Predictive Translation Memory in the Wild: A Study of Interactive Machine Translation Use on Lilt

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Why Interactive MT?

- **Problem**: MT systems cannot guarantee correctness. Errors can affect business reputation
- A **human in the loop** is needed to ensure correctness
- **Interactive MT**: optimizing interactions between the translator and MT system

Post-editing: Translators edit MT output

An idea with a long history (Bisbey and Kay 1972)

Post-editing: Translators edit MT output

Source text

The physicist Arthur Eddington drew on Borel's image further in The Nature of the Physical World (1928), writing: If I let my fingers wander idly over the keys of a typewriter it might happen that my screed made an intelligible sentence.

MT suggestion

Le physicien Arthur Eddington a attiré sur l'image de Borel dans le caractère du monde physique (1928), écrit: Si je laisse mes doigts se promener les bras croisés sur les touches de la machine à écrire, il peut arriver que mon chape fait une phrase intelligible.

Submit

Image Source

Green, Spence, Jeffrey Heer, and Christopher D. Manning. "The efficacy of human post-editing for language translation." *Proceedings of the SIGCHI conference on human factors in computing systems*. 2013.

Post-editing: Translators edit MT output

Pros

- Easy to implement (can use off-the-shelf MT system)
- Reduces translation time [1]

Cons

- Post-edited text is more similar to MT than unassisted translations [1]
- Translators can find post-editing frustrating [2]

[1] Green, Spence, Jeffrey Heer, and Christopher D. Manning. "The efficacy of human post-editing for language translation." *Proceedings of the SIGCHI conference on human factors in computing systems*. 2013.
[2] Gaspari, Federico, et al. "Perception vs reality: Measuring machine translation post-editing productivity." *Proceedings of the 11th Conference of the Association for Machine Translation in the Americas: Workshop on Post-Editing Technology and Practice (WPTP3)*. Vancouver: AMTA, 2014.

Predictive Translation Memory

MT system suggests text predictions that complete the translation the user has already entered

If the MT suggestion is correct, user can accept it; if it isn’t, user can type as normal.

MT suggestions update and improve as users type.

Transtype (Foster 2000)

The Canadian International Development Agency and the Canada Mortgage and Housing Corporation will be taking part in a conference which will deal with housing for the needy .

The conference will be held in the fall of 1987 .

The Canada Mortgage and Housing Corporation is now looking into the possibility of financing further conferences and forums of this

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Opération afrique 2000 qui a été lancée par moi est une exemple de la détermination du Canada pour aider les gens des régions rurales d' Afrique à surmonter la famine et à briser le cycle de pauvreté

L' a gence canadienne de développement international
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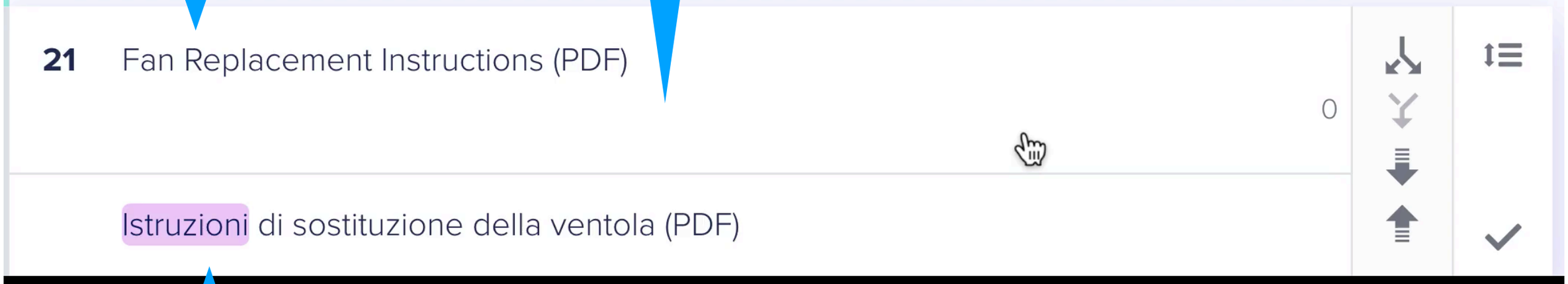
MT suggestion starting with “L’a”

Lilt's Interactive MT

Source text

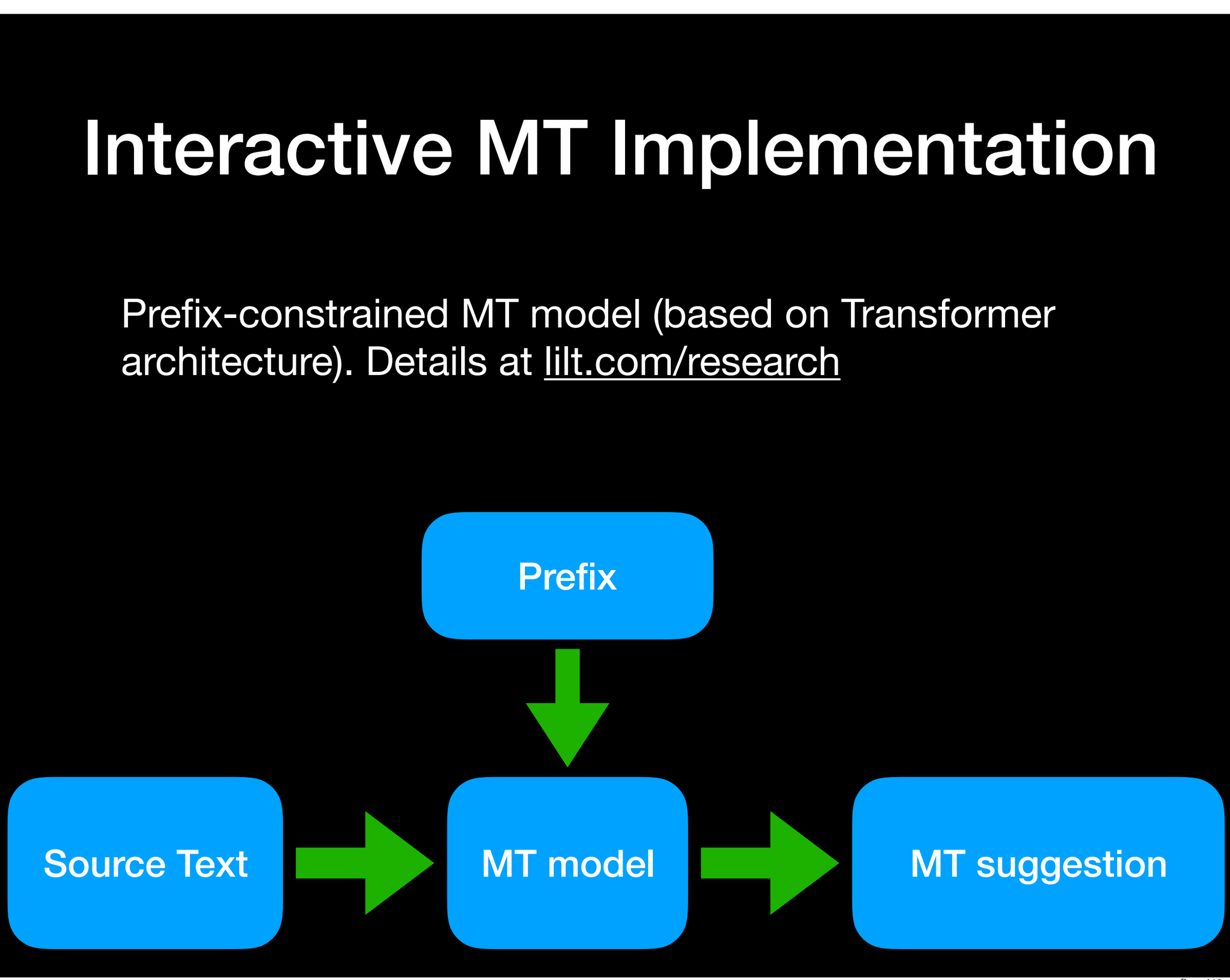
To enter text, user can:
1) Accept the MT-suggested word (Enter)
2) Accept the rest of the MT suggestion (Shift-Enter)
3) Just type normally



MT-suggested completion that continually updates so that it starts with the currently-entered translation

Interactive MT Implementation

Prefix-constrained MT model (based on Transformer architecture). Details at lilt.com/research



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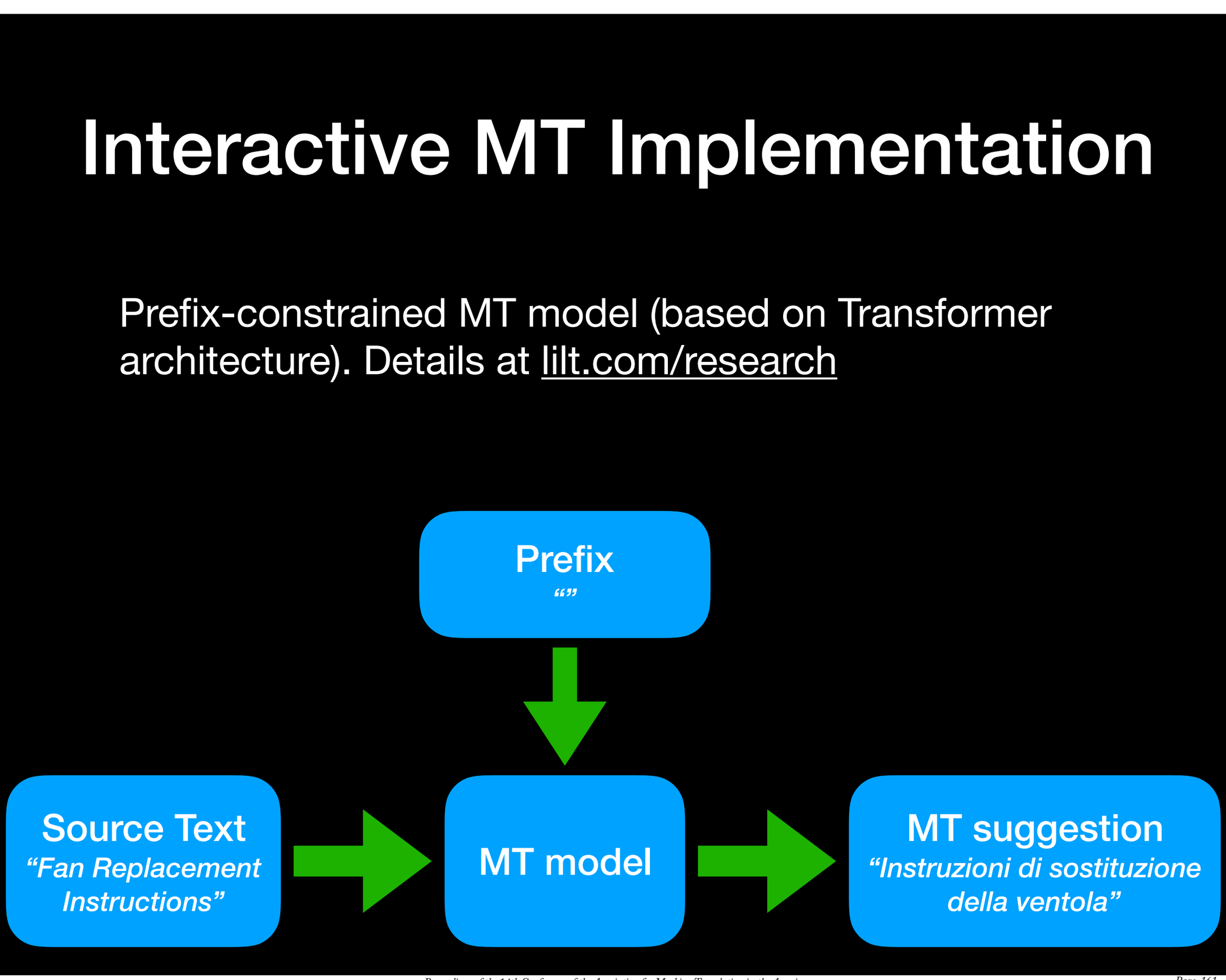

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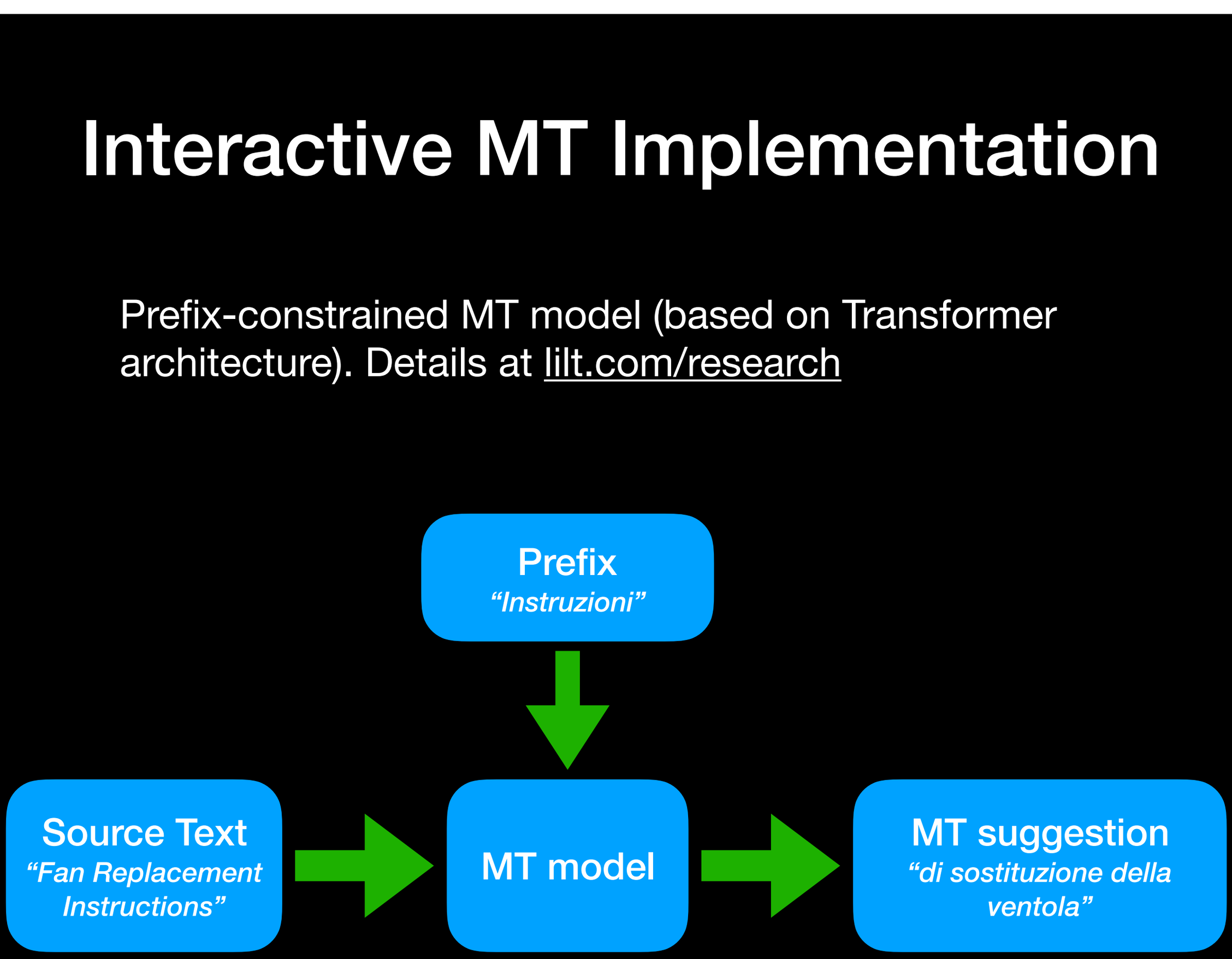

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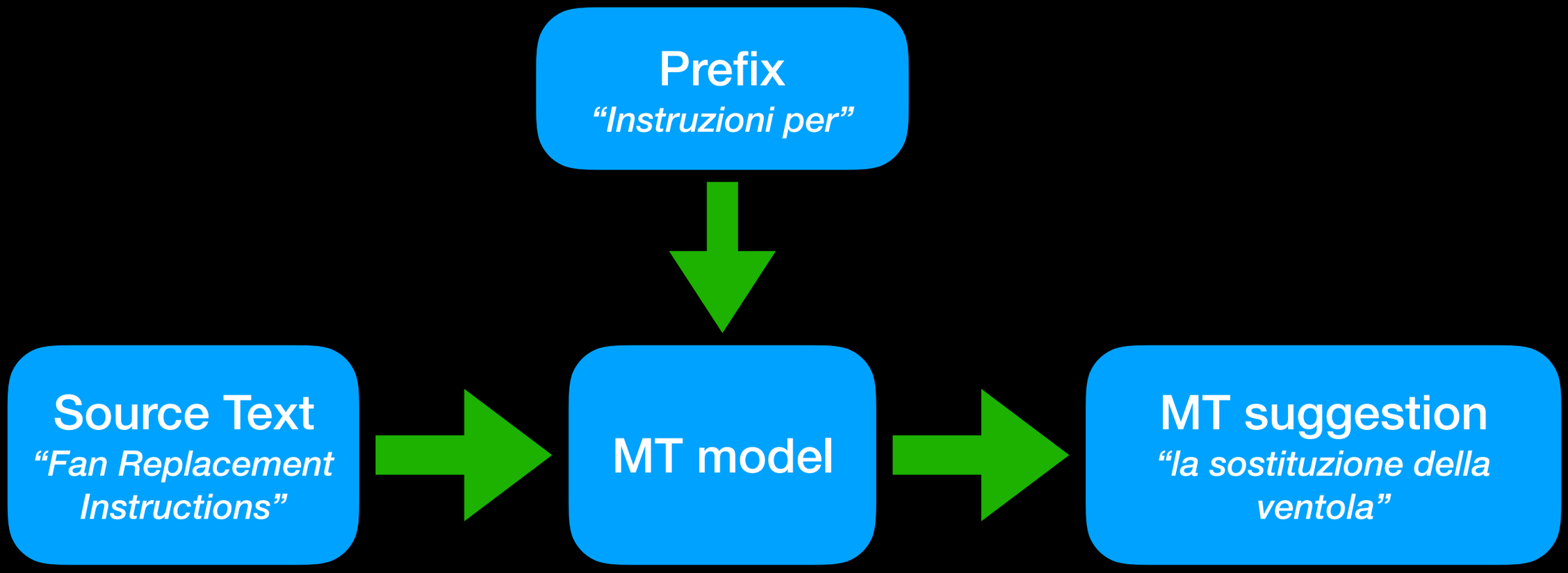

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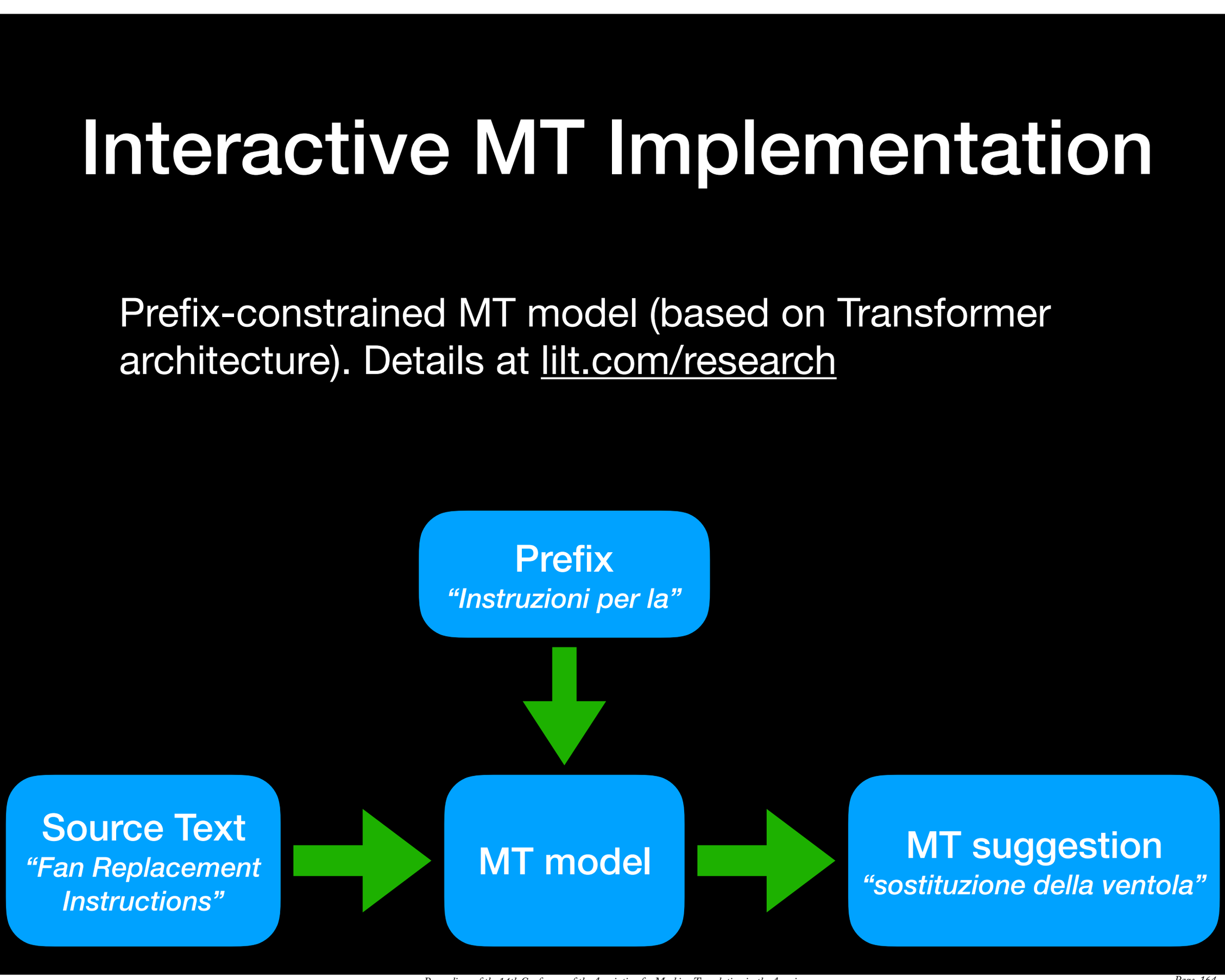

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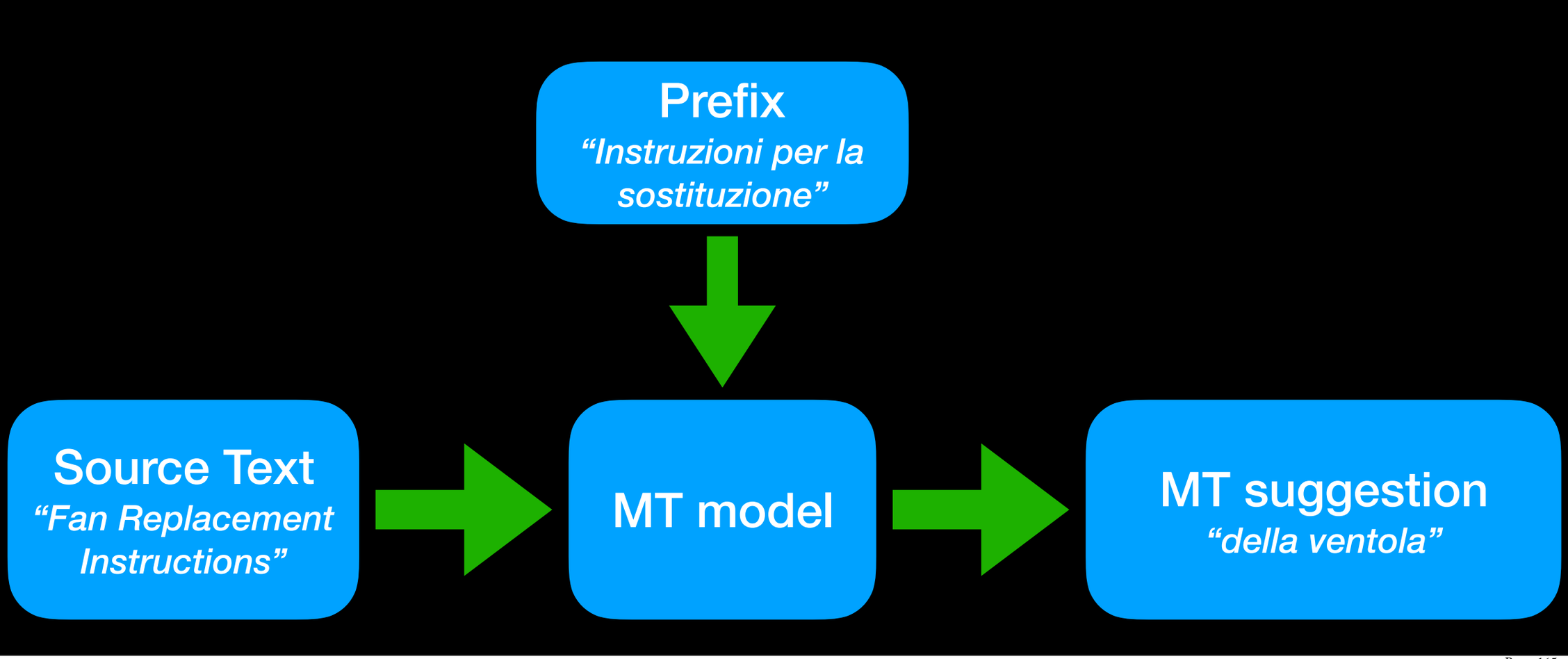

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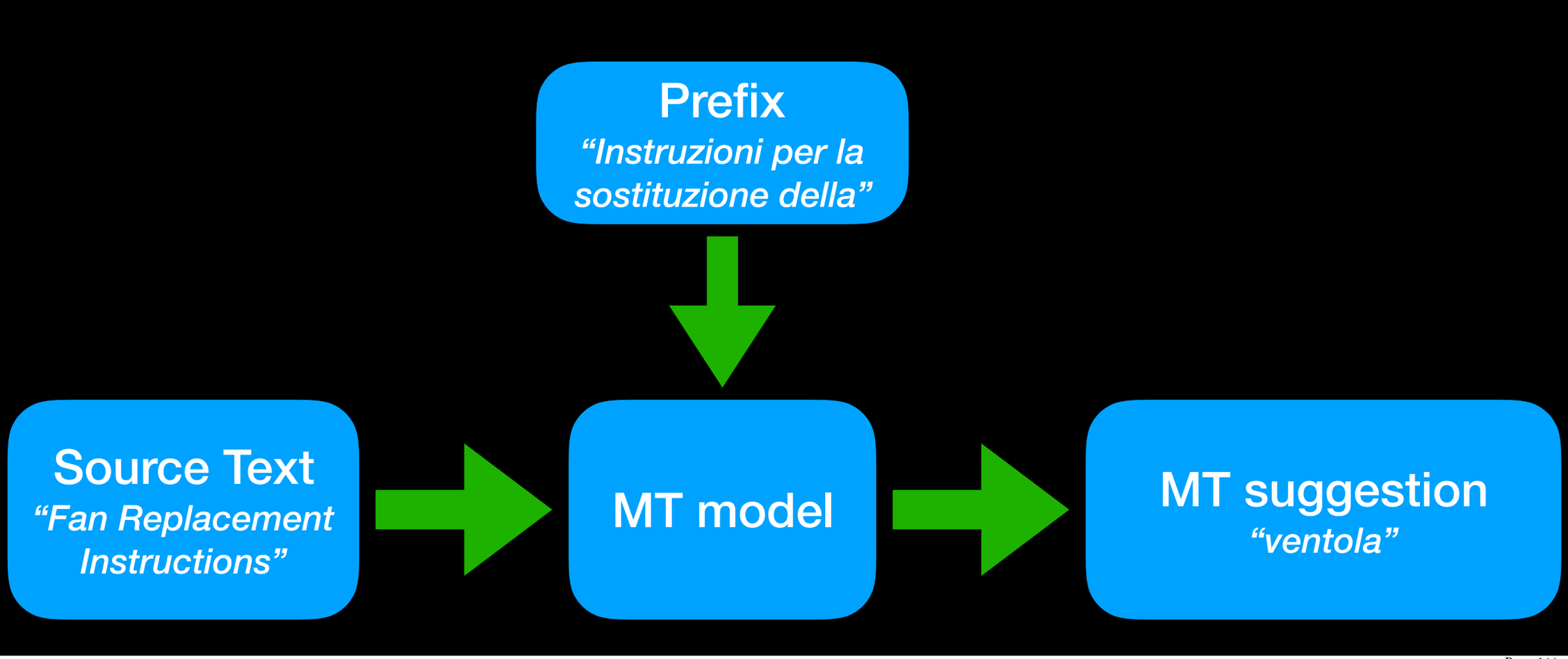
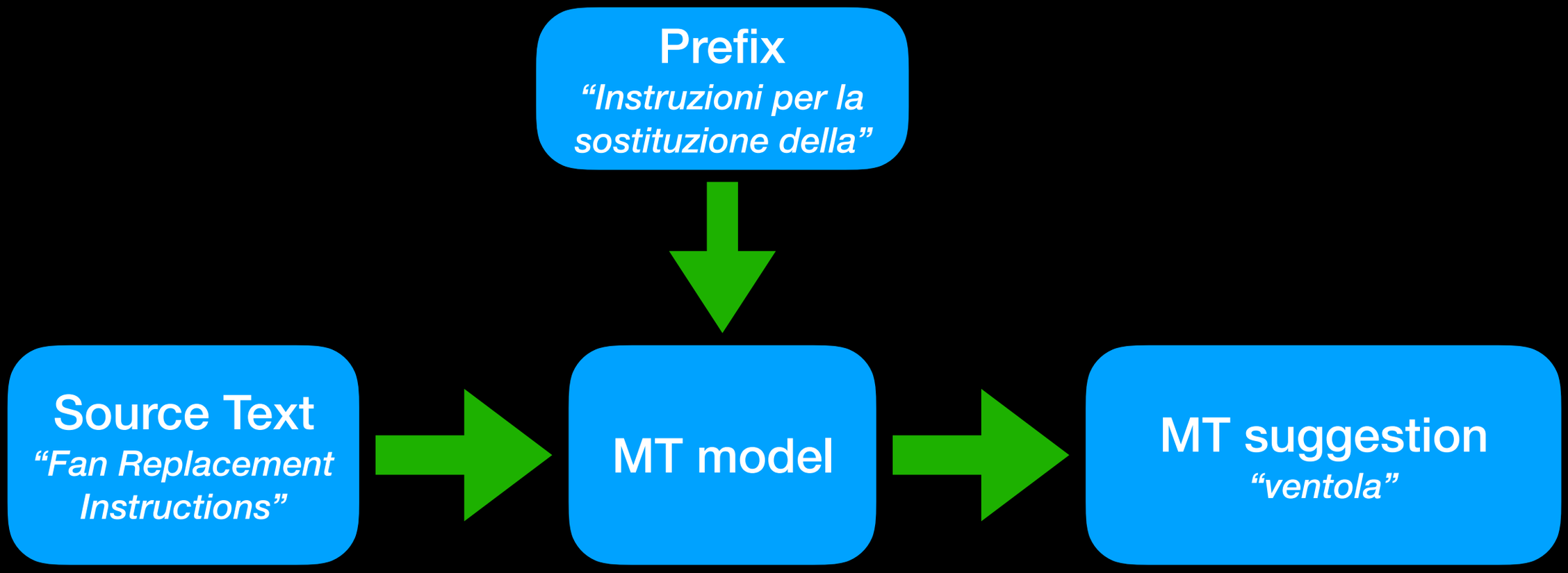


Interactive MT needs to be fast

New MT suggestion needs to be computed whenever the user's entered text no longer matches the MT prediction.

90% of our MT requests are computed in less than 500ms



https://lilt.com/app/projects/details/148716/edit-document/988438 1195 x 657 DEV TOOLS

File View Tools Settings **383** words per hour

17 Click 1 /1 or the topic for details: QA

Fare clic su 1 /1 o sull'argomento per informazioni dettagliate:

18 Option 1: Receive and install a new fan. QA

Opzione 1: ottieni e installa una nuova ventola.

19 You can request a replacement fan kit and replace the fan yourself. 67

Puoi richiedere un kit di sostituzione della ventola e sostituirla.

Puoi richiedere un kit di sostituzione della ventola e sostituire la ventola.

20 Review the fan replacement instructions before deciding on this option.

21 Fan Replacement Instructions (PDF)

22 PDF icon QA

ka14U0000004uIVQAY_xml.sdlxliff (English › Italian (Italy)) Segment 19 of 32 (24 confirmed) **145 / 235** words translated, estimated time to complete **0h 14m**

1:19 / 42:36 NOTE AND SHARE 1X SKIPPING INACTIVITY EXIT FULL SCREEN

How helpful is Lilt's Interactive MT?

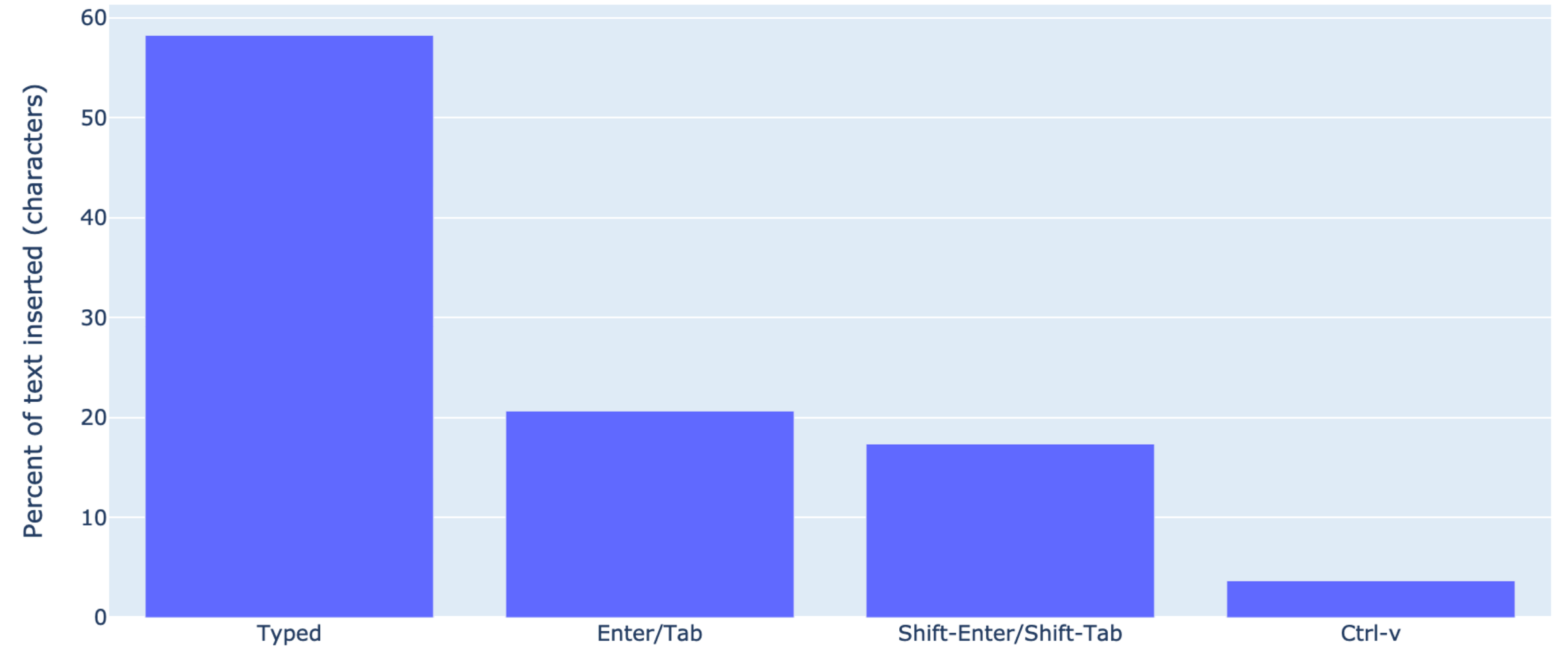
- How often do translators use our MT suggestions?
- How often are our MT suggestions available and correct?
- How much do translators use our word-level suggestions, and how much do they post-edit?
- How do translators spend time on Lilt?

How often do translators use our MT suggestions?

- Check how much text is inserted via Enter and Shift-Enter
- Data is from August to September 2020
- We consider only newly-generated* segments

*newly-generated segments = no TM matches, no segments majority copy-pasted

Keys through which text is inserted



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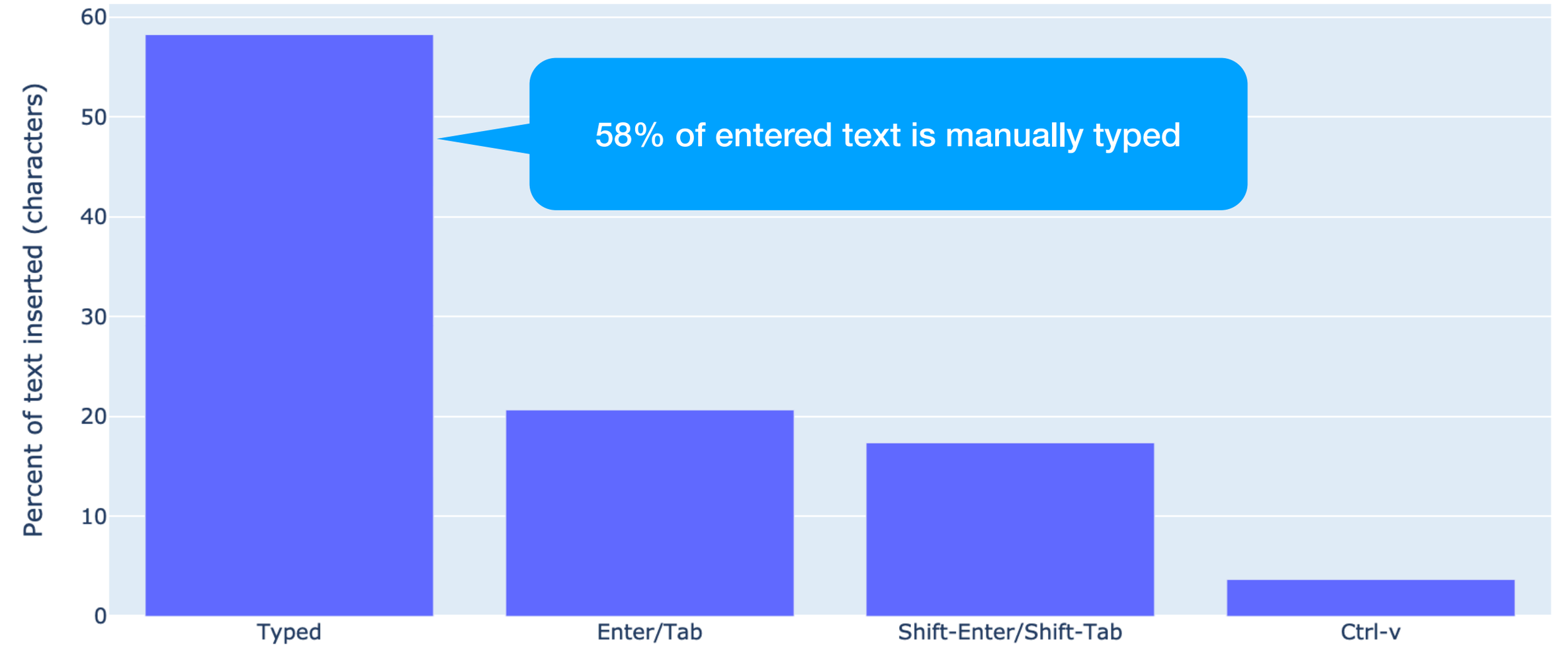

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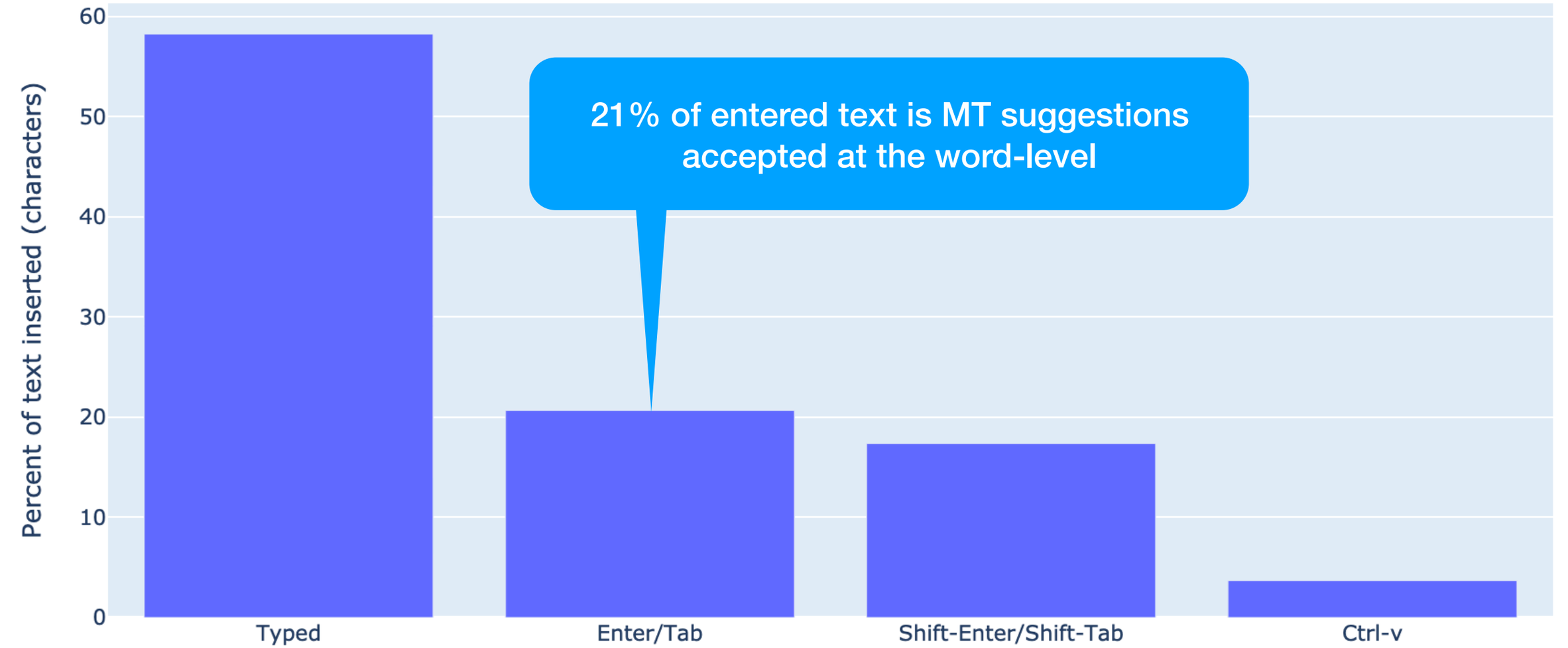

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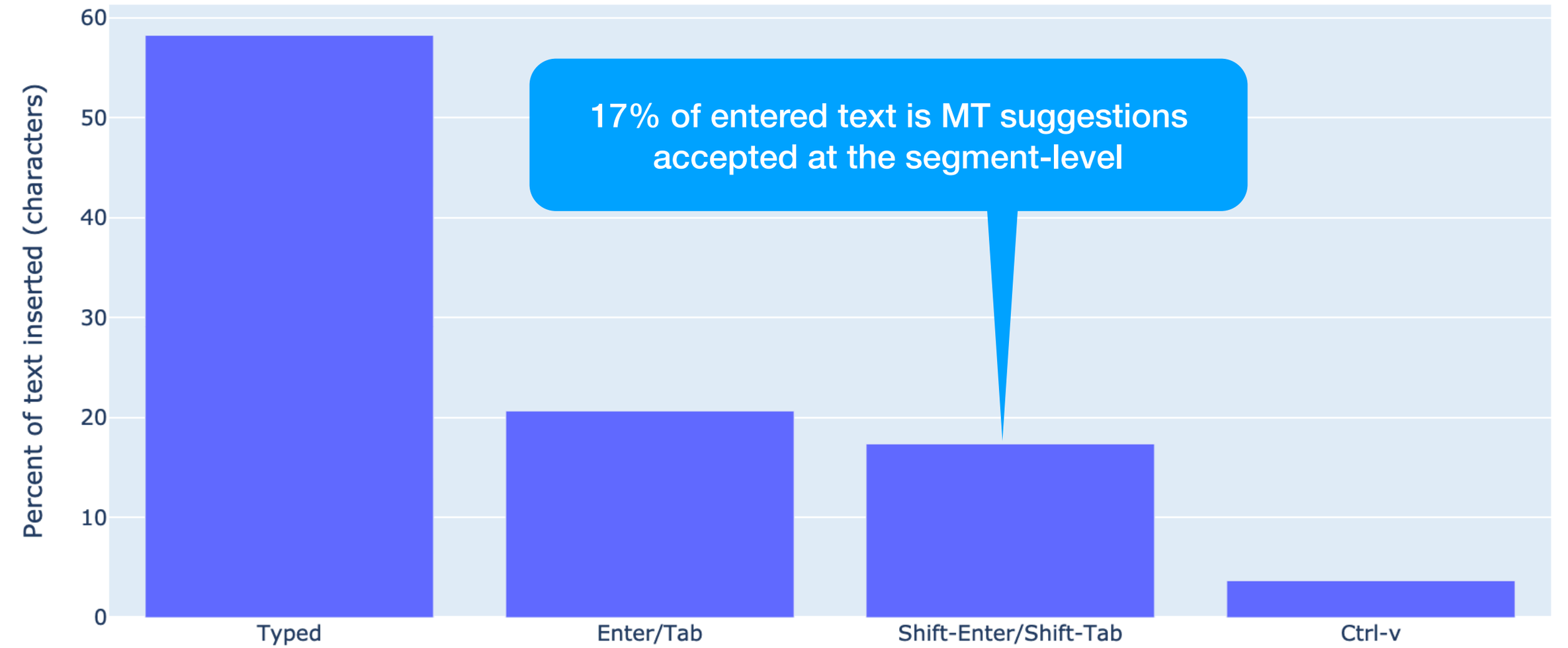
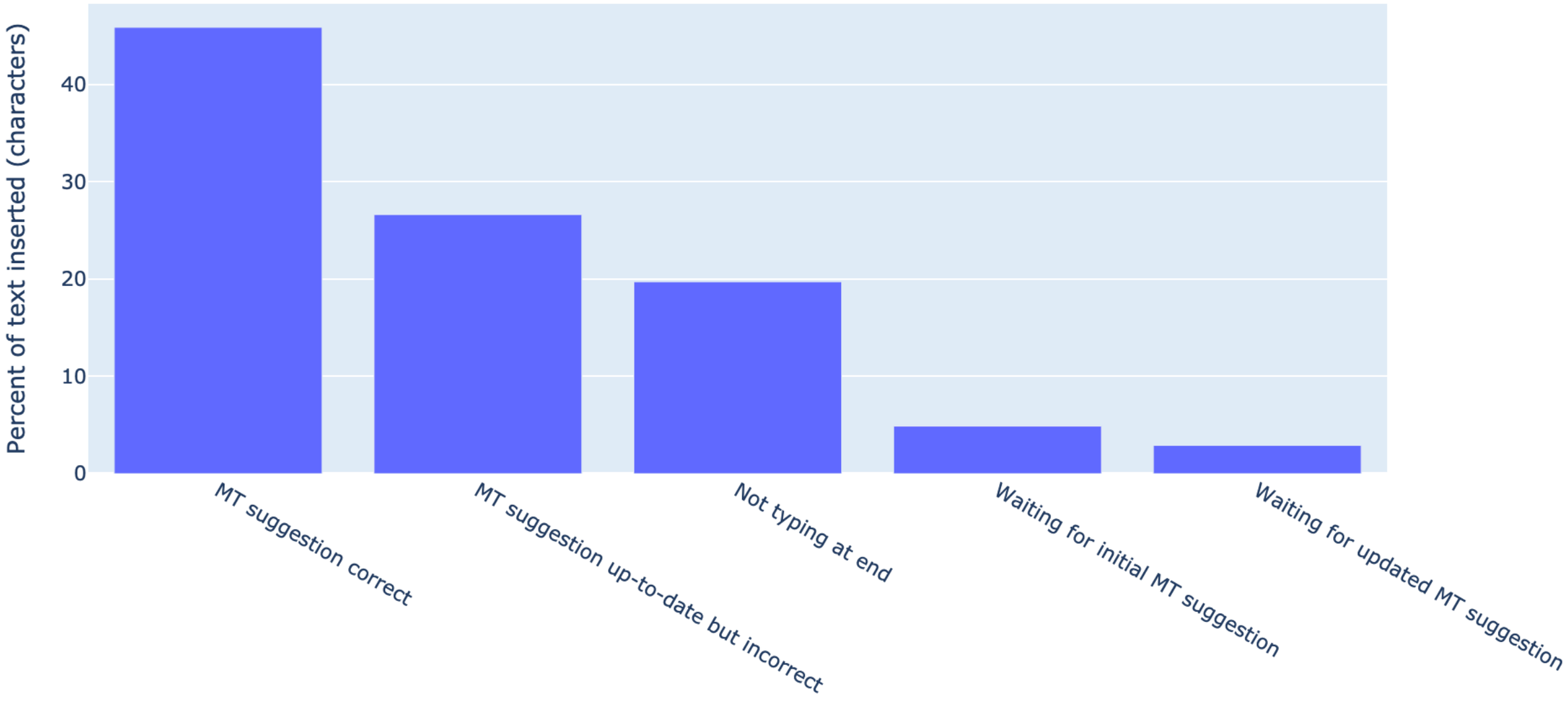


Why aren’t translators using our MT suggestions more?

- Maybe translators aren’t aware they can press Enter?
- Maybe they aren’t editing at the end of the segment?
- Maybe the MT suggestion takes too long to show up?
- Maybe the MT suggestions don’t match what the translator wants to type?

How often are our MT suggestions available and correct?



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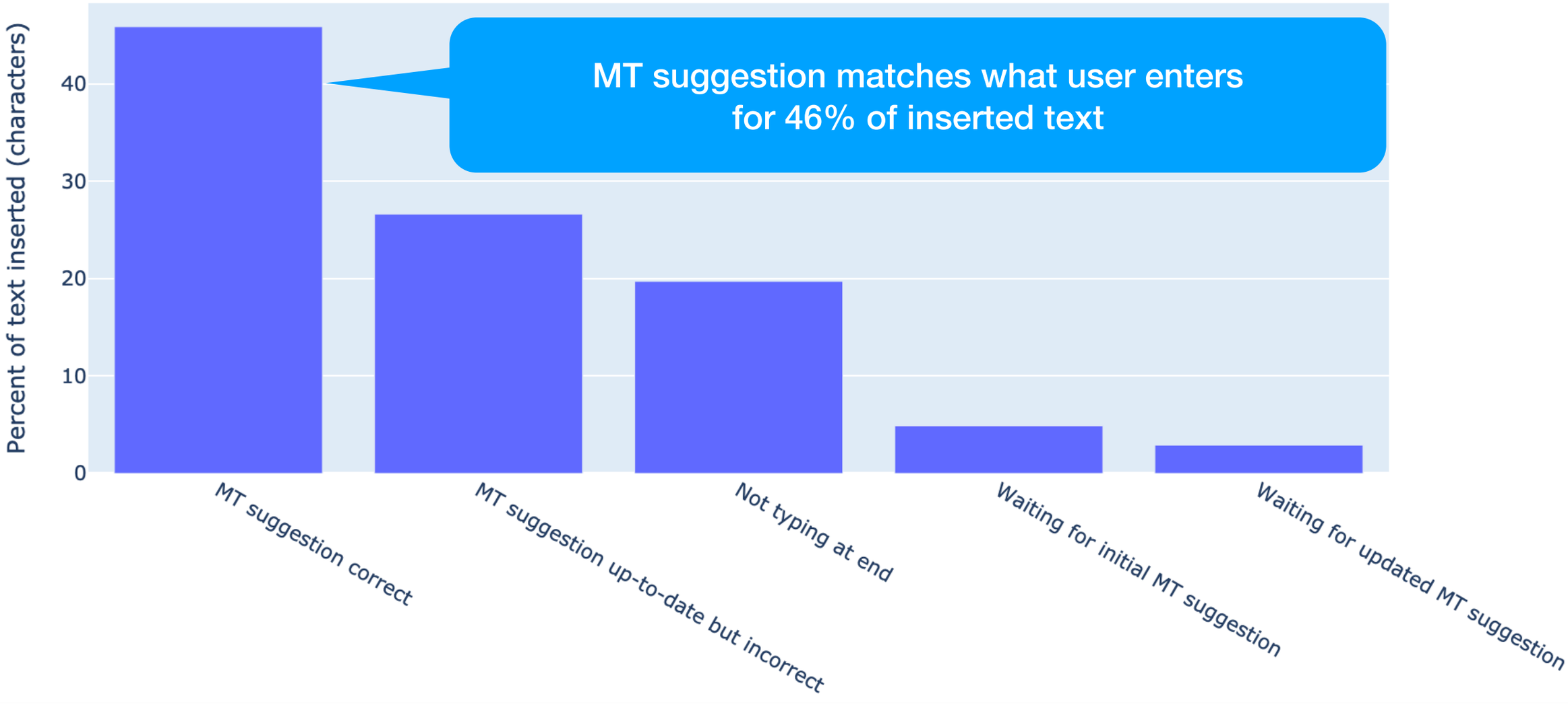

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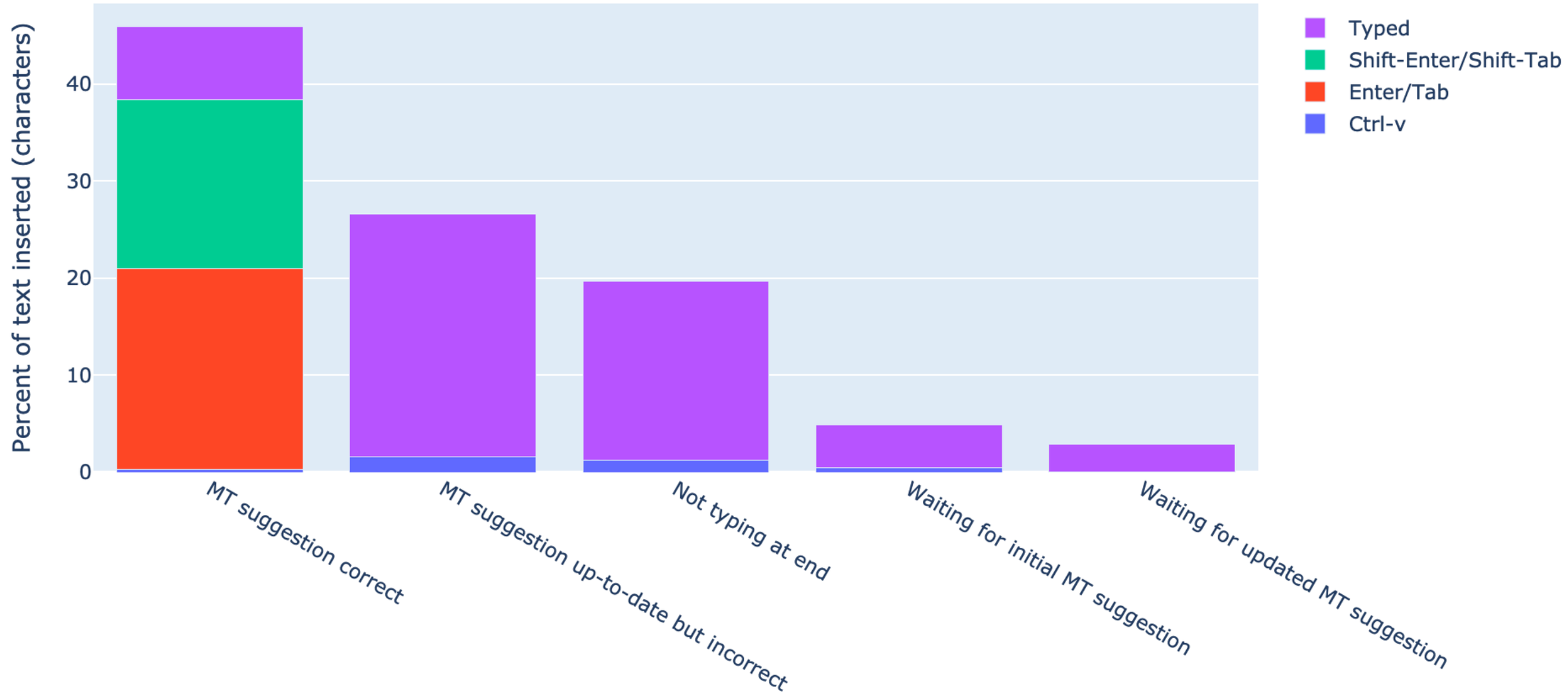

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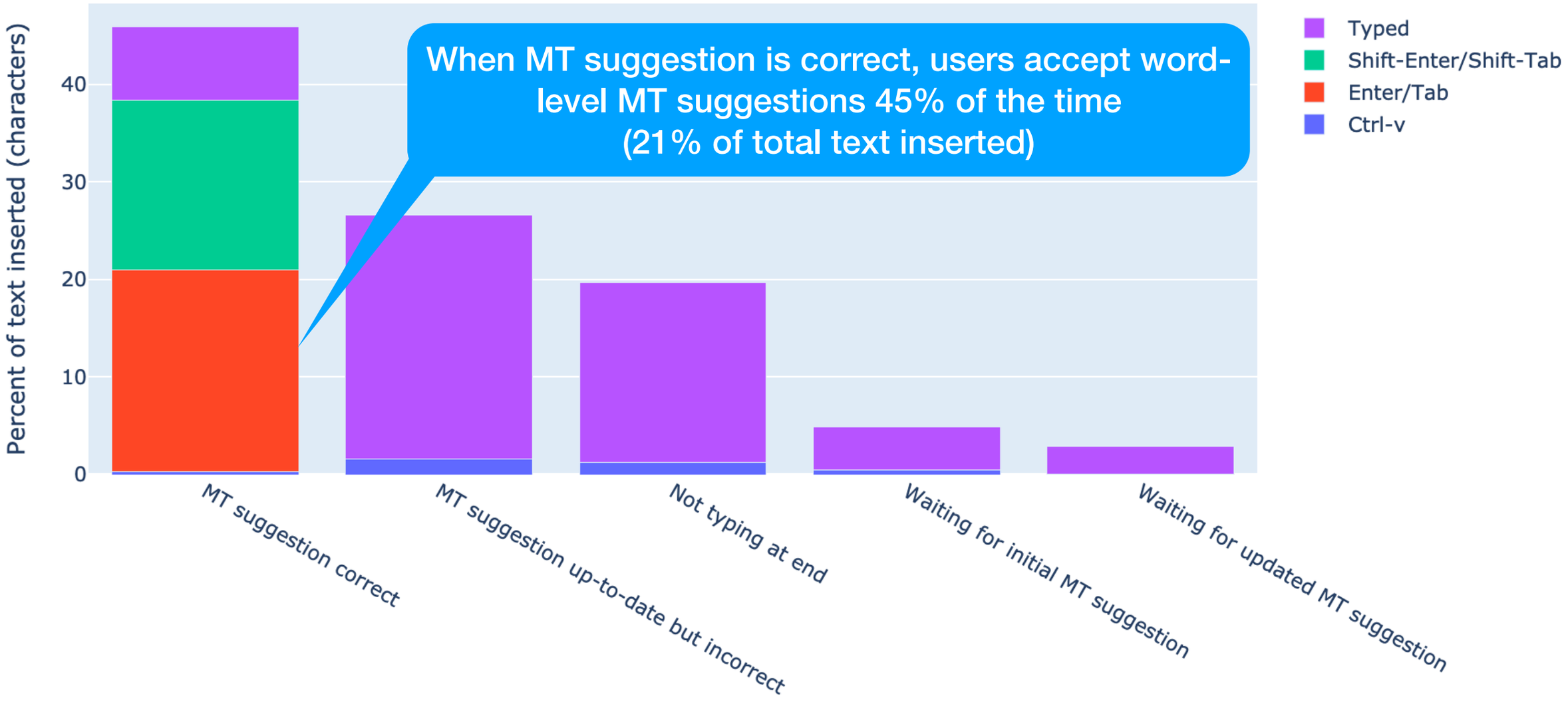

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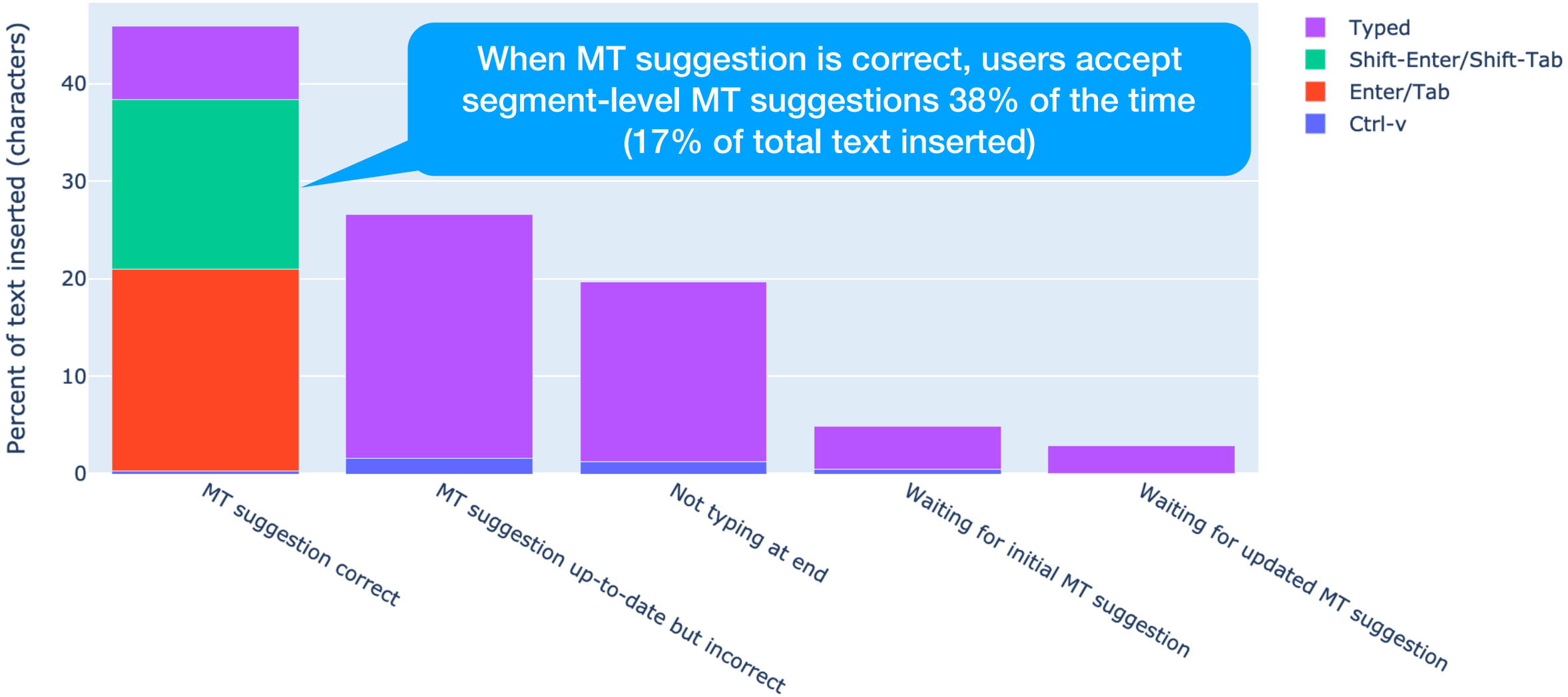

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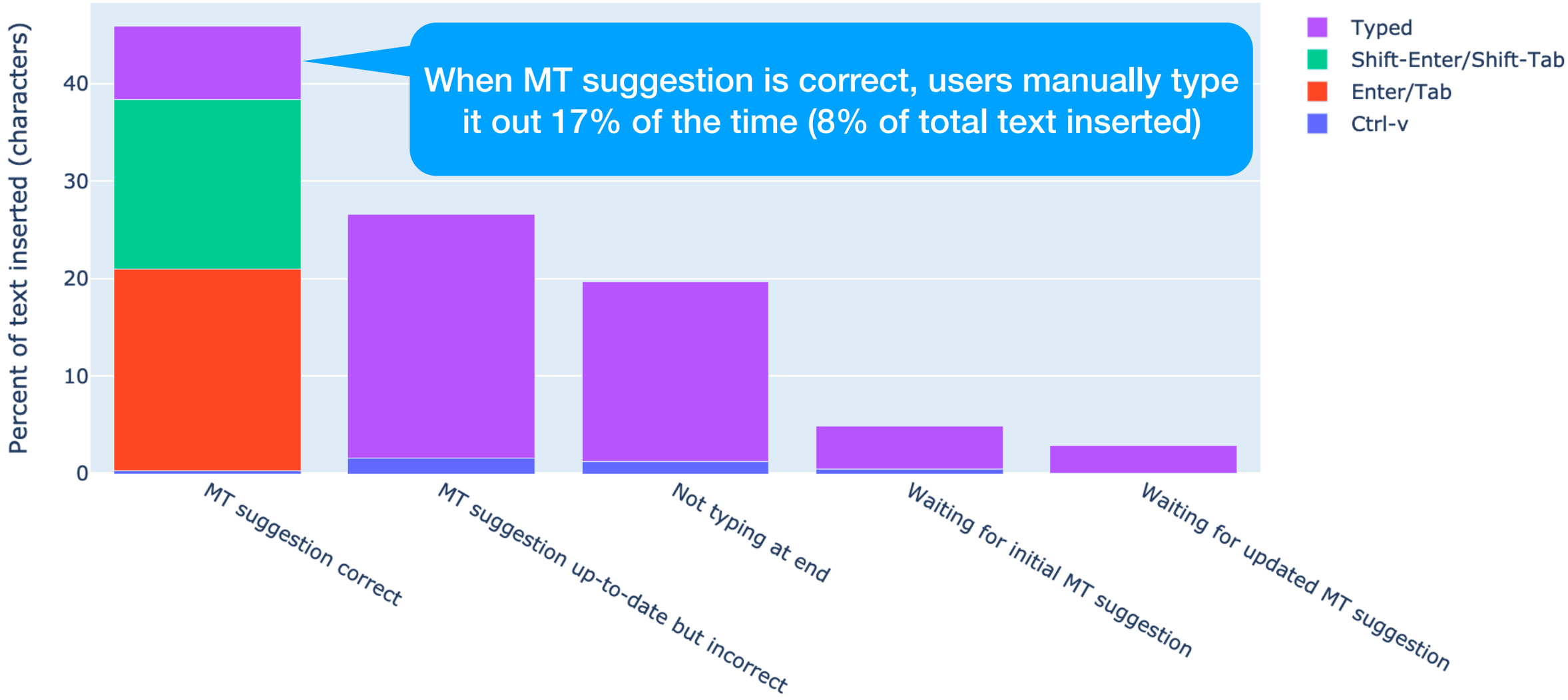

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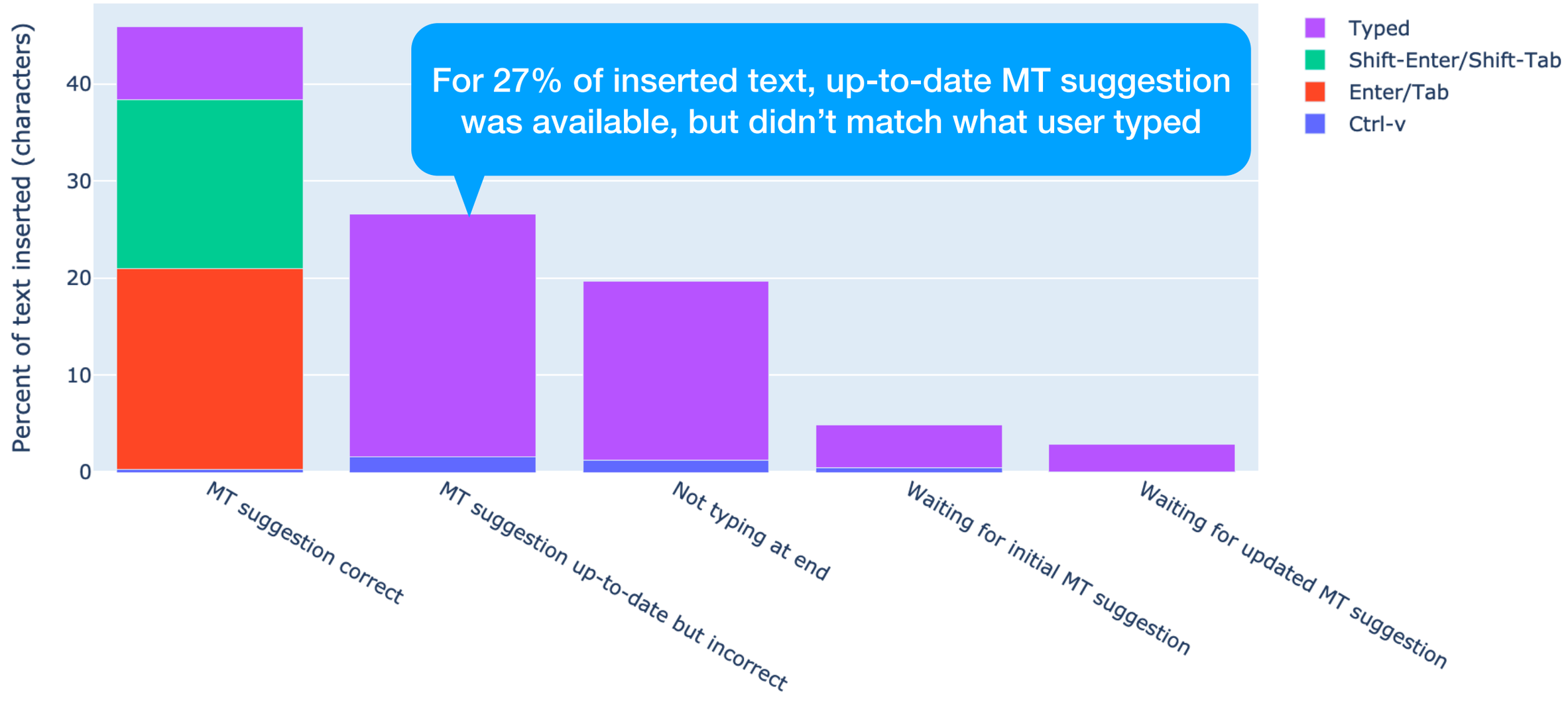

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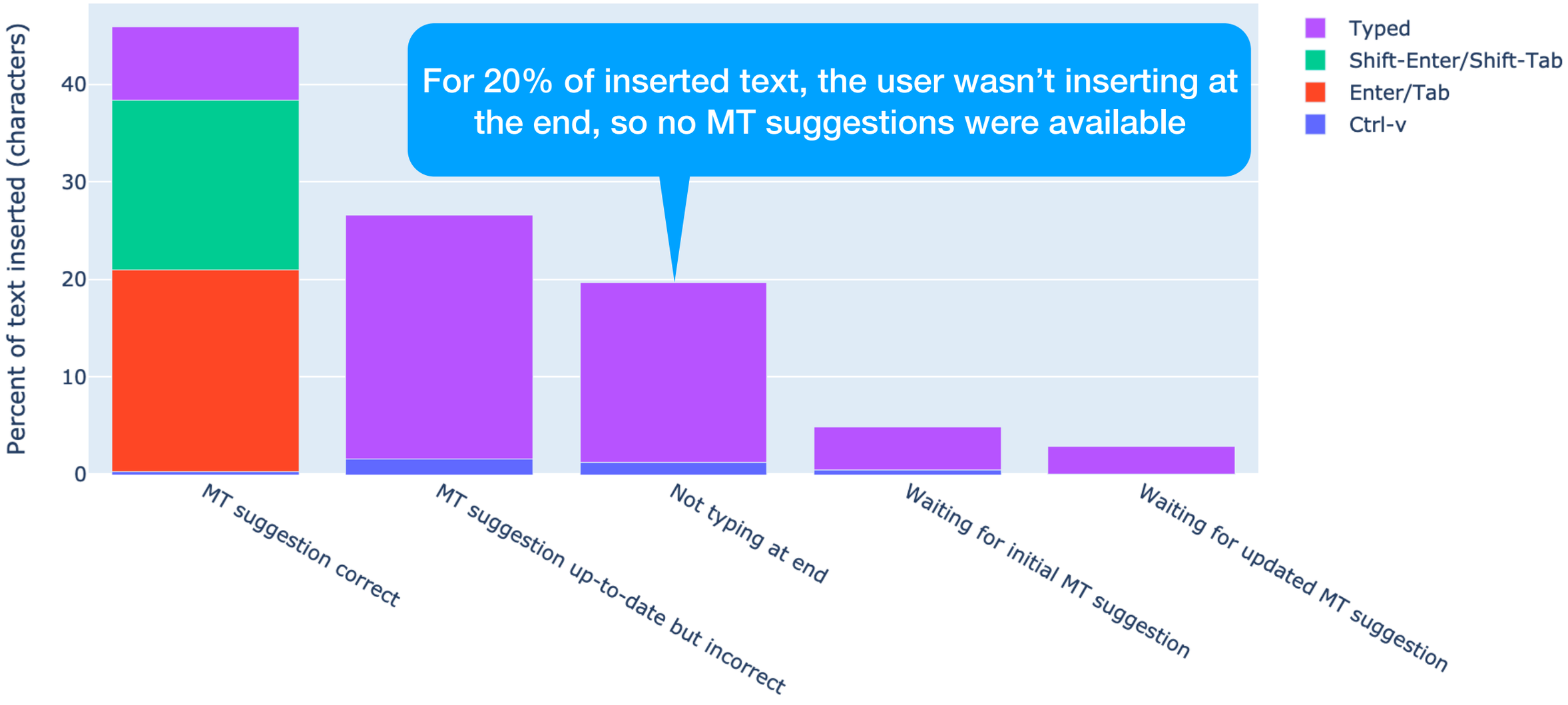

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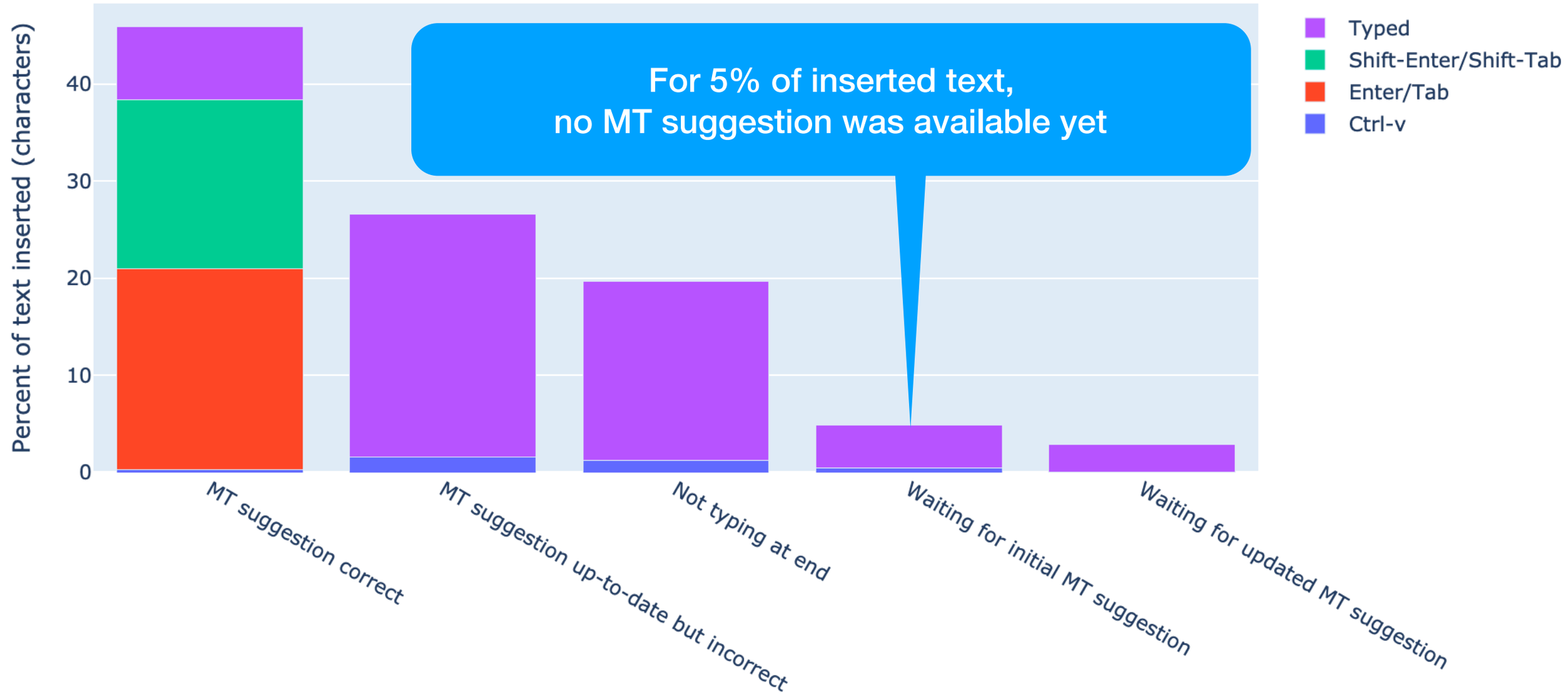

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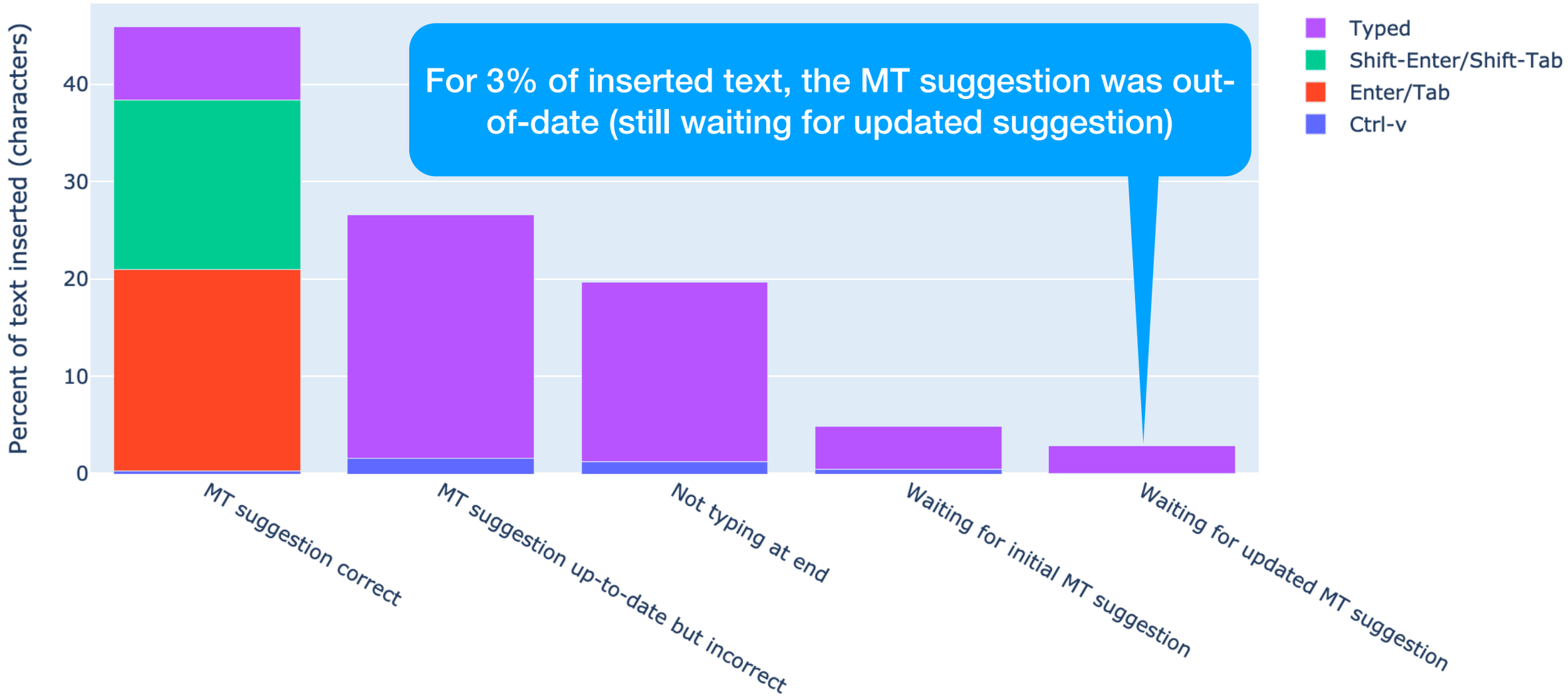
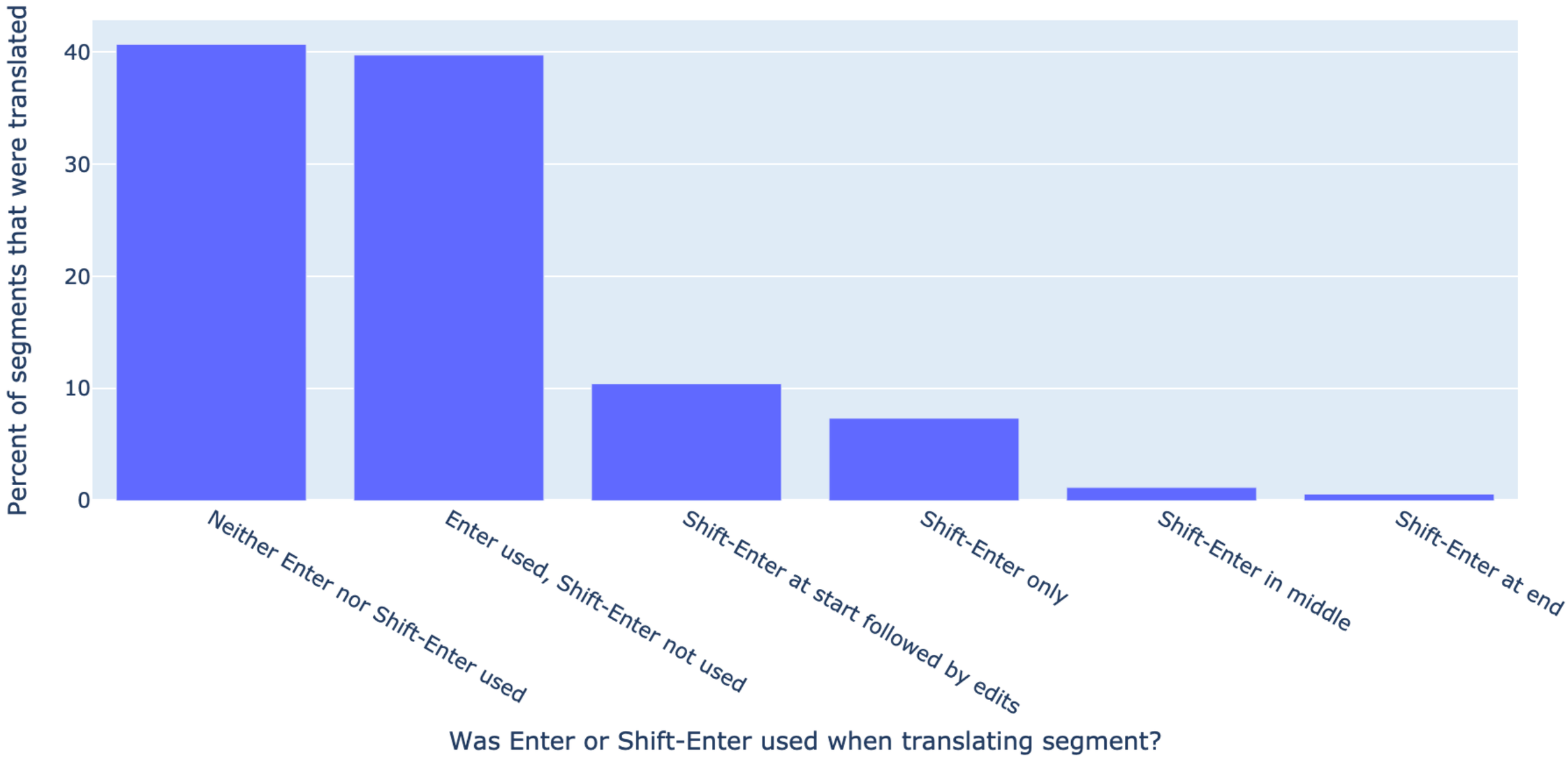


Are users using Lilt interactively, or as a post-editing system?

- We see a lot of users are using Shift-Enter (accept the entire remaining MT suggestion)
- We also see a lot of users making insertions outside the end of the segment
- Are more users using Lilt in an interactive, suffix-suggestion style, or post-editing?

Are users using Lilt interactively, or as a post-editing system?



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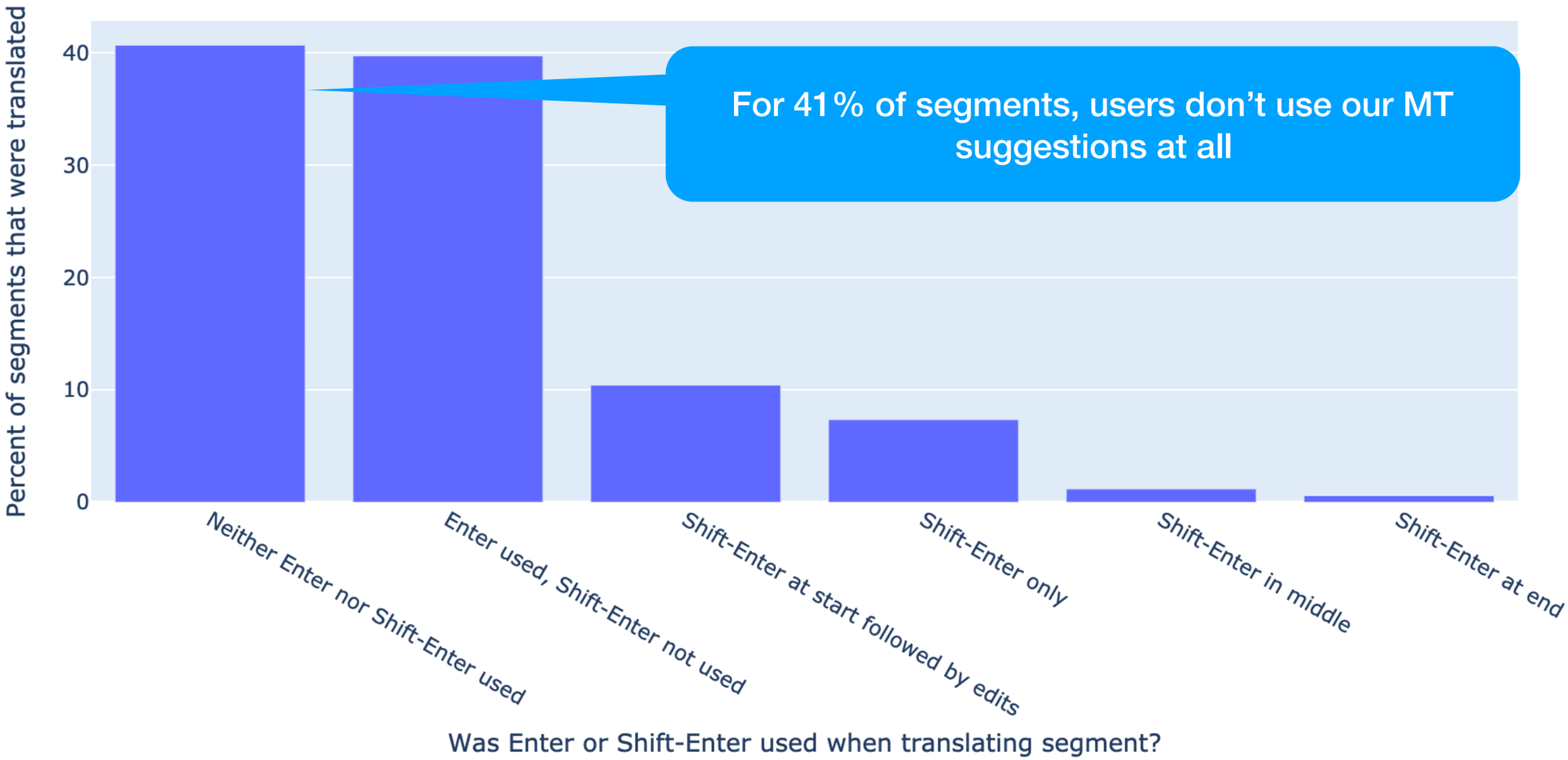

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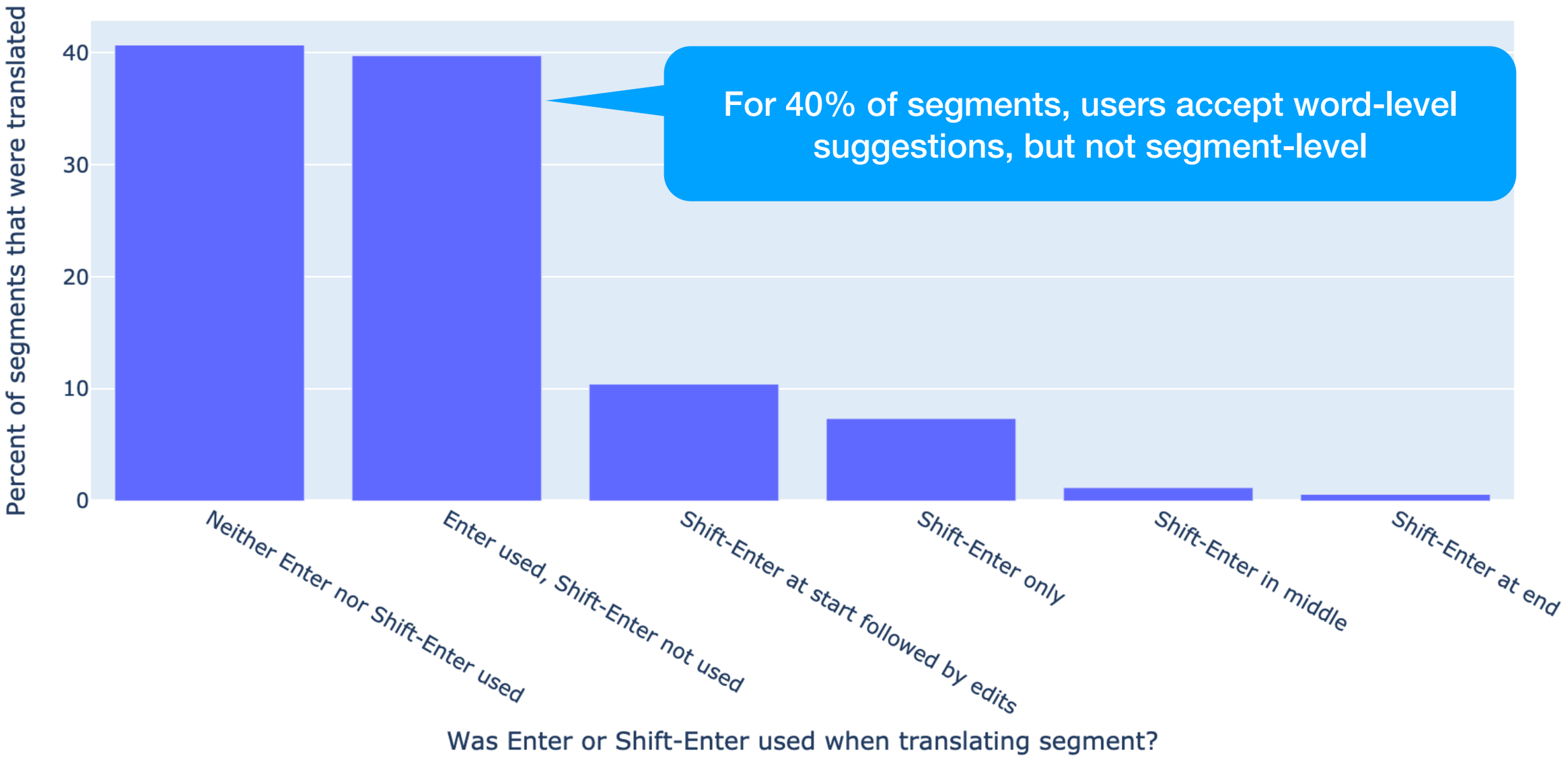

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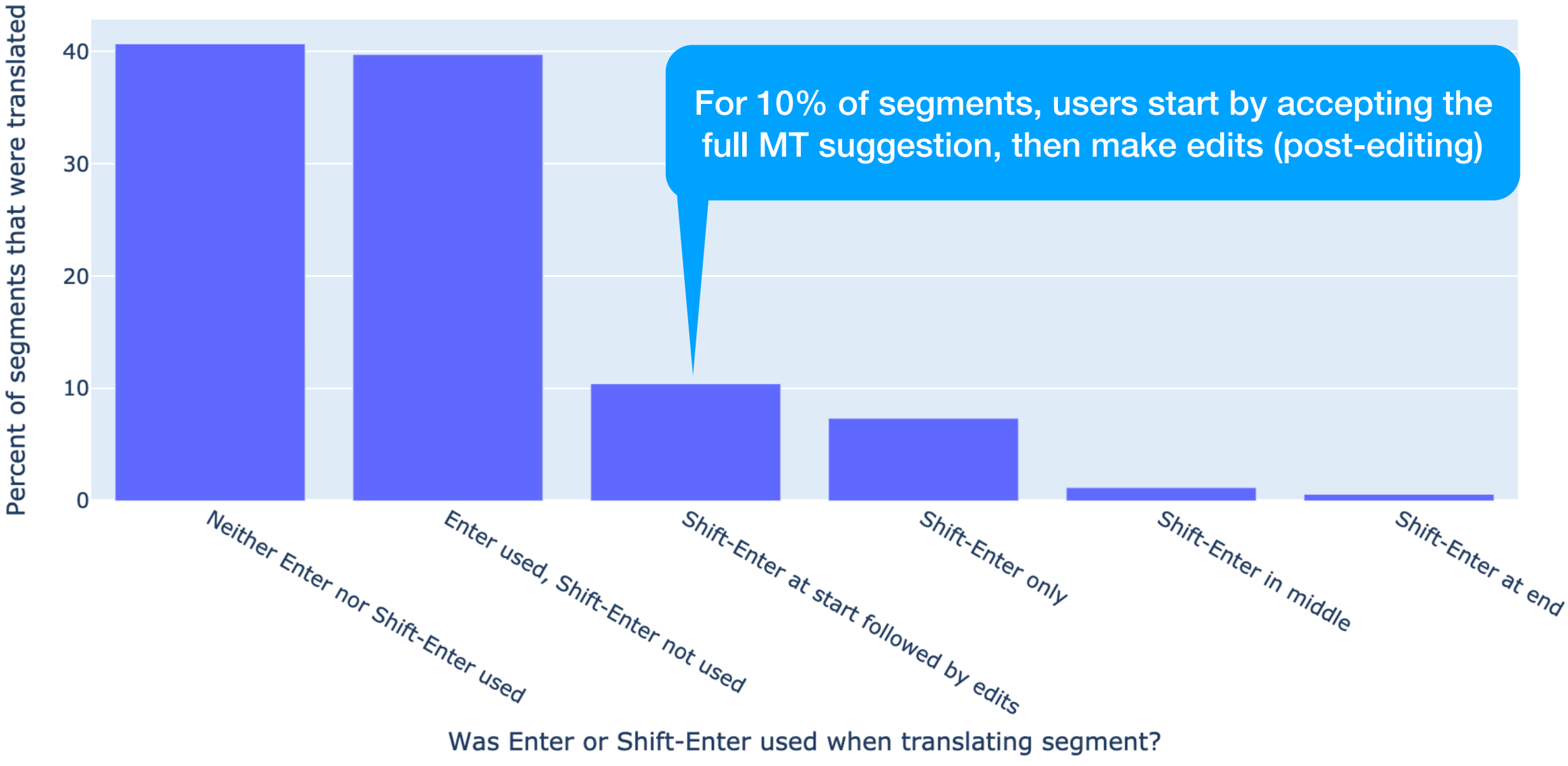

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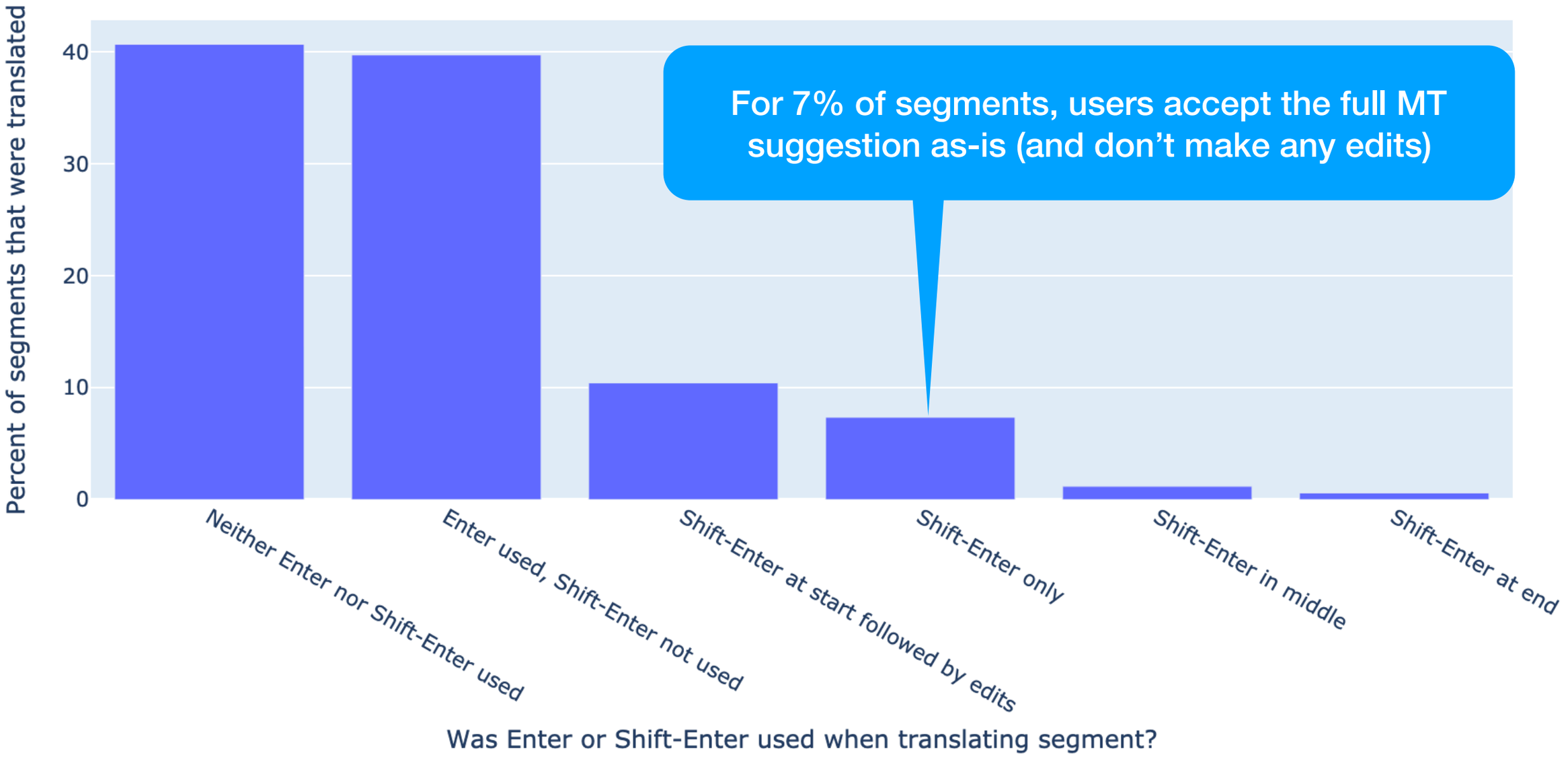
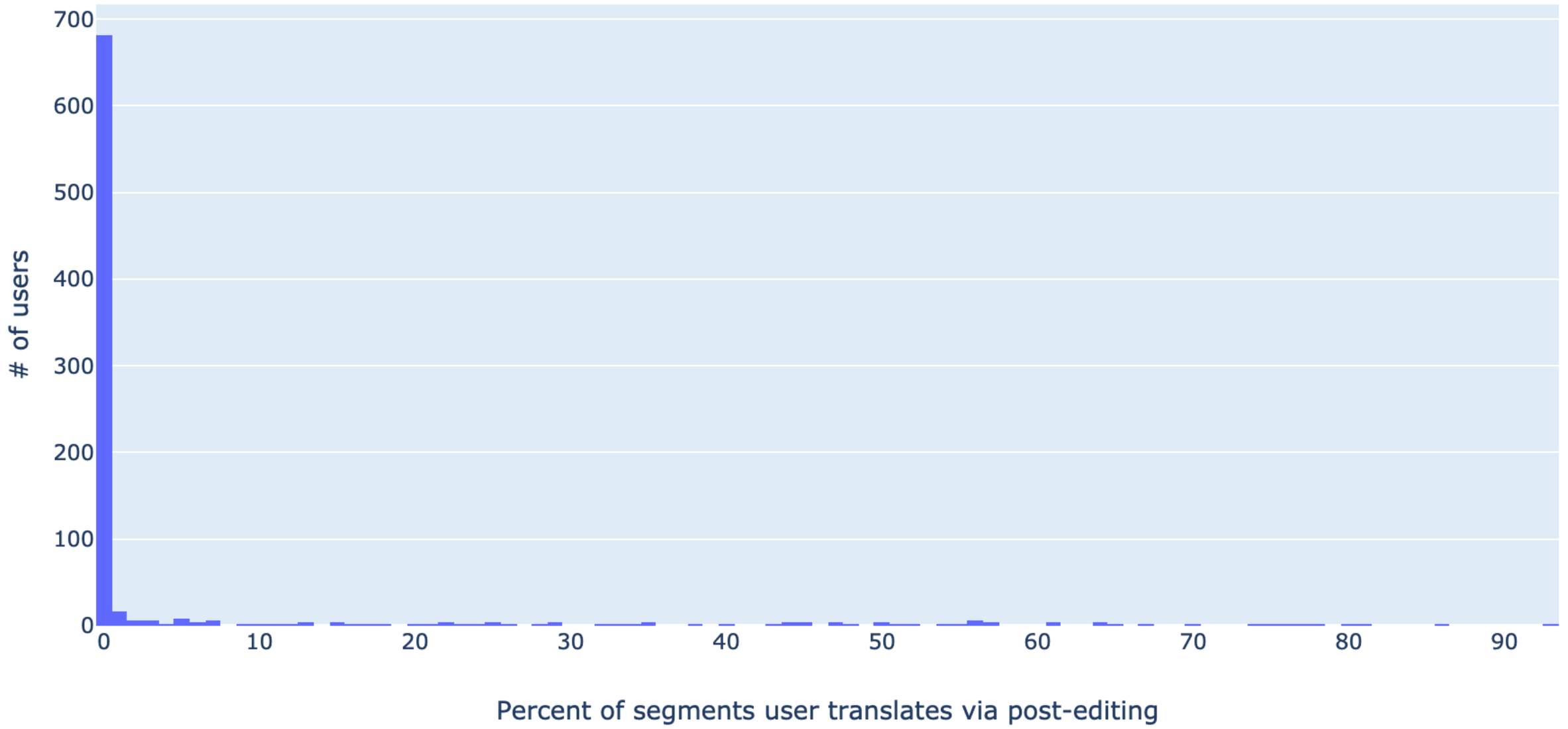


Histogram of users by percent of segments they post-edit



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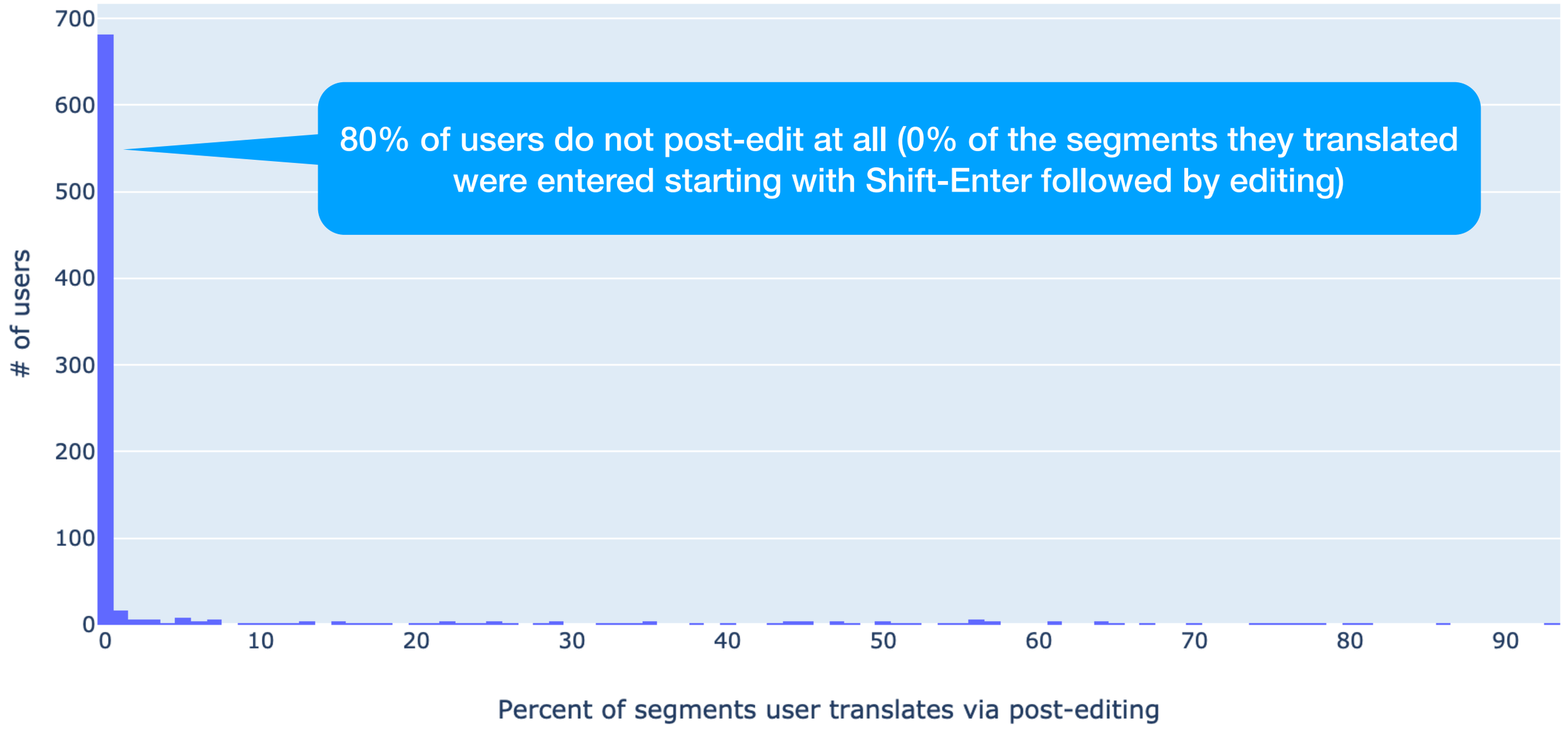

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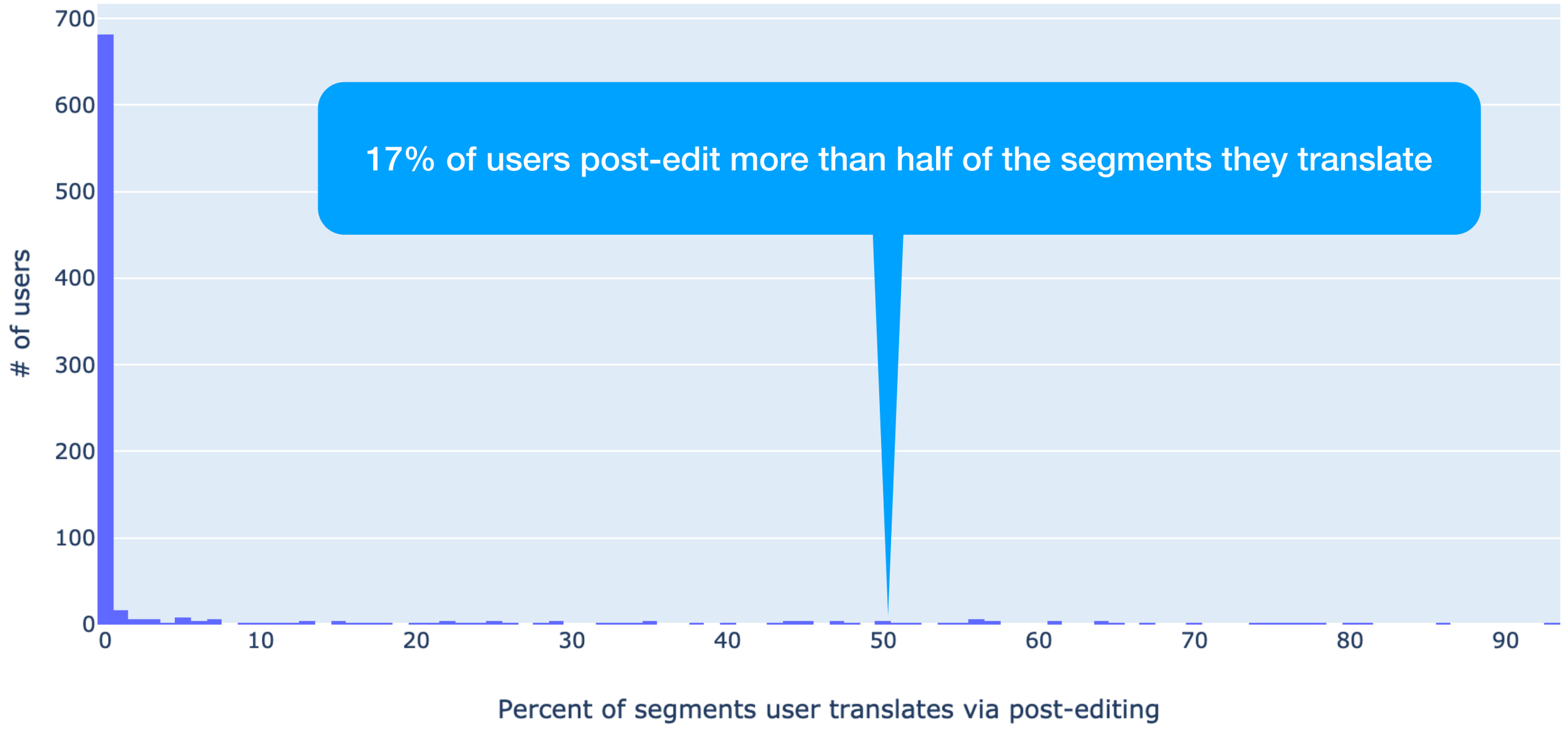
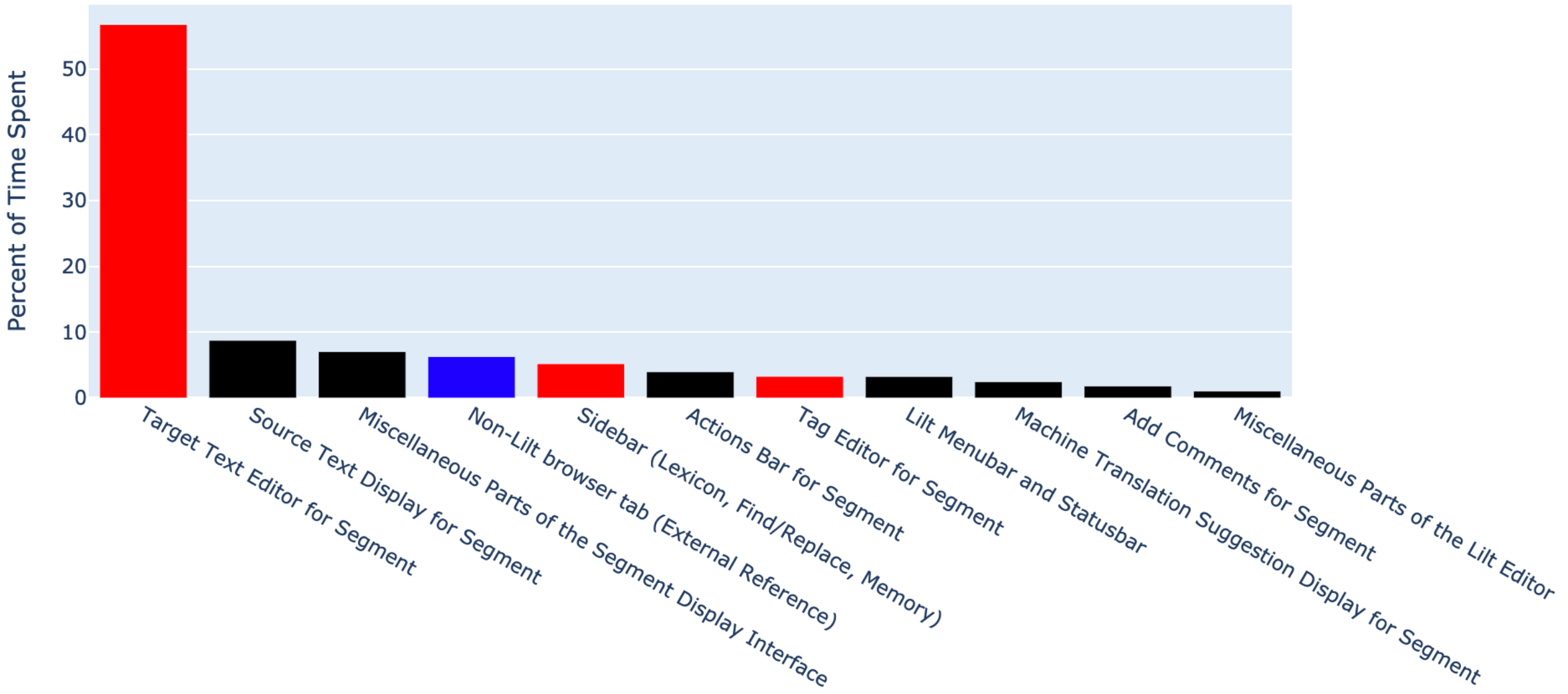


How do translators spend their time on Lilt?

Our efforts have focused on helping translators type translations faster via interactive MT. Is that actually most time-consuming part?

Data based on mouse and keyboard activity while using Lilt in translation mode, permitting up to 30 seconds of idle time between events

How do translators spend their time on Lilt?



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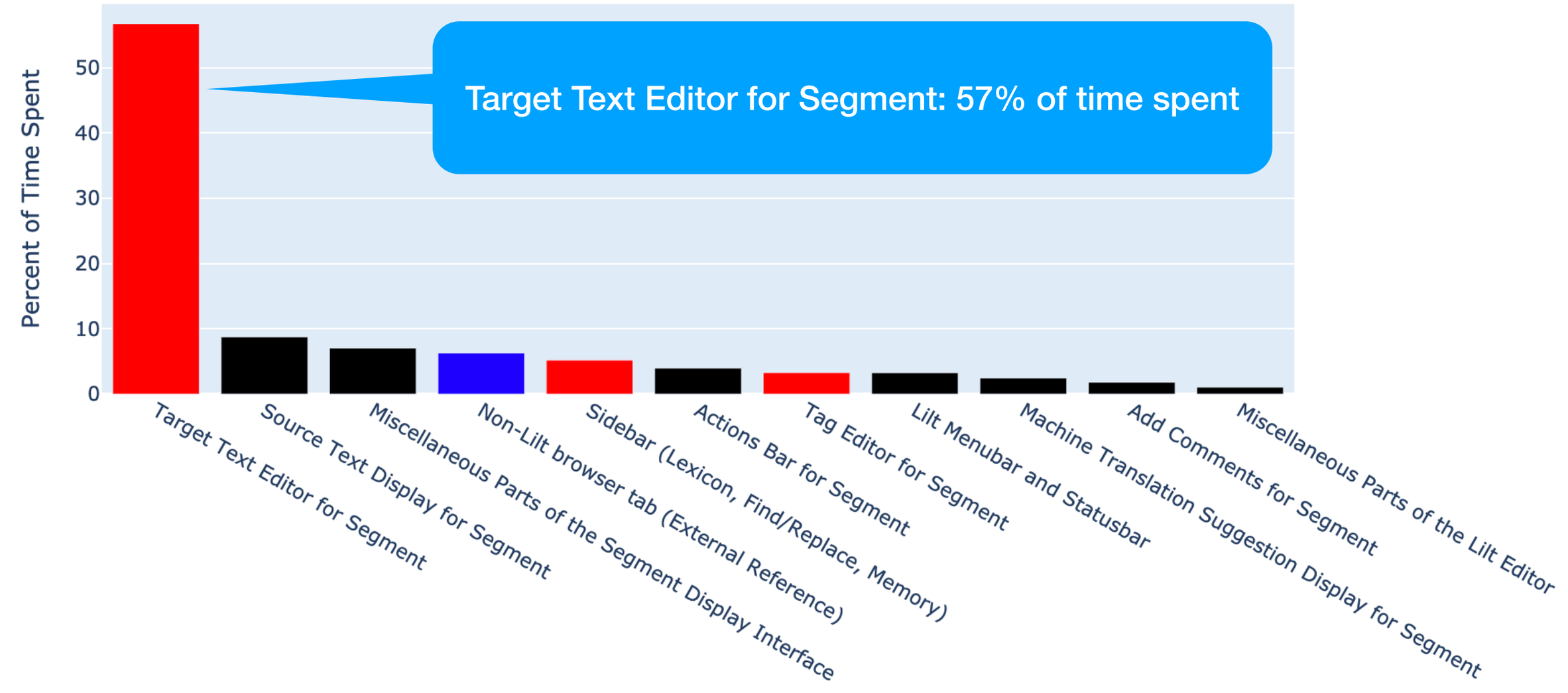
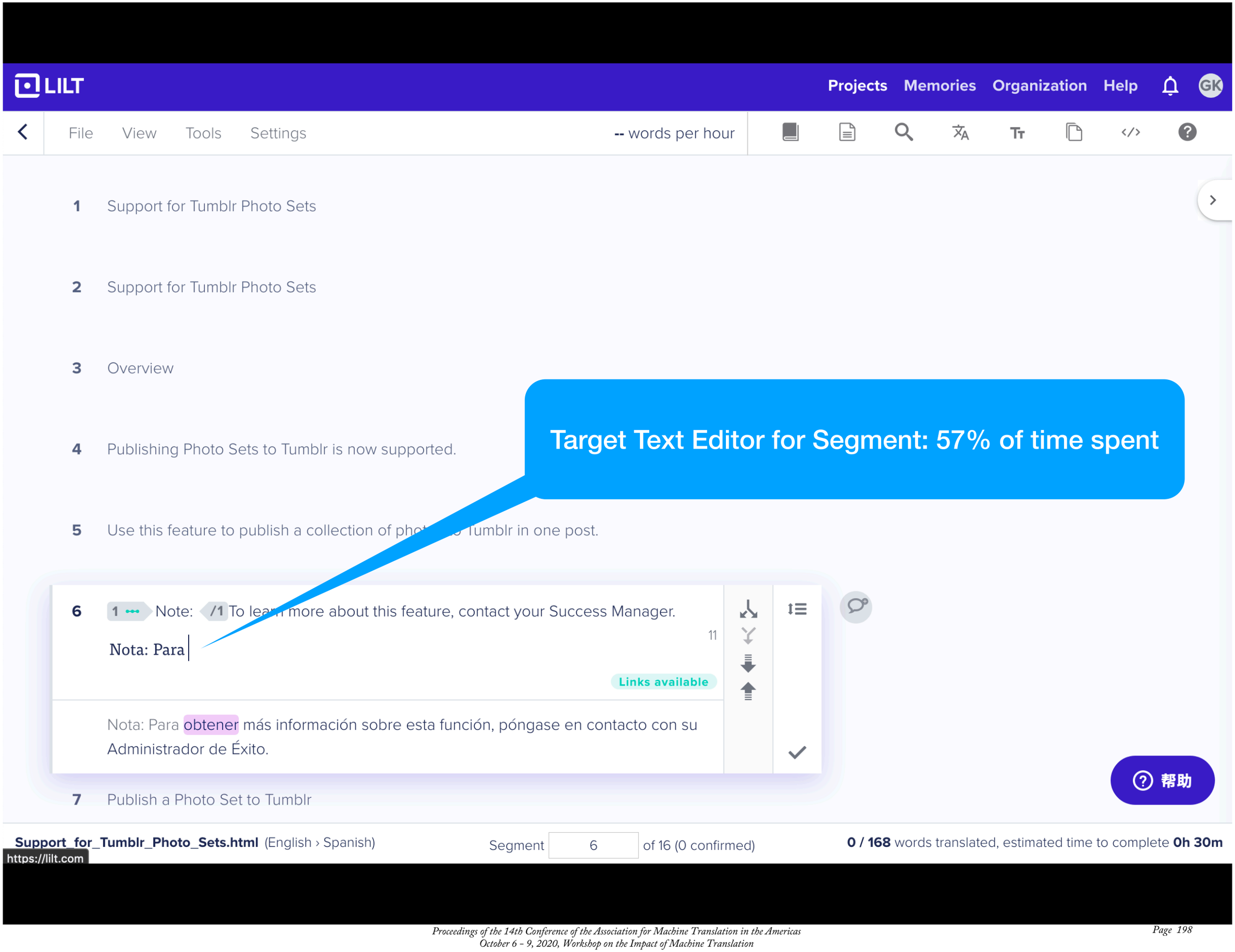
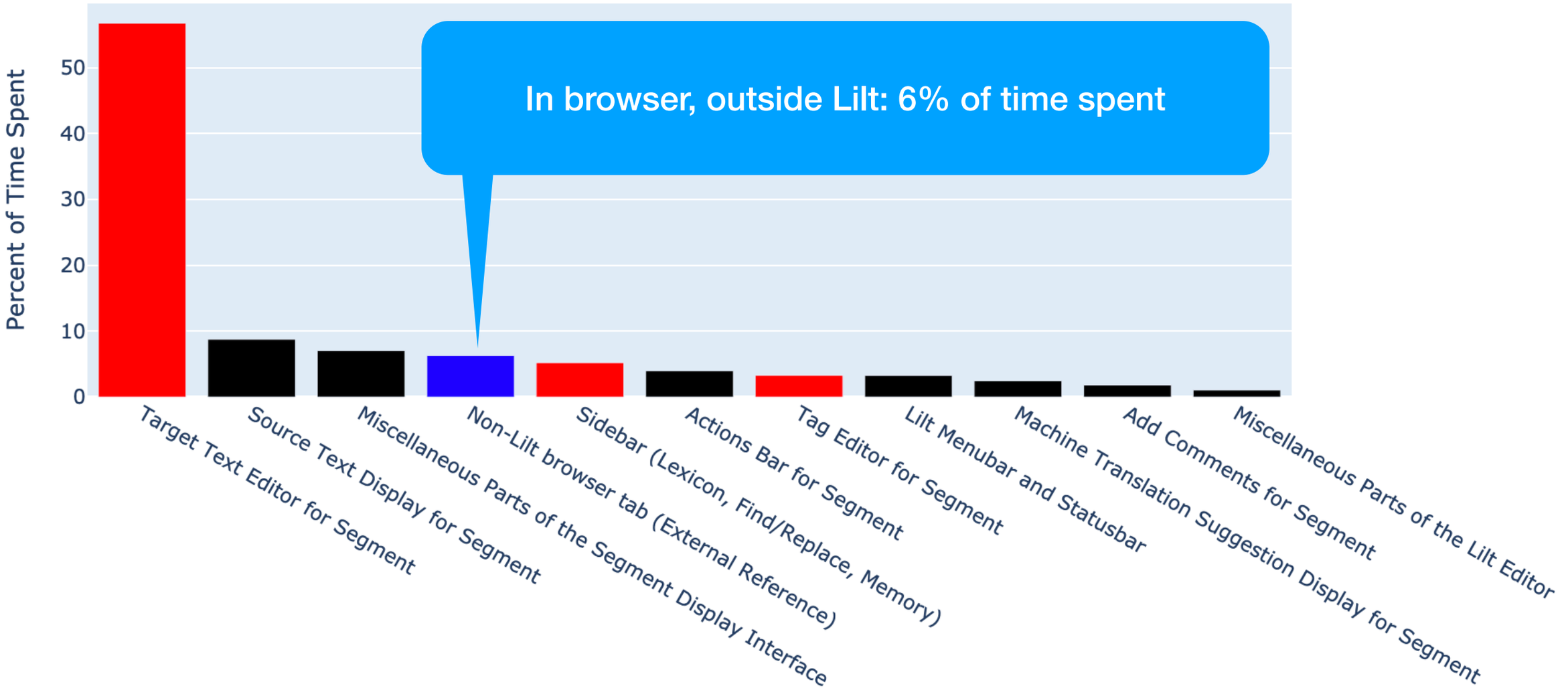



LILT
Projects
Memories
Organization
Help
GK
File
View
Tools
Settings
-- words per hour
1 Support for Tumblr Photo Sets
2 Support for Tumblr Photo Sets
3 Overview
4 Publishing Photo Sets to Tumblr is now supported.
Target Text Editor for Segment: 57% of time spent
5 Use this feature to publish a collection of pho Tumblr in one post.
6 1 Note: /1 To lea more about this feature, contact your Success Manager.
Nota: Para
11
Links available
Nota: Para obtener más información sobre esta función, póngase en contacto con su Administrador de Éxito.
7 Publish a Photo Set to Tumblr
帮助
Support_for_Tumblr_Photo_Sets.html (English › Spanish)
Segment 6 of 16 (0 confirmed)
0 / 168 words translated, estimated time to complete 0h 30m
https://lilt.com

How do translators spend their time on Lilt?



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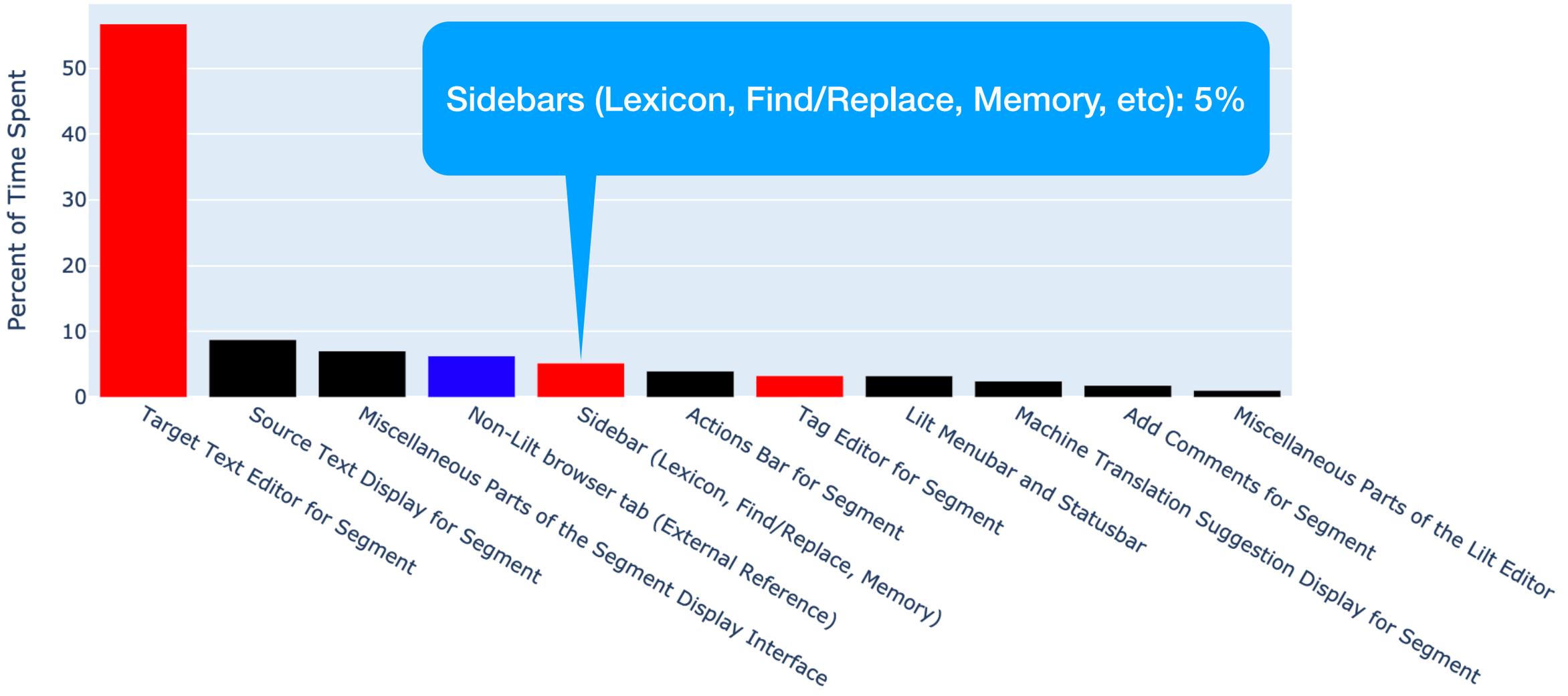

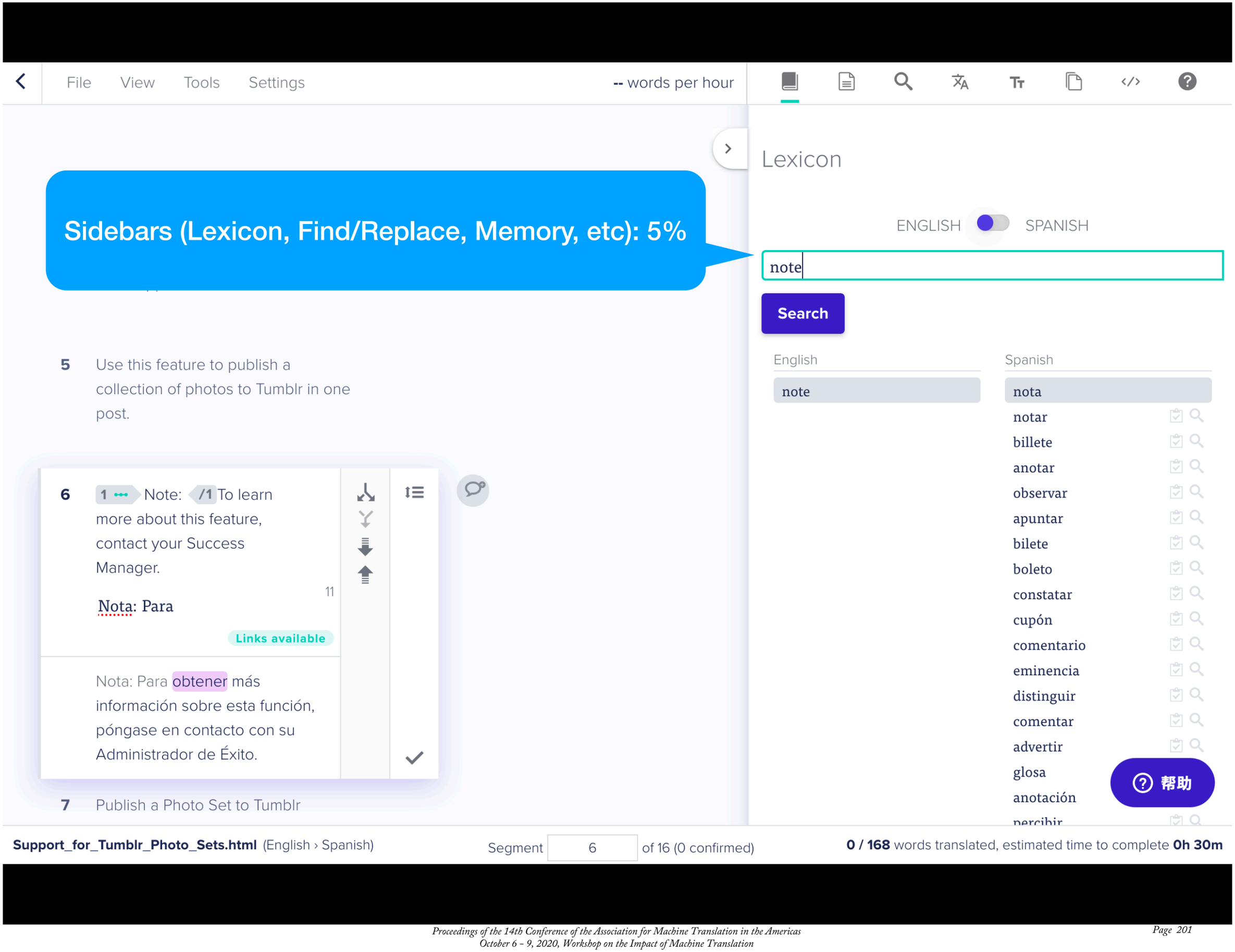
File
View
Tools
Settings
-- words per hour
Sidebars (Lexicon, Find/Replace, Memory, etc): 5%
5 Use this feature to publish a collection of photos to Tumblr in one post.
6 1 Note: /1 To learn more about this feature, contact your Success Manager.
11
Nota: Para
Links available
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7 Publish a Photo Set to Tumblr
Lexicon
ENGLISH
SPANISH
note
Search
English
Spanish
note
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cupón
comentario
eminencia
distinguir
comentar
advertir
glosa
anotación
percibir
帮助
Support_for_Tumblr_Photo_Sets.html (English › Spanish)
Segment 6 of 16 (0 confirmed)
0 / 168 words translated, estimated time to complete 0h 30m

How do translators spend their time on Lilt?

File View Tools Settings **68** words per hour

5 Use this feature to publish a collection of photos to Tumblr in one post.

6 1 ••• Note: /1 To learn more about this feature, contact your Success Manager. QA

1 ••• Nota: /1 Para obtener más información sobre esta función, póngase en contacto con su Administrador de Éxito.

7 Publish a Photo Set to Tumblr

8 1. Click on the <1 ••• /> icon in the top navigation bar and select 2 ••• Quick Publish /2 <3 ••• /> 4 ••• /4 <5 ••• /> QA

99

1. Haga clic en el <1 ••• /> icono de the en la barra de navegación superior y seleccione 2 ••• Publicación rápida /2 <3 ••• /> 4 ••• /4 <5 ••• />

Links available

Tag Editor for Segment: 3%

9 2. In the Select Accounts field, select the Tumblr account you would like to publish from <1 ••• /> 2 ••• /2 <3 ••• />

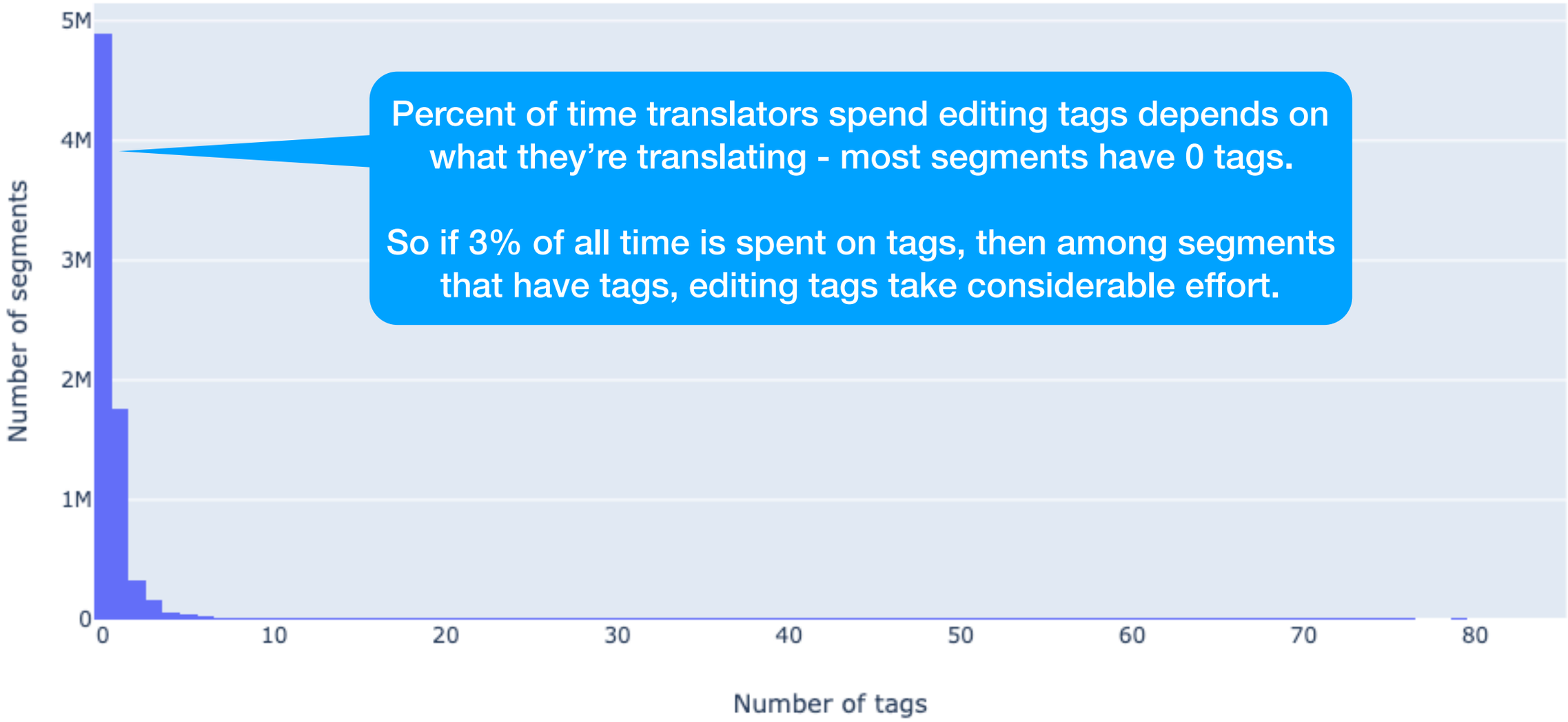
10 3. Click Photo to open the 1 ••• Add Photos /1 window <2 ••• /> 3 ••• /3 <4 ••• />

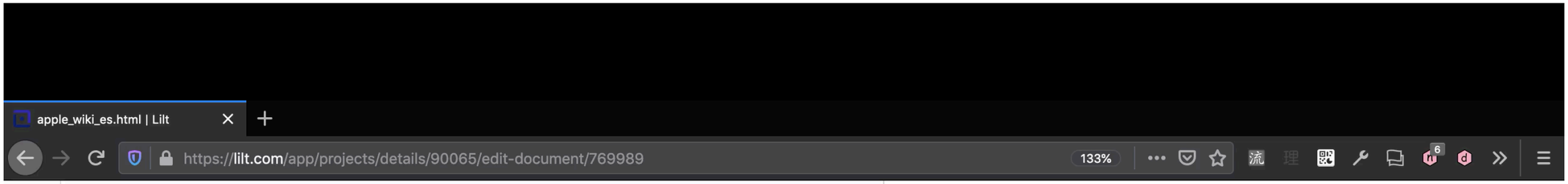
11 4. In the 1 ••• Add Photos /1 window, click on the photos you would like to include in your photo set. Selected images will have a check mark in the upper right corner.

帮助

Support_for_Tumblr_Photo_Sets.html (English › Spanish) Segment 8 of 16 (2 confirmed) **25 / 168** words translated, estimated time to complete **2h 15m**

Histogram of segments by the number of tags





44 Milliardos

45 Dólar

46 La empresa operaba, en 1 mayo de 2014 /1, más de 408 tiendas propias en nueve países, 2 3 4 [/4 4 5] /2 /3 /5 miles de distribuidores (destacándose los distribuidores premium o 6 Apple Premium Resellers /6) y una tienda en línea (disponible en varios países) donde se venden sus productos y se presta asistencia técnica.

0

Links available

In May 2014, the company operated over 408 own stores in nine countries,[4] thousands of distributors (outstanding premium distributors or Apple Premium Resellers) and an online store (available in several countries) where their products are sold and technical assistance is provided.

Lilt does automatic tag placement when segments are confirmed, which users can correct.

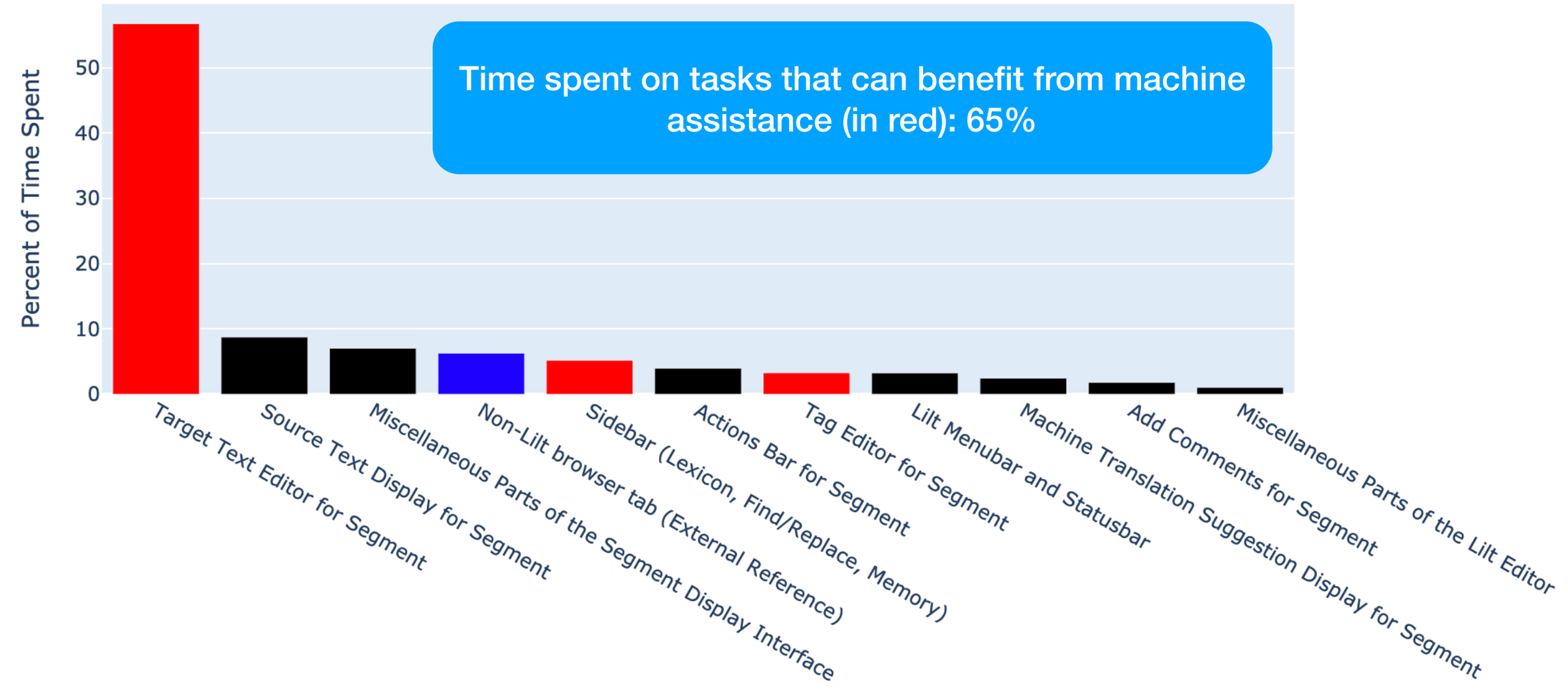
See lilt.com/research for details (Zenkel 2020)

帮助

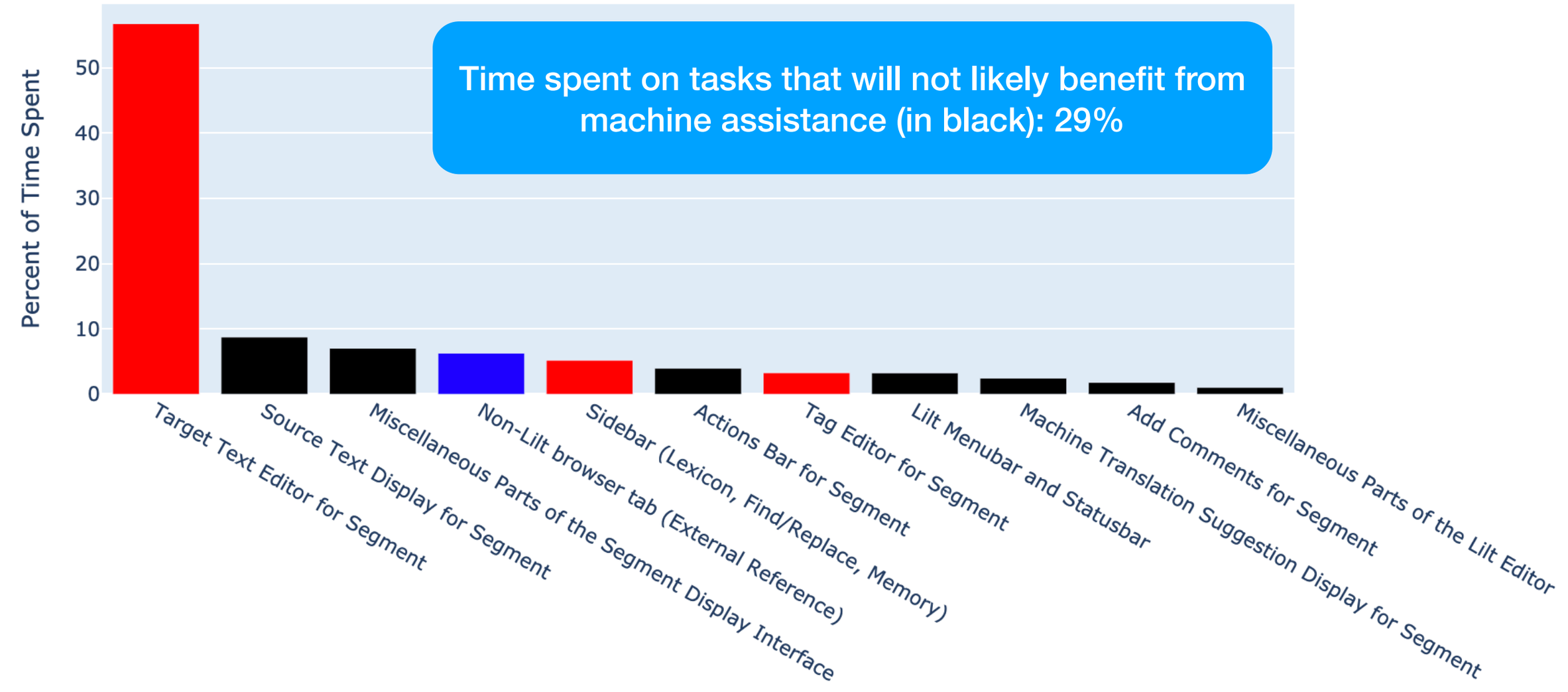
47 De acuerdo con la revista 1 2 Fortune /1 /2, Apple fue la

apple_wiki_es.html (Spanish › English) Segment 46 of 183 (4 confirmed) 24 / 2230 words translated, estimated time to complete 22(

How do translators spend their time on Lilt?



How do translators spend their time on Lilt?



Conclusion: A Study of Interactive Machine Translation Use on Lilt

- 57% of translator time is spent on actually writing the translation, which we can optimize with interactive MT.

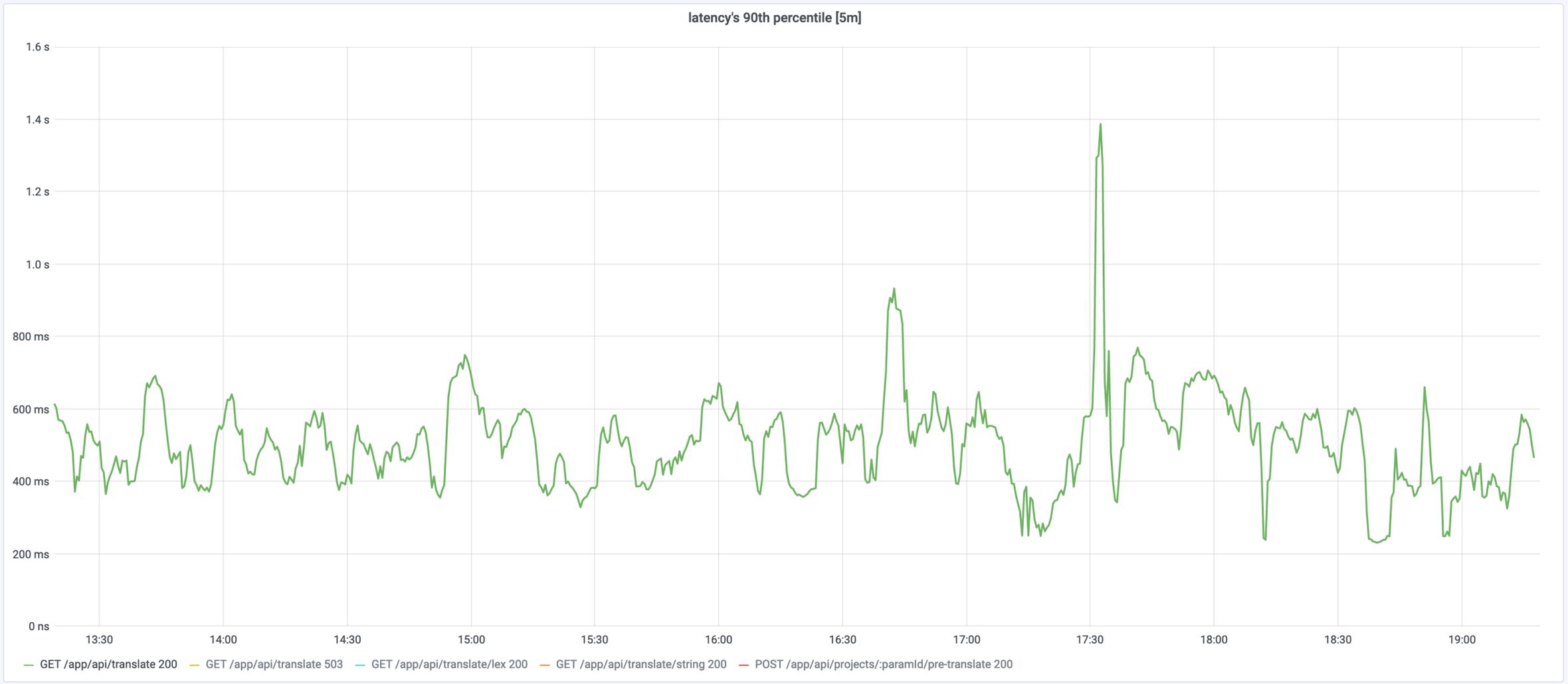
- Our prefix-constrained interactive MT shows the correct suggestion to translators for 46% of the text they type. Of this, they use our autocompletion for 83% of the text.

- Main areas for improvement are MT quality and showing suggestions when user isn't typing at the end. Latency is very good (< 500ms).

- While Lilt is used in an interactive style 4x more than post-editing, 17% of our users primarily use it for post-editing.

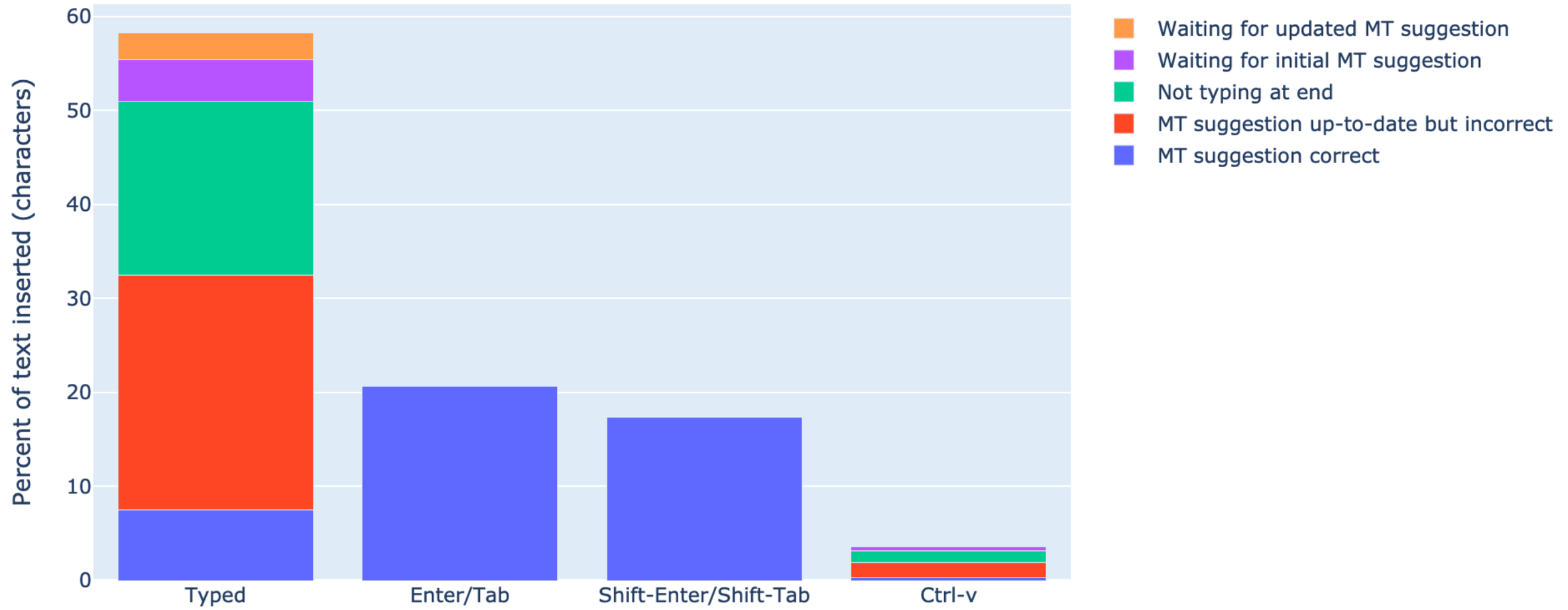
Backup slides

[redacted]

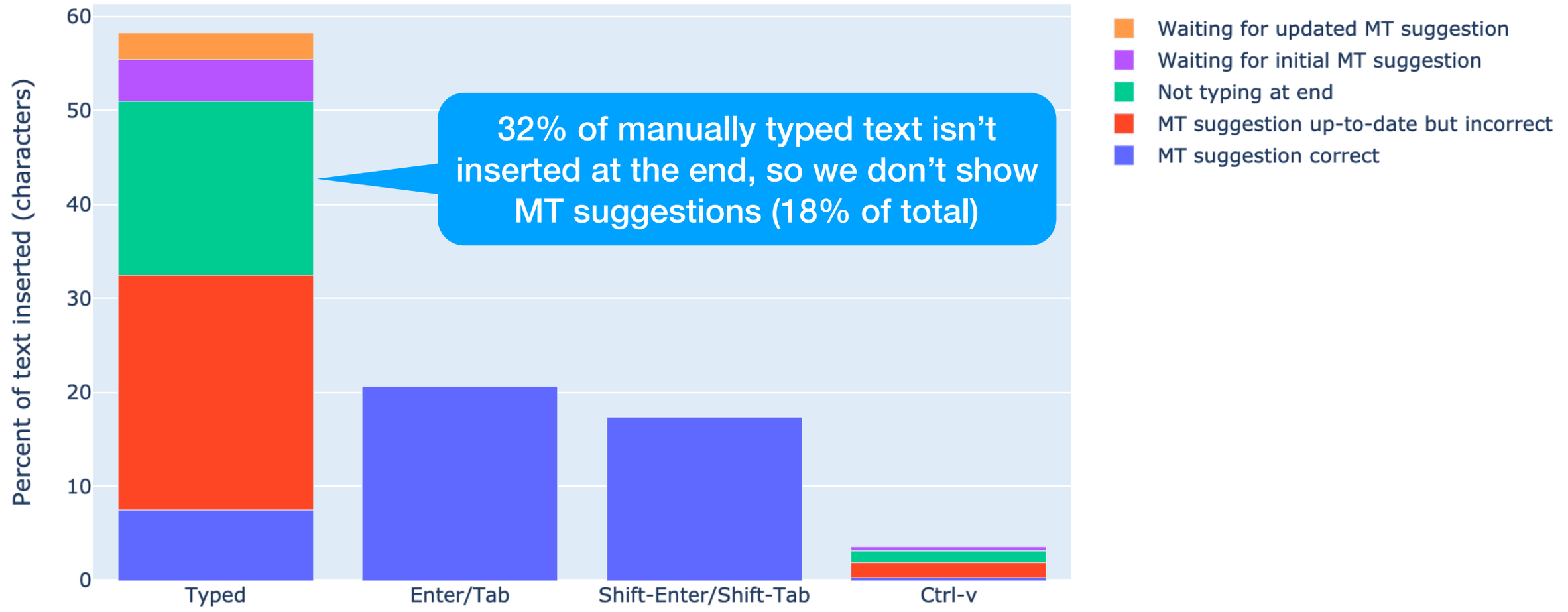


[redacted]

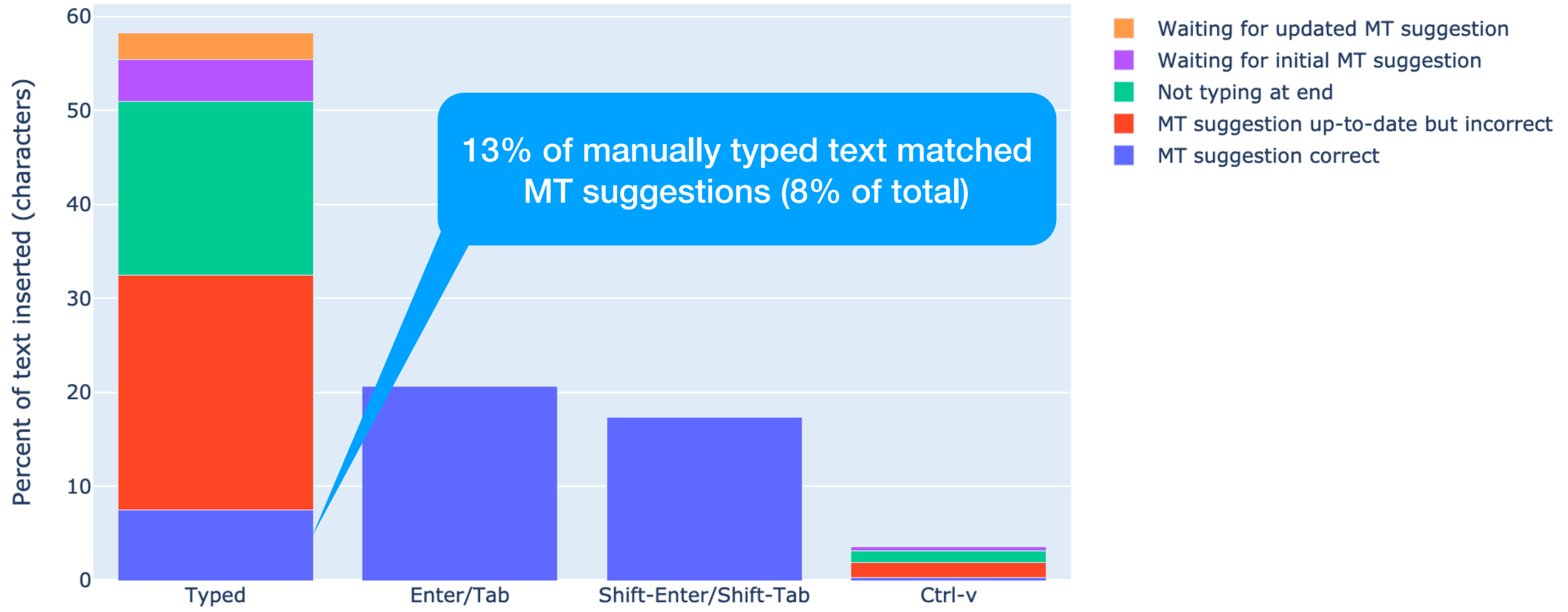
Keys through which text is inserted, broken down by MT state



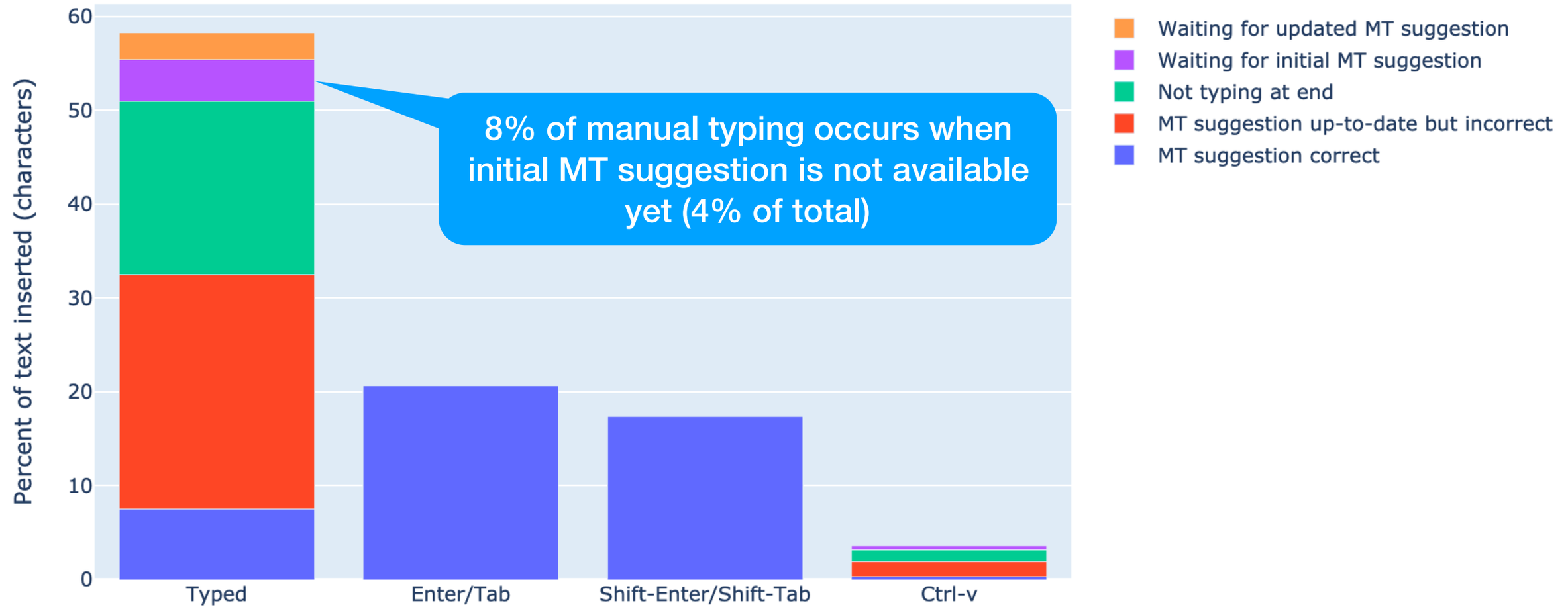
Keys through which text is inserted, broken down by MT state



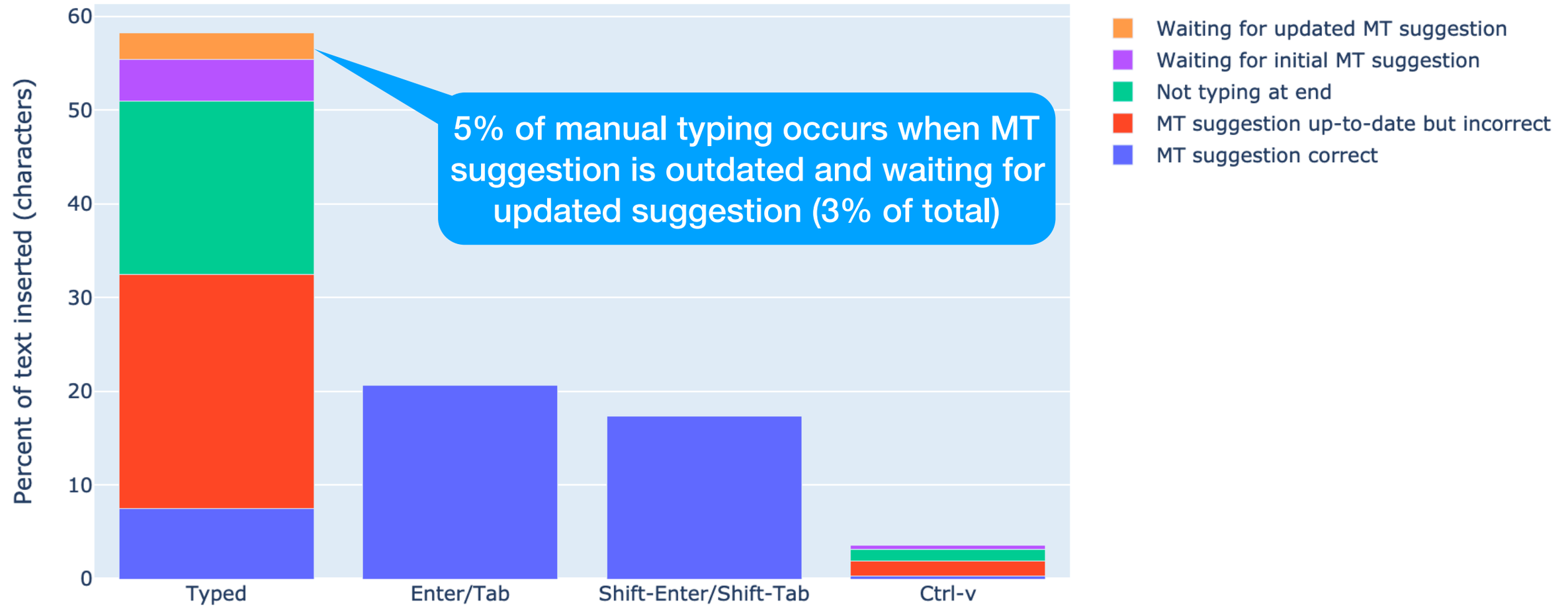
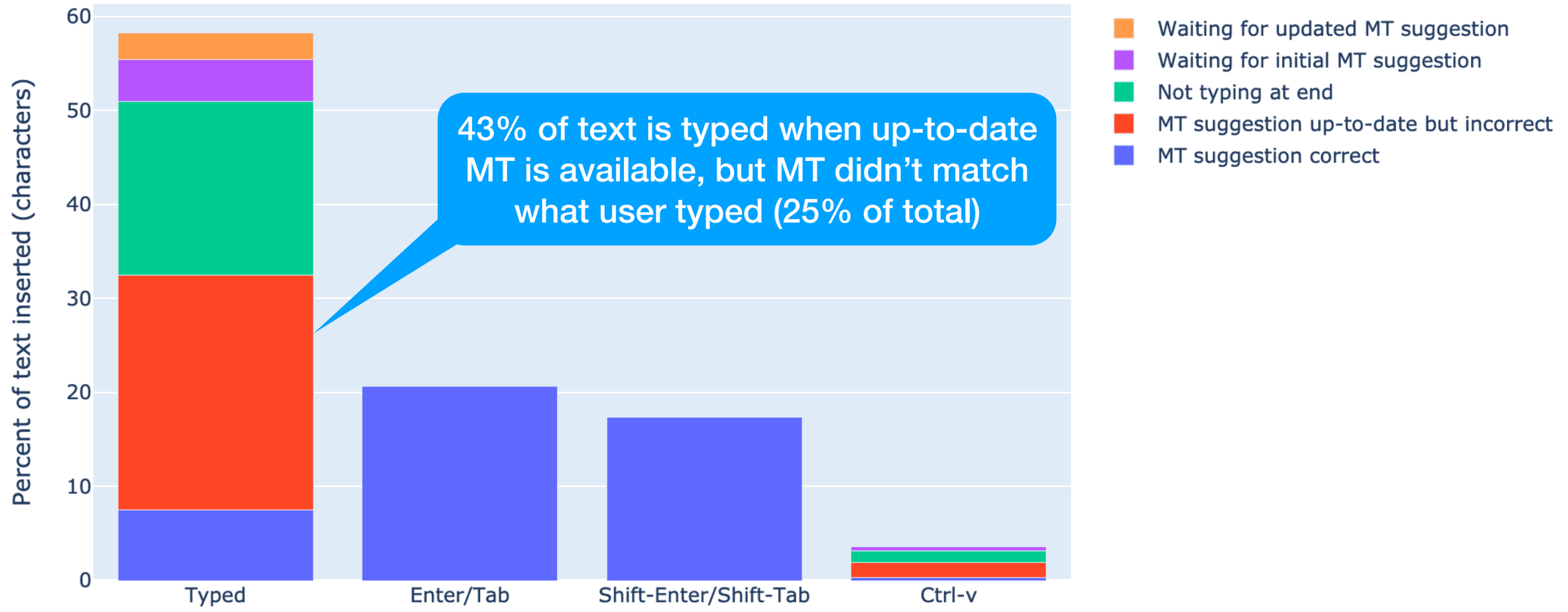
Keys through which text is inserted, broken down by MT state



Keys through which text is inserted, broken down by MT state



Keys through which text is inserted, broken down by MT state



Keys through which text is inserted, broken down by MT state