

visualization

graphics & interaction programming
course notes

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motivation

complex & abstract data

representation for quick understanding

human visual system

pattern seeking

enormous bandwidth

parallel system

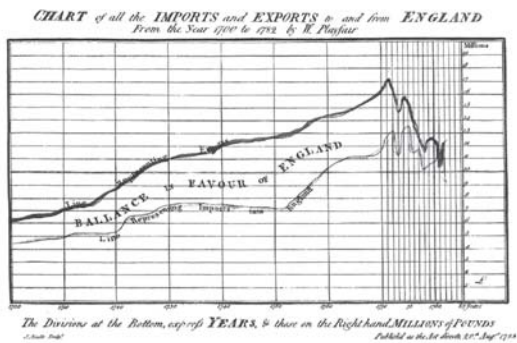
“seeing = understanding”

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illustrative

[playfair 1786]

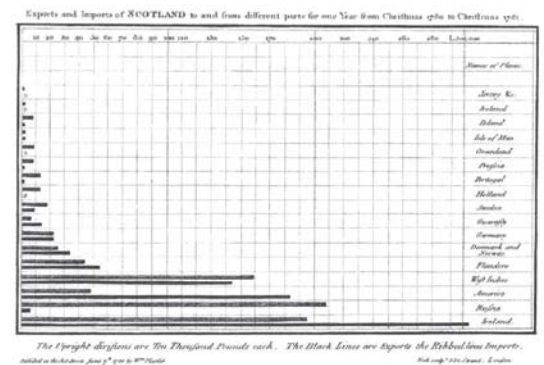


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bar graph

[playfair 1786]

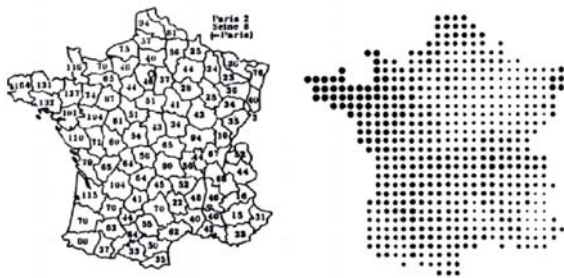


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representation

[bertin 1983]



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visualization

data > { mapping } > representation

optimal: quickly understandable representation

typical input: sampled data points

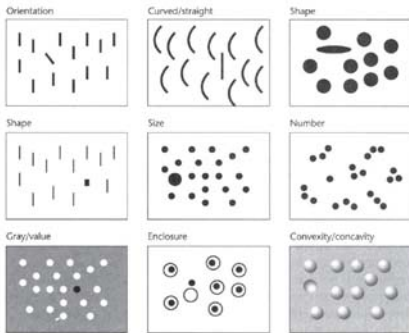
#parameters per point affects mapping complexity

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preattentive features

[ware 2000]



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preattentive features

[ware 2000]

form

line orientation, line length, line width, line collinearity, size, curvature, spatial grouping, added marks, luminosity.

color

hue, intensity

motion

flicker, direction of motion

spatial position

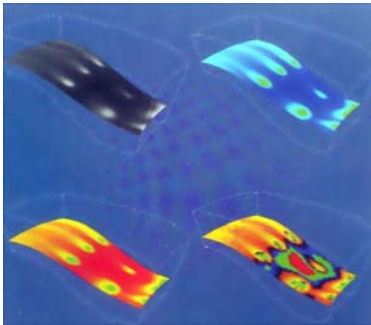
2D position, stereoscopic depth, convex/concave shape from shading.

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common mapping techniques

scalar data (value)
color lookup tables
contouring



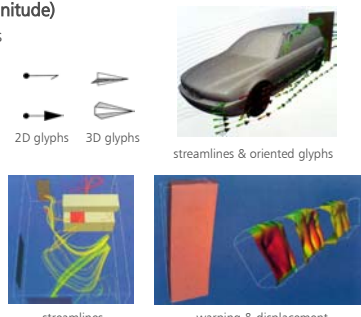
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common mapping techniques

vector data (direction + magnitude)

oriented glyphs & hedgehogs
warping
displacement plots
animation
streamlines



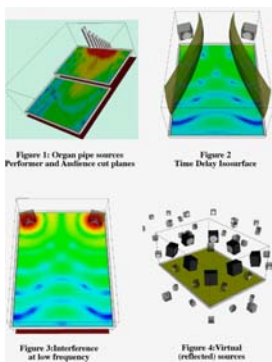
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simulating acoustic fields

center for new music &
audio technology

uc berkeley

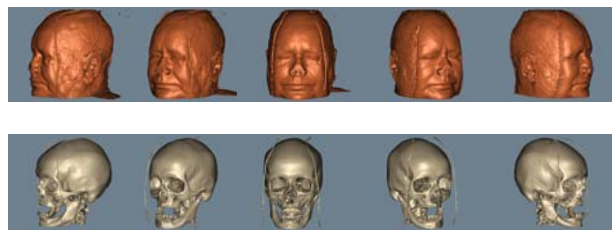


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visible woman

GE R&D (data from national library of medicine)

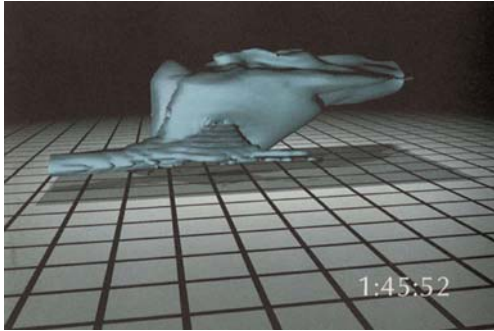


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?

[tuft 1997]

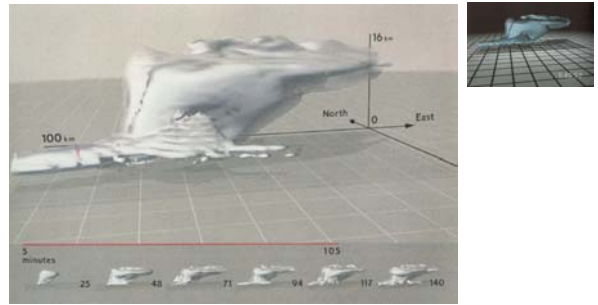


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cloud formation - redesign

[tuft 1997]



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computational information design [fry 2004]



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acquire { us zip codes }

[fry 2004]

00210	+43.005895	-071.013202	U	PORTSMOUTH	33	015
00211	+43.005895	-071.013202	U	PORTSMOUTH	33	015
00212	+43.005895	-071.013202	U	PORTSMOUTH	33	015
00213	+43.005895	-071.013202	U	PORTSMOUTH	33	015
00214	+43.005895	-071.013202	U	PORTSMOUTH	33	015
00215	+43.005895	-071.013202	U	PORTSMOUTH	33	015
00501	+40.922326	-72.637078	U	HOLTSVILLE	36	103
00544	+40.922326	-72.637078	U	HOLTSVILLE	36	103
00601	+18.165275	-066.722583		ADJUNTAS	72	003
00602	+18.393103	-067.180953		AGUADA	72	003
00603	+18.455913	-067.145780		AGUADILLA	72	005
00604	+18.493520	-067.135883		AGUADILLA	72	005
00605	+18.465162	-067.141486	P	AGUADILLA	72	005
00606	+18.172947	-066.944111		MARICAO	72	093
00610	+18.288685	-067.139696		ANASCO	72	013
00611	+18.279531	-066.802170	P	ANGELES	72	143
00612	+18.450674	-066.698262		ARECIBO	72	013
00613	+18.458093	-066.732752	P	ARECIBO	72	013
00614	+18.429675	-066.674506	P	ARECIBO	72	013
00616	+18.444792	-066.640678		BAJADERO	72	013

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parse { us zip codes }

[fry 2004]

string	float	float	char	string	index	index
00210	+43.005895	-071.013202	U	PORTSMOUTH	33	015

01	ALABAMA	AL
02	ALASKA	AK
04	ARIZONA	AZ
05	ARKANSAS	AR
06	CALIFORNIA	CA
08	COLORADO	CO
09	CONNECTICUT	CT
10	DELAWARE	DE
12	FLORIDA	FL
13	GEORGIA	GA
15	HAWAII	HI
16	IDAHO	ID
17	ILLINOIS	IL
18	INDIANA	IN
19	IOWA	IA
20	KANSAS	KS

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filter { us zip codes }

[fry 2004]

00210	43.005895	-71.013202	PORTSMOUTH	NH
00211	43.005895	-71.013202	PORTSMOUTH	NH
00212	43.005895	-71.013202	PORTSMOUTH	NH
00213	43.005895	-71.013202	PORTSMOUTH	NH
00214	43.005895	-71.013202	PORTSMOUTH	NH
00215	43.005895	-71.013202	PORTSMOUTH	NH
00501	40.922326	-72.637078	HOLTSVILLE	NY
00544	40.922326	-72.637078	HOLTSVILLE	NY
00601	18.165275	-66.722583	ADJUNTAS	PR
00602	18.393103	-67.180953	AGUADA	PR
00603	18.455913	-67.145780	AGUADILLA	PR

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mine { us zip codes }

[fry 2004]

00210	43.005895	-71.013202	PORTSMOUTH	NH
00211	43.005895	-71.013202	PORTSMOUTH	NH
00212	43.005895	-71.013202	PORTSMOUTH	NH
00213	43.005895	-71.013202	PORTSMOUTH	NH
00214	43.005895	-71.013202	PORTSMOUTH	NH
00215	43.005895	-71.013202	PORTSMOUTH	NH
00501	40.922326	-72.637078	HOLTSVILLE	NY
00544	40.922326	-72.637078	HOLTSVILLE	NY
+	+	+	+	+
+	+	+	+	+
+	+	+	+	+

min
24.655691
max
48.987385

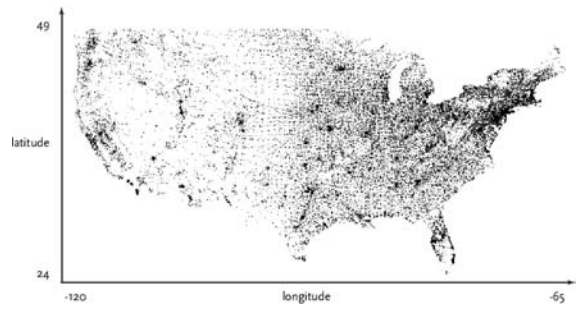
min
-124.62608
max
-67.040764

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represent { us zip codes }

[fry 2004]



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refine { us zip codes }

[fry 2004]



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interact { us zip codes }

[fry 2004]



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summary

human limited without tools

tools enhances cognition

intelligent visualization expands memory & reasoning

not limited to visual feedback

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interactive visualization

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contact me:
for more information
if you would like to see some demos
if you are interested in discussing individual projects in interactive computer graphics
(3D graphics, augmented/virtual reality, touch screens, or anything else you might be interested in...)
or have any other questions...

> 2D1257, visualisering, 4 p

> 2D1465, avancerad individuell kurs i datalogi, 4 p

> 2D1464, större avancerad individuell kurs i datalogi, 6 p

> 2D1466, avancerad individuell kurs i MDI, 4 p

> 2D1904, individuell kurs i medieteknik, 4 p

> 2D1905, individuell kurs i medieteknik, 5 p

> examensarbete

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