My document

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1 Quarto

This analysis looks at language usage on the internet over time and across regions within Ukraine. Google Trends data using the gtrendsR package is primarily used. The gtrendsR limits the amount of queries you can conduct and I have not been able to go over the cap.

This analysis somewhat relies on revealed preference theory in assuming that the language people use on the internet is the one that *really* prefer to use, but not actually express in public or other setting. This is partly inspired by the book by Seth Stephens-Davidowitz Everybody Lies who found people expressed things online that they likely wouldn't openly express. Still, there are clear limitations with revealed preference theory in the context of internet usage in Ukraine. A clear limitation, especially going back further in time, is that there was a genuine dearth of Ukrainian language resources for many things. Even to this day it's possible that primarily Ukrainian speakers could search in Russian for certain things where there are few Ukrainian language sources.

Below are intial queries of different words over time that are spelled differently in Russian v Ukrainian over time with ticks for key events and a trend line.

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how <-  time_plot(wide_dat(process_g_trends(readRDS("C:/UKR-RU-Language-Analysis/Trend Querie
```

```
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
i Please use `linewidth` instead.
```

```
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games <-  time_plot(wide_dat(process_g_trends(readRDS("C:/UKR-RU-Language-Analysis/Trend Que
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`geom_smooth()` using formula = 'y ~ x'

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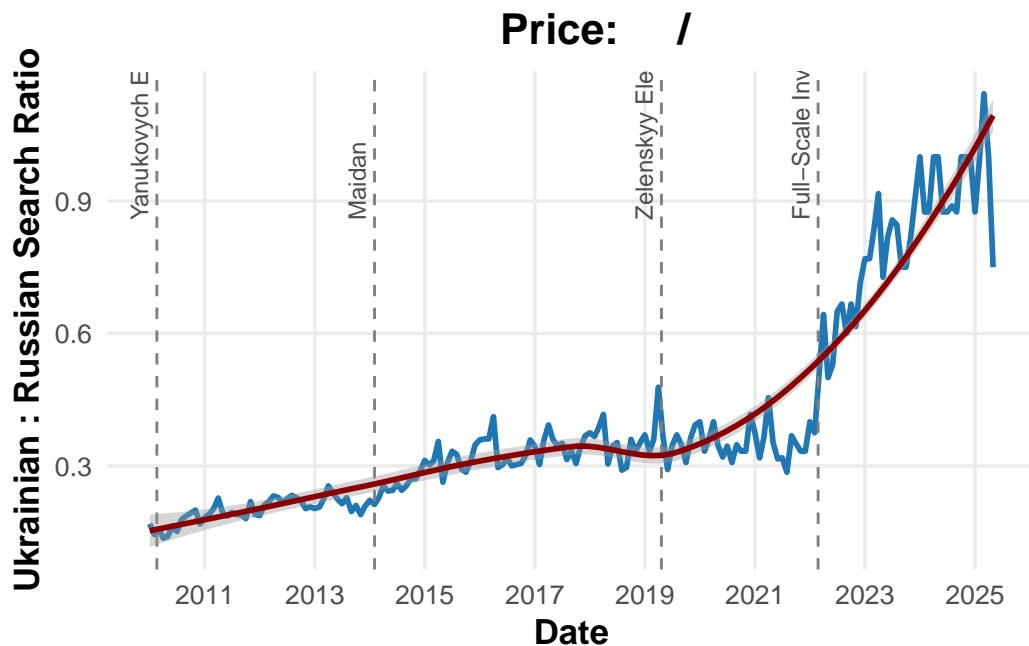

News

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`geom_smooth()` using formula = 'y ~ x'
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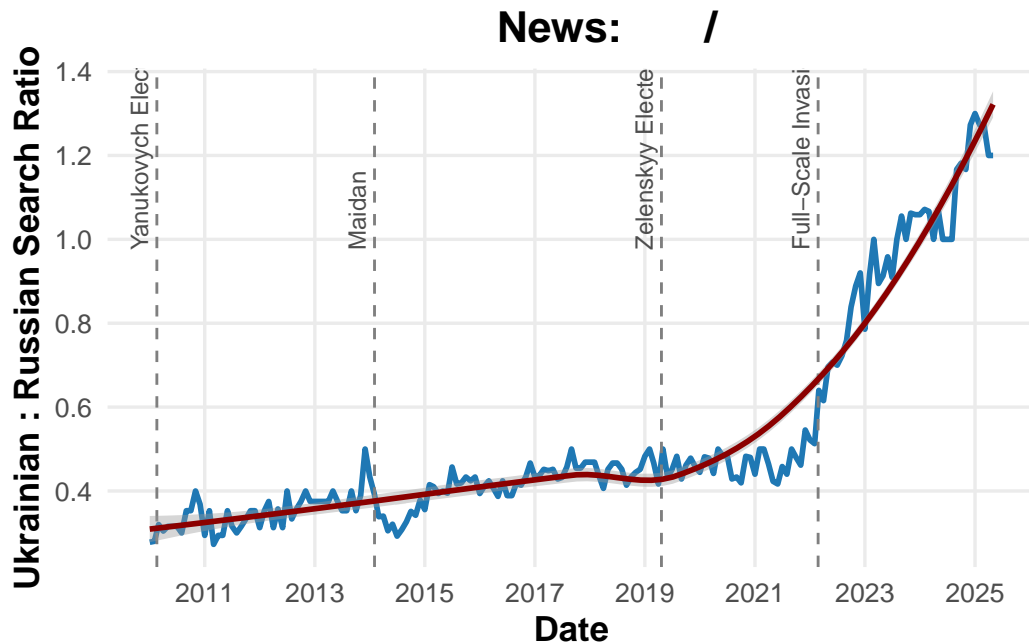
News: /

Ukrainian : Russian Search Ratio (y-axis)

Date (x-axis)

Vertical dashed lines labeled: Yanukovych Elec, Maidan, Zelenskyy Electe, Full-Scale Invasi

```
#Plot over date
(how ) / (what) +
  plot_annotation(title = "Graphs of Ukrainian/Russian Ratios over Time")
```

`geom_smooth()` using formula = 'y ~ x'
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```
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# time_plot(wide_dat(process_g_trends(readRDS("C:/UKR-RU-Language-Analysis/Trend Queries/news
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# time_plot(wide_dat(process_g_trends(readRDS("C:/UKR-RU-Language-Analysis/Trend Queries/game
# time_plot(wide_dat(process_g_trends(readRDS("C:/UKR-RU-Language-Analysis/Trend Queries/reci
```

Below looks at within Oblasts/Cities the ratio for searches that were between 2010 and May
1 2025. Table by ratio

```
how_region <- readRDS("C:/UKR-RU-Language-Analysis/Trend Queries/how2010_01_01_2025_05_01.RDS

#Table Ranking By Region
reg_ru <- how_region  %>%
  filter(keyword=="  ") %>%
  arrange(location) %>% select(hits)

reg_ua <- how_region  %>%
  filter(keyword==" ") %>%
  arrange(location) %>% select(location,hits)


#Creating separte columns for two diff search terms
reg_ua <- rename(reg_ua,hits_ua=hits)
reg_ru <- rename(reg_ru,hits_ru=hits)
regions_tab <- cbind(reg_ua,reg_ru)
#Setting Russian to numeric and sorting by it. Could be better to look at rus realtive to ukr
regions_tab$hits_ua <-  ifelse(regions_tab$hits_ua == "<1",0,regions_tab$hits_ua)
regions_tab$hits_ua <-  as.numeric(ifelse(regions_tab$hits_ua == "",0,regions_tab$hits_ua))
regions_tab$hits_ru <- as.numeric(regions_tab$hits_ru)

regions_tab$rat <- regions_tab$hits_ua / regions_tab$hits_ru

regions_tab <-  arrange(regions_tab, -regions_tab$rat)
names(regions_tab) <- c("Oblast", "Hits UA", "Hits RU", "Ratio UA/RU")
# stargazer(regions_tab,summary=FALSE,
#           title= "Ukrainian Oblasts and Cities Ranked by Ukrainian/Russian Ratio", notes =

regions_tab %>%
  gt() %>%
  tab_header(
    title = "Ukrainian Oblasts and Cities Ranked by Ukrainian-to-Russian Search Ratio",
    subtitle = "Search term: 'how' (' ' vs '  ') from Google Trends"
```

```
) %>%
fmt_number(columns = c(`Hits UA`, `Hits RU`, `Ratio UA/RU`), decimals = 2) %>%
tab_footnote(
  footnote = "Crimea and Sevastopol may have suppressed or missing data.",
  locations = cells_title(groups = "title")
) %>%
cols_label(
  `Hits UA` = "Hits (UA)",
  `Hits RU` = "Hits (RU)",
  `Ratio UA/RU` = "UA/RU Ratio"
) %>%
opt_table_outline()
```

The `echo: false` option disables the printing of code (only output is displayed).

Ukrainian Oblasts and Cities Ranked by Ukrainian-to-Russian Search Ratio[1]

Search term: 'how' (' ' vs ' ') from Google Trends

Oblast	Hits (UA)	Hits (RU)	UA/RU Ratio
Ternopil's'ka oblast	98.00	19.00	5.16
Ivano-Frankivs'ka oblast	100.00	21.00	4.76
Volyns'ka oblast	94.00	24.00	3.92
Rivnens'ka oblast	85.00	26.00	3.27
Lviv Oblast	79.00	26.00	3.04
Khmel'nyts'ka oblast	84.00	35.00	2.40
Zakarpats'ka oblast	66.00	35.00	1.89
Vinnyts'ka oblast	76.00	42.00	1.81
Chernivets'ka oblast	67.00	38.00	1.76
Zhytomyrs'ka oblast	64.00	49.00	1.31
Cherkas'ka oblast	60.00	50.00	1.20
Kyivs'ka oblast	51.00	50.00	1.02
Poltavs'ka oblast	43.00	55.00	0.78
Chernihivs'ka oblast	44.00	60.00	0.73
Kirovohrads'ka oblast	44.00	74.00	0.59
Sums'ka oblast	36.00	65.00	0.55
Kyiv city	28.00	59.00	0.47
Mykolaivs'ka oblast	27.00	72.00	0.38
Dnipropetrovsk Oblast	20.00	68.00	0.29
Khersons'ka oblast	17.00	79.00	0.22
Zaporiz'ka oblast	15.00	81.00	0.19
Odessa Oblast	15.00	82.00	0.18
Kharkiv Oblast	14.00	79.00	0.18
Donetsk Oblast	6.00	84.00	0.07
Luhans'ka oblast	4.00	91.00	0.04
Crimea	0.00	100.00	0.00
Sevastopol' city	0.00	94.00	0.00

[1]Crimea and Sevastopol may have suppressed or missing data.