

Visual Explanations

Images and Quantities, Evidence and Narrative

Olivia, Youchen, Summer

Introduction

First part:

Logic of depicting quantitative evidence (principles and standards within a design)

Second part:

Design strategies, often for the arrangement of images as narrative (visual aspect)

Chapter 1: Images and Quantities

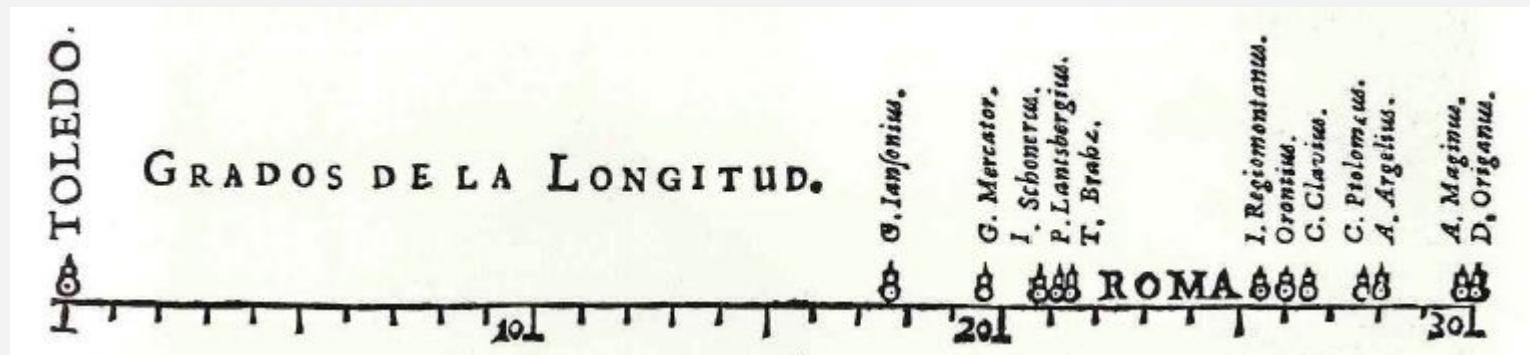
Visual techniques for depicting quantities

1. **Direct labels:** numerically labeled grids of statistical graphics
2. **Encodings:** color scales
3. **Self-representing scales:** objects of known size appearing in an image

One of the earliest visual representations

In 1644, Michael Florent van Langren drew a graph showing **12 diverse estimates** of the distance between Toledo and Rome.

- Toledo was placed at the prime meridian of 0° (longitude)
- All the longitudes are too large, perhaps a result of underestimating the earth's circumference



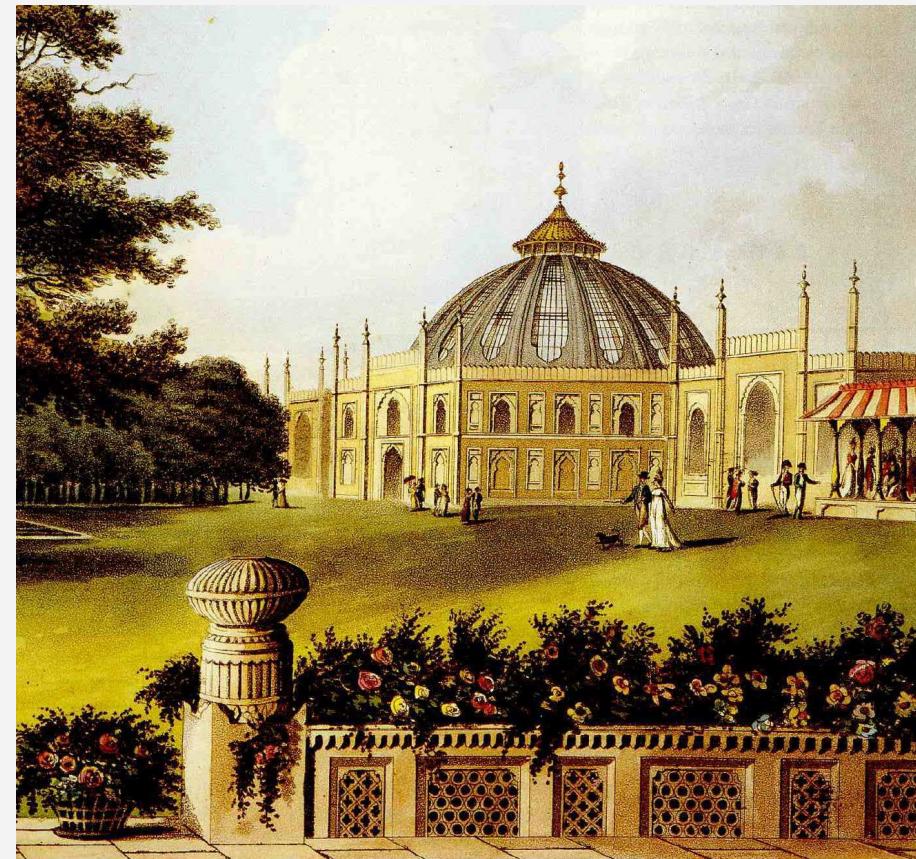
Representing 3-dimensional on 2-dimensional surfaces

By 1765, the two-dimensional plane was quantified, available for any measured data. However, not a great many substantive problems are exclusively two-dimensional.

Humphry Repton, the British landscape architect, **quantified the perspective drawing** by placing three people with ten-foot poles around the grounds.



Before



After

Reproduction of Artwork & Images

- Published photographs of works of art **often fail to indicate a sense of the sizes of the original objects**
- Sizes of reproduced images depend almost entirely on **convenience of fit into grid layout** of a page or computer screen



Photograph by Bob Adelman; originally published in *Roy Lichtenstein: Mural with Blue Brushstroke*, essay by Calvin Tomkins, with photographs and interview by Bob Adelman (New York, 1988), p. 127.

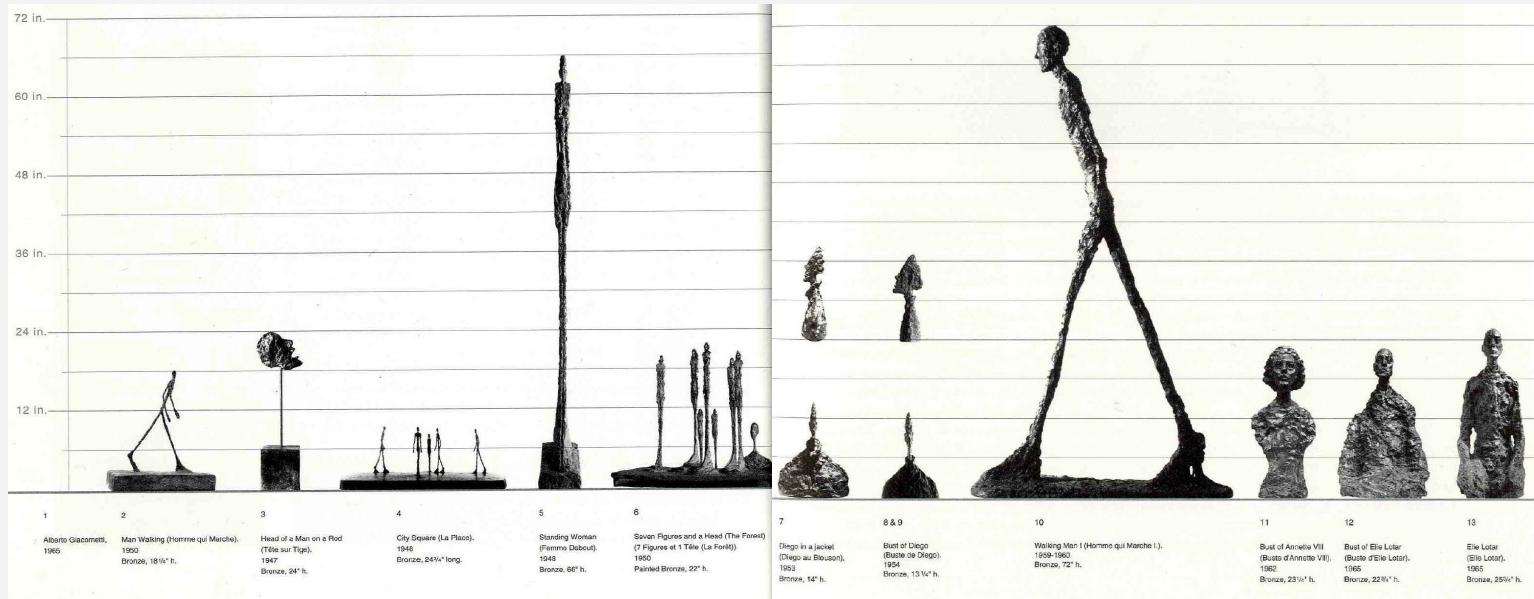


MURAL
WITH
BLUE
BRUSH-
STROKE

Photographs
and Interview by
Bob Adelman
Introduction by
Calvin Tomkins

Reproduction of Artwork & Images

Partial visual knowledge about size of a work can be conveyed by maintaining a **consistent relative scale** throughout an entire set of reproduced images.

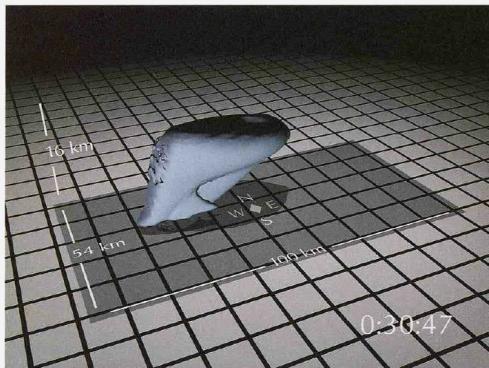
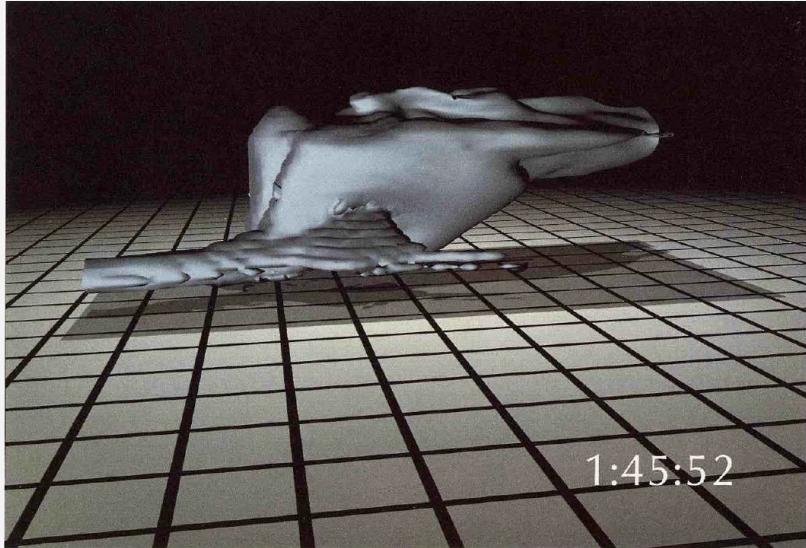


Herbert Matter, Thirteen Photographs: Alberto Giacometti and Sculptures (Hamden, 1978)

Quantification in scientific and technical imaging

Fundamentals of scale, orientation and labels are often **missing** in colorful images emanating from computer visualizations.

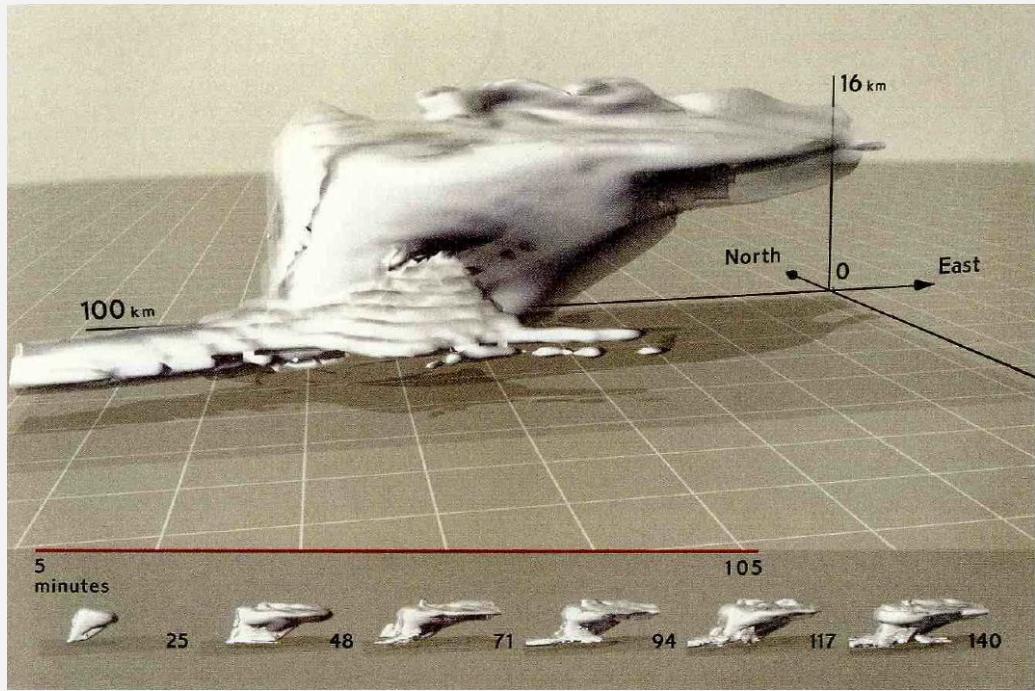
The original image is **informationally flat** despite the forced perspective. The dominant visual effect is the orthodontic grid, which lacks quantified scales.



Videotape "Study of a Numerically Modeled Severe Storm", National Center for Supercomputing Applications

Redesign Version

- Locates the storm within a three-dimensional tripod of scales and directional arrows
- Six small clouds depict a **still-land history** and also serve as three-dimensional **tick marks** for the red timeline
- Two other layers of information lie beneath the cloud: a rectangular computational domain and the **animation shadow**



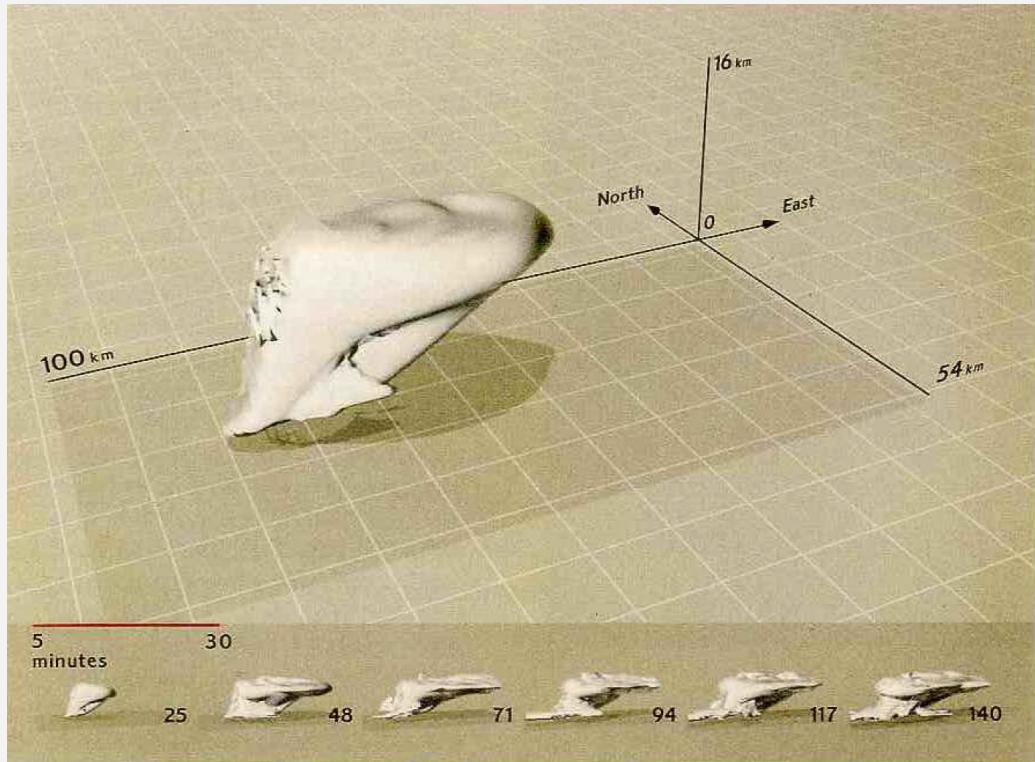
Redesigned animation by Edward Tufte and Colleen B. Bushell, with assistance of Matthew Arrott, Polly Baker, and Michael McNeill;

Redesign Version

Original design: measurement scales and compass directions appear for only 14 out of 315 seconds of animation before vanishing.

Redesign: **Vertical dimension** up into the air is **multiple two-fold** compared with the scales down to the ground.

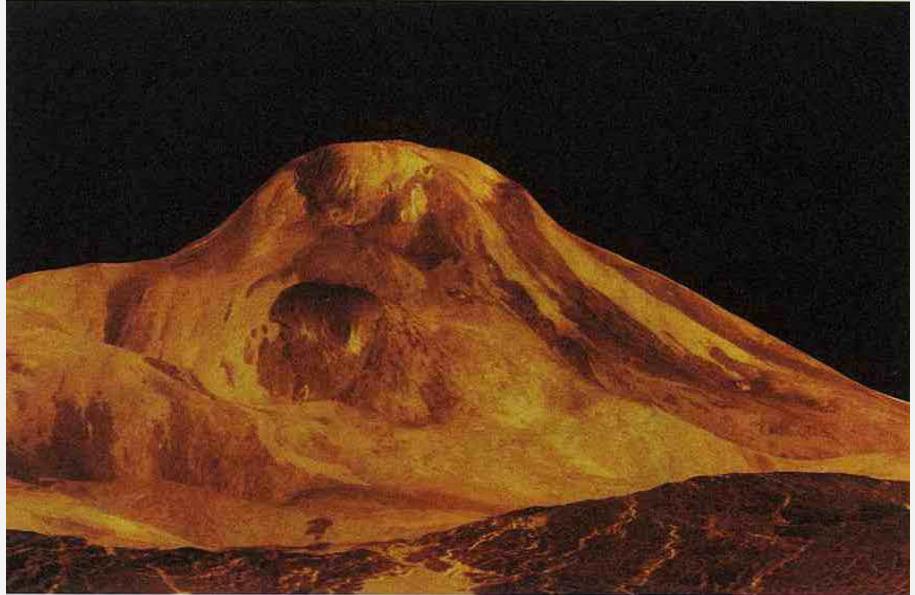
- Stretching the vertical sometimes helps to depict natural scenes, but **such shifts in scaling should be persistently made clear to viewers.**



Redesigned animation by Edward Tufte and Colleen B. Bushell, with assistance of Matthew Arrott, Polly Baker, and Michael McNeill;

Extravagant Dequantification

- Seen in a video flyover of the planet Venus, cooked up from radar data collected during the 1992 Magellan space probe.
- The animation takes viewers on a **rollercoaster tour of steep canyons and soaring mountains**, sharply silhouetted against a dark sky.
- The excitement, however, results from **an exaggeration of the vertical scale by 22.5 times!**
- “**Terrific television but lousy science.**”

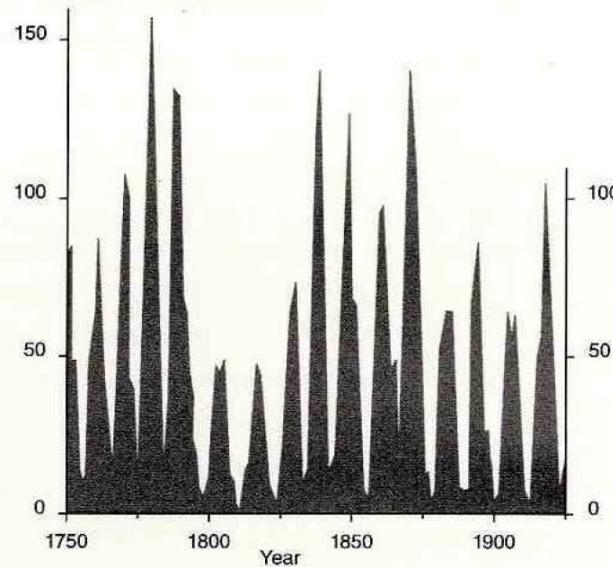


- Our knowledge is surely **imprisoned** by the arbitrary technology of image processing and display.

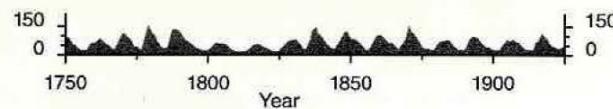
Appropriate Re-expressions

- Despite dangers of misrepresentation, **appropriate re-expressions or transforms of scales** are among the most powerful strategies for exploring data.
- The graph shows the number of sunspots by year, 1749 to 1924, moving along in the well-known 11-year cycle.
- William Cleveland's idea is to choose an **aspect ratio** that centers the absolute values of the slopes of selected line segments on 45° , a technique implemented by iterative computing.

Number of sunspots each year, 1749–1924



Number of sunspots each year, 1749–1924

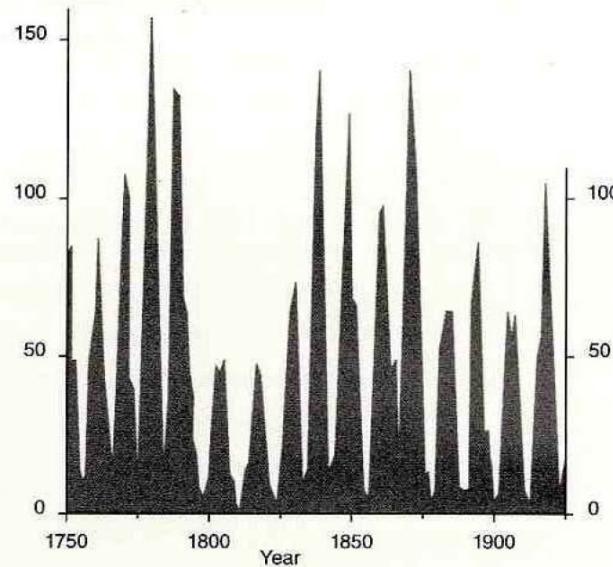


¹³ William S. Cleveland, *The Elements of Graphing Data* (Murray Hill, New Jersey, revised edition, 1994), pp. 66–79. Redrawn.

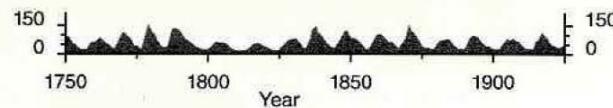
Appropriate Re-expressions

- Cycles tend to **rise rapidly and decline slowly**, a behavior strongest for cycles with sharp peaks, less strong for medium peaks and absent for cycles with small peaks.
- From the original spiky mass of data, **fresh and subtle information** about quantities emerges with a radiant clarity in the rescaled image.

Number of sunspots each year, 1749–1924



Number of sunspots each year, 1749–1924



¹³ William S. Cleveland, *The Elements of Graphing Data* (Murray Hill, New Jersey, revised edition, 1994), pp. 66–79. Redrawn.

Chapter 2: Visual and Statistical Thinking

1. The Cholera Epidemic in London, 1854
2. Space Shuttle Challenger Launch, 1986

For both cases, the consequences resulted directly from the **quality of methods** used in displaying and assessing quantitative evidence.

The Cholera Epidemic, 1854

- Cholera broke out in the Broad Street area of central London
- John Snow, who had investigated earlier epidemics, suspected that the **water from a community pump-well** at Broad and Cambridge Streets was **contaminated**
- On close inspection, the water had an amount of organic impurity in the form of small white particles.

The Cholera Epidemic, 1854

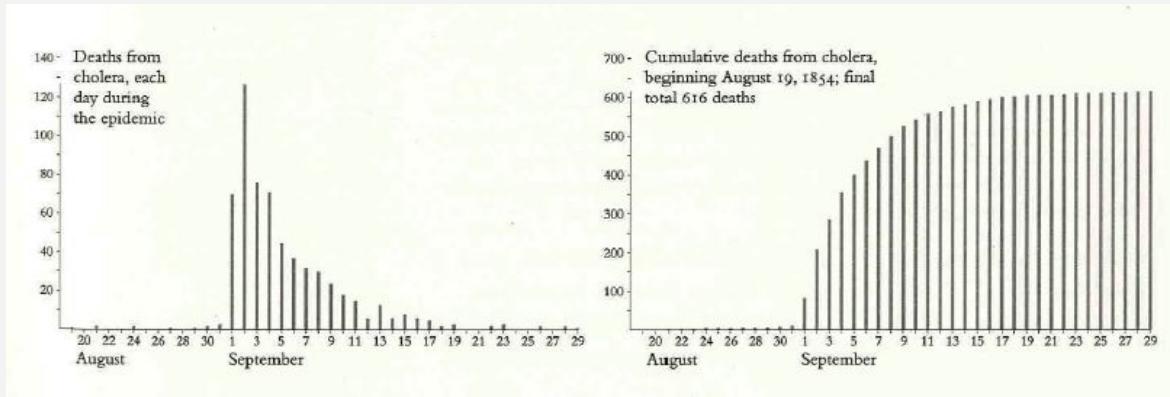
When plotted on a **map**, the data showed a close link between the death by cholera and the Broad Street pump, a plausible **cause-and-effect** relationship.

John Snow found that nearly all of the deaths had taken place **within a short distance** of the pump. The Board ordered that the pump-handle on the Broad Street well be removed immediately.

John Snow's Good Method

Original data was in order by date of death, a time-series display, chronology of the epidemic.

The passage of time is a **poor explanatory variable**, practically useless in discovering a strategy of how to intervene and stop the epidemic.

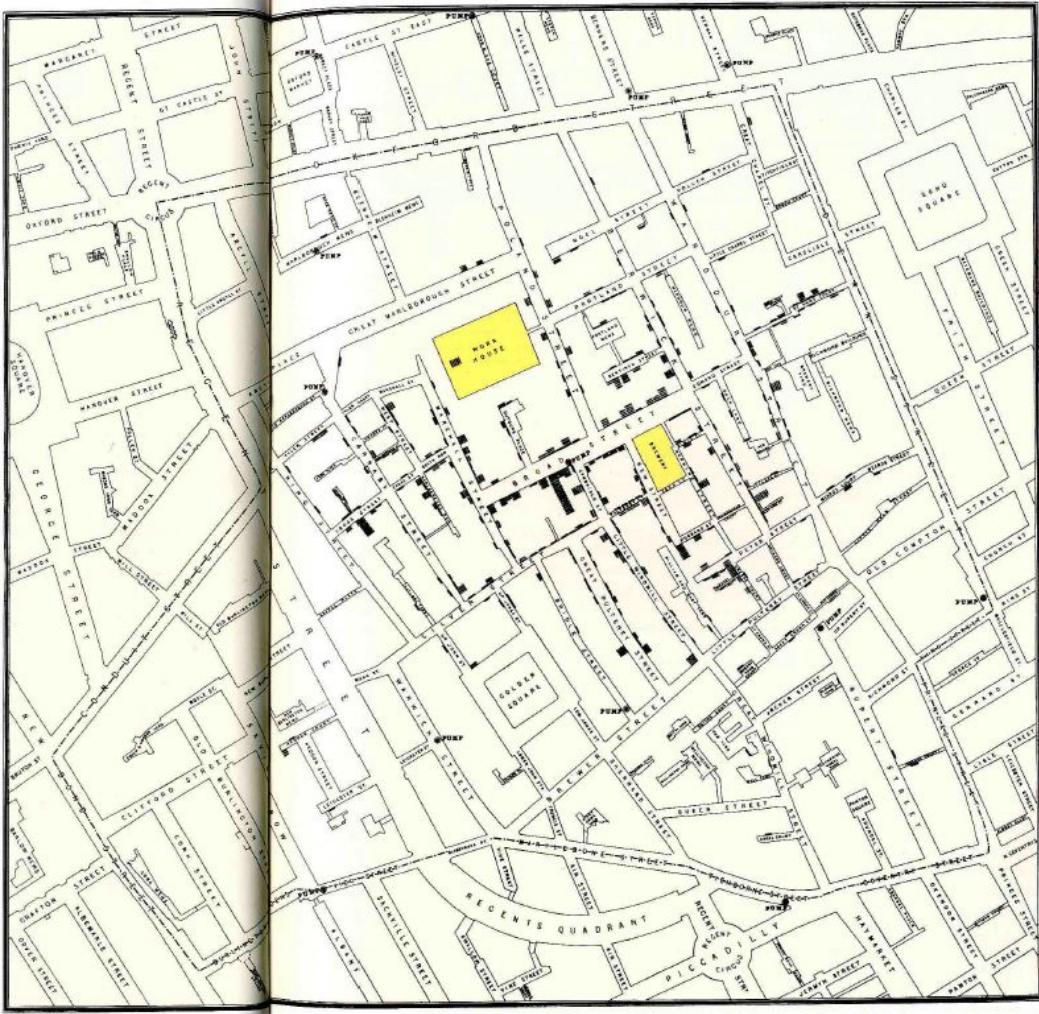


John Snow's Good Method

Snow's graph display a direct and powerful testimony about a possible cause-effect relationship.

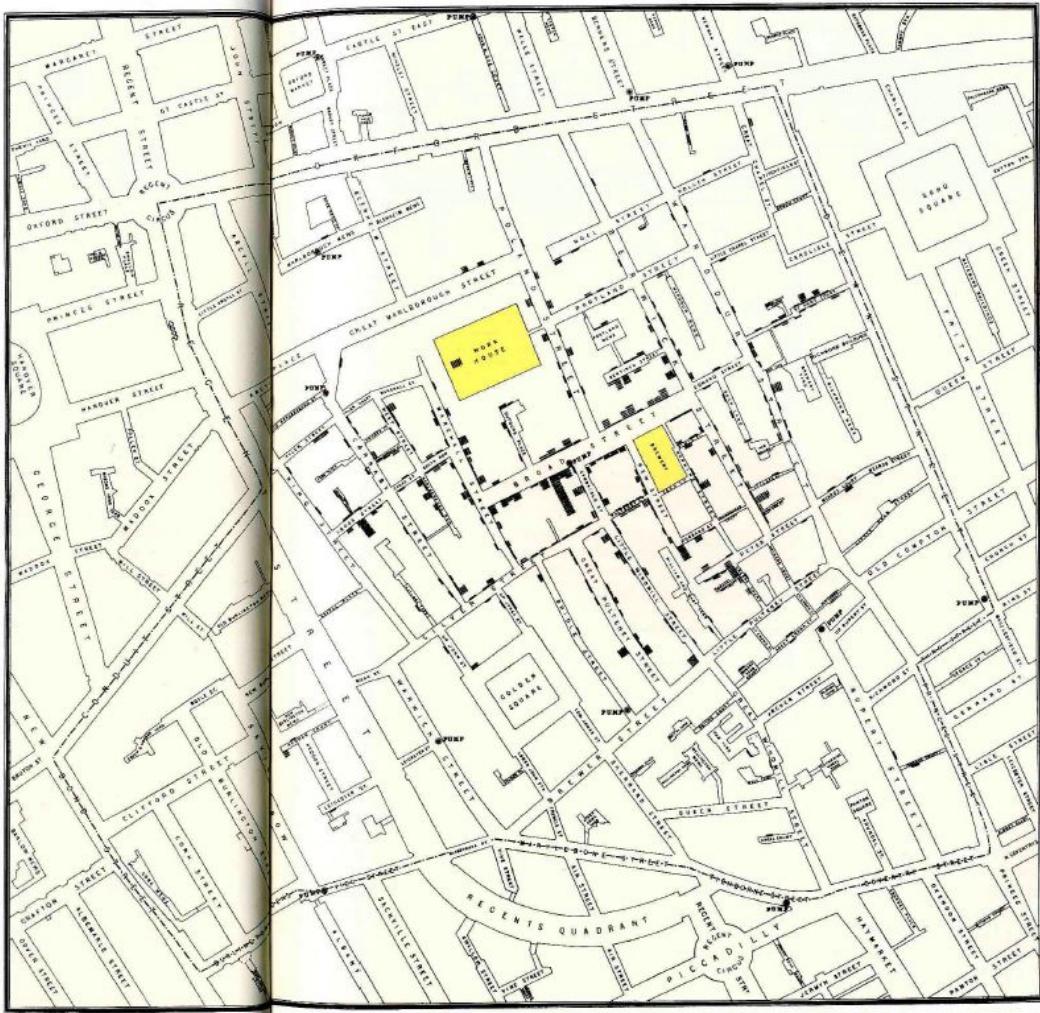
- Recasting the one-dimensional graph into **two-dimensional spatial comparison**
- Marked deaths from cholera on this map, along with locations the area's 13 community water pump-wells.

This map reveals a strong association between cholera and proximity to the Broad Street pump.



Dot Maps

- Death rates are not shown but deceptive effects of aggregation are avoided.
- Snow's dot map does not assess varying **densities of population** in the area around the pump.
- The map is also difficult to reproduce on a single page. If reduced in size, symbols become murky and the type too small.



Alternative Explanations & Contrary Cases

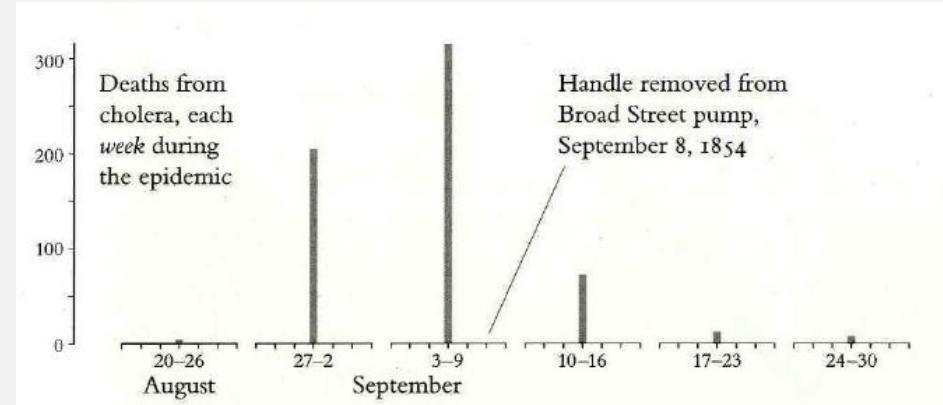
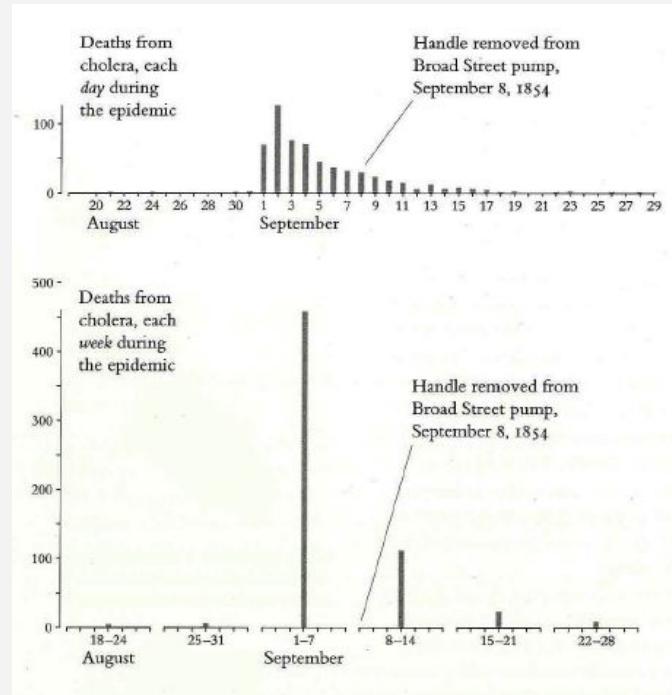
Both Snow's map and the time-sequence of deaths show several apparently contradictory instances, a number of deaths from cholera with **no obvious link** to the Broad Street pump.

Although at first glance these deaths appear unrelated to the Broad Street pump, they are strong evidence pointing to that well.

Ironically, the most famous aspect of Snow's work is also **the most uncertain part of his evidence**.

Aggregation in Graphs

When the daily data are added up into **weekly intervals**, a different picture emerges.



Data mining, multiplicity or specification searching:
Only selecting those findings strongly favorable to the point of view being advocated.

Space Shuttle Challenger Launch, 1986

On January 28, 1986, the space shuttle Challenger exploded and seven astronauts died because two rubber O-rings leaked.

Morton Thiokol's only no-launch recommendation in 12 years was rejected as "**the evidence presented was inconclusive**, that cool temperatures were not linked to O-ring problems".

The Unconvincing Charts

- Does not provide names of people who prepared the material (no reputation or credibility to account for)
- Does not provide data about the possible cause, temperature
- Same rocket has 3 different names (61A LH, SRM no. 22A and launch date)
- 6 different types of O-ring description but no summarizing index

1151

1152

1153

1154

1155

1156

1157

1158

1159

1160

1161

1162

1163

1164

1165

1166

1167

1168

1169

1170

1171

1172

1173

1174

1175

1176

1177

1178

1179

1180

1181

1182

1183

1184

1185

1186

1187

1188

1189

1190

1191

1192

1193

1194

1195

1196

1197

1198

1199

1200

1201

1202

1203

1204

1205

1206

1207

1208

1209

1210

1211

1212

1213

1214

1215

1216

1217

1218

1219

1220

1221

1222

1223

1224

1225

1226

1227

1228

1229

1230

1231

1232

1233

1234

1235

1236

1237

1238

1239

1240

1241

1242

1243

1244

1245

1246

1247

1248

1249

1250

1251

1252

1253

1254

1255

1256

1257

1258

1259

1260

1261

1262

1263

1264

1265

1266

1267

1268

1269

1270

1271

1272

1273

1274

1275

1276

1277

1278

1279

1280

1281

1282

1283

1284

1285

1286

1287

1288

1289

1290

1291

1292

1293

1294

1295

1296

1297

1298

1299

1300

1301

1302

1303

1304

1305

1306

1307

1308

1309

1310

1311

1312

1313

1314

1315

1316

1317

1318

1319

1320

1321

1322

1323

1324

1325

1326

1327

1328

1329

1330

1331

1332

1333

1334

1335

1336

1337

1338

1339

1340

1341

1342

1343

1344

1345

1346

1347

1348

1349

1350

1351

1352

1353

1354

1355

1356

1357

1358

1359

1360

1361

1362

1363

1364

1365

1366

1367

1368

1369

1370

1371

1372

1373

1374

1375

1376

1377

1378

1379

1380

1381

1382

1383

1384

1385

1386

1387

1388

1389

1390

1391

1392

1393

1394

1395

1396

1397

1398

1399

1400

1401

1402

1403

1404

1405

1406

1407

1408

1409

1410

1411

1412

1413

1414

1415

1416

1417

1418

1419

1420

1421

1422

1423

1424

1425

1426

1427

1428

1429

1430

1431

1432

1433

1434

1435

1436

1437

1438

1439

1440

1441

1442

1443

1444

1445

1446

1447

1448

1449

1450

1451

1452

1453

1454

1455

1456

1457

1458

1459

1460

1461

1462

1463

1464

1465

1466

1467

1468

1469

1470

1471

1472

1473

1474

1475

1476

1477

1478

1479

1480

1481

1482

1483

1484

1485

1486

1487

1488

1489

1490

1491

1492

1493

1494

1495

1496

1497

1498

1499

1500

1501

1502

1503

1504

1505

1506

1507

1508

1509

1510

1511

1512

1513

1514

1515

1516

1517

1518

1519

1520

1521

1522

1523

1524

1525

1526

1527

1528

1529

1530

1531

1532

1533

1534

1535

1536

1537

1538

1539

1540

1541

1542

1543

1544

1545

1546

1547

1548

1549

1550

1551

1552

1553

1554

1555

1556

1557

1558

1559

1560

1561

1562

1563

1564

1565

1566

1567

1568

1569

1570

1571

1572

1573

1574

1575

1576

1577

1578

1579

1580

1581

1582

1583

1584

1585

1586

1587

1588

1589

1590

1591

1592

1593

1594

1595

1596

1597

1598

1599

1600

1601

1602

1603

1604

1605

1606

1607

1608

1609

1610

1611

1612

1613

1614

1615

1616

1617

1618

1619

1620

1621

1622

1623

1624

1625

1626

1627

1628

1629

1630

1631

1632

1633

1634

1635

1636

1637

1638

1639

1640

1641

1642

1643

1644

1645

1646

1647

1648

1649

1650

1651

1652

1653

1654

1655

1656

1657

1658

1659

1660

1661

1662

1663

1664

1665

1666

1667

1668

1669

1670

1671

1672

1673

1674

1675

1676

1677

1678

1679

1680

1681

1682

1683

1684

1685

1686

1687

1688

1689

1690

1691

1692

1693

1694

1695

1696

1697

1698

1699

1700

1701

1702

1703

1704

1705

1706

1707

1708

1709

1710

1711

1712

1713

1714

1715

1716

1717

1718

1719

1720

1721

1722

1723

1724

1725

1726

1727

1728

1729

1730

1731

1732

1733

1734

1735

1736

1737

1738

1739

1740

1741

1742

1743

1744

1745

1746

1747

1748

1749

1750

1751

1752

1753

1754

1755

1756

1757

1758

1759

1760

1761

1762

1763

1764

1765

1766

1767

1768

1769

1770

1771

1772

1773

1774

1775

1776

1777

1778

1779

1780

1781

1782

1783

1784

1785

1786

1787

1788

1789

1790

1791

1792

1793

1794

1795

1796

1797

1798

1799

1800

1801

1802

1803

1804

1805

1806

1807

1808

1809

1810

1811

1812

1813

1814

1815

1816

1817

1818

1819

1820

1821

1822

1823

1824

1825

1826

1827

1828

1829

1830

1831

1832

1833

1834

1835

1836

1837

1838

1839

1840

1841

1842

1843

1844

1845

1846

1847

1848

1849

1850

1851

1852

1853

1854

1855

1856

1857

1858

1859

1860

1861

1862

1863

1864

1865

1866

1867

1868

1869

1870

1871

1872

1873

1874

1875

1876

1877

1878

1879

1880

1881

1882

1883

1884

1885

1886

1887

1888

1889

1890

1891

1892

1893

1894

1895

1896

1897

1898

1899

1900

1901

1902

1903

1904

1905

1906

1907

1908

1909

1910

1911

1912

1913

1914

1915

1916

1917

1918

1919

1920

1921

1922

1923

1924

1925

1926

1927

1928

1929

1930

1931

1932

1933

1934

1935

1936

1937

1938

1939

1940

1941

1942

1943

1944

1945

1946

1947

1948

1949

1950

1951

1952

1953

1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

1967

1968

1969

1970

1971

1972

1973

1974

1975

1976

1977

1978

1979

1980

1981

1982

1983

1984

1985

1986

1987

1988

1989

1990

1991

1992

1993

1994

1995

1996

1997

1998

1999

2000

2001

2002

2003

2004

2005

2006

2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

2026

2027

2028

2029

2030

2031

2032

2033

2034

2035

2036

2037

2038

2039

2040

2041

2042

2043

2044

2045

2046

2047

2048

2049

2050

2051

2052

2053

2054

2055

2056

2057

2058

2059

2060

2061

2062

2063

2064

2065

2066

2067

2068

2069

2070

2071

2072

2073

2074

2075

2076

2077

2078

2079

2080

2081

2082

2083

2084

2085

2086

2087

2088

2089

2090

2091

2092

2093

2094

2095

2096

2097

2098

2099

2100

2101

2102

2103

2104

2105

2106

2107

2108

2109

2110

2111

2112

2113

2114

2115

2116

2117

2118

2119

2120

2121

2122

2123

2124

2125

2126

2127

2128

2129

2130

2131

2132

2133

2134

2135

2136

2137

2138

2139

2140

2141

2142

2143

2144

2145

2146

2147

2148

2149

2150

2151

2152

2153

2154

2155

2156

2157

2158

2159

2160

2161

2162

2163

2164

2165

2166

2167

2168

2169

2170

2171

2172

2173

2174

2175

2176

2177

2178

2179

2180

2181

2182

2183

2184

2185

2186

2187

2188

2189

2190

2191

2192

2193

2194

2195

2196

2197

2198

2199

2200

2201

2202

2203

2204

2205

2206

2207

2208

2209

2210

2211

2212

2213

2214

2215

2216

2217

2218

2219

2220

2221

2222

2223

2224

2225

2226

2227

2228

2229

2230

2231

2232

2233

2234

2235

2236

2237

2238

2239

2240

2241

2242

2243

2244

2245

2246

2247

2248

2249

2250

2251

2252

2253

2254

2255

2256

2257

2258

2259

2260

2261

2262

2263

2264

2265

2266

2267

2268

2269

2270

2271

2272

2273

2274

2275

2276

2277

2278

2279

2280

2281

2282

2283

2284

2285

2286

2287

2288

2289

2290

2291

2292

2293

2294

2295

2296

2297

2298

2299

2300

2301

2302

2303

2304

2305

2306

2307

2308

2309

2310

2311

2312

2313

2314

2315

2316

2317

2318

2319

2320

2321

2322

2323

2324

2325

2326

2327

2328

2329

2330

2331

2332

2333

2334

2335

2336

2337

2338

2339

2340

2341

2342

2343

2344

2345

2346

2347

2348

2349

2350

2351

2352

2353

2354

2355

2356

2357

2358

2359

2360

2361

2362

2363

2364

2365

2366

2367

2368

2369

2370

2371

2372

2373

2374

2375

2376

2377

2378

2379

2380

2381

2382

2383

2384

2385

2386

2387

2388

2389

2390

2391

2392

2393

2394

2395

2396

2397

2398

2399

2400

2401

2402

2403

2404

2405

2406

2407

2408

2409

2410

2411

2412

2413

2414

2415

2416

2417

2418

2419

2420

2421

2422

2423

2424

2425

2426

2427

2428

2429

2430

2431

2432

2433

2434

2435

2436

2437

2438

2439

2440

2441

2442

2443

2444

2445

2446

2447

2448

2449

2450

2451

2452

2453

2454

2455

2456

2457

2458

2459

2460

2461

2462

2463

2464

2465

2466

2467

2468

2469

2470

2471

2472

2473

2474

2475

2476

2477

2478

2479

2480

2481

2482

2483

2484

2485

2486

2487

2488

2489

2490

2491

2492

2493

2494

2495

2496

2497

2498

2499

2500

2501

2502

2503

2504

2505</

Blow-By History

- The focus on blow-by (soot) than more common erosion, the chart of blow-by history is a devastating comparison of SRM 15 and SRM 22
- These charts defined the database for the decision: blow-by (not erosion) and temperature for two launches
- Limited measurement of effect, wrong number of cases

Blow By History
SRM-15 WORST BLOW-BY
○ 2 CASE JOINTS (80°), (110°) ARC
○ MUCH WORSE VISUALLY THAN SRM-22

SRM 22 BLOW-BY
○ 2 CASE JOINTS (30-40°)

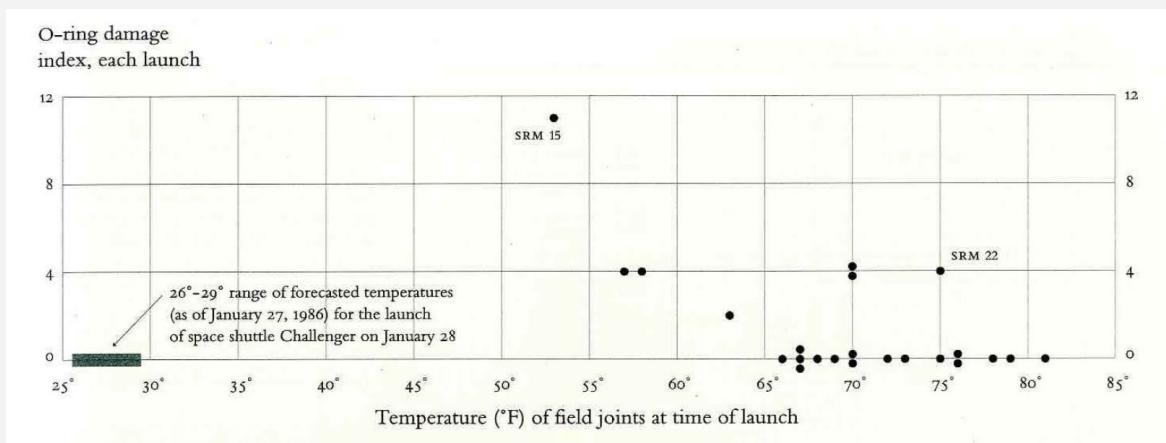
SRM-13A, 15, 16A, 18, 23A 24A
○ NOZZLE Blow-By

MOTOR	HISTORY OF O-RING TEMPERATURES (DEGREES - F)			WIND
	MBT	AMB	O-RING	
DM-1	68	36	47	10 MPH
DM-2	76	45	52	10 MPH
QM-3	72.5	40	48	10 MPH
QM-4	76	48	51	10 MPH
SRM-15	52	64	53	10 MPH
SRM-22	77	78	75	10 MPH
SRM-25	55	26	29 27	10 MPH 25 MPH

Temperature Data

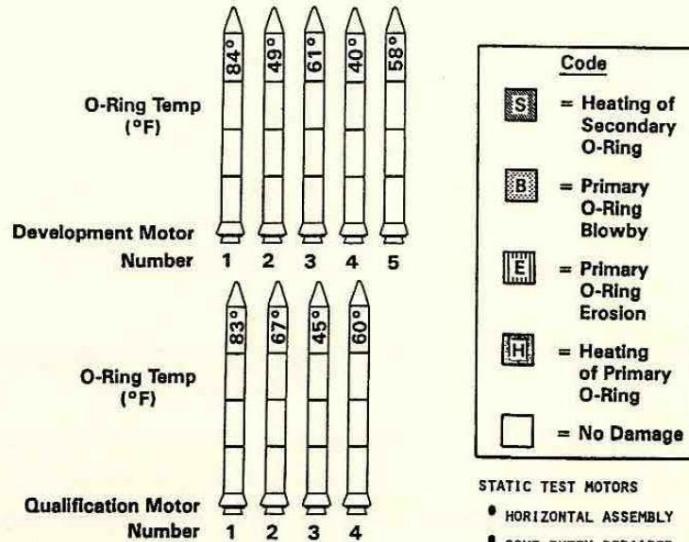
- The first 4 rockets never left the ground
- **Missing data:** 5 launches with erosion and 17 without erosion
- The major recommendation, which was rejected, rightly implies that **the Challenger could not be safely launched the next morning at 29°.**

<u>MOTOR</u>	<u>O-RING</u>	
DM - 4	47	
DM - 2	52	Test rockets ignited on fixed horizontal platforms in Utah.
QM - 3	48	
QM - 4	51	The only 2 shuttle launches (of 24) for which temperatures were shown in the 13 Challenger charts.
SRM - 15	53	
SRM - 22	75	
SRM - 25	29	
	27	Forecasted O-ring temperatures for the Challenger.

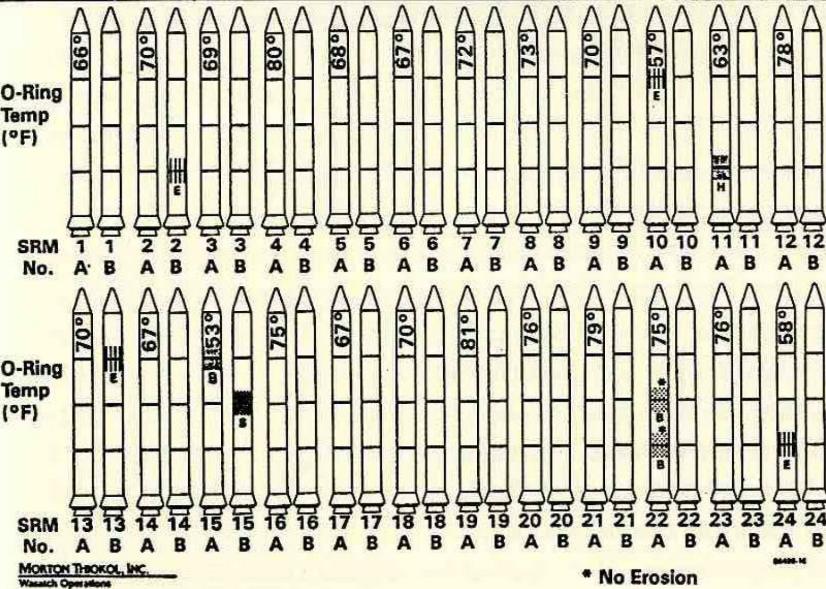


Charts Used During Testimony

History of O-Ring Damage in Field Joints



History of O-Ring Damage in Field Joints (Cont)

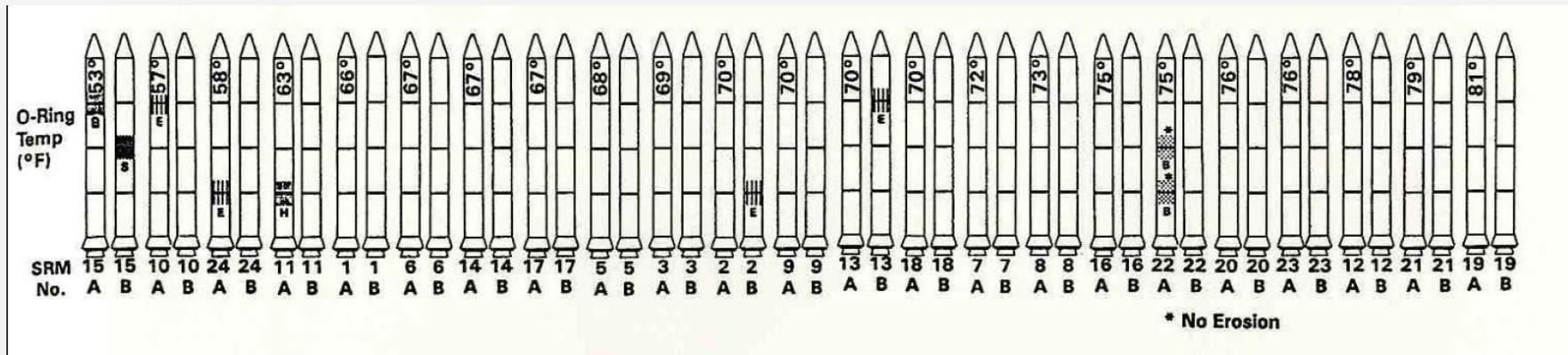


INFORMATION ON THIS PAGE WAS PREPARED TO SUPPORT AN ORAL PRESENTATION
AND CANNOT BE CONSIDERED COMPLETE WITHOUT THE ORAL DISCUSSION

INFORMATION ON THIS PAGE WAS PREPARED TO SUPPORT AN ORAL PRESENTATION
AND CANNOT BE CONSIDERED COMPLETE WITHOUT THE ORAL DISCUSSION

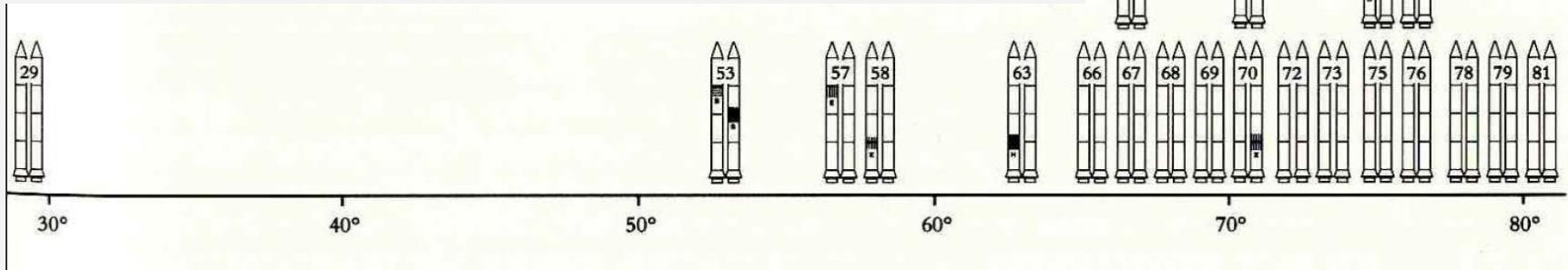
Redrawn: Arranged by Launch Temperature

To illuminate cause-effect relationship, the little rockets must be placed in order by temperature, the possible cause.



Redrawn: Proportional Scaling

- Include a symbolic pair of rockets way over at 29°, the predicted temperature for the Challenger launch
- In fact, these **pictorial approach are unnecessary** and only require a simple scatterplot or an ordered table to reveal the deadly relationship.



Chapter 2 Conclusion

- The quality of these representations (maps, tables, graphs) differ enormously, and in ways that governed the **ultimate consequences**
- Design reasoning must correspond to scientific reasoning
- Clear and precise seeing = clear and precise thinking

Chapter 3: Explaining Magic Pictorial Instructions and Disinformation Design

Explanations of magic involve pictorial instructions demonstrating a sequence of performance, a step-by-step description of conjuring activities. **To document and explain a process, to make verbs visible, is at the heart of information design.**

Visual Explanations is about pictures of verbs, the representation of mechanism and motion, of process and dynamics, of causes and effects, of explanation and narrative. Since such displays are often used to reach conclusions and make decisions, there is a special concern with the integrity of the content and the design.

Explaining Magic

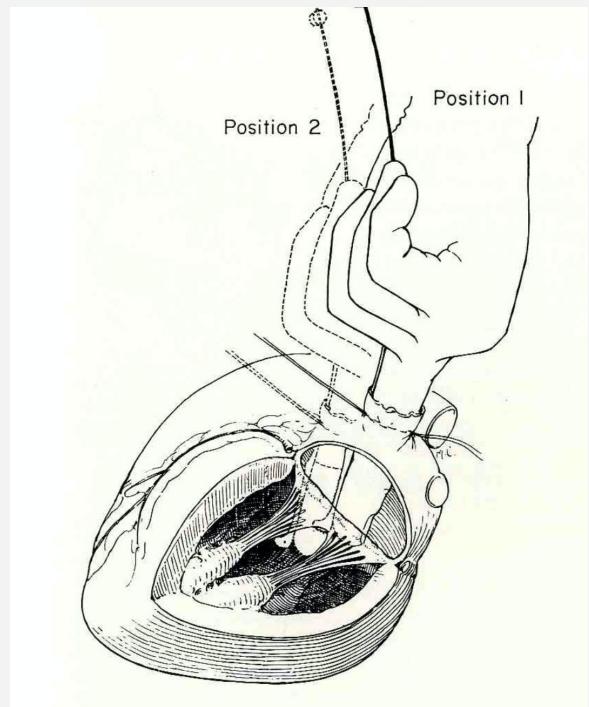
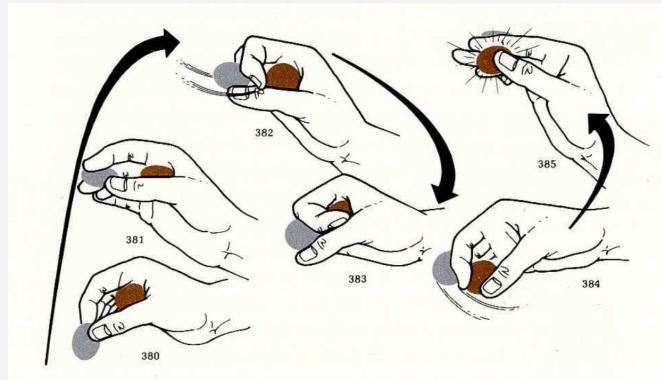
In the world of the diagram, showing a sequence of changes over time is identical to showing adjacent layers information; on paper, time and space are as one. Multiple positions signal either temporal or spatial adjacency, movement or arrest.

Two strategies for explaining magic on flatten surface :

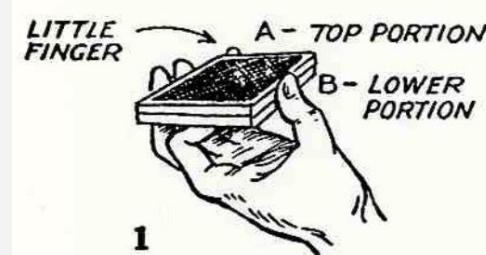
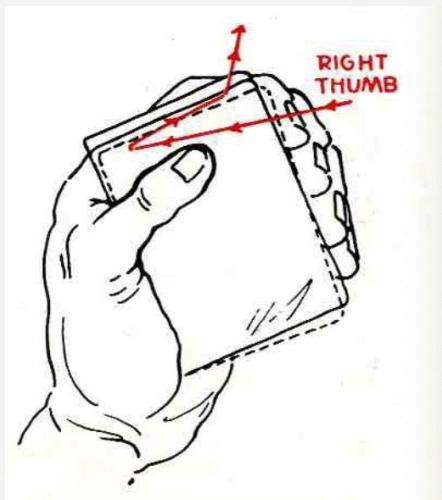
- Sense of sequence and rhythm
- Precise timing of swift movement

Explaining Magic: The power of Multiples in Time and Space

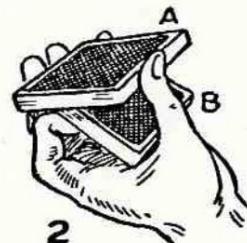
1. Ghosting of multiple images, like blurring, to signal motion in pictorial descriptions
2. Statistically record a time-series in graphics



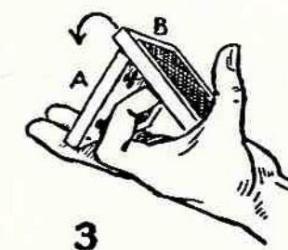
3. Using text to serve as an imagery, supplementary to the whole design
4. Utilize sequences with multiple states, along with words and images working together



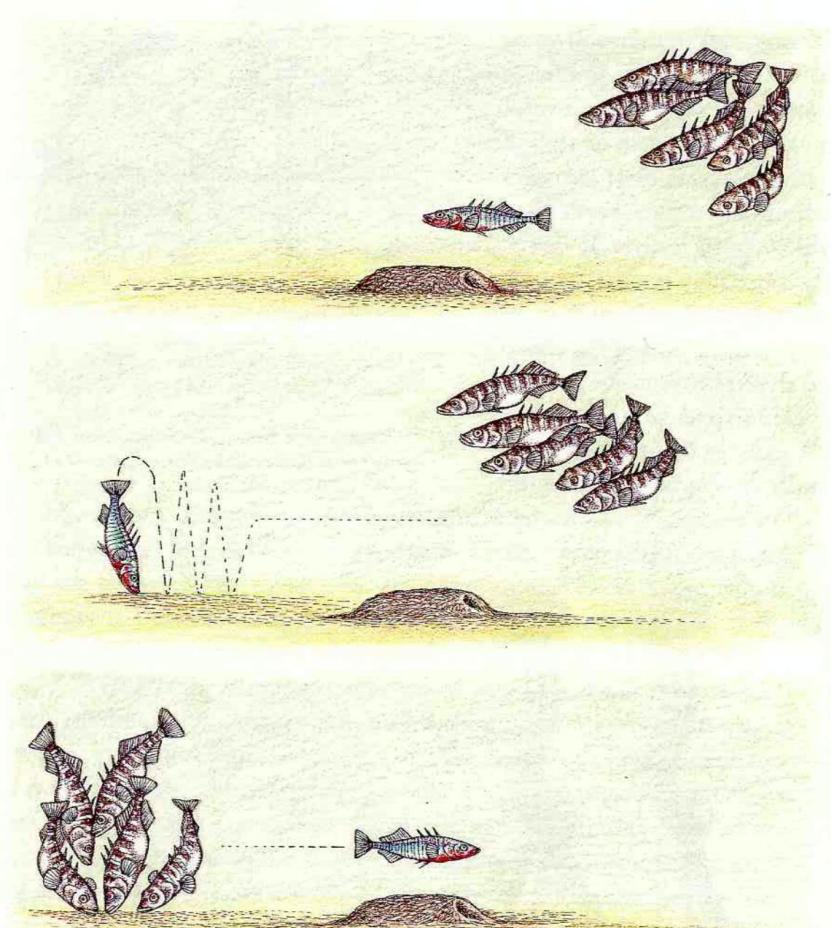
PACK IS HELD BY TIPS OF THUMB, MIDDLE, AND RING FINGER. FOREFINGER IS BENT UNDERNEATH.



THUMB RELEASES LOWER PORTION (B). FOREFINGER PUSHES FINGER SIDE OF LOWER PORTION UP.



BOTTOM PORTION GOES UP AND OVER TOP PORTION WHICH DROPS INTO THE PALM AS FOREFINGER WITHDRAWS



DISTRACTION DISPLAY is a tactic a male may use to protect his nest from raiding females (top). The guardian male swims away from the nest, poking his snout into the ground several times (middle). This action resembles a feeding movement that lures the attacking females away from the nest (bottom).

Effective Visual Explanation of Movement on flatten surface

- Separate diagrams show paragraphs of activity
- Dotted lines track motion within images
- Varying postures of the many fish together to indicate motions



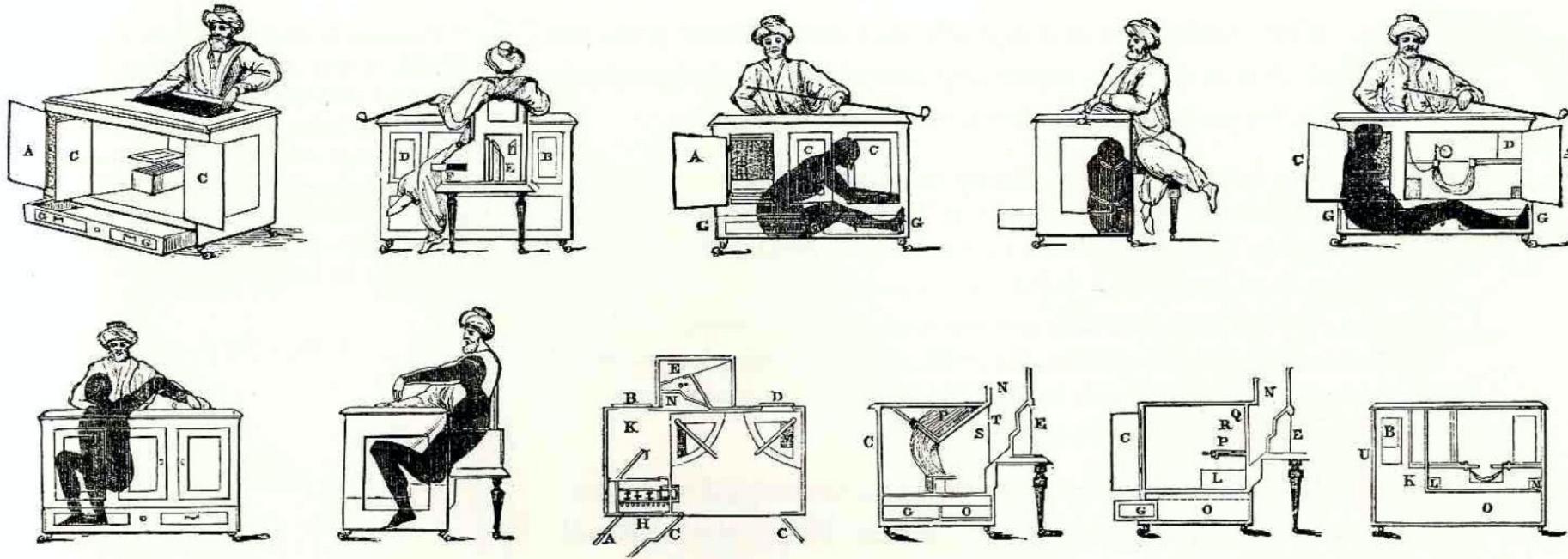
Thoughtful Design May Skillfully Present False Information

The Mechanical Turk, also known as the Automaton Chess Player, was a fake chess-playing machine constructed in the late 18th century developed by Wolfgang von Kempelen. Decked out in Turkish dress, the magical automaton stiffly moved chess pieces with its left hand, rolled its eyes, and when checking its human opponent, shook its head thrice.



Thoughtful Design May Skillfully Present False Information

Robert Willis's drawing above documented a theory of concealed workings of the Automaton Chess Player. Willis depicts a human chess-player hidden behind a false wall in the cabinet, who secretly climbs up in side the Turk in order to move the pieces.



Developing on the foundation of Willi's opinion and "logical reasoning" of his solution, physicist David Brewster recreated the diagram for Chess Player. Yet, the well-executed diagrams detailed wrong guess about the mechanics behind automaton.

These much-copied drawings resemble "urban legends", fictional narrative told about bizarre happenings that can never be traced to actual events or particular eye-witnesses.

Magical illusions are based on techniques that deny, conceal, obscure, and manipulate optical information.

**Two primary principles for successful
Magical illusion-performing:**

1. Suppressing context

“Never tell your audience beforehand what you are going to do”

2. Preventing reflective analysis

“Never perform the same trick twice on the same evening”

Two primary principles for successful diagram-making:

1. Explain the context

What the problem is / Why the problem is important / What the solution to the problem is

2. Use the PGP method to explain complex ideas or data

Particular / General / Particular

Chapter 3: Conclusion

The techniques of disinformation and the pseudo-explanation of the automaton chess-player illustrate the supreme and enduring test of all information design, **the integrity of the content** displayed:

Is the display revealing the truth?

Is the presentation accurate?

Are the data carefully documented?

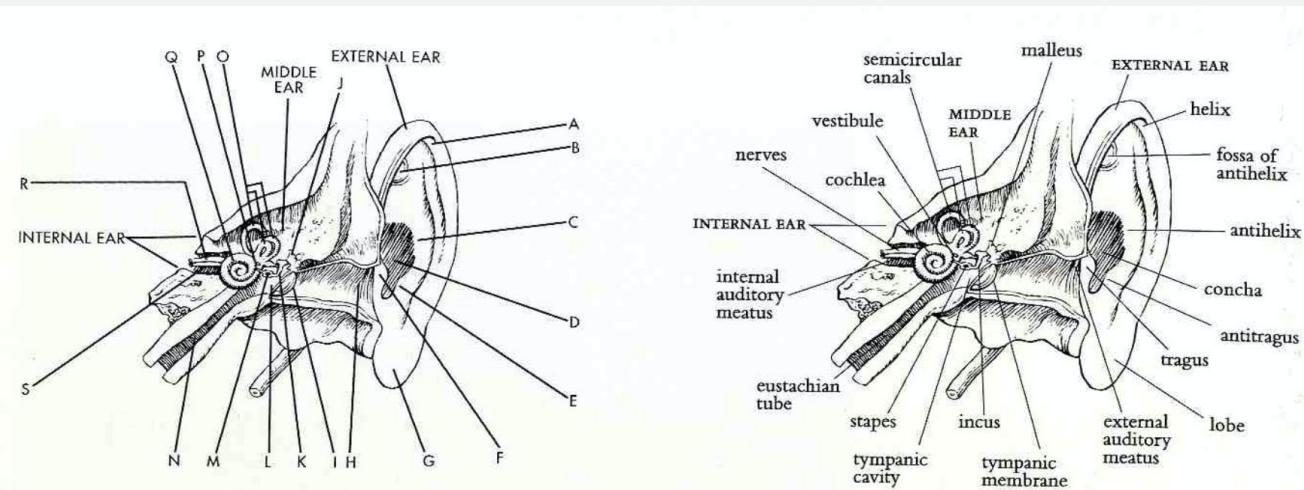
Do the method of display avoid spurious reading of the data?

Are appropriate comparisons and contexts shown?

Chapter 4: The Smallest Effective Difference

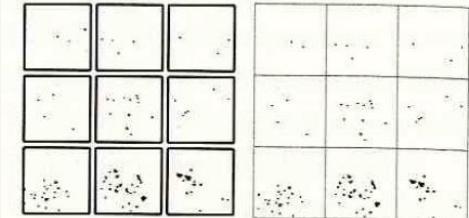
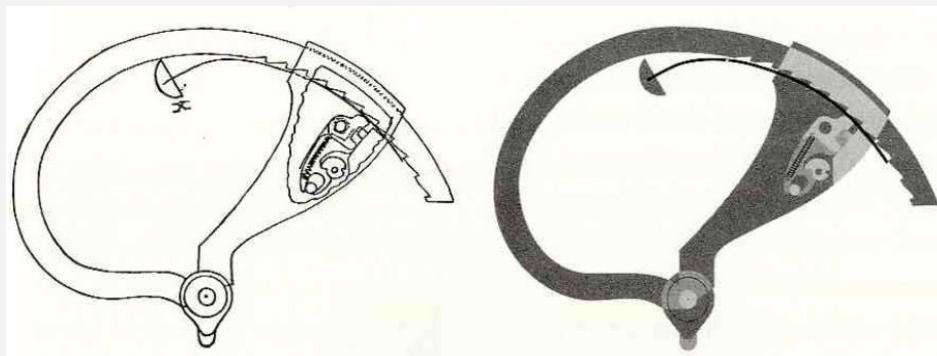
Make all visual distinctions as subtle as possible, but still clear and effective

Relevant to nearly every display of data, the smallest effective difference is the Occam's razor ("what can be done with fewer is done in vain with more") of information design. **For small differences allow more differences, economical use of visual distinction provides more space for informations.**



Emphasize the primary information

- Muting secondary and structural elements (colors, arrows, pointer lines, scales, grids, frames) will reduce visual clutter, thus help to clarify the primary information
- Strong contrast between secondary elements and the background will also visually activate the background



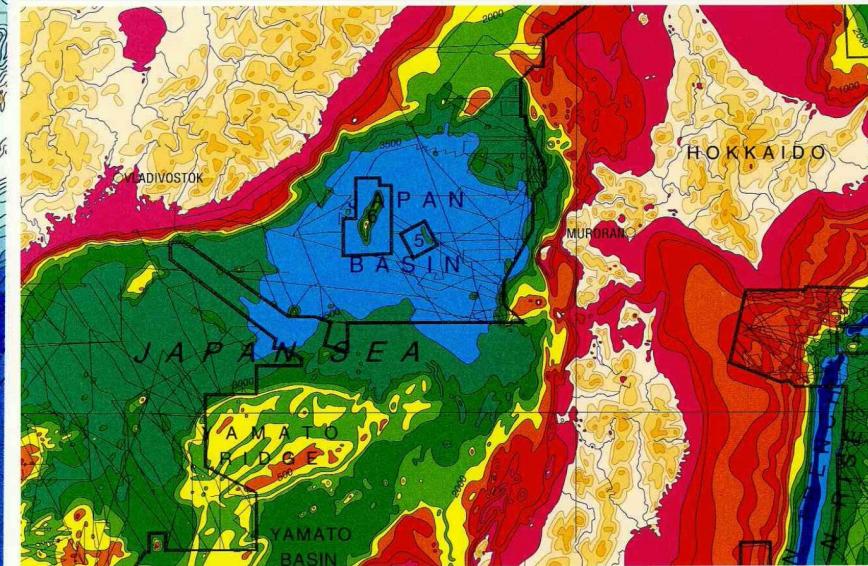
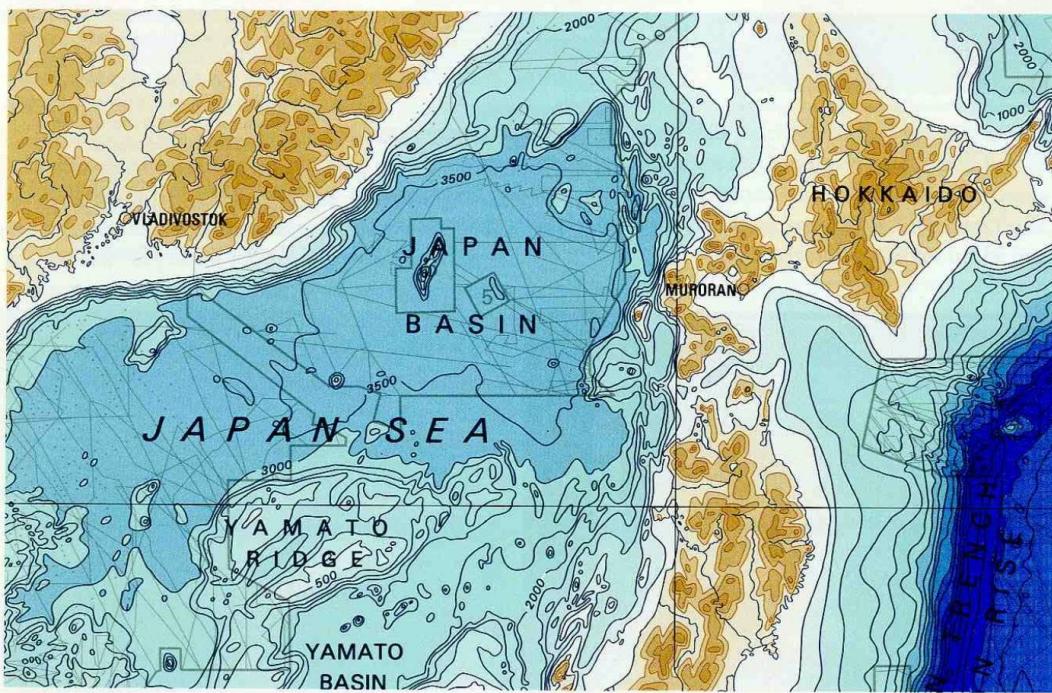
1866	516	9998
758	510	7310
658	150	4465
698	121	3274

1866	516	9998
758	510	7310
658	150	4465
698	121	3274

Minimal (but clear) distinctions reduce the clutter of visual noise. Minimal contrasts enrich the visual signal by increasing the number of distinctions that can be made within a single image, as we saw in comparing the blue and the rainbow oceans. Design by means of the smallest effective difference helps to maximize the resolution of our images. In practice, the size of smallest effective difference will depend on the context, priority of particular visual elements in the overall story, number

Minimal (but clear) distinctions reduce the clutter of visual noise. Minimal contrasts enrich the visual signal by increasing the number of distinctions that can be made within a single image, as we saw in comparing the blue and the rainbow oceans. Design by means of the smallest effective difference helps to maximize the resolution of our images. In practice, the size of smallest effective difference will depend on the context, priority of particular visual elements in the overall story, number

Japan Sea and the great trenches of the western Pacific



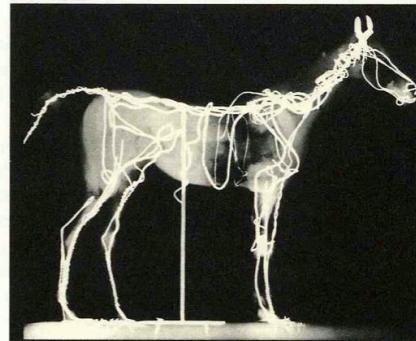
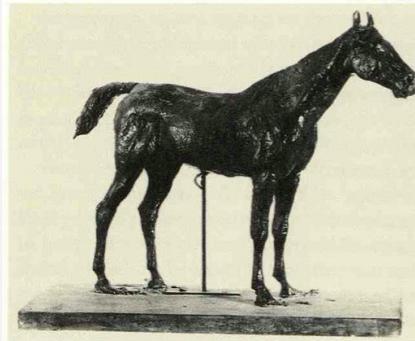
Chapter 4: Conclusion

- Minimal distinctions reduce visual clutter.
- Design by means of small effective differences helps to increase the resolution of images.
- In practice, the appropriate size of small contrasts will depend on the context, priority of particular elements in the overall visual story, number of differentiations made within the diagram, and characteristics of target audiences.

Chapter 5: Parallelism

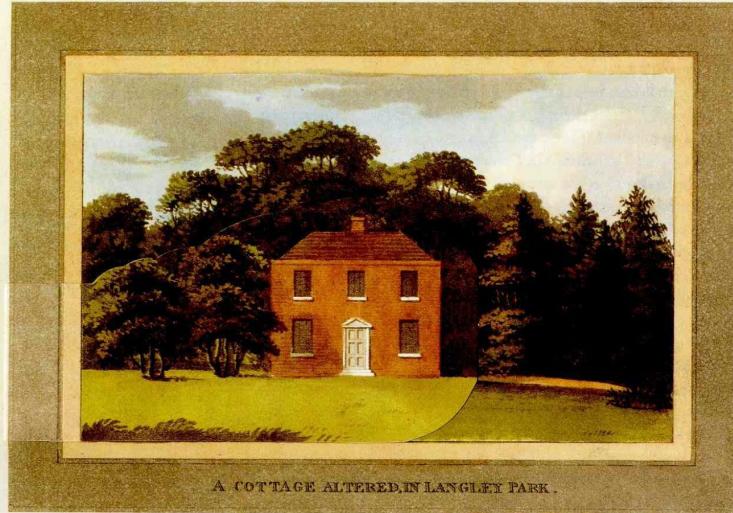
Repetition and Change, Comparison and Surprise

Parallelism helps bring about clarity, efficiency, forcefulness, rhythm, balance. Repetitions, elaborations and contrast advance the argument. Paired images enforce a direct visual parallelism.

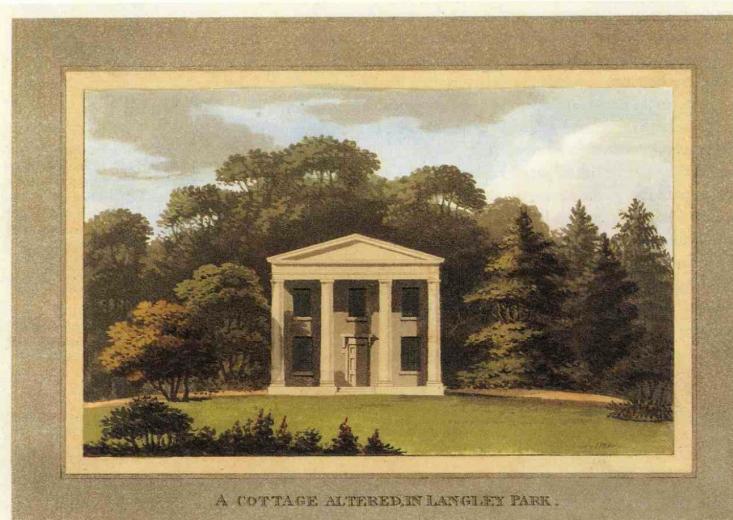


Parallel in Time

Spatial parallelism takes advantage of our notable capacity to compare and reason about multiple images that appear simultaneously within our eyespan. **We are able to canvas, sort, identify, reconnoiter, select, contrast and review--ways of seeing all quickened and sharpened by the direct spatial adjacency of parallel elements.**



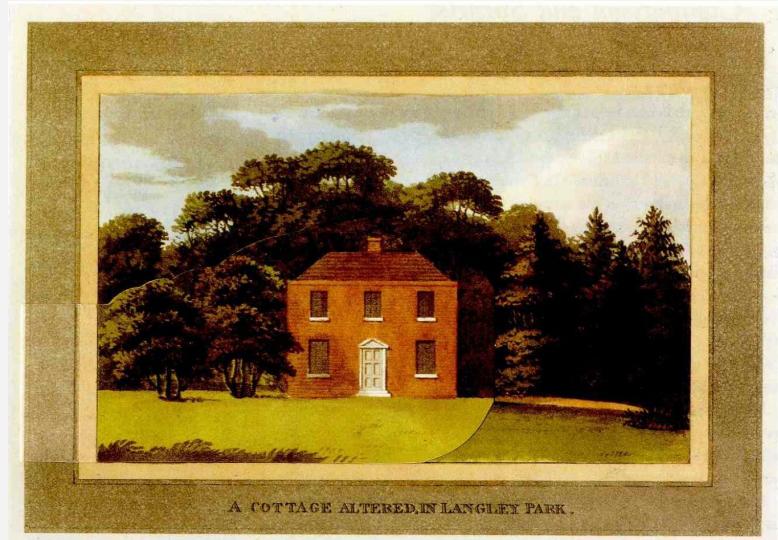
A COTTAGE ALTERED IN LANGLEY PARK.



A COTTAGE ALTERED IN LANGLEY PARK.

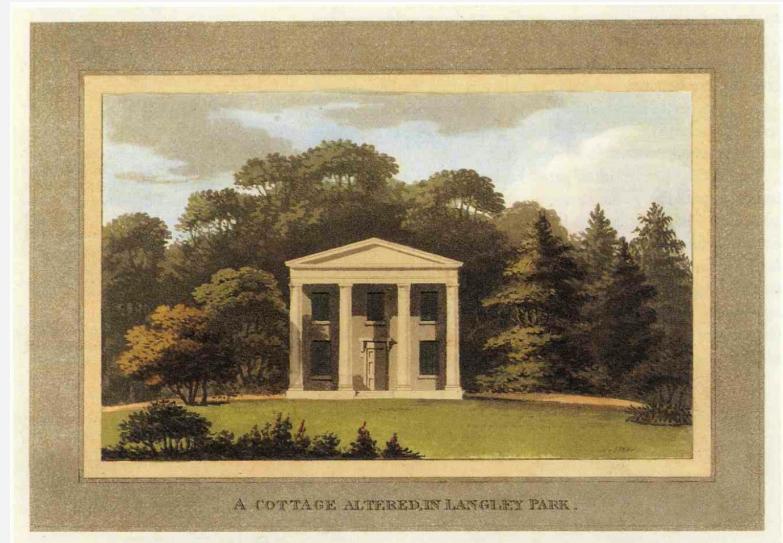
Parallel in Time

Lifting the flap above provides an example of parallelism in time, a before/after presentation of an architectural redesign(a Doric portico added to a cosy cottage).



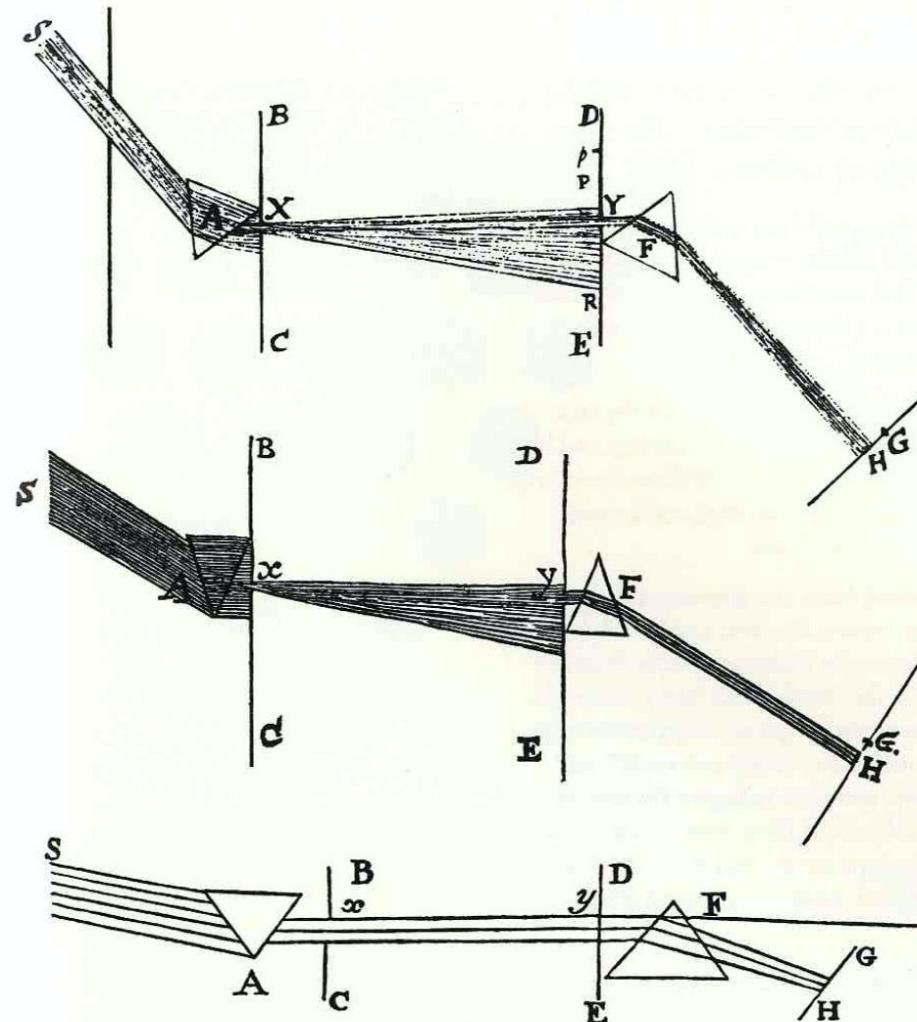
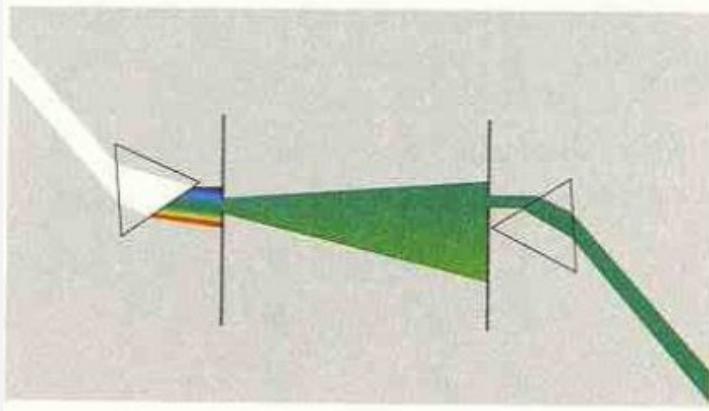
Parallel in Time

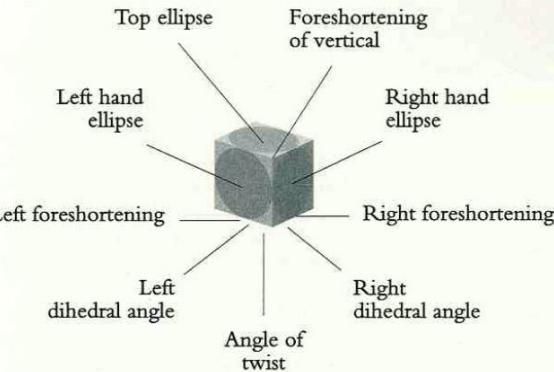
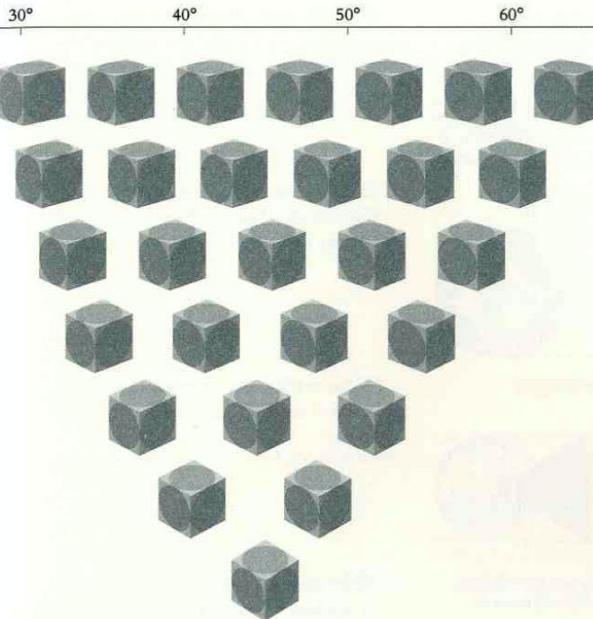
Lifting the flap above provides an example of parallelism in time, a before/after presentation of an architectural redesign(a Doric portico added to a cosy cottage).



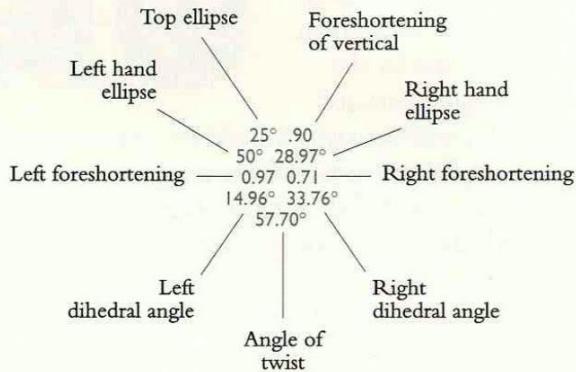
Multiple parallelism - a transparent, powerful and widely used method of enforcing visual comparisons - show here three versions of the same finding.

Isaac Newton's sketch of his experiment demonstrating that a second refraction of a colored ray does not alter its color. Sunlight is refracted into a rainbow at the left prism; green light only is allowed to pass through the silt at bcx , and it remains green.





30°	40°	50°	60°				
15° .96 30° 55.74° 0.58 0.90 23.16° 06.90° 31.17°	15° .96 35° 51.00° 0.65 0.85 19.32° 10.81° 36.43°	15° .96 40° 46.13° 0.72 0.79 16.19° 12.99° 41.72°	15° .96 45° 41.15° 0.78 0.73 13.54° 15.54° 47.06°	15° .96 50° 36.04° 0.84 0.67 11.24° 18.62° 52.47°	15° .96 55° 30.79° 0.89 0.59 9.19° 22.50° 58.00°	15° .96 60° 25.32° 0.94 0.52 7.29° 27.65° 63.71°	
20° .93 30° 52.71° 0.64 0.92 28.55° 12.13° 32.15°	20° .93 35° 48.10° 0.71 0.87 23.93° 14.77° 37.62°	20° .93 40° 43.27° 0.77 0.82 20.04° 17.78° 43.16°	20° .93 45° 38.23° 0.84 0.75 16.66° 21.35° 48.81°	20° .93 50° 32.98° 0.89 0.68 13.66° 25.70° 54.60°	20° .93 55° 27.42° 0.94 0.61 10.88° 31.32° 60.66°	20° .93 55° 27.42° 0.94 0.61 10.88° 31.32° 60.66°	
25° .90 30° 49.11° 0.72 0.96 32.58° 15.62° 35.27° 19.47°	25° .90 35° 44.57° 0.79 0.90 27.34° 19.06° 39.26°	25° .90 40° 39.71° 0.85 0.85 22.79° 23.03° 45.17°	25° .90 45° 34.53° 0.91 0.78 18.72° 27.80° 51.28°	25° .90 50° 28.97° 1.00 0.82 14.96° 33.76° 57.70°	25° .90 55° 28.97° 1.00 0.82 14.96° 33.76° 57.70°	25° .90 55° 28.97° 1.00 0.82 14.96° 33.76° 57.70°	
30° .86 30° 45° 0.82 1.00 35.27° 19.47° 35.26°	30° .86 35° 40.45° 0.88 0.95 29.49° 23.85° 41.48°	30° .86 40° 35.48° 0.94 0.88 29.30° 28.98° 47.92°	30° .86 45° 30° 1.00 0.82 19.47° 35.26° 54.73°	35° .81 30° 40.45° 0.93 1.06 36.66° 23.85° 37.62°	35° .81 35° 35.79° 0.99 1.00 30.32° 29.36° 44.44°	35° .81 40° 30.52° 1.05 0.94 24.38° 35.98° 51.69°	35° .81 45° 30.52° 1.05 0.94 24.38° 35.98° 51.69°
40° .76 30° 35.47° 1.06 1.13 36.72° 28.98° 40.75°	40° .76 35° 35.79° 1.12 1.07 29.64° 35.98° 48.48°	40° .76 40° 30.52° 1.12 1.07 24.38° 35.98° 48.48°	40° .76 45° 30° 1.22 1.22 35.26° 35.26° 45°	45° .70 30° 30° 1.22 1.22 35.26° 35.26° 45°	45° .70 35° 30.52° 1.22 1.22 24.38° 35.98° 45°	45° .70 40° 30.52° 1.22 1.22 24.38° 35.98° 45°	45° .70 45° 30.52° 1.22 1.22 24.38° 35.98° 45°



Trimetric projection, a method for translating three-space objects onto flatten surface.

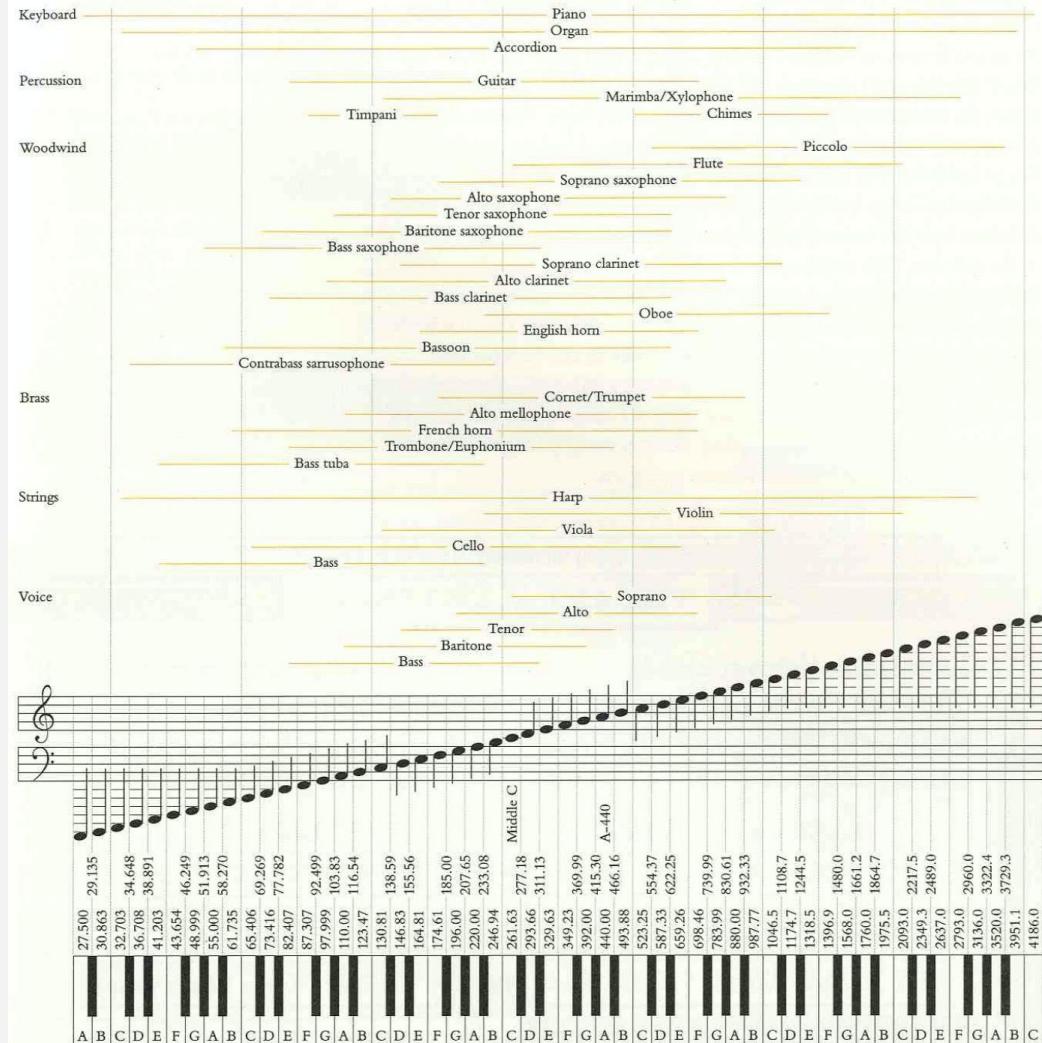
At upper left, matrix of visual elements organizes 28 cubes.

At upper right, corresponding data matrix shows 252 numbers, with 9 numbers describing the particulars of each cubes.

Parallel beneath the visual and data, legends explain the individual data entries.

Multiple parallelism is a natural design strategy for explanations of music and sound, as repeated comparisons are made with respect to frequency and time.

The overlapping parallel tracks run on the common dimension of 88 keys of piano keyboard. Frequencies of sounds, notes of the musical scale, ranges of singing voices, and families of musical instruments are aligned, described, compared, contrasted.

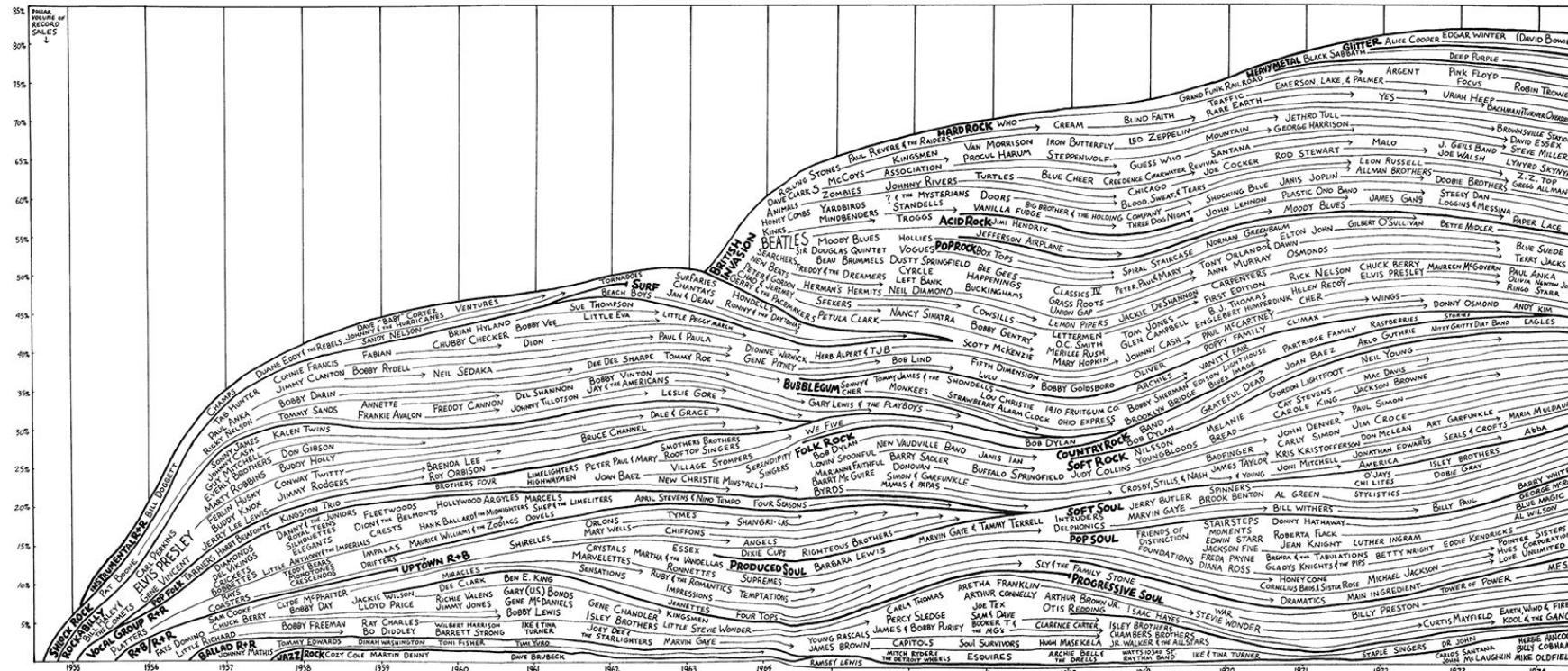


HERE is a musical streams-of-story, an appealing history of “marketing trends and stylistic patterns in the development of pop/rock music.” Topping the chart is a time-series that tracks sales of popular and rock music as a share of total record sales, although the names are not scaled in proportion to their contributions to the grand total. Bold letters indicate some 24 stylistic categories, fountains flowing into musical streams (e.g., **SHOCK ROCK**, lower left). Several fashions, including **BUBBLEGUM** and **SURF**, did not last, to the relief of a grateful world. In these overlapping parallel time-series, a few names of the 470 artists

Steve Chapple and Reebee Garofalo, *Rock 'N' Roll is Here to Pay: The History and Politics of the Music Industry* (Chicago, 1977), inside front and inside back covers. Concept and design by Reebee Garofalo; graphics by Damon Rarey; copyright 1975 by Robert L. Garofalo.

are repeated, as they resurface in fresh currents. The multiple, parallel flows locate music-makers in two dimensions—*linking* musical parents and offspring from 1955 to 1974, and *listing* contemporaries for each year.¹⁰ With an intense richness of detail (measuring in at 20% of the typographic density of a telephone book), this nostalgic and engaging chart fascinates many viewers—at least those of a certain age. Also the illustration presents a somewhat divergent perspective on popular music: songs are not merely singles—unique, one-time, *de novo* happenings—rather, music and music-makers share a pattern, a context, a history.

¹⁰ Among the missing are The Weavers, Pete Seeger, Bonnie Raitt, and Lou Reed and The Velvet Underground.



Steven Chapple and Reebee Garofalo, *Rock N Roll is Here to Pay: The History and Politics of the Music Industry*

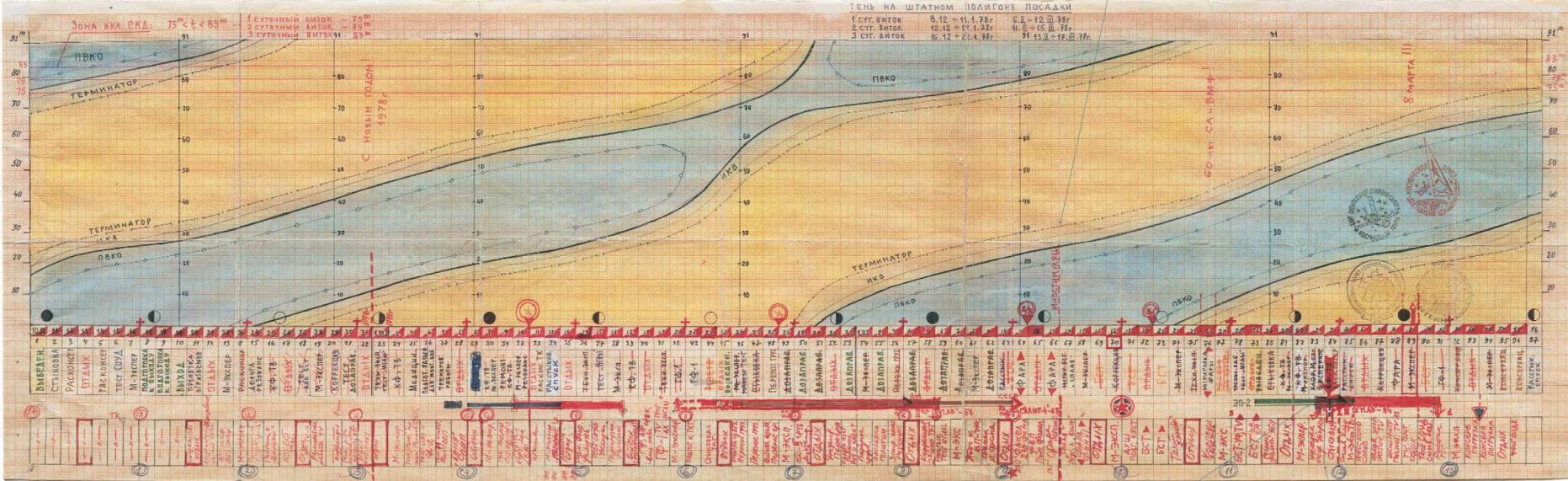
Timing cycle for ignition of engines to make orbit corrections: "Zone of corrective engines."

Happy New Year!

С Новым Годом!
1978г

Visit by *Soyuz 27*, January 10-16. Grechko caught a cold, probably from one of the guests. Visits are marked by solid red lines between the planned and actual schedules.

A cargo ship brought up an electric muscle-stimulator (мюостимуляц.) to supplement the daily exercise regime, which the cosmonauts were neglecting.



Grechko and Romanenko arrive at space station *Salyut 6*, via *Soyuz 26*.

Actual activity for each day, recorded in red pen, while in orbit. As the flight goes on, the pen tip squashes and broadens.

Planned activity for each day, schedule prepared prior to flight, with variously colored pens. Note the many deletions and changes (e.g., ~~отдых~~ ~~спокойств~~).

Red boxes (ОТДЫХ) indicate every 6th day of rest (revised schedule).

Spacewalk (Выход) ВЫХОД, exit) by Grechko on January 20. When Grechko returned, Romanenko decided on the spur of the moment to look around outside. While pushing himself through the tight airlock, he lost his grip and began to drift away from the spacecraft! Romanenko's line was not secure; at the last second, Grechko caught hold of the line and pulled his floating colleague to safety. The cosmonauts waited until months after their return to Earth before saying anything to authorities about their near disaster. Romanenko went on to spend 430 days in space on this and later flights.

Visit by *Progress 1*, January 20 to February 6. This automated cargo ship, without a crew, brought equipment, fresh fruit, mustard, horseradish, bread, music tapes and a cassette recorder, clothes, linens, air filters, an atlas, newspapers, and mail.

"*САНАТ*" (БАНЯ) "Steamroom," a traditional Russian bath. Surrounded by quotation marks, the word is used here sarcastically, mocking the engineering jargon (the acronym *САНАТ*) that calls a space-bath "A System of Taking Water Procedures."

On a television broadcast of February 10, Grechko noted a birthday: "Hello everyone. Today marks the one hundred and fiftieth birthday of Jules Verne, the remarkable French writer. There's hardly a person who hasn't read his books, at any rate not among the cosmonauts, because Jules Verne was a dreamer, a visionary who saw flights in space. I'd say this flight too was predicted by Jules Verne."

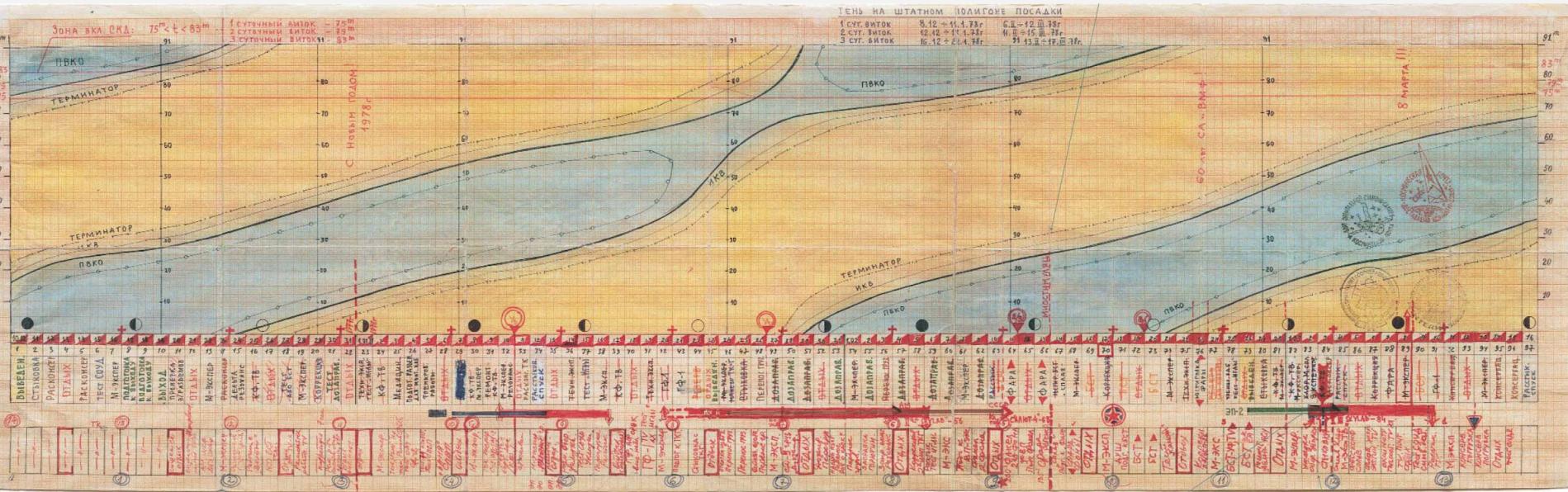
A visiting cosmonaut quietly mentioned to Romanenko that Grechko's father had just died. Romanenko decided to tell Grechko only after they were safely back to earth.

This red arrow celebrates the 84th day in orbit when *Salyut 6* equaled the space endurance record set five years earlier by America's *Skylab 4*. A thick red line extends from the 84th to the 91st day, when Grechko and Romanenko exceeded the previous endurance record by the officially necessary ten percent.

February 23, the 60th anniversary of the Soviet Army and Navy. The cosmonauts observed notable dates to mark the progress on their very long stay in space.

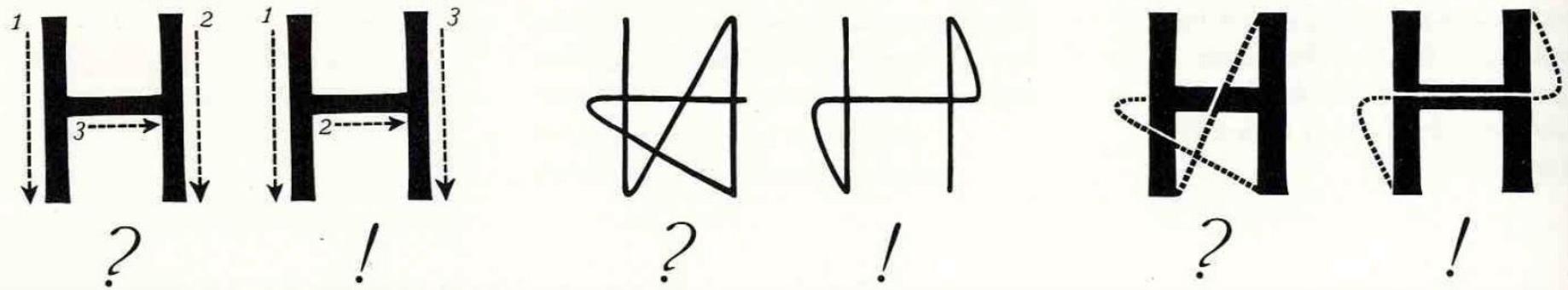
8 МАРТА!!! March 8, International Women's Day. Grechko and Romanenko made a television broadcast and prepared mail to send back on *Soyuz 28*.

Visit by *Soyuz 28*, March 2-10. In addition to a Czech cosmonaut (who became the first non-Soviet, non-American in space), the visitors brought a package with fresh onions, garlic, Bulgarian peppers, lemons, apples, milk, gingerbread, and honey.



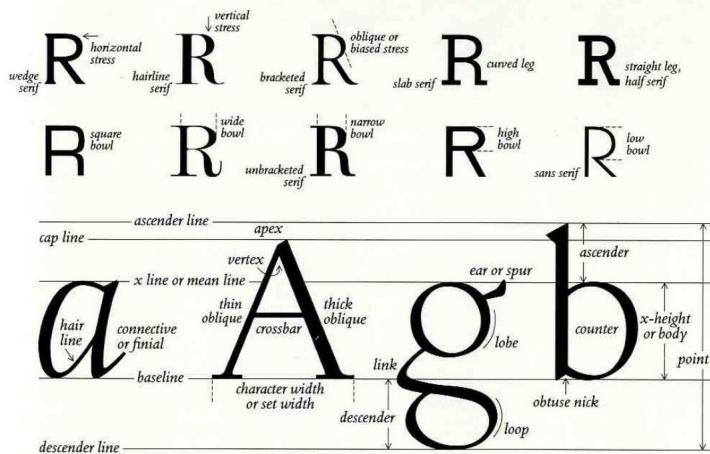
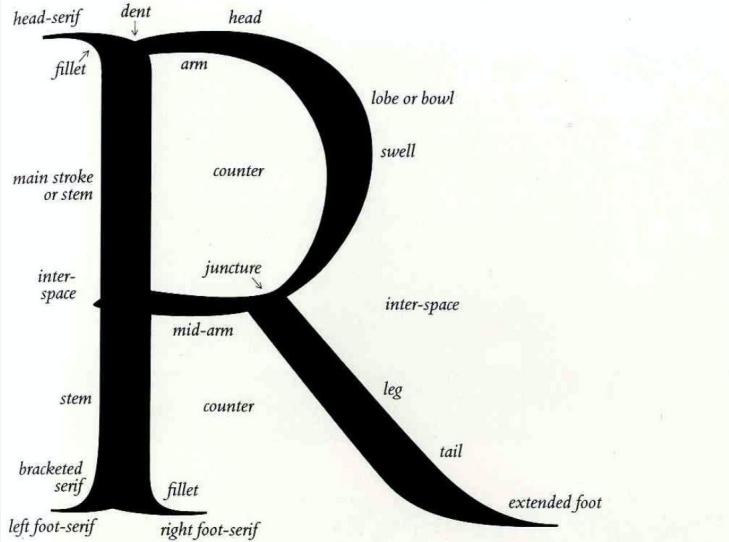
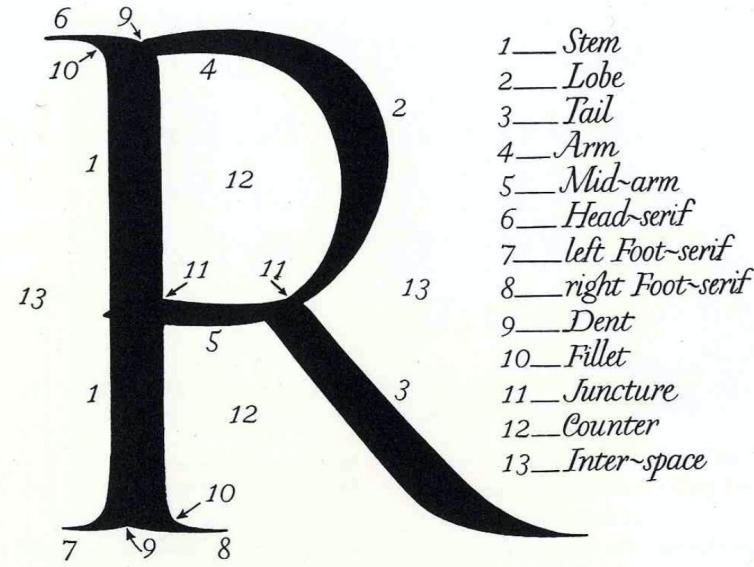
The cyclogram measure the passage of time with eight methods, all along with parallelism. Phases of the moon, holidays, weeks(red tick marks), fraction of total flight, date(each newly completed day was colored with a red triangle), elapsed days, total weeks to go and total weeks finished.

Visual distinction will lost its merit in the information clutter. As the cosmonauts report, the whole diagram was “witless ploys that did not help much”



Parallelism in study of letterforms, as repeated and subtle comparisons are made across complex shapes.

Above, side-by-side parallelism depicts the brushstrokes for painting the letter H as used by sign writers. Three pairs of letters juxtapose the wrong and correct methods, comparing sequence, direction, and path followed by the brush.



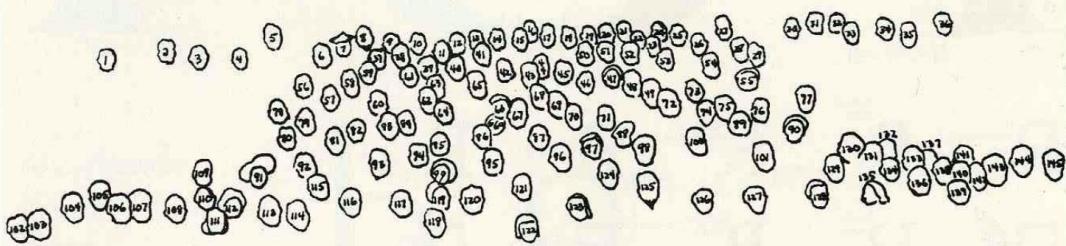
Parallelism can be obstruct by codes. Replacing codes with direct labels unifies the information.

Regardless, codes and keys are sometimes necessary for presenting highly complex data (e.g. Geological field maps)

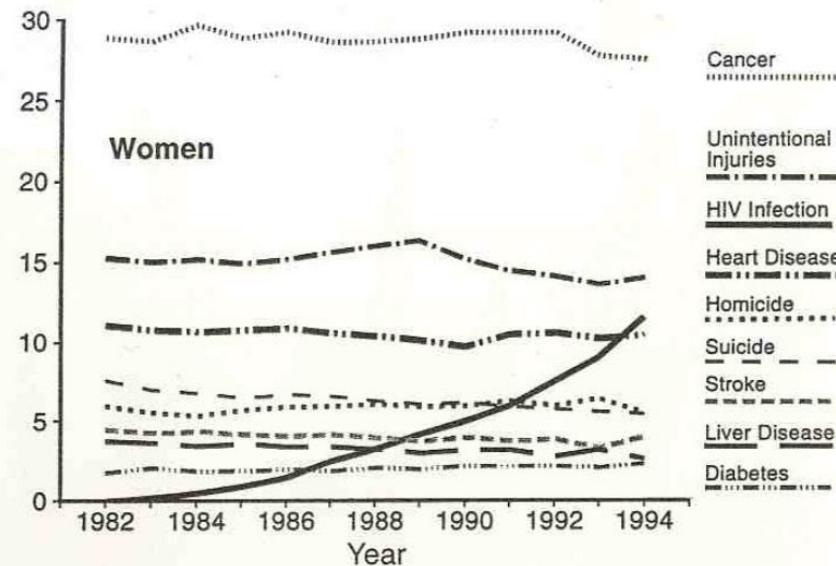
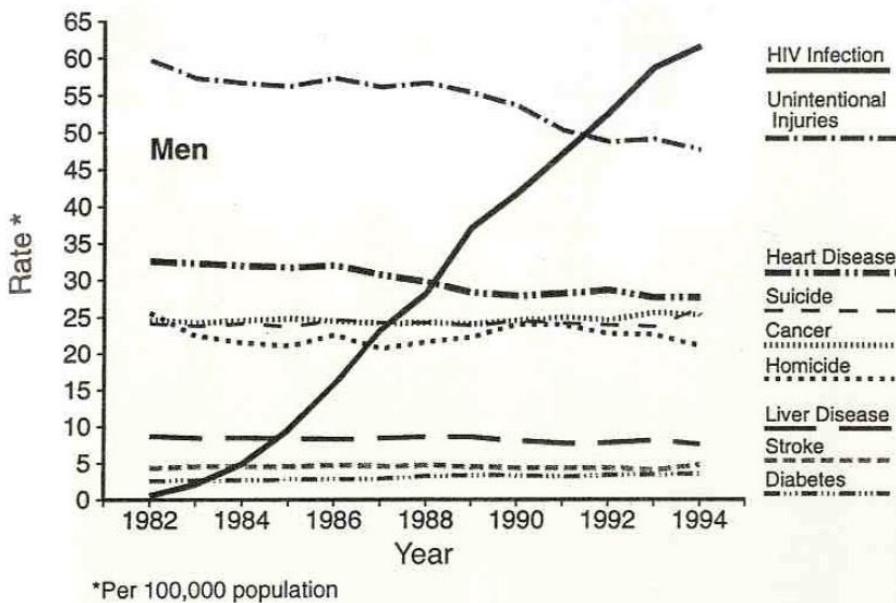
n Rome

Encoded parallel on the right is composed with photograph, drawing, number, and word.

The 84th meeting of the American Astronomical Society in Haverford in 1950 had photograph taken of the 146 attendees. The diagram arrays numbered heads as an intermediary code, linking the picture to names of the 146 attendees.



1. Dimitroff	25. Merrill	49. Streeter	73. Miss Williams	98. Mrs. Woodward	122. Barbara Federer
2. Cameron	26. Henry Smith	50. Cuffey	74. Mrs. Mayall	99. Mrs. Deutsch	123. Mrs. Miller
3. Adams	27. Bestul	51. Mrs. Sitterly	75. Hall	100. Goldberg	124. Millman
4. Layzer	28. Scott	52. Naevi	76. Mrs. Jones	101. Mangel	125. London
5. Lin	29. Schedoff	53. Giesler	77. Owen	102. Burton	126. Miss Barne
6. Binnendijk	30. Yengley	54. Mrs. Savedoff	78. Wolff	103. Whitford	127. Schwarzschild
7. Rieber	31. R. H. Wilson	55. Mrs. Lewis	79. Rabinowitz	104. Duke	128. Mrs. Schwarzschild
8. Smiley	32. Ashbrook	56. Leavitt	80. Hynek	105. Green	129. Gingrich
9. Dyer	33. Sutton	57. Brouwer	81. Eckert	106. van de Kamp	130. Miss Swope
10. Keller	34. Alden	58. Federer	82. Mrs. Eckert	107. Baker	131. Stuecklen
11. Vysotsky	35. Schlesinger	59. Mrs. Morrow	83. Schlesinger	108. Berlin	132. Clemente
12. Schell	36. Heimes	60. Miss Hutzler	84. Yoss	109. Spitzer	133. Miss Hill
13. Protheroe	37. Weston	61. Huffett	85. Miss Weber	110. Chester Cook	134. Miss Hill
14. Deutsch	38. Harlan Smith	62. Malitsky	86. Miss Underhill	111. Mrs. Chamberlin	135. Miss Wright
15. Matthews	39. Mrs. Harlan Smith	63. Wood	87. Allan Cook	112. Miss Damkoehler	136. Olivier
16. T. G. Cowling	40. Keenan	64. Seyert	88. Mrs. Whipple	113. Hertz	137. Bappu
17. Wildt	41. Stearns	65. Blitzstein	89. Lee	114. Kameny	138. Miss Johns
18. Smiley	42. Sarah Lee Lippincott	66. Mrs. Roy	90. Mrs. Menzel	115. Karp	139. Ziff
19. Israel	43. Munro	67. Miss Allen	91. Mrs. van de Kamp	116. Warwick	140. Yowell
20. Hoag	44. Mrs. Stearns	68. Haddock	92. Mrs. Baker	117. Joy	141. Milford
21. Wyller	45. Miss Roman	69. Hagen	93. Aller	118. Toni Federer	142. Mrs. Owren
22. Mrs. Merrill	46. King	70. Thomas	94. Mrs. Federer	119. Miss Schwartzman	143. Epstein
23. Mrs. Henry Smith	47. Mrs. Gossner	70. Whipple	95. Schilt	120. Nassau	144. Wrubel
24. McKrosky	48. Davis	71. Harris	96. Miller	121. Robertson	145. de Jonge
		72. Eggen	97. McLaughlin		

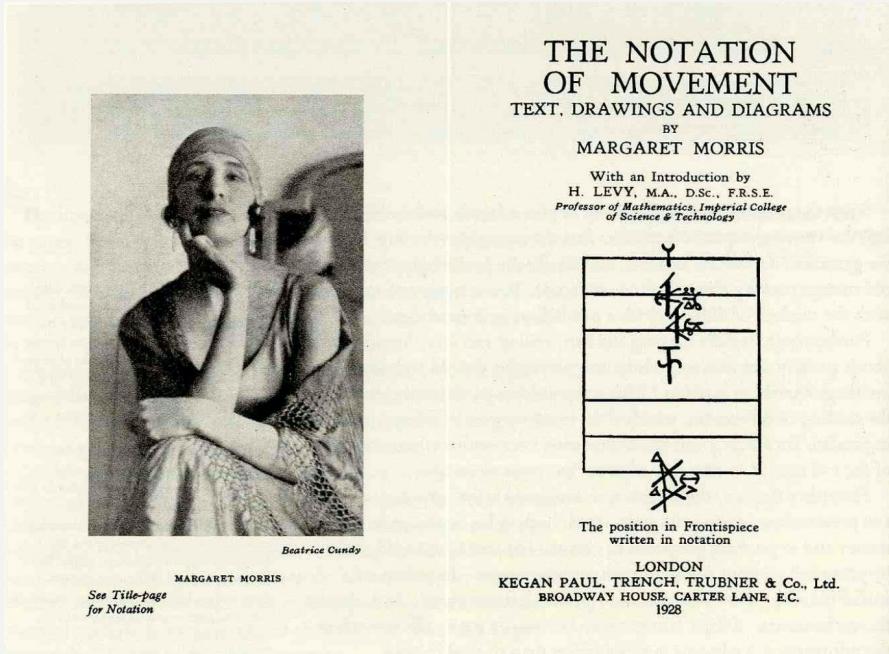


Faulty Parallelism

Faulty parallelism occurs in design as well as in language. Two un-parallelisms shown in the graph on the major cause of death from 1982 to 1994 among men and women aged 25 to 44. The lack of parallelism in the vertical scales of death-rates for men and women, using equal vertical distance to represent different quantities, demolish the purpose of visual comparison.

Chapter 5: Conclusion

- Parallelism connects visual elements. Connections are built among images by position, orientation, overlap, synchronization, and similarities in content.
- Parallelism synchronize multiple channels of information, draw analogies, enforces contrasts and comparisons.
- Parallelism strategies : pairing, orientation, simultaneity, overlap, superimposition, codes, pointer lines, sequence, adjacency, analogy.



Chapter 6: Multiples in Space and Time

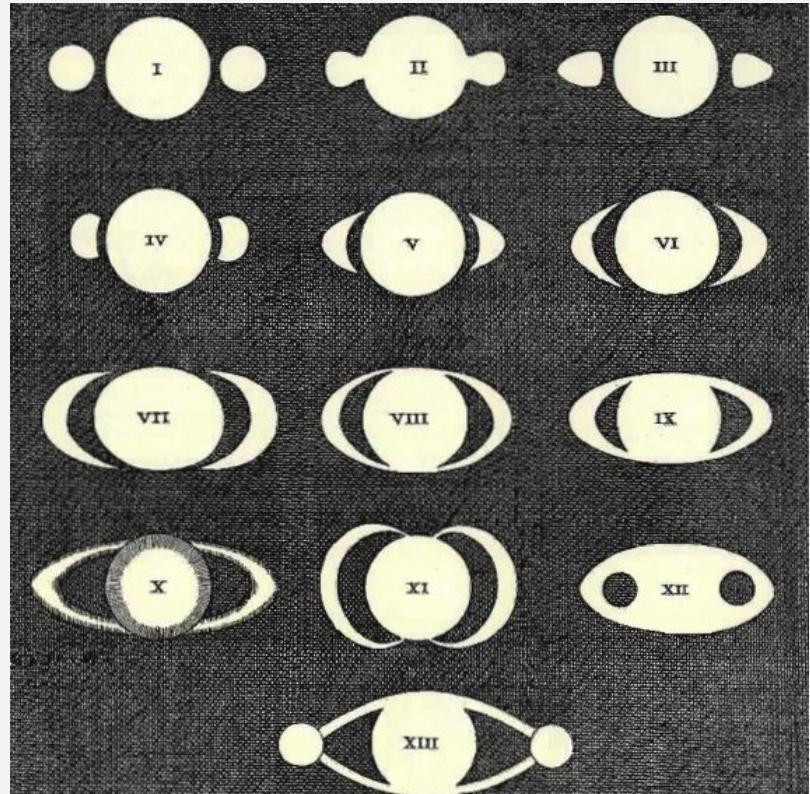
Multiple images reveal **repetition and pattern, change and surprise.**

Multiples depict comparisons, enhance dimensionality, represent and narrate sequences of motion, amplify, intensify, and reinforce the meaning of images.

Systema Saturnium

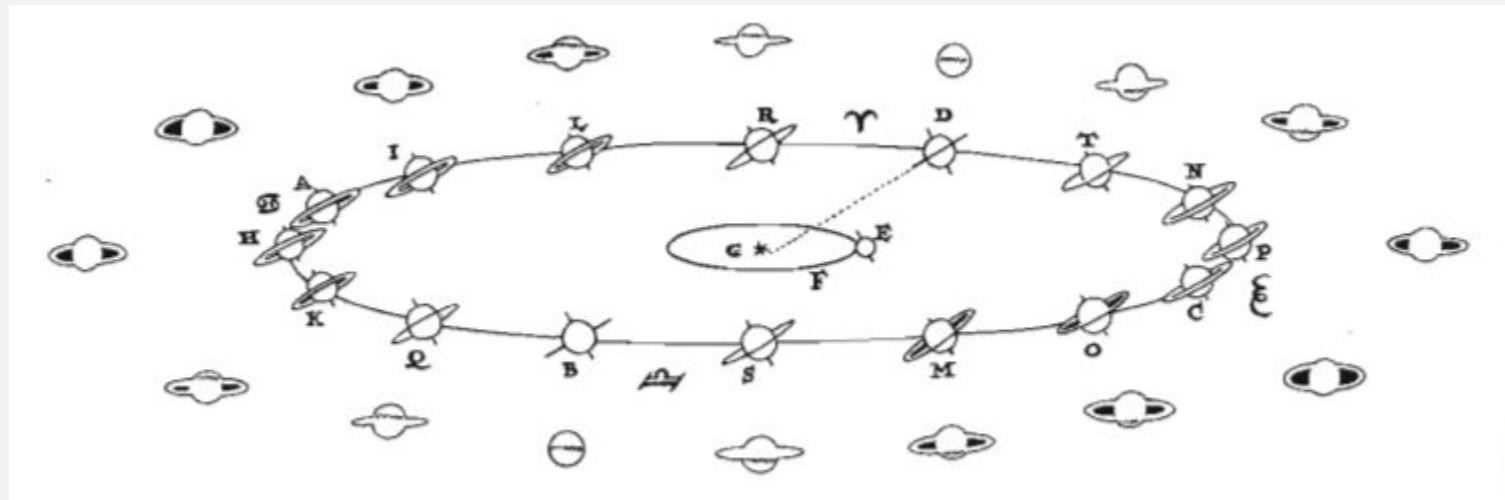
One of the most significant early applications of multiple images is, Dutch astronomer, physicist, and mathematician, Christiaan Huygens' demonstration of the true shape of Saturn rings in his publication *Systema Saturnium*.

Huygens used multiple images to record and compare previous views of Saturn and visually demonstrate his own discoveries.



Systema Saturnium

Huygens constructed a visual model of Saturn's movement in space based on his observations and given documents. Using multiple images, he was able to explain the long-run changes in the shape of Saturn, a 50-year mystery.



Systema Saturnium

However, Huygen's success poses a question:

For still images that depict movement, space replaces time as the sequencing dimension.
Sequences of still images suffer the loss of the experience of the passage of time, the loss of the rates and rhythms of the actual movement.

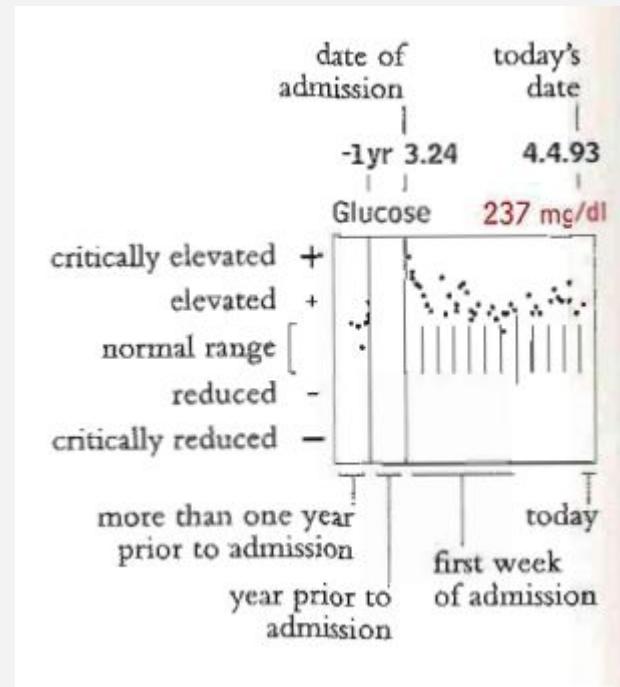
Practical functions of Multiples:

1. Help monitor and analyze multi-variable processes

Monitor and Analyze Multi-Variable Processes

Multiples provide a quick, simultaneous look at a continuous flow of different measurements.

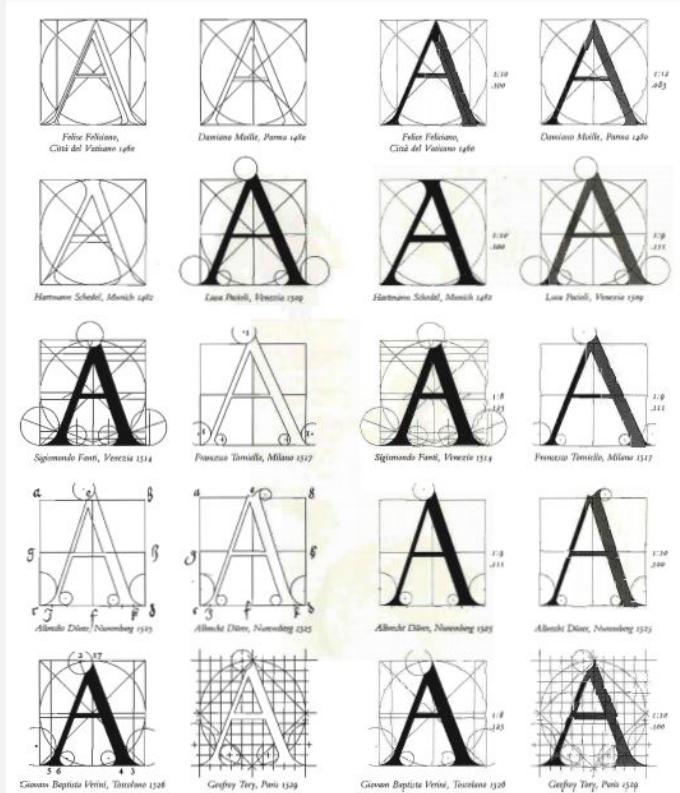
The image at right shows a graphical view of patient status, an overlay summary of the traditional medical record. This sample compiles multiple variables with different legends on both vertical and horizontal scales. Thus data are seen in short-run and long-run contexts, and in relation to other measurements.



Practical functions of Multiples:

1. Help monitor and analyze multi-variable processes;
2. Help make fine distinctions and close comparisons among similar nouns;

Fine Distinctions and Close Comparisons



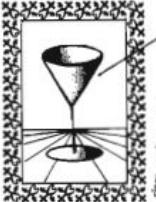
Practical functions of Multiples:

1. Help monitor and analyze multi-variable processes;
2. Help make fine distinctions and close comparisons among similar nouns;
3. Help organize and display visual information.

Organize and Display Information

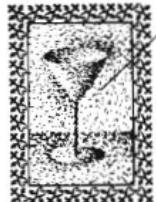
By consciously laying out and categorizing the images, multiples organize and compact complex information. Notably, such use of multiples should follow **the rule of minimalism**.

The images in the next page are two versions of an introductory tour of modern artists comparing how a wine glass would be depicted by different artists. Edward Tufte redesigned the original Ad Reinhardt version (left) to eliminate all the redundant elements and add colors essential to the demonstration.



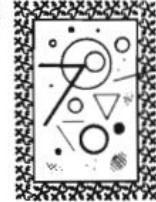
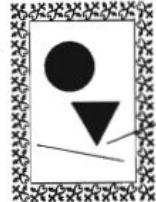
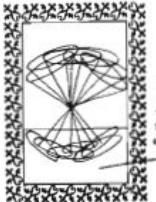
Our "classic" imitation or illusion of a glass as a solid, isolated thing in a static, empty space fixed it for all time.

"The principal person in a picture is light", Monet said. We flatten our glass to a rough, temporary "impression".



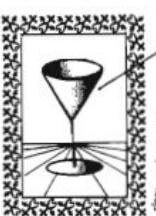
Cubism breaks our glass into bits and pushes space around until it flickers like an early movie-montage.

Séurat broke light into "points" of color (like a prism does) and your eyes mix them together at a distance.



A futurist attempt to represent a glass in motion will always look like a walking dog or a wagging tail.

The essential structural elements of all glasses and all things. (A finale and a fresh "constructivist" start.)



"Monet is an eye, but what an eye", (Cézanne) Our glass dissolves into atmosphere, like light on a haystack or mist.

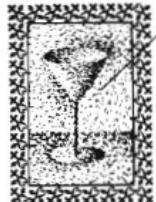
The subject-matter of Cézanne is not an apple or a person or a glass but a color-space structure and rhythm.



Our "classic" imitation or illusion of a glass as a solid, isolated thing in a static, empty space fixed it for all time.

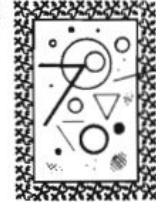
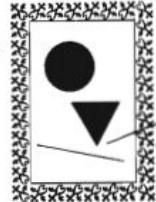
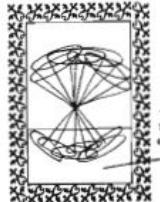
"Monet is an eye, but what an eye", (Cézanne) Our glass dissolves into atmosphere, like light on a haystack or mist.

The subject-matter of Cézanne is not an apple or a person or a glass but a color-space structure and rhythm.



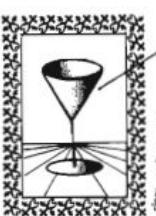
Cubism breaks our glass into bits and pushes space around until it flickers like an early movie-montage.

Séurat broke light into "points" of color (like a prism does) and your eyes mix them together at a distance.



A futurist attempt to represent a glass in motion will always look like a walking dog or a wagging tail.

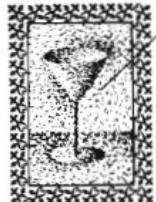
The essential structural elements of all glasses and all things. (A finale and a fresh "constructivist" start.)



Our "classic" imitation or illusion of a glass as a solid, isolated thing in a static, empty space fixed it for all time.

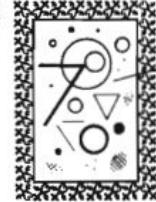
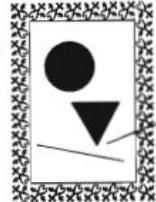
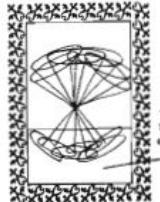
"Monet is an eye, but what an eye", (Cézanne) Our glass dissolves into atmosphere, like light on a haystack or mist.

The subject-matter of Cézanne is not an apple or a person or a glass but a color-space structure and rhythm.



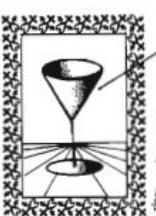
Cubism breaks our glass into bits and pushes space around until it flickers like an early movie-montage.

Séurat broke light into "points" of color (like a prism does) and your eyes mix them together at a distance.



A futurist attempt to represent a glass in motion will always look like a walking dog or a wagging tail.

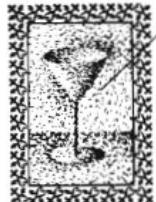
The essential structural elements of all glasses and all things. (A finale and a fresh "constructivist" start.)



Our "classic" imitation or illusion of a glass as a solid, isolated thing in a static, empty space fixed it for all time.

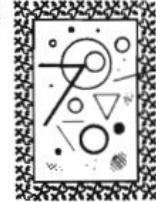
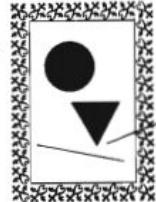
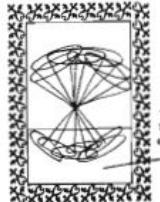
"Monet is an eye, but what an eye", (Cézanne) Our glass dissolves into atmosphere, like light on a haystack or mist.

The subject-matter of Cézanne is not an apple or a person or a glass but a color-space structure and rhythm.



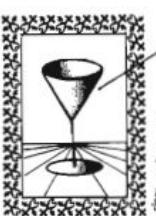
Cubism breaks our glass into bits and pushes space around until it flickers like an early movie-montage.

Séurat broke light into "points" of color (like a prism does) and your eyes mix them together at a distance.



A futurist attempt to represent a glass in motion will always look like a walking dog or a wagging tail.

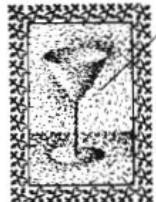
The essential structural elements of all glasses and all things. (A finale and a fresh "constructivist" start.)



Our "classic" imitation or illusion of a glass as a solid, isolated thing in a static, empty space fixed it for all time.

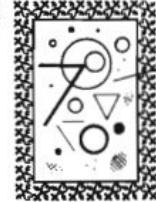
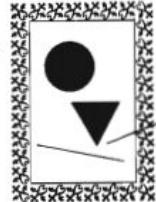
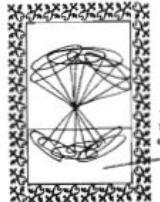
"Monet is an eye, but what an eye", (Cézanne) Our glass dissolves into atmosphere, like light on a haystack or mist.

The subject-matter of Cézanne is not an apple or a person or a glass but a color-space structure and rhythm.



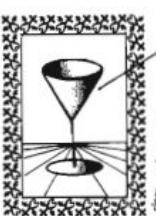
Cubism breaks our glass into bits and pushes space around until it flickers like an early movie-montage.

Séurat broke light into "points" of color (like a prism does) and your eyes mix them together at a distance.



A futurist attempt to represent a glass in motion will always look like a walking dog or a wagging tail.

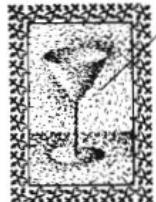
The essential structural elements of all glasses and all things. (A finale and a fresh "constructivist" start.)



Our "classic" imitation or illusion of a glass as a solid, isolated thing in a static, empty space fixed it for all time.

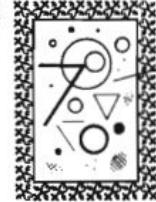
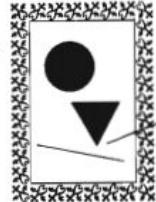
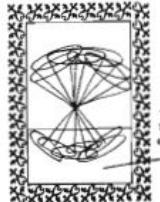
"Monet is an eye, but what an eye", (Cézanne) Our glass dissolves into atmosphere, like light on a haystack or mist.

The subject-matter of Cézanne is not an apple or a person or a glass but a color-space structure and rhythm.



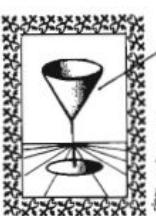
Cubism breaks our glass into bits and pushes space around until it flickers like an early movie-montage.

Séurat broke light into "points" of color (like a prism does) and your eyes mix them together at a distance.

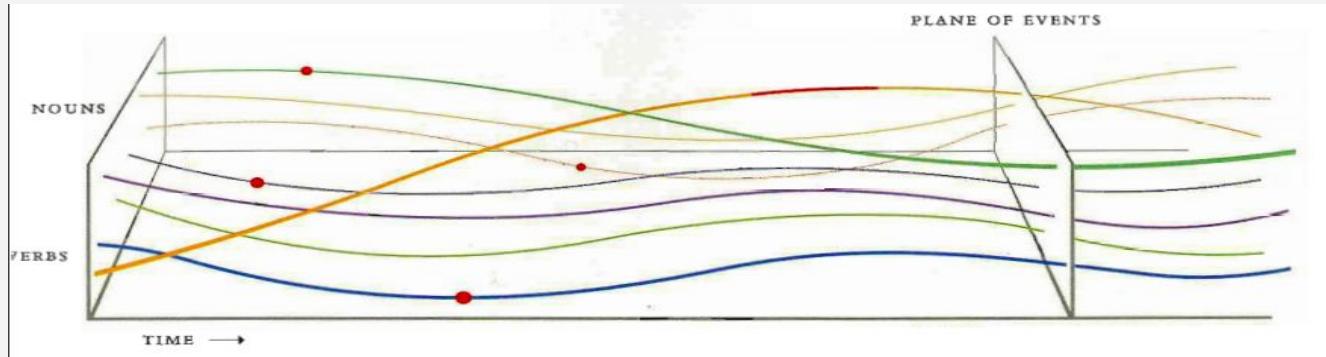


A futurist attempt to represent a glass in motion will always look like a walking dog or a wagging tail.

The essential structural elements of all glasses and all things. (A finale and a fresh "constructivist" start.)



Chapter 7: Visual Confections: Juxtapositions from the Ocean of the Streams of story



Plane: an event made by the intersection of nouns and verbs

Strand: a storyline

Red line: a short period or an image sequence in a storyline

Red dot: a visual confection

Visual Confections

Definition:

structures that consist of a multiplicity of image events that **illustrate an argument, organize information, show and enforce visual comparisons**;

they should be **transparent, straightforward, obvious, natural, ordinary, conventional with no need for hesitation or questioning on the part of the viewer**

Illustrate an Argument

The confection portrays the confectionary title. It envisions the direct message and the hidden information behind the text, thus completing the true meaning of an argument.

The 1630 book about sunspots *Rosa Ursina Sive Sol* (Rose, Bear, or the Sun) has a title page that depicts a rose garden and cave house with five bears occupied with playing and observing sunspots. Roses and bears are symbols of the author's patrons.

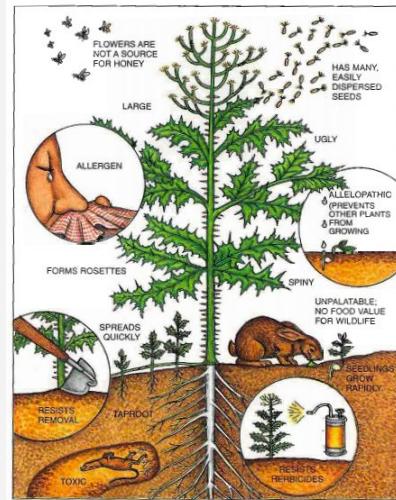
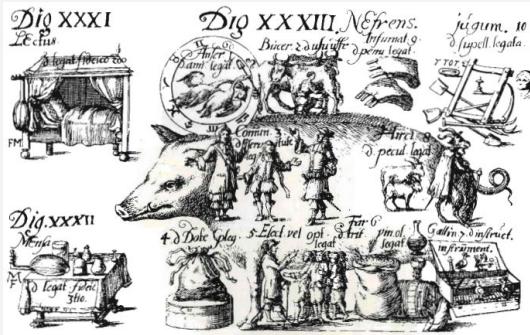


Organize Information

The confection serves as a **visual list**.

A visual list catalogues and lists necessary information with images and annotations. Confections usually display two kinds of visual lists:

1. Display individual key points
 2. Show the relationship between interconnected points



Construct Confections

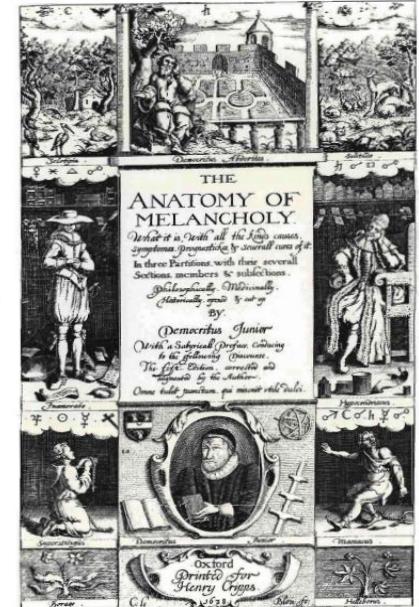
Compartments and **imagined scenes** are the two strategies to arrange and organize the images gathered for confections.

Compartments

The Compartments strategy is self-explanatory. It uses **compartments, grids to organize the images.**

On the right is The Anatomy of Melancholy. Its title page consists of ten compartments each corresponding to a stanza in the book's prefatory poem.

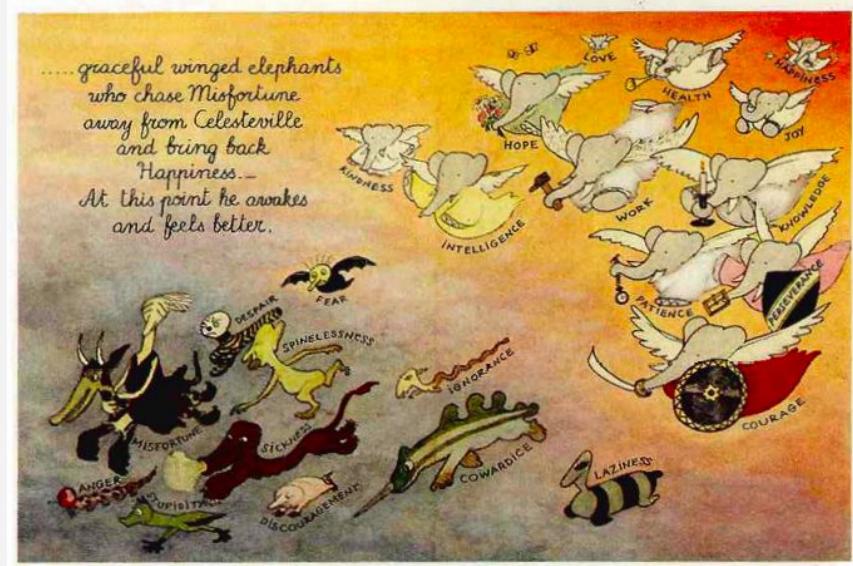
2	1	3
4	THE ANATOMY OF MELANCHOLY <i>Where it is, what all the signs, symptoms, propria, & severall cures of it, in three Partitions with three several Sections, members & sub-sections. Philosophically, Medicinally, Historically, & Critically. By Democritus Junior, M.D. a Sub-scholar of Professor Gougen, to the following Owners: The Right Honourable the Lord Brouncker, Earl of Bath, & the Honourable Sir Francis Bacon, Lord Chanceller, & the Honourable Sir Francis Bacon, Lord Chanceller, &c. Printed for Henry Cotes, at the Signe of the Red Roome. 1628.</i>	5
6	10	7
8	9	



Imagined Scenes

With imagined scenes, the confection creates an imaginary environment for the individual images and symbols. The scene should reflect the central idea of the story.

On the right is the Babar's Dream by Jean de Brunhoff where he depicts an archetypal battle between good and evil. Each quality is listed here within a curated scene where virtues are championed.



Limitations

The limitation of confections comes from the thinness of content, flimsy logic, poverty of annotating text, and heavy-handed arrangement of structure. Confections stand or fall depending on **how deeply they illuminate ideas or the relations between ideas**. Behind an intriguing confection is an **intriguing concept**.

Interface Design

As a successful device for visual confections, computers can quickly assemble and display confections to serve immediate, local, unique purposes.

On the right is Tufte's interface design for a museum website. The context for this confection is **content-oriented** and **user-oriented**. Therefore, it's free of icons and decorative elements. The labels are clearly laid out and images serve as the substance.

Touch any item for more information.

English | Español | Deutsch | Français | Italiano | 中文 | 日本語

INFORMATION	FACILITIES	PERMANENT WORKS
art information	cascade espresso bar	American Painting
bookstores	checkroom	British Painting
calendar	concourse buffer	Dutch Painting
copyrights	elevators	European Sculpture and Decorative Arts, 14th–19th century
film programs	facility for disabled	Flemish Painting
gallery talks	first aid	French Painting and Sculpture
guides	garden cafe	German Painting
hours	lost and found	Information Design
photography	restaurants	Italian Painting and Sculpture
security	stairways	Netherlandish Painting
slide lectures	telephones	Spanish Painting
special programs	terrace cafe	Twentieth-century Painting and Sculpture
Sunday concerts		
tours		
wheelchairs/strollers		

SPECIAL EXHIBITIONS, NOVEMBER 2004

	Architectural Designs of Humphry Repton
	Henri Matisse: <i>Les perrières</i> , 1919
	Henri Rousseau: French Winged Confections
	Susan Rothenberg: Recent Paintings
	The Great Age of Tedious British Watercolors: 1750 to 1880
	Information Designs of Charles Joseph Minard

Interface Design

Direct measurement of content and non-content provides a quantitative assessment of an interface:

1. **The proportion of space** devoted to content , to computer administration, and to blank space;
2. **Character counts and typographic density;**
3. **The number of computer commands** immediately available