Nightingale_Coxcomb

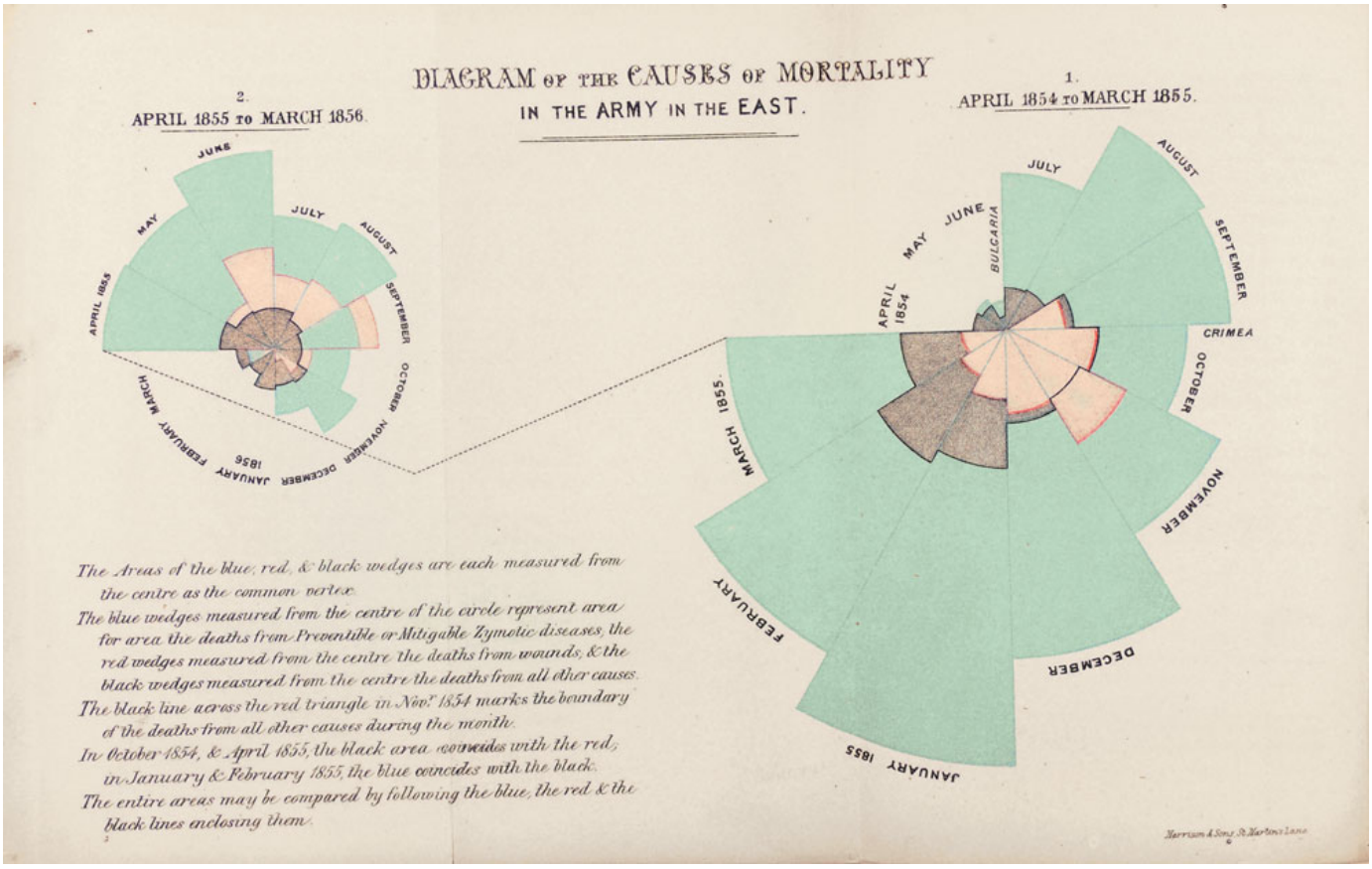
데이터테크전공 20173204 곽명빈

2020-11-10

자료와 배경

나이팅게일(Florence Nightingale, 1820-1910)은 크림전쟁(1854-1856) 당시 38명의 잉글랜드 성공회 수녀들의 도움을 받으며 슈코더르(Scutari)의 야전 병원에서 유능한 보건행정가로서의 역량을 발휘하여 병원에서 쓰는 물건을 세심하게 관리하고 무질서한 병원에 규율을 세웠다. 환자의 사망율을 42%에서 2%로 낮추고 집중치료실(ICU)을 설치하여 상태가 중한 환자를 격리하여 집중관리하는 등 근대적인 간호체계를 수립하는 데 기여하였다. 관료주의에 물든 군의 관리들을 설득하기 위하여 사용한 다음 도표는 Rose Diagram, 혹은 Coxcomb plot 등으로 불린다.

```
knitr::include_graphics("../pics/Nightingale_Coxcomb.jpg")
```



데이터

```
library(knitr)
library(HistData)
library(tidyverse)
library(magrittr)
library(grid)
library(gridExtra)
kable(Nightingale)
```

Date	Month	Year	Army	Disease	Wounds	Other	Disease.rate	Wounds.rate	Other.rate
1854-04-01	Apr	1854	8571	1	0	5	1.4	0.0	7.0
1854-05-01	May	1854	23333	12	0	9	6.2	0.0	4.6
1854-06-01	Jun	1854	28333	11	0	6	4.7	0.0	2.5
1854-07-01	Jul	1854	28722	359	0	23	150.0	0.0	9.6
1854-08-01	Aug	1854	30246	828	1	30	328.5	0.4	11.9
1854-09-01	Sep	1854	30290	788	81	70	312.2	32.1	27.7
1854-10-01	Oct	1854	30643	503	132	128	197.0	51.7	50.1
1854-11-01	Nov	1854	29736	844	287	106	340.6	115.8	42.8
1854-12-01	Dec	1854	32779	1725	114	131	631.5	41.7	48.0
1855-01-01	Jan	1855	32393	2761	83	324	1022.8	30.7	120.0
1855-02-01	Feb	1855	30919	2120	42	361	822.8	16.3	140.1
1855-03-01	Mar	1855	30107	1205	32	172	480.3	12.8	68.6
1855-04-01	Apr	1855	32252	477	48	57	177.5	17.9	21.2
1855-05-01	May	1855	35473	508	49	37	171.8	16.6	12.5
1855-06-01	Jun	1855	38863	802	209	31	247.6	64.5	9.6
1855-07-01	Jul	1855	42647	382	134	33	107.5	37.7	9.3
1855-08-01	Aug	1855	44614	483	164	25	129.9	44.1	6.7
1855-09-01	Sep	1855	47751	189	276	20	47.5	69.4	5.0
1855-10-01	Oct	1855	46852	128	53	18	32.8	13.6	4.6
1855-11-01	Nov	1855	37853	178	33	32	56.4	10.5	10.1
1855-12-01	Dec	1855	43217	91	18	28	25.3	5.0	7.8
1856-01-01	Jan	1856	44212	42	2	48	11.4	0.5	13.0
1856-02-01	Feb	1856	43485	24	0	19	6.6	0.0	5.2
1856-03-01	Mar	1856	46140	15	0	35	3.9	0.0	9.1

```
Night <- Nightingale %>%
  as_tibble %>%
  subset(select = c(1, 8:10))
kable(Night)
```

Date	Disease.rate	Wounds.rate	Other.rate
1854-04-01	1.4	0.0	7.0
1854-05-01	6.2	0.0	4.6
1854-06-01	4.7	0.0	2.5

Date	Disease.rate	Wounds.rate	Other.rate
1854-07-01	150.0	0.0	9.6
1854-08-01	328.5	0.4	11.9
1854-09-01	312.2	32.1	27.7
1854-10-01	197.0	51.7	50.1
1854-11-01	340.6	115.8	42.8
1854-12-01	631.5	41.7	48.0
1855-01-01	1022.8	30.7	120.0
1855-02-01	822.8	16.3	140.1
1855-03-01	480.3	12.8	68.6
1855-04-01	177.5	17.9	21.2
1855-05-01	171.8	16.6	12.5
1855-06-01	247.6	64.5	9.6
1855-07-01	107.5	37.7	9.3
1855-08-01	129.9	44.1	6.7
1855-09-01	47.5	69.4	5.0
1855-10-01	32.8	13.6	4.6
1855-11-01	56.4	10.5	10.1
1855-12-01	25.3	5.0	7.8
1856-01-01	11.4	0.5	13.0
1856-02-01	6.6	0.0	5.2
1856-03-01	3.9	0.0	9.1

```
Night %<>%
  gather(key = "Cause", value = "Deaths", -Date) %>%
  mutate(Month = gl(12, 1, 72, labels = month.name[c(4:12, 1:3)])) %>%
  mutate(Regime = gl(2, 12, 72, labels = c("Before", "After"), ordered = TRUE))
kable(Night)
```

Date	Cause	Deaths	Month	Regime
1854-04-01	Disease.rate	1.4	April	Before
1854-05-01	Disease.rate	6.2	May	Before
1854-06-01	Disease.rate	4.7	June	Before
1854-07-01	Disease.rate	150.0	July	Before
1854-08-01	Disease.rate	328.5	August	Before
1854-09-01	Disease.rate	312.2	September	Before

Date	Cause	Deaths	Month	Regime
1854-10-01	Disease.rate	197.0	October	Before
1854-11-01	Disease.rate	340.6	November	Before
1854-12-01	Disease.rate	631.5	December	Before
1855-01-01	Disease.rate	1022.8	January	Before
1855-02-01	Disease.rate	822.8	February	Before
1855-03-01	Disease.rate	480.3	March	Before
1855-04-01	Disease.rate	177.5	April	After
1855-05-01	Disease.rate	171.8	May	After
1855-06-01	Disease.rate	247.6	June	After
1855-07-01	Disease.rate	107.5	July	After
1855-08-01	Disease.rate	129.9	August	After
1855-09-01	Disease.rate	47.5	September	After
1855-10-01	Disease.rate	32.8	October	After
1855-11-01	Disease.rate	56.4	November	After
1855-12-01	Disease.rate	25.3	December	After
1856-01-01	Disease.rate	11.4	January	After
1856-02-01	Disease.rate	6.6	February	After
1856-03-01	Disease.rate	3.9	March	After
1854-04-01	Wounds.rate	0.0	April	Before
1854-05-01	Wounds.rate	0.0	May	Before
1854-06-01	Wounds.rate	0.0	June	Before
1854-07-01	Wounds.rate	0.0	July	Before
1854-08-01	Wounds.rate	0.4	August	Before
1854-09-01	Wounds.rate	32.1	September	Before
1854-10-01	Wounds.rate	51.7	October	Before
1854-11-01	Wounds.rate	115.8	November	Before
1854-12-01	Wounds.rate	41.7	December	Before
1855-01-01	Wounds.rate	30.7	January	Before
1855-02-01	Wounds.rate	16.3	February	Before
1855-03-01	Wounds.rate	12.8	March	Before
1855-04-01	Wounds.rate	17.9	April	After
1855-05-01	Wounds.rate	16.6	May	After

Date	Cause	Deaths	Month	Regime
1855-06-01	Wounds.rate	64.5	June	After
1855-07-01	Wounds.rate	37.7	July	After
1855-08-01	Wounds.rate	44.1	August	After
1855-09-01	Wounds.rate	69.4	September	After
1855-10-01	Wounds.rate	13.6	October	After
1855-11-01	Wounds.rate	10.5	November	After
1855-12-01	Wounds.rate	5.0	December	After
1856-01-01	Wounds.rate	0.5	January	After
1856-02-01	Wounds.rate	0.0	February	After
1856-03-01	Wounds.rate	0.0	March	After
1854-04-01	Other.rate	7.0	April	Before
1854-05-01	Other.rate	4.6	May	Before
1854-06-01	Other.rate	2.5	June	Before
1854-07-01	Other.rate	9.6	July	Before
1854-08-01	Other.rate	11.9	August	Before
1854-09-01	Other.rate	27.7	September	Before
1854-10-01	Other.rate	50.1	October	Before
1854-11-01	Other.rate	42.8	November	Before
1854-12-01	Other.rate	48.0	December	Before
1855-01-01	Other.rate	120.0	January	Before
1855-02-01	Other.rate	140.1	February	Before
1855-03-01	Other.rate	68.6	March	Before
1855-04-01	Other.rate	21.2	April	After
1855-05-01	Other.rate	12.5	May	After
1855-06-01	Other.rate	9.6	June	After
1855-07-01	Other.rate	9.3	July	After
1855-08-01	Other.rate	6.7	August	After
1855-09-01	Other.rate	5.0	September	After
1855-10-01	Other.rate	4.6	October	After
1855-11-01	Other.rate	10.1	November	After
1855-12-01	Other.rate	7.8	December	After
1856-01-01	Other.rate	13.0	January	After

Date	Cause	Deaths	Month	Regime
1856-02-01	Other.rate	5.2	February	After
1856-03-01	Other.rate	9.1	March	After

```
str(Night)
```

```
## tibble [72 x 5] (S3: tbl_df/tbl/data.frame)
##  $ Date  : Date[1:72], format: "1854-04-01" "1854-05-01" ...
##  $ Cause : chr [1:72] "Disease.rate" "Disease.rate" "Disease.rate" "Disease.rate" ...
##  $ Deaths: num [1:72] 1.4 6.2 4.7 150 328.5 ...
##  $ Month : Factor w/ 12 levels "April","May",..: 1 2 3 4 5 6 7 8 9 10 ...
##  $ Regime: Ord.factor w/ 2 levels "Before"<"After": 1 1 1 1 1 1 1 1 1 1 ...
```

```
Night$Cause %<>%
  sub("WW.rate", "", .)
Night$Cause %<>%
  factor(levels = c("Disease", "Wounds", "Other"))
Night %>%
  kable(align = c("c", "c", "r", "c", "c"))
```

Date	Cause	Deaths	Month	Regime
1854-04-01	Disease	1.4	April	Before
1854-05-01	Disease	6.2	May	Before
1854-06-01	Disease	4.7	June	Before
1854-07-01	Disease	150.0	July	Before
1854-08-01	Disease	328.5	August	Before
1854-09-01	Disease	312.2	September	Before
1854-10-01	Disease	197.0	October	Before
1854-11-01	Disease	340.6	November	Before
1854-12-01	Disease	631.5	December	Before
1855-01-01	Disease	1022.8	January	Before
1855-02-01	Disease	822.8	February	Before
1855-03-01	Disease	480.3	March	Before
1855-04-01	Disease	177.5	April	After
1855-05-01	Disease	171.8	May	After
1855-06-01	Disease	247.6	June	After
1855-07-01	Disease	107.5	July	After
1855-08-01	Disease	129.9	August	After
1855-09-01	Disease	47.5	September	After

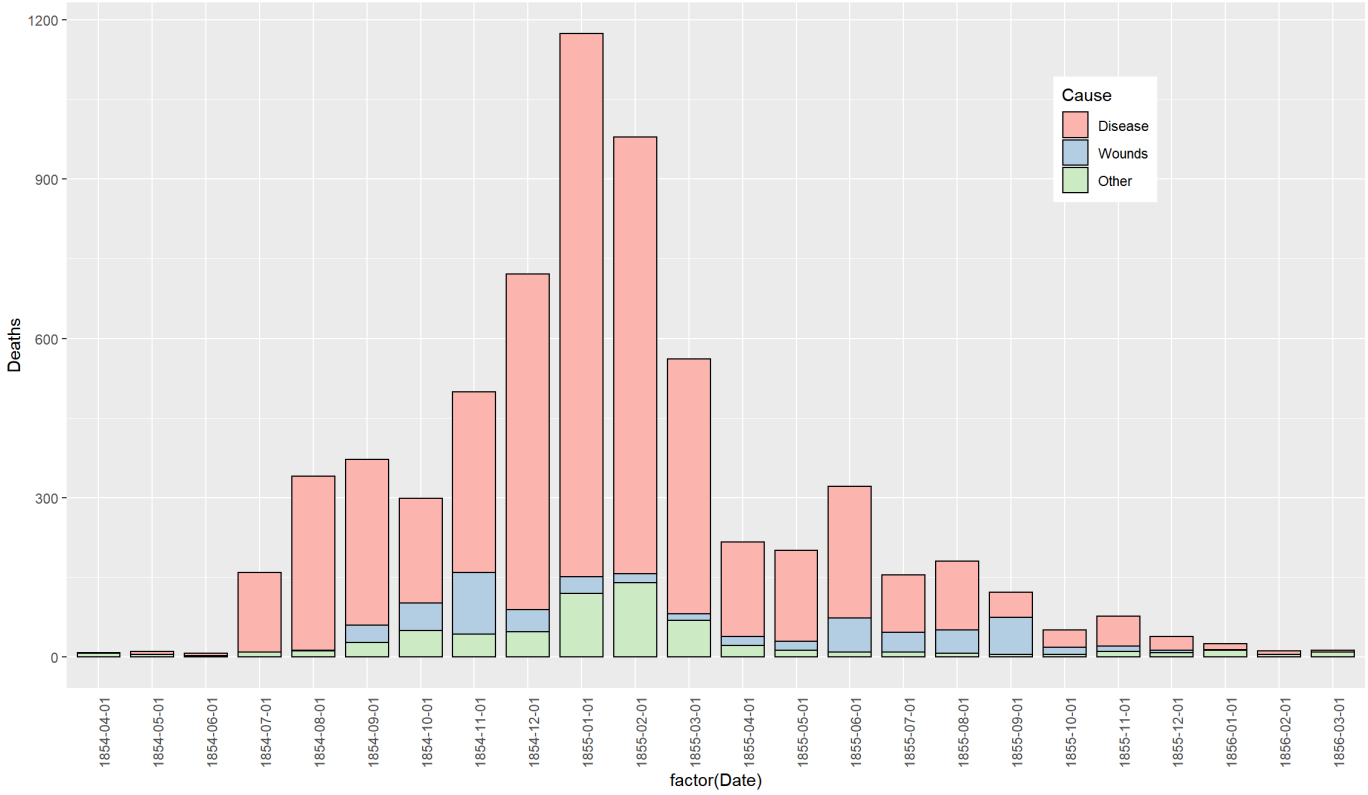
Date	Cause	Deaths	Month	Regime
1855-10-01	Disease	32.8	October	After
1855-11-01	Disease	56.4	November	After
1855-12-01	Disease	25.3	December	After
1856-01-01	Disease	11.4	January	After
1856-02-01	Disease	6.6	February	After
1856-03-01	Disease	3.9	March	After
1854-04-01	Wounds	0.0	April	Before
1854-05-01	Wounds	0.0	May	Before
1854-06-01	Wounds	0.0	June	Before
1854-07-01	Wounds	0.0	July	Before
1854-08-01	Wounds	0.4	August	Before
1854-09-01	Wounds	32.1	September	Before
1854-10-01	Wounds	51.7	October	Before
1854-11-01	Wounds	115.8	November	Before
1854-12-01	Wounds	41.7	December	Before
1855-01-01	Wounds	30.7	January	Before
1855-02-01	Wounds	16.3	February	Before
1855-03-01	Wounds	12.8	March	Before
1855-04-01	Wounds	17.9	April	After
1855-05-01	Wounds	16.6	May	After
1855-06-01	Wounds	64.5	June	After
1855-07-01	Wounds	37.7	July	After
1855-08-01	Wounds	44.1	August	After
1855-09-01	Wounds	69.4	September	After
1855-10-01	Wounds	13.6	October	After
1855-11-01	Wounds	10.5	November	After
1855-12-01	Wounds	5.0	December	After
1856-01-01	Wounds	0.5	January	After
1856-02-01	Wounds	0.0	February	After
1856-03-01	Wounds	0.0	March	After
1854-04-01	Other	7.0	April	Before
1854-05-01	Other	4.6	May	Before

Date	Cause	Deaths	Month	Regime
1854-06-01	Other	2.5	June	Before
1854-07-01	Other	9.6	July	Before
1854-08-01	Other	11.9	August	Before
1854-09-01	Other	27.7	September	Before
1854-10-01	Other	50.1	October	Before
1854-11-01	Other	42.8	November	Before
1854-12-01	Other	48.0	December	Before
1855-01-01	Other	120.0	January	Before
1855-02-01	Other	140.1	February	Before
1855-03-01	Other	68.6	March	Before
1855-04-01	Other	21.2	April	After
1855-05-01	Other	12.5	May	After
1855-06-01	Other	9.6	June	After
1855-07-01	Other	9.3	July	After
1855-08-01	Other	6.7	August	After
1855-09-01	Other	5.0	September	After
1855-10-01	Other	4.6	October	After
1855-11-01	Other	10.1	November	After
1855-12-01	Other	7.8	December	After
1856-01-01	Other	13.0	January	After
1856-02-01	Other	5.2	February	After
1856-03-01	Other	9.1	March	After

Plot

barplot

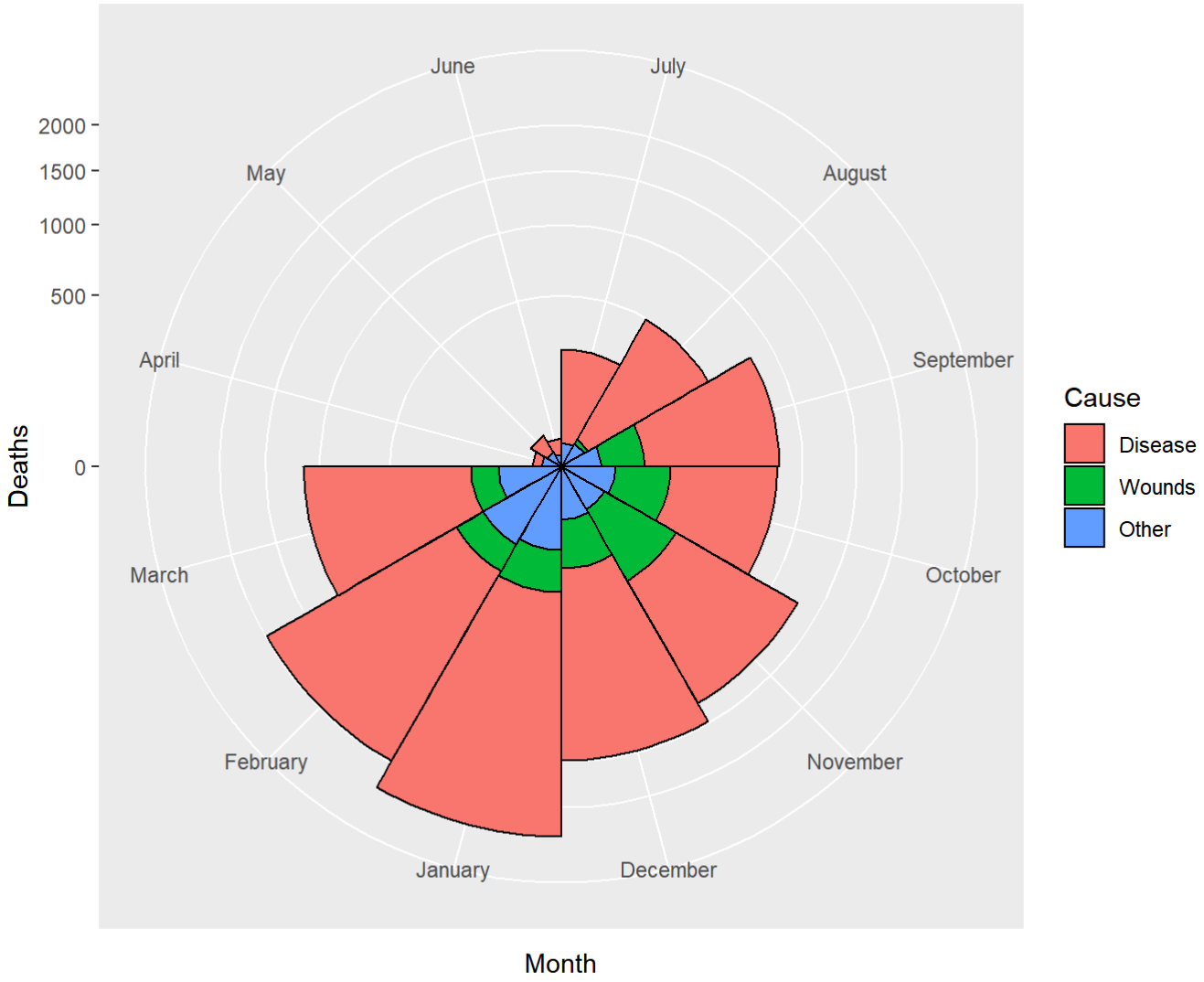
```
cxc_b <-
  ggplot(data = Night,
         mapping = aes(x = factor(Date),
                       y = Deaths,
                       fill = Cause)) +
  geom_bar(width = 0.8,
           stat = "identity",
           position = "stack",
           colour = "black") +
  theme(axis.text.x = element_text(angle = 90, hjust = 1),
        axis.ticks.x = element_blank(),
        legend.position = c(0.8, 0.8)) +
  scale_fill_brewer(type = "qual",
                    palette = "Pastel1")
cxc_b
```



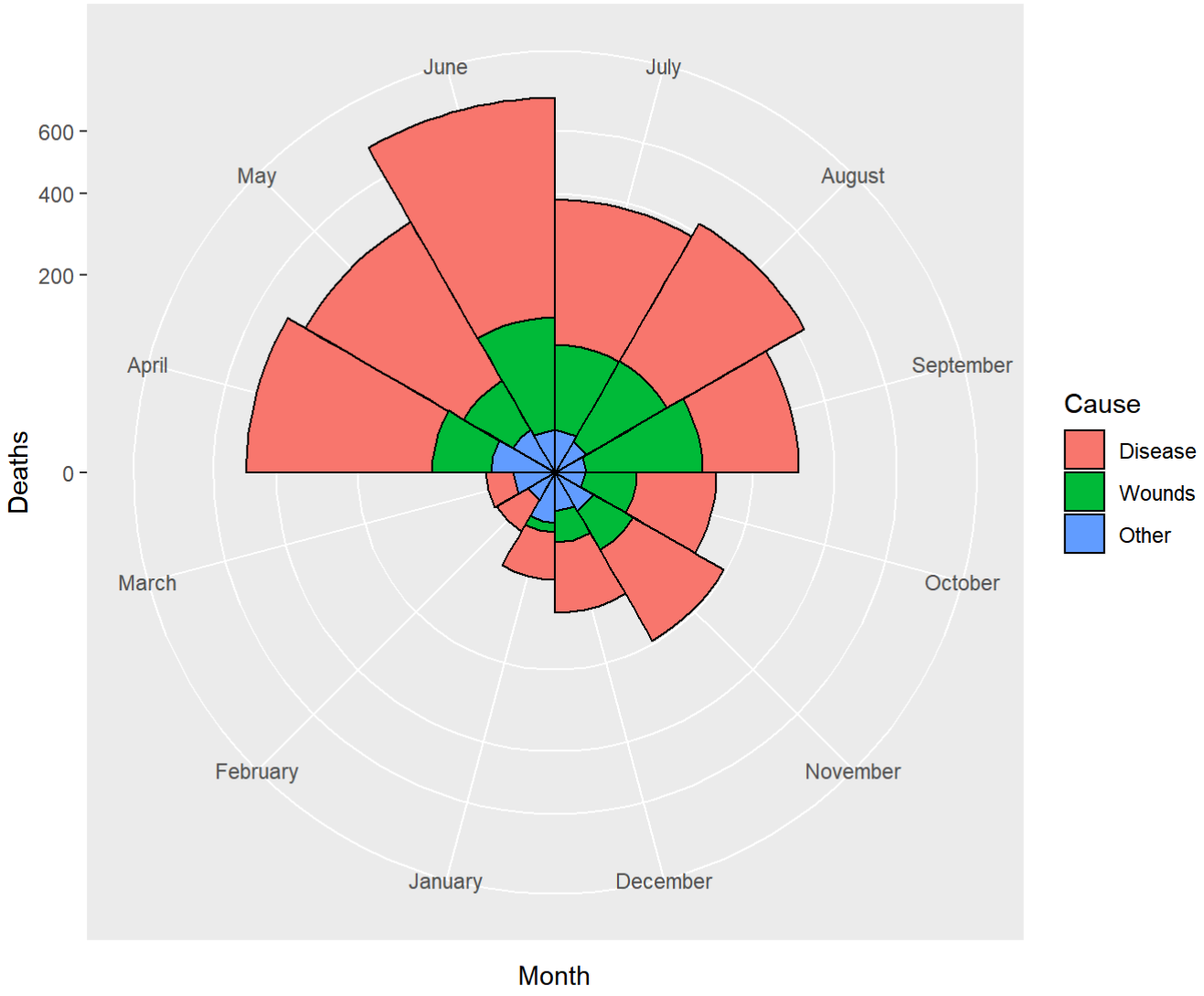

```
ggsave(cxc_b, file = "../pics/cxc_b.png", width = 12, height = 7)
```

Coxcomb Plot

```
cxc1 <-
  ggplot(data = Night %>% subset(Regime == "Before"),
         aes(x = Month,
             y = Deaths,
             fill = Cause)) +
  geom_bar(width = 1,
           stat = "identity",
           position = "stack",
           colour = "black") +
  scale_y_sqrt() +
  coord_polar(start = 3 * pi / 2)
cxc1
```



```
cxc2 <-
  ggplot(data = Night %>% subset(Regime == "After"),
         aes(x = Month,
             y = Deaths,
             fill = Cause)) +
  geom_bar(width = 1,
           stat = "identity",
           position = "stack",
           colour = "black") +
  scale_y_sqrt() +
  coord_polar(start = 3 * pi / 2)
cxc2
```



facet

```
Regime_lab <- c("Before", "After")
names(Regime_lab) <- c("Before", "After")
cxc_f <-
  ggplot(data = Night,
         aes(x = Month,
             y = Deaths,
             fill = Cause)) +
  geom_bar(width = 1,
           stat = "identity",
           position = "stack",
           colour = "black") +
  scale_y_sqrt() +
  scale_fill_brewer(type = "qual", palette = "Pastel2") +
  facet_grid(. ~ Regime,
             scales = "fixed",
             labeller = labeller(Regime = Regime_lab)) +
  coord_polar(start = 3 * pi / 2)
cxc_f
```


```
ggsave(cxc_f, file = "../pics/cxc_f.png", width = 12, height = 7)
```

Comments

이번시간에는 나이팅게일 데이터를 확인할수 있었습니다. tidy한 데이터로 만들어서 데이터를 알아보기 편하게 만들 수 있었습니다. 관리를 들어가기 전, 후로 나누어 비교해볼수있었습니다. 전쟁이나고, 위생 관리가 들어간 후에 질병이 확실히 줄어든 것을 확인할수있었습니다. 새로운 그래프인 coxcomb plot을 만들어 보았습니다. 1954년의 전쟁으로 인하여 질병의 수가 크게 늘어난것을 확인해보았습니다. before after로 지정하고 두개를 한번에 비교할 수있었습니다. 두개의 데이터를 한번에 표시하게되니 더 쉽게 이해할수있었습니다. 또한 예방조사를접종한 사람과 안한사람의 데이터 또한 비교해볼수 있었고 SNOWMAP을 통해 지도를 그릴수도 있다는 사실을 알게되었습니다. 이번 수업을 들으면 서 HISTDATA에 어떤 종류가 있는지 확인하고, 팀프로젝트인 HISTDATA를 이용하여 어떻게 팀 프로젝트를 할지 정하고 방향을 고민해볼수 있던 시간이였습니다.