The **Pyciea** Layout

By Tompas#7989 (Discord)

About

You stumbled onto my work journal for an alternative keyboard layout, welcome.

Layout and Stats

Use the Development Journal tab for the latest reflections and variation testing
A short Comparison section vs other thumb R layouts, with cyanophage stats + oxy stats
Variations and personalization

- If you want less lat stretch/inner column you can move p -> bottom right
    - You can also swap l-m if you want higher effort without scissor, but not easily composable with the p move unless you're willing to accept a pnb column.
- This can be adjusted to support SNTH if you don't mind a minor stat hit but you have to be okay with the cross row ergonomics of the nd bigram notably.
- Q / z / qu can (probably should) be combo'd.

Layout Notes:

- *Current mod key is `=`, will likely be using hold modifiers on home-row for layers*
- ***R should be on the right thumb in pictures**, the layout tool tends to show the R thumb as left! You may horizontally mirror the layout.*

Objectives and Methods

- An alpha thumb without concessions on speed/comfort of switching to symbols
- Find an optimal balance between comfort with performance
    - maximize ergonomic insights; embrace good ergo vs speed ROI tradeoffs.
- Utilization of strong digits, factoring both keypress and movement for effort.
- Has decent vim key placement to enable less dependency on the nav layer.

Primarily developed on the ZSA Voyager
I also have a Ferris Sweep which is occasionally used for testing

References

HD-Promethium - reference

This is a heavy influence and starterpoint. This layout evolved around addressing personal quirks I've had with the layout. The HD community has been an excellent resource in exploring ideas around optimizing ergo layouts. A website homepage which includes discord can be found at: https://sites.google.com/alanreiser.com/handsdown/home

Alt Keyboard Layout Discord Server - A discord server with a lot of info and helpful folks.

Night - reference

An important case study for myself on comfort vs speed on SFBs weighting versus other stats like scissor, column/row usage, and digit usage. There are some interesting ideas and lessons learned in the review of this. I would likely need to consider a few effort optimizations and comfort adjustments to embrace it, but I do find the author's study and WPM compelling.

Engram - https://engram.dev/

If I recall correctly this is the second layout I tried, after colemak-dh. I'm not sure if it was v1 or v2 but I had moderate success with it, slowed down a bit by pinky implementation.

Enthium - https://sunaku.github.io/enthium-keyboard-layout.html

Encouraged experimentation with 5th column pinky, which at the moment I'm not incorporating. Punctuation ideas I've yet to fully consider. Thoughtful analysis of Promethium.

Colemak-mod-DH - https://colemakmods.github.io/mod-dh/

First layout I tried on slab. A fine layout. no major issues, but I wanted less inner column activity to promote more comfort and flow while typing. I've since been exploring distributing the effort a bit more liberally, lower inner column usage, and min stretch/scissor.

Alt Keyboard Layout Guide - https://getreuer.info/posts/keyboards/alt-layouts/index.html

N-curl case study (among many layouts) - https://cyanophage.github.io/index.html#gallium_v1

Cyanophage layout tool - https://cyanophage.github.io/playground.html. I've analyzed most of these layouts.

Oxy layout Playground - https://oxey.dev/playground/ | needed to fill in stat gaps from cyano

Development Journal

I desired an alt-layout after being particularly frustrated by the lower inner columns on staggered keyboards. On colstag with QWERTY, n is horribly placed in particular, and eventually I gave in to realizing a change needed to happen.

While QWERTY has a lot of room for improvement, it has stuck around for a while for at least some reasons that must be respected. The biggest reason in my analysis relates to the fact that it does put most of the work onto stronger fingers.

It also spreads out keys such that it avoids encouraging fast unnatural contortions of the fingers, instead the user basically has to “peck” faster, which can only be so bad. A danger of alternative layouts may be that they highly encourage cross-row sequences that are painful.

No matter how well optimized a layout is, if a finger is overused or encouraged into strange contortions, that can mitigate theory gains. While we try hard to avoid SFBs, they are ultimately a speed factor first and foremost.

There are comfort decisions and individual dexterity differences. The optimal speed layout may not be the most comfortable layout for sustained heavy work loads.

I used HD-promethium as a starting point and ultimately you can observe the migrations I do over time towards what seems most optimal to me.

You may see layouts named “Pear” and “Pyciea”. The layout was originally called Pear, later I decided Pyciea was a cooler name! I certainly had some inspiration from the Nordrassil layout.

Dev Journal Note: You may find myself retesting/going back on prior assertions in testing. The truth is that I’m not always certain when I make an observation and draw a conclusion because things change with higher WPMs and technique variation, which is difficult to manually simulate quickly. I do my best to get WPM up to around 40 or so before drawing opinionated conclusions, and that’s still probably not perfect but practical. I’m also trying different posture techniques/devices to rule out bias.

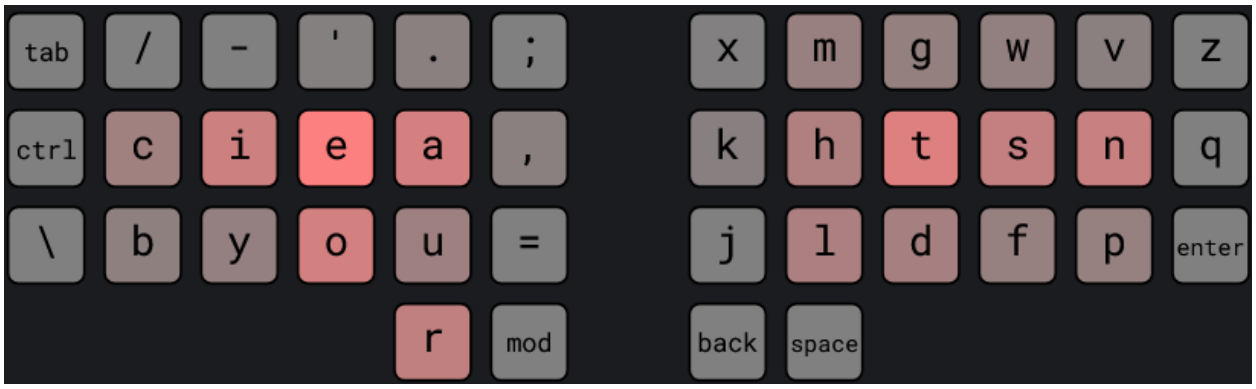
Pear v0.1 Early Observations

Starting with the NG curl in HD-Promethium (or ND, depends on row swap)

I found the NG bigram and IO bigram upwards ring-middle curl a source of discomfort on the ZSA voyager, especially at higher speed.

I then determined I wasn’t a big fan of the st roll, which another reddit user personally expressed as a sore spot. I may have over fixated on it after I read that, but it did start to bother me a bit.

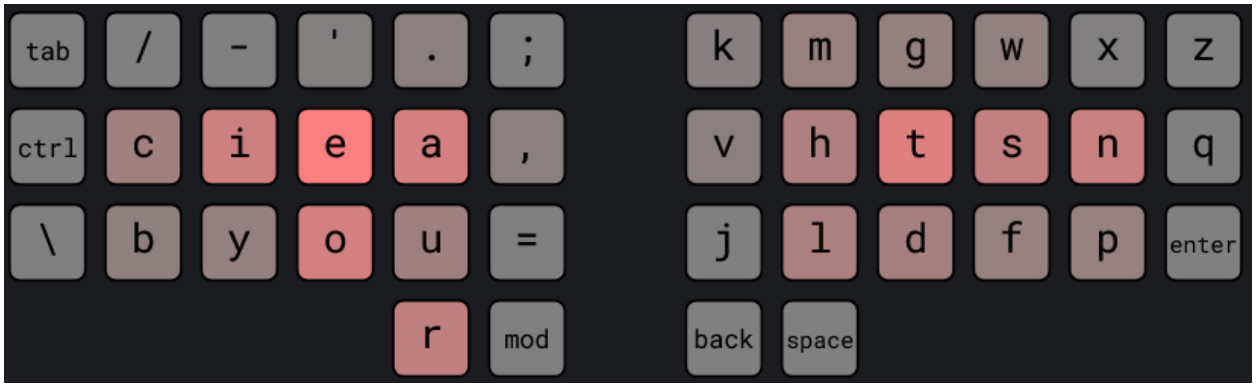
Pear v0.11 NSTH



This improved the `g` placement in the ng bigram, in addition to less repetition of `n` versus `s`, and finally the more natural rolls, NSTH seemed promising.

Need to address my issue with upper column `v`.

Pear v0.12 moving v around



View and edit

Experiment with home row V due to the higher frequency compared to K as well as minimizing the skip gram. I'm not strongly opinionated on KVJ versus VKJ.

Trials in exploring if w_l can be less motion effort

Alas, I'm typing `would` over and over again and, partially inspired from thinking about the w-ou scissor from Night, wondering if this could be made a bit easier, possibly over biased from monkeytype english corpus. Maybe this is just a necessary evil.

I deliberated that `ldw` would be superior, but needed to confirm that `wh` would still be acceptable.

Finally I recalled the stats `bnp` and had quite a few changes to string together…

Pear v0.13 ldw trials

View and edit

This achieves the obvious goal that `w_d` and `w_l` have reduced motion, but still have to do deeper analysis to determine if that is worth swapping w-f vertically. **I'll give this a name, Pear.**

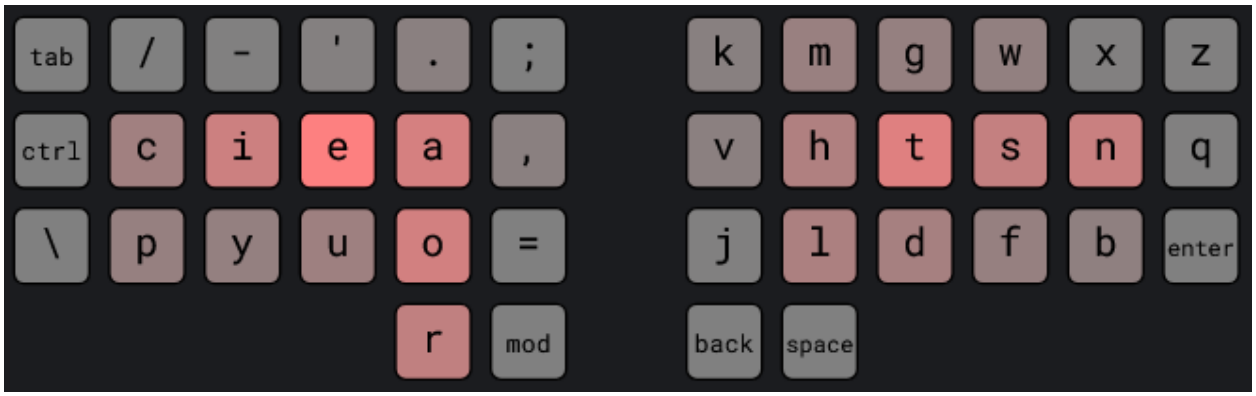
Pear v0.14 vk (testing kv swap => k middle, v top) | This change will likely be embraced

Despite v being more popular in some corpus, `nk` is a popular bigram and so is `rk`. In both situations it is a bit nicer to have k on the home row. With `rk` hitting with the thumb causes a lateral drift towards the central column that encourages k there.

Pear v0.15 wsf column

W dominantly starts words in the english corpus versus appearing in the middle of words. Upon deeper analysis, w_l and wh_ occur similarly. Therefore I am starting to be more inclined towards considering keeping `w` on the top row as more ergonomic and faster overall due to leveraging more frequently occurring downwards word composition sequences. Further considering w_t w_m w_… it is probably not worth improvements to w_l to make all of those sequences slightly worse.

Pear v0.16 yuo vs you



`co` is fairly frequent bigram (0.48% as an SFB) and slows me down a bit on the pinky middle interaction and so I was considering how to mitigate this. There's better finger balance (2% less most used finger) Ue is also less frequent than oe, which is nice because a meta goal is always reducing ring-middle curls.

Cu on the other hand is at 10%.

Looking at an arguably even worse sequence which is oc or uc, both occur about the same, so it's not like we get negative compensation. Curling o here feels good. I think this interaction bothers me less on the consonant side because my hand is more vertically active, on the vowel hand it feels a tad more disruptive. Or just the right hand index is less used.. so less noticeable.

Pear v0.18 retest top heavy

I’m embracing the O change because I believe the pointer finger dexterity is quite noticeable when frequently hitting O. We also reduce the top load finger by 2% as well as SFB reduction.

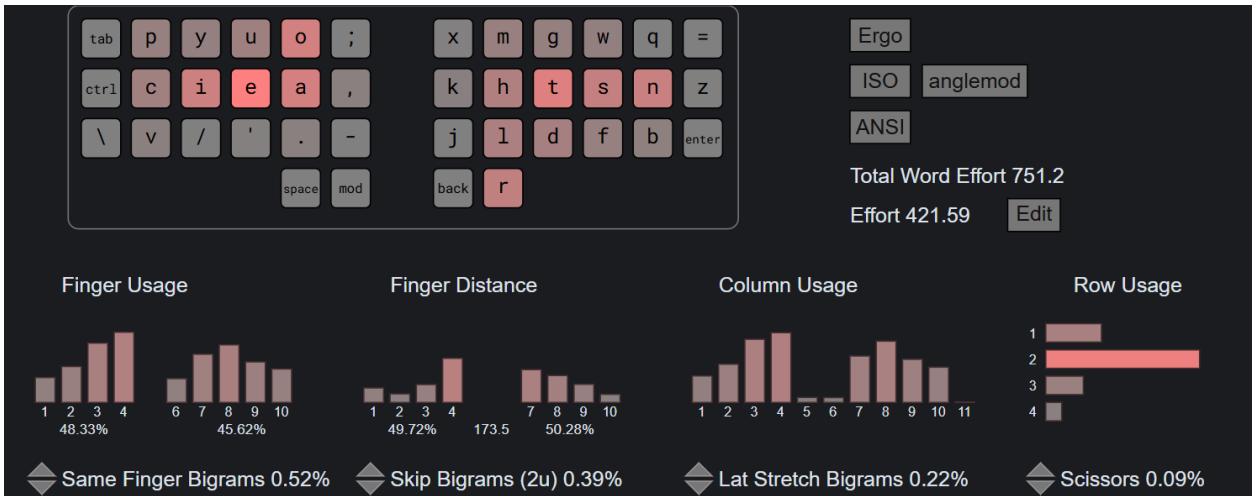
Retesting top heavy approach largely due a few observations. Hitting space is more comfortable. A big difference is that the pinky finger curls down slowly, but it's faster to move my hand up to hit `p` comparatively, vs curling down the pinky encourages a less than optimal deviation of the hand outwards.

May need adaptives like FG produces fr and FGM produces for. This to attenuate the ergonomic discomfort faster f->r thumb key interactions. F_r or fr is the only primary issue so far I feel with `R` thumb.

Pear v0.19 fsw column again

Fr and f_r interactions still seem to be bothering me too much, doesn’t seem right. Because w tends to start words and then end in the home or top row, by the time you would hit a w_r sequence, `r` feels nicer to hit. Trying this for now.

Pear v0.2 a milestone



A couple conclusions so far.
`g` has to be top in this type of layout… or accept `ght` from bottom->top is really slow.

Cross-row finger interaction observation:

- as my speed ramps up I'm not a big fan of i->o or s->d/g middle ring cross-row activity. s->g stands out as the bigger issue on the exaggerated middle column stagger.

Pear v0.21 ldw retrial

Ldw does feel nice, could be word sampling bias and actually how it happens to be on engram (but with a lot of concessions we don't have to make) it feels a lot lower effort than the constant hand motion for a lot of w words. The f_l interaction is also a bit nicer going down them up.

Trying `-` is a modifier key. exploring a comfortable layer switch opportunity for fast symbol keying. I like how this enables symbols to be easy to access working around dedicating a thumb to alpha. This has inspired some additional confidence in the layout boons overall.

Pear v0.21 x backspace?

Exploring is “x” as conditional backspace/delete via the row `-` mod key. (it may change in its representation in the images below, it's always the key below e)

Note: I decided against this later on.

Pear v0.22 curl optimizations

View and edit

Middle row bottom has proven to be a massive thorn in the side with respect to ng

This may be an interesting symbol solution, with `=` -> modifier. n->d has no issues to me here, but I’m always feeling a bit off with n-> bottom row middle. i->g feels totally fine to me. I’m just typing and basically nothing is interrupting my flow or comfort.

I was looking at more of the meta layouts like gallium etc and basically none feature n-> bottom row middle interactions, possibly as an unconscious bias or something selectively removed, uncertain. I’m guessing it's intentional because on slab it would be extra bad?

I’ve drifted quite close to engram but optimizing around tripping ergo circuit breakers at higher speed. Notably i->g feels better going up, R on thumb, etc. YUO seems better in a top heavy layout (as far as speed is concerned to me so far) well imo due to aforementioned curling of ring->middle upper, as well as SFBs.

Then adjusting for R thumb specific redirects and comfort like finding p is much more comfortable on the opposite side R as in with p_r words.

Pyciea v0.23 lateral test

```
  g y u o ;  v l d w q z
p c i e a ,  k h t s n b
    x = . -  j ‘ m f /
               r
```

A feasible way to reduce a bit of hand movement. My primary concern is that lateral pinky stretch feels unergonomic. **Regardless, I feel like changing the name to Pyciea now** 🎄

Pyciea v0.24 normalized

```
g y u o ;  v l d w q
c i e a ,  k h t s n
p x = . z  j ‘ m f b
             r
```

[View and edit on layout tool]

I use a symbol layer with =, I try to avoid using the bottom inner column so ultimately I can clean up the alpha layer here a bit. I will probably end up combo’ing z/q/qu but want a canonical normalized form that is perhaps easier to also share with others before encouraging such adaptives. At this stage of development this layout does feel pretty viable, but there’s room for improvement on the strain on the index stretching a bit more than I would like for o, appreciable better than QWERTY to be certain though.

State of the Layout 2/7/2025

Before diving into more tweaks and possibly preparing for the more dramatic changes ahead I want to consolidate some important observations and insight so far.

- “Bottom Heavy” layout adaptations, I don’t think are working so well for me
    - **The effort of curling the middle finger downwards seems high**, and is flared in effort when I need to precede it with a different digit.
        - This effort is noticeable from the home row-bottom row, but not from the top row-home row.
        - This was a source of frustration in pinky-middle or pinky-ring downwards curls in the canonical promethium layout
    - Thumb button not spaced ideally on both the keyboards I own from comfortable and fast actuation after adjusting my hand to hit the bottom row not from index
    - I will mention that it's overall a bit more ergonomic to hit keys generally closer to the bottom row from a stable static position, but this is invalidated when typing

and your hand is moving and preceding finger utilization. It does however feel worth it to load up effort on the bottom row pointer versus top.

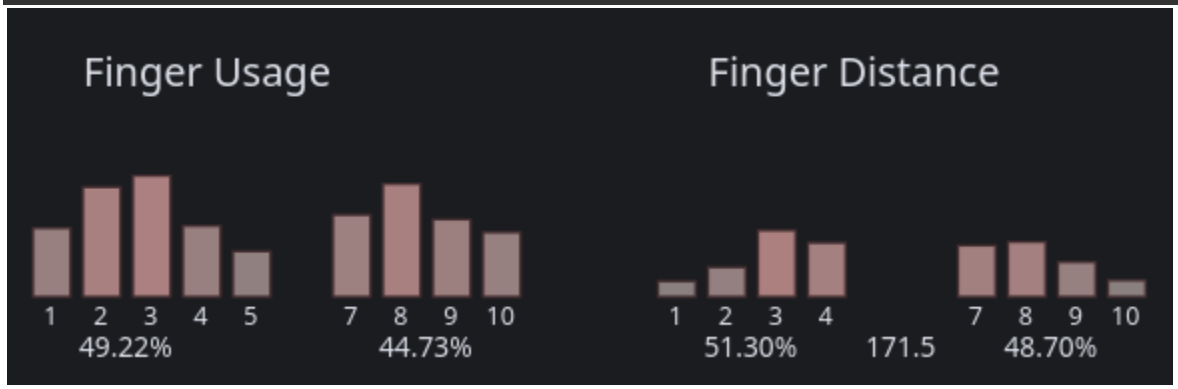
- My pointer finger feels relatively overworked. My evaluation of finger heatmaps on digit usage alone may be inadequate
    - I may need to more seriously consider both finger travel as well as usage for a more accurate evaluation of effort/stress on the finger.
    - **Discourages high frequency letters on the top index column, like `o`.**

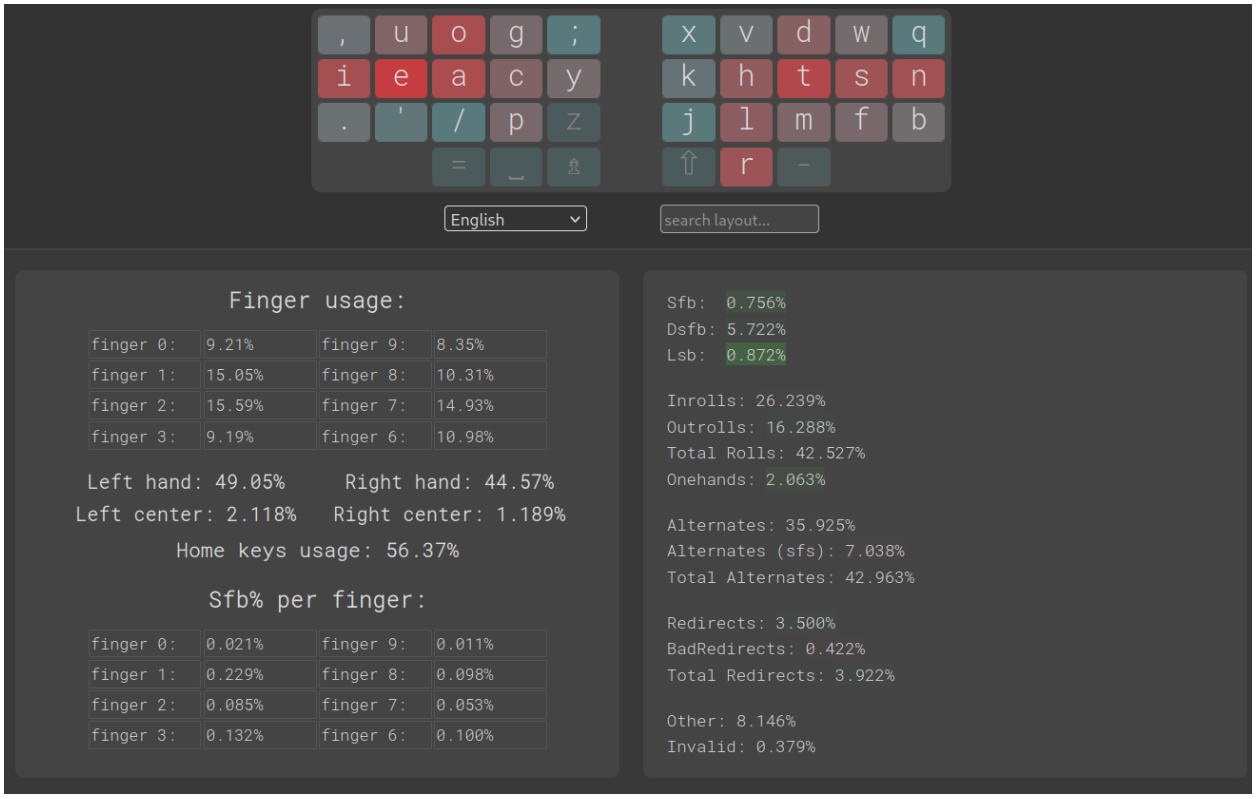
The above observations considerably influence how I evaluate IEA layouts starting on pinky, and more generally index finger evaluation. **For example, 10% utilization of an index finger may be totally reasonable when also considering the effort/stress from travel.**

Given the above observations, I struggle to make IEA from ring agreeable, because I either concede the I->O upwards ring-middle activity (from `YOU`) as the better option compared to `YUO` top row, or `YUO` bottom row but then have to deal with downward curl challenges, slightly more awkward space actuation, or keep UO top for a nasty OU scissor.

curlfix-stage-1

```
‘ u o y ;  x v d w q
i e a c g  k h t s n
, = . p z  j l m f b
             r
```





Here's an IEAC starting point. I suspect I'm more bothered by uncomfortable middle to bottom row interactions that seem to be forced without shifting iea, as well as a heatmap that is causing some of my fingers to work a bit harder (like o on index top) than I would like.

As I compare Pyciea's effort vs Night's effort stats Pyciea has greater load on middle finger vs index, without overly disagreeable concession on speed. Losing the TH roll I wouldn't care much about however specifically for R thumb it feels nicer to roll towards the thumb.

Testing to what extent finger distance may be a significant factor on the feeling of tiredness of utilization, at parity or even exceeding just "usage" when together considered. Here we have pretty balanced finger utilization on both hands in this line of reasoning.

- Minimal upwards index finger interaction, ensure index columns are mid-bot heavy
- Minimize downwards interaction from the middle. Here we could swap M to an inner column pursuant to this but the finger distance transformation is discouraging.

The left ring finger utilization at first pass is concerning, but finger distance is pretty low. Conversely the opposite ring finger has lower utilization but higher distance, striking a balance.

This is worse SFBs compared to Night but in exchange there are ergonomic factors worth considering and roll balance.

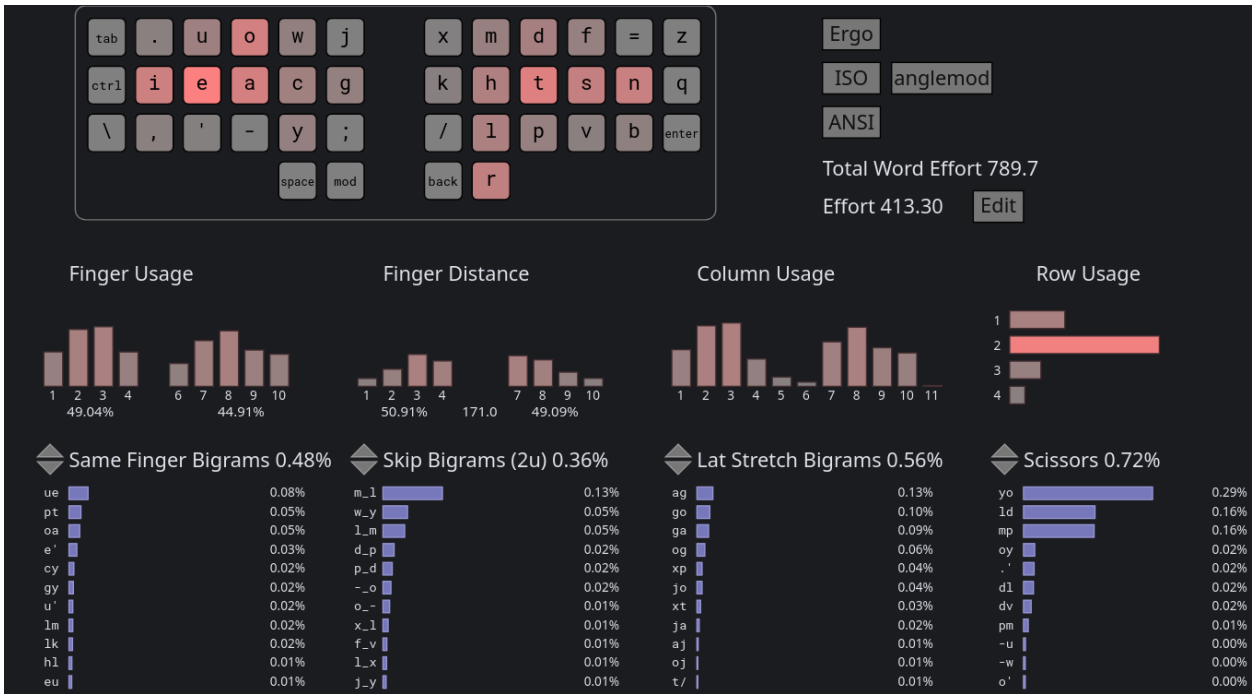
The problem remains though that we have `m` on the bottom curl position

curlfix-stage-2

```
, u o g p  x m d f =
i e a c y  k h t s n
. = = w ‘  q l j v b
           r
```

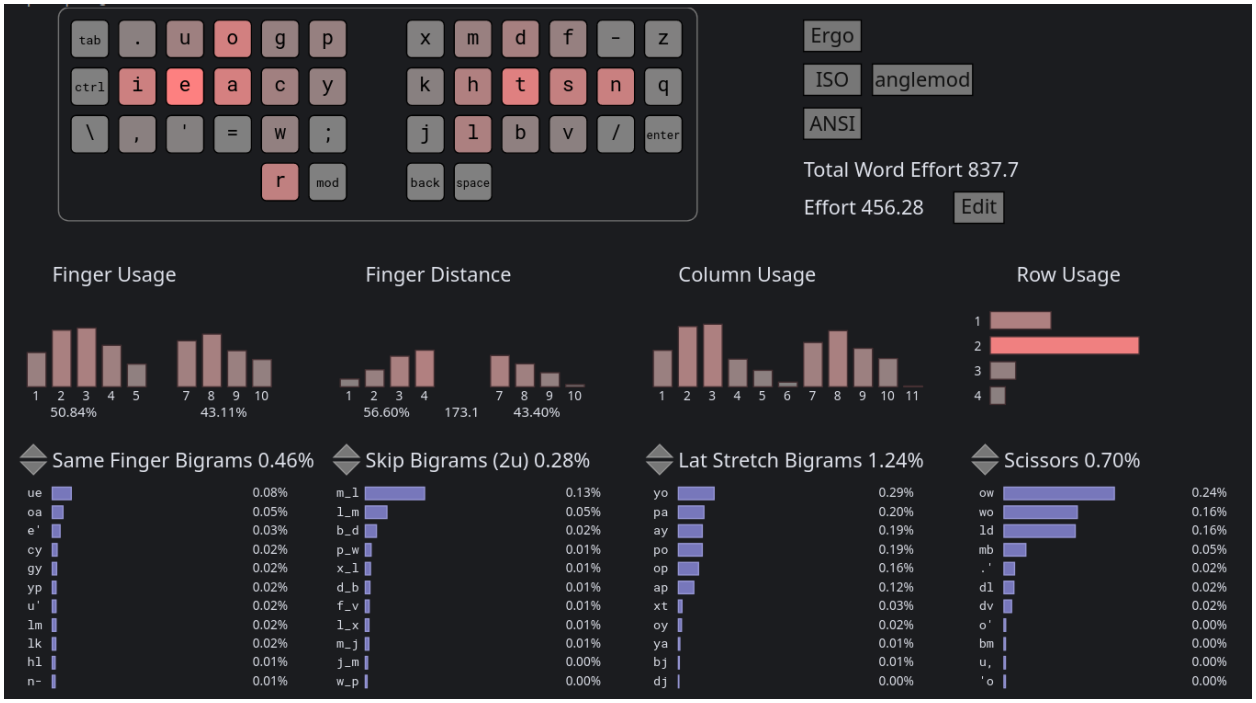
[view and edit](#) (symbols are placeholder)

curlfix-stage-3



A short test of this layout yielded that the bottom right pinky I frankly rather not engage with. It causes fairly noticeable slow down and especially with the r-thumb feels awkward to roll.

curlfix-stage-4



This seems the most agreeable so far. I'm accepting suboptimal theory stats for the practical factor of having b on a middle finger rather than j. An obvious ergonomically sound tradeoff.

Pyciea v0.30 iea shift

View and edit (symbols are WIP)

I'm embracing most of the night's punctuation choices here. Like the apostrophe next to y for slide-down. `=` remains my essential easy to press and endurable OSL key (this layout is pointless if i have to make any concession on symbol layer ease of actuation). To restate why thumb alpha, beyond alphanumeric performance, is that it's better to actually transfer layers with fingers than it is with thumbs, due to thumb overuse risks, especially when programming layer swaps will be highly frequent. R alpha is less than even space.

Pyciea v0.31 no curl test

Exploring the difference in feeling of having no middle curl, which can be a bit slow.

You can alt-finger b here ring for lower hand movement if you don't have a `bl` sequence here but ultimately I'm circling back to the same problems I had before with `o` top having a high frequency letter (l, which occurs decently more than m) again.

Ultimately I'm apparently hitting the optimization constraint of the "th" block here.

Pyciea v0.32 no corner

View and edit (symbols are WIP), r should be on the right side above.

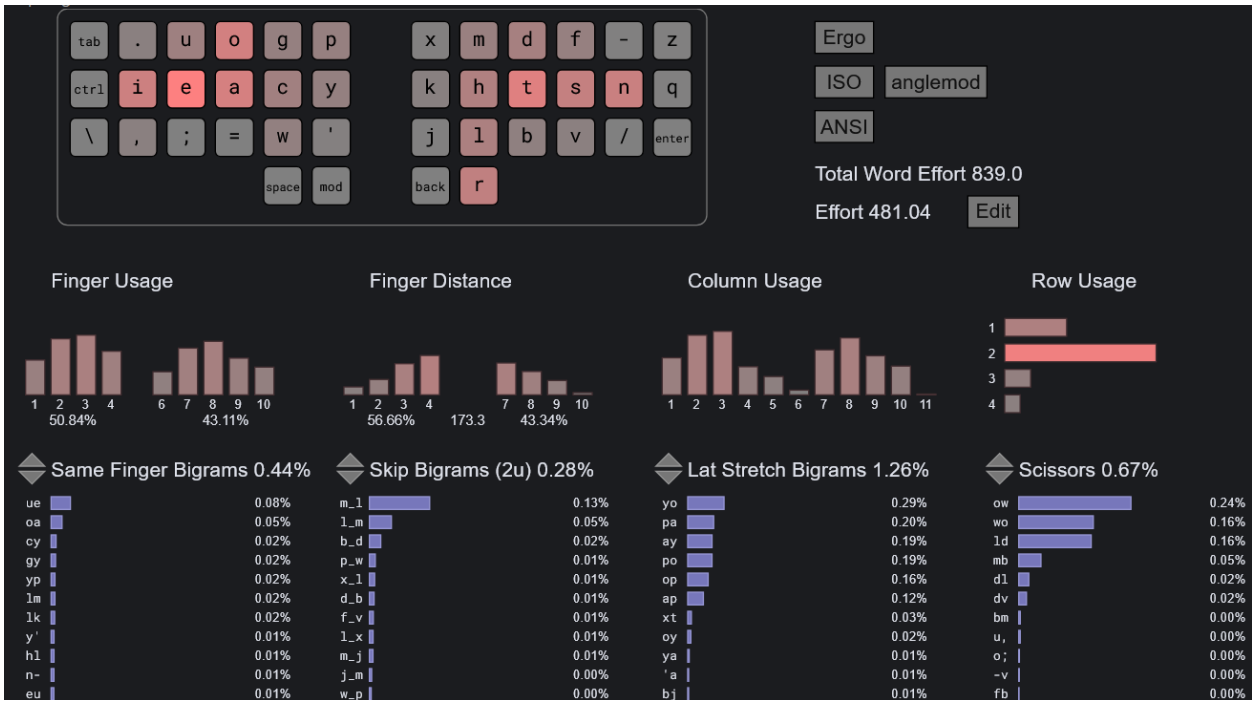
Yep this is the same as 0.30 just incrementing the version number to neatly have this be the final. My effort is done on the alpha layer. The main selling point vs Night is that the heatmap is better. Acknowledging Night would most likely perform better on speed by some margin… There are trade-offs worth considering from this layout, ultimately having nearly symmetric index effort when considering travel distance, and better utilized middle finger (from an ergo/effort perspective). Vim key placement is solid, no corner key.

Comparisons with 0.32

Tl;DR main trade offs vs thumb layouts

vs night + dusk-wp: no corner usage, `th` in-roll, easy vim bindings | worse: .40-50% skip grams
vs night**:** better heatmap, no n->d bottom interaction
vs dusk-wp: roughly equal effort map, no n -> g bottom or n -> k bottom | worse: lat/scissors
vs hd-promethium**:** removed slow curls and corner-p thumb interaction, see dev log. 2% better on skip grams, worse on stretch and scissors (there's a variation option if you want less of this).
Scroll below for stat details.

Pyciea

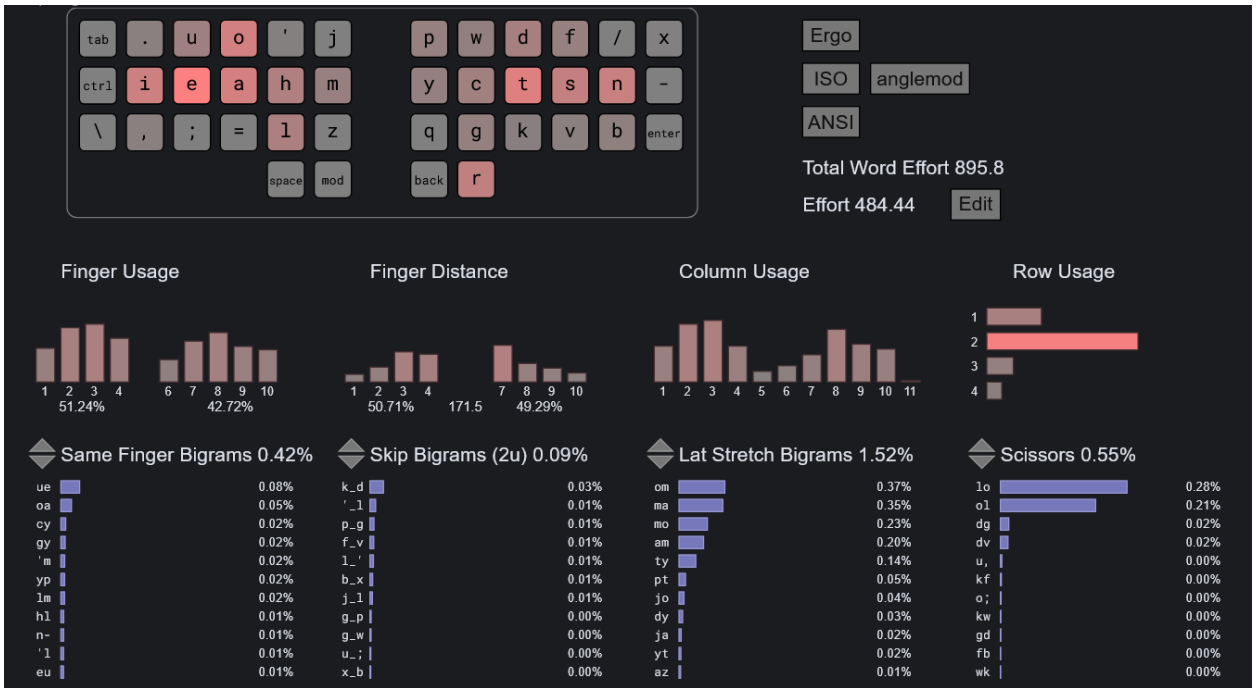


View and edit

MT-QUOTES:
  Alt: 33.11%
  Rol: 42.51% (In/Out: 25.32% | 17.19%)
  One: 3.39% (In/Out: 0.66% | 2.74%)
  Rtl: 45.90% (In/Out: 25.98% | 19.93%)
  Red: 2.57% (Bad: 0.31%)

  SFB: 0.37%
  SFS: 4.48% (Red/Alt: 0.73% | 3.76%)
  LH/RH: 51.33% | 48.67%

Dusk-wp



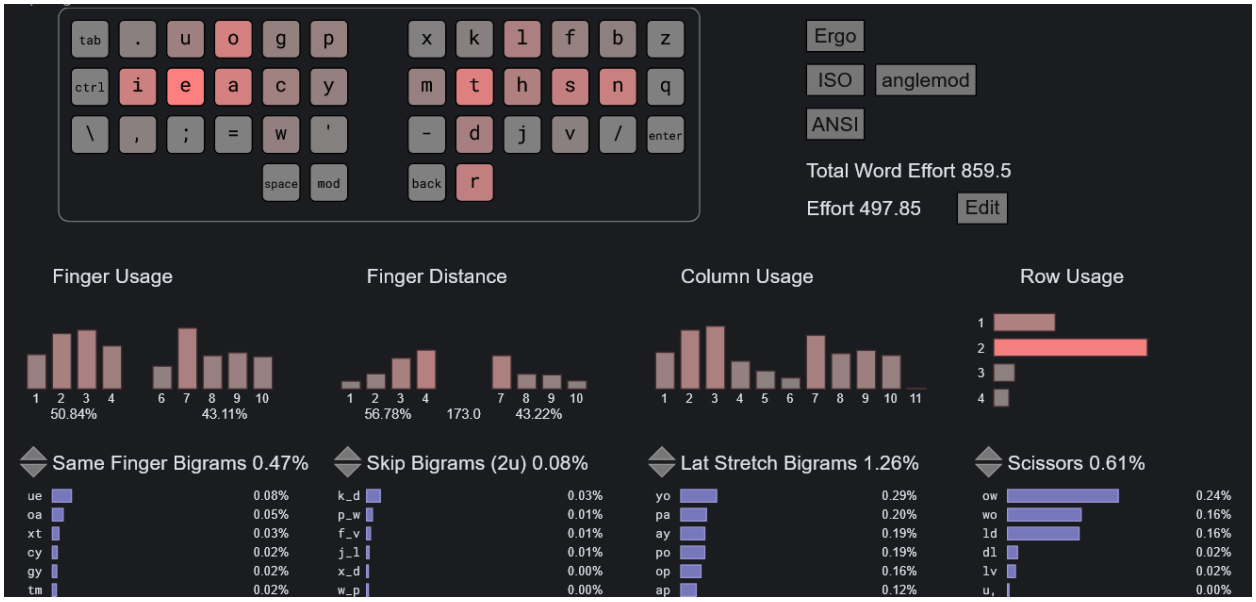
View and edit

MONKEYRACER:
Alt: 28.95%
Rol: 49.90% (In/Out: 21.69% | 28.20%)
One: 1.80% (In/Out: 0.76% | 1.04%)
Rtl: 51.69% (In/Out: 22.46% | 29.24%)
Red: 3.38% (Bad: 0.32%)

SFB: 0.49%
SFS: 3.89% (Red/Alt: 1.14% | 2.76%)

LH/RH: 46.97% | 53.03%

Night



[View and Edit]

MT-QUOTES:
Alt: 35.05%
Rol: 43.51% (In/Out: 21.32% | 22.19%)
One: 3.16% (In/Out: 0.53% | 2.63%)
Rtl: 46.68% (In/Out: 21.85% | 24.82%)
Red: 2.99% (Bad: 0.08%)

SFB: 0.33%
SFS: 4.07% (Red/Alt: 0.77% | 3.29%)

LH/RH: 48.31% | 51.69%

Nightingale

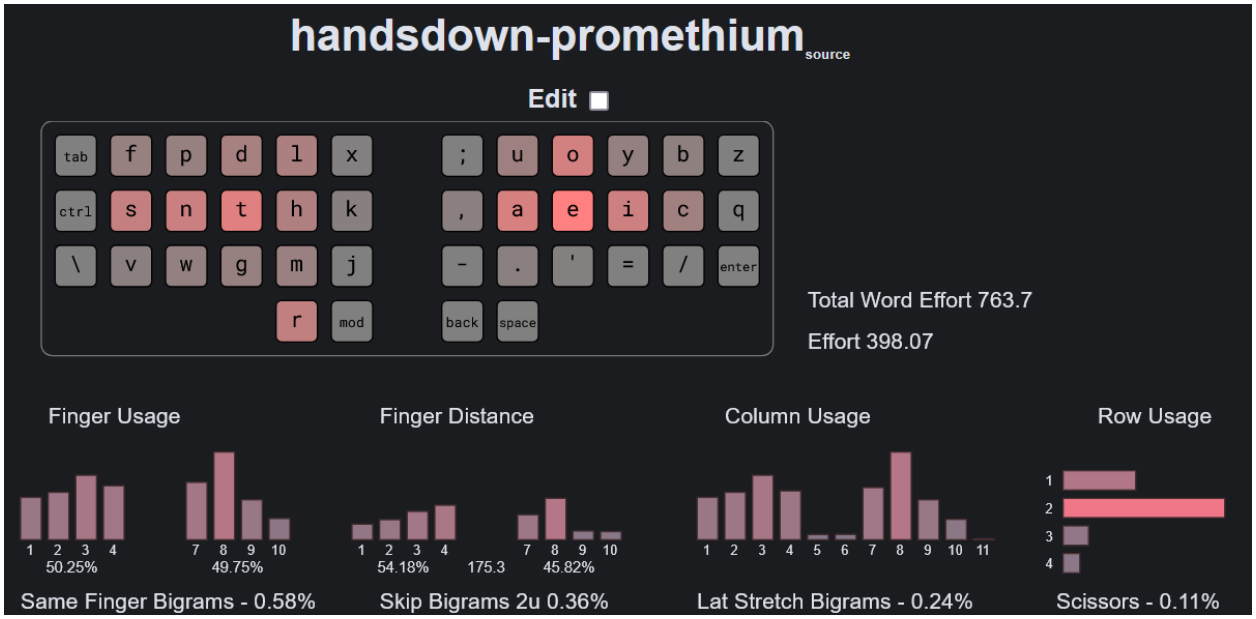
nightingale (Valorance) (3 likes)
  b f l d v p w o u .
  n s h t m c y a e i
  x z j k q ' g ; / ,
           r

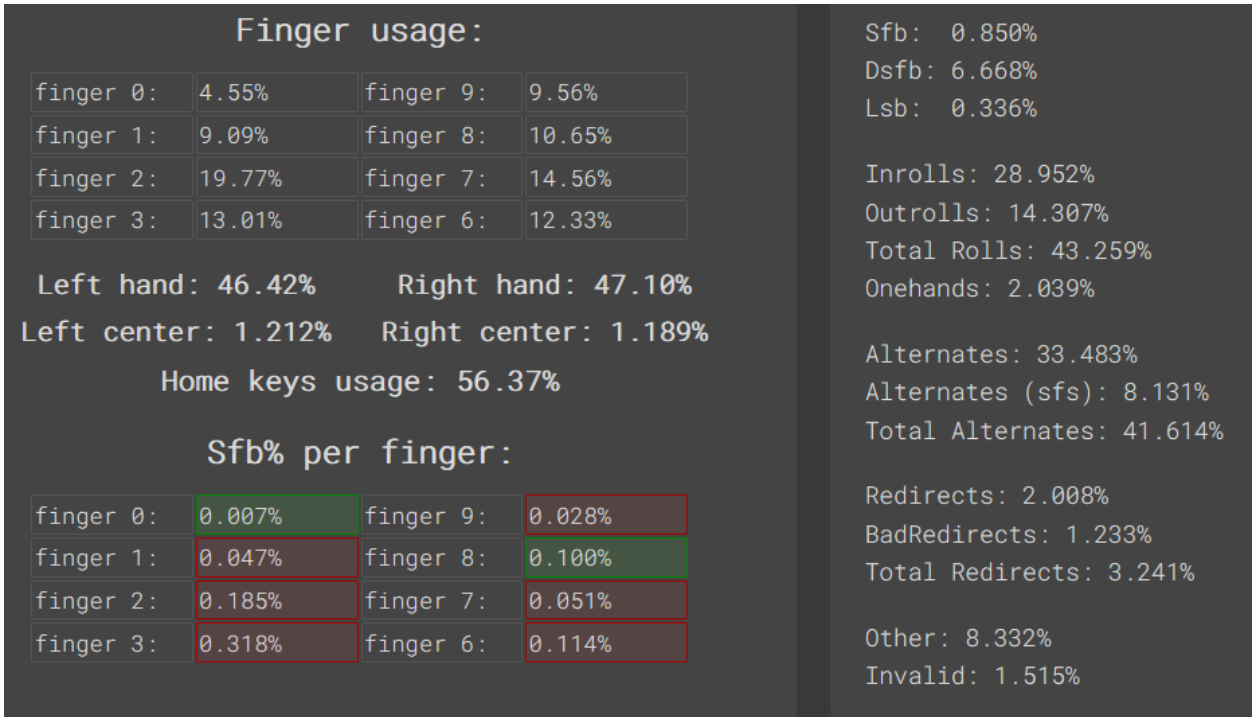
MT-QUOTES:
  Alt: 35.01%
  Rol: 43.49% (In/Out: 21.42% | 22.07%)
  One: 3.16% (In/Out: 0.53% | 2.63%)
  Rtl: 46.65% (In/Out: 21.95% | 24.70%)
  Red: 2.99% (Bad: 0.08%)

  SFB: 0.34%
  SFS: 4.11% (Red/Alt: 0.77% | 3.34%)

  LH/RH: 48.31% | 51.69%

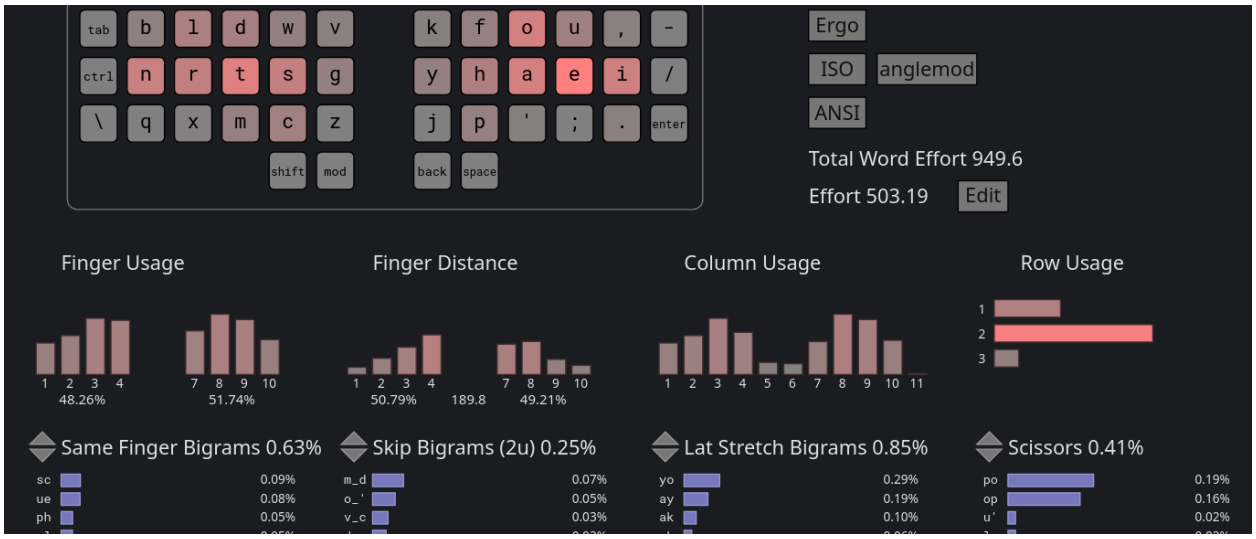
HD-Promethium





Best Non Thumb Layout

Gallium/Graphite Structure I would use on ortho + col stag



C bottom because frequency and s-c slidedown. K should be top for i_k for ortho flex

Post Design Thoughts

alpha-thumb or modifier

The contention of the alpha-thumb design is that it is not easily transferable to laptop keyboards as well as its not obvious in practice if it is better than other great options for the thumb.

- Backspace with an easy to hit OSM modifier for ctrl to ctrl-backspace to avoid repeat
- A primary modifier layer in the resting thumb position

R-thumb utilizes a fairly desirable state of eliminating pinky corner alpha. On some keyboards this feels like a decent quality of life improvement, on other keyboards with a well tuned stagger the pinky button (especially top pinky) isn't so hard to hit (i.e a ferris sweep).

I'm happy with the layout created here, but at this time I don't have experience living without a modifier thumb that I can confidently embrace an alpha-thumb layout myself. I'm going to simply drive QWERTY for a bit longer with and without modifier thumb and see if I can achieve home-row type mods, and/or pinky OSLs, that fully convince me there's no degradation of layer switch facility.

Lastly, I still find myself using my laptop a decent bit due to working in a reclined position, which may not be ideal from a posture and health perspective versus my sit/stand desk routine.

To be more clear, laptop keyboard compatibility is still also a very nice outcome. So not only have I not yet fully embraced a home row-mod only layer switching strategy, I still haven’t convinced myself I’m happy swapping between QWERTY and an optimized thumb layout