

# Subject 2: Purchasing power of English workers from the 16th to the 19th century

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## Preamble

The aim of this activity is to perform convenient visualization for data describing the evolution of wages and wheat price for English workers from the 16th to the 19th century.

We will need to use the following libraries:

```
# The environment
library(tidyverse)
library(ggplot2)
```

## Build the data frame

From the following link we have downloaded the data we are going to work with in the form of a csv file, and make it into **data/** folder: <https://raw.githubusercontent.com/vincentarelbundock/Rdatasets/master/csv/HistData/Wheat.csv>

We build the data frame as follows, and we print a couple of rows to have a look at its structure:

```
df <- read.csv("data/Wheat.csv",header=T)
df[c(1,2),]
```

```
##   X Year Wheat Wages
## 1 1 1565    41  5.00
## 2 2 1570    45  5.05
```

## Clean the data frame

We observe that the first column indicates a sort of an identifier for each data sample. This is not an interesting parameter, so we can simply omit it:

```
# only keep columns from 2 to 4 (column 1 is omitted)
df <- df[c(2:4)]
df[c(1,2),]
```

```
##   Year Wheat Wages
## 1 1565    41  5.00
## 2 1570    45  5.05
```

## 1. Reproducing Playfair's graph

```
# create a list of colors
my_colors <- list( blue = "#3399e6",
                   red  = "#ff3333",
```

```

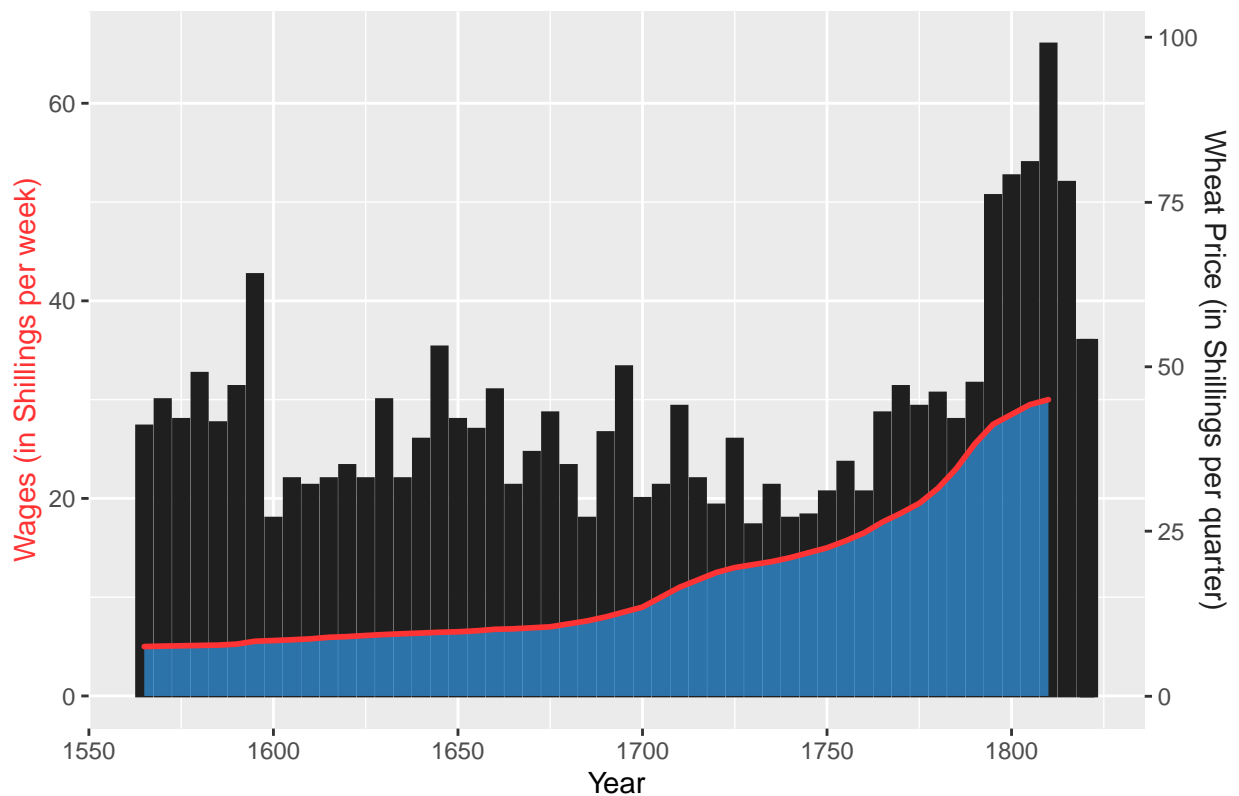
    dark = "#1f1f1f")

# Start with a usual ggplot2 call:
ggplot(df, aes(x=Year)) +
  geom_col( aes(y=Wheat/1.5), width = 4.15, alpha=1,
             color = my_colors[["dark"]],
             fill = my_colors[["dark"]] ) +
  geom_area( aes(y=Wages), size = 1, alpha=0.7,
             color = my_colors[["red"]],
             fill=my_colors[["blue"]] ) +

# Custom the Y scales:
scale_y_continuous(
  # Features of the first axis
  name = "Wages (in Shillings per week)",
  # Add a second axis and specify its features
  sec.axis = sec_axis( trans=~.*1.5, name="Wheat Price (in Shillings per quarter)" )
) +
labs(title = "Evolution of wages and wheat price for English workers (16th to 19th century)") +
theme(plot.title = element_text(hjust = 0.5),
      axis.title.y.left = element_text(colour = my_colors[["red"]]),
      axis.title.y.right = element_text(colour = my_colors[["dark"]]))

```

Evolution of wages and wheat price for English workers (16th to 19th century)



## 2. Alternative representation

First, we represent the data as simple dots for both wages and wheat price.

As it is difficult to see the pattern for the wheat values evolution, we use the `stat_smooth()` function that shows a smoothed mean (with a confidence level of 70%).

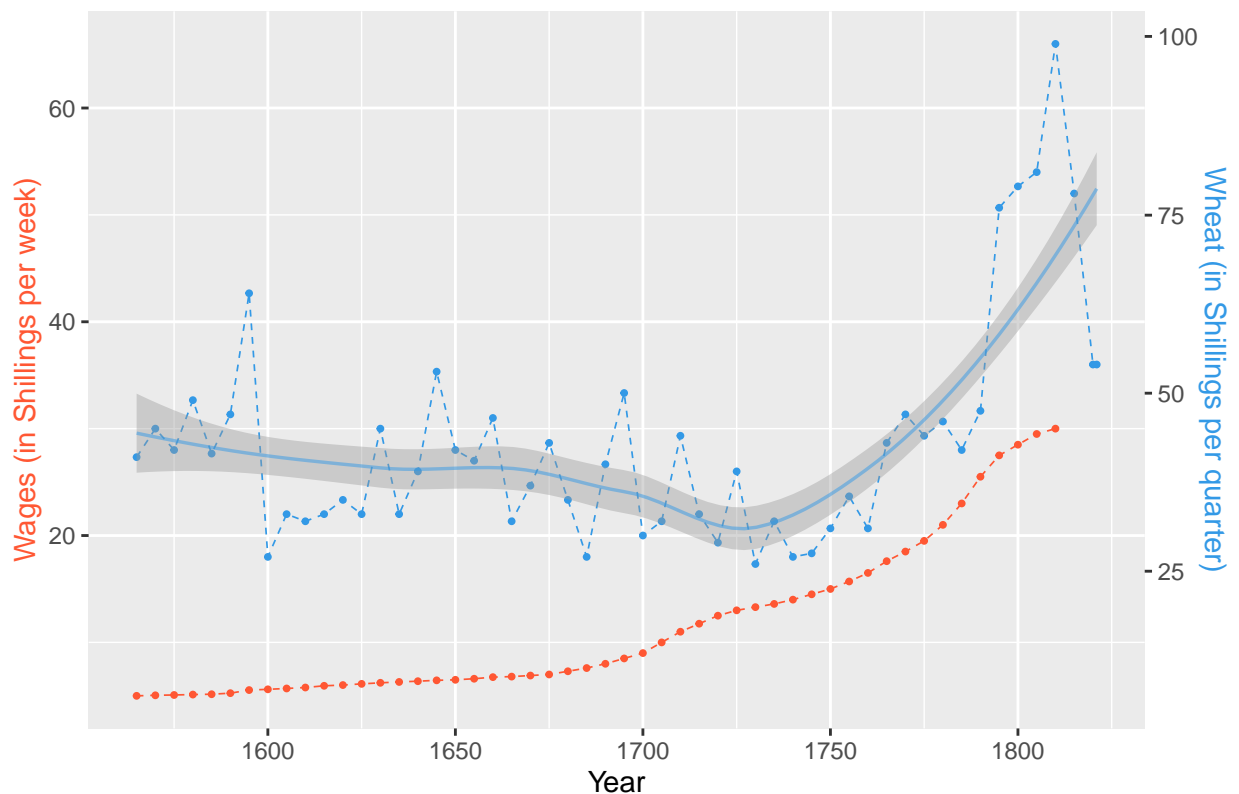
```
# Set color parameters
wages_color <- "#ff5733"
wheat_color <- rgb(0.2, 0.6, 0.9, 1)
wheat_color_trans <- rgb(0.2, 0.6, 0.9, 0.5)

# Start with a usual ggplot2 call:
ggplot(df, aes(x=Year)) +
  geom_point( aes(y=Wages), size = 0.7, color = wages_color) +
  geom_point( aes(y=Wheat/1.5), size = 0.7, color = wheat_color) +
  geom_line( aes(y=Wages), size = 0.3, color = wages_color, linetype="dashed") +
  geom_line( aes(y=Wheat/1.5), size = 0.3, color = wheat_color, linetype="dashed") +
  stat_smooth(aes(y=Wheat/1.5), level = 0.7, size=0.6, color=wheat_color_trans) +

# Custom the Y scales:
scale_y_continuous(
  # Features of the first axis
  name = "Wages (in Shillings per week)",

  # Add a second axis and specify its features
  sec.axis = sec_axis( trans=~.*1.5, name="Wheat (in Shillings per quarter)" )
) +
labs(title = "Evolution of wages and wheat price for English workers (16th to 19th century)") +
theme(plot.title = element_text(hjust = 0.5),
      axis.title.y.left = element_text(colour = wages_color),
      axis.title.y.right = element_text(colour = wheat_color))
```

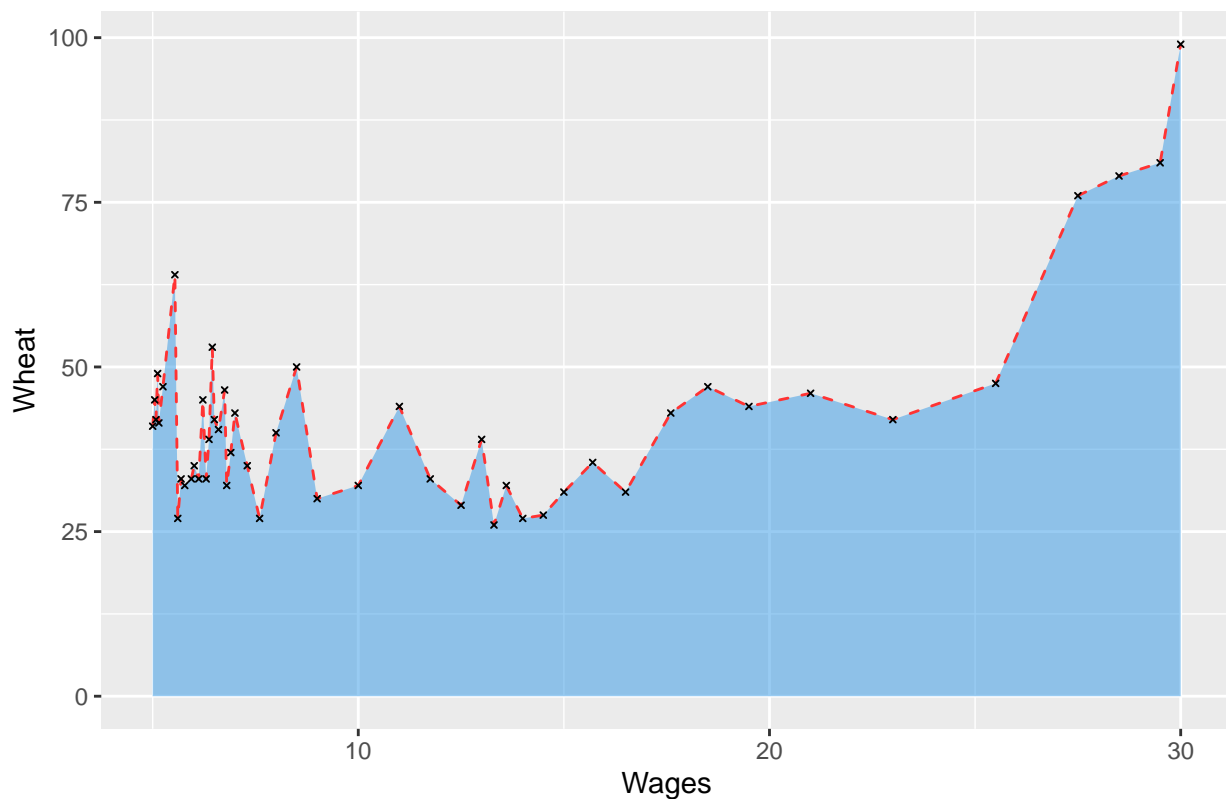
Evolution of wages and wheat price for English workers (16th to 19th century)



### 3. Another Representation without an explicit time axis

```
ggplot(df, aes(x=Wages, y=Wheat)) +  
  geom_area( size = 0.5, alpha=0.5,  
            linetype="dashed",  
            color = "#ff3333",  
            fill = "#3399e6" ) +  
  geom_point( size = .7, shape = 4 ) +  
  
  xlim(min((na.omit(df))$Wages), max((na.omit(df))$Wages)) +  
  
  labs(title = "Evolution Wheat price with respect to Salary of English workers (16th to 19th century)",  
       theme(plot.title = element_text(hjust = 0.5))
```

Evolution Wheat price with respect to Salary of English workers (16th to 19th cen



Comments

TBD