Project - Mapping the life and work of Arno Schmidt

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```
library(knitr)
library(dbplyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:dbplyr':
##
##     ident, sql
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(foreign)
library(ggrepel)
```

```
## Loading required package: ggplot2
```

```
library(haven)
library(kableExtra)
```

```
## Warning: package 'kableExtra' was built under R version 4.0.5
```

```
##
## Attaching package: 'kableExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     group_rows
```

```
library(tidyr)
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.0 --
```

```
## v tibble  3.0.6     v stringr 1.4.0
## v readr   1.4.0     v forcats 0.5.1
## v purrr   0.3.4

## -- Conflicts ---------------------------------------- tidyverse_conflicts() --
## x dplyr::filter()          masks stats::filter()
## x kableExtra::group_rows() masks dplyr::group_rows()
## x dplyr::ident()           masks dbplyr::ident()
## x dplyr::lag()             masks stats::lag()
## x dplyr::sql()             masks dbplyr::sql()
```

```
library(tidygeocoder)
```

```
## Warning: package 'tidygeocoder' was built under R version 4.0.5
```

```
library(ggplot2)
library(maps)
```

```
## Warning: package 'maps' was built under R version 4.0.5

##
## Attaching package: 'maps'

## The following object is masked from 'package:purrr':
##
##     map
```

```
library(ggrepel)
library(rnaturalearth)
```

```
## Warning: package 'rnaturalearth' was built under R version 4.0.5
```

```
library(rnaturalearthdata)
```

```
## Warning: package 'rnaturalearthdata' was built under R version 4.0.5
```

```
library(rgdal)
```

```
## Warning: package 'rgdal' was built under R version 4.0.5

## Loading required package: sp

## Warning: package 'sp' was built under R version 4.0.5

## rgdal: version: 1.5-23, (SVN revision 1121)
## Geospatial Data Abstraction Library extensions to R successfully loaded
## Loaded GDAL runtime: GDAL 3.2.1, released 2020/12/29
## Path to GDAL shared files: C:/Users/sched/Documents/R/win-library/4.0/rgdal/gdal
## GDAL binary built with GEOS: TRUE
```

```
## Loaded PROJ runtime: Rel. 7.2.1, January 1st, 2021, [PJ_VERSION: 721]
## Path to PROJ shared files: C:/Users/sched/Documents/R/win-library/4.0/rgdal/proj
## PROJ CDN enabled: FALSE
## Linking to sp version:1.4-5
## To mute warnings of possible GDAL/OSR exportToProj4() degradation,
## use options("rgdal_show_exportToProj4_warnings"="none") before loading rgdal.
## Overwritten PROJ_LIB was C:/Users/sched/Documents/R/win-library/4.0/rgdal/proj
```

```
library(readr)
library(maptools)
```

```
## Warning: package 'maptools' was built under R version 4.0.5
```

```
## Checking rgeos availability: TRUE
```

```
library(ggspatial)
```

```
## Warning: package 'ggspatial' was built under R version 4.0.5
```

```
library(sf)
```

```
## Warning: package 'sf' was built under R version 4.0.5
```

```
## Linking to GEOS 3.9.0, GDAL 3.2.1, PROJ 7.2.1
```

```
library(osmdata)
```

```
## Warning: package 'osmdata' was built under R version 4.0.5
```

```
## Data (c) OpenStreetMap contributors, ODbL 1.0. https://www.openstreetmap.org/copyright
```

```
library(rgeos)
```

```
## Warning: package 'rgeos' was built under R version 4.0.5
```

```
## rgeos version: 0.5-5, (SVN revision 640)
##  GEOS runtime version: 3.8.0-CAPI-1.13.1
##  Linking to sp version: 1.4-5
##  Polygon checking: TRUE
```

```
library(igraph)
```

```
## Warning: package 'igraph' was built under R version 4.0.5
```

```
##
## Attaching package: 'igraph'
```

```
## The following object is masked from 'package:rgeos':
##
##     union

## The following objects are masked from 'package:purrr':
##
##     compose, simplify

## The following object is masked from 'package:tibble':
##
##     as_data_frame

## The following object is masked from 'package:tidyr':
##
##     crossing

## The following objects are masked from 'package:dplyr':
##
##     as_data_frame, groups, union

## The following objects are masked from 'package:stats':
##
##     decompose, spectrum

## The following object is masked from 'package:base':
##
##     union
```

```
library(ggraph)
```

```
## Warning: package 'ggraph' was built under R version 4.0.5
```

```
##
## Attaching package: 'ggraph'

## The following object is masked from 'package:sp':
##
##     geometry
```

```
library(leaflet)
```

```
## Warning: package 'leaflet' was built under R version 4.0.5
```

```
library(htmlwidgets)
```

```
## Warning: package 'htmlwidgets' was built under R version 4.0.5
```

```
library(gganimate)
```

```
## Warning: package 'gganimate' was built under R version 4.0.5
```

```
library(transformr)
```

```
## Warning: package 'transformr' was built under R version 4.0.5
```

```
##
## Attaching package: 'transformr'
```

```
## The following object is masked from 'package:sf':
##
##     st_normalize
```

Geocoding

```
# locations_lived <- read.csv("./Arno Schmidt_locations_lived.csv")
#
# locations_lived <- locations_lived %>%
#    tidygeocoder::geocode(city = location_current, country = country_current, method = 'osm',
#            full_results = TRUE, custom_query= list(extratags = 1))
#
# locations_lived_filtered <- locations_lived %>%
#   select(ï..address, state_original, state_current, country_current, country_original, location_curre

#write.csv(locations_lived_filtered, "Arno Schmidt_locations_lived_latlong.csv")
```

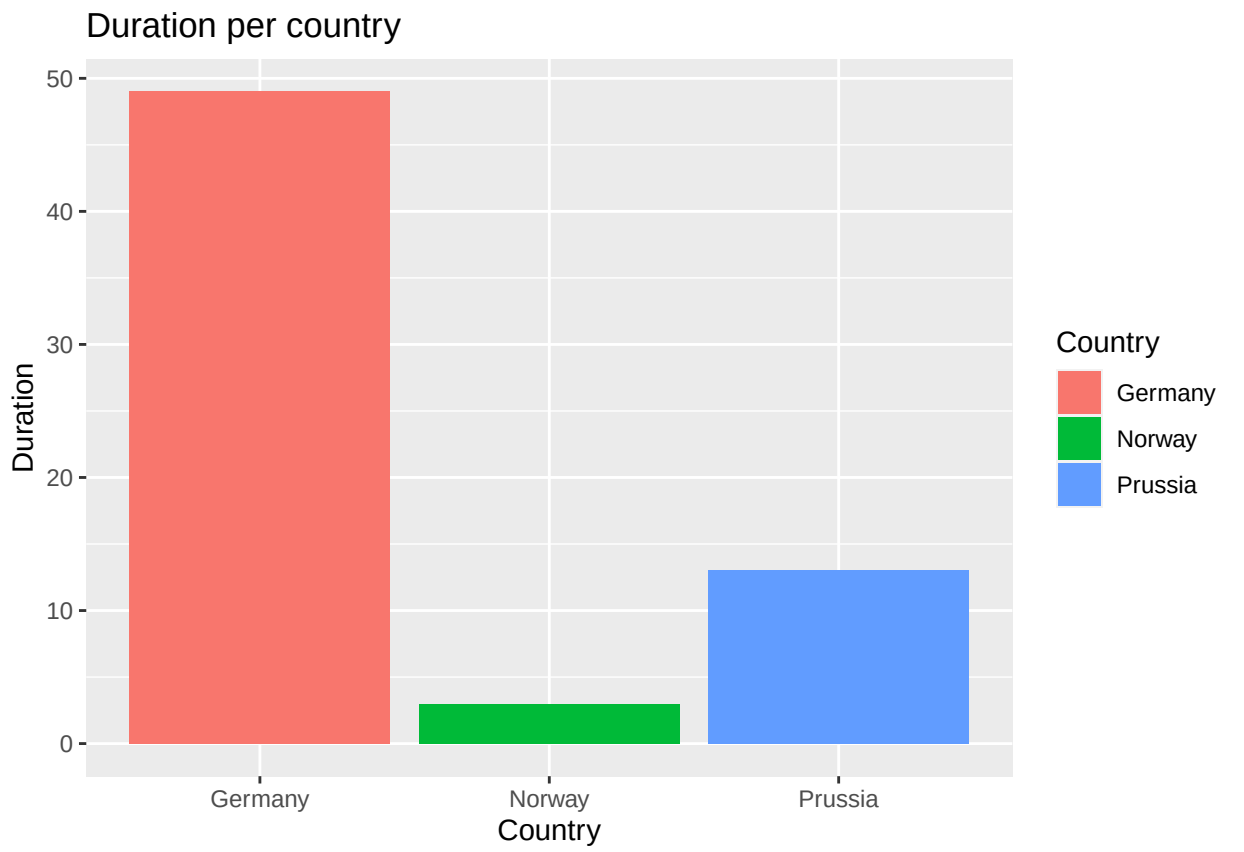
```
# locations_referenced <- read.csv("./Arno Schmidt_locations_referenced.csv")
#
# locations_referenced <- locations_referenced %>%
#    tidygeocoder::geocode(city = location_current, country = country_current, method = 'osm',
#            full_results = TRUE, custom_query= list(extratags = 1))
#
# locations_referenced_filtered <- locations_referenced %>%
#   select(state_original, state_current, country_current, country_original, location_current, ï..locat

#write.csv(locations_referenced_filtered, "Arno Schmidt_locations_referenced_latlong.csv")
```

```
locations_lived <- read.csv("./Arno Schmidt_locations_lived_latlong.csv")
locations_referenced <- read.csv("./Arno Schmidt_locations_referenced_latlong.csv")
works <- read.csv("./Arno Schmidt_works.csv")
locations_works <- read.csv("./Arno Schmidt_locations_2.csv")
```

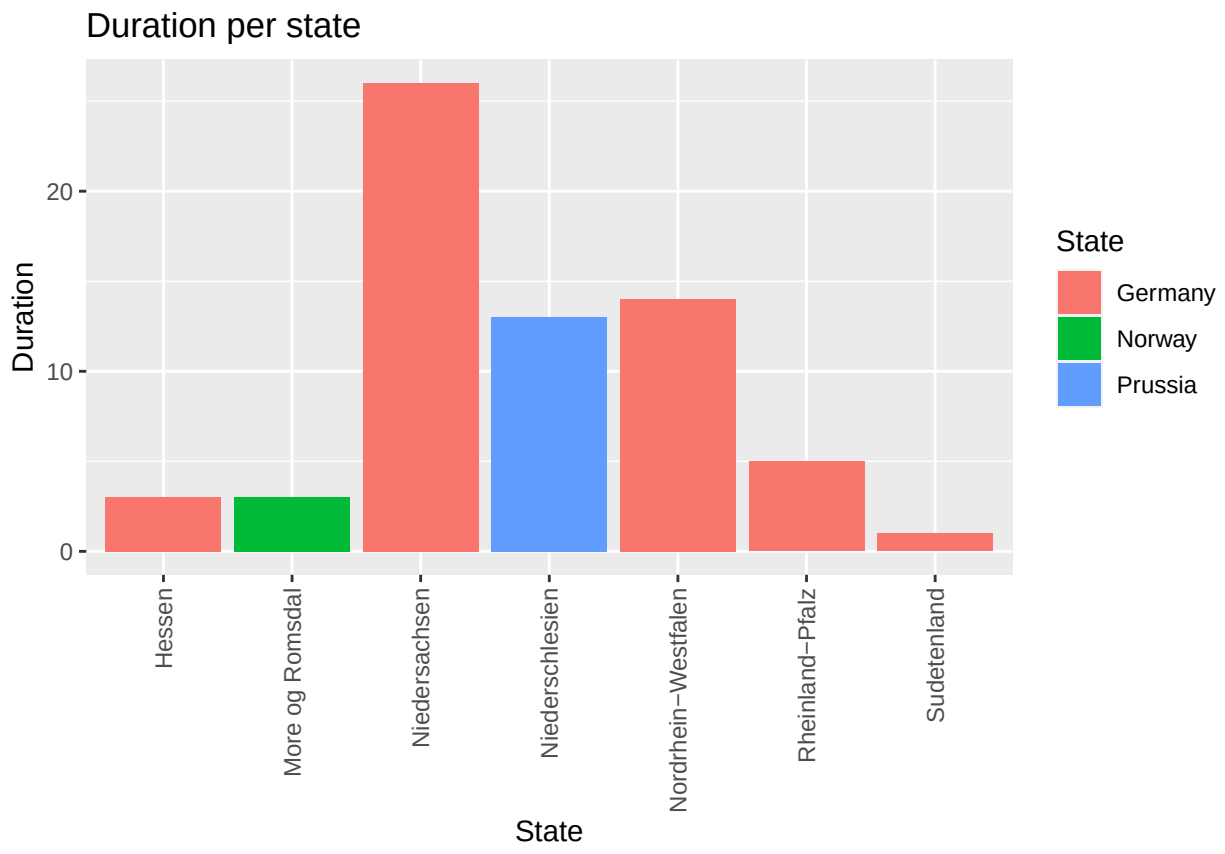
Some preliminary EDA analysis

```
locations_lived <- locations_lived %>%
  mutate(duration = moved_out - moved_in)

locations_lived_duration <- locations_lived %>%
```

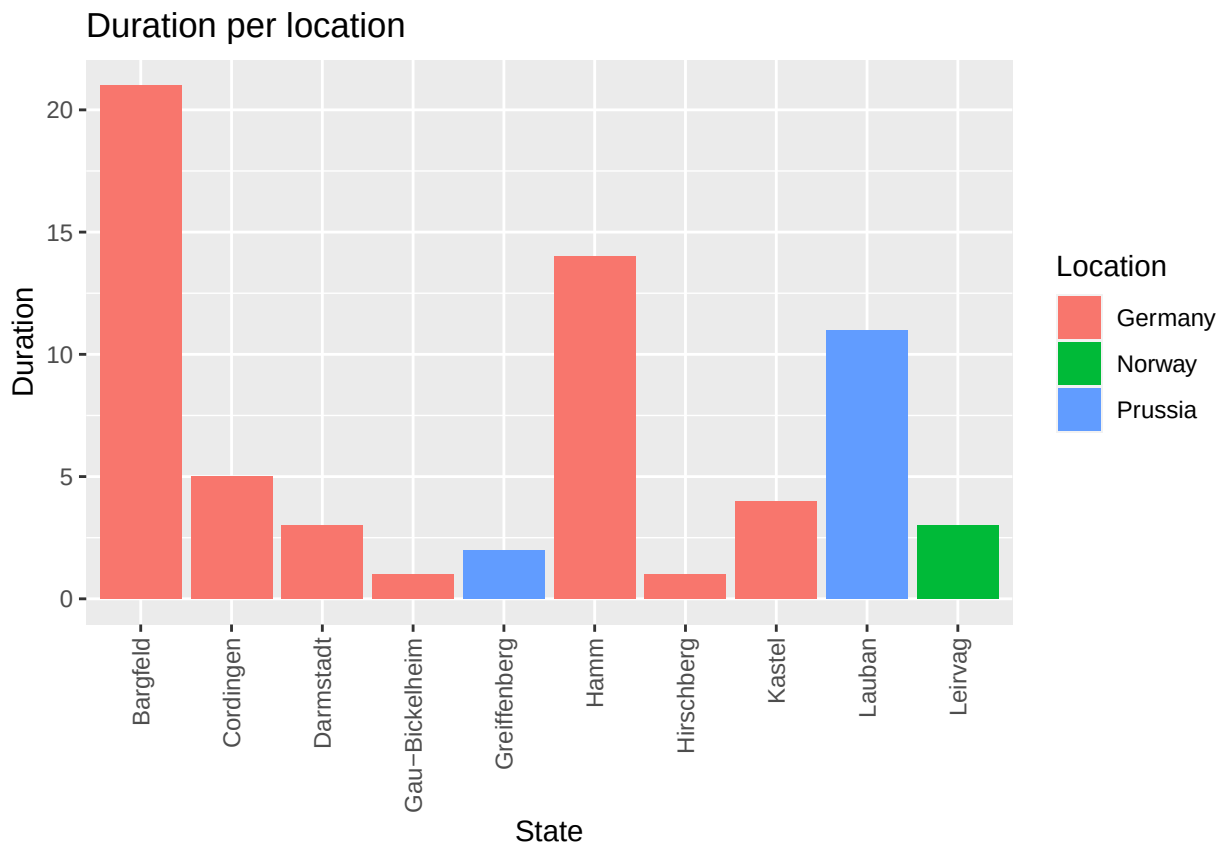
```
  filter(duration != 0)

ggplot(data = locations_lived_duration, aes(x=country_original, y=duration, fill = country_original)) +
  geom_bar(stat = "identity") +
  labs(title = "Duration per country", x = "Country", y = "Duration", fill= "Country")
```



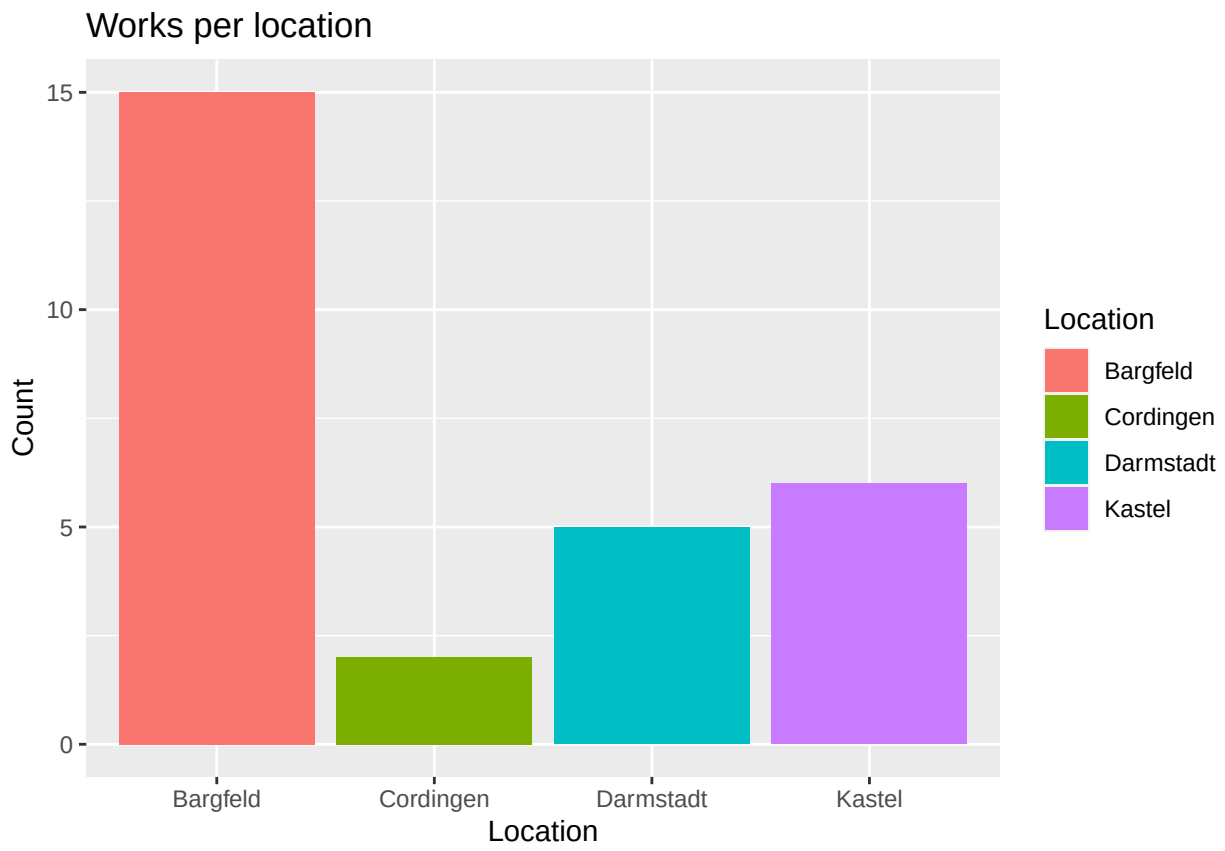

```
ggplot(data = locations_lived_duration, aes(x=state_original, y=duration, fill = country_original)) +
  geom_bar(stat = "identity") +
  labs(title = "Duration per state", x = "State", y = "Duration", fill = "State") +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```



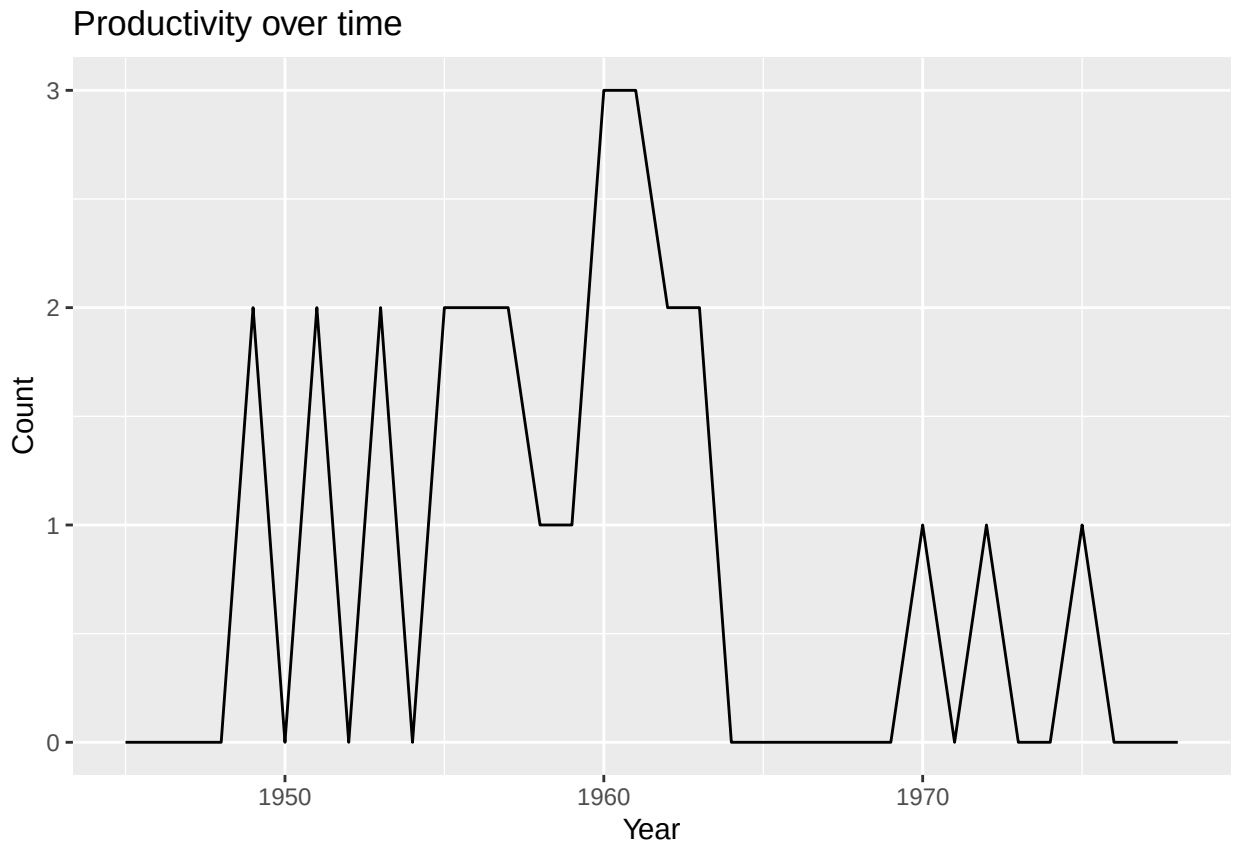

```
ggplot(data = locations_lived_duration, aes(x=location_original, y=duration, fill = country_original)) +
  geom_bar(stat = "identity") +
  labs(title = "Duration per location", x = "State", y = "Duration", fill = "Location") +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```



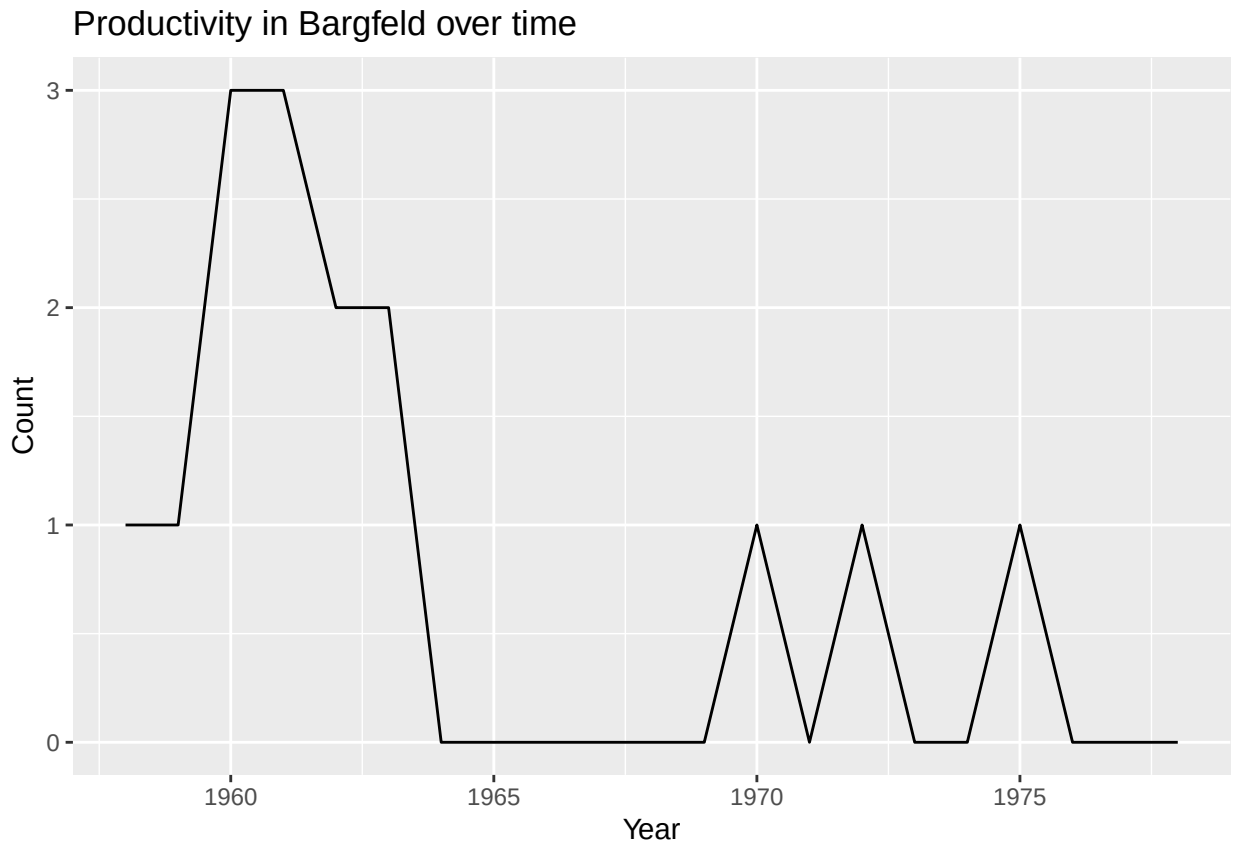

```
locations_works_bargfeld <- locations_works %>%
  filter(location == "Bargfeld")

ggplot(data=locations_works, aes(x=location, y=title, fill = location)) +
  geom_bar(stat="identity") +
  labs(title = "Works per location", x = "Location", y = "Count", fill = "Location")
```



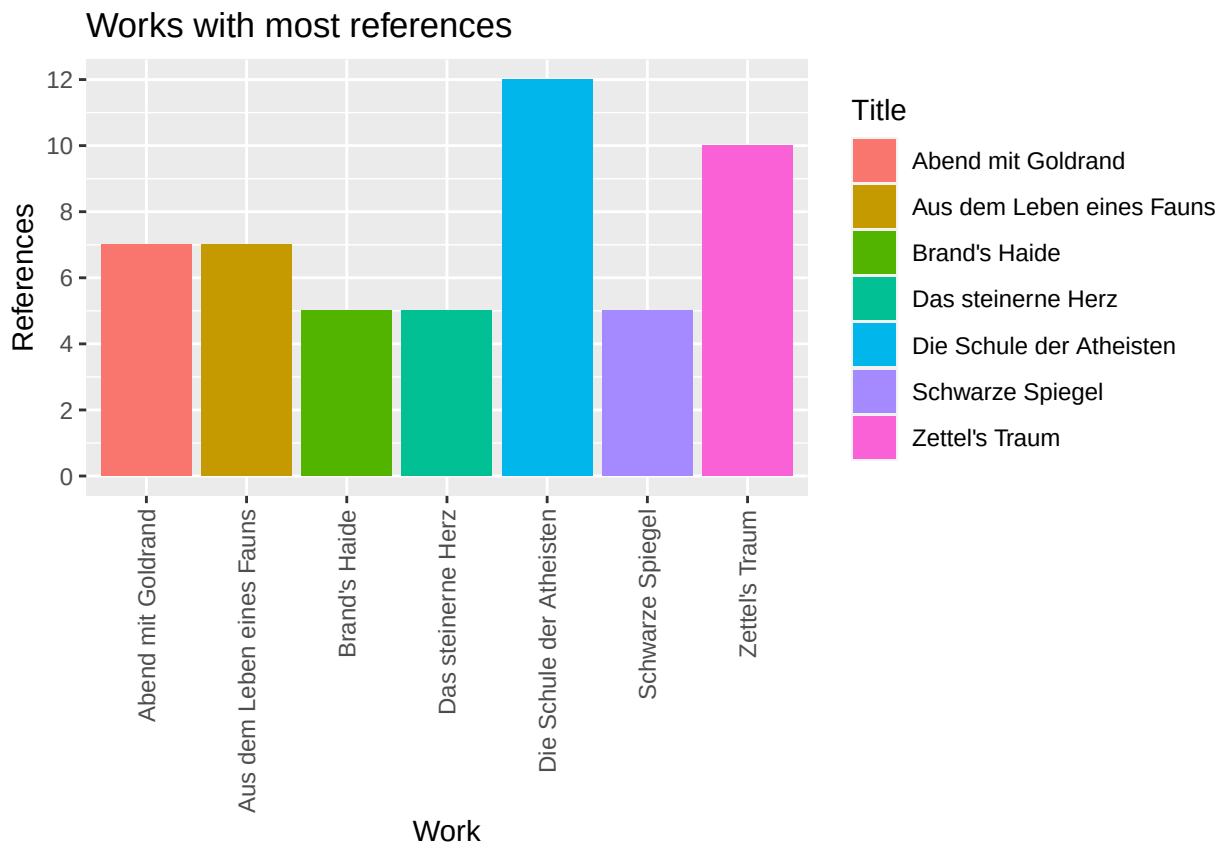

```
ggplot(data=locations_works, aes(x=year, y=title)) +
  geom_line() +
  labs(title = "Productivity over time", x = "Year", y = "Count")
```



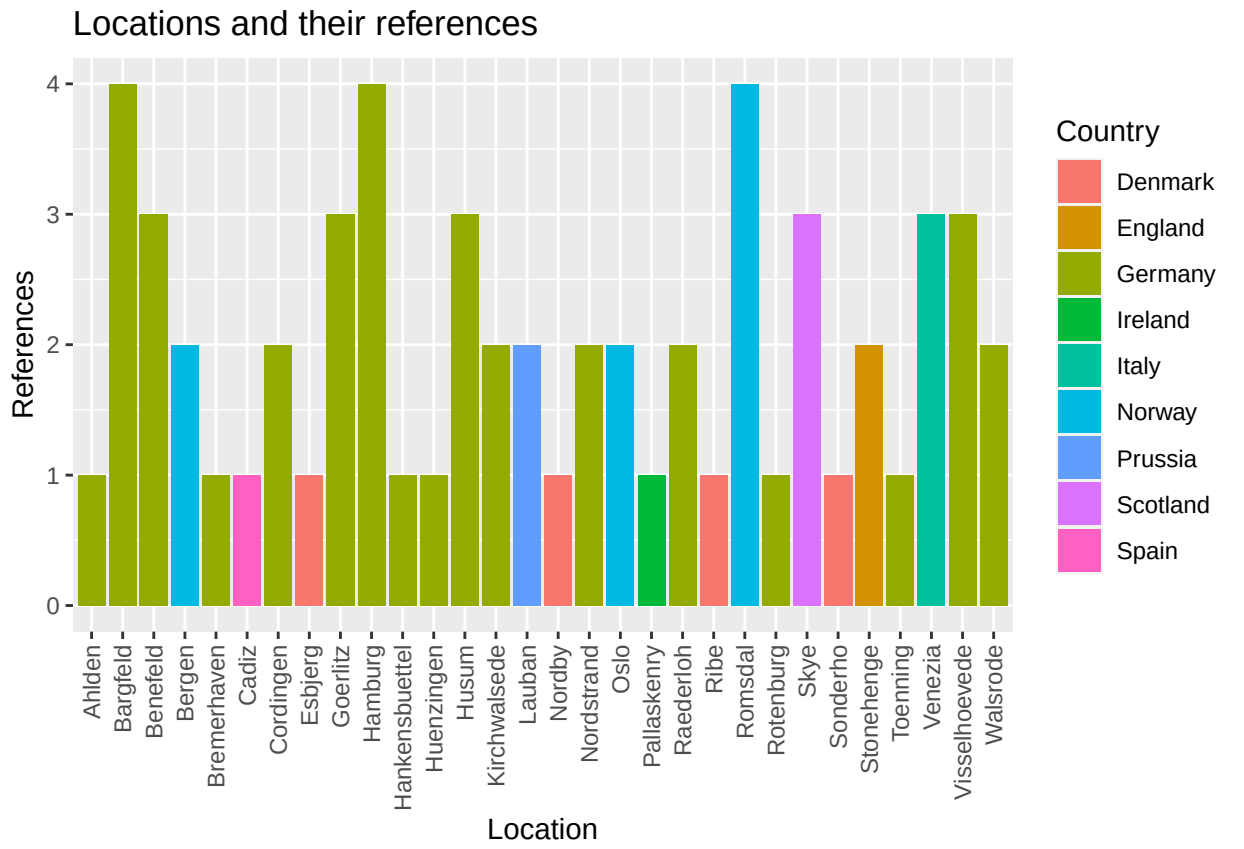

```
ggplot(data=locations_works_bargfeld, aes(x=year, y=title)) +
  geom_line() +
  labs(title = "Productivity in Bargfeld over time", x = "Year", y = "Count")
```




```
locations_referenced_joined <- locations_referenced %>%
  left_join(works, by = c("work_referenced"="id"))

locations_referenced_joined_count <- locations_referenced_joined %>%
  add_count(title, name = "count_title") %>%
  distinct(work_referenced, .keep_all = TRUE)

locations_referenced_joined_count_2 <- locations_referenced_joined %>%
  add_count(location_original, name = "count_location") %>%
  distinct(location_original, .keep_all = TRUE)

locations_referenced_joined_count_top <- locations_referenced_joined_count %>%
  top_n(5, count_title)

ggplot(data=locations_referenced_joined_count_top, aes(x=title, y=count_title, fill = title)) +
  geom_bar(stat="identity") +
  labs(title = "Works with most references", x = "Work", y = "References", fill = "Title") +
  scale_y_continuous(breaks = scales::pretty_breaks(n = 7)) +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```




```
ggplot(data=locations_referenced_joined_count_2, aes(x=location_original, y=count_location, fill = coun
  geom_bar(stat="identity") +
  labs(title = "Locations and their references", x = "Location", y = "References", fill = "Country") +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```



Creating maps

```
world <- ne_countries(scale = "medium", returnclass = "sf")

rivers <- readOGR("./layer.riverData", "ne_50m_rivers_lake_centerlines")
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "C:\Users\sched\Documents\Uni\Digital Humanities\UE - Intro to GIS\Project\layer.riverData",
## with 462 features
## It has 32 fields
## Integer64 fields read as strings:  ne_id
```

```
## Warning in readOGR("./layer.riverData", "ne_50m_rivers_lake_centerlines"):
## Dropping null geometries: 461
```

```
rivers_f <- fortify(rivers)

lüneburg <- readOGR("./Lüneburger Heide", "Lüneburger Heide")
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "C:\Users\sched\Documents\Uni\Digital Humanities\UE - Intro to GIS\Project\Lüneburger Heide"
## with 1 features
## It has 11 fields
## Integer64 fields read as strings:  tessellate extrude visibility drawOrder
```

```
## Warning in readOGR("./Lüneburger Heide", "Lüneburger Heide"): Z-dimension
## discarded
```

```
lüneburg_f <- fortify(lüneburg)
```

```
## Regions defined for each Polygons
```

```
bundesländer <- readOGR("./Bundesländer", "DEU_adm1")
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "C:\Users\sched\Documents\Uni\Digital Humanities\UE - Intro to GIS\Project\Bundesländer", lay
## with 16 features
## It has 9 fields
## Integer64 fields read as strings:  ID_0 ID_1
```

```
bundesländer_f <- fortify(bundesländer)
```

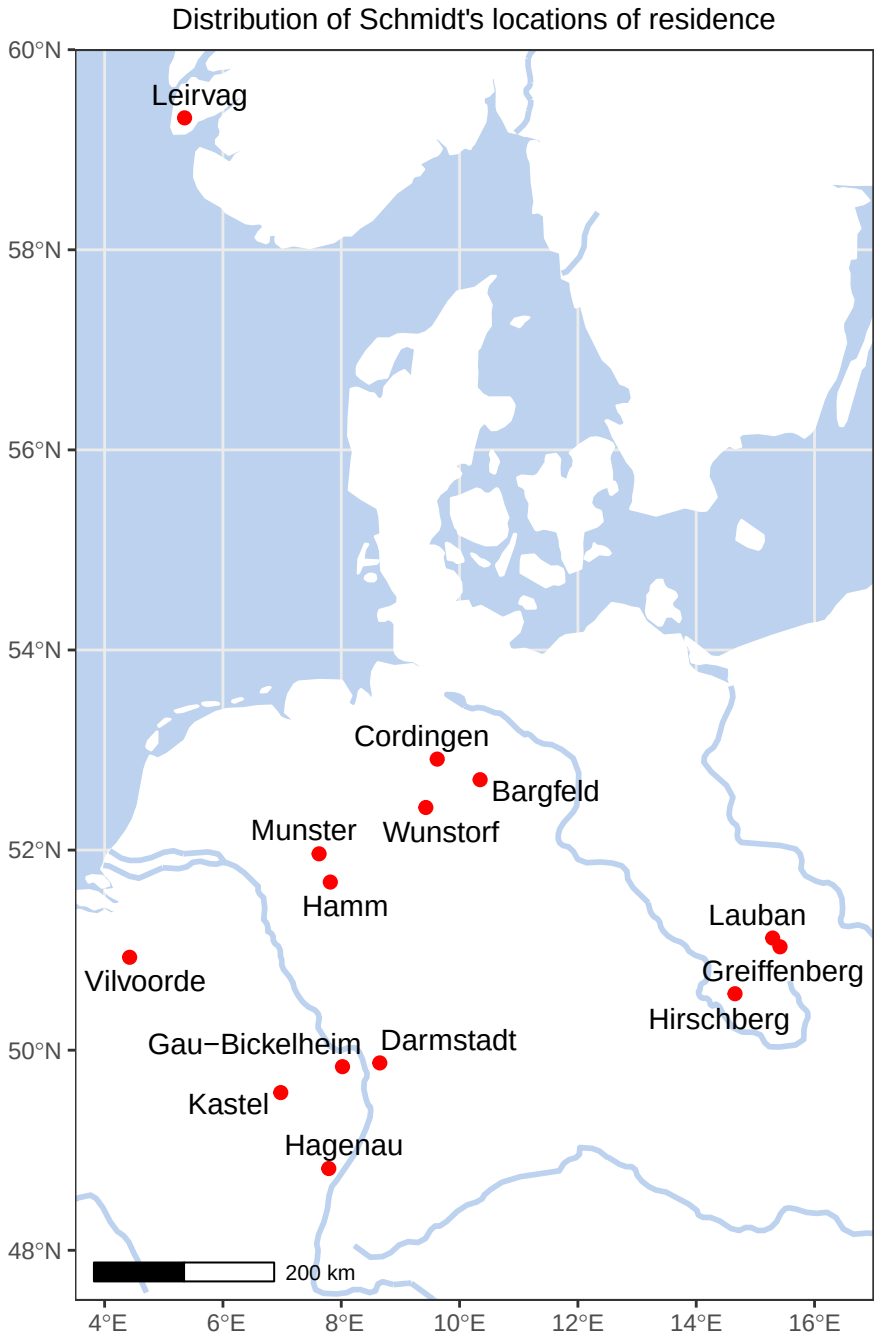
```
## Regions defined for each Polygons
```

```
theme_set(theme_bw())
waterColor = "lightsteelblue2"
```

```
locations_lived_dupl <- locations_lived %>%
  filter(id != 6)

xlim=c(3.5,17); ylim=c(47.5,60)
ggplot(data = world) +
    geom_sf(fill="white", color="white") +
    geom_path(data = rivers_f, aes(x = long, y = lat, group = group), color = waterColor, size = 1) +
    geom_point(data = locations_lived_dupl, aes(x=long, y=lat), color = "red", size = 2) +
    geom_text_repel(data = locations_lived_dupl, aes(x=long, y=lat, label = location_original), size = 4
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    annotation_scale(location = "bl", width_hint = 0.25) +
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    ggtitle("Distribution of Schmidt's locations of residence") +
    theme(panel.background = element_rect(fill = waterColor), plot.title = element_text(size = rel(1), l
```

```
## Coordinate system already present. Adding new coordinate system, which will replace the existing one
```

```
## Scale on map varies by more than 10%, scale bar may be inaccurate
```




```
locations_lived_1stperiod <- locations_lived %>%
  filter(moved_in >= 1914 & moved_in < 1938)

locations_lived_2ndperiod <- locations_lived %>%
  filter(moved_out >= 1940 & moved_out <= 1945)

locations_lived_3rdperiod <- locations_lived %>%
  filter(moved_out >= 1950 & moved_out <= 1979)

xlim=c(3.5,17); ylim=c(47.5,60)
ggplot(data = world) +
```

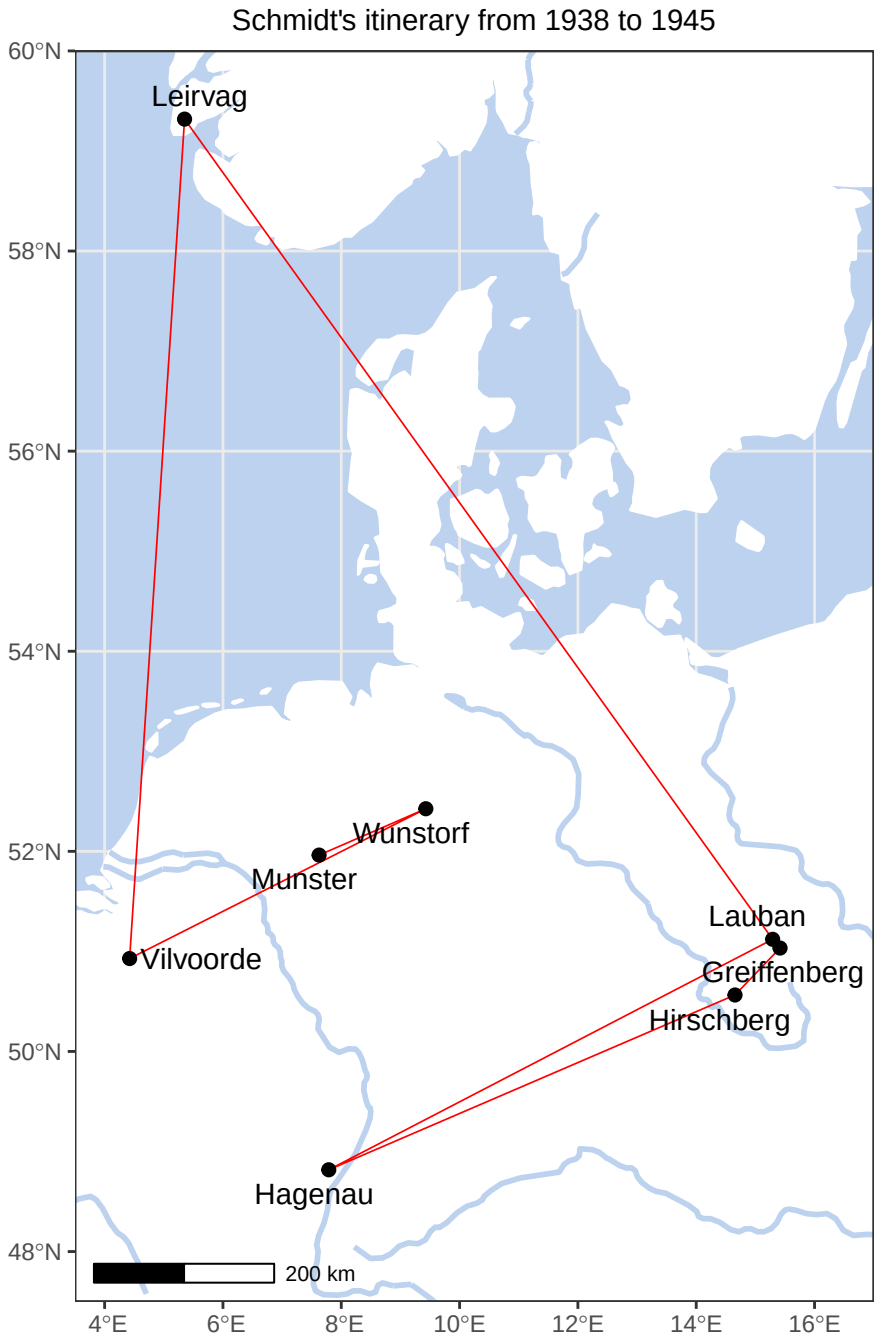
```
    geom_sf(fill="white", color="white") +
    geom_path(data = rivers_f, aes(x = long, y = lat, group = group), color = waterColor, size = 1) +
    geom_path(data = locations_lived_1stperiod, aes(x = long, y = lat), color = "red", size = 1) +
    geom_point(data = locations_lived_1stperiod, aes(x=long, y=lat), color = "black", size = 2) +
    geom_text_repel(data = locations_lived_1stperiod, aes(x=long, y=lat, label = location_original), si
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    annotation_scale(location = "bl", width_hint = 0.25) +
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    ggtitle("Schmidt's itinerary from 1914 to 1938") +
    theme(panel.background = element_rect(fill = waterColor), plot.title = element_text(size = rel(1), h
```

```
## Coordinate system already present. Adding new coordinate system, which will replace the existing one
## Scale on map varies by more than 10%, scale bar may be inaccurate
```


```
xlim=c(3.5,17); ylim=c(47.5,60)
ggplot(data = world) +
    geom_sf(fill="white", color="white") +
    geom_path(data = rivers_f, aes(x = long, y = lat, group = group), color = waterColor, size = 1) +
    geom_path(data = locations_lived_2ndperiod, aes(x=long, y=lat), color = "red", size = 0.3) +
    geom_point(data = locations_lived_2ndperiod, aes(x=long, y=lat), color = "black", size = 2) +
    geom_text_repel(data = locations_lived_2ndperiod, aes(x=long, y=lat, label = location_original), si
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    annotation_scale(location = "bl", width_hint = 0.25) +
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    ggtitle("Schmidt's itinerary from 1938 to 1945") +
```

```
    theme(panel.background = element_rect(fill = waterColor), plot.title = element_text(size = rel(1), l
```

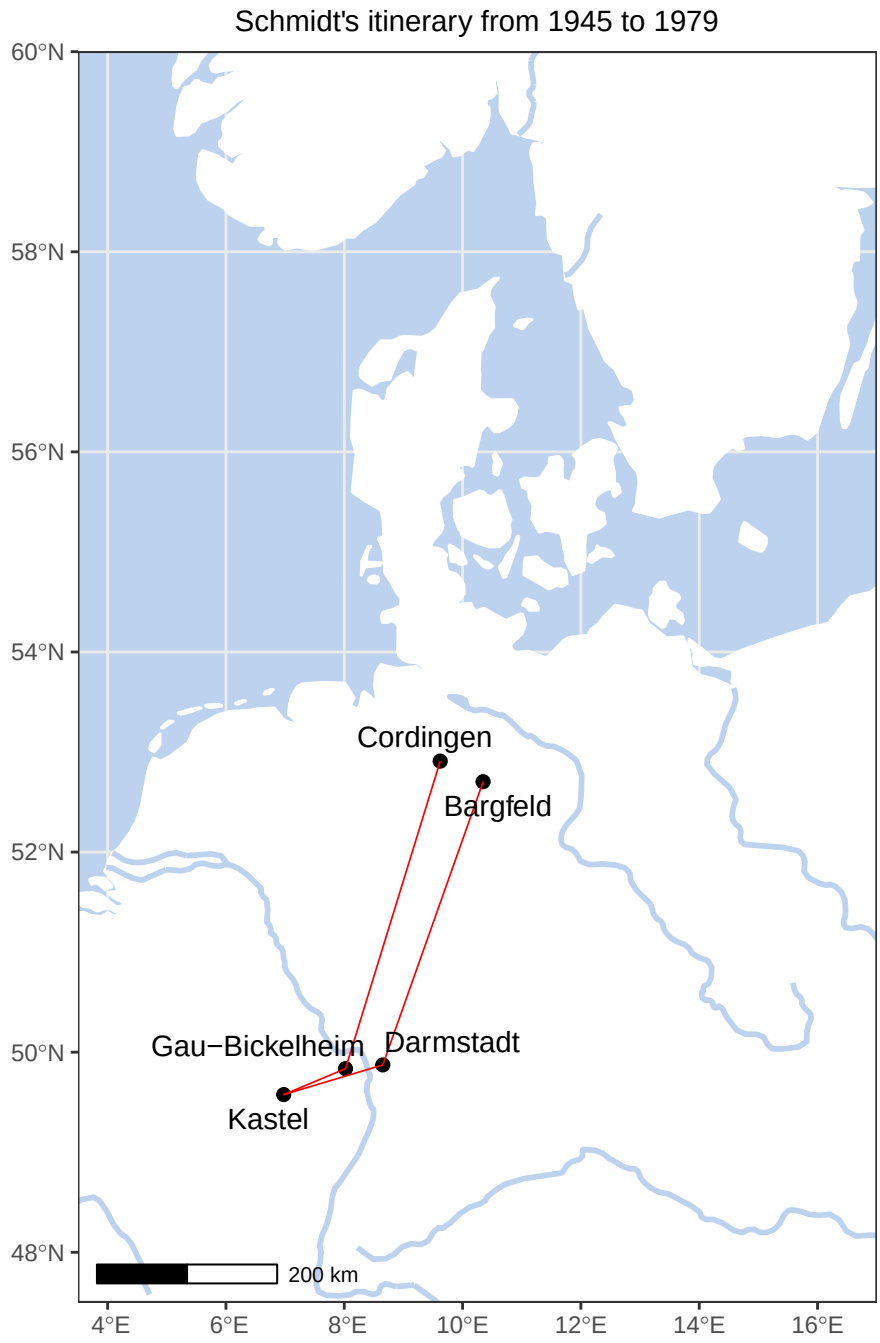
```
## Coordinate system already present. Adding new coordinate system, which will replace the existing one
## Scale on map varies by more than 10%, scale bar may be inaccurate
```




```
xlim=c(3.5,17); ylim=c(47.5,60)
ggplot(data = world) +
    geom_sf(fill="white", color="white") +
    geom_path(data = rivers_f, aes(x = long, y = lat, group = group), color = waterColor, size = 1) +
```

```
    geom_point(data = locations_lived_3rdperiod, aes(x=long, y=lat), color = "black", size = 2) +
    geom_path(data = locations_lived_3rdperiod, aes(x = long, y = lat), color = "red", size = 0.3) +
    geom_text_repel(data = locations_lived_3rdperiod, aes(x=long, y=lat, label = location_original), si
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    annotation_scale(location = "bl", width_hint = 0.25) +
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    ggtitle("Schmidt's itinerary from 1945 to 1979") +
    theme(panel.background = element_rect(fill = waterColor), plot.title = element_text(size = rel(1), 
```

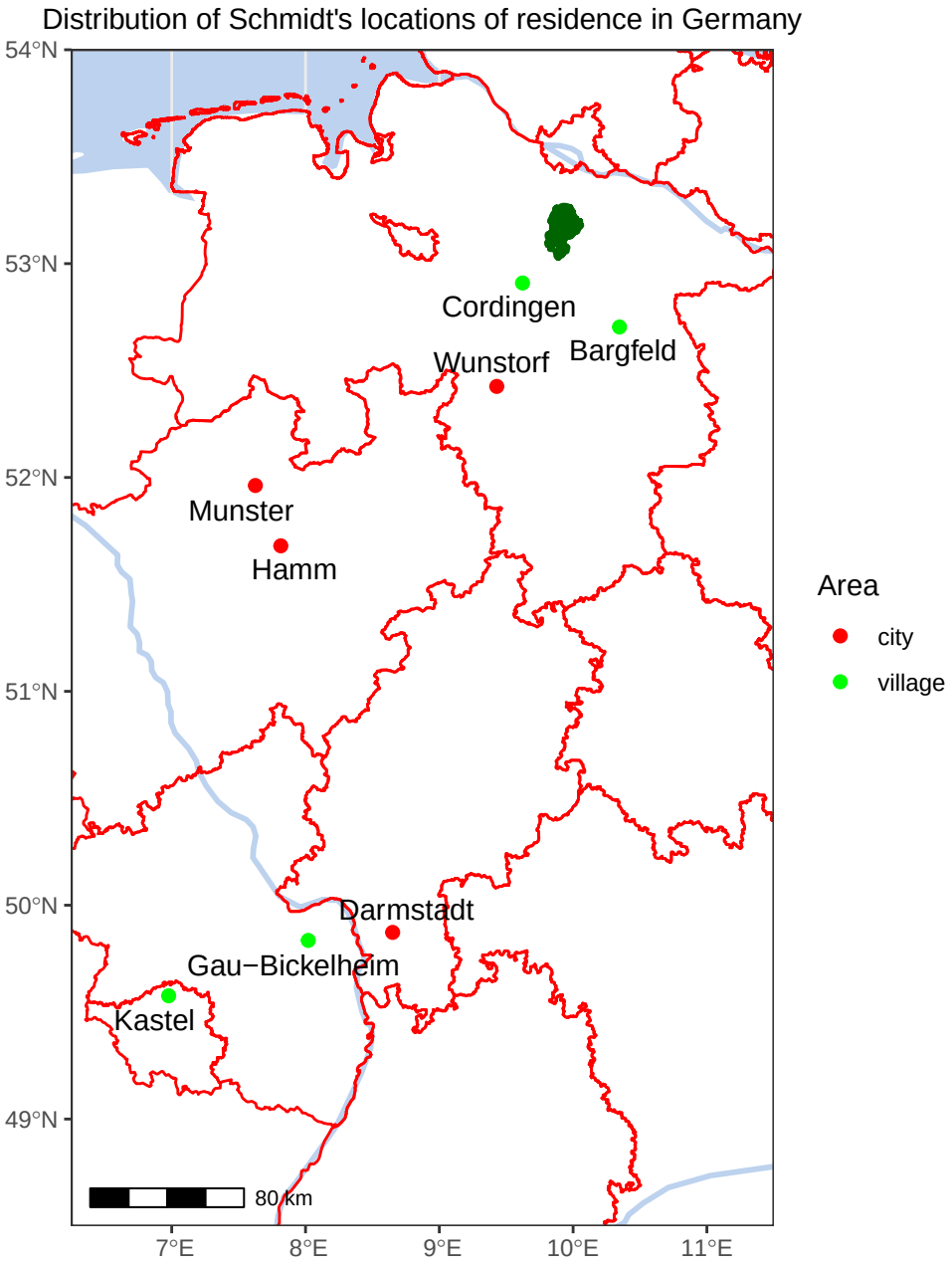
```
## Coordinate system already present. Adding new coordinate system, which will replace the existing one
## Scale on map varies by more than 10%, scale bar may be inaccurate
```




```
locations_lived_germ <- locations_lived %>%
  filter(country_current == "Germany")

xlim=c(6.25,11.5); ylim=c(48.5,54)
ggplot(data = world) +
    geom_sf(fill="white", color="white") +
    geom_path(data = rivers_f, aes(x = long, y = lat, group = group), color = waterColor, size = 1) +
    geom_path(data = bundesländer_f, aes(x = long, y = lat, group = group), color = "red", size = 0.5) +
    geom_polygon(data = lüneburg_f, aes(x = long, y = lat, group = group), color = "darkgreen", fill =
    geom_point(data = locations_lived_germ, aes(x=long, y=lat, color=category), size = 2) +
    scale_color_manual(name="Area", values = c("city"="red", "village"="green")) +
```

```
    geom_text_repel(data = locations_lived_germ, aes(x=long, y=lat, label = location_original), size = 4
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    annotation_scale(location = "bl", width_hint = 0.25) +
    ggtitle("Distribution of Schmidt's locations of residence in Germany") +
    theme(panel.background = element_rect(fill = waterColor), plot.title = element_text(size = rel(1), h
```

```
## Scale on map varies by more than 10%, scale bar may be inaccurate
```



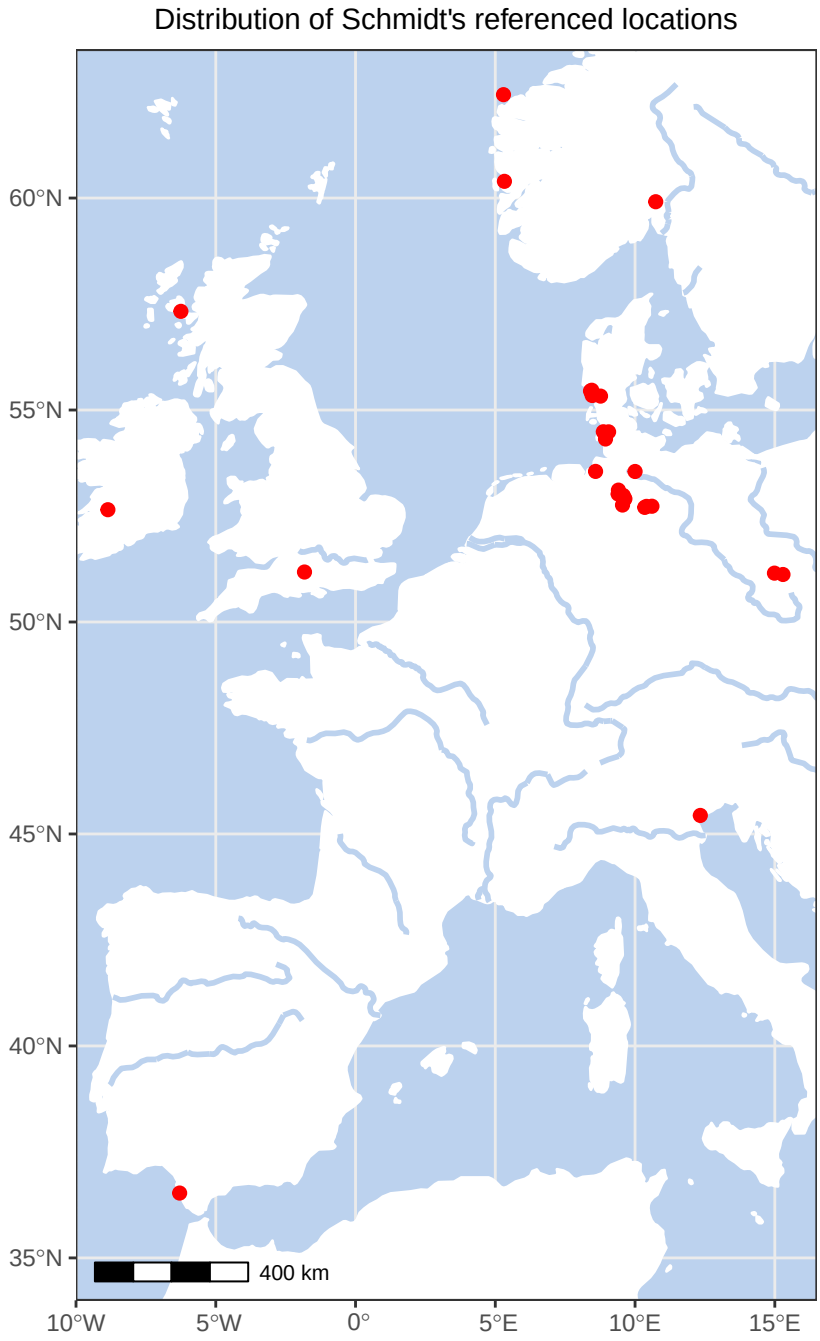
```
locations_lived_leaflet <- locations_lived %>%
  mutate(popup = paste0(address, "<br> Arno Schmidt lived here from ", moved_in, " to ", moved_out))

locations_lived_leaflet_city <- locations_lived_leaflet %>%
  filter(category == "city")

locations_lived_leaflet_village <- locations_lived_leaflet %>%
  filter(category == "village")

locations_lived_leaflet_1stperiod <- locations_lived_leaflet %>%
  filter(moved_in >= 1914 & moved_in < 1938)

locations_lived_leaflet_2ndperiod <- locations_lived_leaflet %>%
  filter(moved_out >= 1940 & moved_out <= 1945)

locations_lived_leaflet_3rdperiod <- locations_lived_leaflet %>%
  filter(moved_out >= 1950 & moved_out <= 1979)

m <- leaflet() %>%
  addProviderTiles(providers$Stamen.Toner) %>%
  setView(lng = 11, lat = 52, zoom = 7) %>%
  addMarkers(data=locations_lived_leaflet_1stperiod, ~long, ~lat, popup=~popup, label=~location_original
  addMarkers(data=locations_lived_leaflet_2ndperiod, ~long, ~lat, popup=~popup, label=~location_original
  addMarkers(data=locations_lived_leaflet_3rdperiod, ~long, ~lat, popup=~popup, label=~location_original
  addLayersControl(
    overlayGroups = c("1914-1938", "1938-1945", "1945-1979")) %>%
    hideGroup(c("1914-1938", "1938-1945", "1945-1979"))
  #m
```

```
#saveWidget(m, 'map_locations_lived.html', selfcontained = FALSE)
```

```
locations_referenced_unique <- locations_referenced %>%
  select(-c(1, 11)) %>%
  distinct()

xlim=c(-10,16.5); ylim=c(34,63.5)
ggplot(data = world) +
    geom_sf(fill="white", color="white") +
    geom_path(data = rivers_f, aes(x = long, y = lat, group = group), color = waterColor, size = 1) +
    geom_point(data = locations_referenced_unique, aes(x=long, y=lat), color = "red", size = 2) +
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    annotation_scale(location = "bl", width_hint = 0.25) +
    coord_sf(xlim = xlim, ylim = ylim, expand = FALSE) +
    ggtitle("Distribution of Schmidt's referenced locations") +
    theme(panel.background = element_rect(fill = waterColor), plot.title = element_text(size = rel(1),
```

```
## Coordinate system already present. Adding new coordinate system, which will replace the existing one
```

```
## Scale on map varies by more than 10%, scale bar may be inaccurate
```




```
locations_referenced_joined_ZT <- locations_referenced_joined %>%
  filter(title == "Zettel's Traum")

locations_referenced_joined_AB <- locations_referenced_joined %>%
  filter(title == "Abend mit Goldrand")

locations_referenced_joined_G <- locations_referenced_joined %>%
  filter(title == "Gadir oder erkenne dich")

locations_referenced_joined_B <- locations_referenced_joined %>%
  filter(title == "Brand's Haide")
```

```
locations_referenced_joined_S <- locations_referenced_joined %>%
  filter(title == "Schwarze Spiegel")

locations_referenced_joined_F <- locations_referenced_joined %>%
  filter(title == "Aus dem Leben eines Fauns")

locations_referenced_joined_H <- locations_referenced_joined %>%
  filter(title == "Das steinerne Herz")

locations_referenced_joined_K <- locations_referenced_joined %>%
  filter(title == "Kaff auch Mare Crisium")

locations_referenced_joined_W <- locations_referenced_joined %>%
  filter(title == "Windmuehlen")

locations_referenced_joined_KG <- locations_referenced_joined %>%
  filter(title == "Kundisches Geschirr")

locations_referenced_joined_P <- locations_referenced_joined %>%
  filter(title == "Piporakemes!")

locations_referenced_joined_WS <- locations_referenced_joined %>%
  filter(title == "Die Wasserstrasse")

locations_referenced_joined_U <- locations_referenced_joined %>%
  filter(title == "Die Umsiedler")

locations_referenced_joined_SA <- locations_referenced_joined %>%
  filter(title == "Die Schule der Atheisten")

m2 <- leaflet() %>%
  addProviderTiles(providers$Stamen.Toner) %>%
  addMarkers(data=locations_referenced_joined_ZT, ~long, ~lat, label=~location_original, group = "Zettel
  addMarkers(data=locations_referenced_joined_AB, ~long, ~lat, label=~location_original, group = "Abend
  addMarkers(data=locations_referenced_joined_G, ~long, ~lat, label=~location_original, group = "Gadir
  addMarkers(data=locations_referenced_joined_B, ~long, ~lat, label=~location_original, group = "Brand's
  addMarkers(data=locations_referenced_joined_S, ~long, ~lat, label=~location_original, group = "Schwarz
  addMarkers(data=locations_referenced_joined_F, ~long, ~lat, label=~location_original, group = "Aus der
  addMarkers(data=locations_referenced_joined_H, ~long, ~lat, label=~location_original, group = "Das ste
  addMarkers(data=locations_referenced_joined_K, ~long, ~lat, label=~location_original, group = "Kaff au
  addMarkers(data=locations_referenced_joined_W, ~long, ~lat, label=~location_original, group = "Windmue
  addMarkers(data=locations_referenced_joined_KG, ~long, ~lat, label=~location_original, group = "Kundis
  addMarkers(data=locations_referenced_joined_P, ~long, ~lat, label=~location_original, group = "Piporal
  addMarkers(data=locations_referenced_joined_WS, ~long, ~lat, label=~location_original, group = "Die Wa
  addMarkers(data=locations_referenced_joined_U, ~long, ~lat, label=~location_original, group = "Die Ums
  addMarkers(data=locations_referenced_joined_SA, ~long, ~lat, label=~location_original, group = "Die Sc
  addLayersControl(
    overlayGroups = c("Gadir oder erkenne dich (1949)", "Brand's Haide (1951)", "Schwarze Spiegel (1951)
  )%>%
  hideGroup(c("Gadir oder erkenne dich (1949)", "Brand's Haide (1951)", "Schwarze Spiegel (1951)", "Aus
  #m2
```

```
#saveWidget(m2, 'map_locations_referenced.html', selfcontained = FALSE)
```