

# WEEK 1

## WHAT VISUALIZATION IS

*Part two:*

# the elements of visualization



# the functional art

2012

# the truthful art

data, charts, and maps  
for communication

alberto cairo

"Welcome to Alberto's world. Cairo has done it all in *The Functional Art*: theory, practice, examples. And he's done it brilliantly. It is the most comprehensive and sensible book yet on real-world information graphics; we won't need another one for a long time."

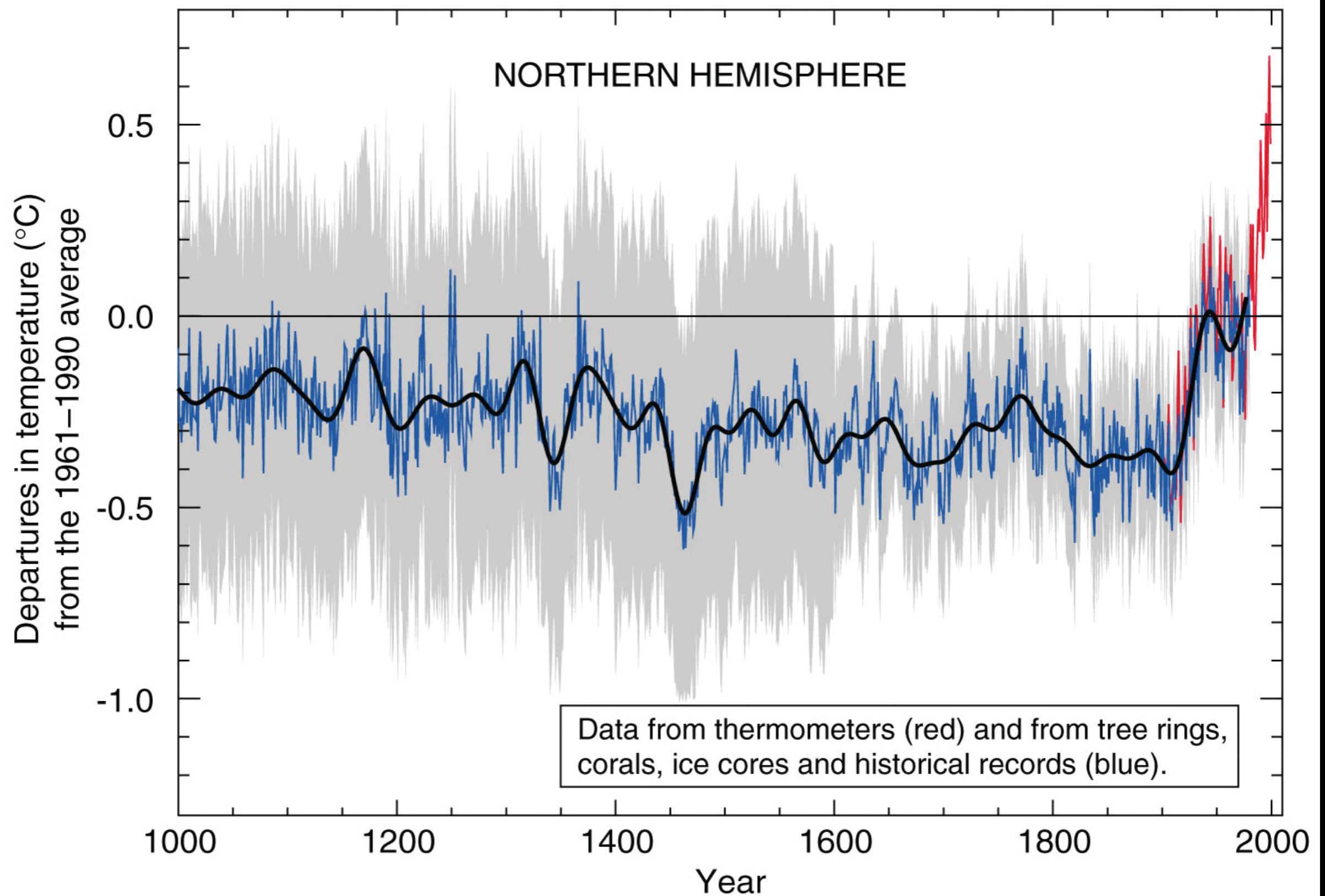
Nigel Holmes, former graphics director for *Time* magazine and founder of Explanation Graphics

2016

A visualization is a representation designed to enable **exploration, discovery, or communication**

	A	B	C	D	E	F	G
1	YEAR	TEMP	YEAR	1 SIGMA	2 SIGMA		
2	1000	0.0659	1000	0.240346	0.480693	0.206137	0.123588
3	1001	-0.1241	1001	0			
4	1002	-0.1208	1002	0			
5	1003	-0.1801	1003	0			
6	1004	-0.0711	1004	0			
7	1005	-0.1334	1005	0			
8	1006	-0.0644	1006	0			
9	1007	0.0042	1007	0			
10	1008	-0.1288	1008	0			
11	1009	-0.0296	1009	0			
12	1010	0.1187	1010	0			
13	1011	-0.1252	1011	0			
14	1012	-0.1634	1012	0			
15	1013	-0.0791	1013	0			
16	1014	-0.1120	1014	0			
17	1015	-0.1146	1015	0			
18	1016	-0.1206	1016	0			
19	1017	-0.0815	1017	0			
20	1018	-0.2031	1018	0			
21	1019	0.0305	1019	0			
22	1020	0.1098	1020	0			
23	1021	0.0244	1021	0			
24	1022	-0.0743	1022	0			
25	1023	-0.0323	1023	0			
26	1024	-0.0434	1024	0			

	A	B	C	D	E	F	G	H
878	1876	-0.1891	1876	0.113228	0.226456	8.25297E-02	7.75207E-02	
879	1877	-0.0140	1877	0.113228	0.226457	8.25299E-02	7.75209E-02	
880	1878	-0.0873	1878	0.113228	0.226457	8.25298E-02	7.75209E-02	
881	1879	-0.2959	1879	0.113229	0.226458	8.25302E-02	7.75212E-02	
882	1880	-0.2368	1880	0.113229	0.226457	8.25300E-02	7.75210E-02	
883	1881	-0.1977	1881	0.113229	0.226458	8.25302E-02	7.75212E-02	
884	1882	-0.2036	1882	0.113229	0.226457	8.25300E-02	7.75210E-02	
885	1883	-0.2489	1883	0.113228	0.226455	8.25293E-02	7.75204E-02	
886	1884	-0.2125	1884	0.113229	0.226457	8.25301E-02	7.75211E-02	
887	1885	-0.1896	1885	0.113228	0.226457	8.25299E-02	7.75210E-02	
888	1886	-0.1084	1886	0.113228	0.226456	8.25298E-02	7.75208E-02	
889	1887	-0.3265	1887	0.113228	0.226456	8.25296E-02	7.75206E-02	
890	1888	-0.1694	1888	0.113228	0.226457	8.25298E-02	7.75209E-02	
891	1889	-0.1339	1889	0.113228	0.226456	8.25298E-02	7.75208E-02	
892	1890	-0.3107	1890	0.113229	0.226457	8.25301E-02	7.75211E-02	
893	1891	-0.1754	1891	0.113229	0.226457	8.25300E-02	7.75210E-02	
894	1892	-0.3186	1892	0.113228	0.226456	8.25295E-02	7.75205E-02	
895	1893	-0.3236	1893	0.113228	0.226456	8.25297E-02	7.75207E-02	
896	1894	-0.1970	1894	0.113228	0.226456	8.25295E-02	7.75205E-02	
897	1895	-0.1578	1895	0.113228	0.226456	8.25297E-02	7.75207E-02	
898	1896	-0.0804	1896	0.113228	0.226456	8.25298E-02	7.75208E-02	
899	1897	-0.0537	1897	0.113228	0.226456	8.25298E-02	7.75208E-02	
900	1898	-0.2195	1898	0.113229	0.226457	8.25301E-02	7.75211E-02	
901	1899	-0.3486	1899	0.113228	0.226456	8.25297E-02	7.75207E-02	
902	1900	-0.1253	1900	0.113229	0.226457	8.25300E-02	7.75210E-02	
903	1901	-0.1575	1901	0.113228	0.226456	8.25296E-02	7.75206E-02	



**Michael E. Mann, Raymond S. Bradley, and Malcolm K. Hughes**  
Intergovernmental Panel on Climate Change (IPCC), Third Report, 2001

A FRAMEWORK

+

ONE OR MORE VISUAL ENCODINGS

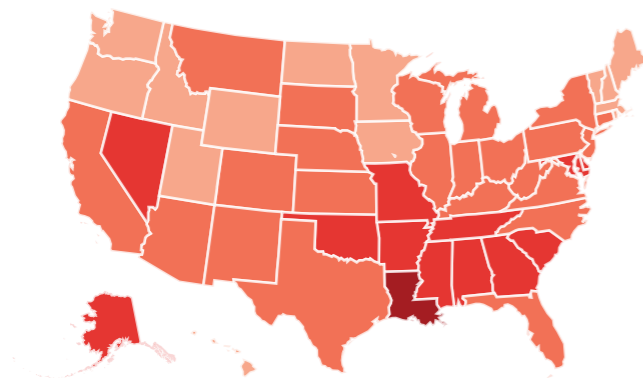
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ANNOTATIONS

## COMPLETE CHART

### MURDERS

Rate per 100,000 people (2015)

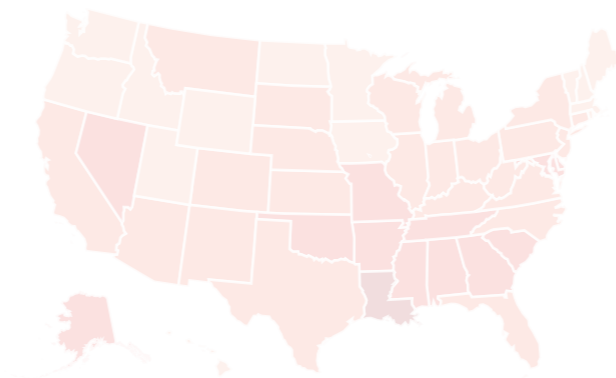


Source: FBI Uniform Crime Reports

## FRAMEWORK

### MURDERS

Rate per 100,000 people (2015)

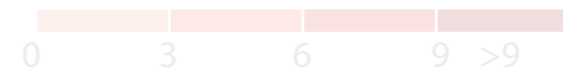
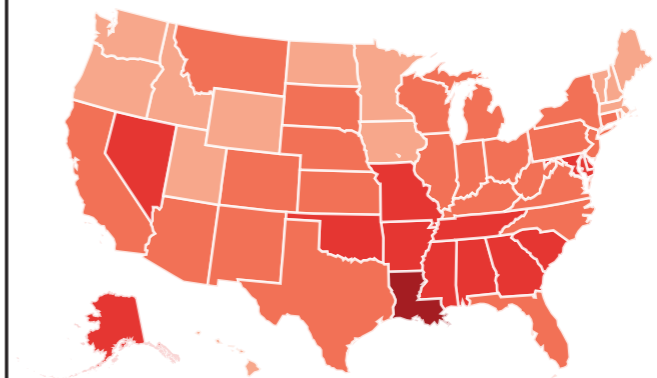


Source: FBI Uniform Crime Reports

## CONTENT (ENCODING)

### MURDERS

Rate per 100,000 people (2015)

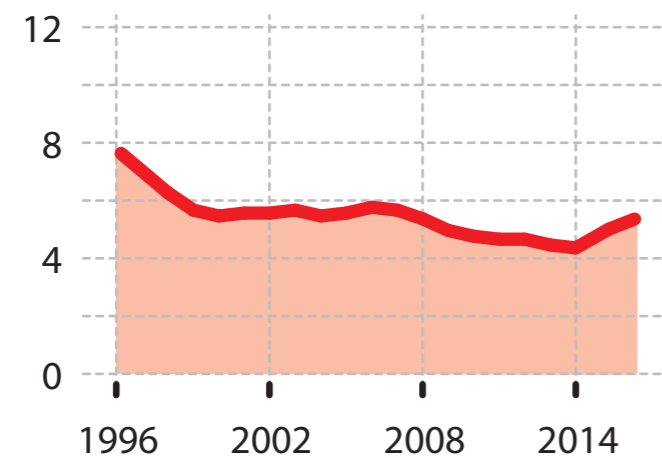


Source: FBI Uniform Crime Reports

## COMPLETE CHART

### MURDERS

Rate per 100,000 people

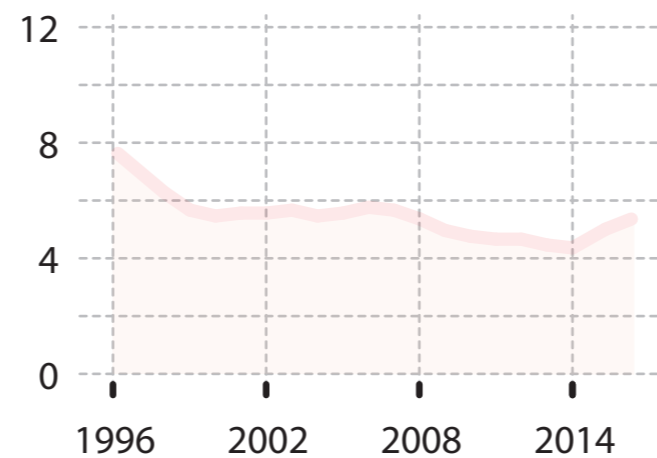


Source: FBI Uniform Crime Reports

## FRAMEWORK

### MURDERS

Rate per 100,000 people

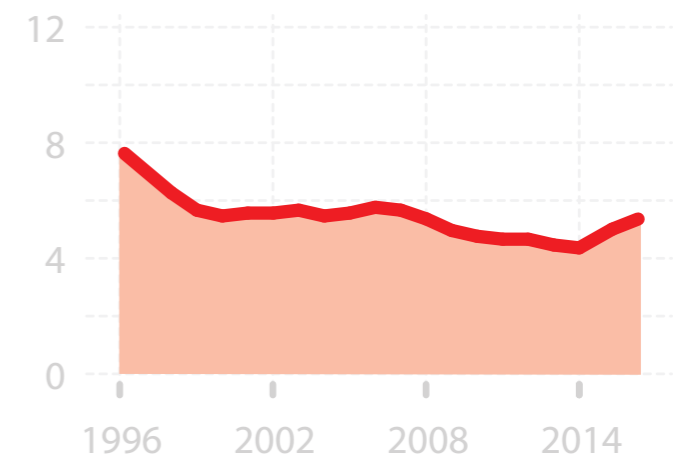


Source: FBI Uniform Crime Reports

## CONTENT (ENCODING)

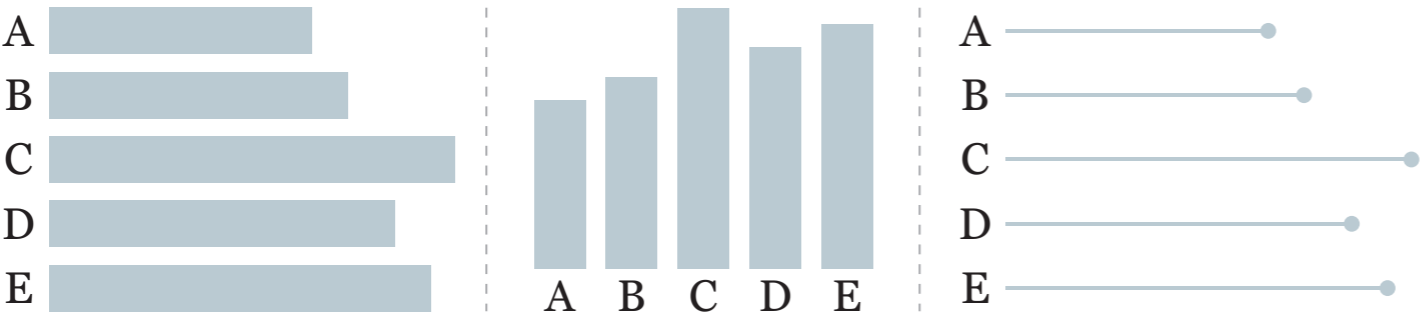
### MURDERS

Rate per 100,000 people

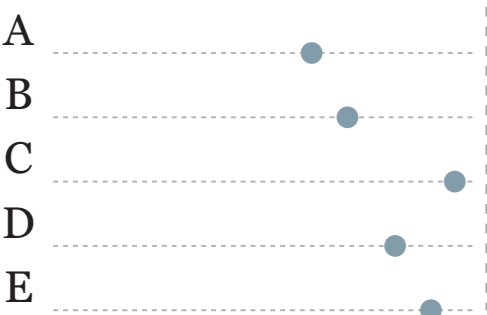


Source: FBI Uniform Crime Reports

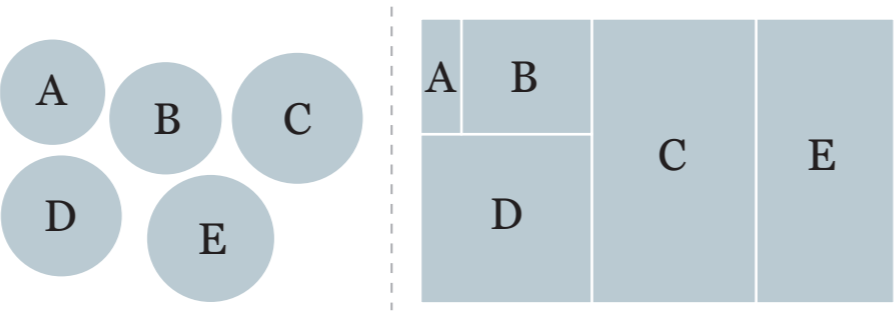
*Length or height*



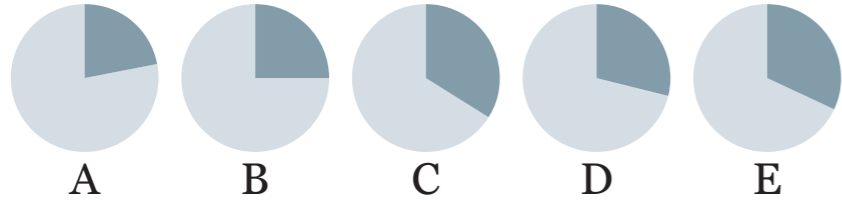
*Position*



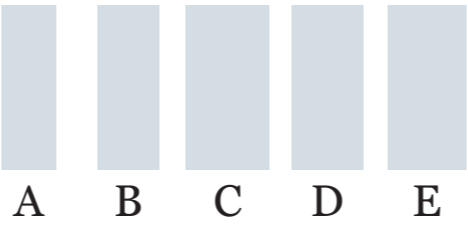
*Area*



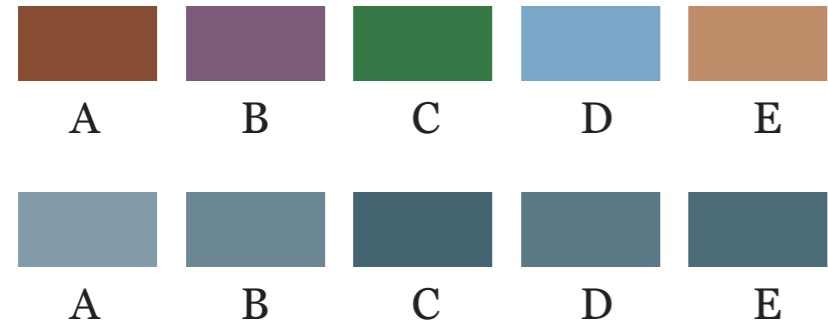
*Angle/area*



*Line weight*



*Hue and shade*



Figures represented  
in all these graphics:  
22%, 25%, 34%, 29%, 32%

Visual encoding

