

Murders in Philadelphia

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Outline

The Data

Two Philadelphias

The Data

The Philadelphia Inquirer has a Google Fusion table ([link](#)) where they have compiled publicly available data from the Philadelphia Police Department on every murder in Philadelphia County between 1988 and 2011.

The Data

```
nrow(philly)
```

```
## [1] 8991
```

```
colnames(philly)
```

```
## [1] "date"      "lastname"  "firstname" "age"
## [5] "race"      "sex"       "cause"     "motive"
## [9] "weapon"    "time"
```

The Data

```
table(is.na(philly$cause))
```

```
##
```

```
## FALSE TRUE
```

```
## 6931 2060
```

```
table(is.na(philly$motive))
```

```
##
```

```
## FALSE TRUE
```

```
## 6931 2060
```

```
table(is.na(philly$time))
```

```
##
```

```
## FALSE TRUE
```

```
## 2060 6931
```

The Data

```
library(reshape2)
dcast(philly, race ~ weapon)
```

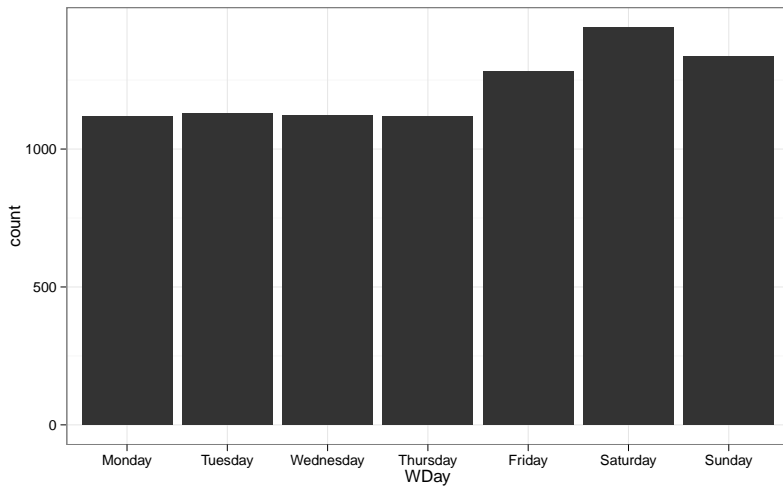
##	race	ARSON	FIREARM	HANDS	KNIFE	OTHER	UNKNOWN
## 1	A	1	67	9	17	1	0
## 2	B	97	5610	467	676	171	15
## 3	H	2	269	31	36	3	0
## 4	I	0	2	0	0	0	0
## 5	M	0	1	0	0	0	0
## 6	O	5	50	12	8	0	0
## 7	W	35	951	214	171	63	5
## 8	<NA>	0	1	0	1	0	0

The Data

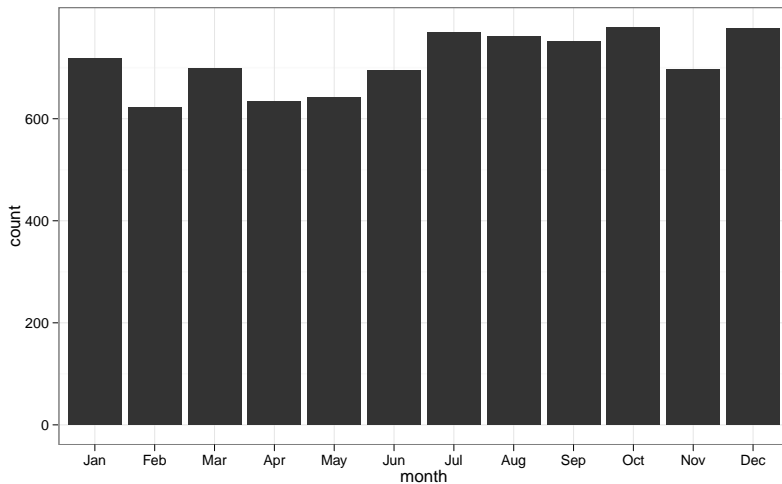
I've manipulated the data in my own way to include

- Month of year,
- month in Date format,
- year,
- a few different representations of the hour of day
- and the weekday.

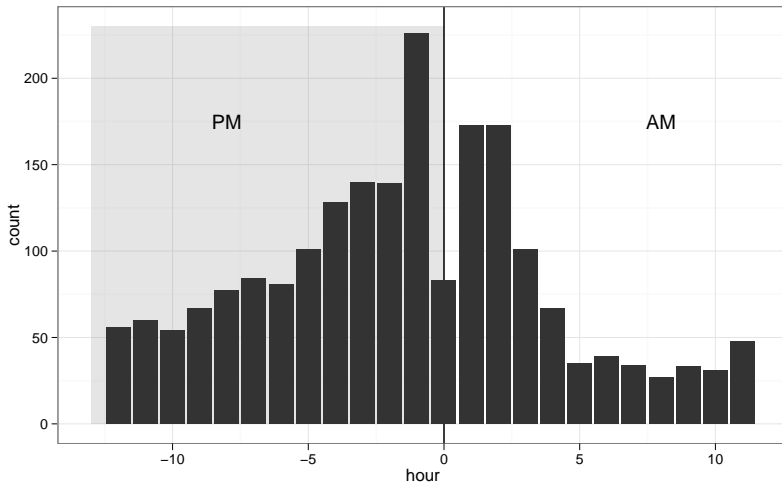
By Weekday



By Month



By Hour



Outline

The Data

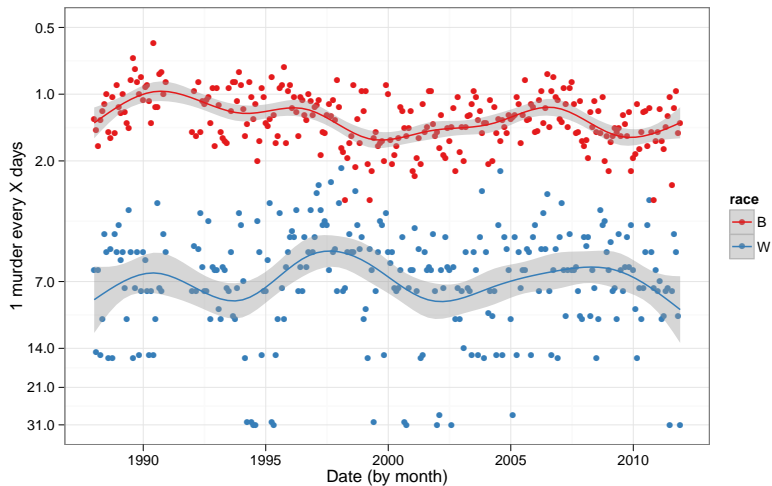
Two Philadelphias

Two Philadelphias

```
philly.bw <- subset(philly, race %in%  
  c("B", "W") & !is.na(month))  
philly.bw.count <- count(philly.bw,  
  c("month.date", "month", "race", "ndays"))  
head(philly.bw.count)
```

##	month.date	month	race	ndays	freq
## 1	1988-01-01	Jan	B	31	24
## 2	1988-01-01	Jan	W	31	5
## 3	1988-02-01	Feb	B	29	20
## 4	1988-02-01	Feb	W	29	2
## 5	1988-03-01	Mar	B	31	18
## 6	1988-03-01	Mar	W	31	5

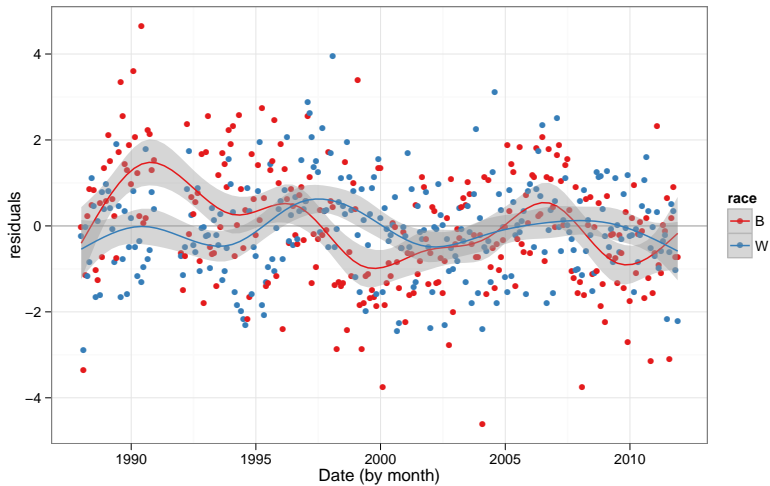
Two Philadelphias



Two Philadelphias

```
model1 <- glm(freq ~ month * race,  
              offset = ndays, family = poisson, data = philly.bw.count)  
anova(model1, test = "Chisq")  
  
## Analysis of Deviance Table  
##  
## Model: poisson, link: log  
##  
## Response: freq  
##  
## Terms added sequentially (first to last)  
##  
##  
##           Df Deviance Resid. Df Resid. Dev Pr(>Chi)  
## NULL                                549      7593  
## month      11      2913      538      4680 <2e-16 ***  
## race        1      3795      537       886 <2e-16 ***  
## month:race 11         9      526       876    0.59  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Two Philadelphias

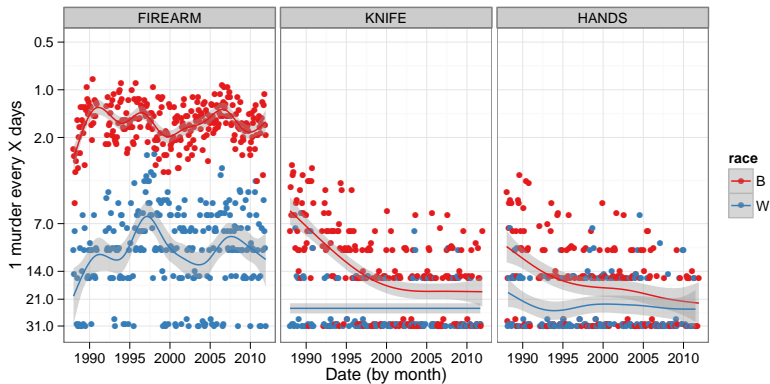


Two Philadelphias

```
philly.bw.count.w <- count(philly.bw,  
  c("month.date", "month", "race", "weapon",  
    "ndays"))  
philly.bw.count.w <- transform(philly.bw.count.w,  
  weapon = reorder(weapon, -freq, sum))  
philly.bw.count.w <- subset(philly.bw.count.w,  
  weapon %in% c("FIREARM", "KNIFE", "HANDS"))  
head(philly.bw.count.w)
```

##	month.date	month	race	weapon	ndays	freq
## 1	1988-01-01	Jan	B	FIREARM	31	13
## 2	1988-01-01	Jan	B	HANDS	31	7
## 3	1988-01-01	Jan	B	KNIFE	31	4
## 4	1988-01-01	Jan	W	FIREARM	31	3
## 5	1988-01-01	Jan	W	KNIFE	31	1
## 7	1988-02-01	Feb	B	FIREARM	29	11

Two Philadelphias



```

model2 <- glm(freq ~ month + weapon *
  race, offset = ndays, data = philly.bw.count.w,
  family = poisson)
anova(model2, test = "Chisq")

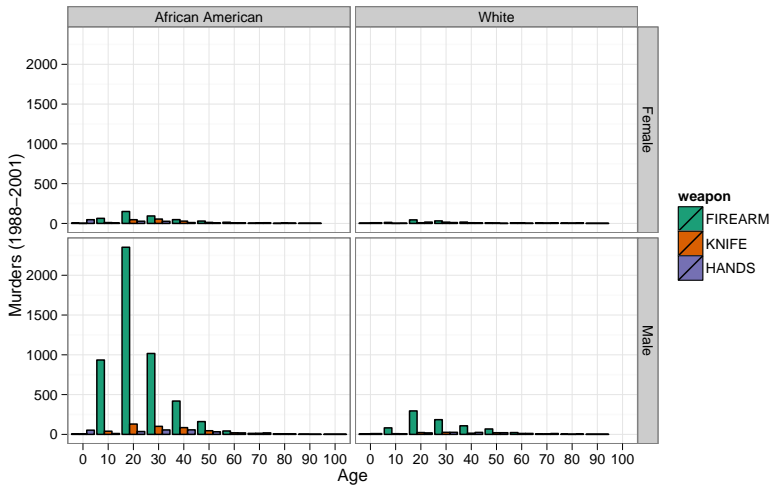
## Analysis of Deviance Table
##
## Model: poisson, link: log
##
## Response: freq
##
## Terms added sequentially (first to last)
##
##
##           Df Deviance Resid. Df Resid. Dev Pr(>Chi)
## NULL                                1211      12097
## month           11      2907      1200      9190  <2e-16 ***
## weapon          2      4607      1198      4583  <2e-16 ***
## race            1      3041      1197      1542  <2e-16 ***
## weapon:race     2        243      1195      1299  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

Two Philadelphias

- White murder victims are $2.54\times$ more likely to be shot than stabbed.
- African American murder victims are $7.19\times$ more likely to be shot than stabbed.
- African American murder victims are $2.83\times$ more likely to have been shot than White murder victims.

Two Philadelphias



Thanks