

# Einführung in R und RStudio

## [Termine 7 & 8]

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▶ **Termin 1 & 2**

- ▶ Grundlagen
- ▶ Datentypen

▶ **Termin 3 & 4**

- ▶ Objekten
- ▶ Lesen und Schreiben

▶ **Termin 5 & 6**

- ▶ Statistiken
- ▶ Grafiken

▶ **Termin 7 & 8**

- ▶ Fortgeschrittenes Programmieren
- ▶ Erstellen von Dokumenten
- ▶ Abschluss

- ▶ Iterationen (Schleifen)
- ▶ Funktionen
- ▶ Quellcode
- ▶ Pakete

```
for (i in 1:5)
  print(paste("Da wert von i ist", i))

## [1] "Da wert von i ist 1"
## [1] "Da wert von i ist 2"
## [1] "Da wert von i ist 3"
## [1] "Da wert von i ist 4"
## [1] "Da wert von i ist 5"
```

```
add_one <- function(x) {
  return(x + 1)
}
```

```
add_one(c(1:5))

## [1] 2 3 4 5 6
```

## Iterationen (Schleifen)

```
repeat {Ausdruck}  
while (Bedingung) {Ausdruck}  
for (i in M) {Ausdruck}  
  
next  
break
```

```
for (i in names(Bonn)) {  
  if (is.numeric(Bonn[[i]])) {  
    print(paste(i, mean(Bonn[[i]])))  
  }  
}
```

```
## [1] "BezirkNr 250.258064516129"  
## [1] "Jahr 2020"  
## [1] "Gesamt 5389.98924731183"  
## [1] "DichteKm2 4162.48924731183"  
## [1] "Maenner 2606.31182795699"  
## [1] "Frauen 2783.60752688172"  
## [1] "Zuwanderer 1627.06989247312"  
## [1] "Auslaender 947.693548387097"  
## [1] "FlaecheKm2 2.1936729876851"  
## [1] "X 2578524.77378713"  
## [1] "Y 5620621.4448268"
```

## Funktionen

```
foo <- function(Argumente) {Ausdruck}
```

- ▶ Definition
- ▶ Parameter (Argumente)
- ▶ Argumente mit Voreinstellungen
- ▶ ...

```
mean_sd <- function(x) {  
  y <- c(mean(x), sd(x))  
  names(y) <- c("Mittelwert",  
                "Standardabweichung")  
  return(y)  
}
```

```
mean_sd(Bonn$Gesamt)
```

```
##           Mittelwert Standardabweichung  
##           5389.989           2491.407
```

## Quellcode

```
source("Pfad")
```

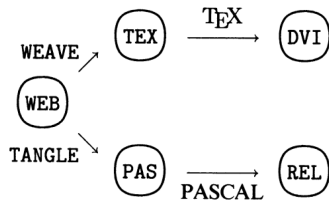
```
source("MeineFunktionen.R", echo = TRUE)
```

```
##  
## > BonnStats <- function(x, ...) {  
## +   if (!is.numeric(x))  
## +     stop("Der Wert 'x' muss numerisch sein")  
## +   out <- c(mean(x, ...), sd(x, ...))  
## +   n .... [TRUNCATED]
```

## Literarisches Programmieren Paradigma

## Reproduzierbare Datenanalyse

- ▶ Sweave
- ▶ knitr
- ▶ Rmarkdown
- ▶ roxygen



**Figure 1.** Dual usage of a WEB file.

Knuth (1984)

## Datei .Rmd

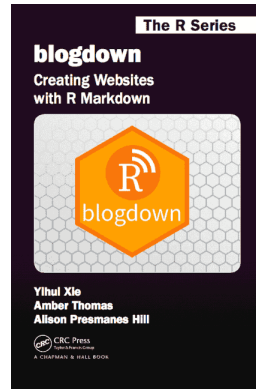
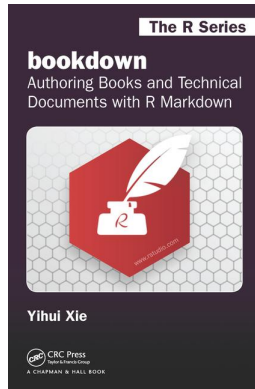
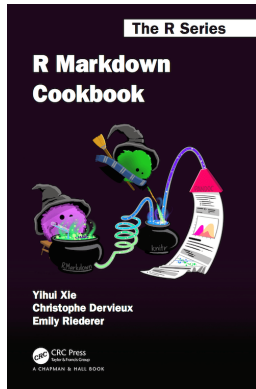
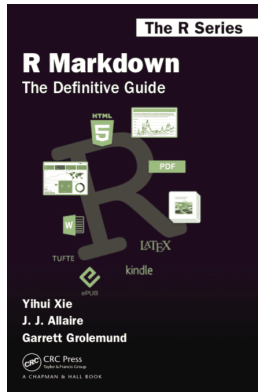
- ▶ Kopf: yaml
- ▶ Inhalt: markdown
- ▶ Code Chunks (Bausteine):
  - ▶ R
  - ▶ SQL
  - ▶ usw.
- ▶ Ausgangsformate
  - ▶ PDF
  - ▶ html
  - ▶ docx (MS Word)
  - ▶ odt (LibreOffice Write)
  - ▶ pptx (MS Power Point)

```

1- ---
2- title: "Untitled"
3- author: "Ich"
4- date: "`r Sys.Date()``"
5- output: html_document
6- ---
7-
8- ```{r setup, include=FALSE}
9- knitr::opts_chunk$set(echo = TRUE)
10- ```
11-
12- ## R Markdown
13-
14- This is an R Markdown document. Markdown is a simple formatting syntax for
15- authoring HTML, PDF, and MS Word documents. For more details on using
16- R Markdown see <http://rmarkdown.rstudio.com>.
17-
18- When you click the Knit button a document will be generated that includes
19- both content as well as the output of any embedded R code chunks within the
20- document. You can embed an R code chunk like this:
21-
22- ```{r cars}
23- summary(cars)
24- ```
25-
26- ## Including Plots
27-
28- You can also embed plots, for example:
29-
30- ```{r pressure, echo=FALSE}
31- plot(pressure)
32- ```
33-

```





## Weitere Themen

- ▶ Interaktive Dokumente
  - ▶ *shiny* Apps
  - ▶ *leaflet* widgets
- ▶ Räumliche Daten (GIS)
- ▶ Text Analyse
- ▶ Bild Animation
- ▶ R Pakete
- ▶ Internet Seiten





# Vielen Dank!

```
library(fortunes)
fortune(43)
```

```
##
## My preference goes with the numbering scheme attributed to a tribe on some
## island in the Pacific which consists of a 'factor' with four levels: 'one',
## 'two', 'three', and 'lots'. Hence, I'd go with 'lots of R users'.
## -- Dirk Eddelbuettel (in a discussion about trying to estimate the number of
## R users)
## R-help (April 2004)
```