```
gapminder
```

```
# A tibble: 1,704 x 6
   country     continent  year lifeExp      pop gdpPercap
   <fct>       <fct>     <int>   <dbl>    <int>     <dbl>
 1 Afghanistan Asia       1952    28.8  8425333      779.
 2 Afghanistan Asia       1957    30.3  9240934      821.
 3 Afghanistan Asia       1962    32.0 10267083      853.
 4 Afghanistan Asia       1967    34.0 11537966      836.
 5 Afghanistan Asia       1972    36.1 13079460      740.
 6 Afghanistan Asia       1977    38.4 14880372      786.
 7 Afghanistan Asia       1982    39.9 12881816      978.
 8 Afghanistan Asia       1987    40.8 13867957      852.
 9 Afghanistan Asia       1992    41.7 16317921      649.
10 Afghanistan Asia       1997    41.8 22227415      635.
# ... with 1,694 more rows
```

```
gapminder %>%
  select(-c(pop, gdpPercap))
```

```
# A tibble: 1,704 x 4
   country     continent  year lifeExp
   <fct>       <fct>     <int>   <dbl>
 1 Afghanistan Asia       1952    28.8
 2 Afghanistan Asia       1957    30.3
 3 Afghanistan Asia       1962    32.0
 4 Afghanistan Asia       1967    34.0
 5 Afghanistan Asia       1972    36.1
 6 Afghanistan Asia       1977    38.4
 7 Afghanistan Asia       1982    39.9
 8 Afghanistan Asia       1987    40.8
 9 Afghanistan Asia       1992    41.7
10 Afghanistan Asia       1997    41.8
# ... with 1,694 more rows
```

```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent)
```

```
# A tibble: 1,704 x 4
# Groups:   country, continent [142]
   country     continent  year lifeExp
   <fct>       <fct>     <int>   <dbl>
 1 Afghanistan Asia       1952    28.8
 2 Afghanistan Asia       1957    30.3
 3 Afghanistan Asia       1962    32.0
 4 Afghanistan Asia       1967    34.0
 5 Afghanistan Asia       1972    36.1
 6 Afghanistan Asia       1977    38.4
 7 Afghanistan Asia       1982    39.9
 8 Afghanistan Asia       1987    40.8
 9 Afghanistan Asia       1992    41.7
10 Afghanistan Asia       1997    41.8
# ... with 1,694 more rows
```

```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest()
```

```
# A tibble: 142 x 3
# Groups:   country, continent [142]
   country     continent data
   <fct>       <fct>     <list>
 1 Afghanistan Asia      <tibble [12 x 2]>
 2 Albania     Europe    <tibble [12 x 2]>
 3 Algeria     Africa    <tibble [12 x 2]>
 4 Angola      Africa    <tibble [12 x 2]>
 5 Argentina   Americas  <tibble [12 x 2]>
 6 Australia   Oceania   <tibble [12 x 2]>
 7 Austria     Europe    <tibble [12 x 2]>
 8 Bahrain     Asia      <tibble [12 x 2]>
 9 Bangladesh  Asia      <tibble [12 x 2]>
10 Belgium     Europe    <tibble [12 x 2]>
# ... with 132 more rows
```

```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance))
```

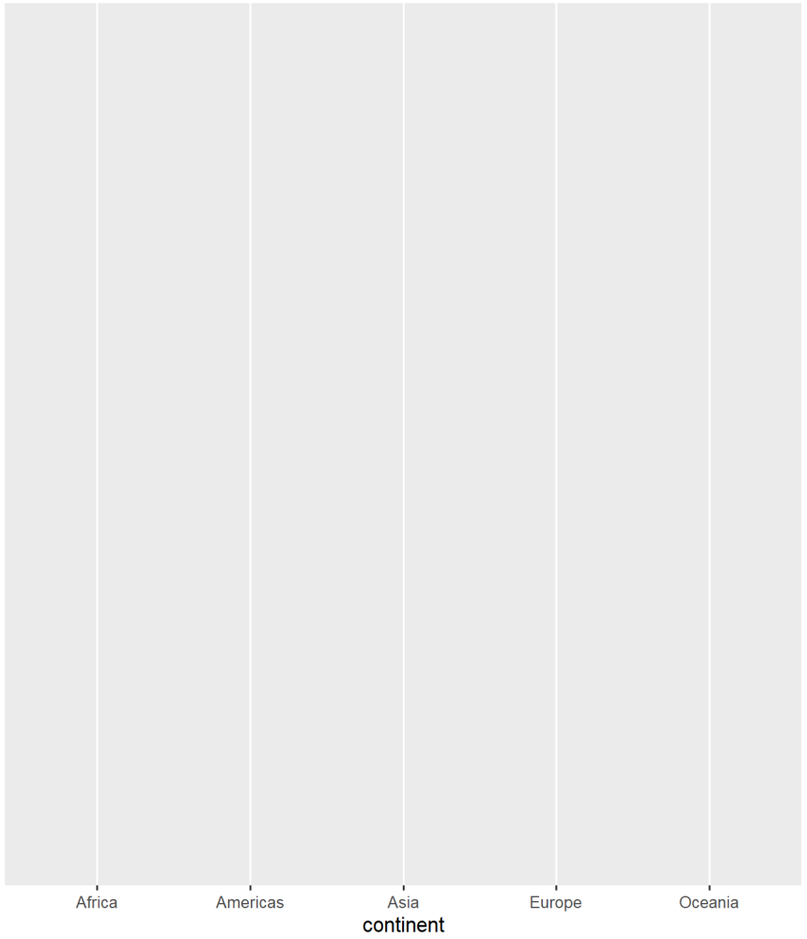
```
# A tibble: 142 x 5
# Groups:   country, continent [142]
   country     continent data              model  results
   <fct>       <fct>     <list>            <list> <list>
 1 Afghanistan Asia      <tibble [12 x 2]> <lm>   <tibble [1 x
 2 Albania     Europe    <tibble [12 x 2]> <lm>   <tibble [1 x
 3 Algeria     Africa    <tibble [12 x 2]> <lm>   <tibble [1 x
 4 Angola      Africa    <tibble [12 x 2]> <lm>   <tibble [1 x
 5 Argentina   Americas  <tibble [12 x 2]> <lm>   <tibble [1 x
 6 Australia   Oceania   <tibble [12 x 2]> <lm>   <tibble [1 x
 7 Austria     Europe    <tibble [12 x 2]> <lm>   <tibble [1 x
 8 Bahrain     Asia      <tibble [12 x 2]> <lm>   <tibble [1 x
 9 Bangladesh  Asia      <tibble [12 x 2]> <lm>   <tibble [1 x
10 Belgium     Europe    <tibble [12 x 2]> <lm>   <tibble [1 x
# ... with 132 more rows
```

```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results)
```

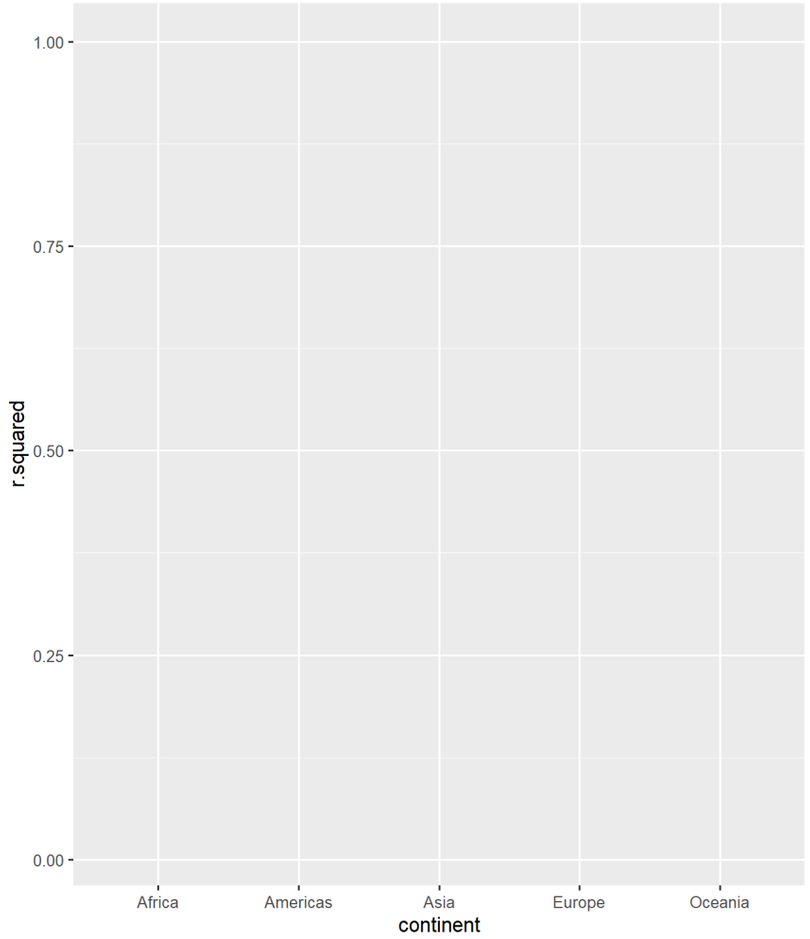
```
# A tibble: 142 x 15
# Groups:   country, continent [142]
   country continent data  model r.squared adj.r.squared sigma
   <fct>   <fct>     <lis> <lis>     <dbl>         <dbl> <dbl>
 1 Afghan~ Asia      <tib~ <lm>      0.948         0.942 1.22
 2 Albania Europe    <tib~ <lm>      0.911         0.902 1.98
 3 Algeria Africa    <tib~ <lm>      0.985         0.984 1.32
 4 Angola  Africa    <tib~ <lm>      0.888         0.877 1.41
 5 Argent~ Americas  <tib~ <lm>      0.996         0.995 0.292
 6 Austra~ Oceania   <tib~ <lm>      0.980         0.978 0.621
 7 Austria Europe    <tib~ <lm>      0.992         0.991 0.407
 8 Bahrain Asia      <tib~ <lm>      0.967         0.963 1.64
 9 Bangla~ Asia      <tib~ <lm>      0.989         0.988 0.977
10 Belgium Europe    <tib~ <lm>      0.995         0.994 0.293
# ... with 132 more rows, and 5 more variables: logLik <dbl>, A
#   deviance <dbl>, df.residual <int>
```

```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()
```

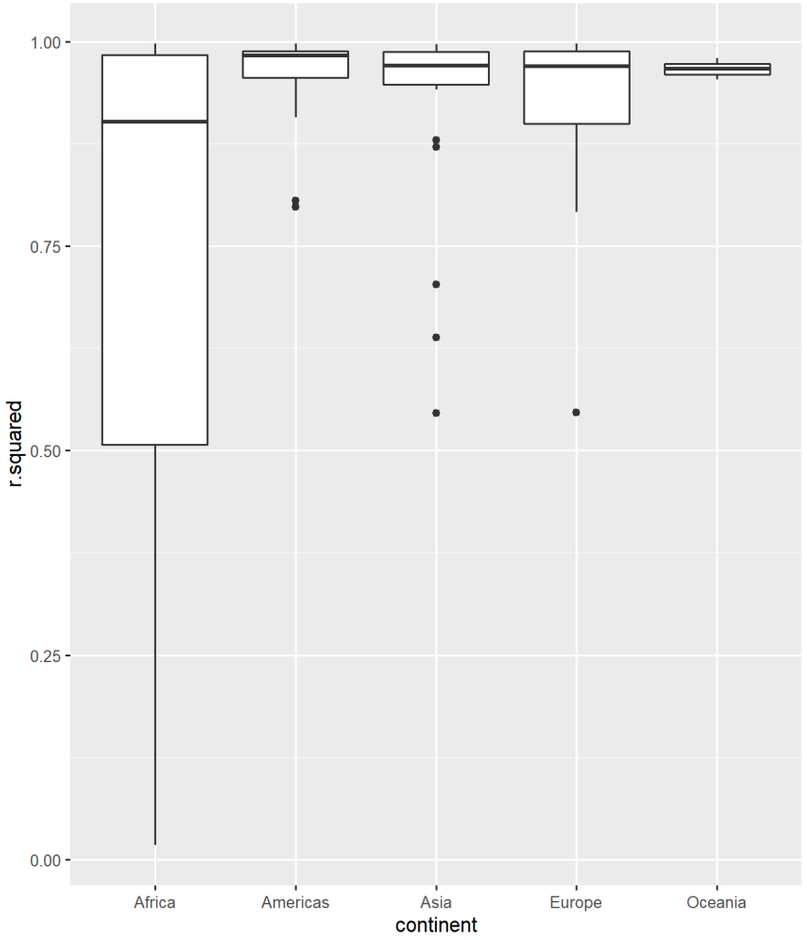
```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)
```



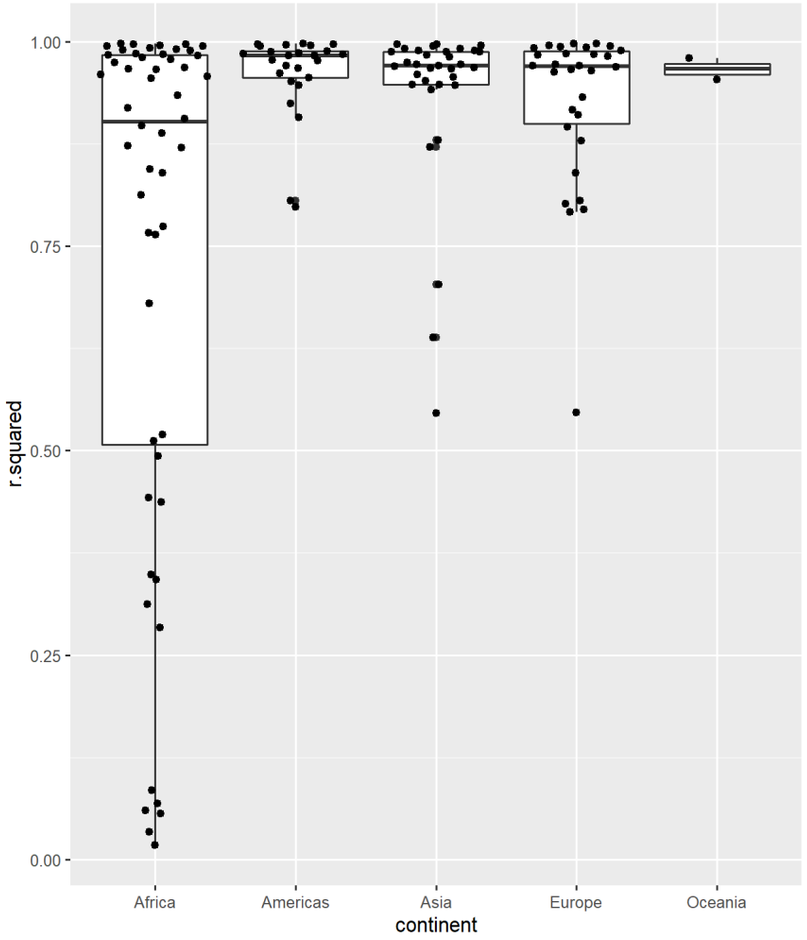
```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)
```



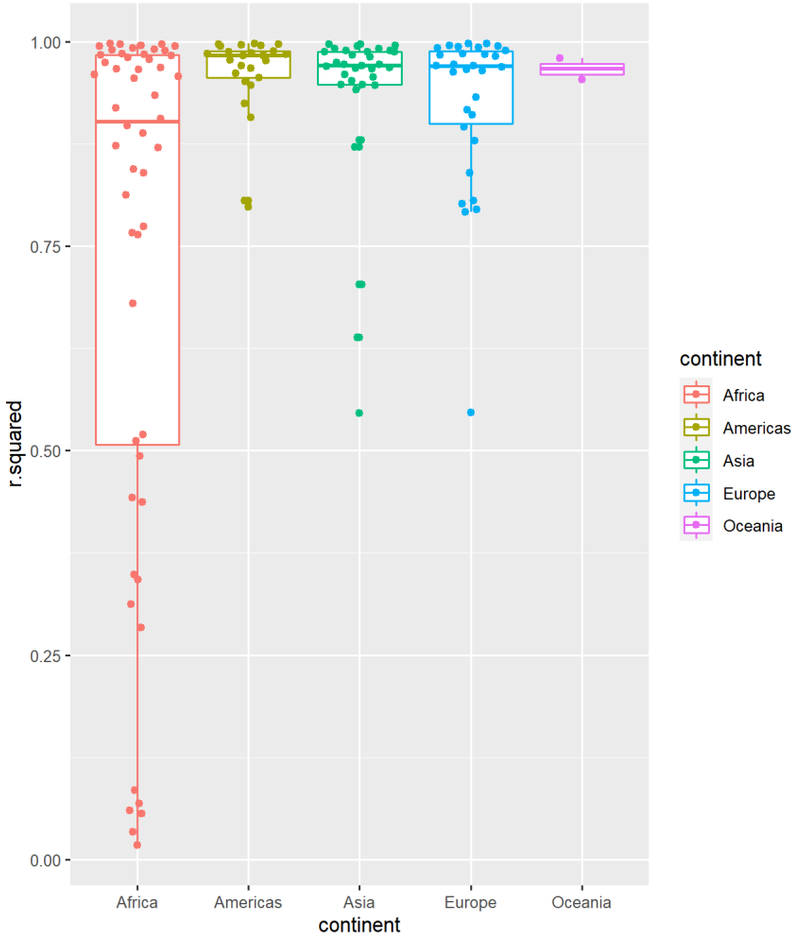
```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)+
  geom_boxplot()
```



```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)+
  geom_boxplot()+
  ggbeeswarm::geom_quasirandom()
```



```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)+
  geom_boxplot()+
  ggbeeswarm::geom_quasirandom()+
  aes(colour = continent)
```



```
gapminder %>%
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  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)+
  geom_boxplot()+
  ggbeeswarm::geom_quasirandom()+
  aes(colour = continent)+
  labs(title = "How much of life expectancy is explain
       subtitle = "For some nations (a linear pattern)
       caption = "Example from 'Many Models' chapter c
```

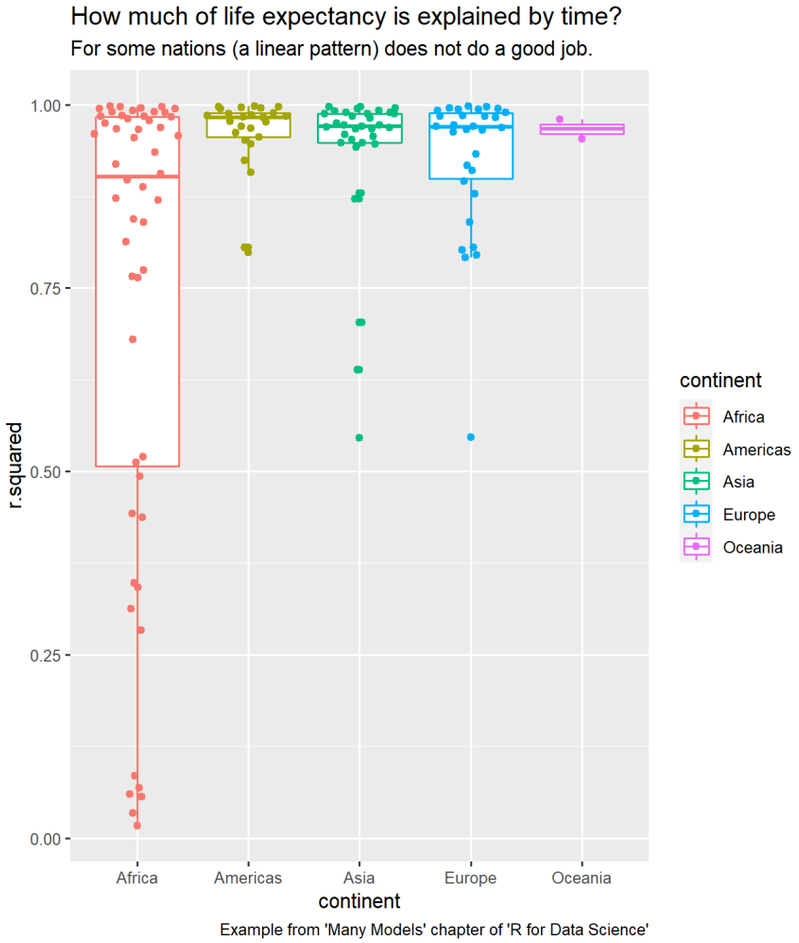

```
gapminder %>%
  select(-c(pop, gdpPercap)) %>%
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  nest() %>%
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         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)+
  geom_boxplot()+
  ggbeeswarm::geom_quasirandom()+
  aes(colour = continent)+
  labs(title = "How much of life expectancy is explain
       subtitle = "For some nations (a linear pattern)
       caption = "Example from 'Many Models' chapter c
  theme_bw()
```

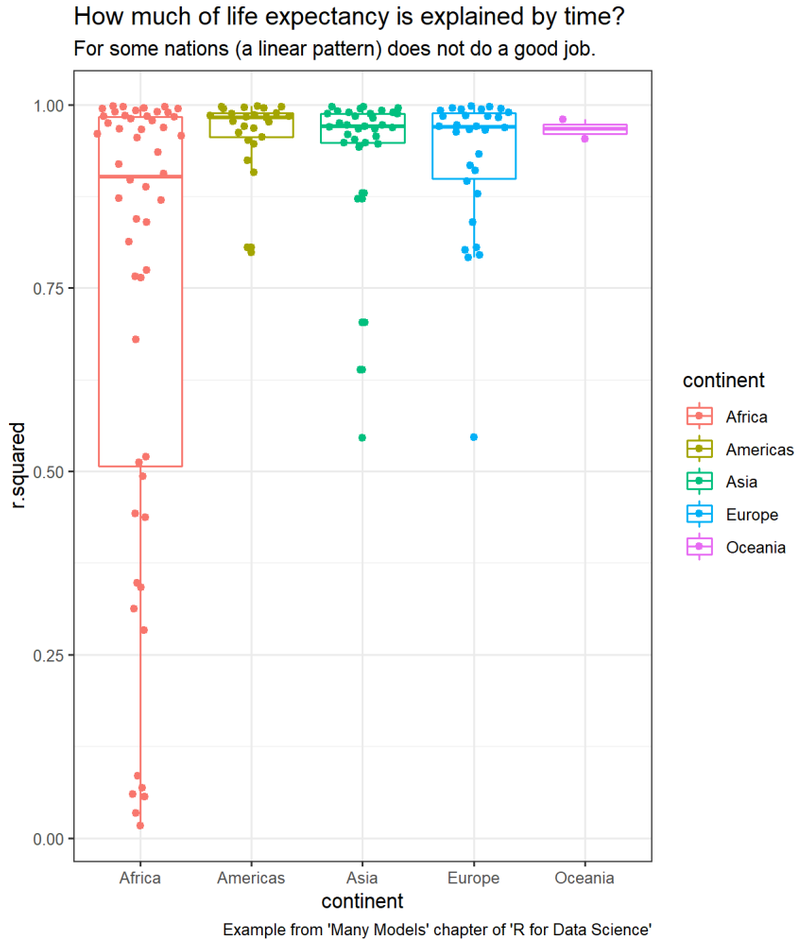

```
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  select(-c(pop, gdpPercap)) %>%
  group_by(country, continent) %>%
  nest() %>%
  mutate(model = map(data,
                     ~lm(lifeExp ~ year, data = .x)),
         results = map(model, broom::glance)) %>%
  unnest(results) %>%
  ggplot()+
  aes(x = continent)+
  aes(y = r.squared)+
  geom_boxplot()+
  ggbeeswarm::geom_quasirandom()+
  aes(colour = continent)+
  labs(title = "How much of life expectancy is explain
       subtitle = "For some nations (a linear pattern)
       caption = "Example from 'Many Models' chapter c
  theme_bw()+
  theme(text = element_text(size = 11.5))
```