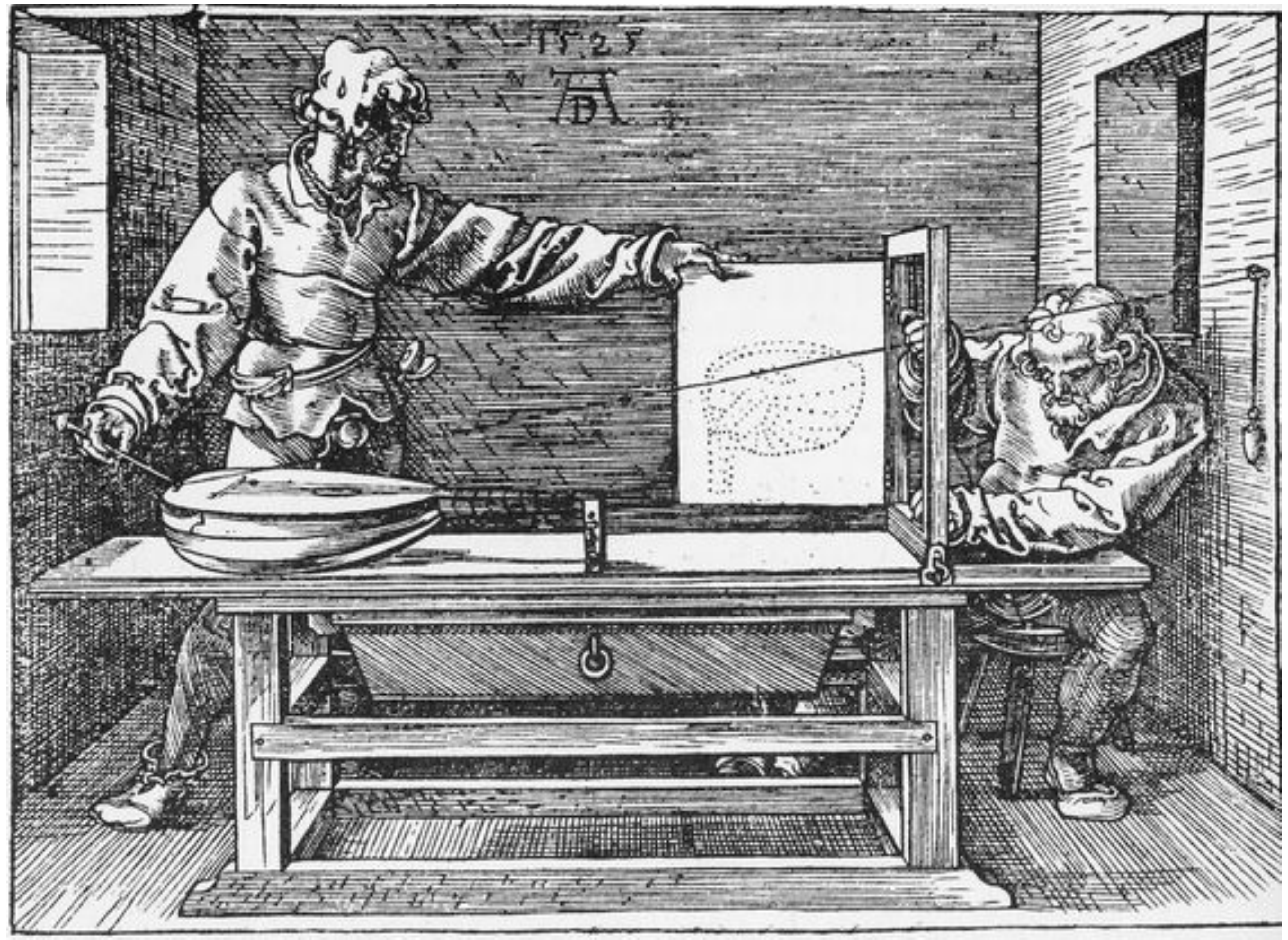
Master the Tidyverse



Garrett Grolemund

Data Scientist, Educator

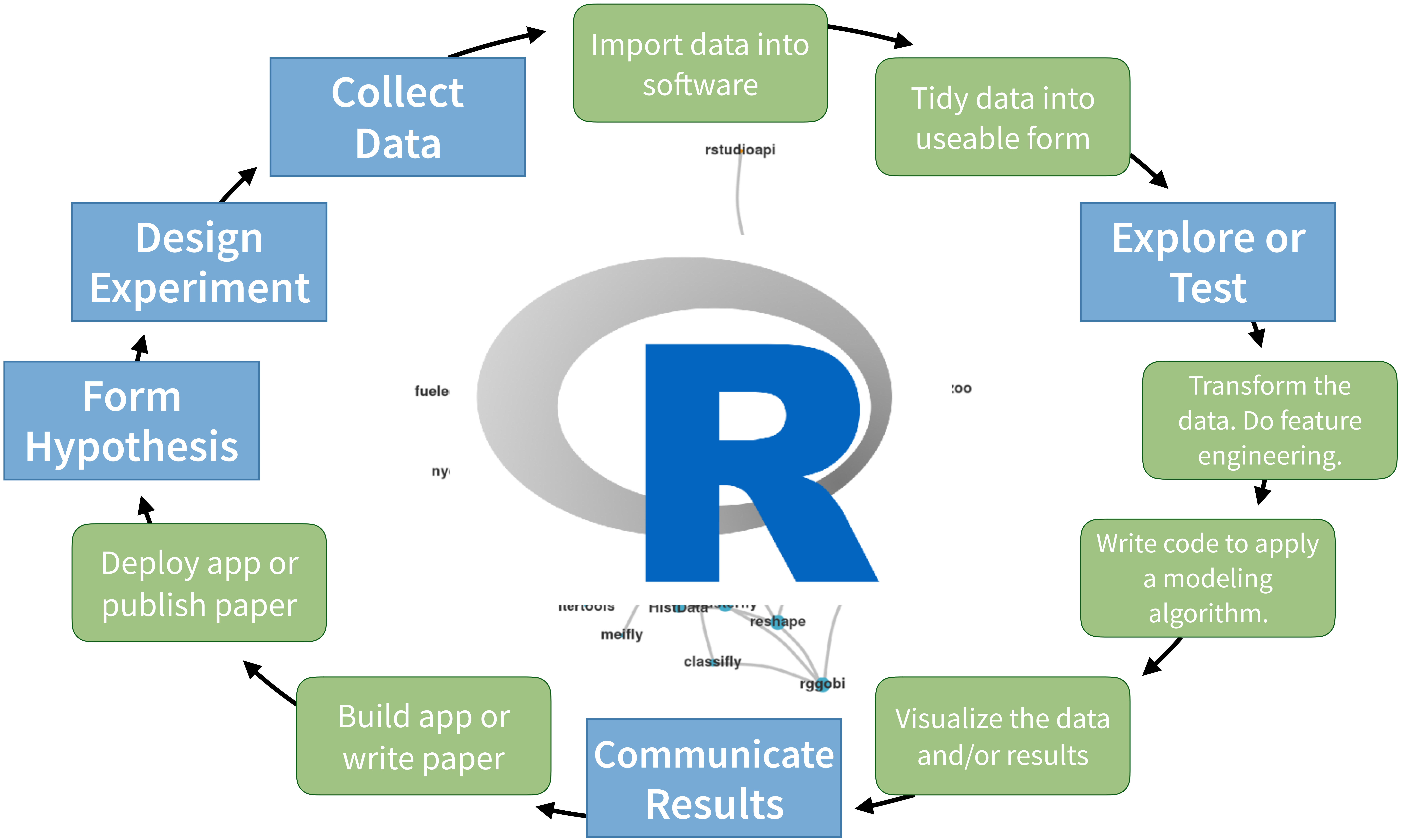
October 2017

RStudio

Your Turn

Re-introduce yourself to the people at your table. Then login to your rstudio.cloud project.

05:00



Form Hypothesis

Design Experiment

Collect Data

Import data into software

Tidy data into useable form

Explore or Test

Transform the data. Do feature engineering.

Write code to apply a modeling algorithm.

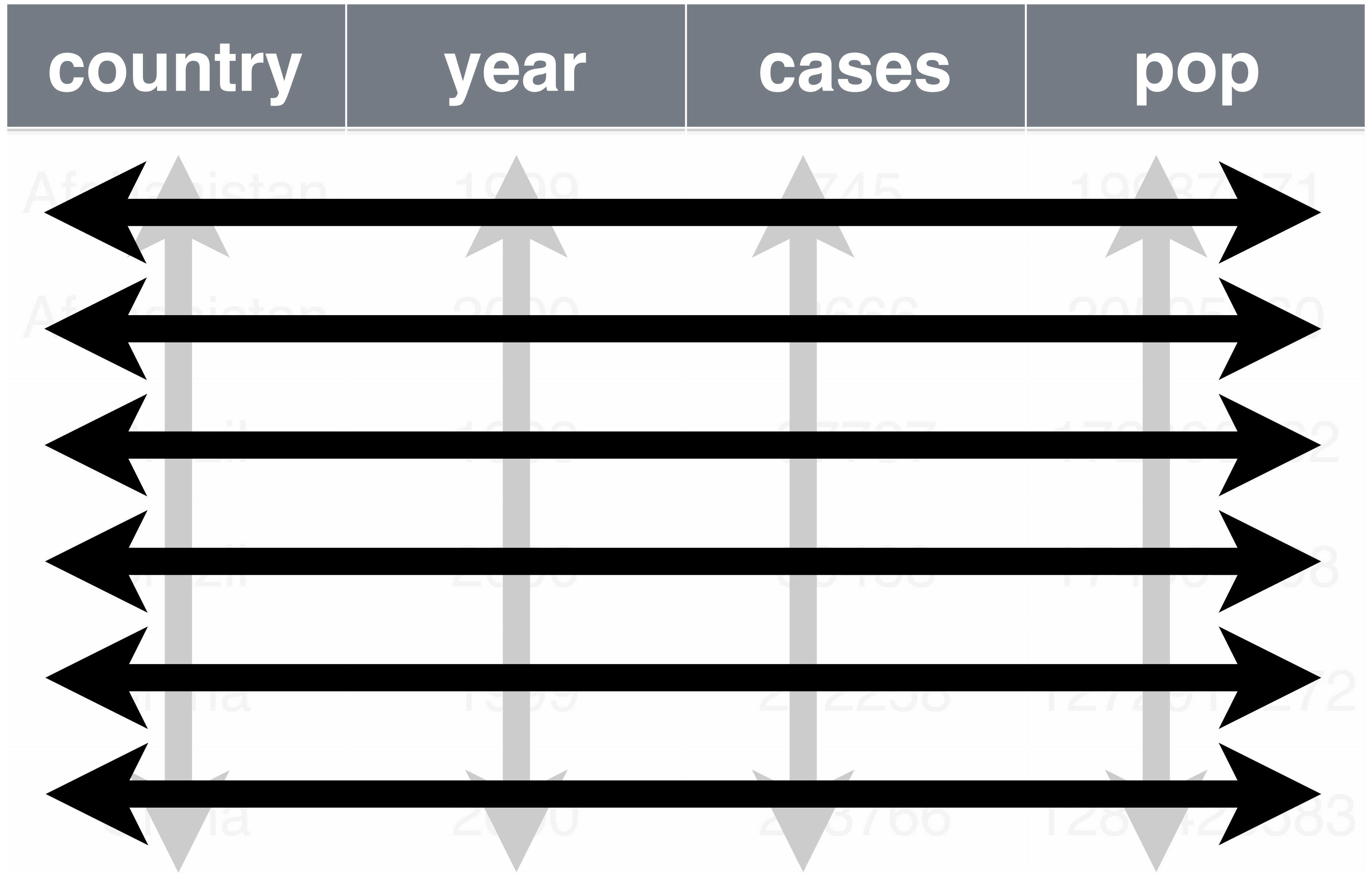
Visualize the data and/or results

Communicate Results

Build app or write paper

Deploy app or publish paper

Tidy data



A data set is **tidy** iff:

1. Each **variable** is in its own **column**
2. Each **case** is in its own **row**
3. Each **value** is in its own **cell**

Tidy tools

country	year	cases	pop
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898
China	1999	212258	1272915272
China	2000	213766	1280428583

```
filter(df, year == 2000)
```

Tidy tools

country	year	cases	pop
Afghanistan	2000	2666	20595360
Brazil	2000	80488	174504898
China	2000	213766	1280428583

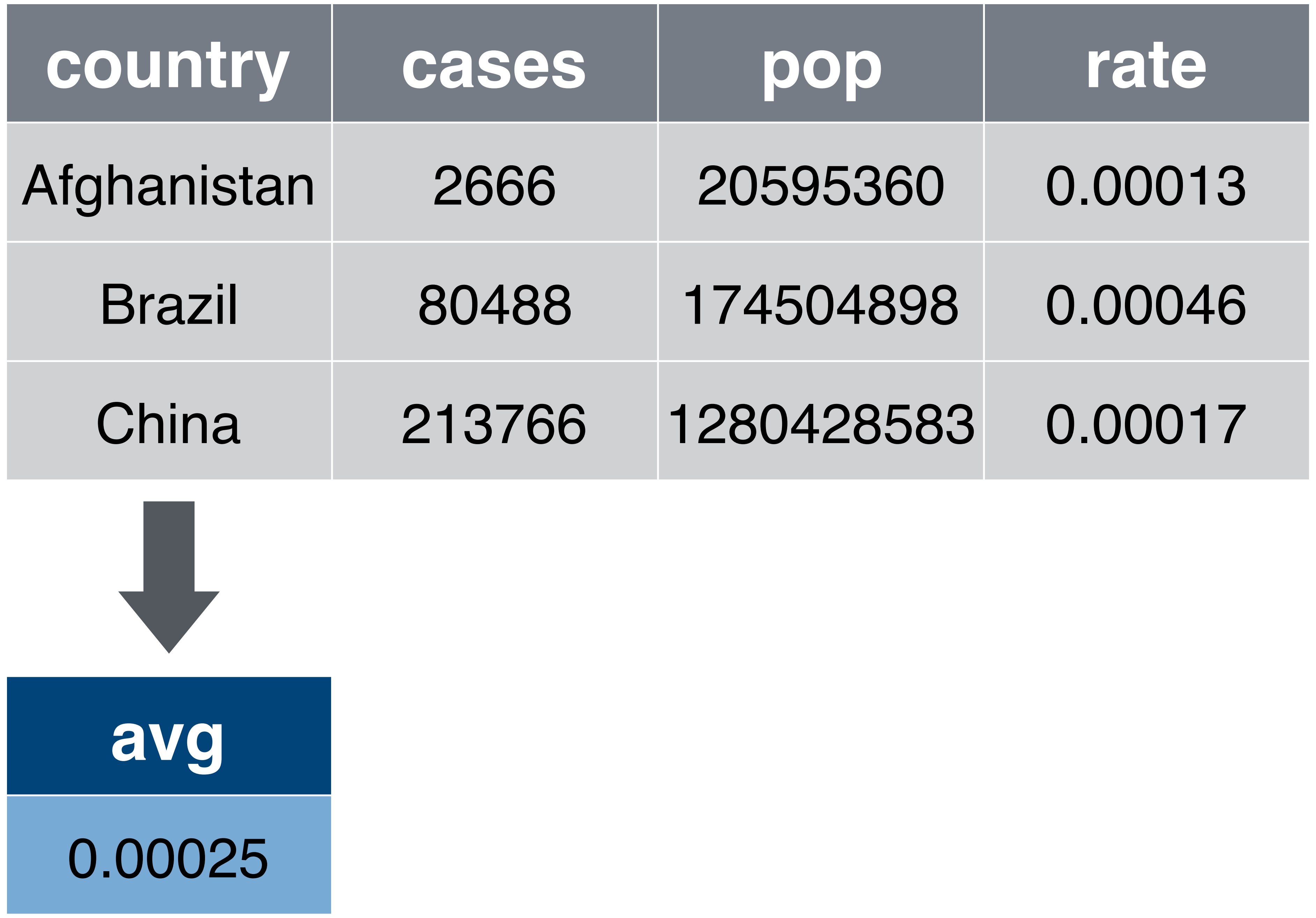
```
filter(df, year == 2000)
select(df, -year)
```

Tidy tools

country	cases	pop	rate
Afghanistan	2666	20595360	0.00013
Brazil	80488	174504898	0.00046
China	213766	1280428583	0.00017

```
filter(df, year == 2000)
select(df, -year)
mutate(df, rate = cases / pop)
```

Tidy tools



country	cases	pop	rate
Afghanistan	2666	20595360	0.00013
Brazil	80488	174504898	0.00046
China	213766	1280428583	0.00017

avg
0.00025

```
filter(df, year == 2000)
select(df, -year)
mutate(df, rate = cases / pop)
summarise(df, avg = mean(rate))
```

Tidy tools

country	cases	pop	rate
Afghanistan	2666	20595360	0.00013
Brazil	80488	174504898	0.00046
China	213766	1280428583	0.00017

avg
0.00025

```
df %>%
  filter(year == 2000) %>%
  select(-year) %>%
  mutate(rate = cases / pop) %>%
  summarise(avg = mean(rate))
```

Today

Functions for specific types of data.

strings

factors

dates

times

Non-Tidy R

Lists

```
$city
[1] "New York" "New York" "London"
[4] "London"   "Beijing"  "Beijing"

$size
[1] "large" "small" "large" "small"
[5] "large" "small"

$amount
[1]  23  14  22  16 121 121

attr(,"row.names")
[1] 1 2 3 4 5 6
```

Models

```
Call:
lm(formula = lifeExp ~ year, data = gapminder)

Residuals:
    Min      1Q  Median      3Q     Max
-39.949  -9.651   1.697  10.335  22.158

Coefficients:
              Estimate Std. Error t value  Pr(>|t|)
(Intercept) -585.65219   32.31396  -18.12  <2e-16 ***
year           0.32590    0.01632   19.96  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 11.63 on 1702 degrees of freedom
Multiple R-squared:  0.1898,    Adjusted R-squared:  0.1893
F-statistic: 398.6 on 1 and 1702 DF,  p-value: < 2.2e-16
```

List Columns

A table is …an organizational structure …that you can manipulate.

<table>
<tr><th>country</th><th>r.squared</th><th>data</th><th>model</th></tr>
<tr><td>Botswana</td><td>0.03</td><td>
<table>
<tr><th>year</th><th>.resid</th></tr>
<tr><td>1952</td><td>-5.3071154</td></tr>
<tr><td>1957</td><td>-3.6144580</td></tr>
<tr><td>1962</td><td>-2.0158007</td></tr>
<tr><td>1967</td><td>-0.5411434</td></tr>
<tr><td>1972</td><td>1.8815140</td></tr>
<tr><td>1977</td><td>4.8731713</td></tr>
<tr><td>1982</td><td>6.7348287</td></tr>
<tr><td>1987</td><td>8.5694860</td></tr>
<tr><td>1992</td><td>7.3891434</td></tr>
<tr><td>1997</td><td>-3.1031993</td></tr>
<tr><td>2002</td><td>-9.3285420</td></tr>
<tr><td>2007</td><td>-5.5378846</td></tr>
</table>
</td><td>Call:
lm(formula = lifeExp ~ year, data = .)

Coefficients:
(Intercept) year
-65.49586 0.06067</td></tr>
<tr><td>Lesotho</td><td>0.08</td><td>
<table>
<tr><th>year</th><th>.resid</th></tr>
<tr><td>1952</td><td>-5.2410256</td></tr>
<tr><td>1957</td><td>-2.8098543</td></tr>
<tr><td>1962</td><td>-0.5876830</td></tr>
<tr><td>1967</td><td>-0.3205117</td></tr>
<tr><td>1972</td><td>0.4766597</td></tr>
<tr><td>1977</td><td>2.4398310</td></tr>
<tr><td>1982</td><td>4.8320023</td></tr>
<tr><td>1987</td><td>6.4561737</td></tr>
<tr><td>1992</td><td>8.4833450</td></tr>
<tr><td>1997</td><td>3.8785163</td></tr>
<tr><td>2002</td><td>-7.5643124</td></tr>
<tr><td>2007</td><td>-10.0431410</td></tr>
</table>
</td><td>Call:
lm(formula = lifeExp ~ year, data = .)

Coefficients:
(Intercept) year
-139.16529 0.09557</td></tr>
</table>

Day 2

ReIntroduction and Data Types	**9:00 - 10:45**
Morning Break	10:45 - 11:00
Iteration	**11:00 - 12:30**
Lunch	12:30 - 1:30
Modeling	**1:30 - 3:15**
Afternoon Break	3:15 - 3:30
List Columns	**3:30 - 5:00**

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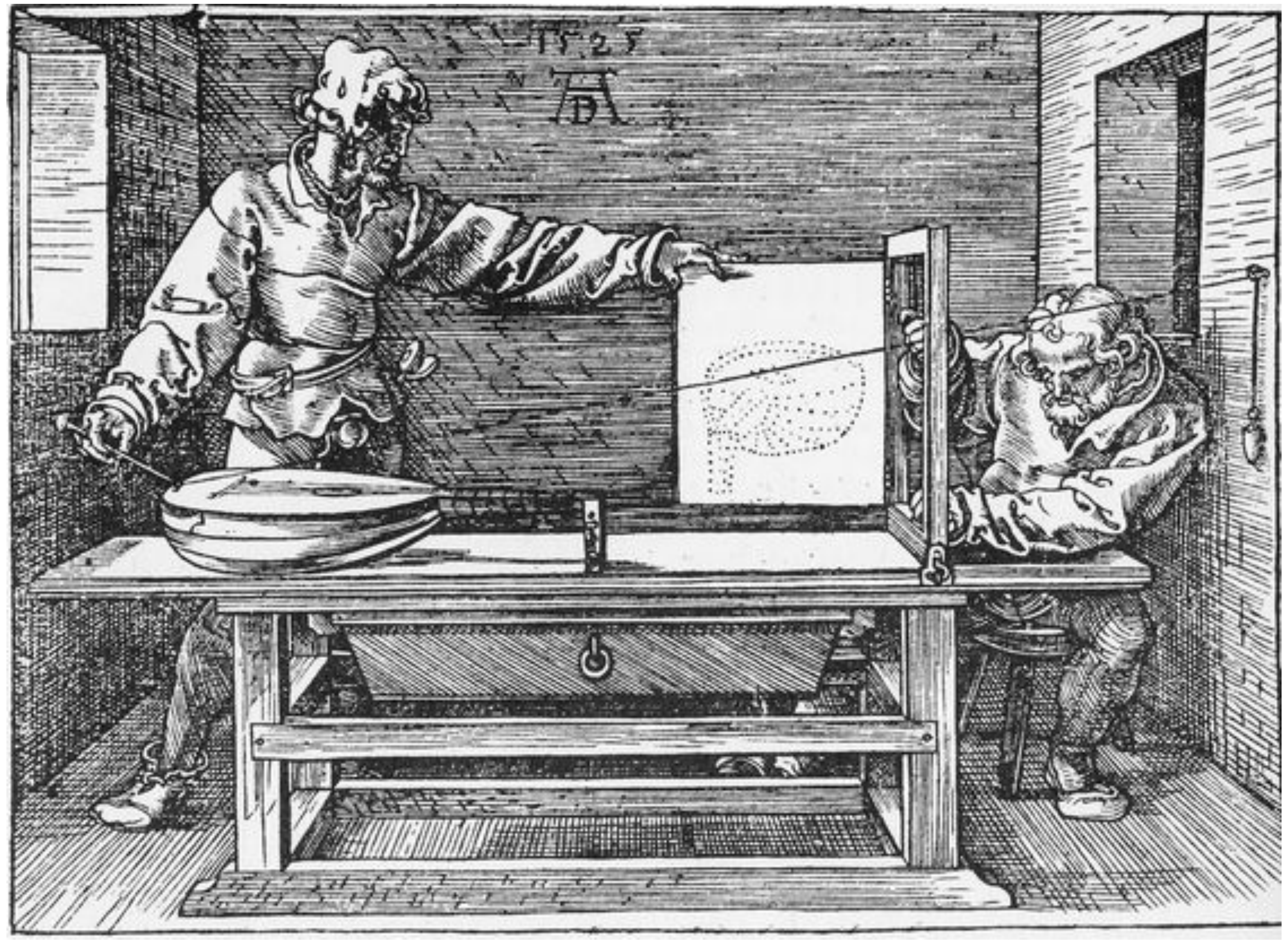

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