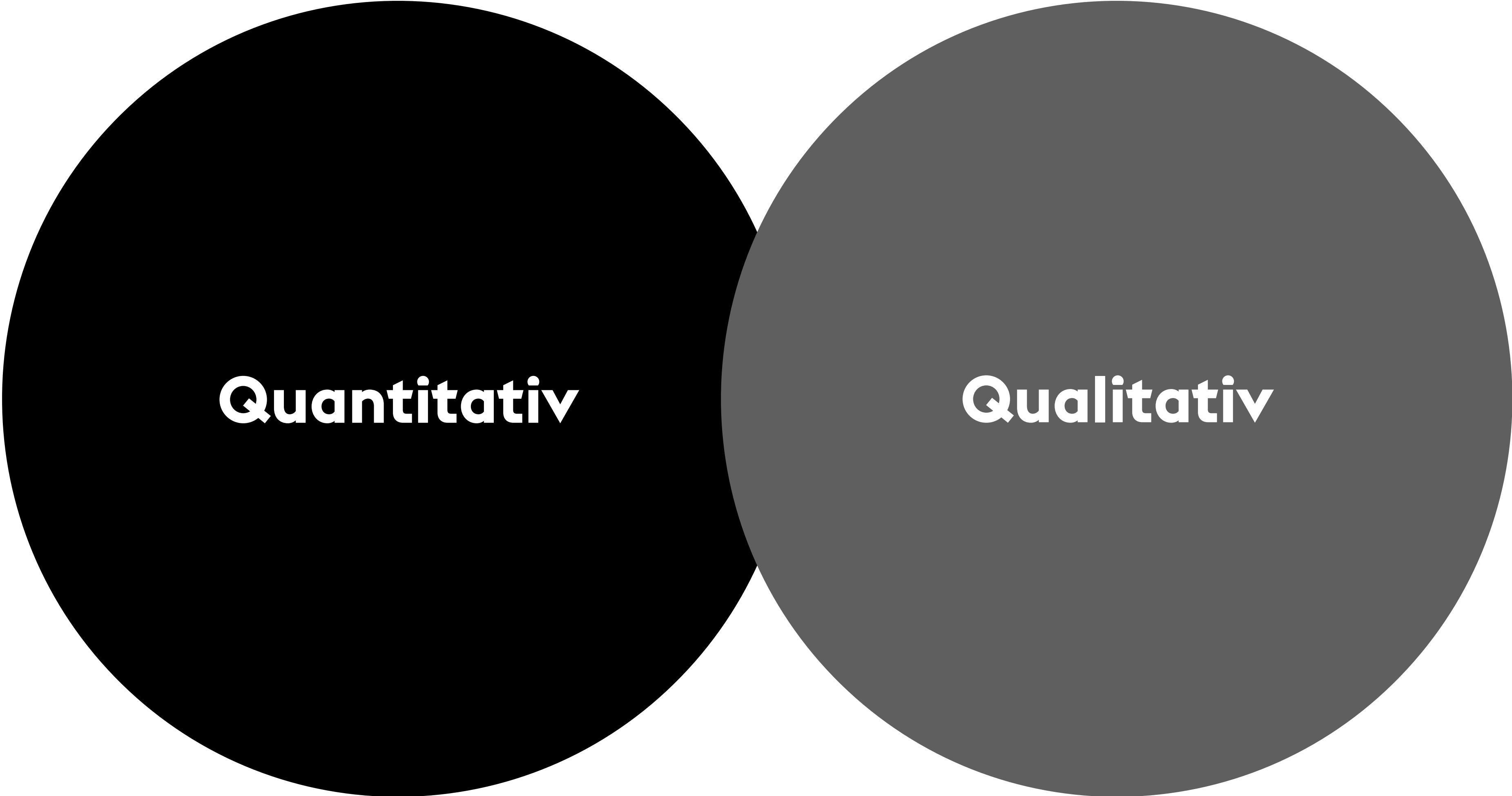


Spekulative Visualisierungen

Tutorium #2, Gestalten mit Daten

Welche Daten gibt es?



A Venn diagram consisting of two overlapping circles. The left circle is black and contains the word "Quantitativ" in white capital letters. The right circle is dark gray and contains the word "Qualitativ" in white capital letters. The two circles overlap in the center.

Quantitativ

Qualitativ



Quantitativ

**Dinge, die objektiv gemessen werden können
bzw. jede Form von Zahl.**

Kommt vor in Dimensionen wie Breite, Länge, Temperatur, Preis, Fläche, etc.



Qualitativ

Daten, deren Eigenschaften bzw. Beschreibung nicht (einfach) gemessen werden können sondern (meist) subjektiv wahrgenommen werden.

Kommt vor in Reizen wie Geruch, Geschmack, Farben, Anziehungskraft, etc.

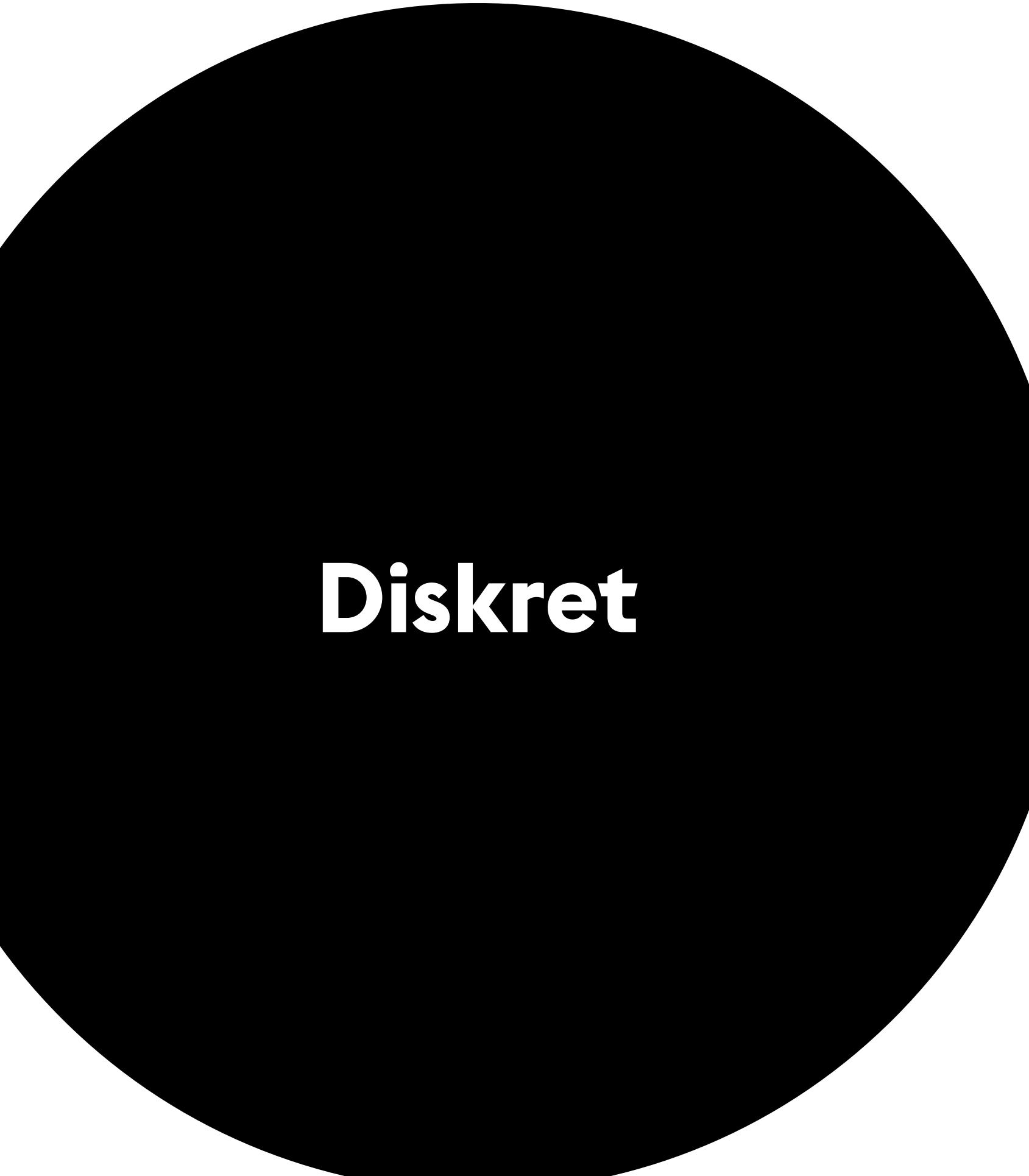
**In der Generativen Gestaltung
arbeiten wir primär mit
quantitativen Daten.**

**Die Frage, wie man qualitative Daten in quantitative Daten umwandelt bzw.
qualitative Daten in Szene setzt sind jedoch spannende und wichtige
Wirkungsfelder in der Generativen Gestaltung. In jedem Fall ist die Arbeit mit
solchen Daten im Kontext programmierter Gestaltung aber aufwändiger.**

**Quantitative Daten existieren
in zwei Ausprägungen.**

Diskret

Kontinuierlich



Diskret

Daten, welche nicht noch präziser gemacht werden können.

Meistens: Ganze Zahlen. In der realen Welt also z.B. die Anzahl von Kindern. Man kann nicht 2,3 Kinder haben.

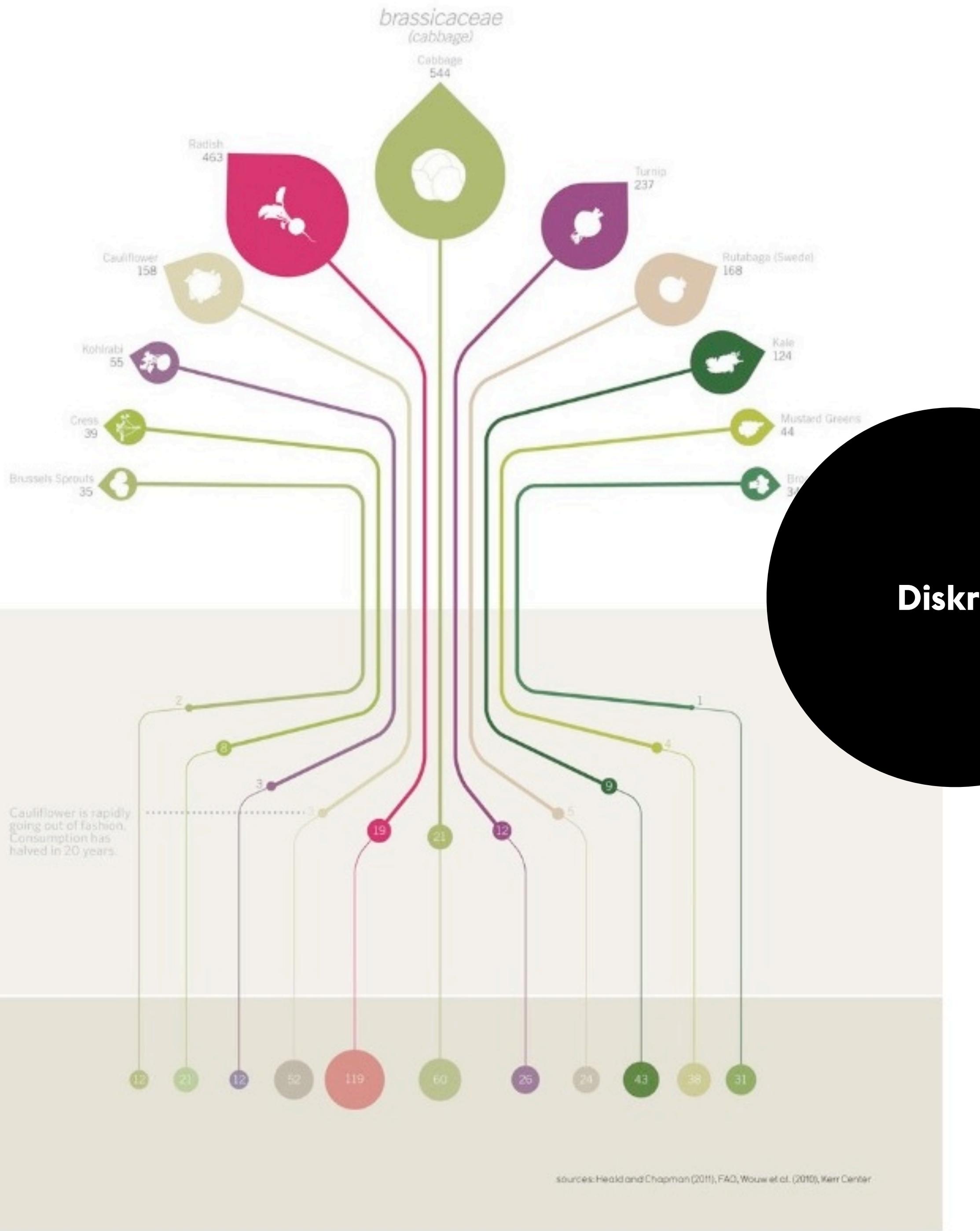


Kontinuierlich

Daten, welche weiter geteilt, reduziert und in „höheren Auflösungen“ betrachtet werden können.

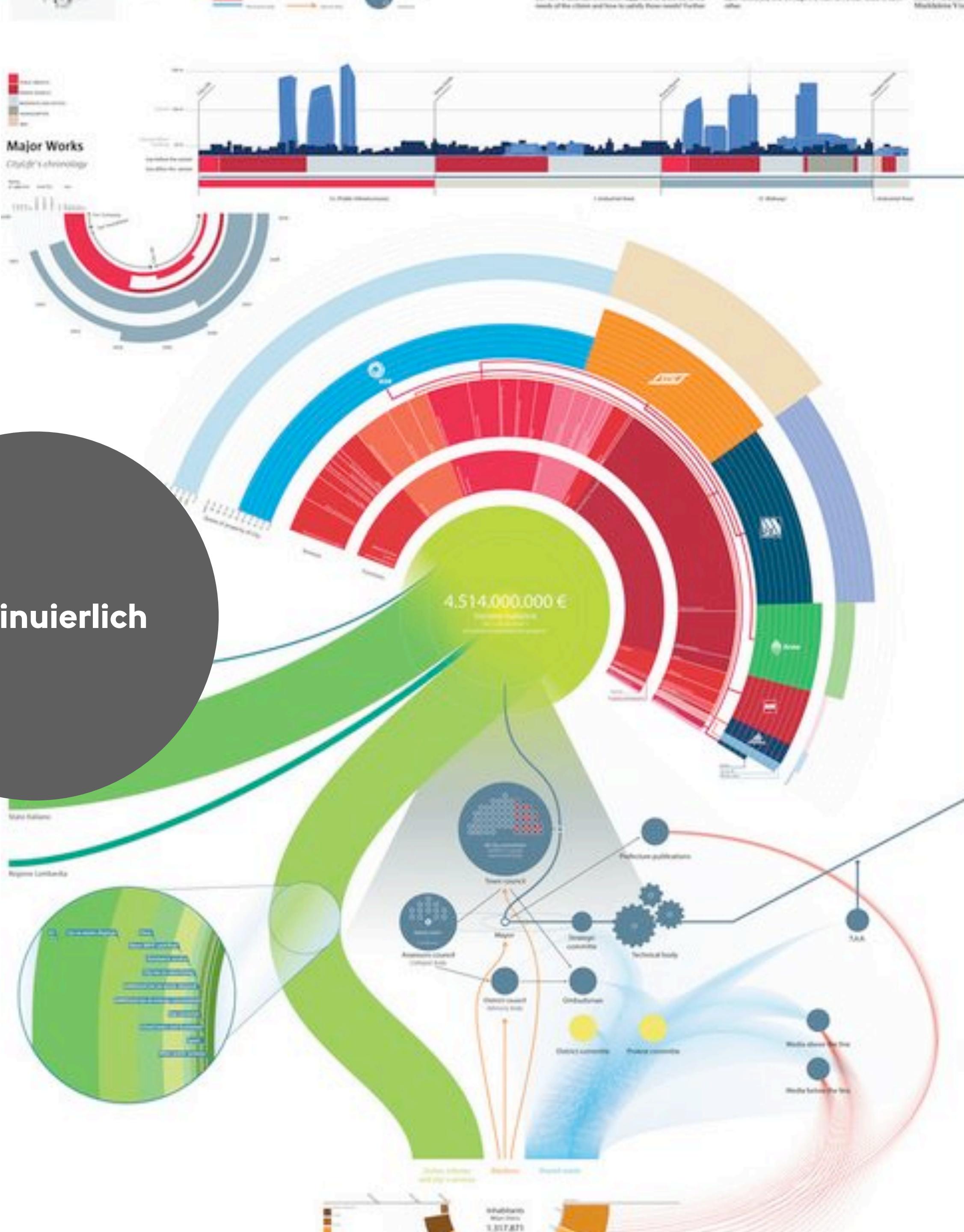
Eine Größenangabe kann man z.B. in Metern, Zentimetern, Millimetern, etc. betrachten.

**Diskrete und kontinuierliche
Daten erfordern unterschiedliche
Ansätze in der Konzeption,
Gestaltung und Interaktion.**

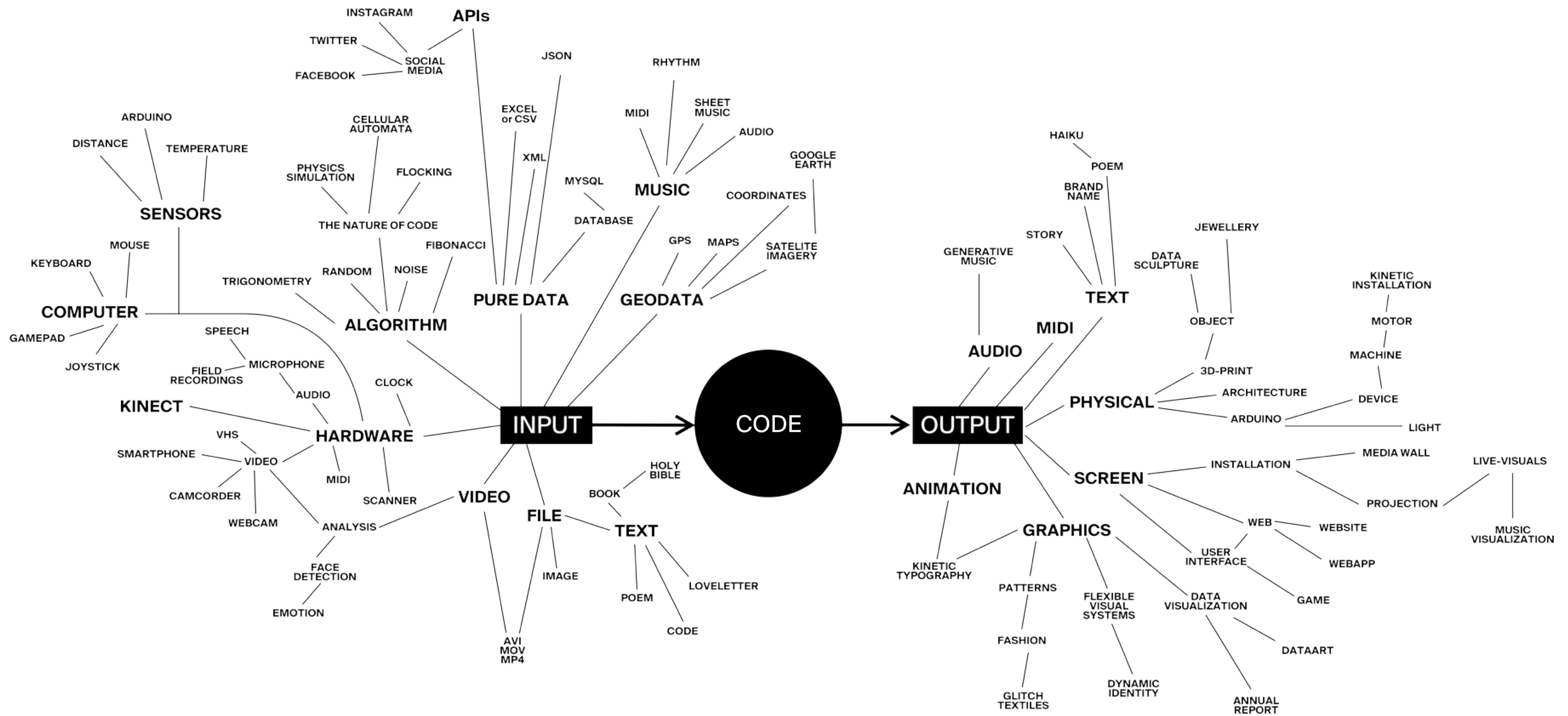


Diskret

Kontinuierlich

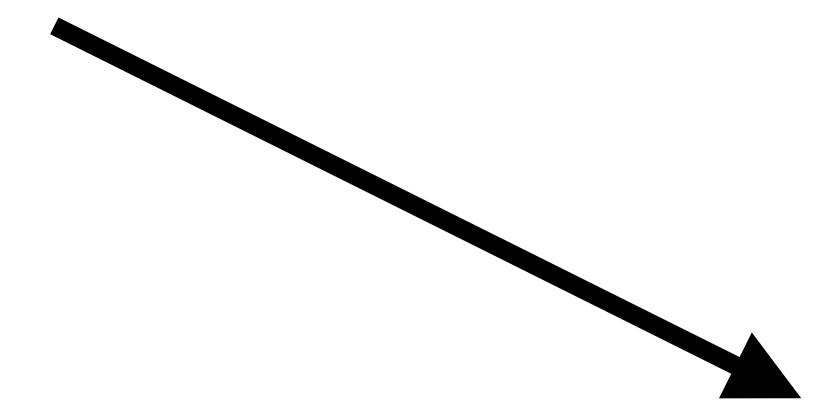


Formen von Daten



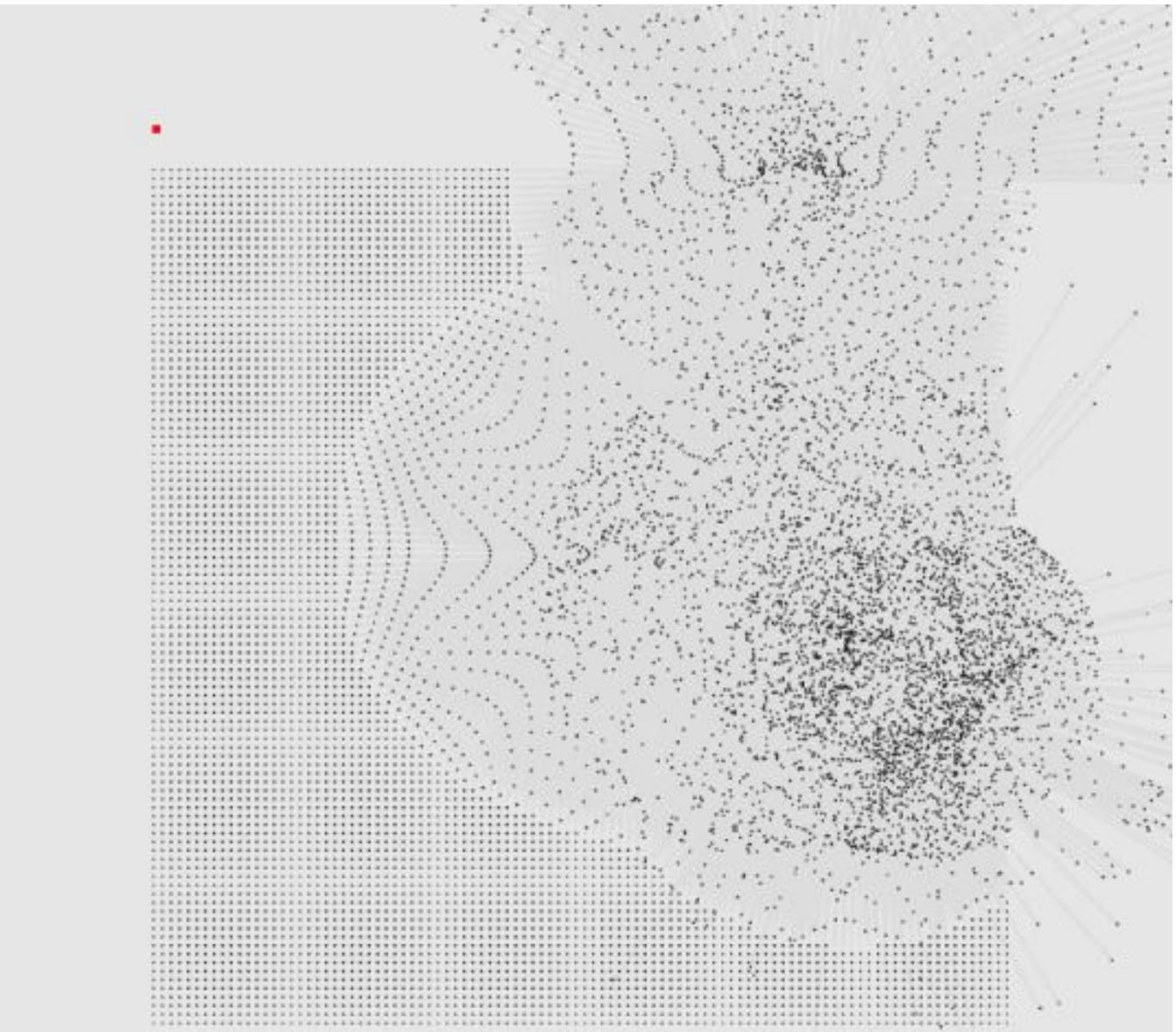
Musik / Sound
Bücher
Bilder
Benutzerinteraktion
Geodaten
Nachrichten-Feeds

...



int, float
Char
String
StringList
ArrayList
JSON

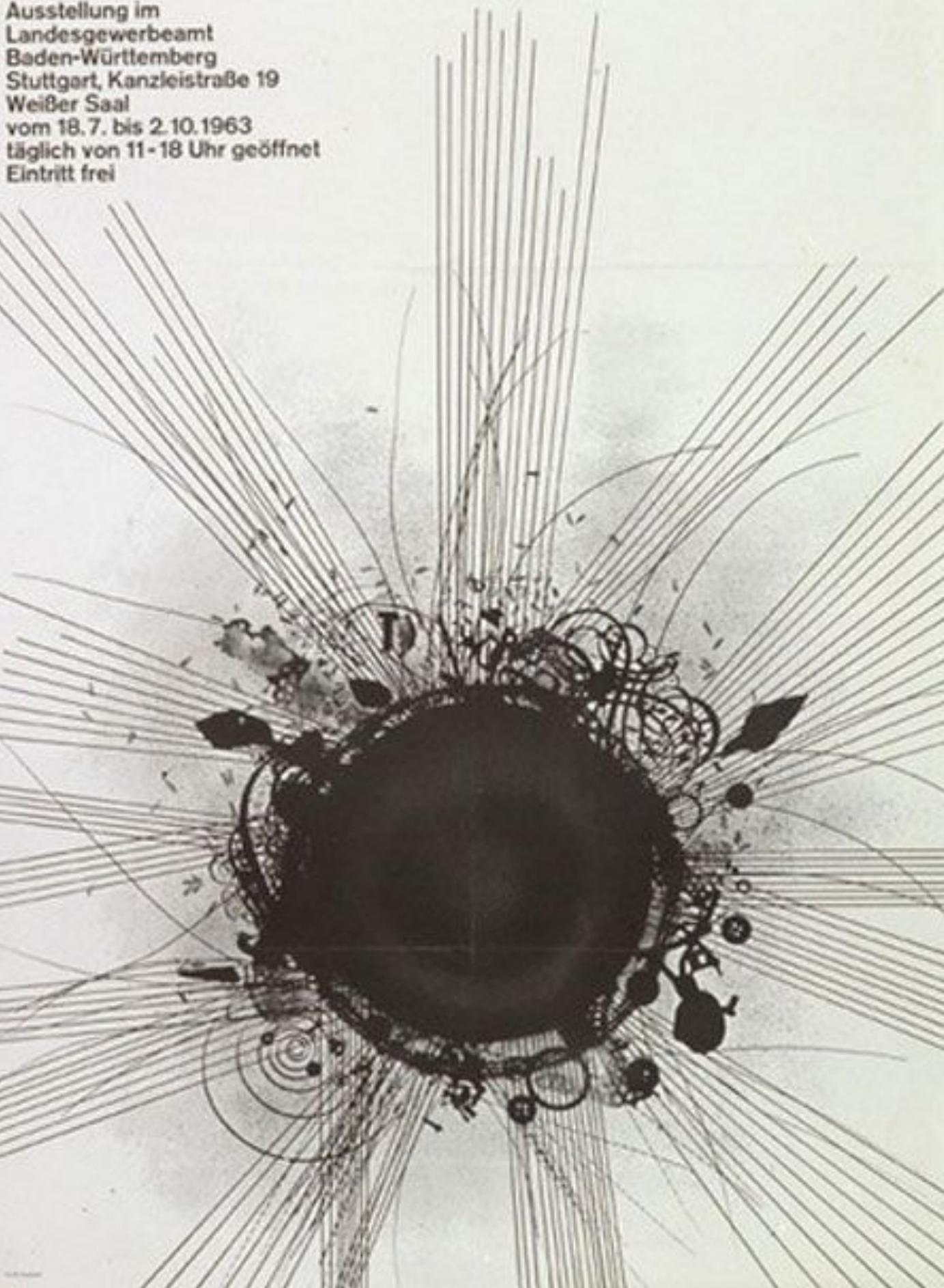
...



Grid Studies
— 2013.09.01

Internationales Kunsthandwerk 1963

Ausstellung im
Landesgewerbeamt
Baden-Württemberg
Stuttgart, Kanzleistraße 19
Weißen Saal
vom 18.7. bis 2.10.1963
täglich von 11-18 Uhr geöffnet
Eintritt frei

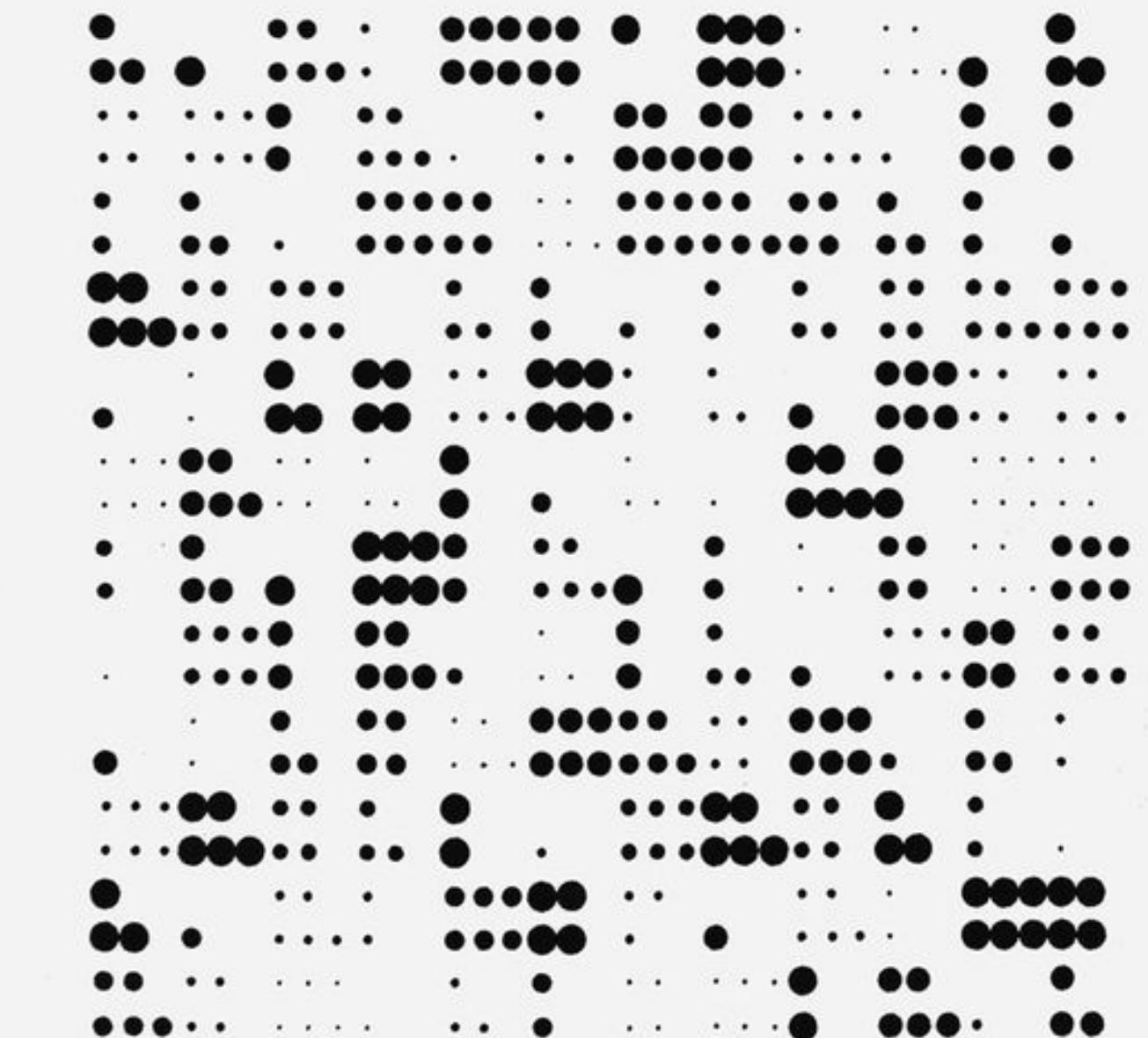


elektronische
und instrumentale musik
von karlheinz stockhausen

Klavier und Schlagzeug:
david Tudor
Schlagzeug:
christoph casel
Tonstudio Köln
6. Dezember 1964
20 Uhr

Klavierstück VI 1954/55
Klavierstück IX 1954
Klavierstück X 1961
Klavierstück XI 1956
zyklus für einen Schlagzeuger 1959
elektronische studien I und II 1953/54
gesang der Jünglinge 1956
elektronische musik

kontakte 2



Welche Daten sind die Grundlage Eurer Arbeit?

Besprechung

Pause

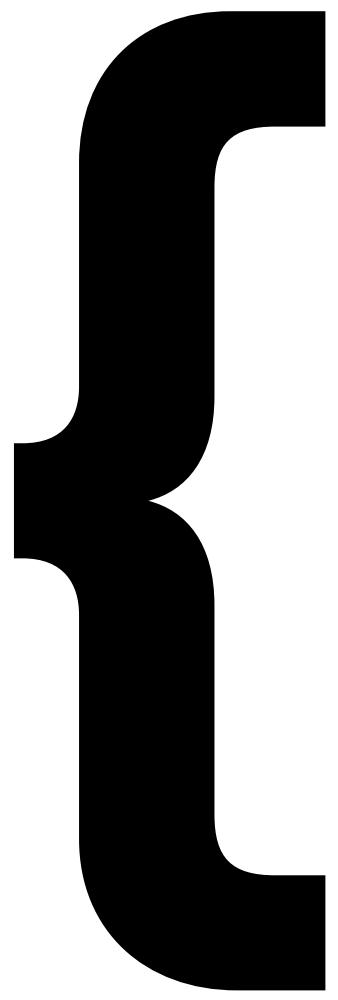
Wie gelangt man an Daten?

Generierte Daten

Eigene Daten

Datenbanken & APIs

Generierte Daten



Zufall - random()
Noise - noise()
Trigonometrie - sin(), cos(), etc.
Kräfte
Simulationen
...

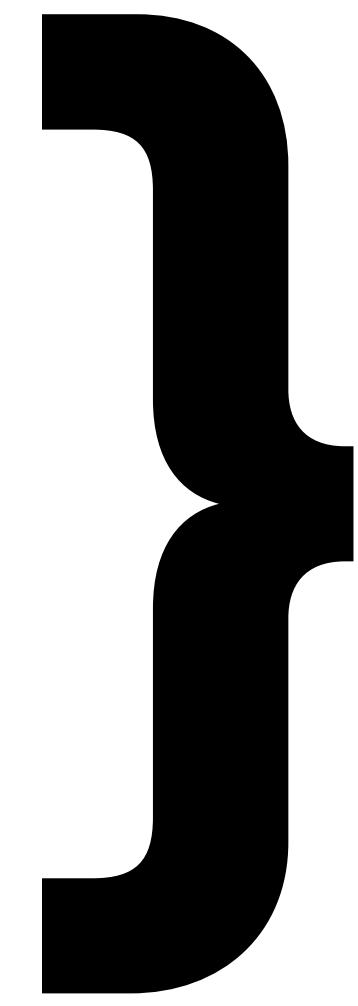
Generierte Daten

{

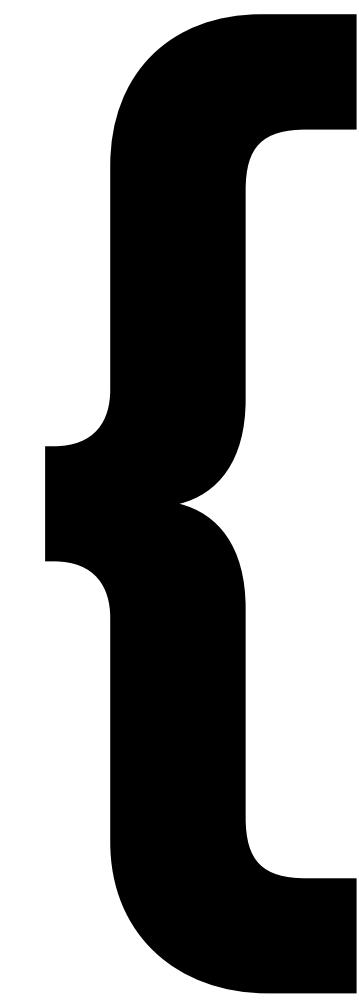
<https://natureofcode.com/>



Musik
Text
Foto
Sprache
...



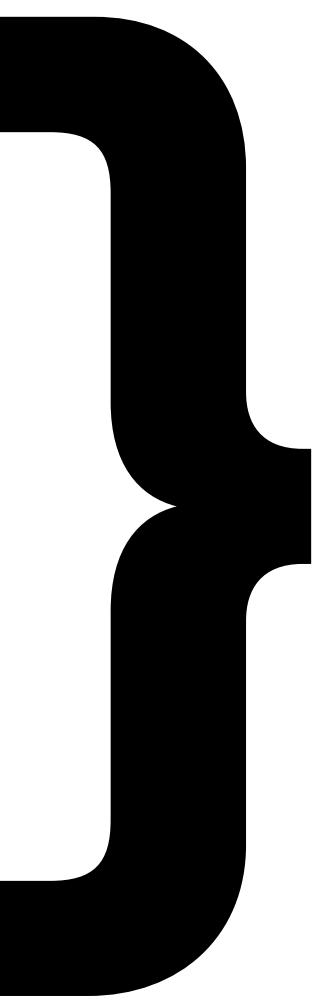
Eigene Daten



Tabellen
Excel
CSV
JSON
...

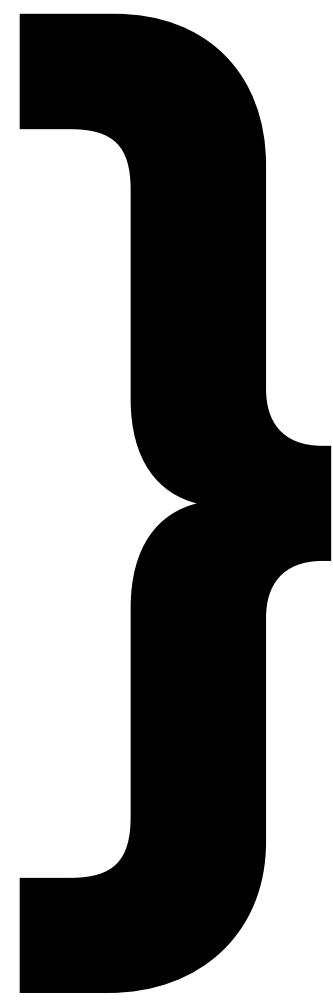
Bildarchive
Textdatenbanken
Wetterdaten
Nahverkehr
Finanztransaktionen
Katzennamen

...



Datenbanken & APIs

<https://github.com/public-apis/public-apis>



Datenbanken & APIs

**Stellt einen Satz an Daten zusammen
den Ihr in Eurem Projekt nutzen wollt.**

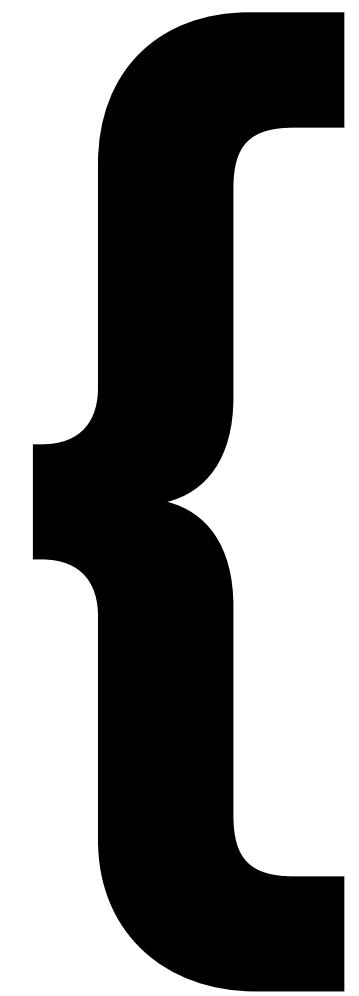
Aufgabe

Pause

Arten von Speichertypen

Arrays

<https://www.processing.org/reference/Array.html>



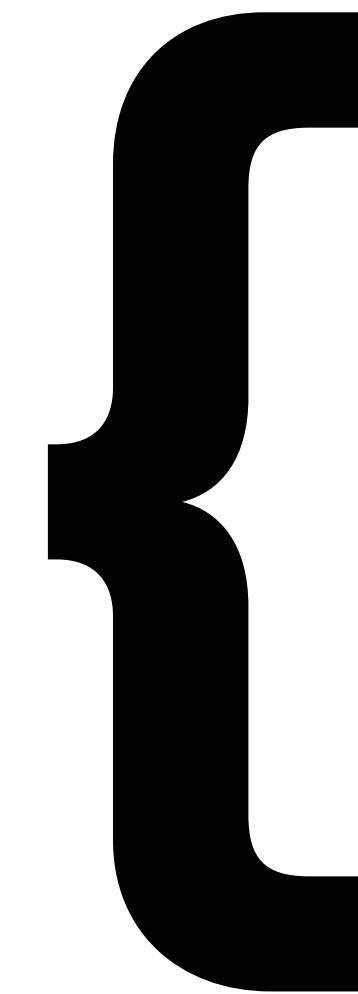
Eine einfache und vielseitig einsetzbare Form von Datenspeicher.

Arrays sind immer von einem Typ (int, float, etc.) und können nicht gemischt werden.

Die Größe von Arrays wird im Vorfeld bestimmt.

Arrays

<https://www.processing.org/reference/Array.html>



Eindimensionale Arrays

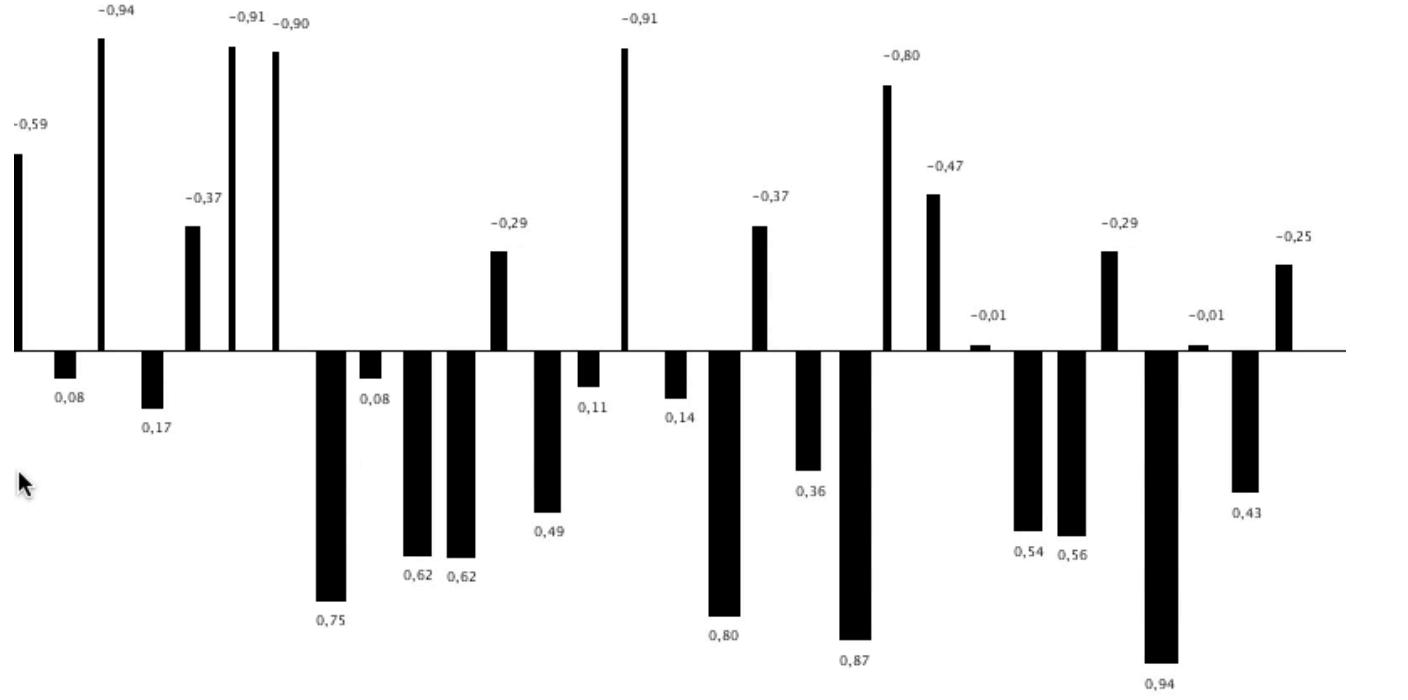
```
int[] myArray = new int[3];  
myArray[0] = 10;  
myArray[1] = 20;  
myArray[2] = 30;
```

```
int[] myArray = {10,20,30};  
  
myArray[1] > output: 20
```

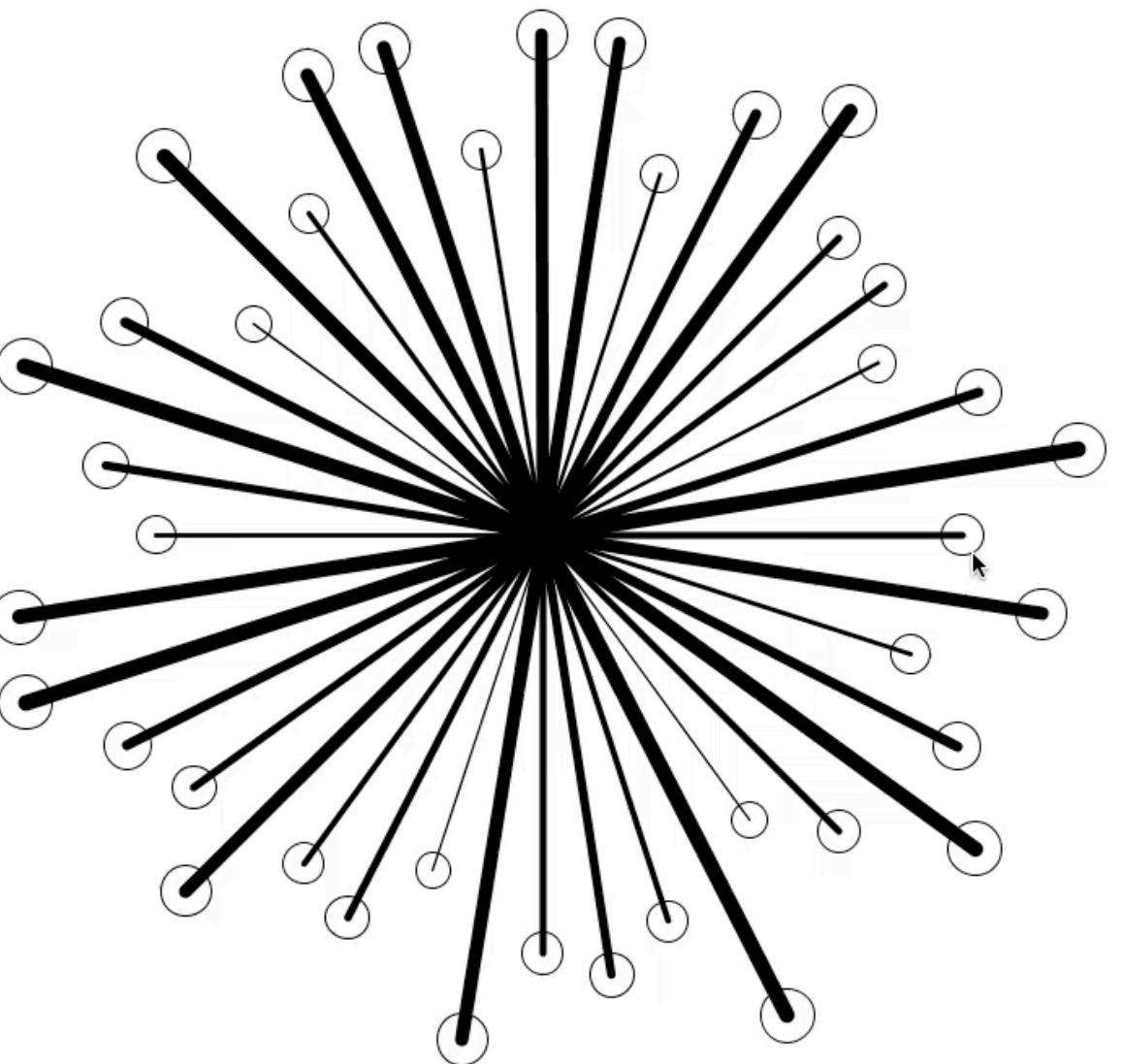
Zweidimensionale Arrays

```
int[][] myArray = {{0, 1, 2, 3},  
                  {3, 2, 1, 0},  
                  {3, 5, 6, 1},  
                  {3, 8, 3, 4}};
```

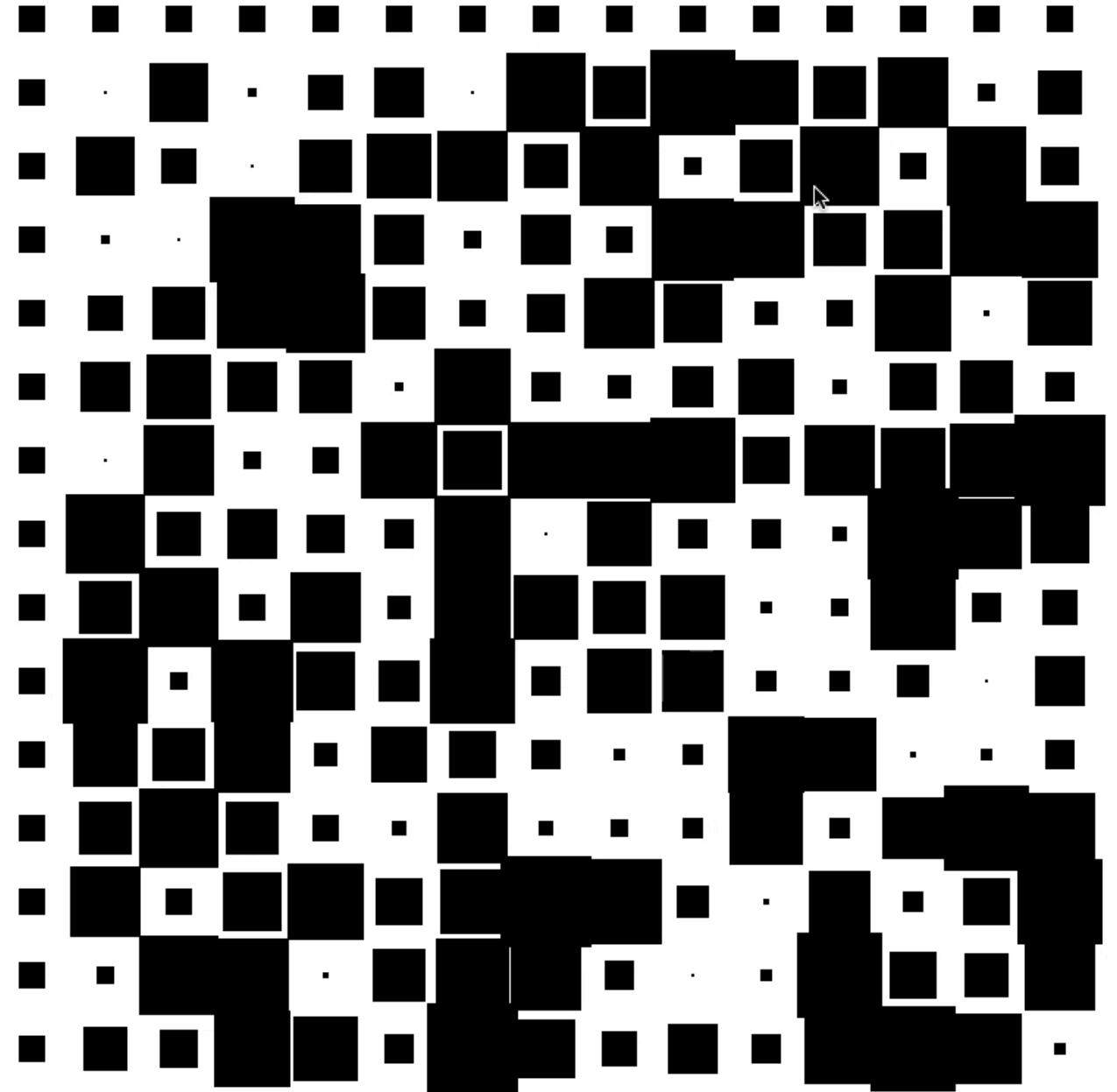
```
myArray[0][1] > output: 1
```



Beliebige Taste drücken um eine neue Version zu generieren

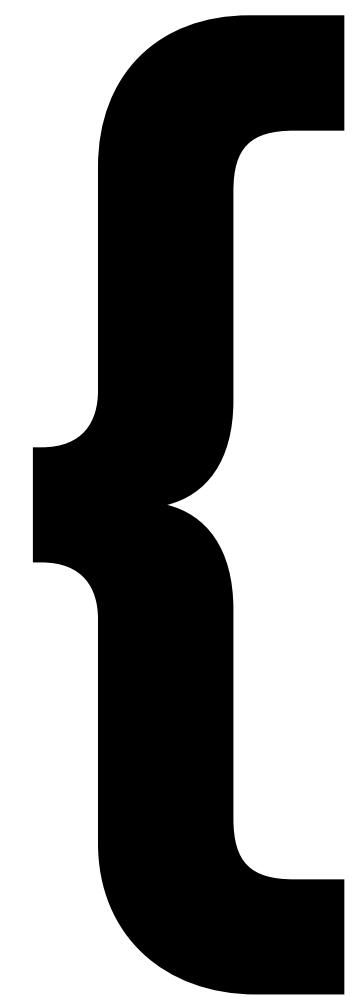


Beliebige Taste drücken um eine neue Version zu generieren.
Maus bewegen um die Form zu verändern.



ArrayLists

<https://processing.org/reference/ArrayList.html>



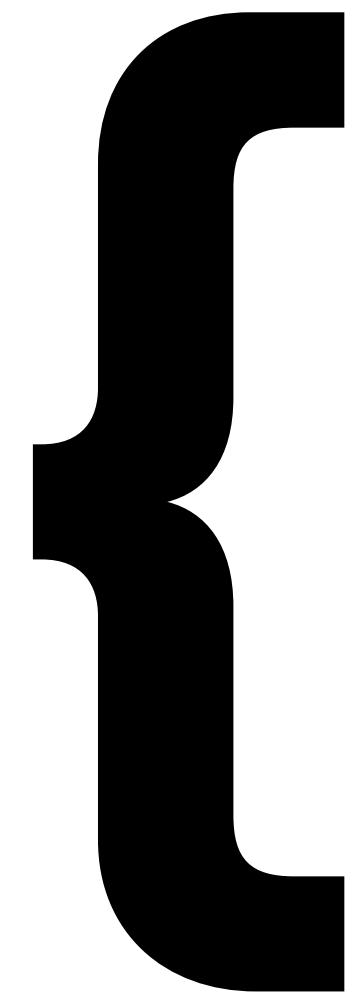
Prinzipiell wie ein Array.

Vorteil: Es können dynamisch Inhalte hinzugefügt und entfernt werden.

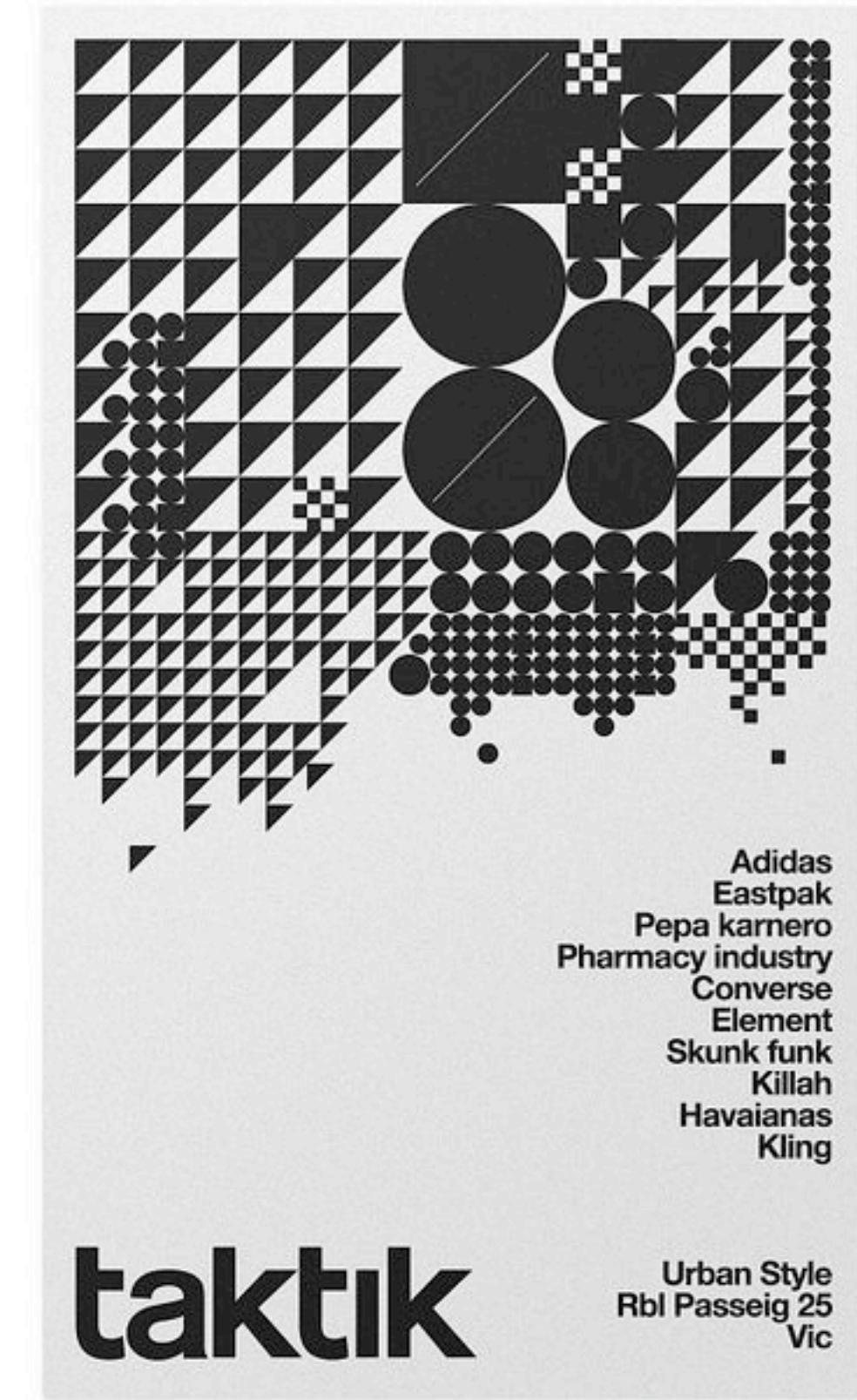
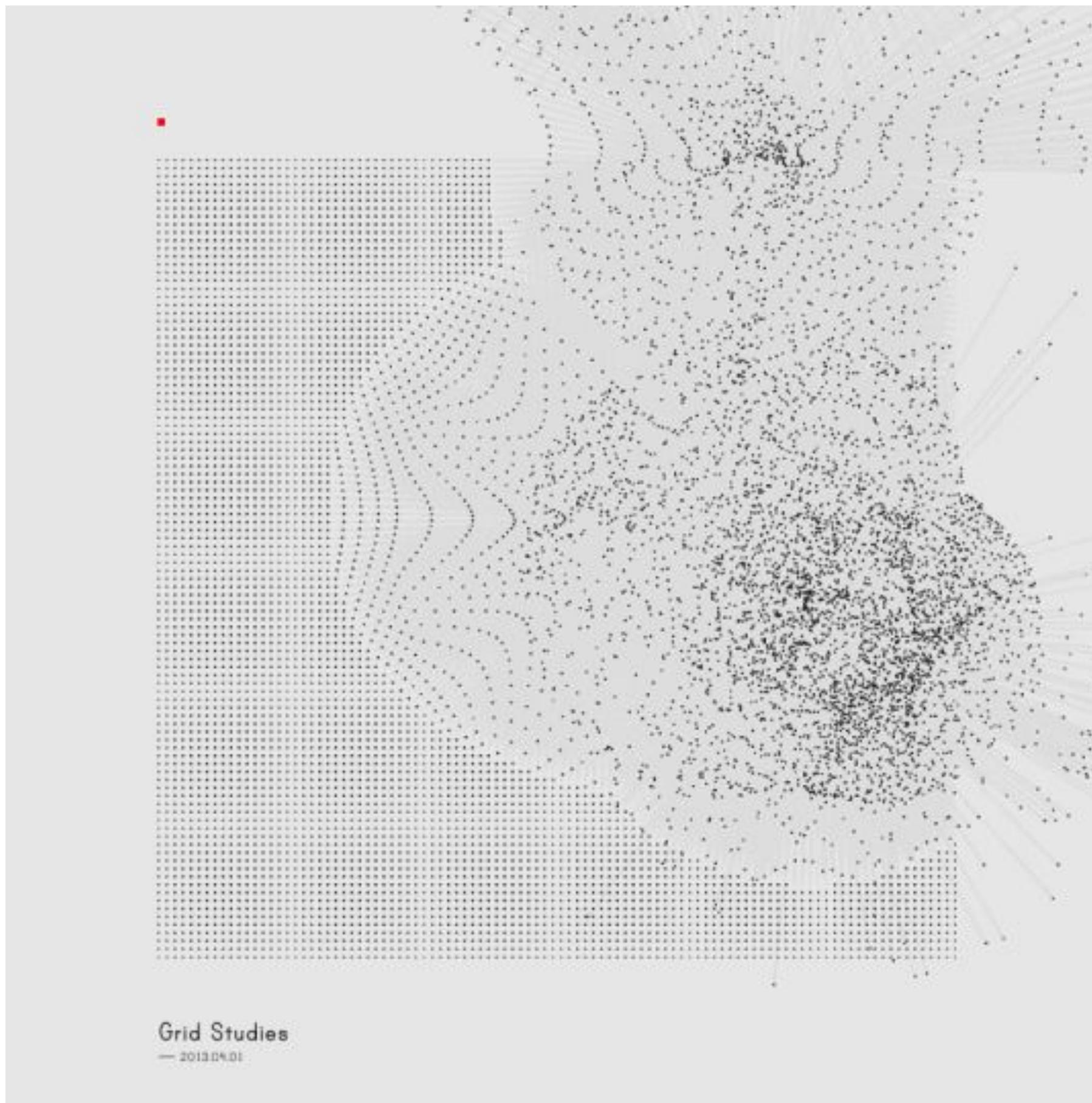
Kommt vor allem zum Einsatz wenn Daten dynamisch sind.

ArrayLists

<https://processing.org/reference/ArrayList.html>



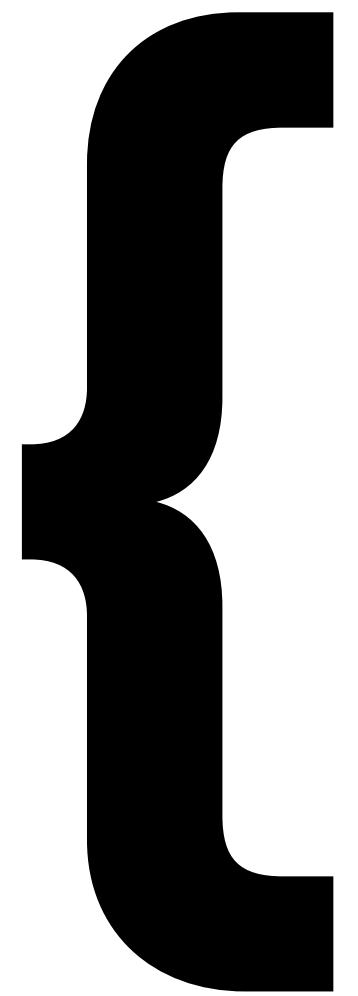
```
ArrayList<Datentyp>()  
z.B. ArrayList<String> myList = new ArrayList<String>();  
  
myList.add(meinString);  
myList.remove(0);
```



StringLists

<https://processing.org/reference/StringList.html>

Verwandte Typen: IntList, FloatList



Kombination aus ArrayList und speziellen Helfer-Funktionen.

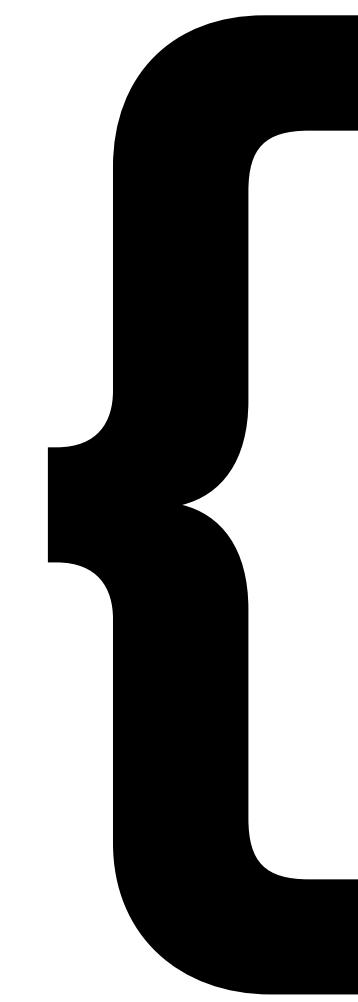
Auch hier können dynamisch Inhalte hinzugefügt und entfernt werden.

Vorteil: Spezifische Funktionen für die Operation mit Strings stehen zur Verfügung, wie z.B. sort(), shuffle(), upper(), etc.

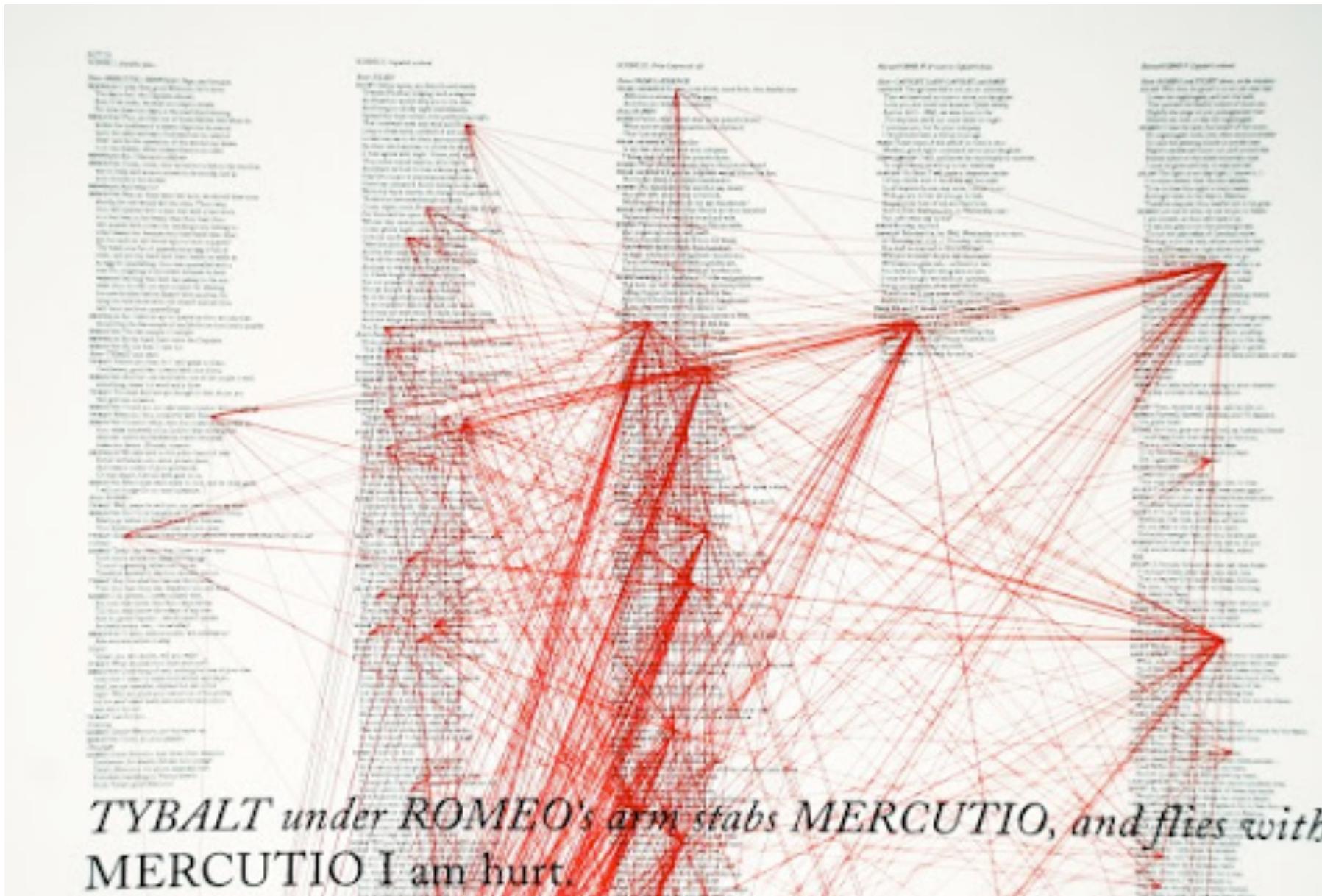
StringLists

<https://processing.org/reference/StringList.html>

Verwandte Typen: IntList, FloatList



```
StringList meineListe;  
meineListe = new StringList();  
  
meineListe.append("FH Bielefeld");  
meineListe.append("Spekulative Visualisierungen");  
  
meineListe.get(0);  
meineListe.sort();  
meineListe.shuffle();
```

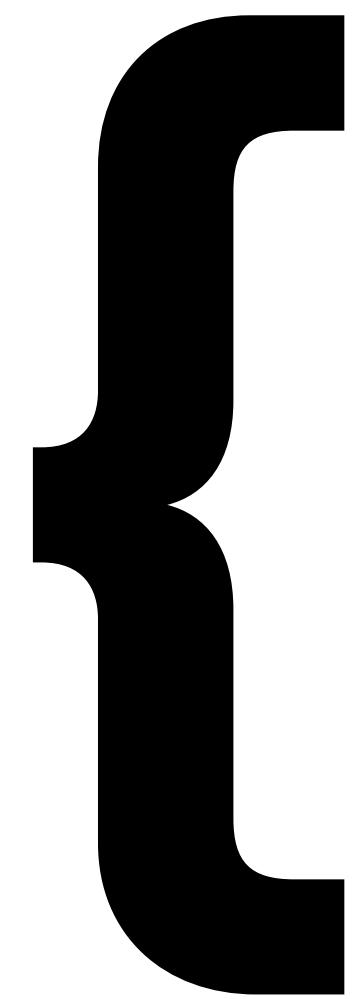


so themselves? Evidently
faculties, proves their
of all and supreme over all his
things they have not placed in ou
have put these other things also in ou
and to such companions, how was it p

"Epictetus, if it were possible, I would have m^a
But now be not ignorant of this; this body is not yours, bu
tempered. And since I was not able to do for you what I
have mentioned, I have given you a small portion of us, this faculty of pursuing an object and avoiding it, and the faculty of desire
and aversion, and, in a word, the faculty of using the appearances of things; and if you will take care of this faculty and consider it
your only possession, you will never be hindered, never meet with impediments; you will not lament, you will not blame, you will
not flatter any person." „Well, do these seem to you small matters?" I hope not. "Be content with them then and pray to the gods."
But now when it is in our power to look after one thing, and to attach ourselves to it, we prefer to look after many things, and to be
bound to many things, to the body and to property, and to brother and to friend, and to child and to slave. Since, then, we are bound
to many things, we are depressed by them and dragged down. For this reason, when the weather is not fit for sailing, we sit down and
torment ourselves, and continually look out to see what wind is blowing. "It is north." What is that to us? "When will the west wind
blow?" When it shall choose, my good man, or when it shall please AEolus; for God has not made you the manager of the winds, but
AEolus. What then? We must make the best use that we can of the things which are in our power, and use the rest according to their
nature. What is their nature then? As God may please. „Must I then, alone have my head cut off? What, would you have all men
lose their heads that you may be consol'd? Will you not stretch out your neck as Lateranus did at Rome when Nero ordered him to
be beheaded? For when he had stretched out his neck, and received a feeble blow which made him draw it in for a moment, he
stretched it out again. And a little before, when he was visited by Epaphroditus, Nero's freedman, who asked him about the cause of
offense which he had given, he said, "If I choose to tell anything, I will tell your master." „What then should a man have in readiness
in such circumstances? What else than "What is mine, and what is not mine, and permitted to me, and what is not permitted to me."
I must die. Must I then die lamenting? I must be cut in chains. Must I then also lament? I must go into exile. Does any man then
hinder me from going with smiles and cheerfulness and contentment? "Taking the secret which you possess." I will not, for this is
in my power. "But I will put you in chains." Man, what are you talking about? Me in chains? You may fetter my leg, but my will not
even Zeus himself can overpower. "I will throw you into prison." My poor body, you mean. "I will cut your head off." When, then,
have I told you that my head alone cannot be cut off? These are the things which philosophers should meditate on, which they should
write daily, in which they should exercise themselves. „Thrasylus used to say, I would rather be killed to-day than banished to
tomorrow." What, then, did Rufus say to him? "If you choose death as the heavier misfortune, how great is the folly of your choice?
But if, as the lighter, who has given you the choice? Will you not study to be content with that which has been given to you?" „What,
then, did Agrippinus say? He said, "I am not a hindrance to myself." When it was reported to him that his trial was going on in the

JSONArray

<https://processing.org/reference/JSONArray.html>



**Flexibelste Variante von
Datenspeicher.**

**Speicherung & Referenz via sog.
name/value-pairs.**

**Vorteil: Verschiedene
Datentypen können gemischt
werden.**

**Viele APIs stellen Daten im
JSON-Format zur Verfügung.**

JSONArray

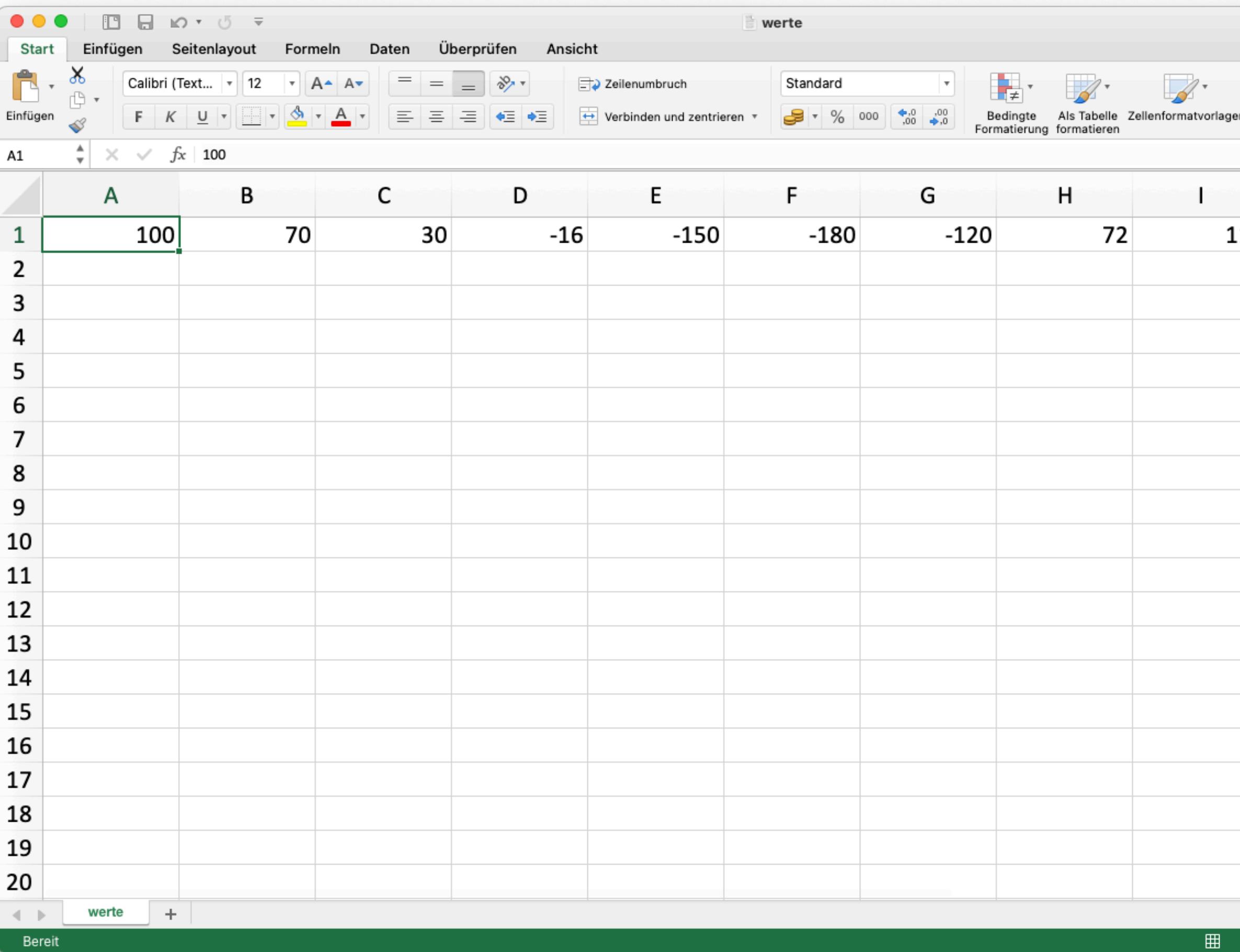
<https://processing.org/reference/JSONArray.html>

{

```
[  
  {  
    "id": 0,  
    "uni": "Bielefeld",  
    "studenten": 10000  
  },  
  {  
    "id": 1,  
    "uni": "Dortmund",  
    "studenten": 15000  
  },  
  {  
    "id": 2,  
    "uni": "Paderborn",  
    "studenten": 20000  
  }  
]
```

Daten selber generieren

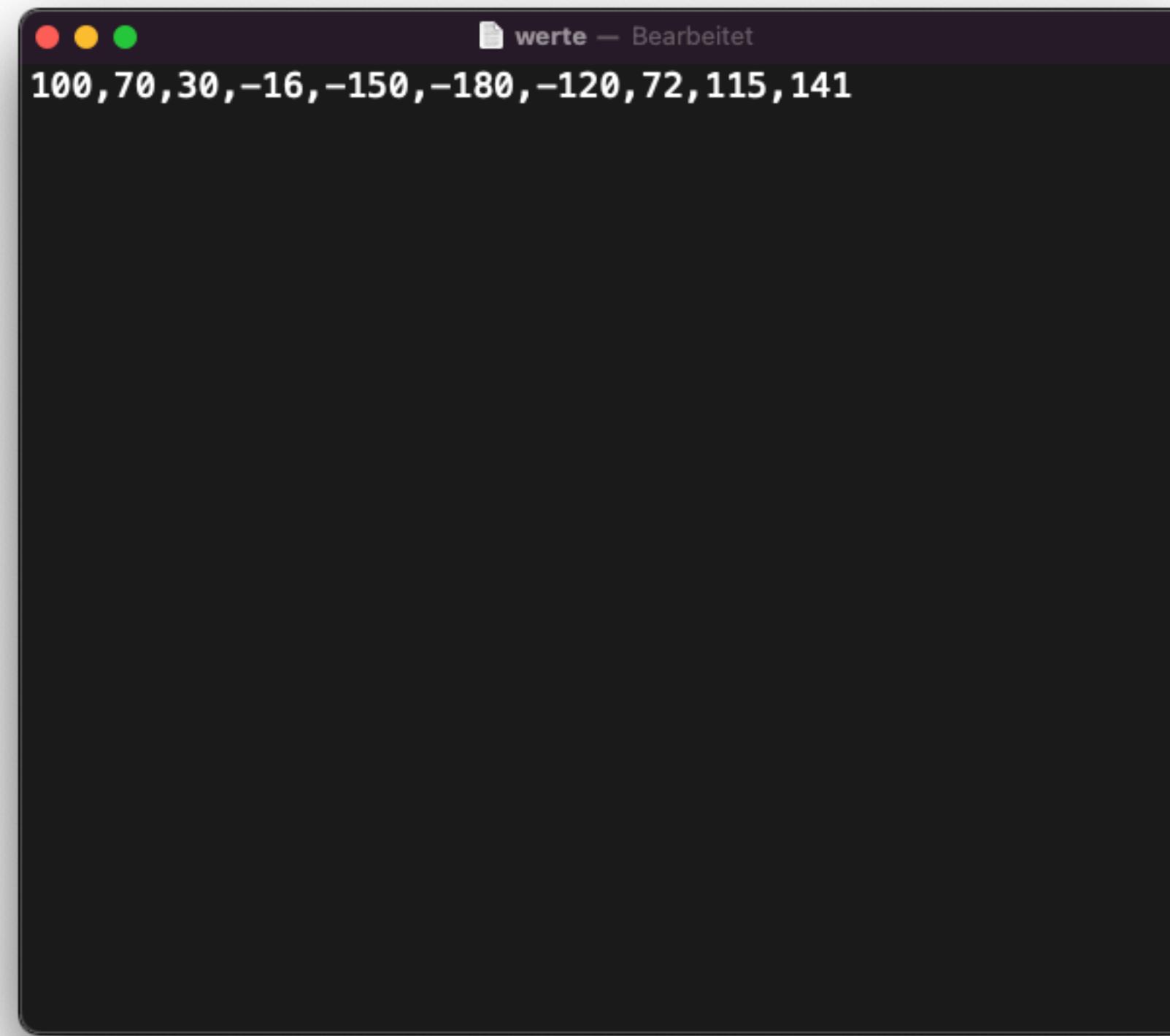
Eine einfache Liste aus Zahlen.



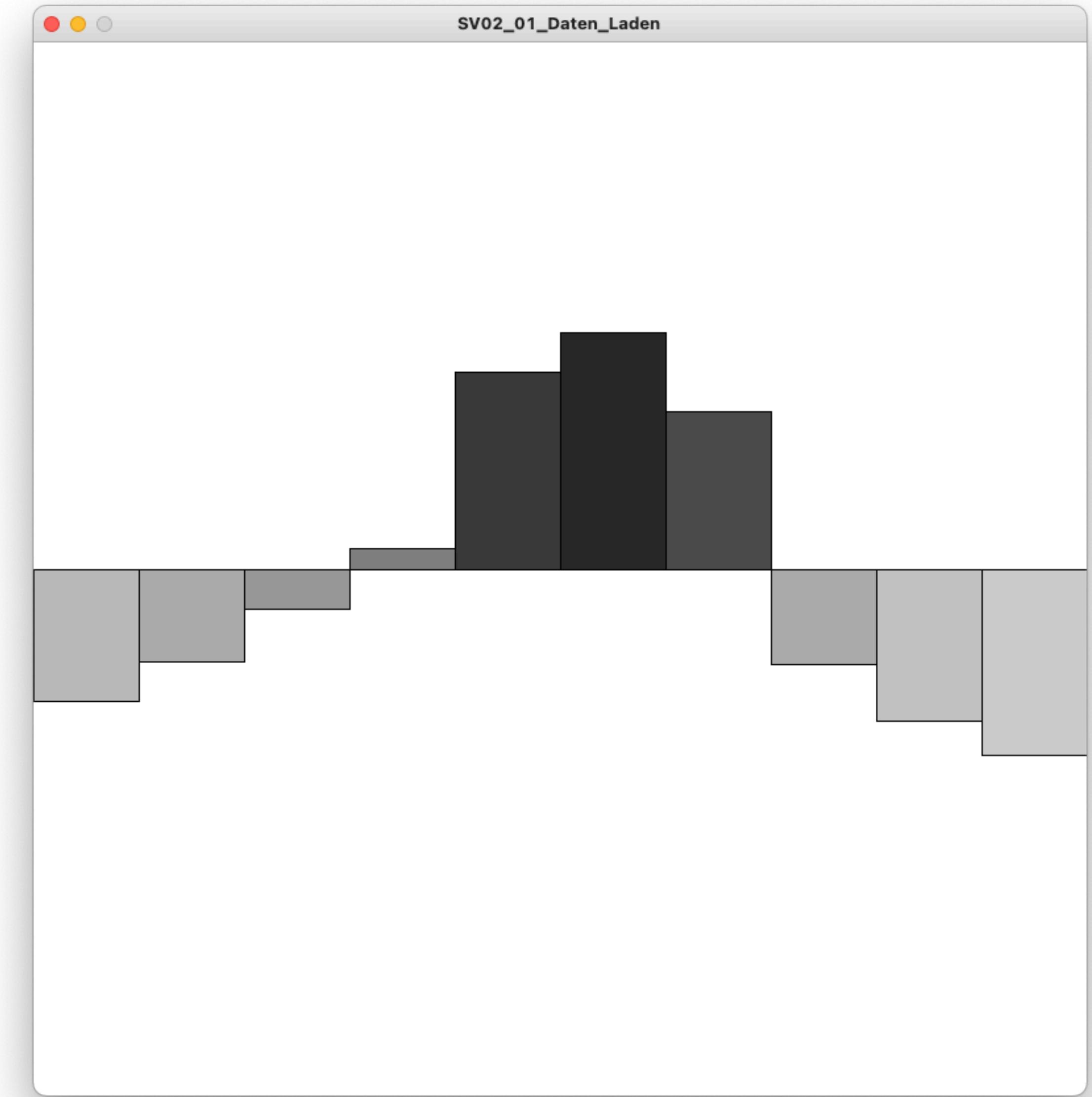
The screenshot shows a Microsoft Excel spreadsheet titled "werte". The table has 20 rows and 9 columns, labeled A through I and 1 through 20 respectively. Row 1 contains the values 100, 70, 30, -16, -150, -180, -120, 72, and 1. The cell containing 100 is highlighted with a green border. The rest of the cells are empty or contain the number 1. The Excel ribbon is visible at the top, showing tabs like Start, Einfügen, Seitenlayout, Formeln, Daten, Überprüfen, and Ansicht. The formula bar shows the value 100. The status bar at the bottom indicates "Bereit".

1	A	B	C	D	E	F	G	H	I
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

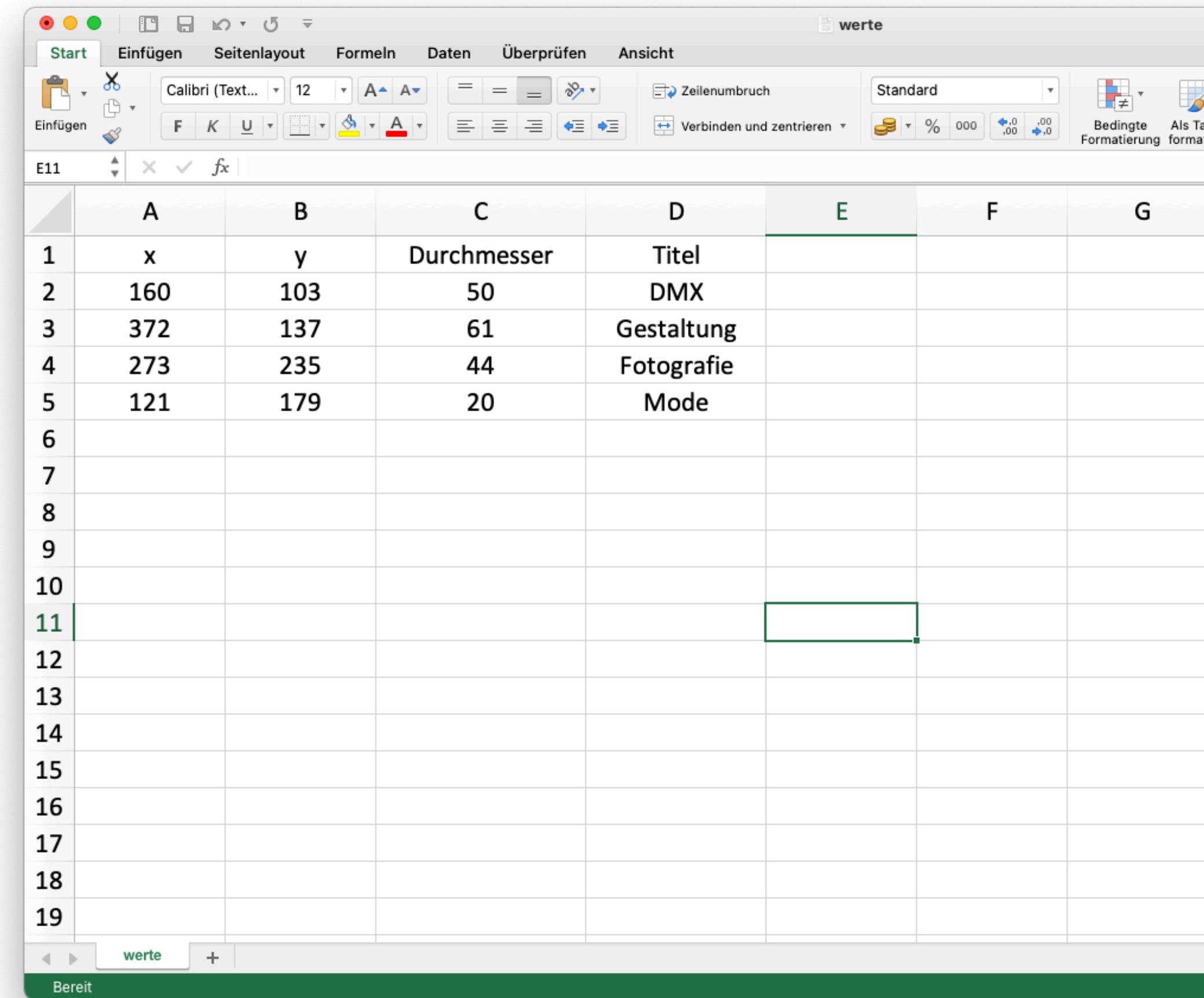
Liste erstellen und dann im CSV-Format (Kommagetrennte Werte) speichern.



```
werte — Bearbeitet
100,70,30,-16,-150,-180,-120,72,115,141
```



Eine Tabelle mit unterschiedlichen Werten

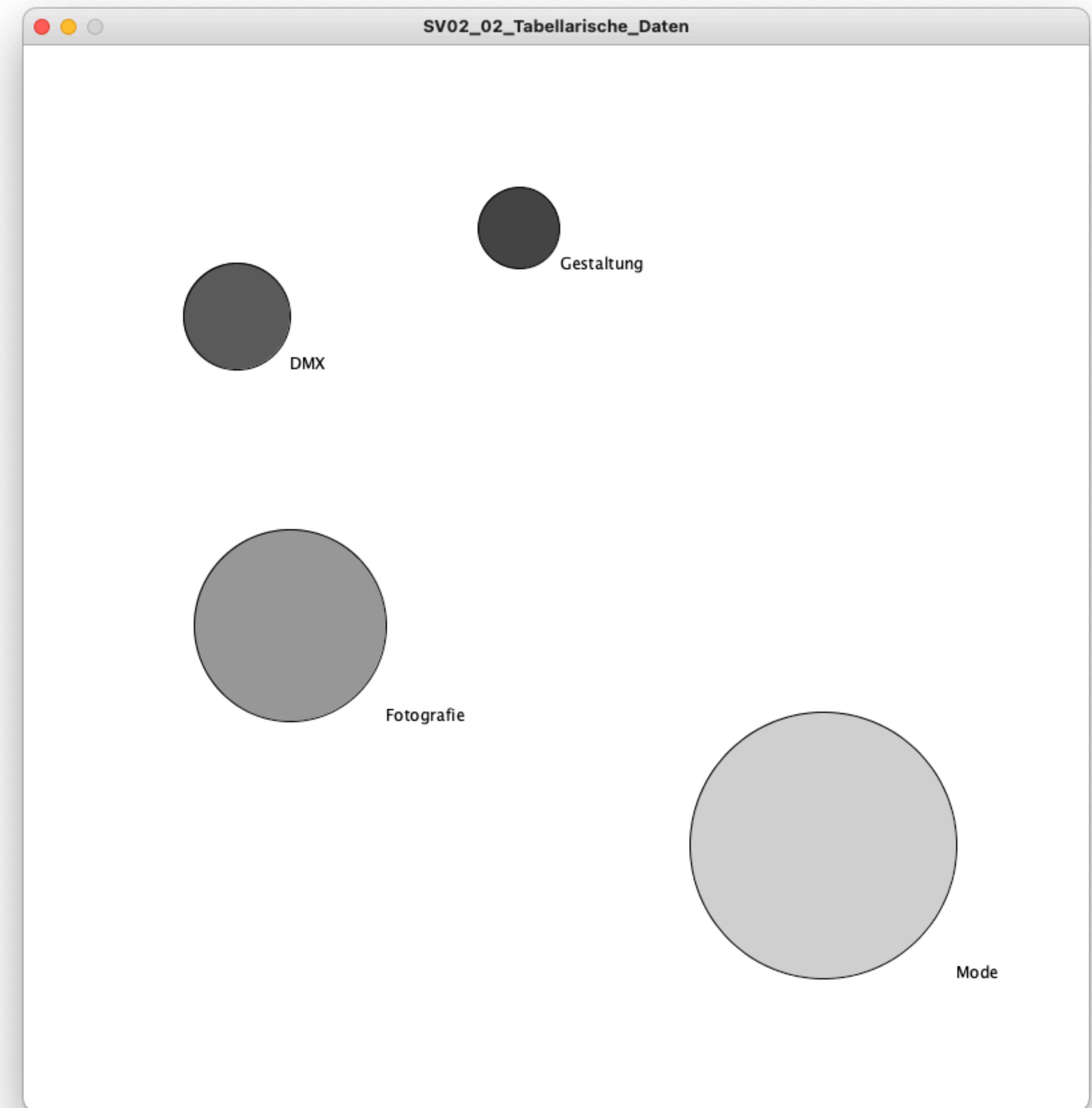


The screenshot shows a spreadsheet application window titled "werte". The ribbon menu includes "Start", "Einfügen", "Seitenlayout", "Formeln", "Daten", "Überprüfen", and "Ansicht". The toolbar contains various icons for file operations, text styling (Font, Size, Bold, Italic, Underline), alignment, and formulas. The formula bar shows "fx". The table has columns labeled A, B, C, D, E, F, and G. Row 1 contains headers: "x", "y", "Durchmesser", and "Titel". Rows 2 through 5 contain data: (160, 103, 50, "DMX"), (372, 137, 61, "Gestaltung"), (273, 235, 44, "Fotografie"), and (121, 179, 20, "Mode"). Row 6 is blank. Rows 7 through 10 are also blank. Row 11 is currently selected, indicated by a green border around the entire row.

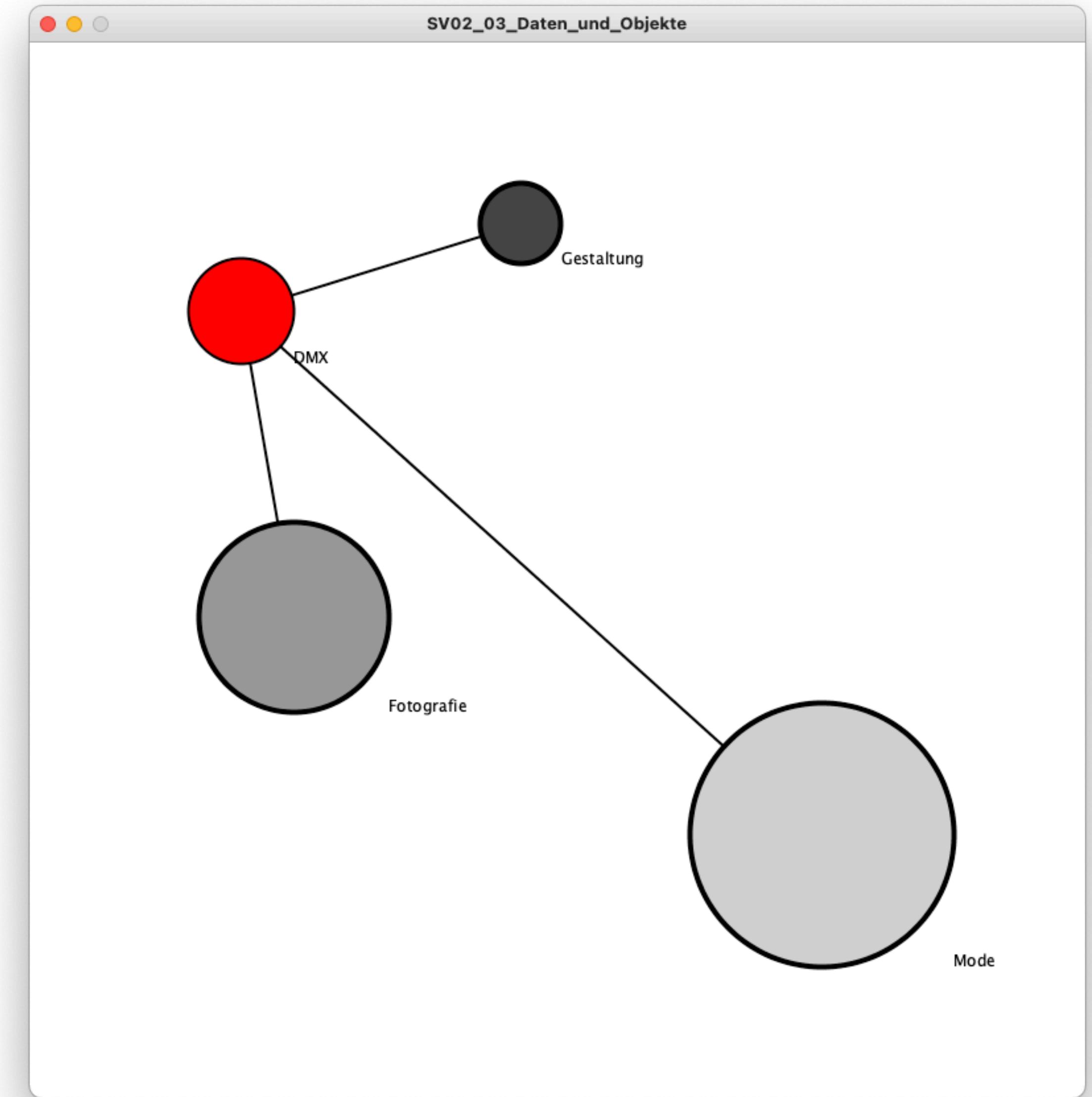
	A	B	C	D	E	F	G
1	x	y	Durchmesser	Titel			
2	160	103	50	DMX			
3	372	137	61	Gestaltung			
4	273	235	44	Fotografie			
5	121	179	20	Mode			
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							

werte — Bearbeitet

```
x,y,Durchmesser,Titel  
160,203,80,DMX  
372,137,61,Gestaltung  
200,435,144,Fotografie  
600,600,200,Mode
```



Datenbasierte Objekte



**Gestalte eine Visualisierung mit den
von Dir zusammengestellten Daten**

Aufgabe

Fragen, Wünsche?