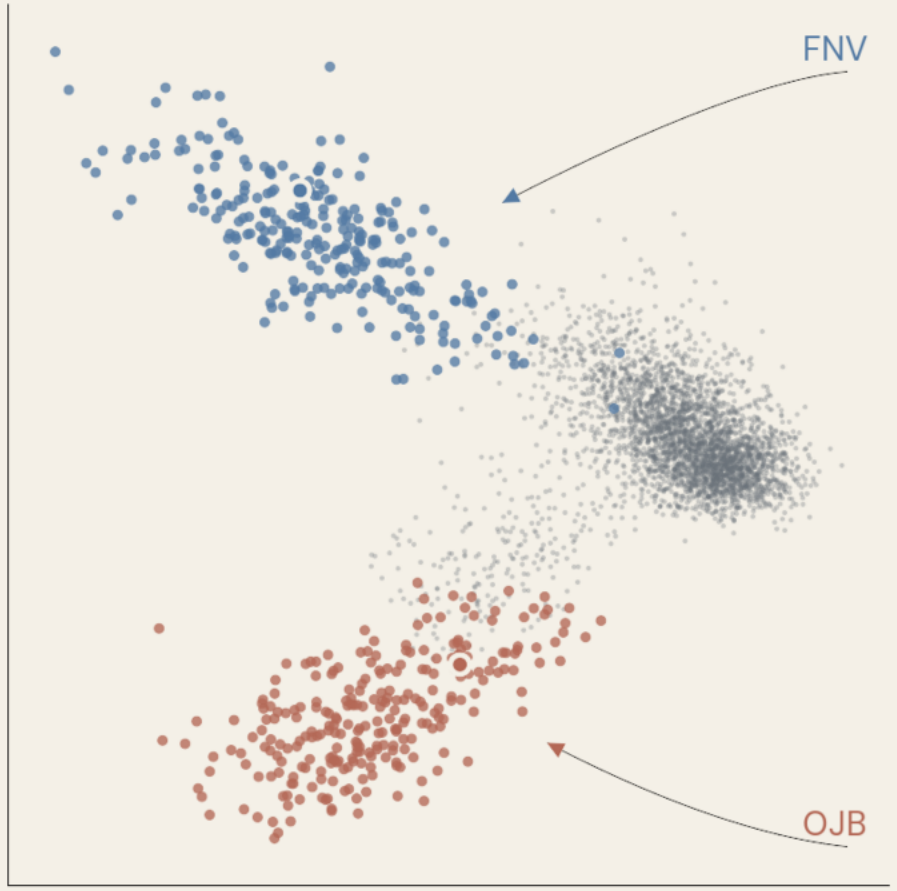


English chapter-level intervention topology · one point per translation × chapter

Acts 17:33

Greek

Οὕτως ὁ Παῦλος ἐξῆλθεν ἐκ μέσου αὐτῶν.



English chapter-level intervention topology · ACT 17 highlighted

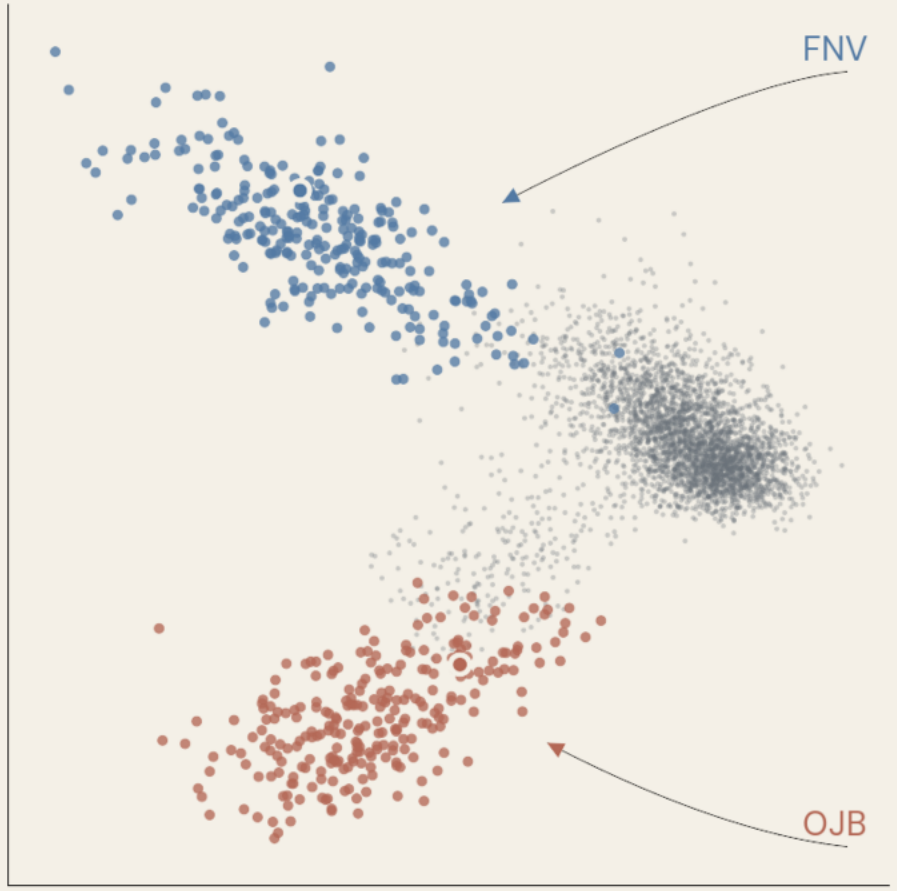
Acts 17:33

Greek

Οὕτως ὁ Παῦλος ἐξῆλθεν ἐκ μέσου αὐτῶν.

Interlinear

Thus Paul went out from the midst of them.



English chapter-level intervention topology · ACT 17 highlighted

Acts 17:33

Greek

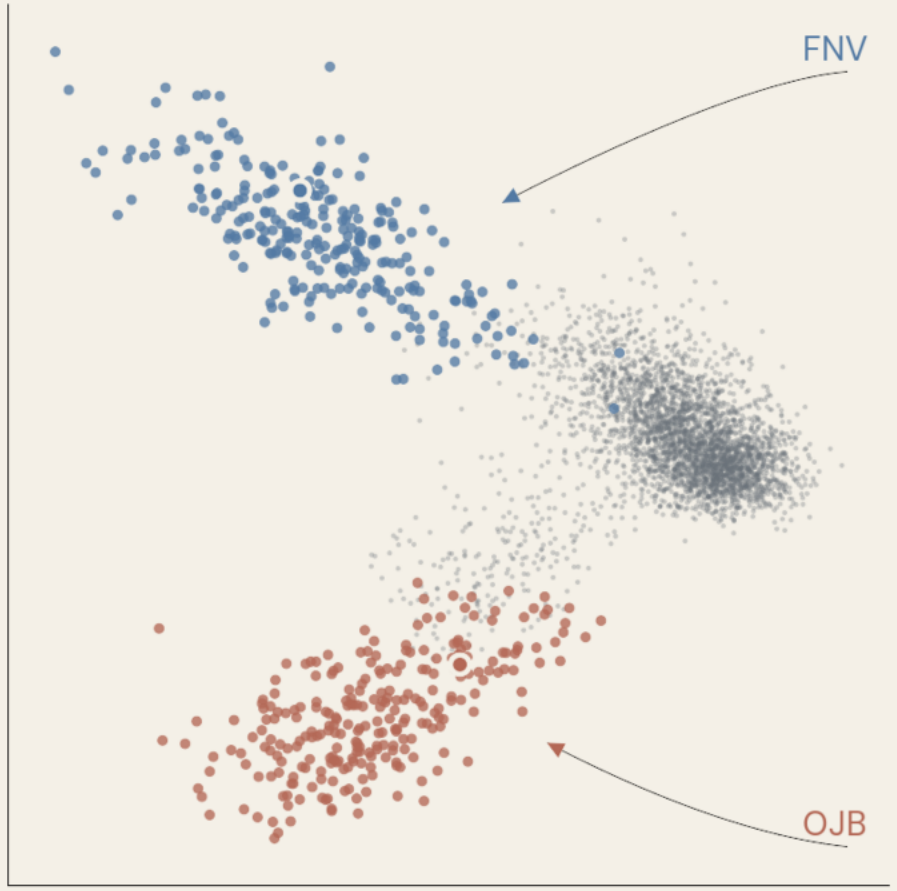
Οὕτως ὁ Παῦλος ἐξῆλθεν ἐκ μέσου αὐτῶν.

Interlinear

Thus Paul went out from the midst of them.

FNV

So Small Man went on his way.



English chapter-level intervention topology · ACT 17 highlighted

Acts 17:33

Greek

Οὕτως ὁ Παῦλος ἐξῆλθεν ἐκ μέσου αὐτῶν.

Interlinear

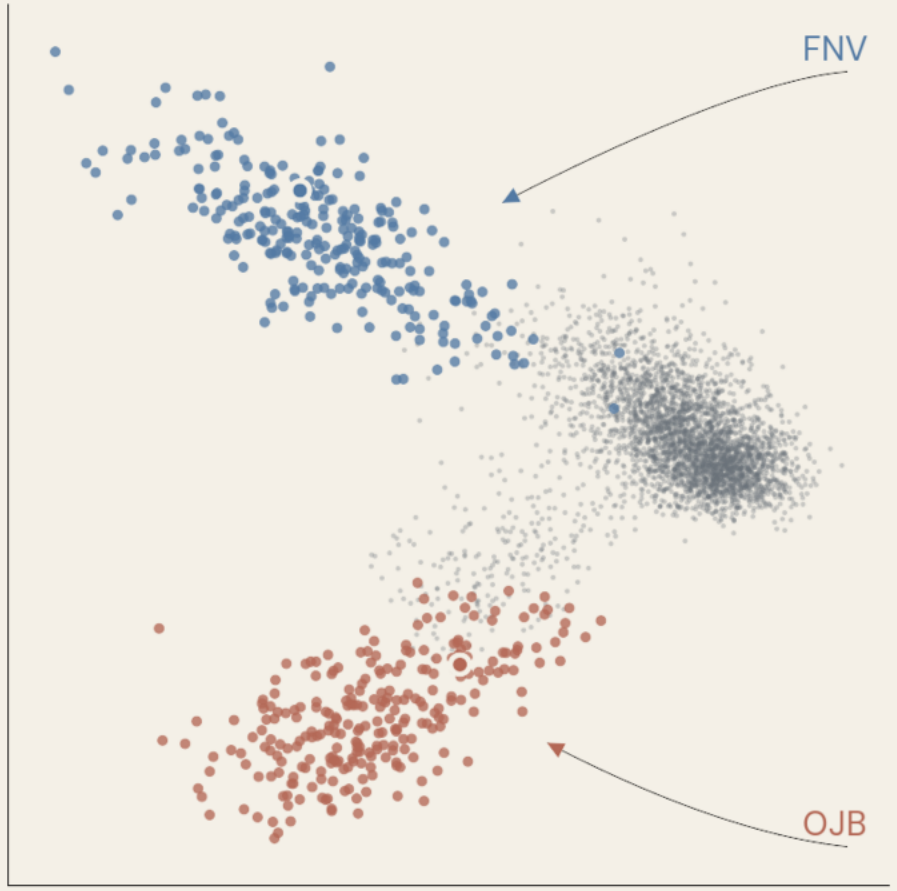
Thus Paul went out from the midst of them.

FNV

So Small Man went on his way.

OJB

Thus did Rav Sha’ul go out from the midst of them.



English chapter-level intervention topology · ACT 17 highlighted

Next steps



Next steps



1. How can we apply the method to texts without interlinear translations?

2. Which changes does the method represent well, and which changes is it blind to?

Next steps



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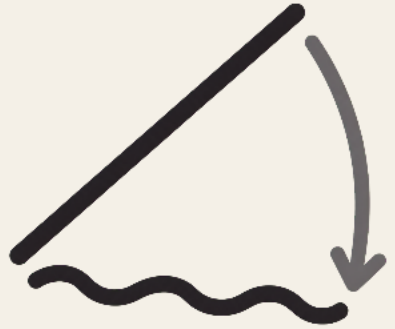
2. Which changes does the method represent well, and which changes is it blind to?

3. How much of the observed behaviour is model-specific?

4. How well do these embeddings perform on downstream tasks such as translator attribution?

Measuring the Shift: Interlinear Baselines for Quantifying Translator Intervention in Vector Spaces

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