Accenture / Fjord Dublin (via teleconference) 07 July 2020

Systems Theory in Design
Design Systems

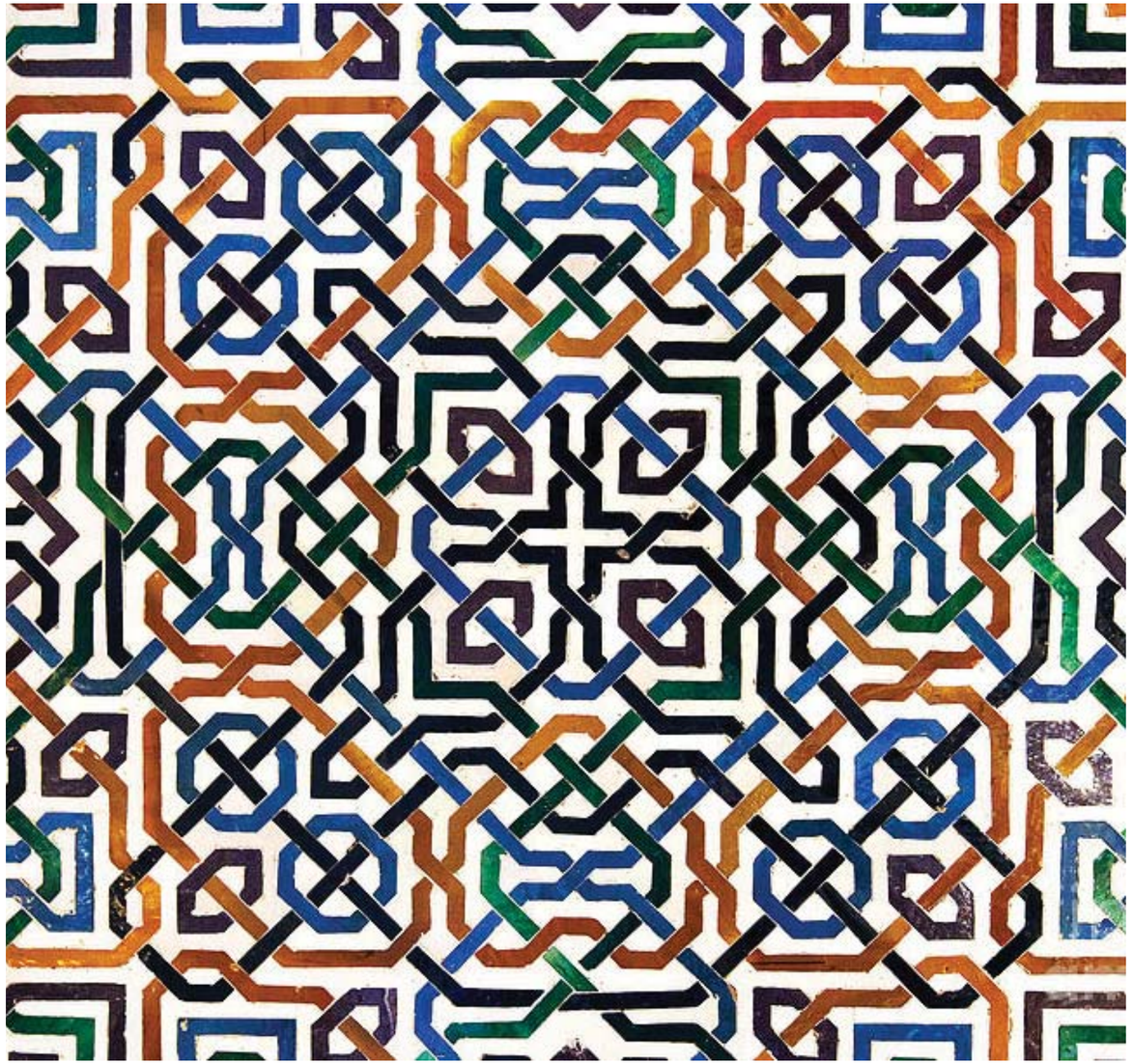
Hugh Dubberly
Dubberly Design Office

For hundreds of years,
a few designers of each generation
created "systems" to aid their work
and to guide the work of others.

The Alhambra

Granada, ~1250

Islamic tile mosaics that form complex mathematical patterns symbolizing order and unity.



Münster Cathedral Cloister

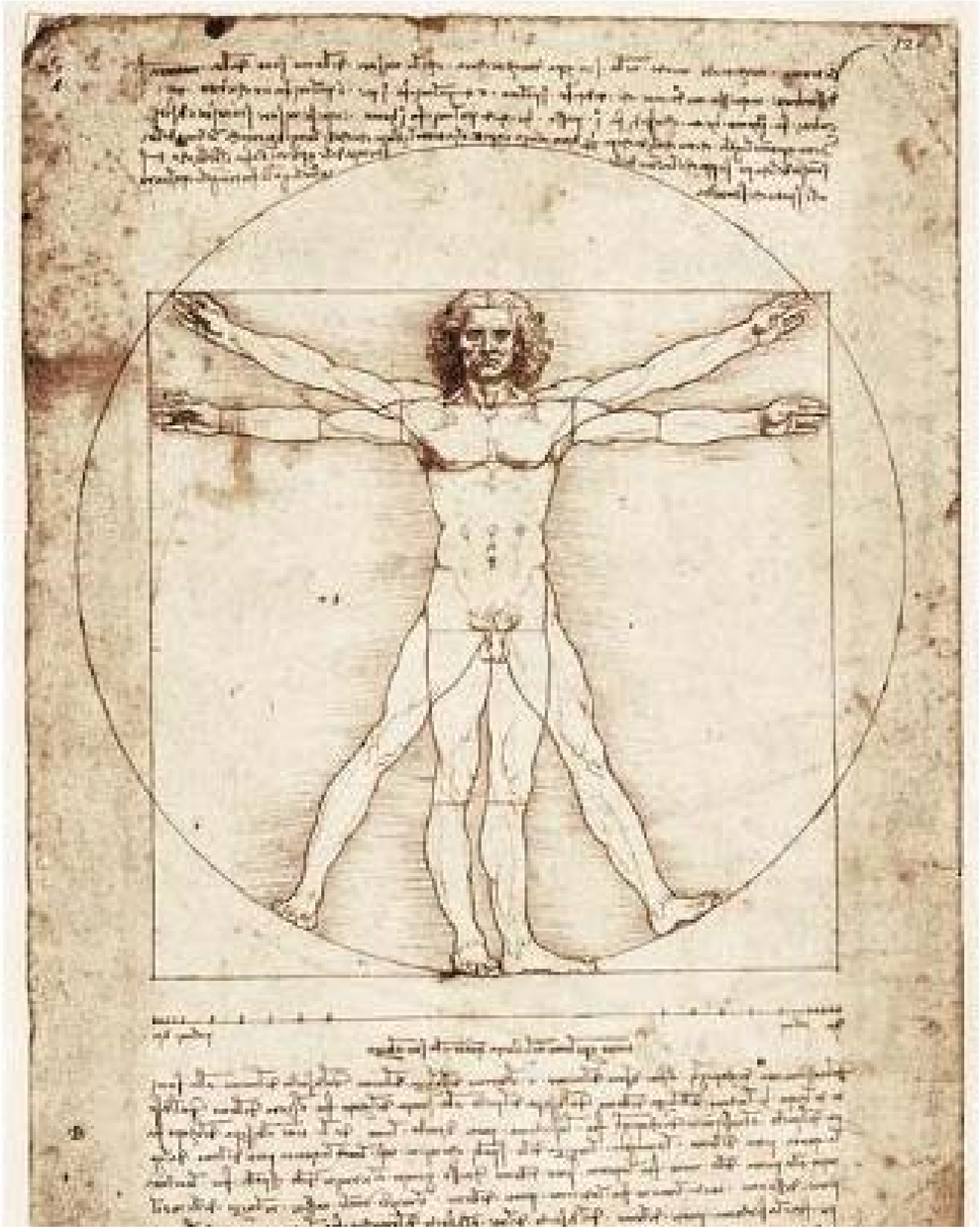
Basel, ~1421

16 different patterned designs within an arch which adheres to the same constraints and variables.

Vitruvian Man

Leonardo da Vinci, 1490

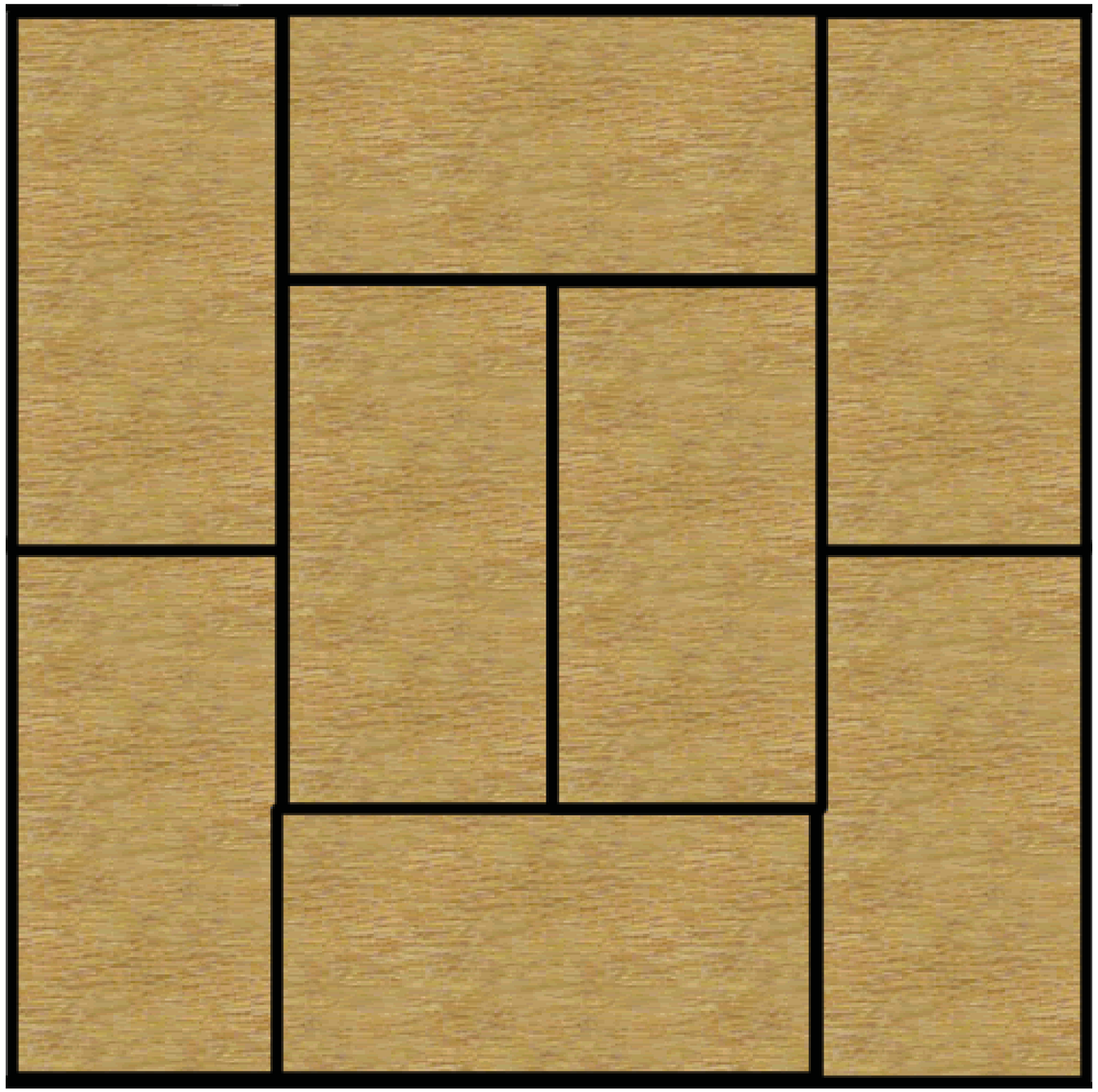
A drawing depicting the correlations of the human body's proportions through application of mathematics and architecture.



Tatami Mats

Japan, ~1650

Flooring material in traditional Japanese-style rooms that are arranged following a set of rules.



Action Office

Herman Miller, 1964

Product line of furniture components that could be combined and recombined over time according to demands.

Heller Dinnerware Set

Massimo & Lella Vignelli, 1964

A stackable dinnerware set that can be stored as a compact group to maximize storage space and maintains a seamless design.

Oxo Good Grips

Sam Farber, 1989
Introduced the concept of Universal Design to mass retail through the launch of kitchen tools.

IKEA Furniture Hacking

2006

An IKEA hack is any modification to an original IKEA product which can range from reassembly to repurposing items to create something new.

BEFORE

Definition

A “Design System” is

- a collection of **reusable components** (elements)
- **rules for their use** (relationships)
- procedures for extending the system (modifying its purpose)

Design systems are also known as
construction sets, frameworks, grids, libraries, modules, programmes, templates, toolkits

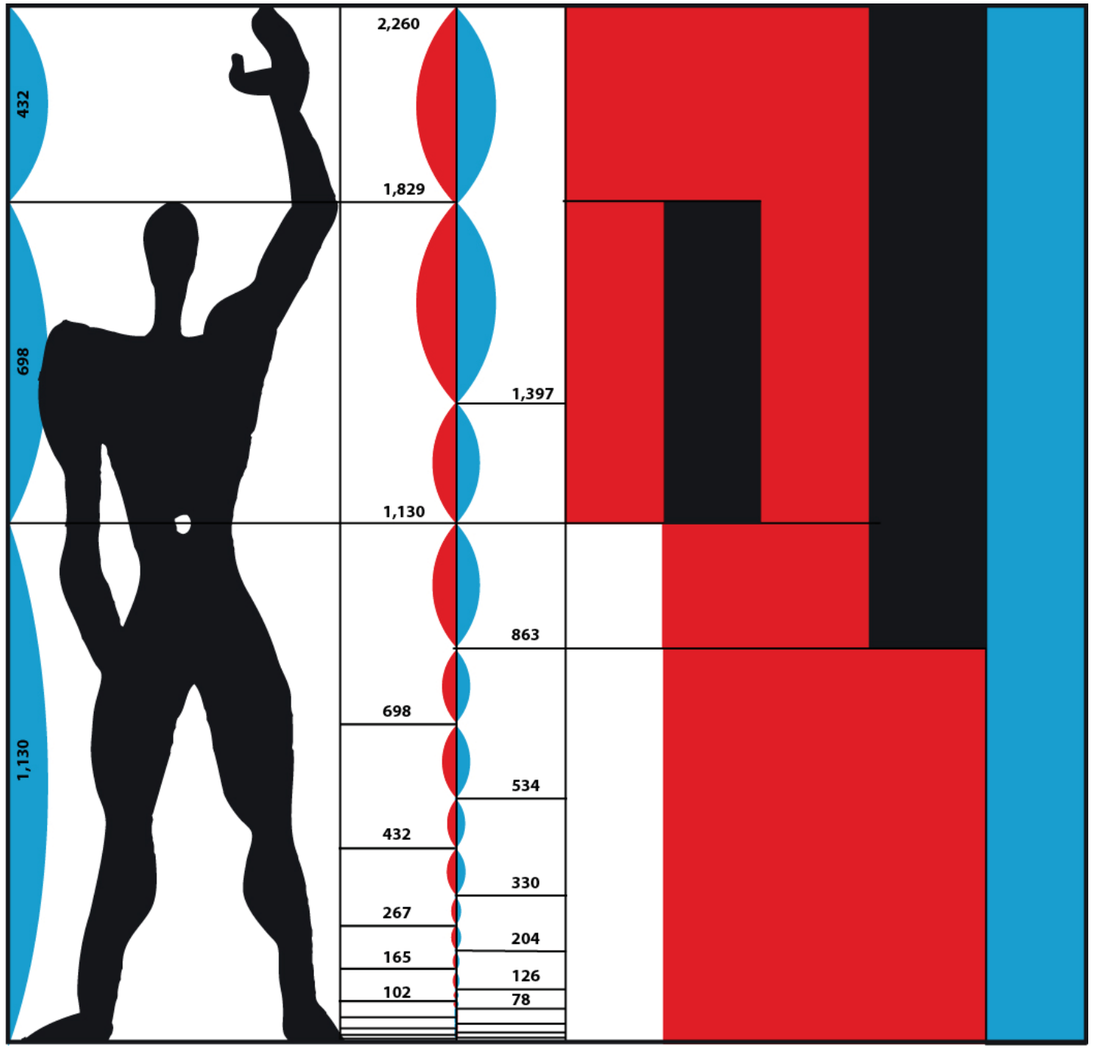
**In the mid-twentieth century,
design systems flourished amid the rise of modernism,
which aspired to make design “rational”.**

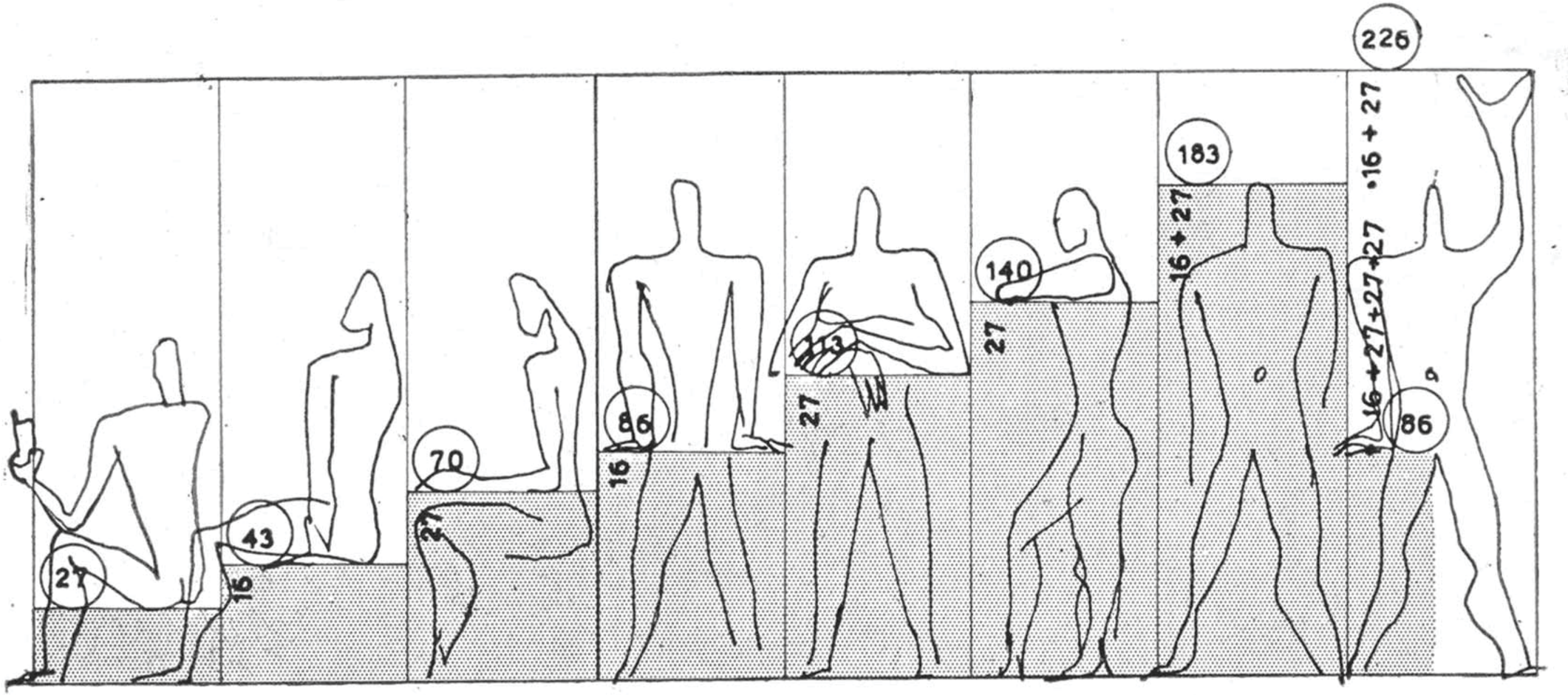
Four texts stand out as classics of design systems theory.

Le Modulor

Le Corbusier, 1950

System of proportions to combine human form, architecture and beauty.




27
43
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86
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113
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140
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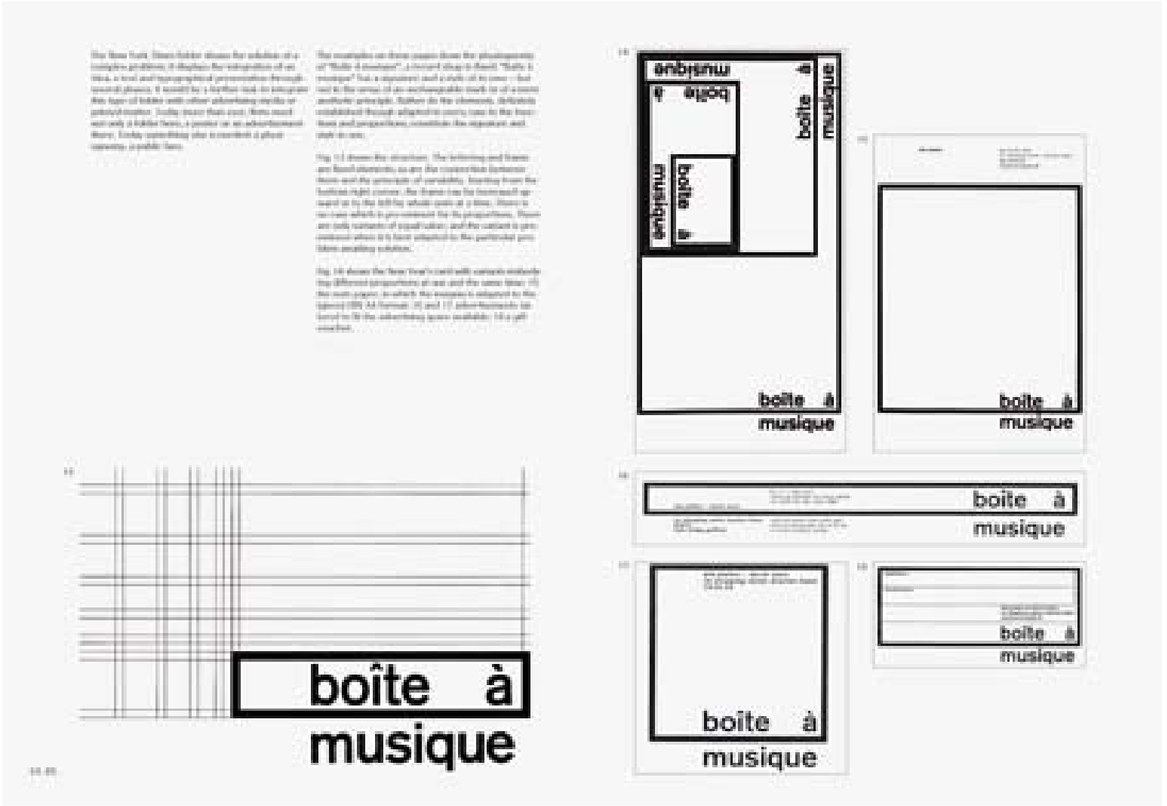
86

Designing Programmes

Karl Gerstner, 1964

An early collection of examples of design systems, which he called “programmes”.



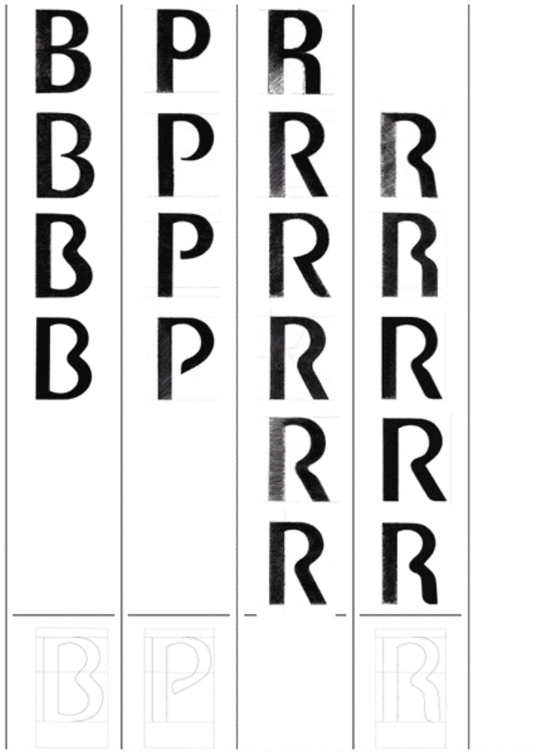
The figure below shows early sketches of the new typeface, drawn with sharp-tipped crayons. The point was to design the basic types in accordance with the premises I applied. On this page I specifically attempted to get a grasp of an old problem of the typographical art, namely, how to avoid the unwanted space after an r. This effort was in vain.

The final product is shown in black, not far from the first drawings. In other words, from the very outset I was cognizant of most of the features of the new font. But working out the "more difficult" types turned into a years-long, time-consuming struggle.

The examples B, P and R. On the uppermost line are the more conventional permutations. But what I had in mind was an open design for all types, and one that avoided punches, that is, closed interior spaces. Here several, by no means all, alternatives are presented. It was gruelling work, but, thank goodness, not all letters of the alphabet were so intractable as these three, whose ultimate computer drawings were O.K.ed by Bernd Möllenstädt (bottom line) after 20 years of work.

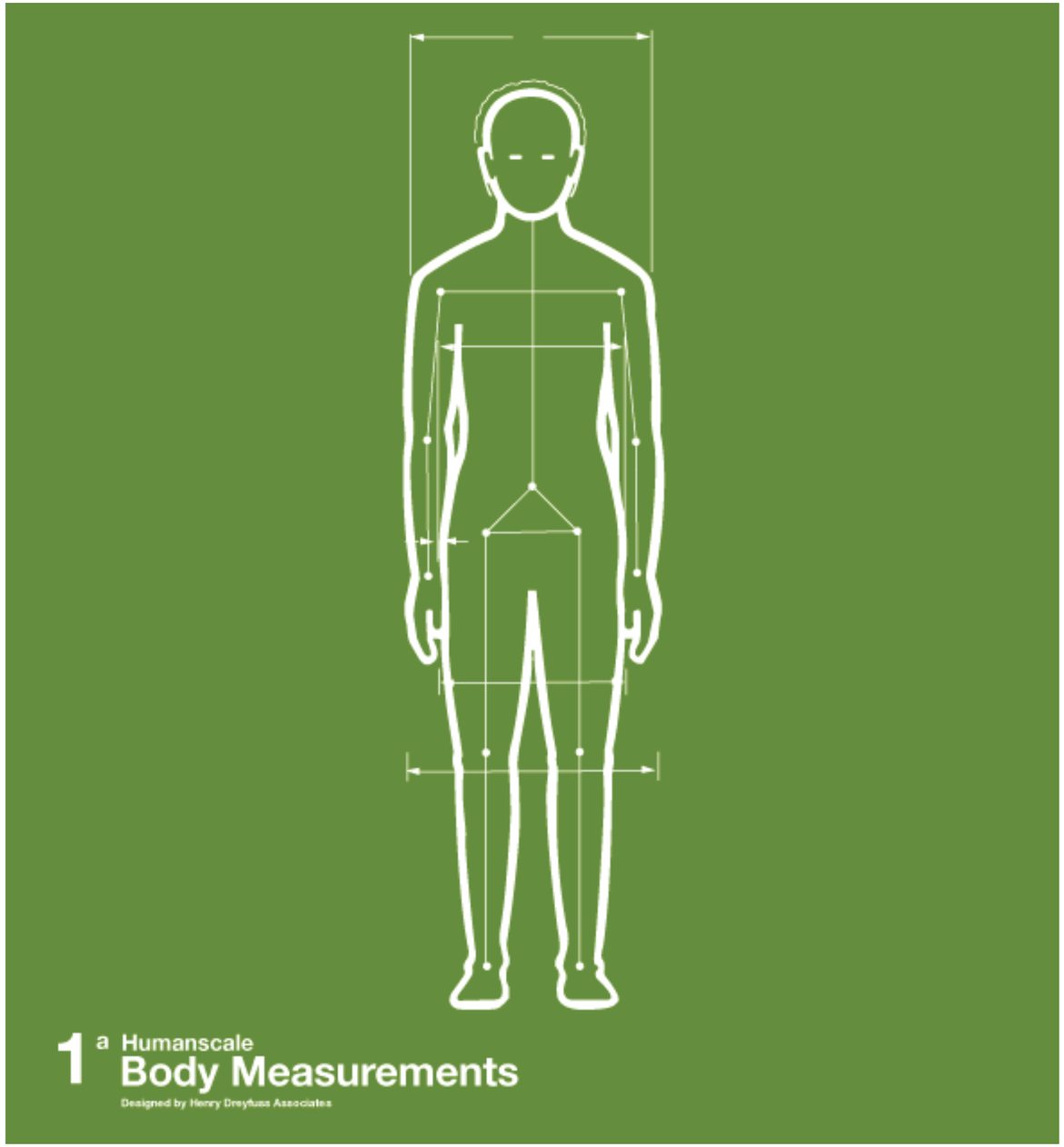
After completing work on the draft, in keeping with the technical advances achieved in the meantime, the types were supposed to be programmed further and made available to the user through the computer; in narrowed, widened, thin, bold versions, shrunk and enlarged, in addition to further differentiations such as any angle of italicization.

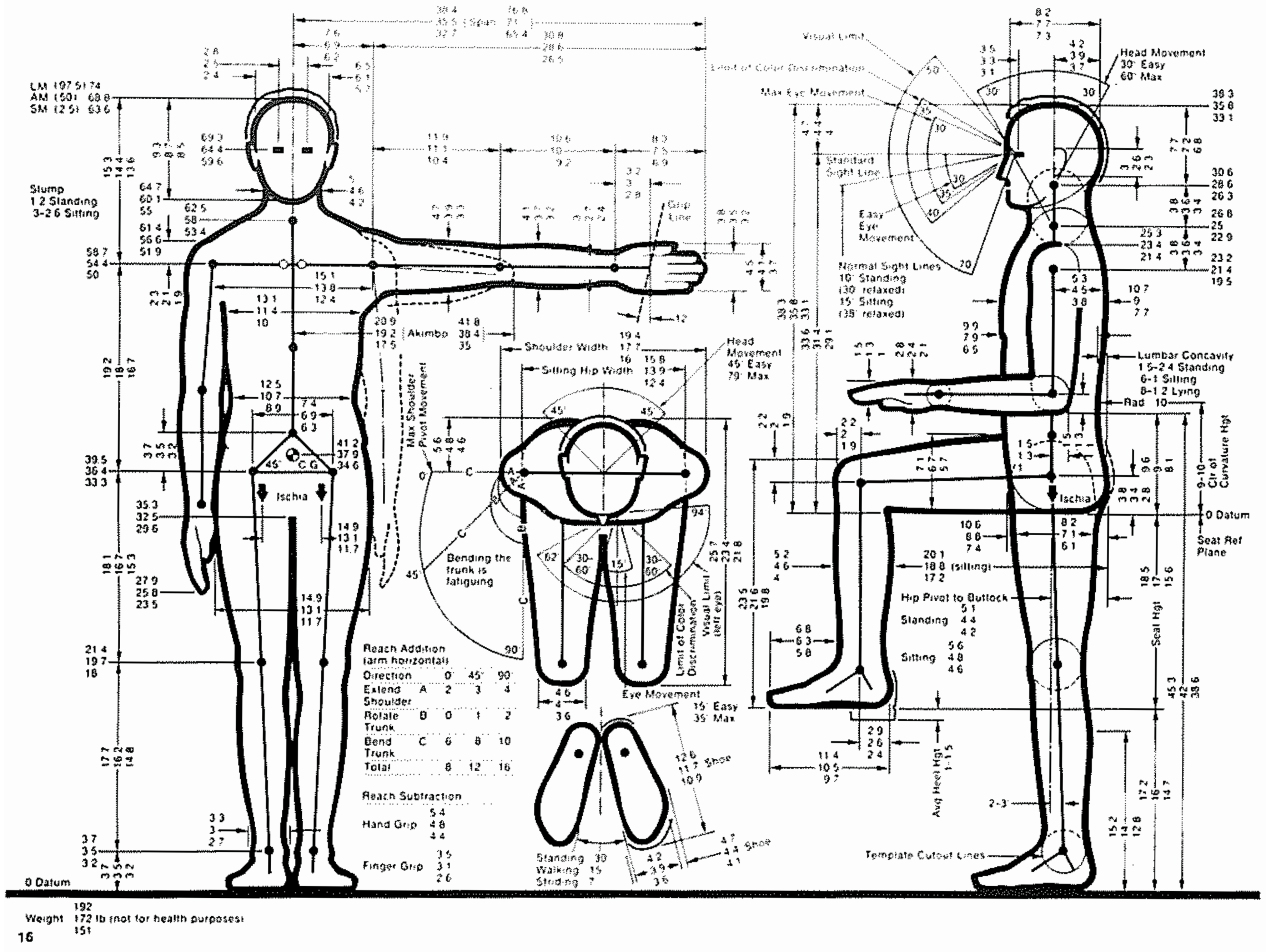
44.45

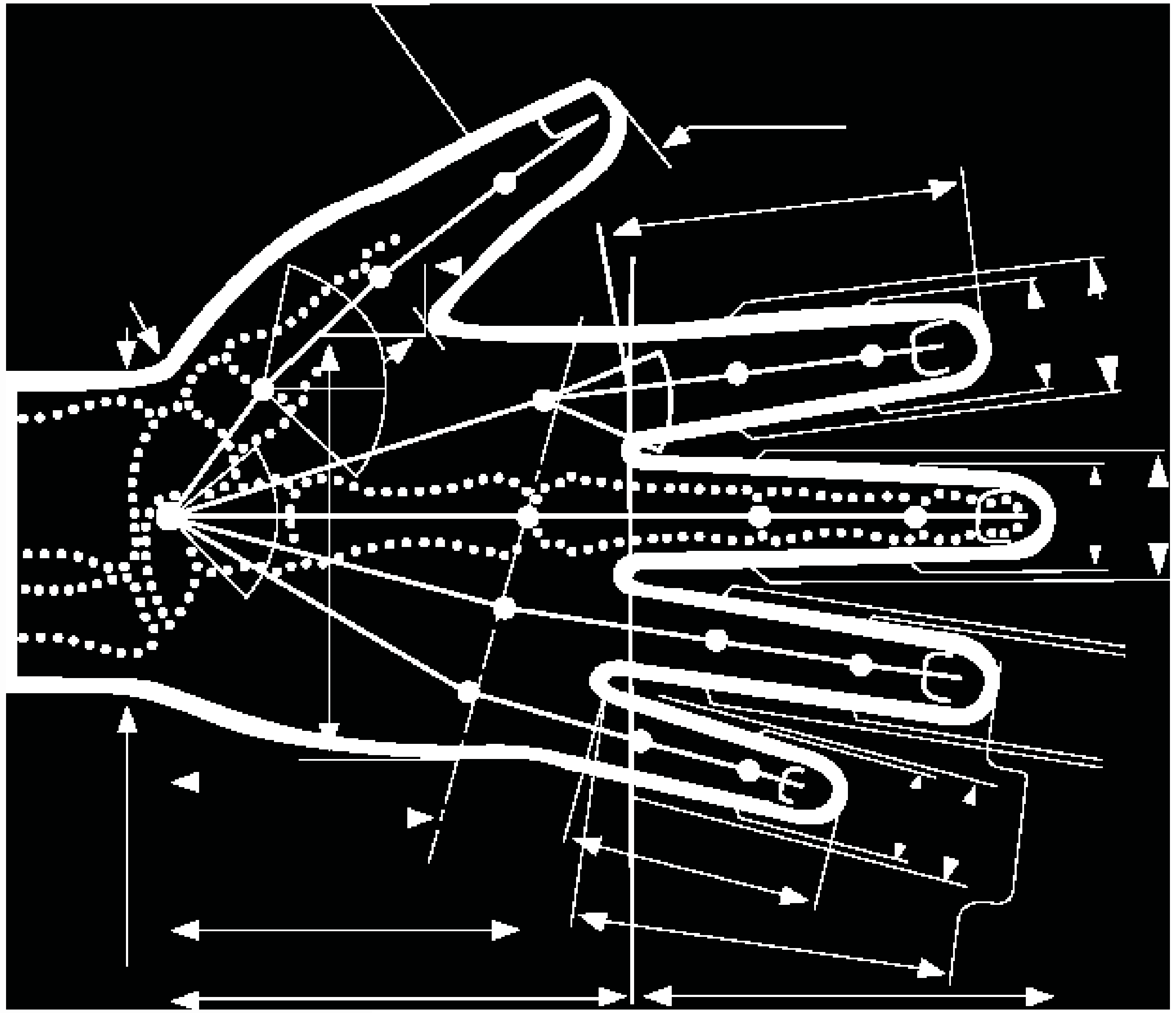


Humanscale

Henry Dreyfuss Associates, 1974
Reference guide for designing objects, interactions, and environments for humans. It incorporates the philosophy that all good design should be human-centered and reflect systematic thinking.

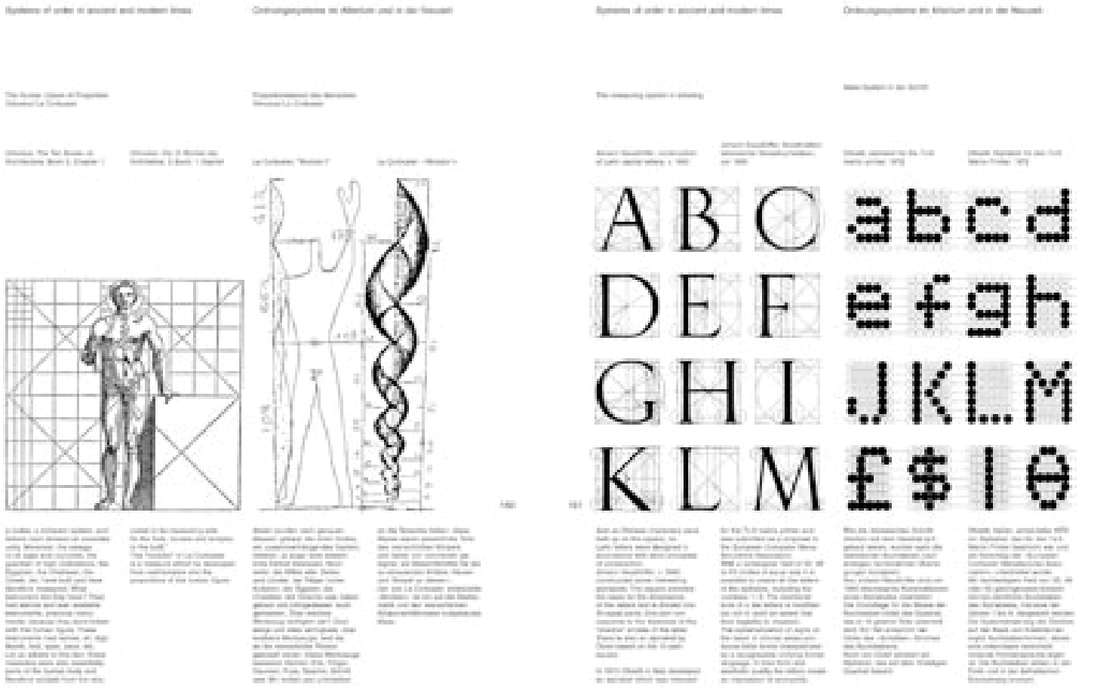



Stump
Head Movement
Standard Sight Line
Easy Eye Movement
Normal Sight Lines
Akimbo
Shoulder Width
Sitting Hip Width
Max Shoulder Pivot Movement
Bending the trunk is fatiguing
Lumbar Concavity
Ischia
0 Datum
Seat Ref Plane
Hip Pivot to Buttock
Standing
Sitting
Reach Addition (arm horizontal)
Reach Subtraction
Hand Grip
Finger Grip
Eye Movement
Template Cutout Lines
Seat Hgt
Avg Heel Hgt
Limit of Color Discrimination
Visual Limit (left eye)
Weight 172 lb (not for health purposes)
16



Grid Systems

Josef Müller-Brockmann, 1981
Visual communication manual that provides guidelines and rules for the function and use for grid systems.


Systems of order in ancient and modern times
Ordnungssysteme im Altertum und in der Neuzeit
Systems of order in ancient and modern times
Ordnungssysteme im Altertum und in der Neuzeit
ABC
DEF
GHI
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abcd
efgh
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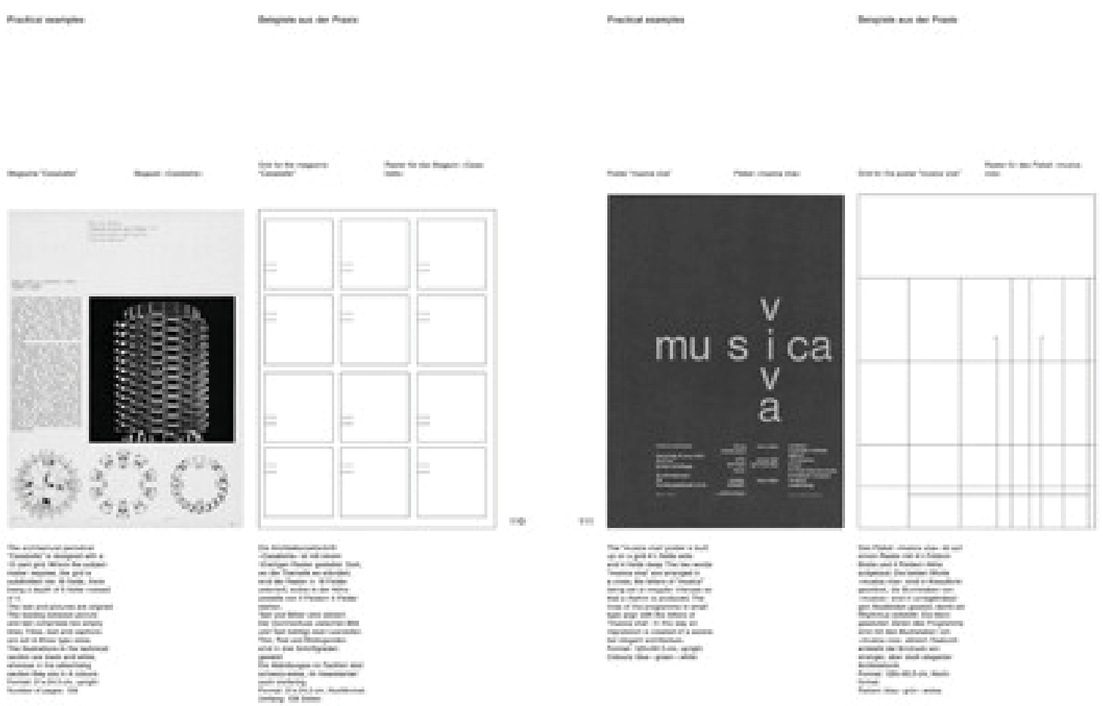

Practical examples
Beispiele aus der Praxis
Practical examples
Beispiele aus der Praxis
mu s i ca
v
v
a

Toward a new “theory” of design systems

Design system: theme + variation; coherence + flexibility

By creating a design system
a designer envisions more than one solution;
A design system outlines a “solution space”.
They define a theme and how it may be varied.

Thus, design systems enable flexibility
while ensuring the coherence of a set of finished artifacts.

For audiences (so-called users),
design systems promise,
“These items are related.
They come from the same source.
They work together.”

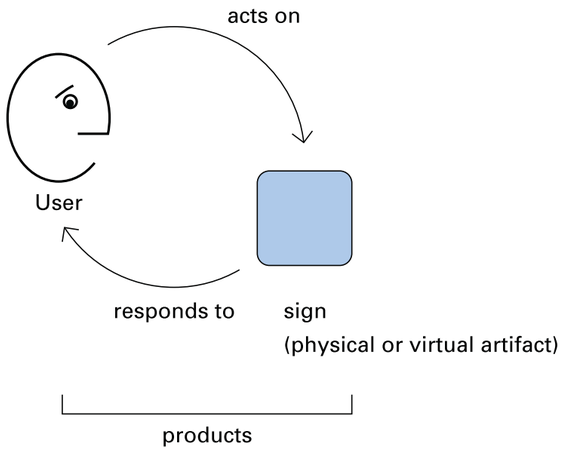
“If you’ve seen this system before,
you pretty much know what to expect,
even if this instance is new to you.”

For designers (and their clients),
design systems are tools
for ensuring consistent delivery
across time, space, and channel.

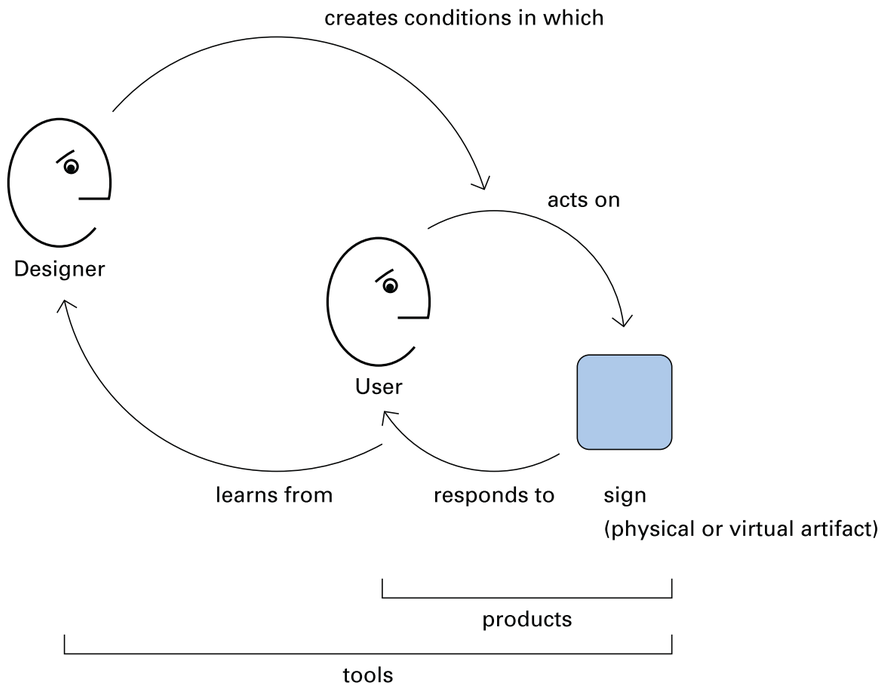
Design systems are also tools
for managing at scale —
helping ensure a shared vision
while enlisting many collaborators.

Design systems create conditions in which others can design.

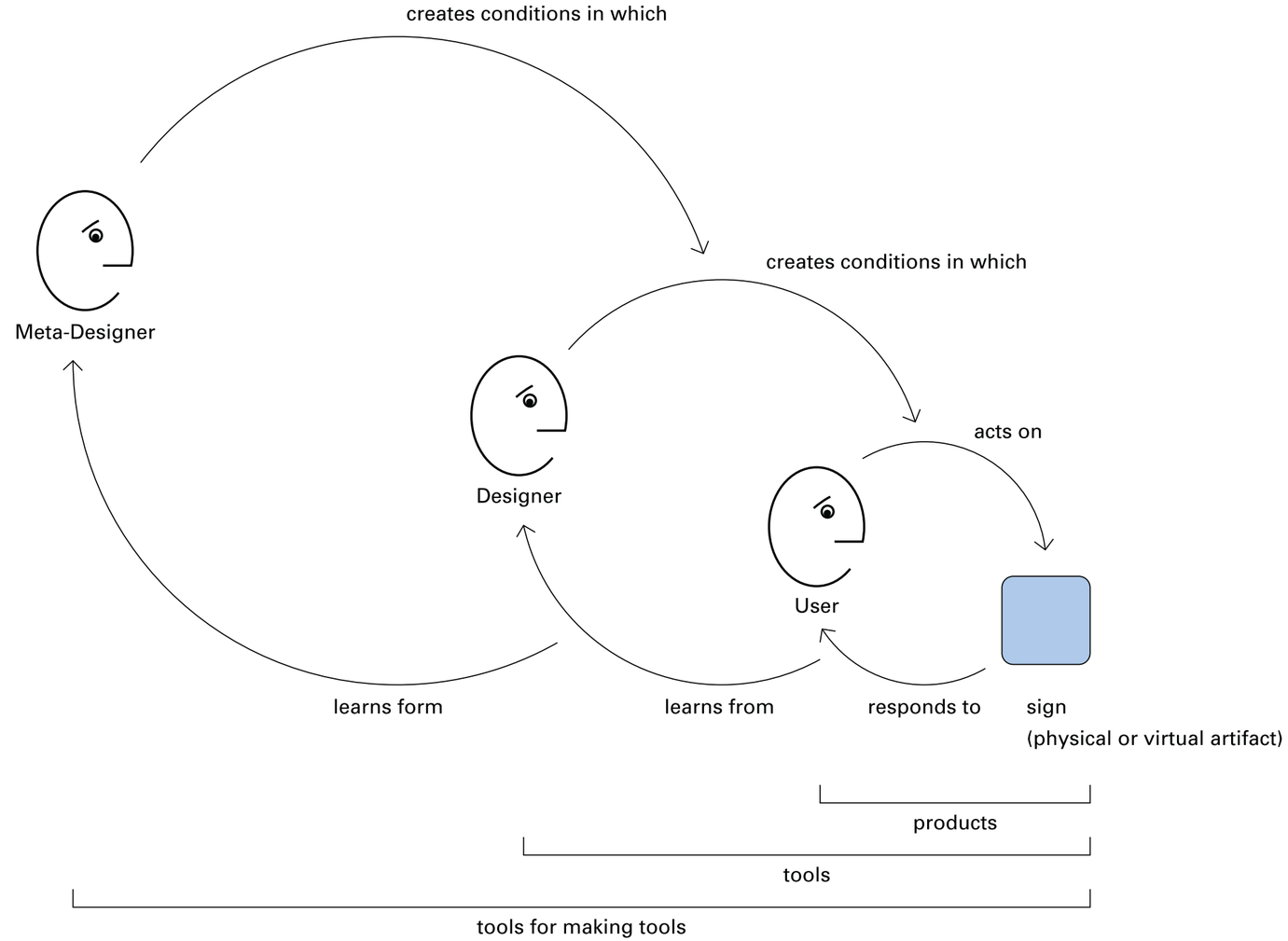
User interacting with artifact



Designer interacting with
User interacting with artifact



Meta-Designer interacting with
Designer interacting with
User interacting with artifact



Era analysis of design systems

	Star-driven 1900–1960	Consultant binders 1960–2010	Integrated systems 2010–
Scale	Individual, maestro	Local team, centralized	Distributed teams, federated
Participants	Hero only	Invite only	Everyone’s invited
Structure	Expert “professional”	Design “police”	Smart tools
Location	Memory, oral	Printed	On-line
Elements	Archive	Curated samples	In code (libraries for designers + programmers)
Rules	Ad hoc	Written	Logic built-in
Change process	Ad hoc	Re-publish	Committee

The third-era of design systems has begun to change design practice.

With the rise of software, designers again focused on modular systems.

"Principles such as simplicity and modularity are the stuff of software engineering; ... It means that when you want to change the system, you can with luck in the future change only one part, which will only require you to understand (and test) that part. This will allow other people to independently change other parts at the same time."

Principles of Design

Simplicity

Modular Design

Being part of a Modular Design

Tolerance

Decentralization

— **Tim Berners-Lee**, "Principles of Design," 1993

Reusable modular systems (and models that describe them) have become the new basic “unit of work” in design practice.

Apple Human Interface Guidelines, Bruce Tognazzini et al. 1978.
Making It Macintosh, Lauralee Alben, Jim Faris, & Harry Saddler, 1993.

Yahoo! User Interface Library (YUI), Thomas Sha, 2006.
JQuery UI, John Resig, 2007.

Bootstrap, CSS framework, Mark Otto & Jacob Thorton, 2011.
Atomic Design, Brad Frost, 2013.
React, JS library, Jordan Walke, 2013.
Google Material Design System, Matias Duarte et al., 2014.

These design systems have become an integral part of software development.

Cloud hosting, e.g., Amazon Web Services (AWS), 2006 (NB Bezos 2002 memo)
Libraries, e.g., Ruby on Rails, 2004; Node.js, 2009
Version Control, e.g., GitHub, 2008 (NB Torvalds, 2005)

Package Managers, e.g., NPM, 2010
Containerization, e.g., Docker, 2013
AI platforms, e.g., Google, Microsoft, 2019

With reusable modular systems, designing becomes “meta” — our frame of designing shifts to stewardship and scaffolding.

First-order design

=

Correcting an error

=

Solving your problem

- prescriptive (here’s what to do)
- presumptive (I / we know what you need)

Second-order design

=

Learning what matters

=

Creating conditions for systems to emerge, in which others can design [for] themselves

- generative (allowing the “seeing” [defining] of what we will do)
- generous (let us see what we decide we need)

A partial history of design systems...

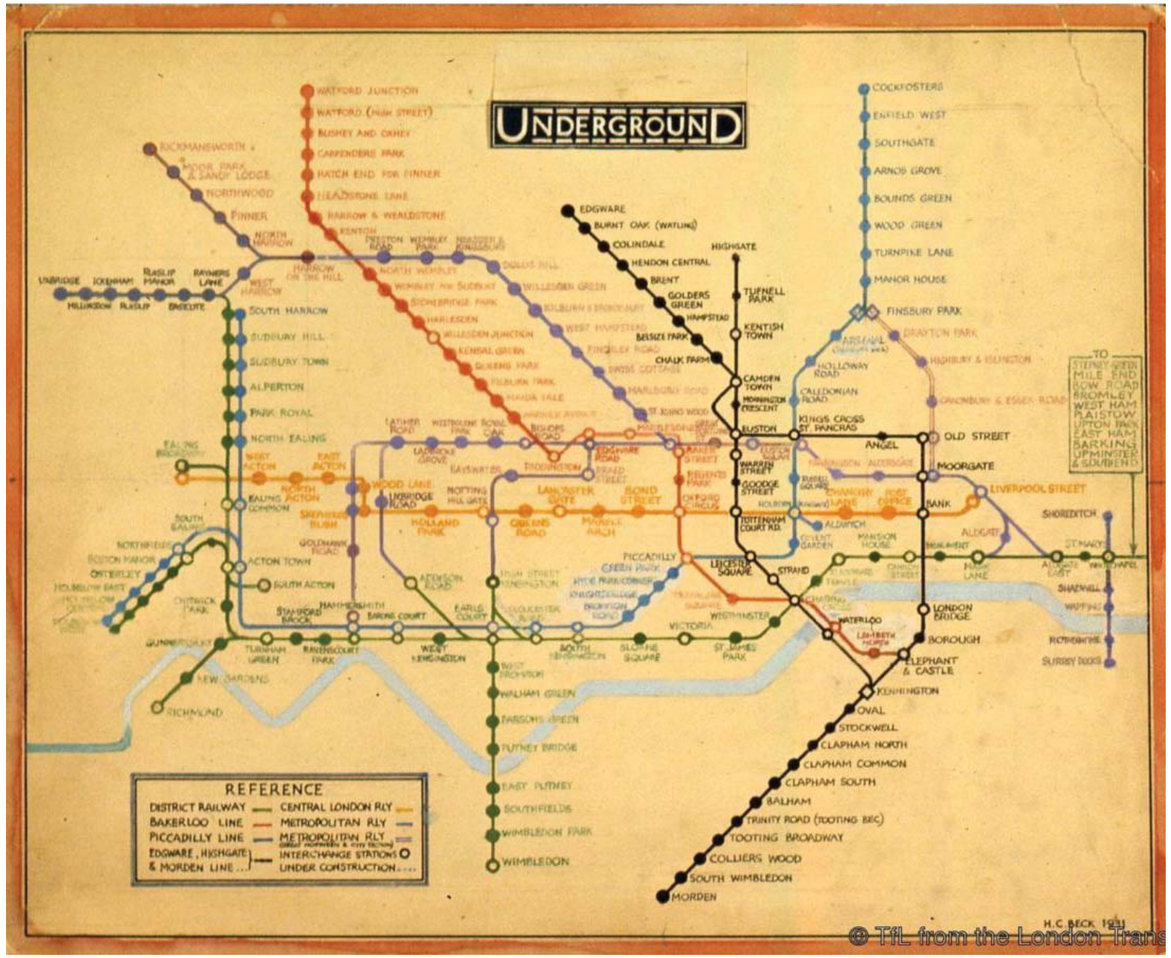
Design systems as **way finding.**
as **symbol systems.**
as **identity**.
as **type.**
as **typography.**
as **building.**
as **art process.**
as **artifact.**
as **toys.**
as **games.**
as **graphical user interface (GUI).**
as **genetic algorithms.**

Design systems as **way finding.**

London Underground Map

Harry Beck, 1931

Diagrammatic map which includes topology that communicated the networking of the London Underground on a circuit system.



London Underground Signage System

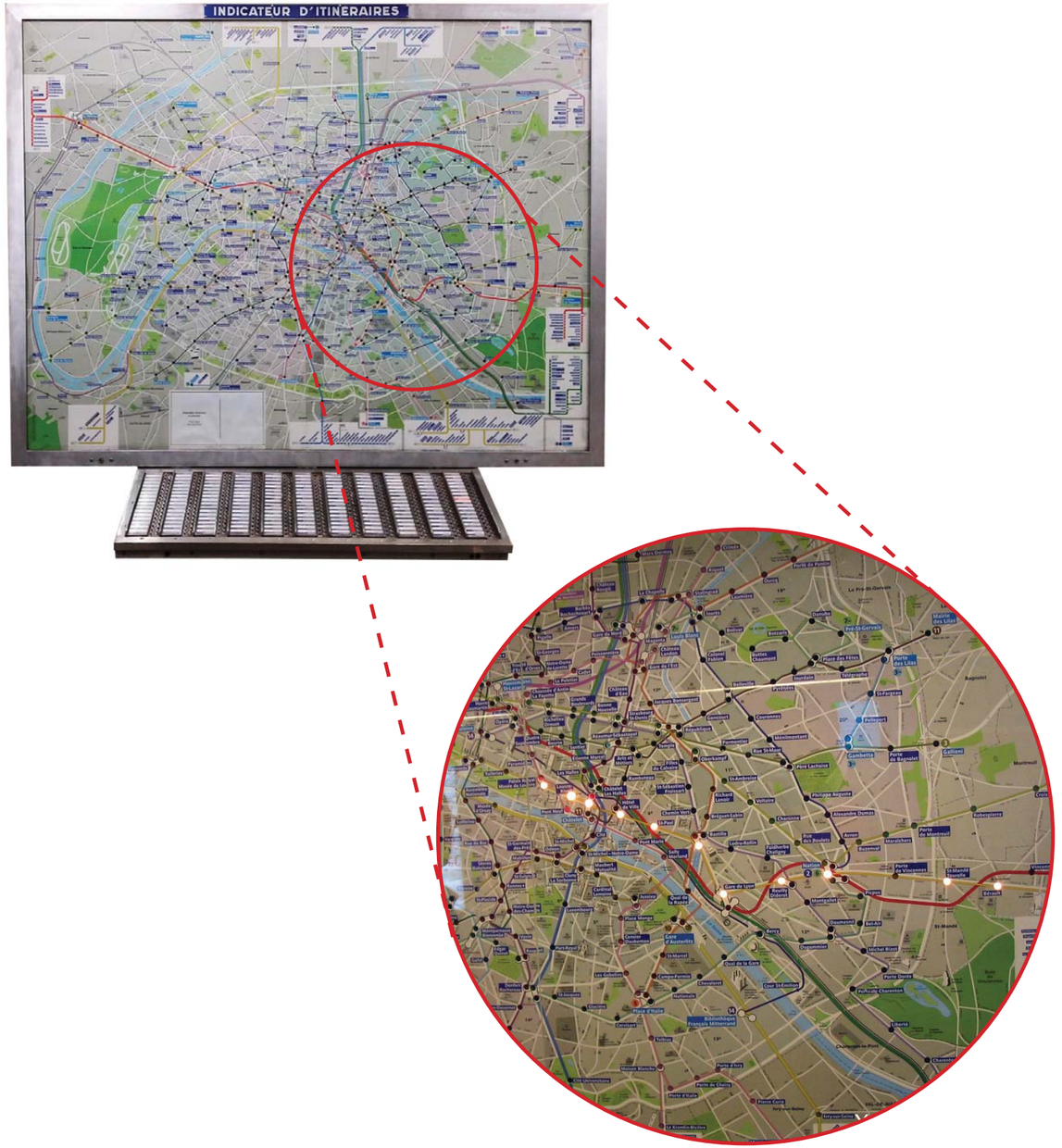
Edward Johnston, 1933

The famous roundel logo which was first introduced in 1908 by Frank Pick. This symbol has become an iconic symbol of the city and adapted by Transport for London.

Plans Indicateurs Lumineux d'Itinéraries (PILI)

Paris Metropolitan Railway Company, 1937

The luminous indicator plans for itineraries are analog computers programmed to show the fastest route to travel between subway stations.



Milan Metro Signage System

Franco Albini & Bob Noorda, 1964

Efforts to display station information in the clearest way possible through color and typography while creating a uniform visual identity.

New York Subway Signage System

Unimark International, 1966

The New York City Transit Authority Graphics Standards,1970 document that established the modern identity and system-wide design for the subway.

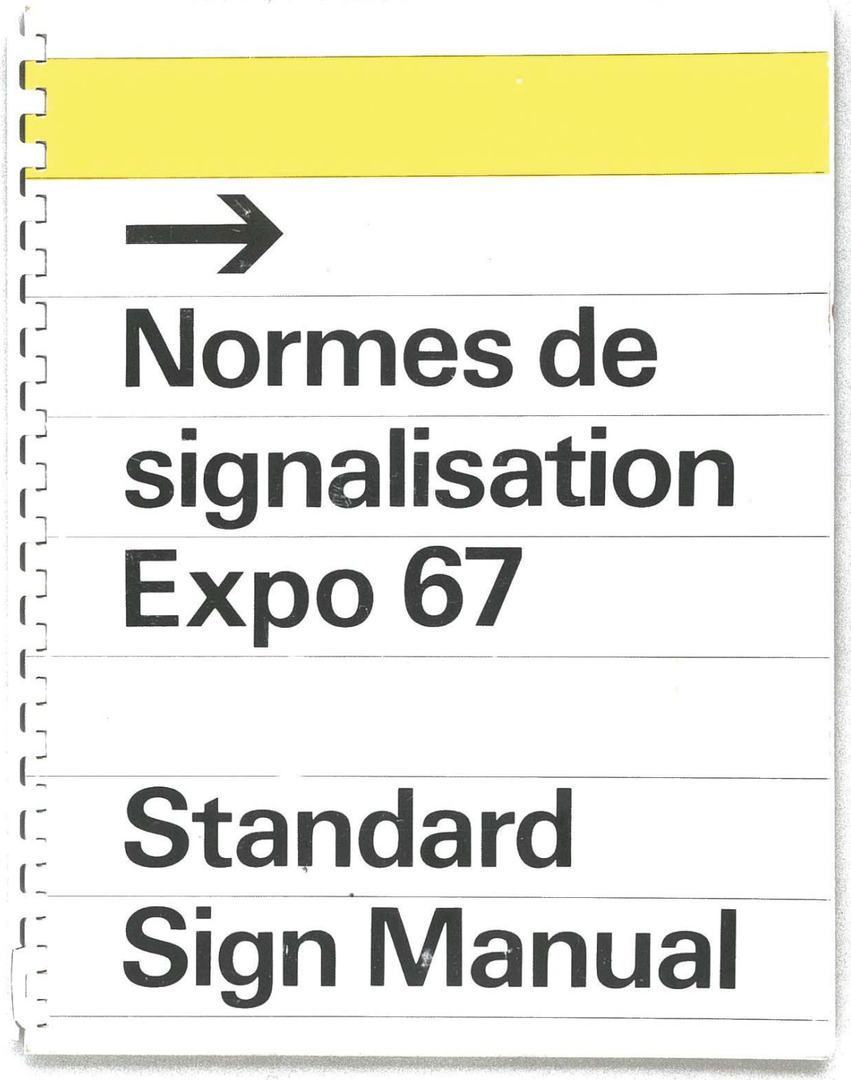
Schiphol Airport Signage

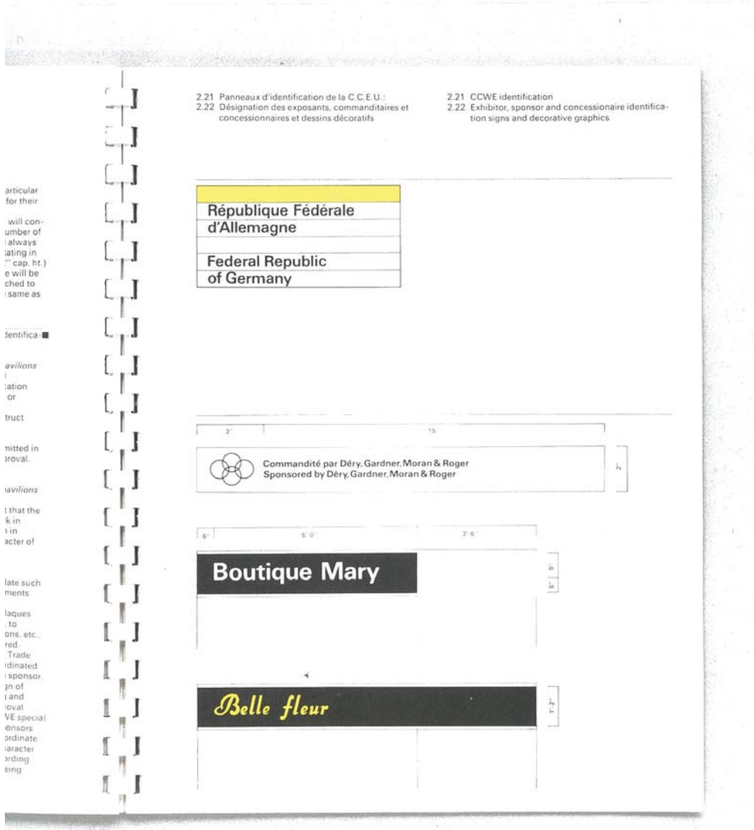
Benno Wissing, 1967

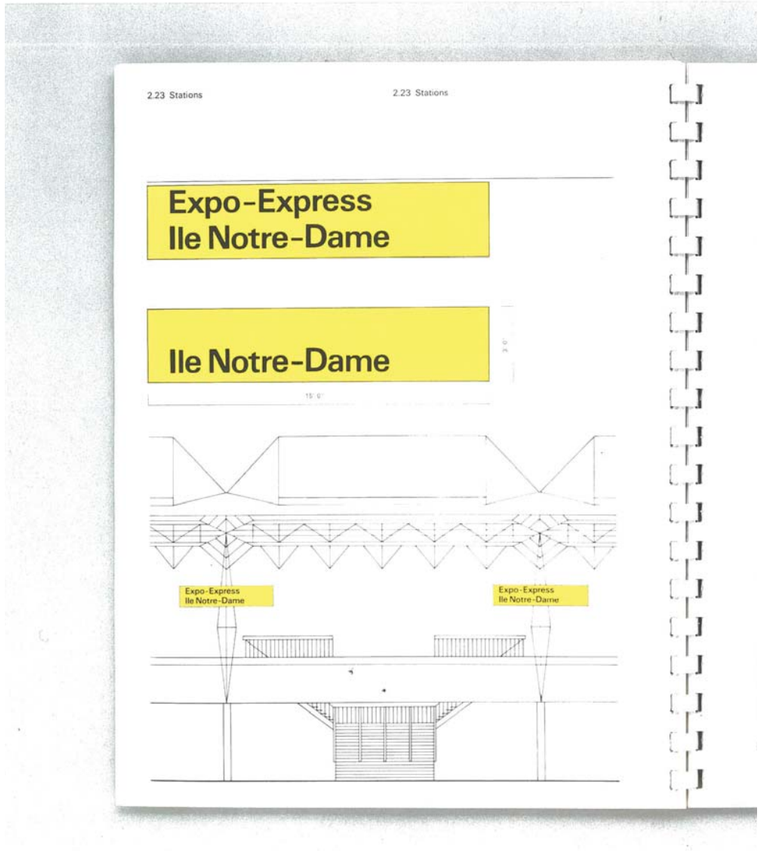
Wayfinding and signage design that served as the blueprint for many other international airports.

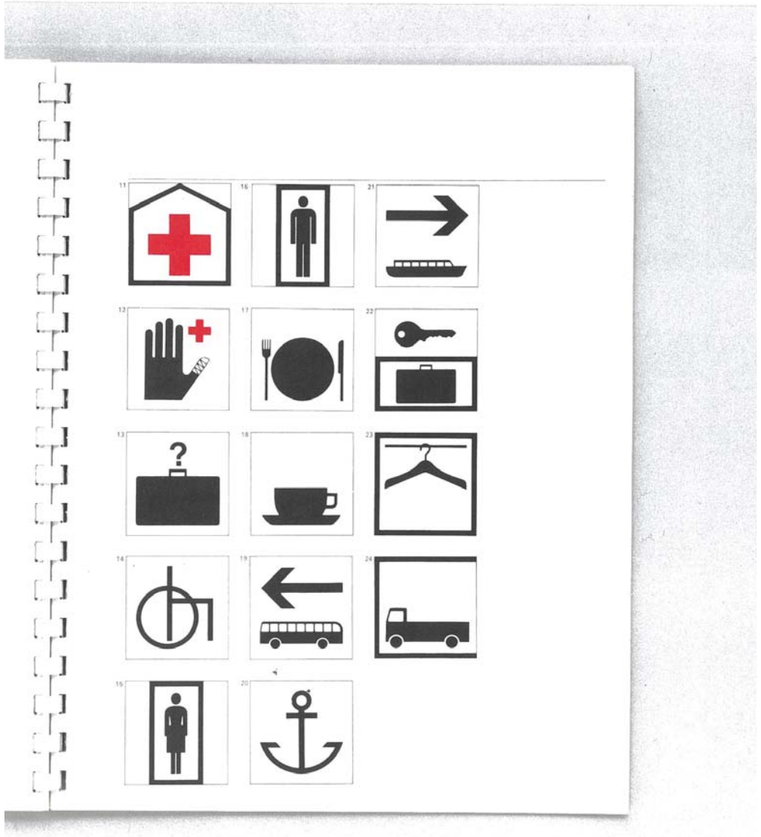
Expo '67 Standard Sign Manual

Paul Arthur & Associates, 1965
A manual designed for the 1967 Universal and International Exhibition, also known as Expo '67 in Canada. It is considered to be the most successful World's Fair exhibition of the 20th century with around 50 million visitors.




2.21 Panneaux d'identification de la C.C.E.U.:
2.22 Désignation des exposants, commanditaires et concessionnaires et dessins décoratifs
2.21 CCWE identification
2.22 Exhibitor, sponsor and concessionaire identification signs and decorative graphics
République Fédérale
d'Allemagne
Federal Republic
of Germany
Commandité par Déry, Gardner, Moran & Roger
Sponsored by Déry, Gardner, Moran & Roger
Boutique Mary
Belle fleur


2.23 Stations
2.23 Stations
Expo-Express
Ile Notre-Dame
Ile Notre-Dame
Expo-Express
Ile Notre-Dame
Expo-Express
Ile Notre-Dame



A Sign Systems Manual

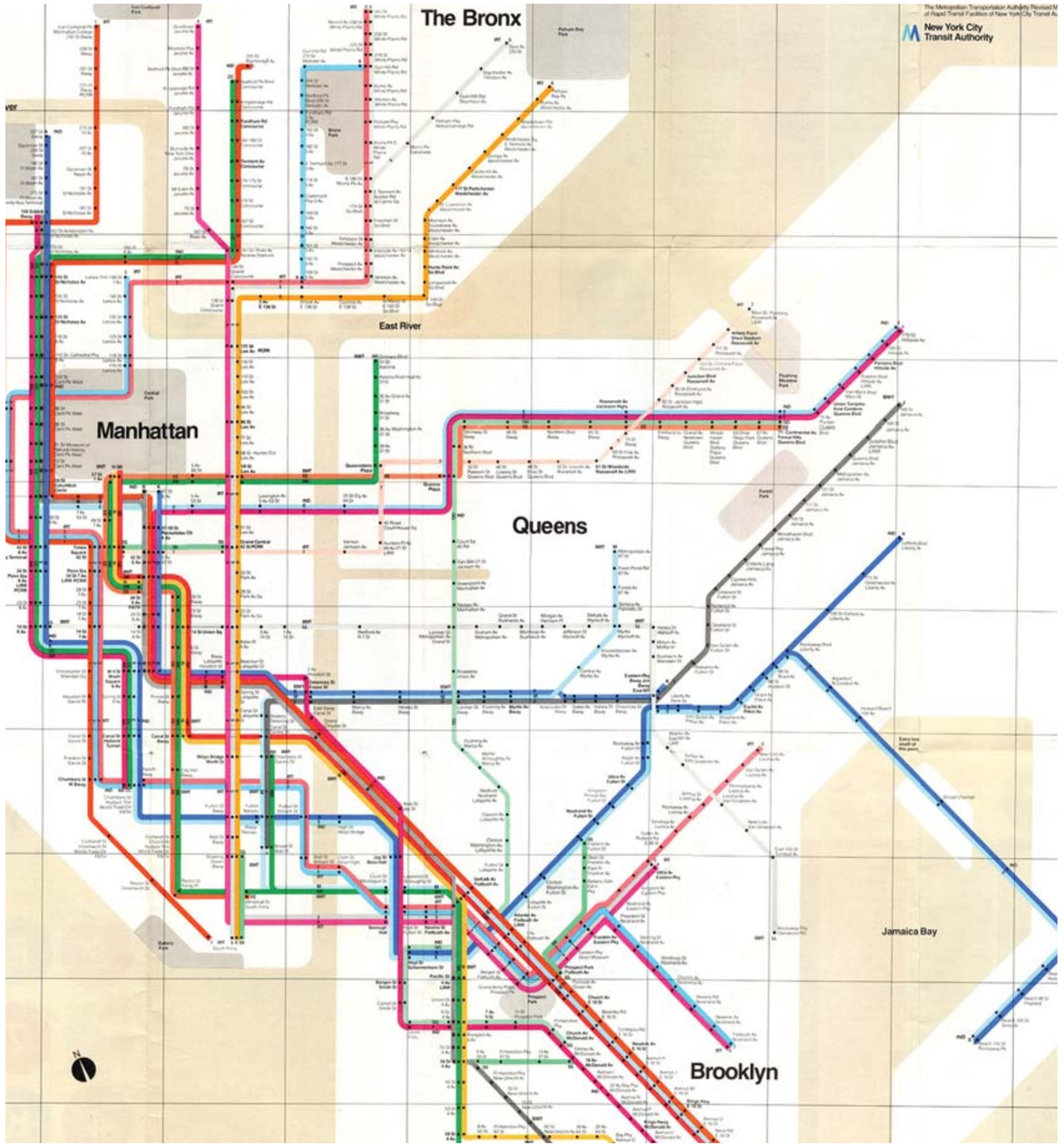
Theo Crosby, Alan Fletcher & Colin Forbes, 1970

A book describing a basic system for designing and displaying signs through rules and methods.

New York Subway System Map

Massimo Vignelli, 1972

Simplifying information to effectively help users navigate a complicated infrastructure.



New York Subway System Map

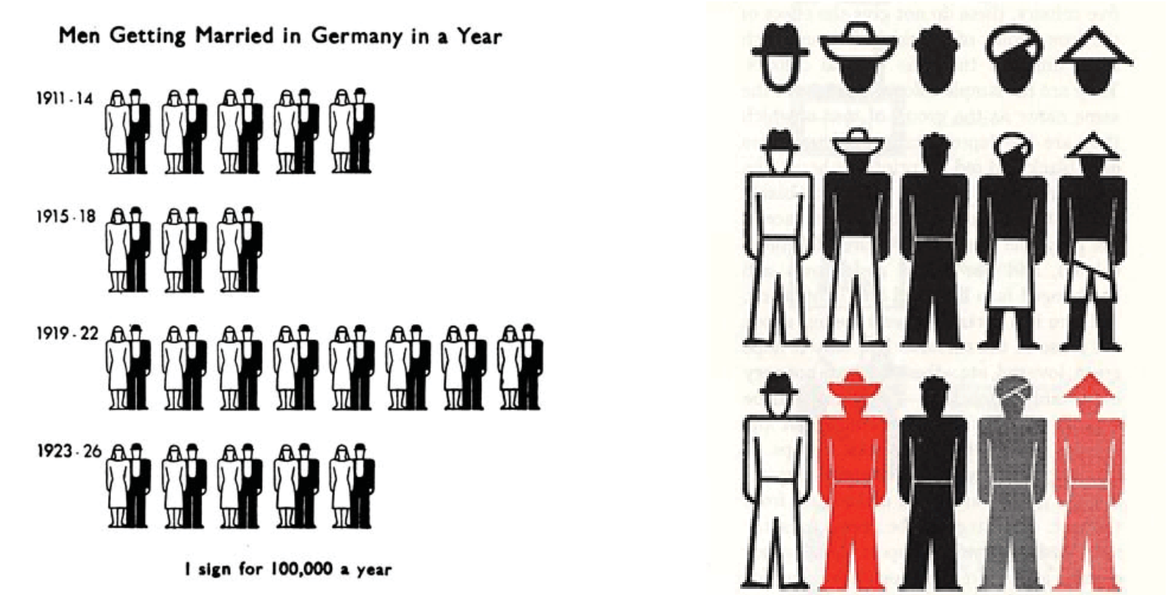
John Tauranac & Michael Hertz, 1979

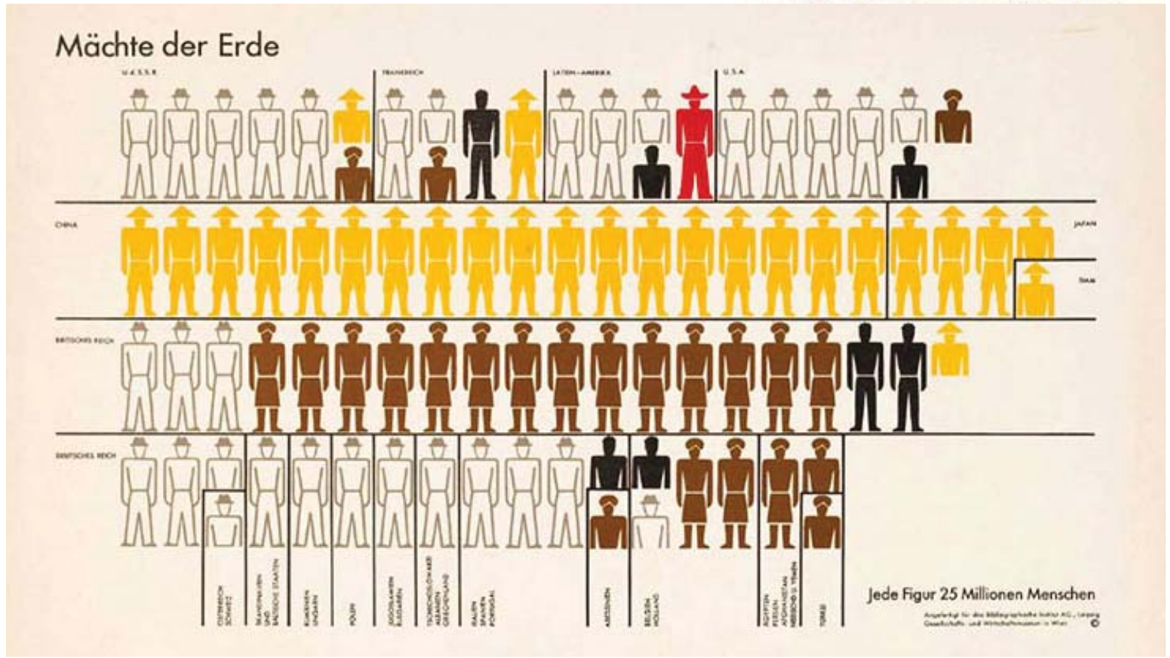
A replacement design for Vignelli's New York Subway map due to much controversy. This version included geographic and navigational clarity above ground.

Design systems as **symbol systems.**

Isotype

Otto Neurath, 1920's
International System of Typographic Picture Education (ISOTYPE), is a visual program for displaying information and quantitative facts.





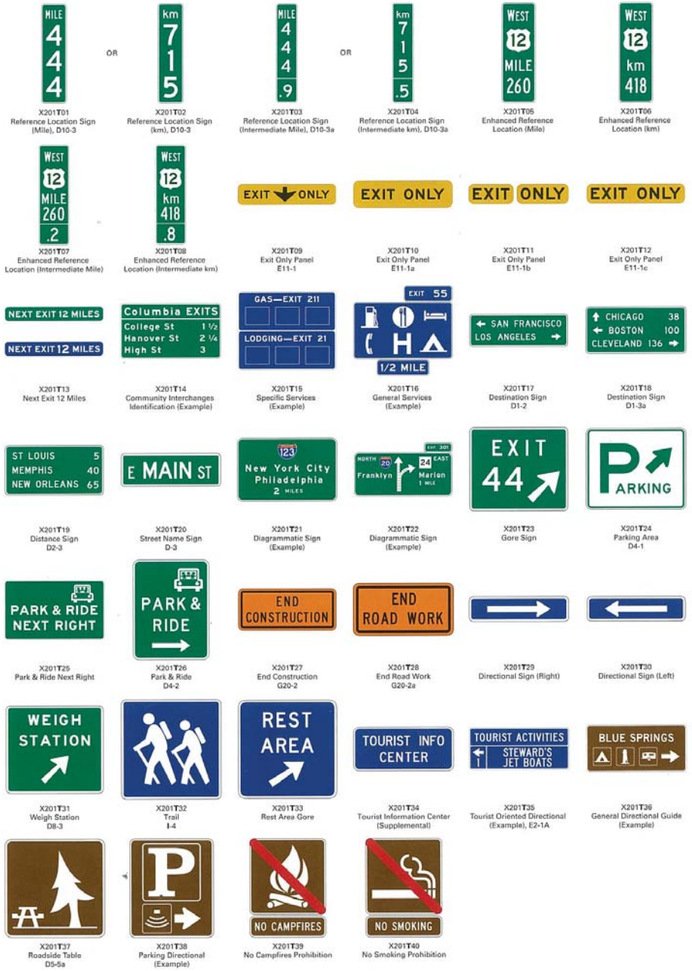
Manual on Uniform Traffic Control Devices for Streets and Highways

American Association of State Highway and Transportation Officials, 1935

Specifies the standards by which traffic signs, road marking, and signals are designed, installed, and used in the United States by the Department of Transportation.

X201A01 Stop R1-1
X201A02 Yield R1-2
X201A03 To Oncoming Traffic R1-2a
X201A04 4 - Way R1-3
X201A05 All Way R1-4
X201A06 Speed Limit, 10 M.P.H. R2-1
X201A07 Speed Limit, 15 M.P.H. R2-1
X201A08 Speed Limit, 20 M.P.H. R2-1
X201A09 Speed Limit, 25 M.P.H. R2-1
X201A10 Speed Limit, 30 M.P.H. R2-1
X201A11 Speed Limit, 35 M.P.H. R2-1
X201A12 Speed Limit, 40 M.P.H. R2-1
X201A13 Truck Speed Limit, 40 M.P.H R 2-2
X201A14 Trucks Speed Limit, 60 km/h R2-2
X201A15 Night Speed Limit R2-3
X201A16 Night Speed Limit R2-3
X201A17 Speed Limit, 45 M.P.H. R2-1
X201A18 Speed Limit, 50 M.P.H. R2-1
X201A19 Speed Limit, 80 km/h R2-1
X201A20 Speed Limit, 55 M.P.H. R2-1
X201A21 Speed Limit, 60 M.P.H. R2-1
X201A22 Speed Limit, 65 M.P.H. R2-1
X201A23 Reduced Speed Ahead R2-5a
X201A24 Speed Zone Ahead R2-5c
X201A25 Minimum Speed 40 M.P.H, R2-4
X201A26 Minimum Speed 60 km/h, R2-4
X201A27 Speed Limit 50 M.P.H. Min. 30 M.P.H., R2-4a
X201A28 Speed Limit 80 km/h Min. 30 km/h., R2-4a
X201A29 Fines Higher R2-6
X201A30 Traffic Laws Photo Enforced R10-18
X201A31 Photo Enforced R10-19
X201A32 No Right Turn R3-1
X201A33 No Left Turn R3-2
X201A34 No Turns R3-3
X201A35 No U-Turn R3-4
X201A36 No U-Turn / No Left Turn R3-18

X201S01 Litter Container D9-4
X201S02 Trash Receptacle D9-4
X201S03 Handicapped D9-6
X201S04 Gas D9-7
X201S05 Food D9-8
X201S06 Lodging D9-9
X201S07 Tourist Information D9-10
X201S08 Diesel Fuel D9-11
X201S09 Alternative Fuel D9-11a
X201S10 Electric Vehicle Charging D9-11b
X201S11 RV Sanitary Station D9-12
X201S12 Emergency Medical Services D9-13
X201S13 Hospital D9-13a
X201S14 Ambulance Station D9-13c
X201S15 Emergency Medical Care D9-13c
X201S16 Propane Gas D9-15
X201S17 Truck Parking D9-16
X201S18 General Information Sign I-2
X201S19 Signals Set for 25 MPH I1-1
X201S20 Signals Set for 40 km/h I1-1
X201S21 General Information Sign I-3
X201S22 Airport I-5
X201S23 Bus Station I-6
X201S24 Train Station I-7
X201S25 Library I-8
X201S26 Recycling Collection Center I-11
X201S27 Police D9-14
X201S28 Weather Info D12-1
X201S29 Car Pool Info Monitor D12-2
X201S30 State Police Monitor D12-3
X201S31 Emergency Dial 911 D12-4
X201S32 Travel Info Call 511 (Logo) D12-4
X201S33 Crossover Left D13-1
X201S34 Crossover 1/4 Mile D13-2
X201S35 Reference Location Sign (Mile) D10-1
X201S36 Reference Location Sign (km) D10-1
X201S37 Reference Location Sign (Intermediate Mile), D10-1a
X201S38 Reference Location Sign (Intermediate km), D10-1a
X201S39 Reference Location Sign (Mile), D10-2
X201S40 Reference Location Sign (km) D10-2
X201S41 Reference Location Sign (Intermediate Mile), D10-2a
X201S42 Reference Location Sign (Intermediate km), D10-2a

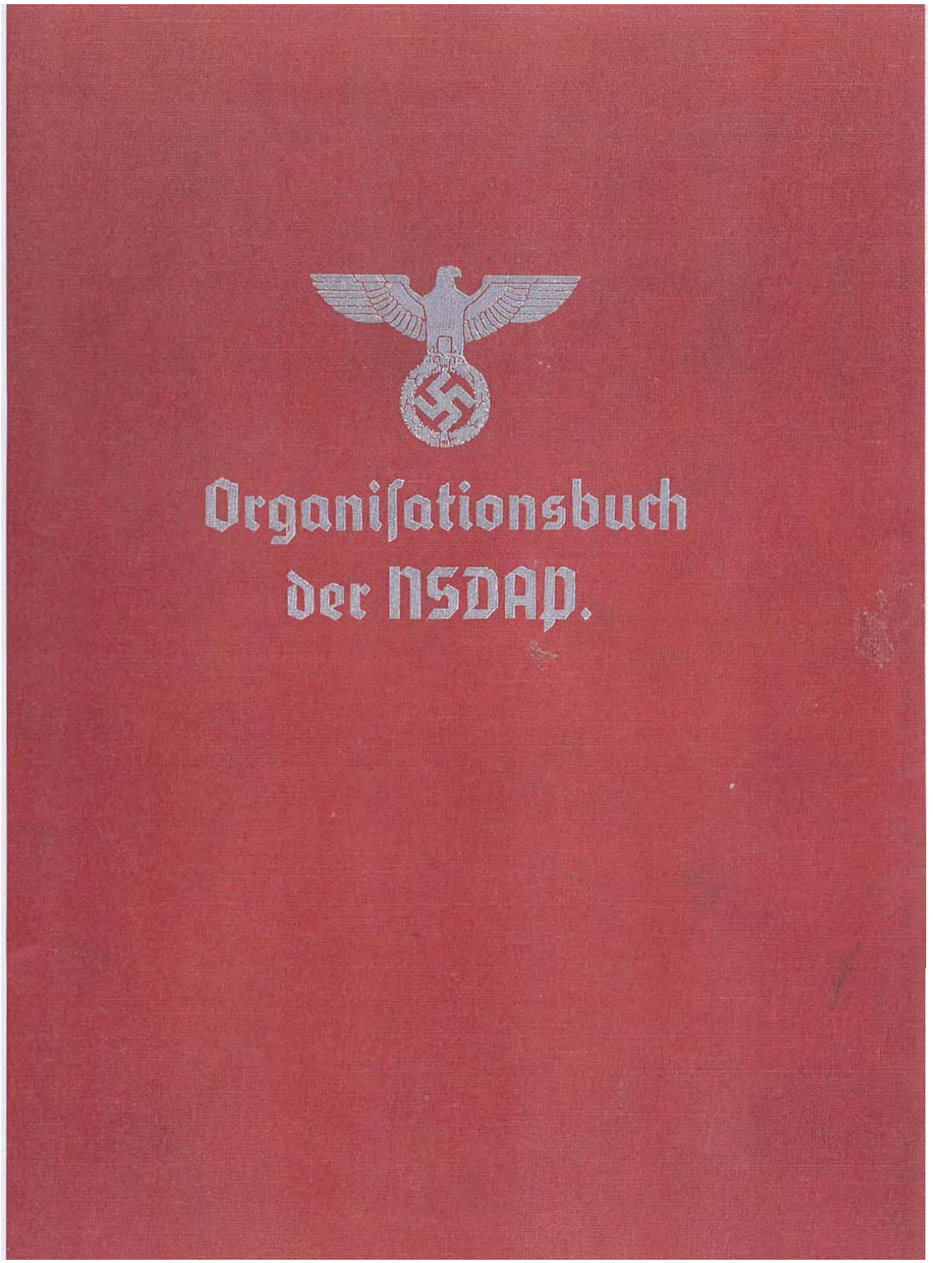


X201T01 Reference Location Sign (Mile), D10-3
X201T02 Reference Location Sign (km), D10-3
X201T03 Reference Location Sign (Intermediate Mile), D10-3a
X201T04 Reference Location Sign (Intermediate km), D10-3a
X201T05 Enhanced Reference Location (Mile)
X201T06 Enhanced Reference Location (km)
X201T07 Enhanced Reference Location (Intermediate Mile)
X201T08 Enhanced Reference Location (Intermediate km)
X201T09 Exit Only Panel E11-1
X201T10 Exit Only Panel E11-1a
X201T11 Exit Only Panel E11-1b
X201T12 Exit Only Panel E11-1c
X201T13 Next Exit 12 Miles
X201T14 Community Interchanges Identification (Example)
X201T15 Specific Services (Example)
X201T16 General Services (Example)
X201T17 Destination Sign D1-2
X201T18 Destination Sign D1-3a
X201T19 Distance Sign D2-3
X201T20 Street Name Sign D-3
X201T21 Diagrammatic Sign (Example)
X201T22 Diagrammatic Sign (Example)
X201T23 Gore Sign
X201T24 Parking Area D4-1
X201T25 Park & Ride Next Right
X201T26 Park & Ride D4-2
X201T27 End Construction G20-2
X201T28 End Road Work G20-2a
X201T29 Directional Sign (Right)
X301T30 Directional Sign (Left)
X201T31 Weigh Station D8-3
X201T32 Trail I-4
X201T33 Rest Area Gore
X201T34 Tourist Information Center (Supplemental)
X201T35 Tourist Oriented Directional (Example), E2-1A
X201T36 General Directional Guide (Example)
X201T37 Roadside Table D5-5a
X201T38 Parking Directional (Example)
X201T39 No Campfires Prohibition
X201T40 No Smoking Prohibition

NSDAP

Organisationsbuch der NSDAP, 1938

The Party's handbook which detailed organizing principles and mechanics are showed for building the movement.



Civil Defense Symbols

Charles Coiner, 1942

A system of symbols that were use by the United States Citizens Defense Corps to illustrate jobs assigned to volunteers.

Protocol on Road Signs and Signals

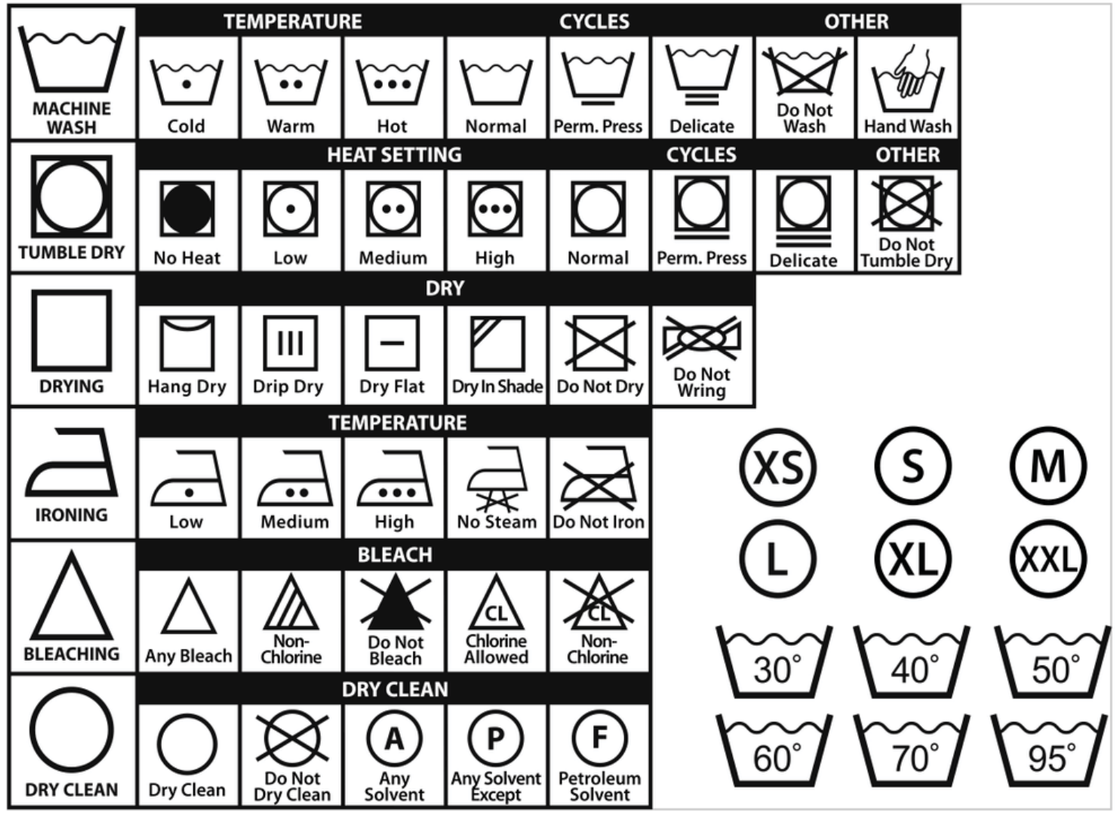
United Nations Conference on Road and Motor Transports, 1949

The difficulty of a multiplicity of languages led to the development of a pictorial sign system for international highway signs.

Fabric Care Symbols

GINETEX, 1963

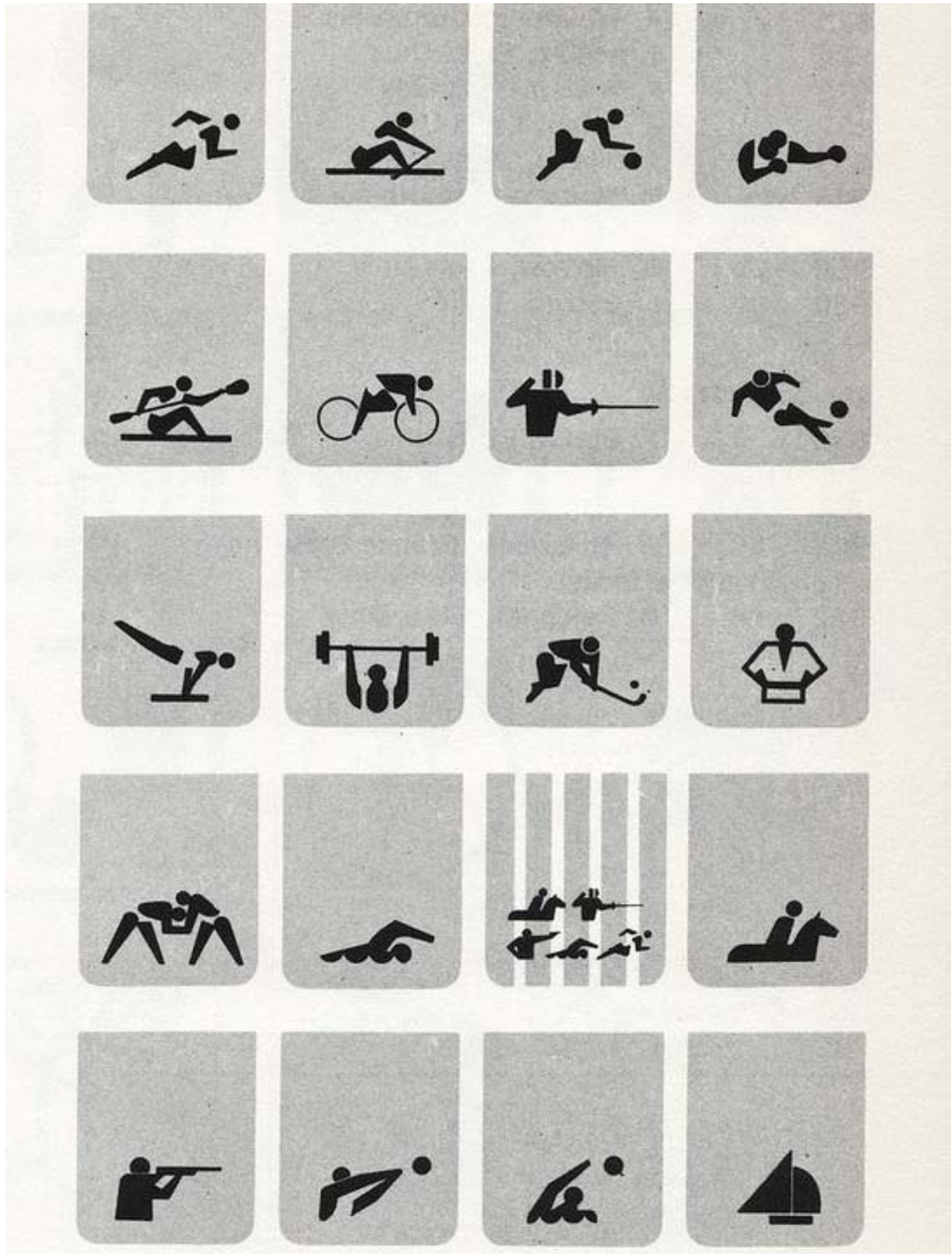
A system of symbols that were created to assist consumers on clothing care information. In 1972 the Federal Trade Commission enforced the Care Labeling Rule to attach instructions to garments.



Tokyo Olympic Pictograms

Yoshiro Yamashita & Masura Katzumie, 1964

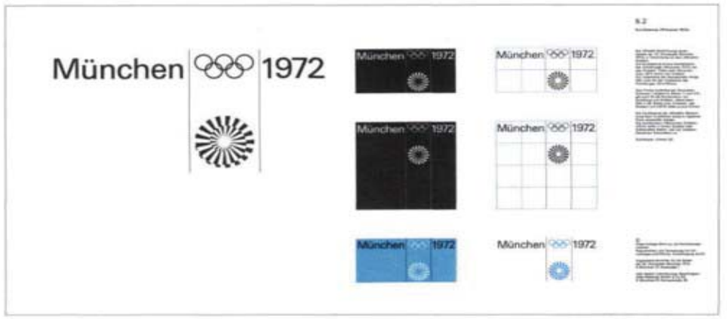
Pictograms were introduced to represent each sport to visually communicate to international groups of athletes and spectators.

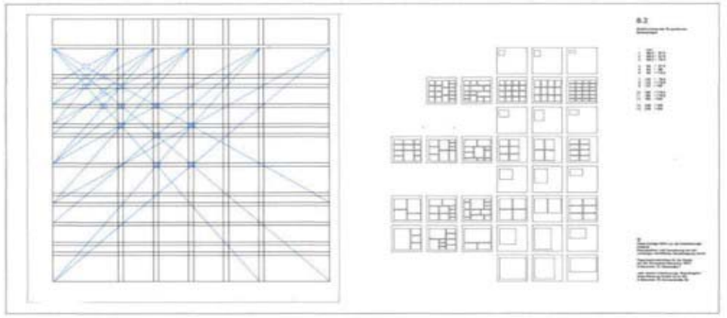


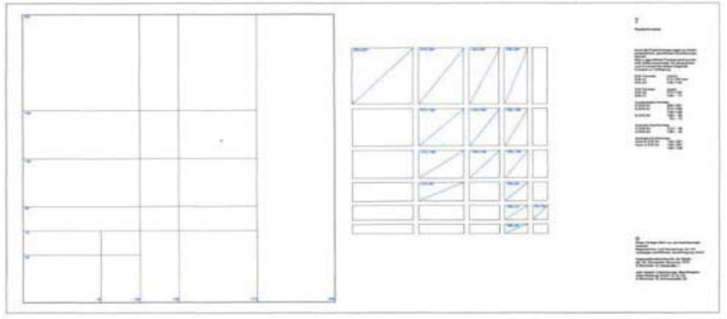
Munich Olympics Design Manual

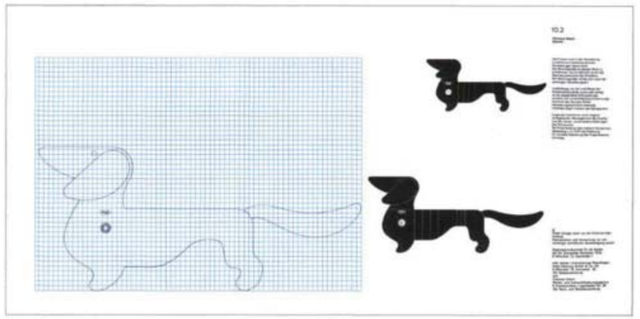
Otl Aicher, 1969

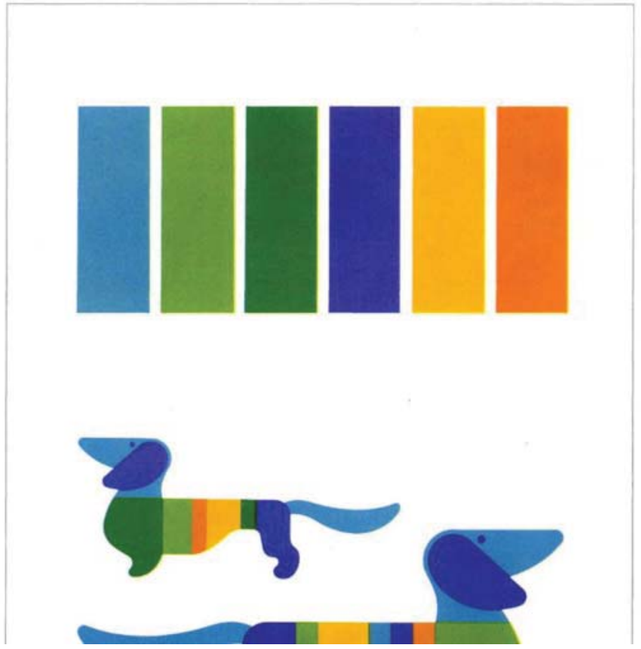
A collection of visual modules which express continuity and connectedness through the design system which was used for governing everything from signage to urban planning.


München 1972





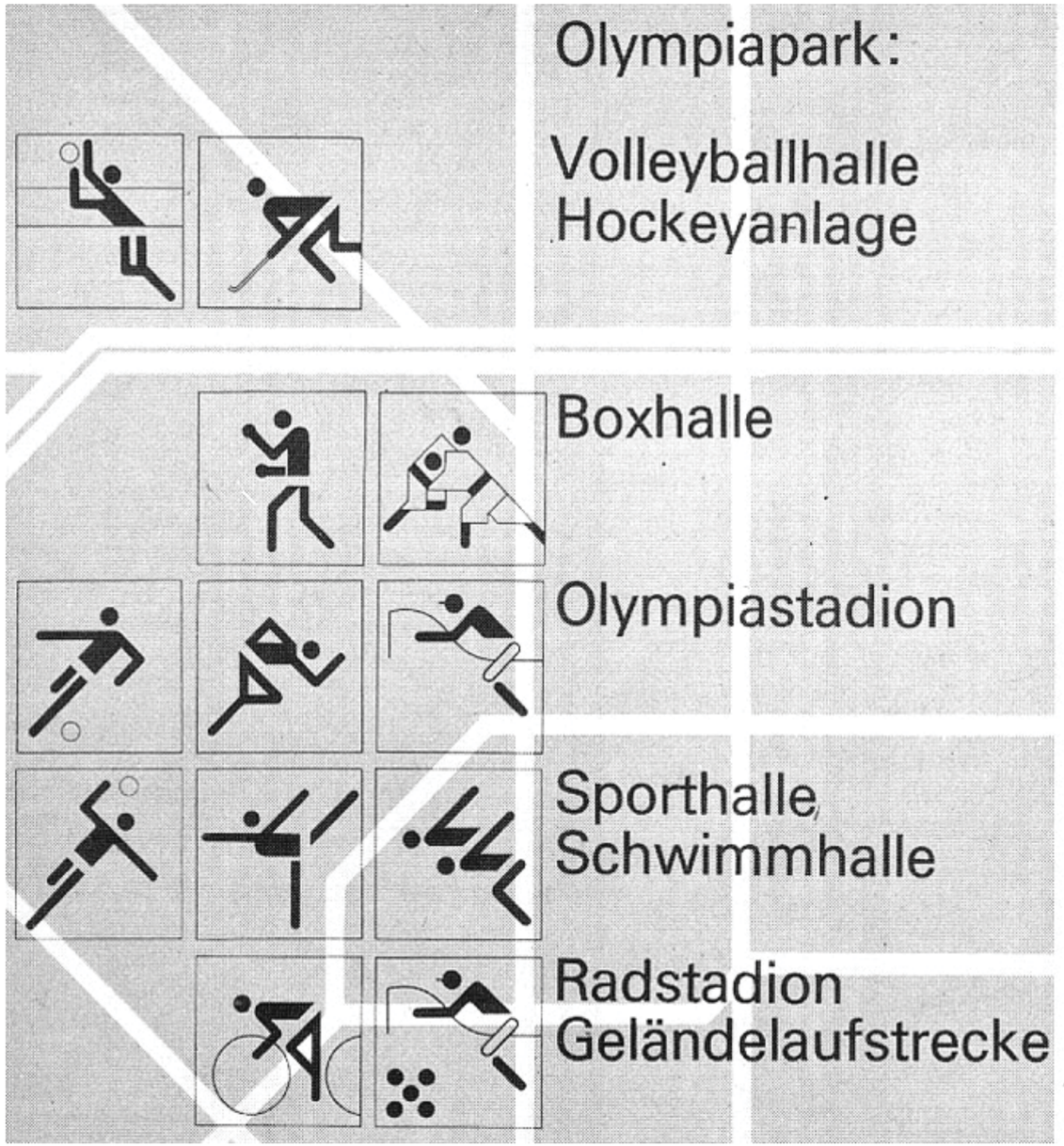


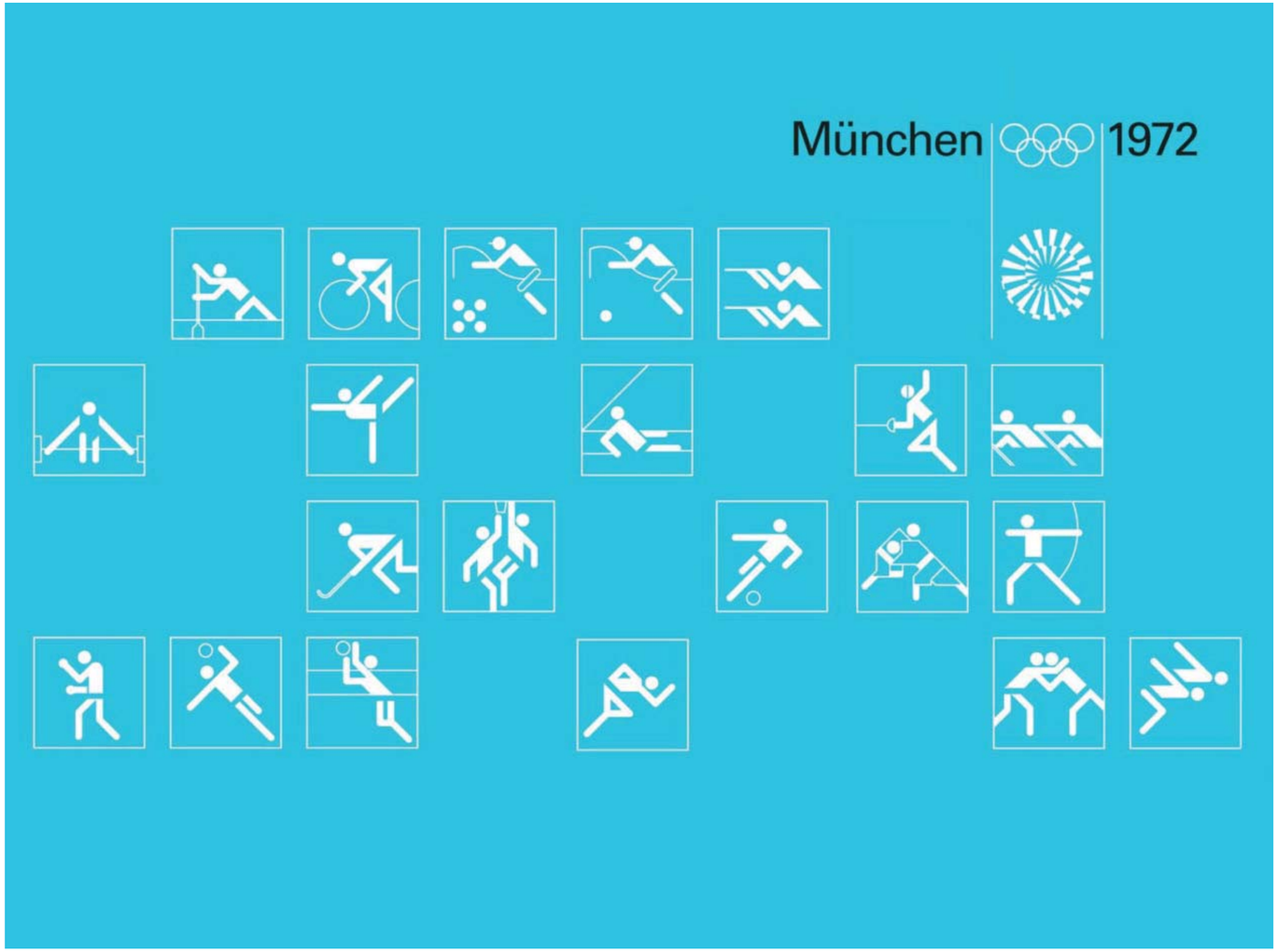


Munich Olympics Identity & Signage System

Otl Aicher, 1972

Standardizing forms through a system of graphic and geometric rules to create unity throughout the pictograms.



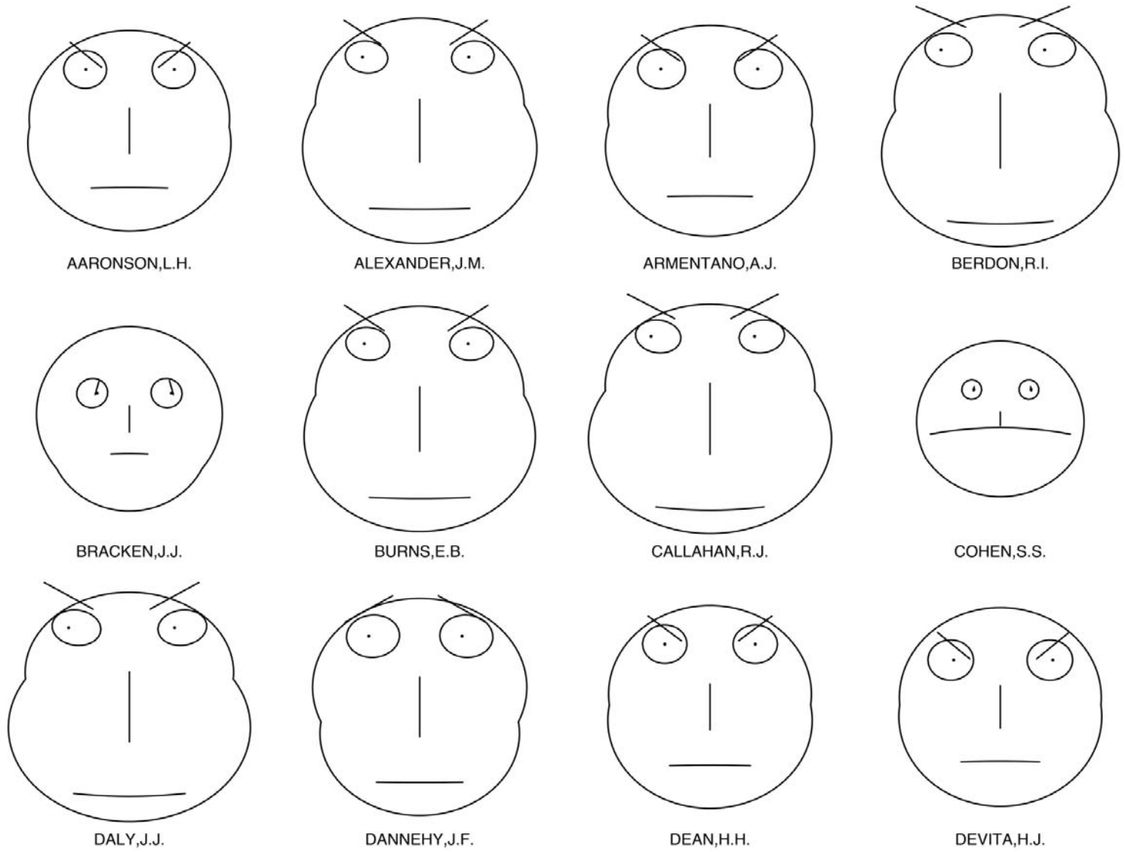

München 1972


München 1972
Handball
Reglement
Regulations
Reglement
26.8.
27.8.
28.8.
29.8.

Chernoff Faces

Herman Chernoff, 1973

A display of multivariate data in human face shapes. Based on the dataset, the position of the human face parts are skewed in theory behind how humans can easily recognize subtle facial changes.



Symbol Signs

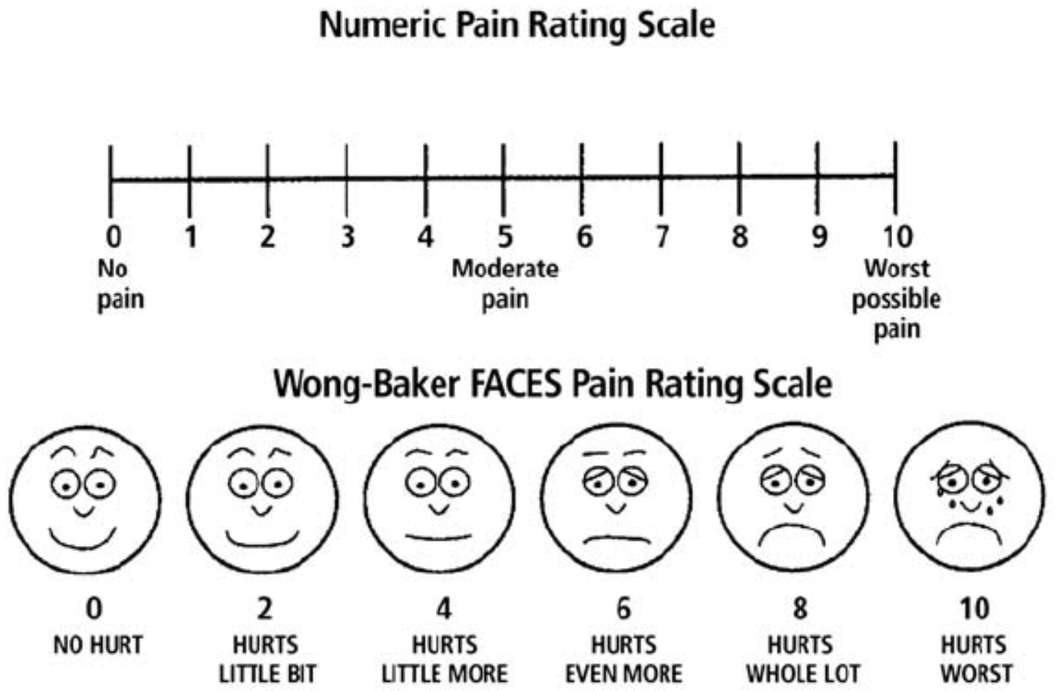
The American Institute of Graphic Arts, 1974

A visual recommendation for the system of passenger and pedestrian oriented symbols developed by AIGA.

Wong-Baker FACES Pain Rating Scale

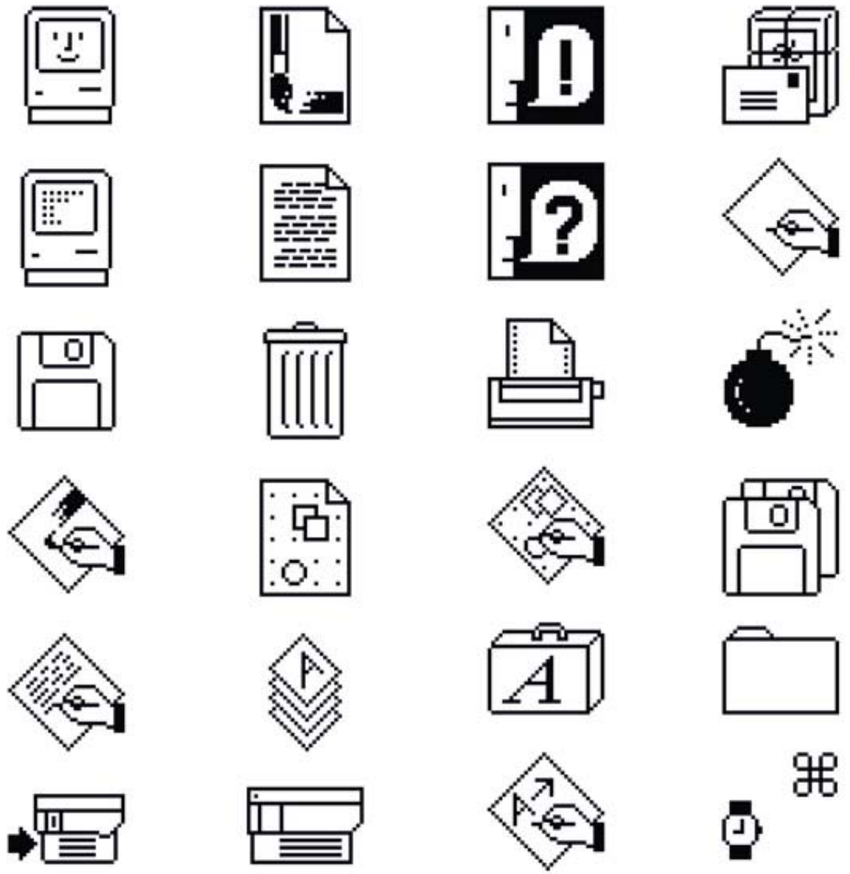
Donna Wong & Connie Baker, 1981

Originally developed for young children to communicate about their pain levels in order to be effectively treated and supported.



Macintosh Icons

Susan Kare, 1984
Graphical user interface icons introduced in the original Macintosh operating system.



Emoticons

Scott Fahlman, 1984
An emotional icon; emoticon.
Punctuation marks, letters, and numbers used in to create pictorial icons that display emotions or sentiment.

:-) :) :] =)

:-(:(:[=(

:-P :P :-p :p =P

:-D :D =D

:-O :O :-o :o

;-) ;)

8-) 8) B-) B)

8-| 8| B-| B|

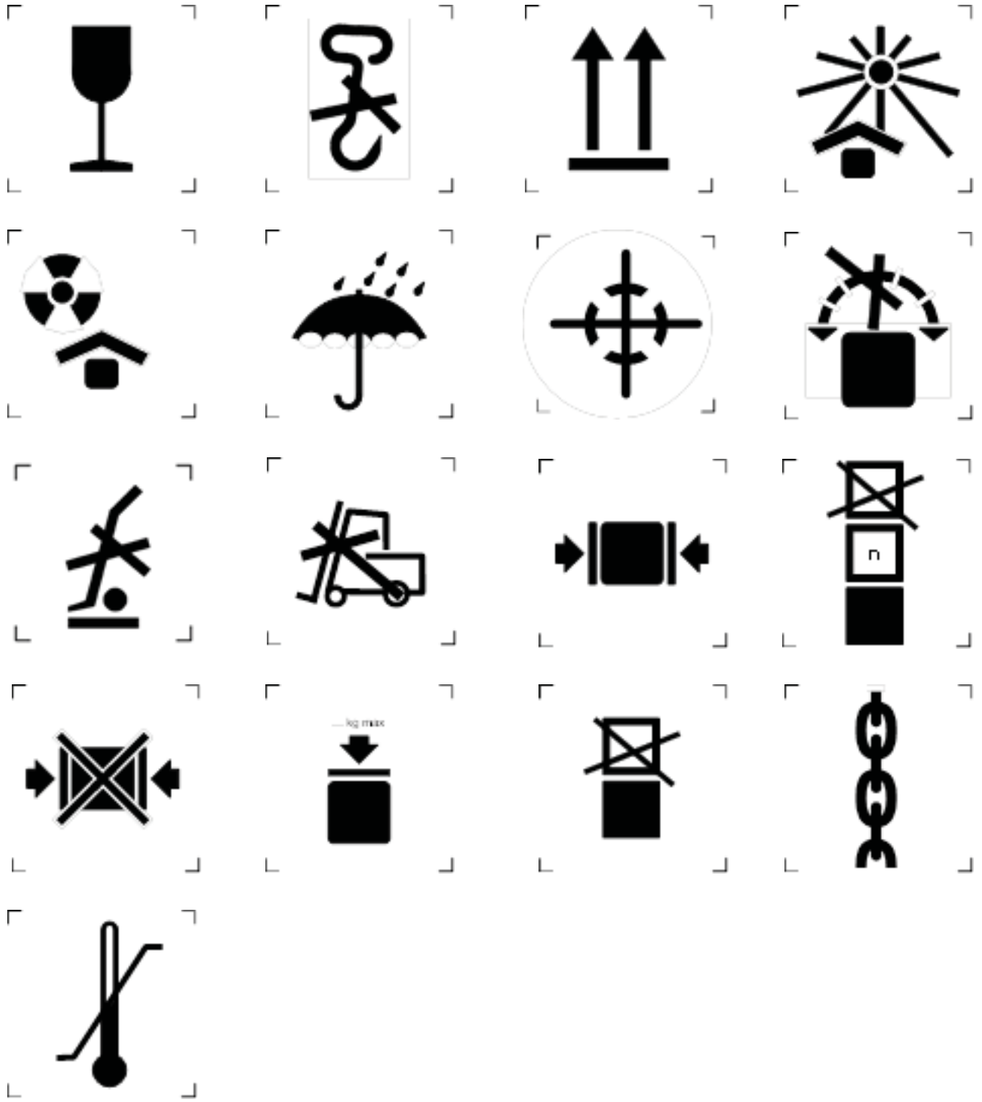
>:(>:-(

>:O >:-O >:o >:-o

Package Handling Marks

International Organization for Standardization, 1985

Universally recognized pictorial markings for handling of goods that convey the consignor's intention of instructions which are included in ISO 780.



Emojis

Shigetaka Kurita, 1999

In Japanese translating to picture character, emojis were introduced to tackle the problem of the SMS character limit. This system is a global language transforming how we communicate digitally.

Design systems as **identity** for **corporate identity systems.**
for **dynamic identities.**
for **packaging.**

Corporate Identity Systems

AEG (Allgemeine Elektrizitäts Gesellschaft)

AEG

Peter Behrens, 1907

Introduced modern corporate identity; unified logos, advertising material and company publications with a consistent and unified design concept.

Olivetti

Camillo Olivetti, 1908
Originally founded as a typewriter manufacturer, in 1938 son Adriano Olivetti took over and integrated a graphic design department into the corporate structure that focused on design over pure functionalism.

NRA Blue Eagle

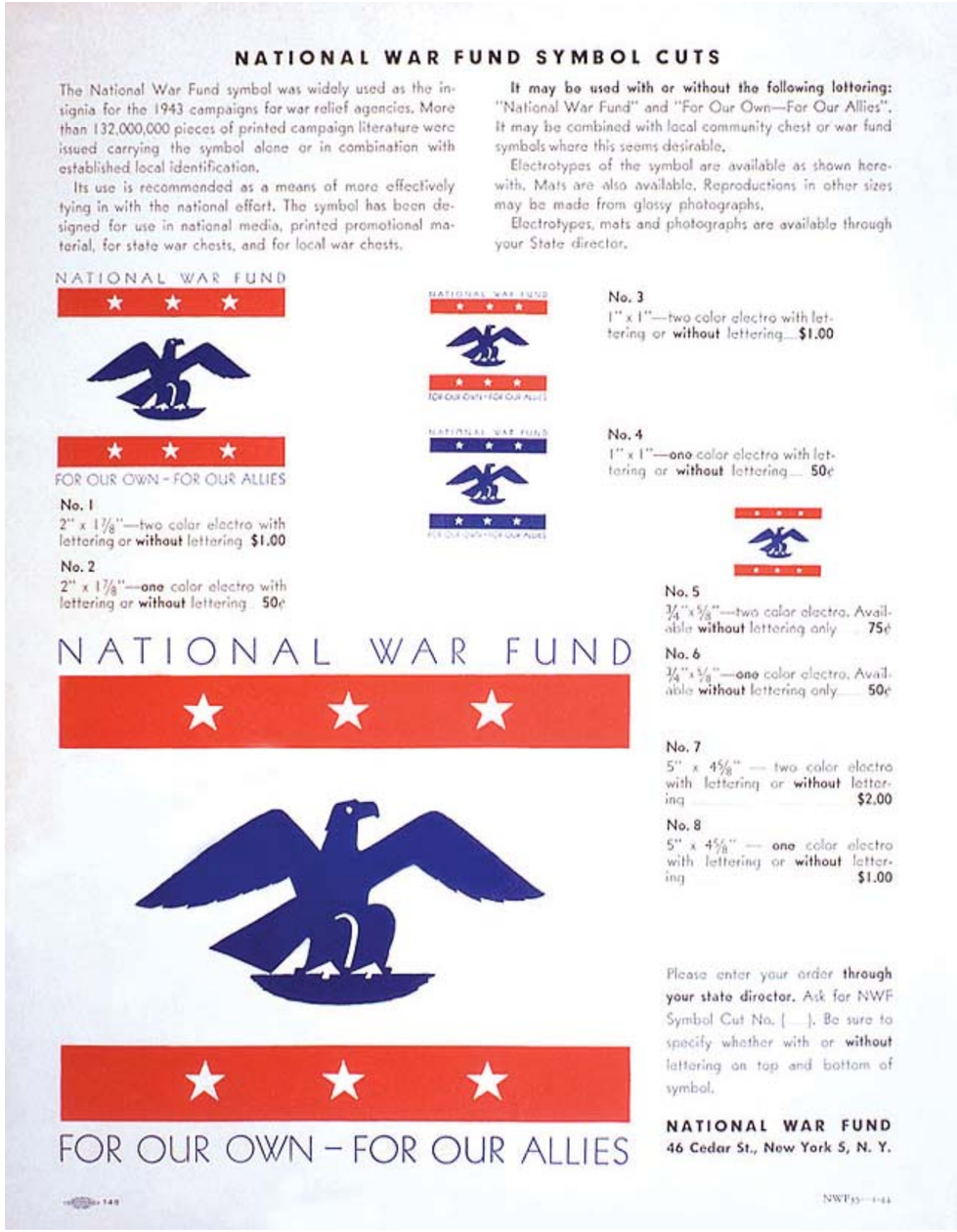
Charles Coiner, 1933

As part of a publicity campaign, the Blue Eagle became a recognized symbol in partner with the National Recovery Administration.

National War Fund

Charles Coiner, 1943

Implementing the Blue Eagle symbol, Coiner designed this identity during World War II in support for the raising funds for war efforts.



Connecticut General Life Insurance Company Identity

Lester Beall, 1956

The stylized and elongated logo that were project the strength of the company.

Connecticut General Life Insurance Company Manual

Lester Beall, 1960

Corporate identity style book that represents his creative approaches analytically.

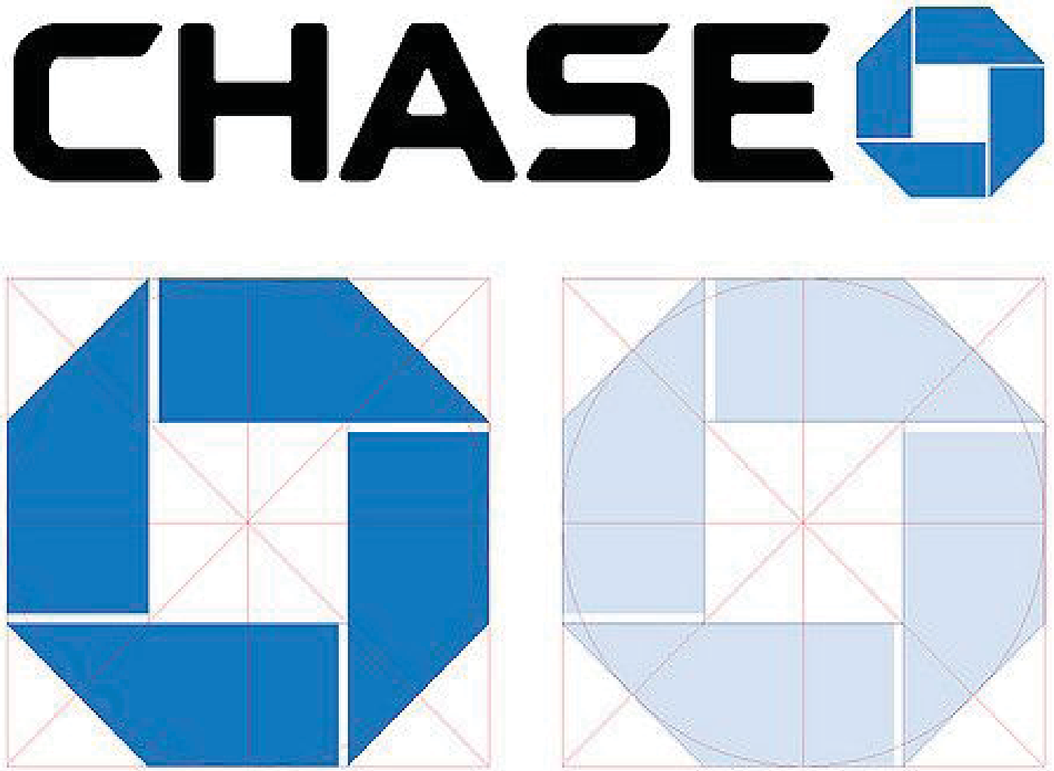
Upjohn Company

Will Burtin, 1959

Various loose mechanicals and paste-ups for the company's manuals and standards.

Chase Manhattan Bank Identity

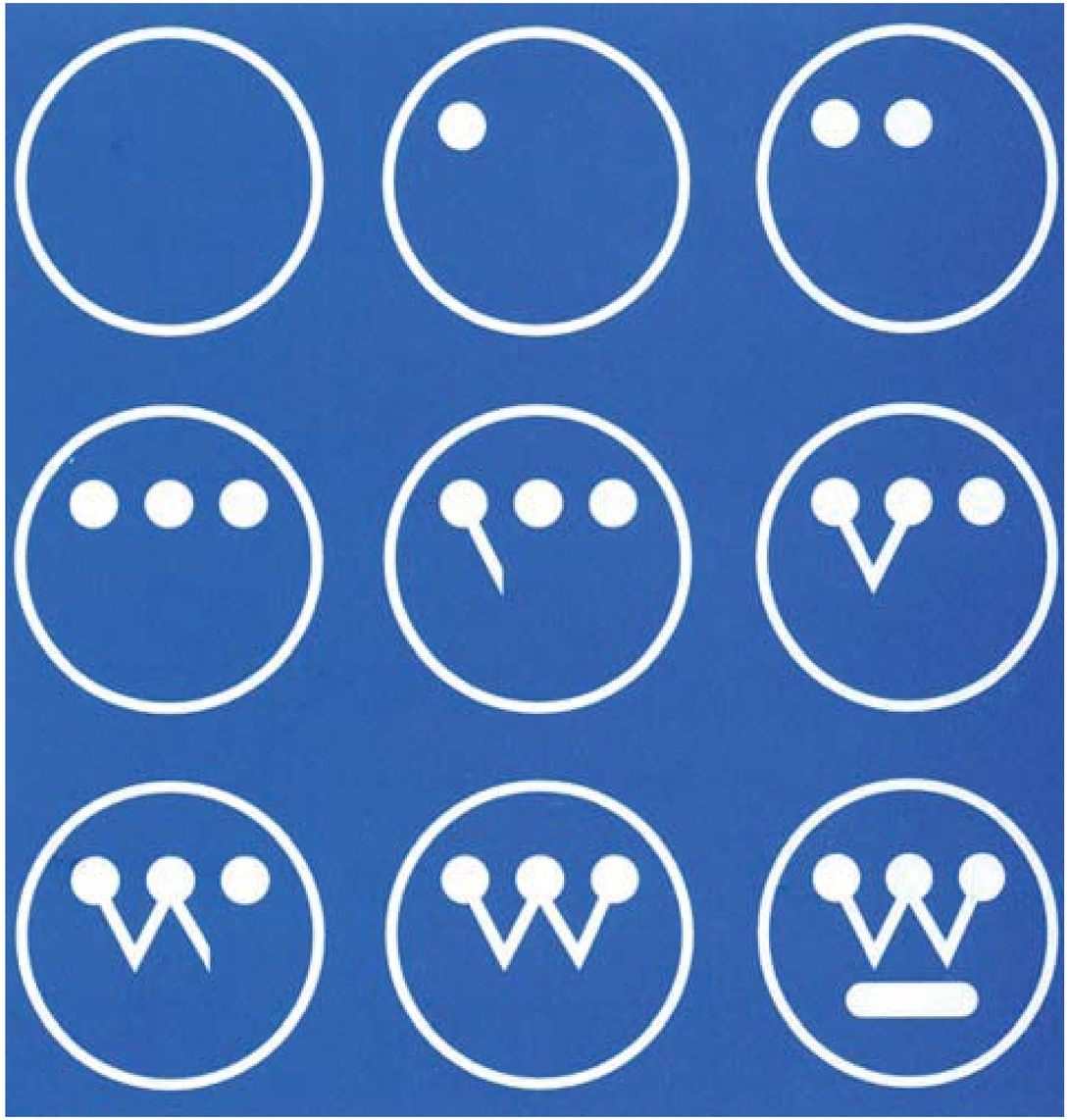
Chermayeff & Geismar, 1960
Design should be able to be reproduced on and in various materials and scalable.



Westinghouse Identity

Paul Rand, 1959

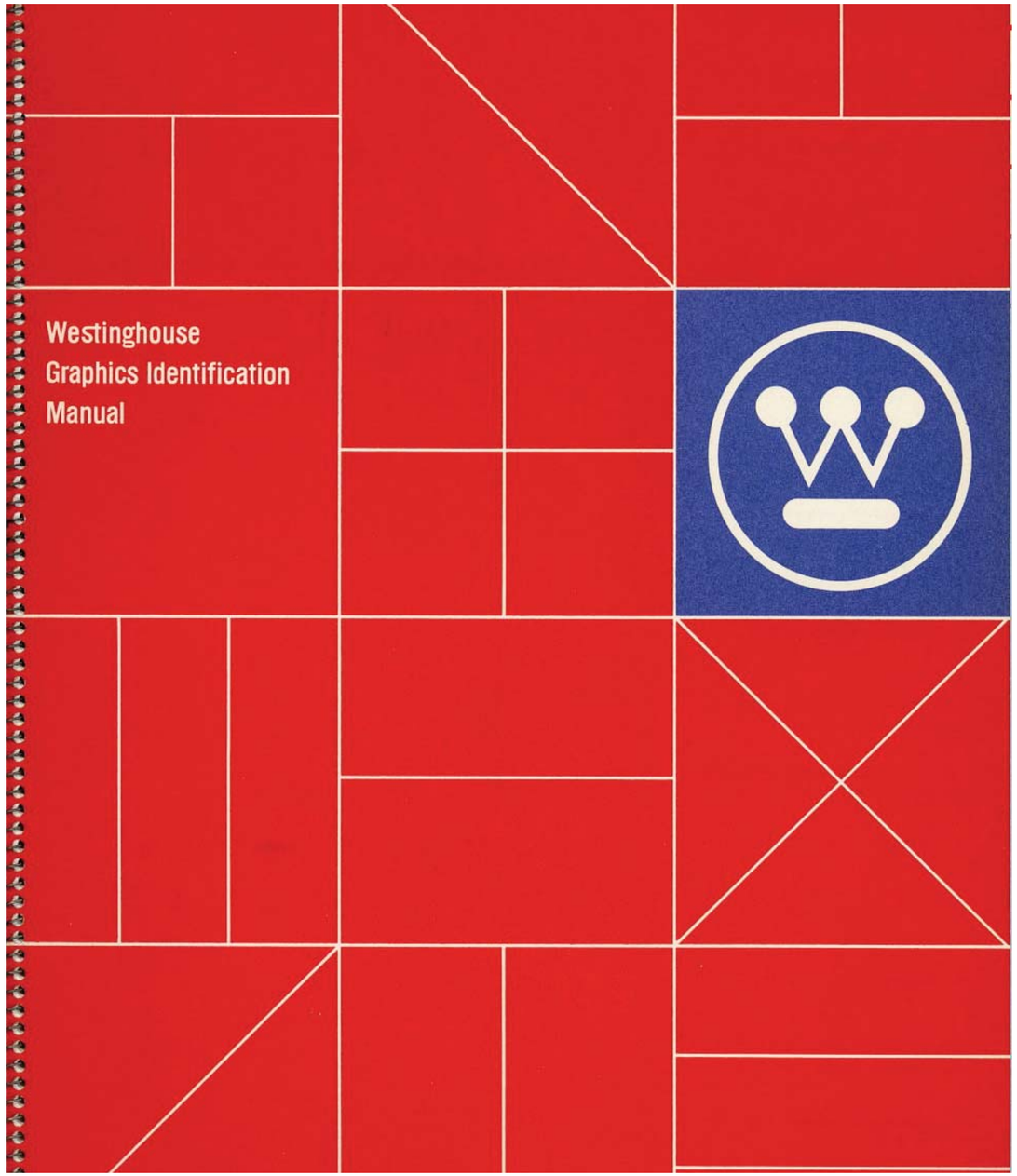
A design that suggested the interlinking points on a circuit board for the electric company.



Westinghouse Graphics Identification Manual

Paul Rand, 1961

To unify and improve the company's graphics, the manual proposed standards and showed how they should work.



Westinghouse Gothic Typeface

An exclusive typeface, designed especially for Westinghouse, is available. Some of its distinguishing features are:

1: Smaller capital letters, (in comparison to the lower case) than are found in other typefaces, as well as short ascenders and descenders.

2: The forms of the lower case f, g, r, t, $, ¢.

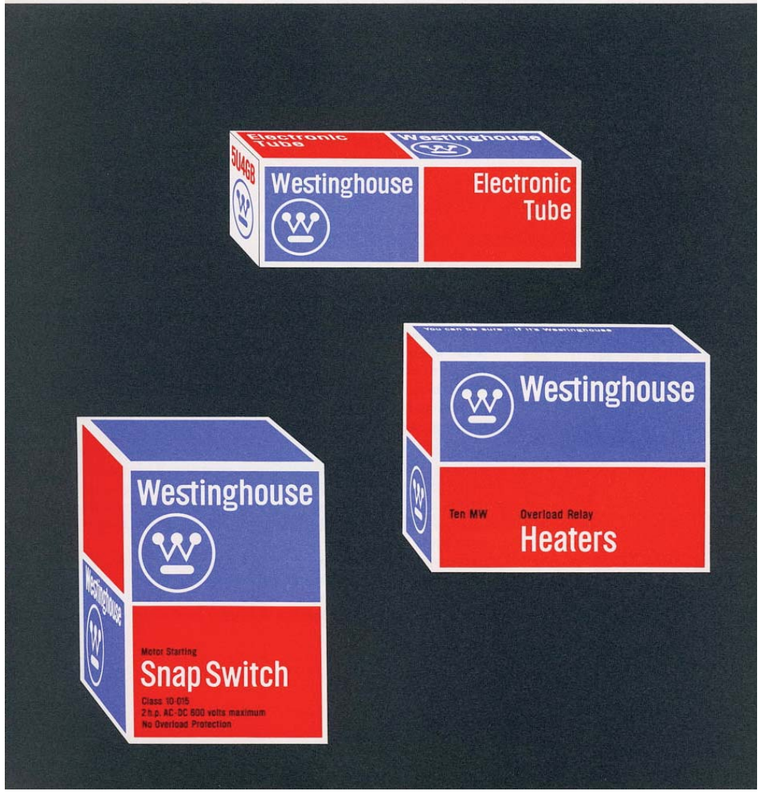
3: The ligature "st." (Note: this "st" may not be used for any word but "Westinghouse.")

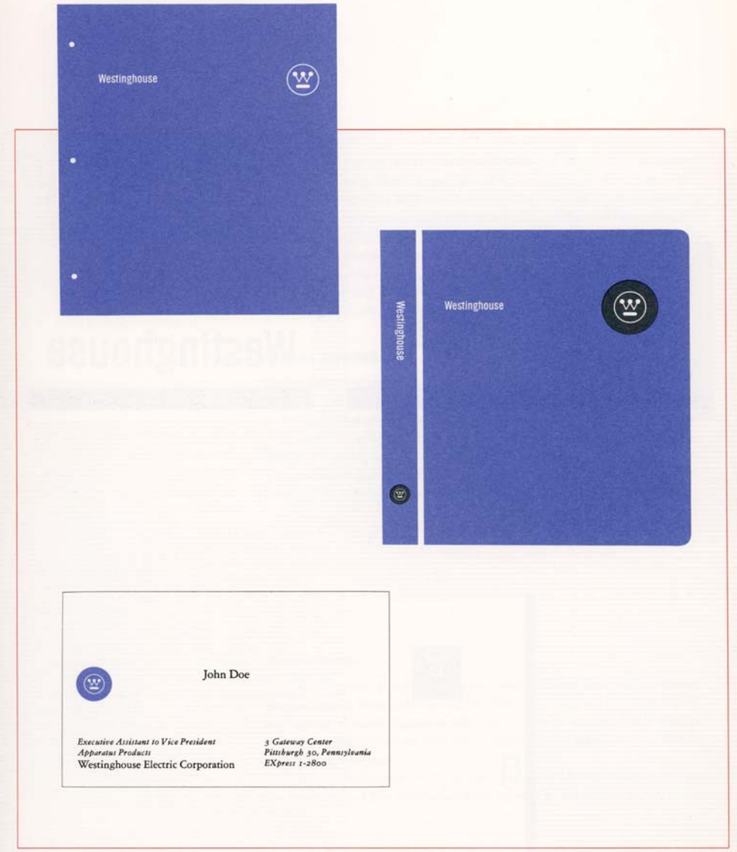
4: Short ascenders and descenders permit large size type in small areas.

Use of Westinghouse Gothic in advertising, TV, packaging, and other printed matter has demonstrated its practicability. It is one more factor which helps to distinguish Westinghouse graphics from hordes of other printed material. Primarily, the typeface should be used in display, rather than text matter.

Westinghouse Gothic comes in two weights: heavy and light. Type sizes range from 8 point to 72 point, and it may be obtained from Westinghouse Electric Corporation, Printing and Nameplate Department, Trafford, Pa., from your local supplier of Protype, or from Photo Lettering, 216 E. 45 St., New York (MU 2-2346).

stg

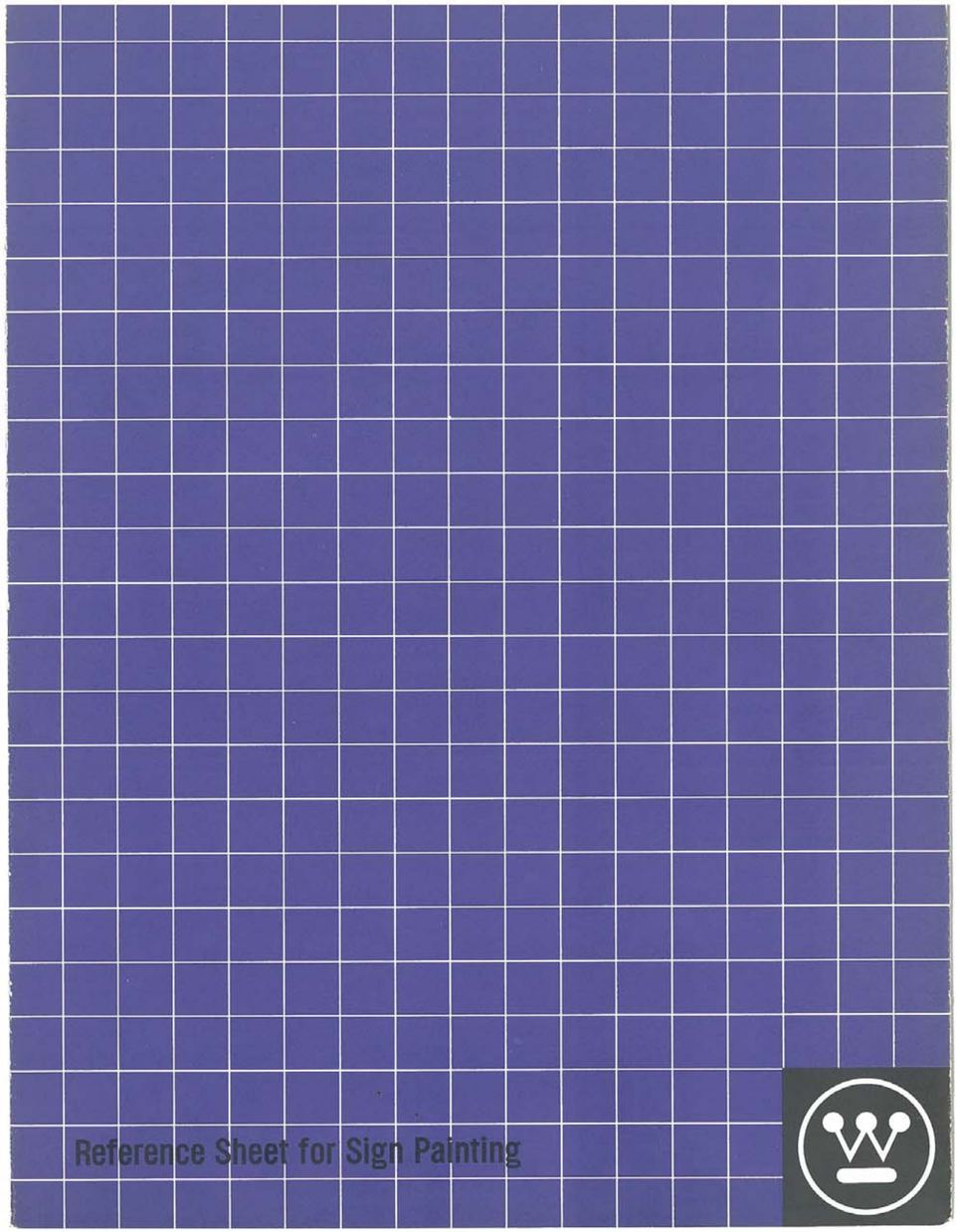




Westinghouse Reference Sheet for Sign Painting

Paul Rand

A manual showcasing how sign painting should be constructed and some the elements used.

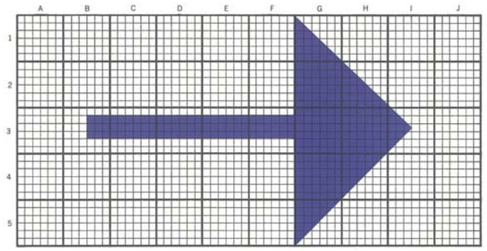


Reference Sheet for Sign Painting

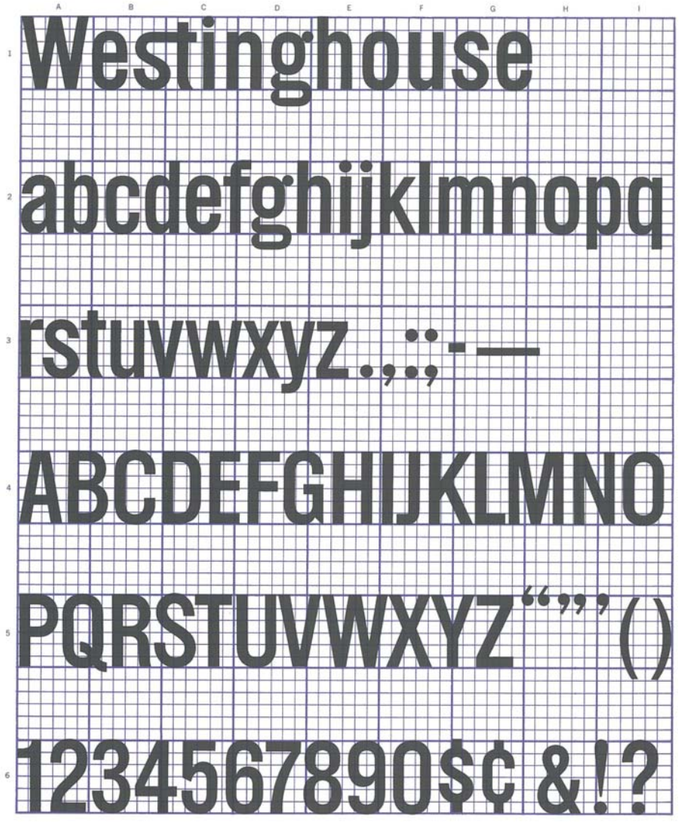
The Westinghouse Standard Sign Manual (B8716) available from Headquarters Identification Section, should be consulted before using this sheet.

Westinghouse Blue is the Corporate color. It should be used on signs as specified in the Standard Sign Manual.

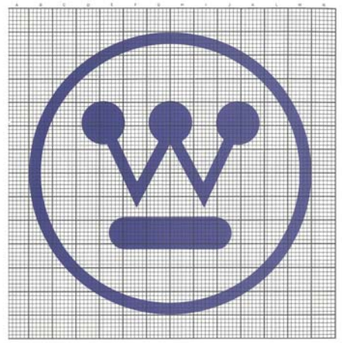
Before painting any sign, a small segment of the sign surface should be tested by applying the color, comparing it with the above panel, and adjusting the paint until the closest color match is obtained. It is important that the test be made on the actual sign surface to be used, because each surface has its own properties which influence how the paint will look when applied.



The Westinghouse Direction Arrow was specially designed for high legibility and distinctiveness. It should be used on painted signs whenever an arrow is required. It should be placed horizontally and vertically, right or left, up or down—never at an odd angle. Whenever possible, locate the arrow in the lower right hand corner of the sign as illustrated on Page 19 of the Standard Sign Manual. This location provides the best focal point for the arrow.

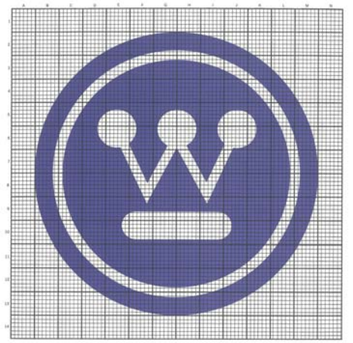


Westinghouse Logotype Trademark and Gothic Type Face: Lettering for all Westinghouse signs should be in the type face of the logotype, the way the trademark "Westinghouse" is printed. This special Gothic type face was developed for high legibility and distinctiveness. The logotype and individual letters of the alphabet can easily and accurately be reproduced by following the grid scale on this page.

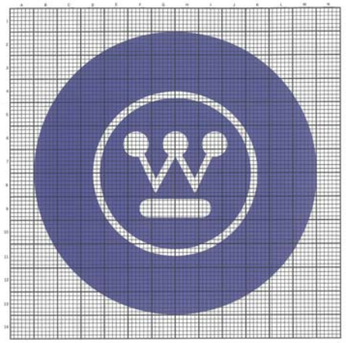


Whenever the circle W trademark is painted, careful attention must be given to keep its proportions accurate. Our trademark rights to the circle W depend upon its consistent accurate reproduction. The trademark style used should be scaled to its full size from the grids on this sheet. The four styles shown are Corporate standards. The Corporate color, Westinghouse Blue, should dominate.

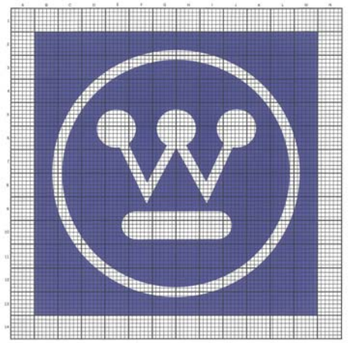
Bubble Circle W: The above style of trademark is the simplest, most easily reproduced form. This is the form recommended for tank and tower identification. When painted in Westinghouse Blue on a light colored tank, the trademark can be seen for great distances.



Reverse Narrow Border Circle W: For special use only . . . contact Headquarters Identification Section for suitability.



Reverse Wide Border Circle W: This style of the trademark is recommended for use on plant-community billboard signs, shown on Pages 14 and 15 of the Standard Sign Manual. It features high legibility plus good decorative qualities.

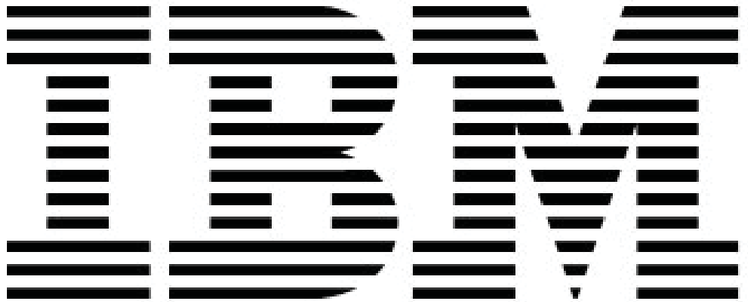


Reverse Square Circle W: For special use only . . . contact Headquarters Identification Section for suitability.

IBM Identity

Paul Rand & Eliott Noyes, 1966

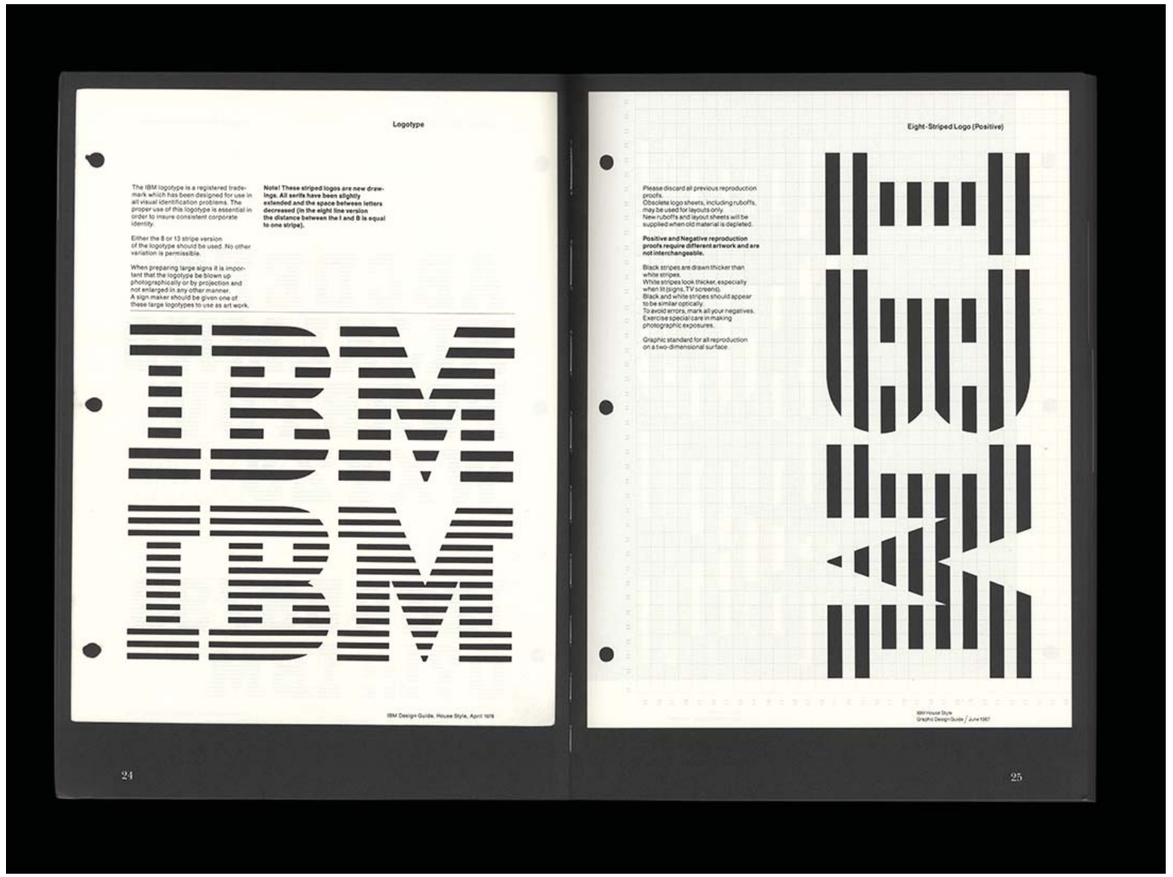
The company's famous stripes were introduced to indicate speed and vibrancy to the international expansion.



IBM Graphic Standards Manual

Paul Rand, 1969

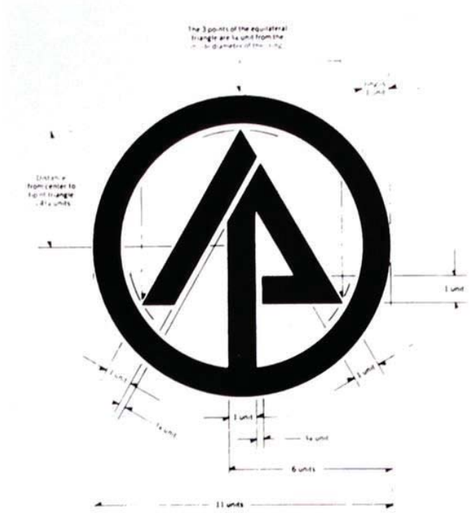
The graphic manual that showcased the design system used to reimagine the company's identity and strategy.



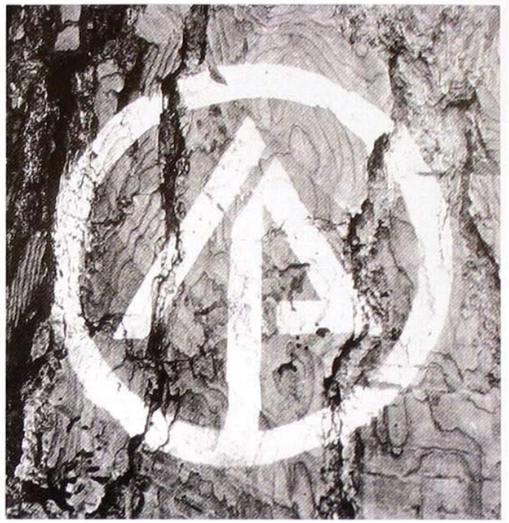
International Paper Company Identity

Lester Beall, 1960

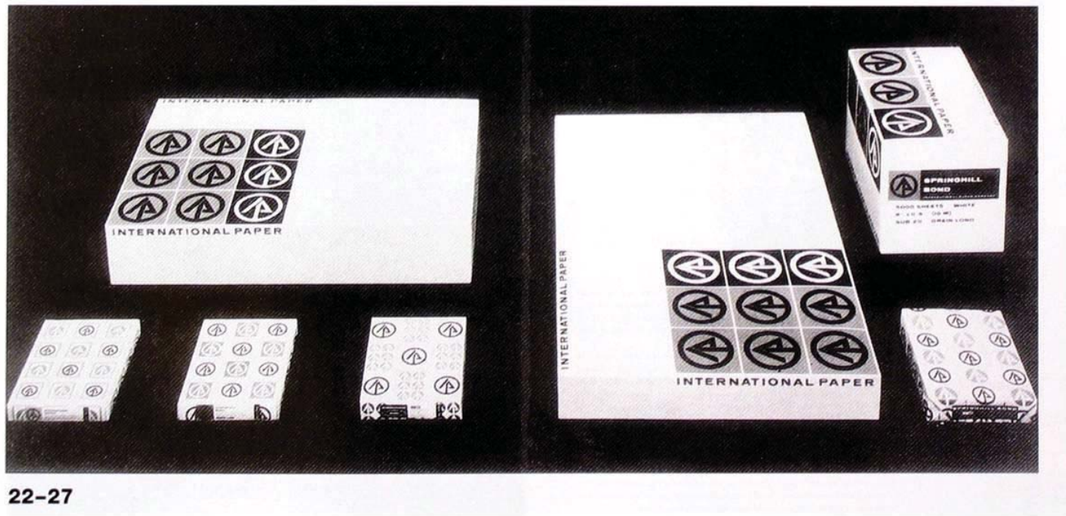
Reshaped the entire company through a corporate identity program to be efficiently introduced and maintained.



22–25



22–26



22–27

International Paper Company
Corporate Identification

Lester Beall, 1967

This style manual was among the first to showcase the detail of an integrated system in corporate design.

Dynamic Identities

St-Raphaël

Charles Loupot, 1957

While redefining the brand, Loupot gave an infinite field of expression to their graphics. A modular system was used for producing all of the brand's visuals offering numerous combination sets.


St Raphaël
QUINQUINA


St Raphaël
quinquina

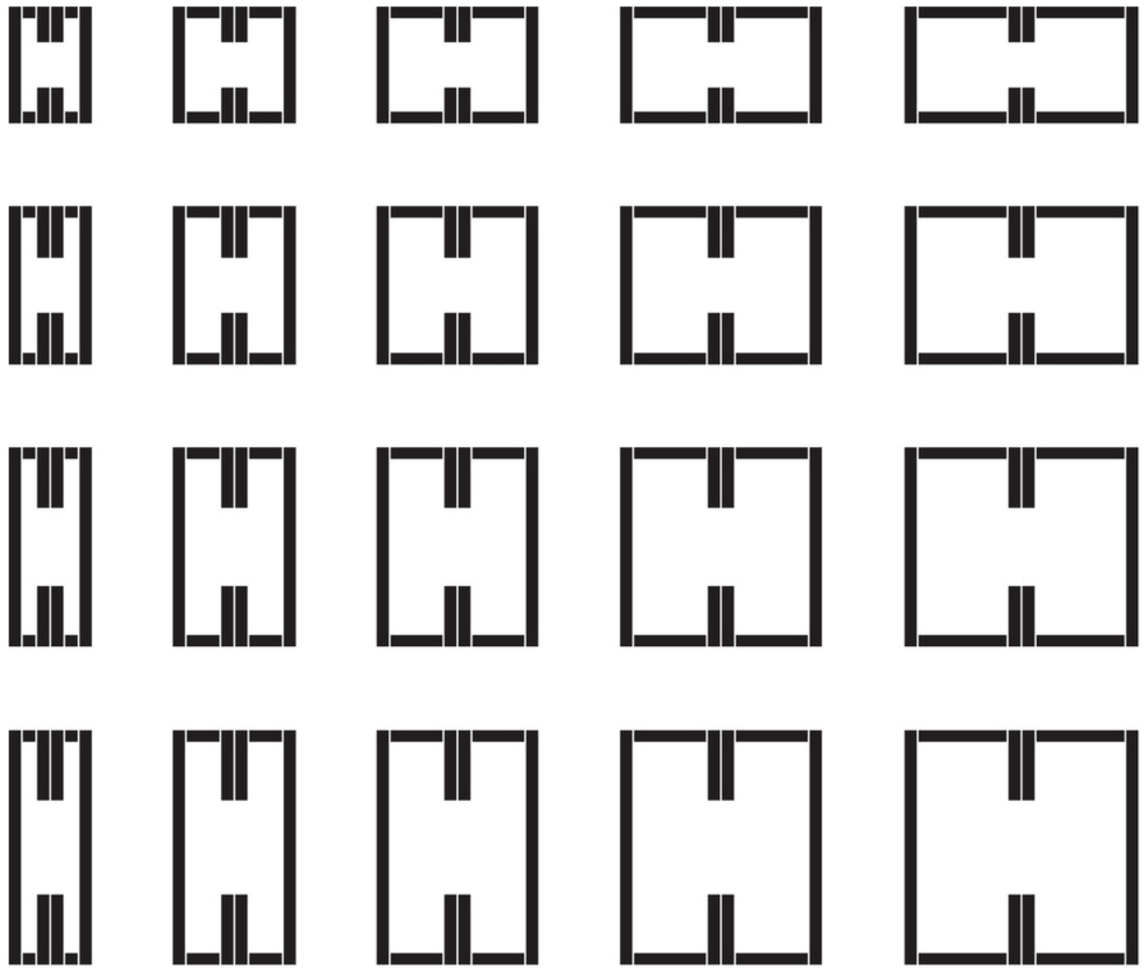

MARTINI
NOILLY
St Raphaël QUINQUINA blanc sec à l'eau rouge sec à l'eau
CLACQUESIN
MANDARIN
SUZE
BERGER
PERNOD
RICARD
VINS
ROUGE
BLANC
ANJOU
BEAUJOLAIS
MOUSSEUX
CHAMPAGNE
BIÈRES - SODAS
BLONDE le 1/2
» la bouteille
BRUNE le 1/2
» la bouteille
LIMONADE
JUS DE FRUITS
GRAND MARNIER
MARIE BRIZARD
PRUNELIA
ALCOOLS
COGNAC
COGNAC "OTARD"
CALVADOS
MARC
MIRABELLE
KIRSCH
RHUM
CAFÉS INFUSIONS
CAFÉ NATURE
» FILTRE
» CRÈME
INFUSIONS
VIANDOX (ou consommé)
EAUX MINÉRALES
VICHY
VITTEL
PERRIER
VITTELLOISE
St Raphaël
quinquina


St Raphaël
quinquina

Holzäpfel

Karl Gerstner, 1959

An office furniture trademark whose identity consist of parts which are components to printer's metal rules.



MTV

Manhattan Design, 1980

One of the first dynamic identities which fixated the shapes and position of the logo but could be built with variations to express its youthful vibe.

Tate Modern

Marina Willer, 2000

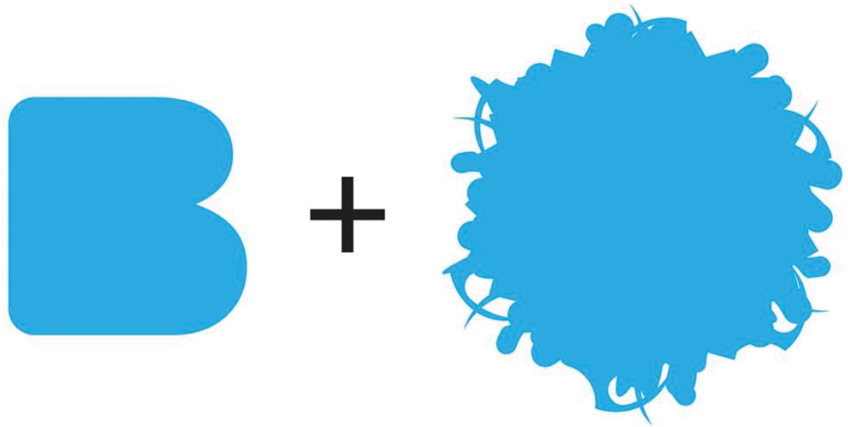
The range of logos suggest the dynamic nature of Tate—always changing and yet still recognizable.

Brooklyn Museum

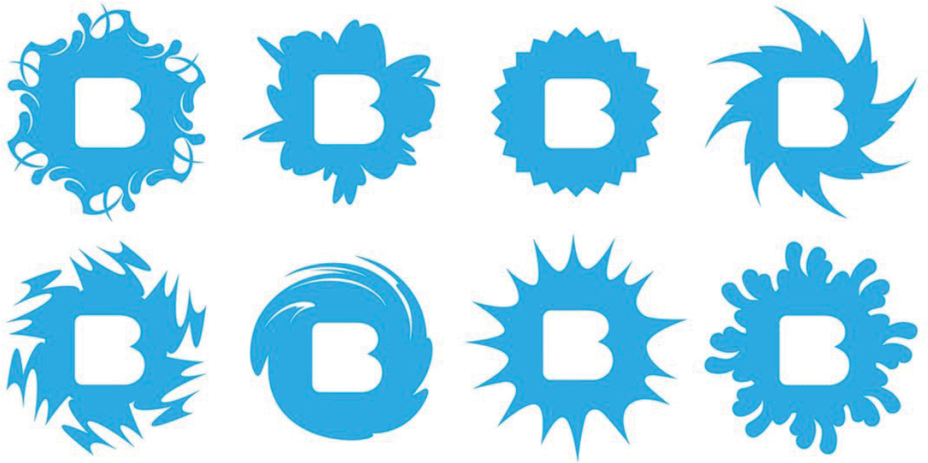
2x4, 2004

A contemporary take on the classic museum seal with reimaging the Brooklyn Museum as an alternative museum; family rather than tourist-oriented. The dynamic logo indicates the wide range of the Museum's collection.

Logotype



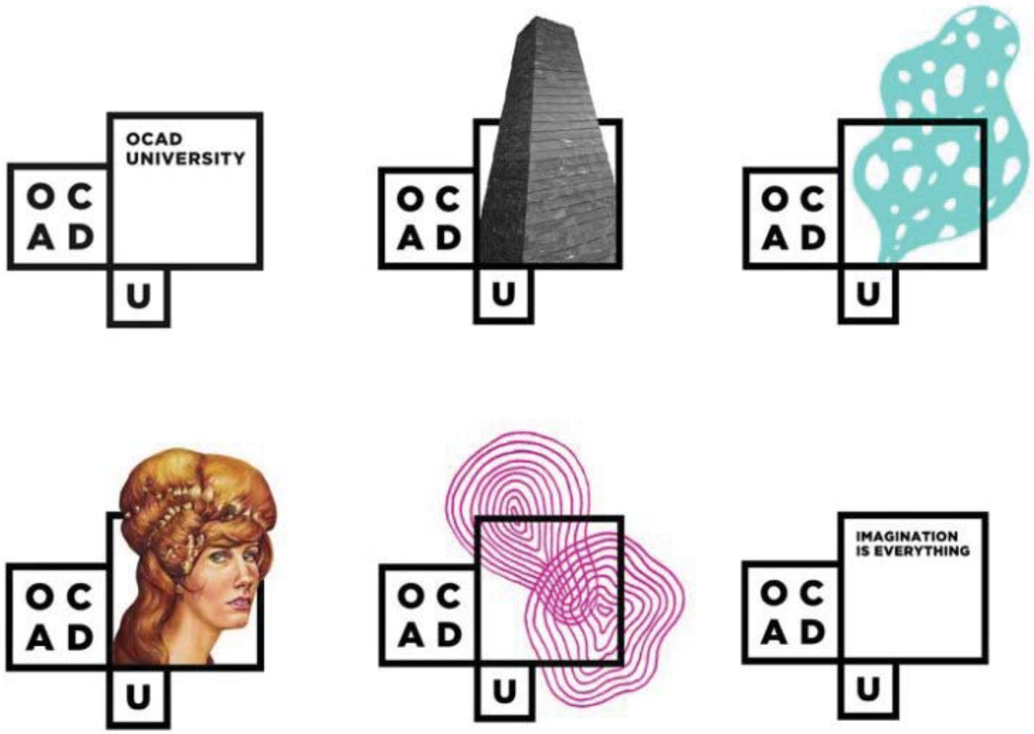
Logotype Variations



OCAD University

Bruce Mau Design, 2011

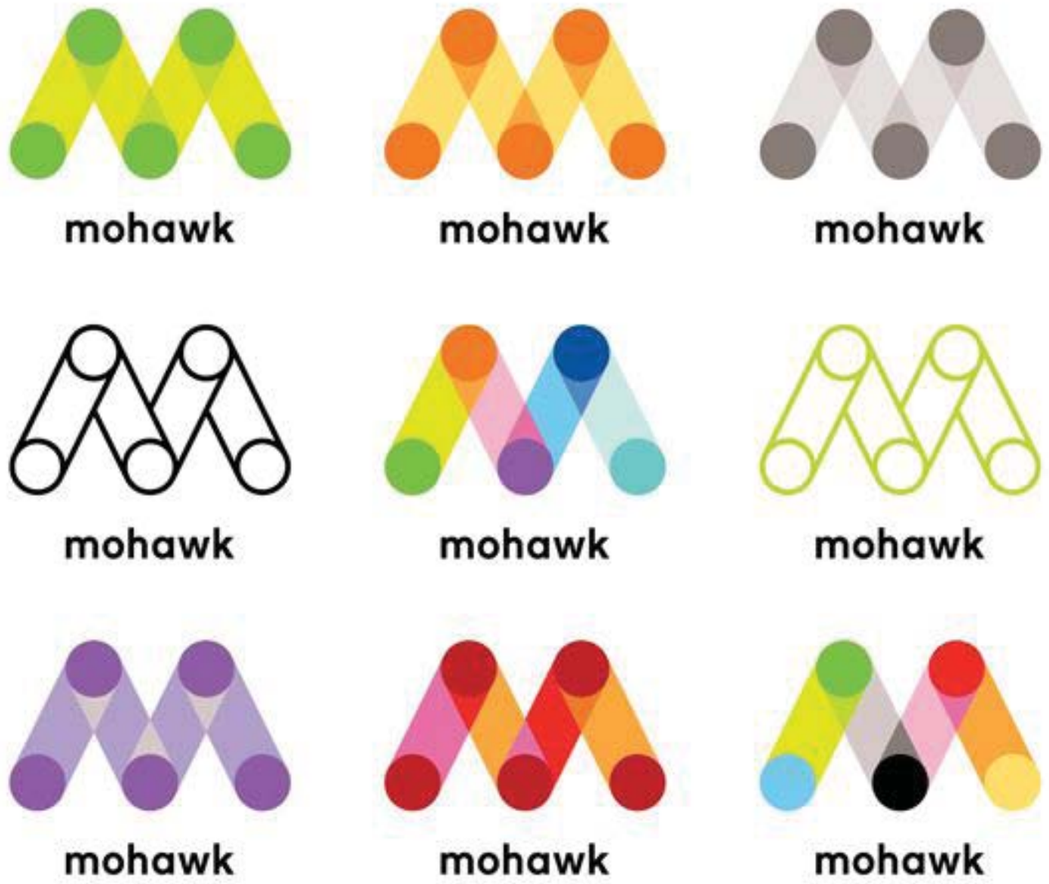
Customized dynamic identity which allows students to insert their individual mark to add to the library collection.



Mohawk

Pentagram, 2012

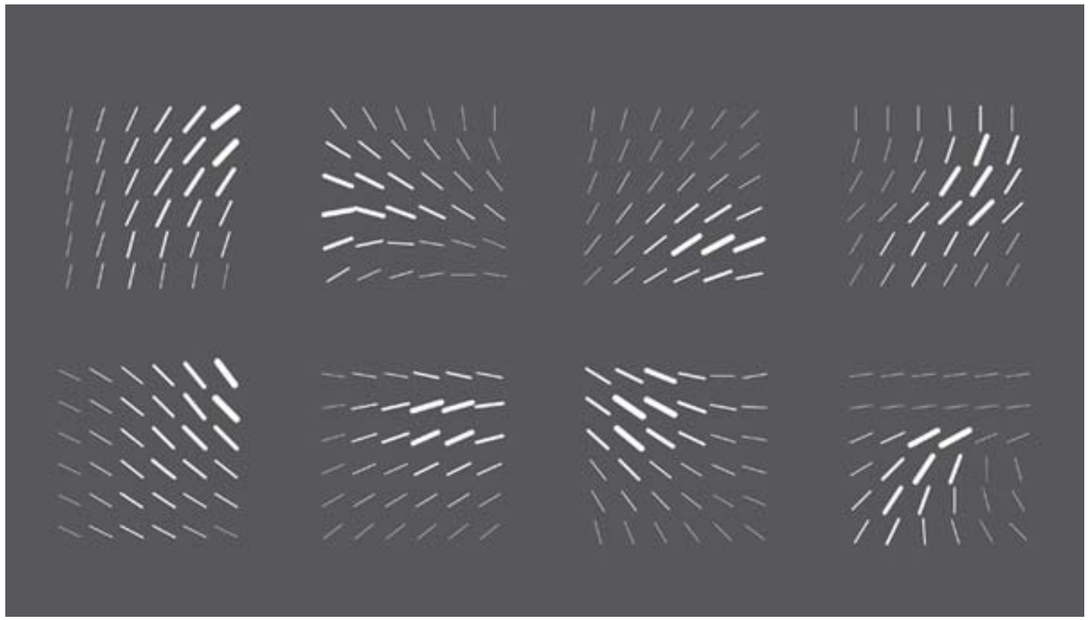
The monogram is the centerpiece of the dynamic system which is to evoke the papermaking and printing process which involve paper moving around cylinders.



EMSCom at Università della Svizzera Italiana

Moving Brands, 2013

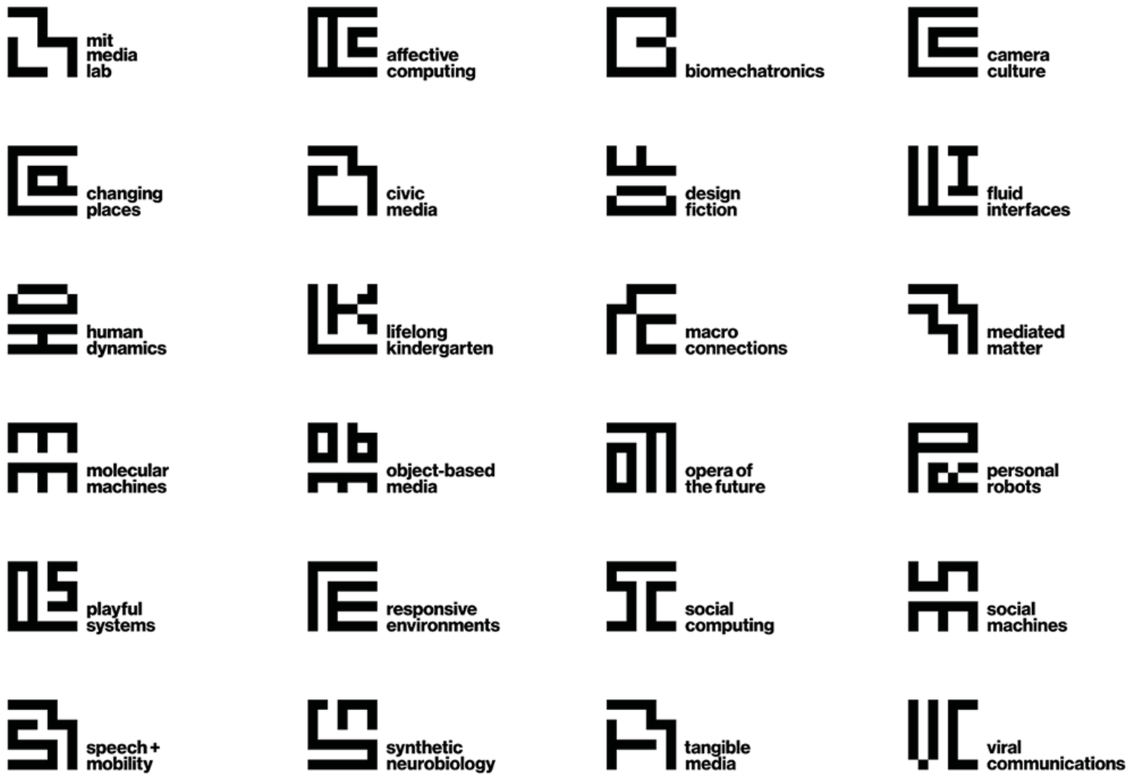
A dynamic reactive logo based on an organic grid of lines created using processing code.



MIT Media Lab

Pentagram, 2014

An interrelated system of glyphs that celebrates the diversity of activities at the Lab.



Packaging

Ciba-Geigy

Max Schmid, 1948

Design of uniform packaging for pharmaceuticals to promote the company brand instead of the product brand.

Campbell's Soup Cans

Andy Warhol, 1962

A series of work produced through screen printing which mimicked the repetition and uniformity of advertising.

Teddymat

Karl Gerstner, 1964

A full comprehensive system of laundry detergent packaging represented through a simple visual formula.

Kellogg's Cereal Boxes

1987


Kellogg's
FROSTED KRISPIES
READY-SWEETENED RICE CEREAL
NET WT. 7/8 OZ.
24 grams
Kellogg's
RICE KRISPIES
NET WT. 5/8 OZ.
18 grams
Kellogg's
HONEY & NUT CORN FLAKES
CORN FLAKES COATED WITH BROWN SUGAR, NUTS AND REAL HONEY.
NET WT. 7/8 OZ.
24 grams
Kellogg's
FROOT LOOPS
READY-SWEETENED CEREAL
Provides 10 essential vitamins & minerals
ALL NATURAL FLAVORS: ORANGE LEMON CHERRY & OTHER FLAVORS
NET WT. 3/4 OZ.
21 grams
Kellogg's
COCOA KRISPIES
NET WT. 1 OZ.
28 grams
Kellogg's
PRODUCT 19
MULTIVITAMIN SUPPLEMENT CEREAL WITH IRON & ZINC
NET WT. 3/4 OZ.
21 grams


Kellogg's
RAISIN BRAN
Two Scoops
NET WT. 1 1/4 OZ.
35 grams
Kellogg's
FROSTED FLAKES OF CORN
FORTIFIED WITH ESSENTIAL VITAMINS
THEY'RE GR-R-EAT!
NET WT. 1 OZ.
28 grams
FROSTED FLAKES OF CORN
Kellogg's
BRAN FLAKES
A cereal high in natural wheat fiber.
NET WT. 1 OZ.
28 grams
Kellogg's
APPLE JACKS
READY-SWEETENED APPLE & CINNAMON FLAVORED CEREAL
NET WT. 5/8 OZ.
18 grams
Kellogg's
RICE KRISPIES
NET WT. 5/8 OZ.
18 grams
Kellogg's RICE KRISPIES
Kellogg's
Special K
High Protein, Low Sugar Cereal
NET WT. 5/8 OZ.
18 grams

Kellogg's Cereal Boxes Redesign

Landor, 2019

The packaging redesigns were to reflect the naturalness of the food and heritage of the company's story.

Clear RX

Deborah Adler, 2005

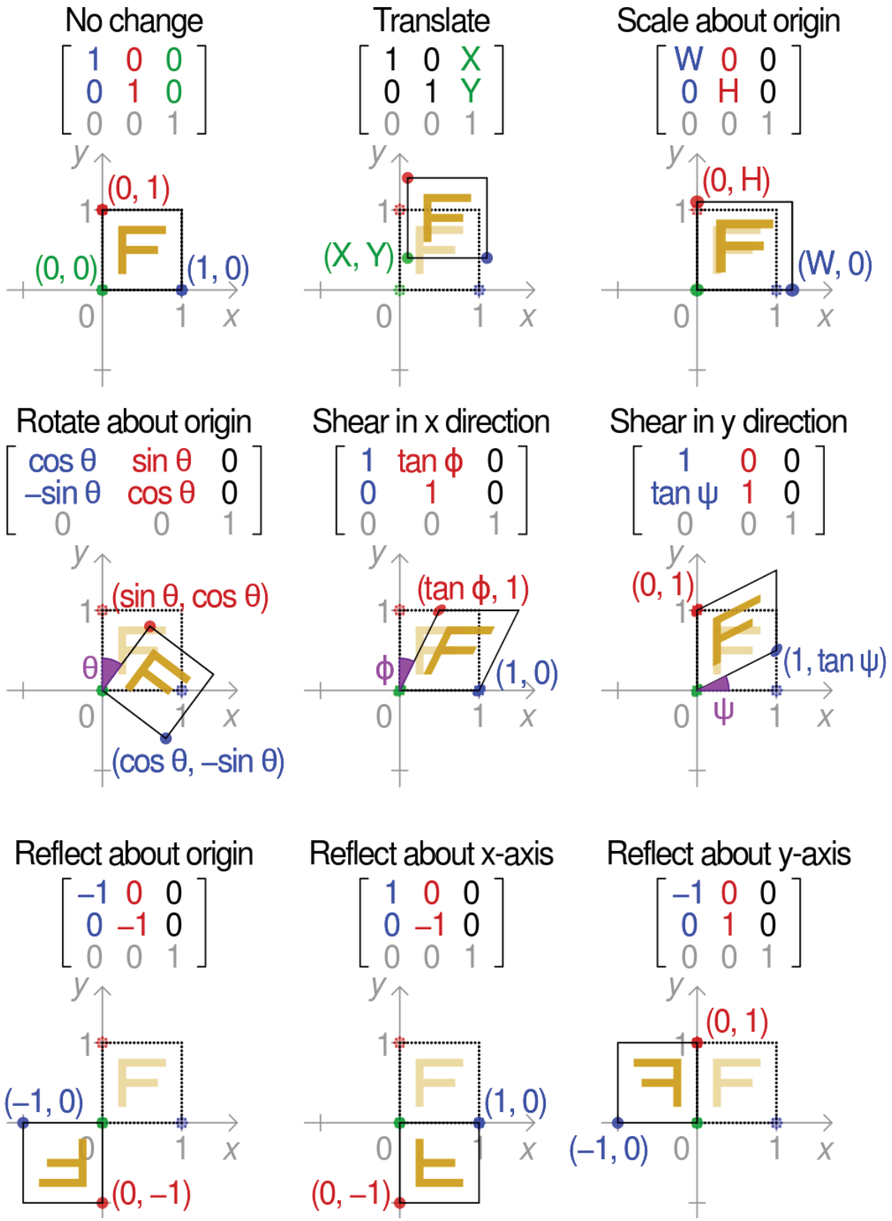
Prescription drug packaging system which included color coded rubber rings and an easy to read label.

Design systems as **type** with **matrix transformations.**
with **character set expansions.**
with **programmatic descriptions.**

Matrix transformations

Transformation Matrix

Allow linear transformations to be displayed in a consistent format appropriate for computation.



D'Arcy Wentworth Thompson

On Growth and Form, 1917

Uses mathematics in biology to show the theory of geometrical transformations within evolution.

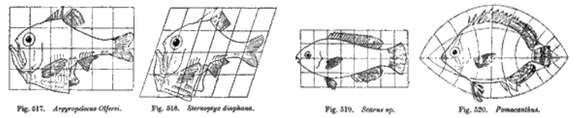


Fig. 517. *Argyropelecus Olfersi.* Fig. 518. *Sternoptyx diaphana.* Fig. 519. *Scarus* sp. Fig. 520. *Pomacanthus.*

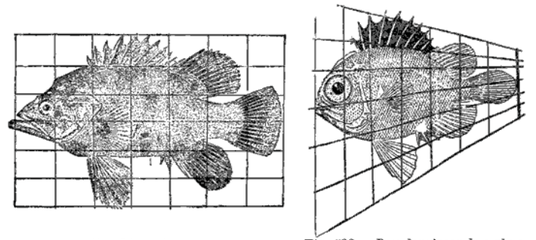


Fig. 521. *Polyprion.* Fig. 522. *Pseudopriacanthus altus.*

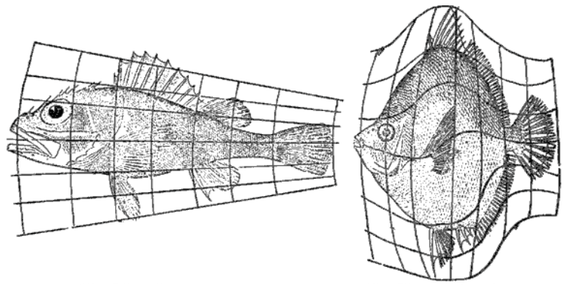


Fig. 523. *Scorpaena* sp. Fig. 524. *Antigonia capros.*

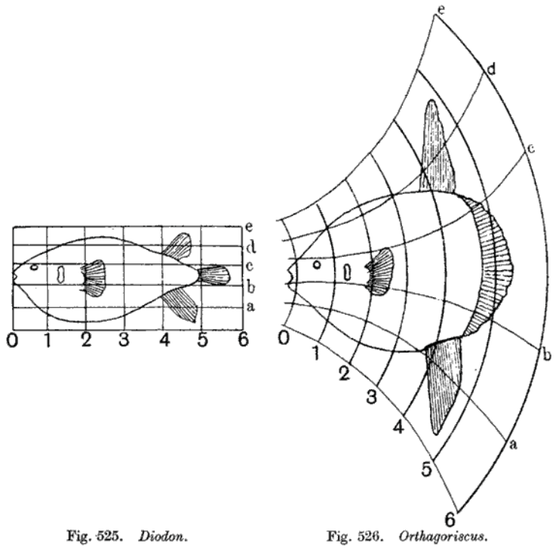


Fig. 525. *Diodon.* Fig. 526. *Orthagoriscus.*

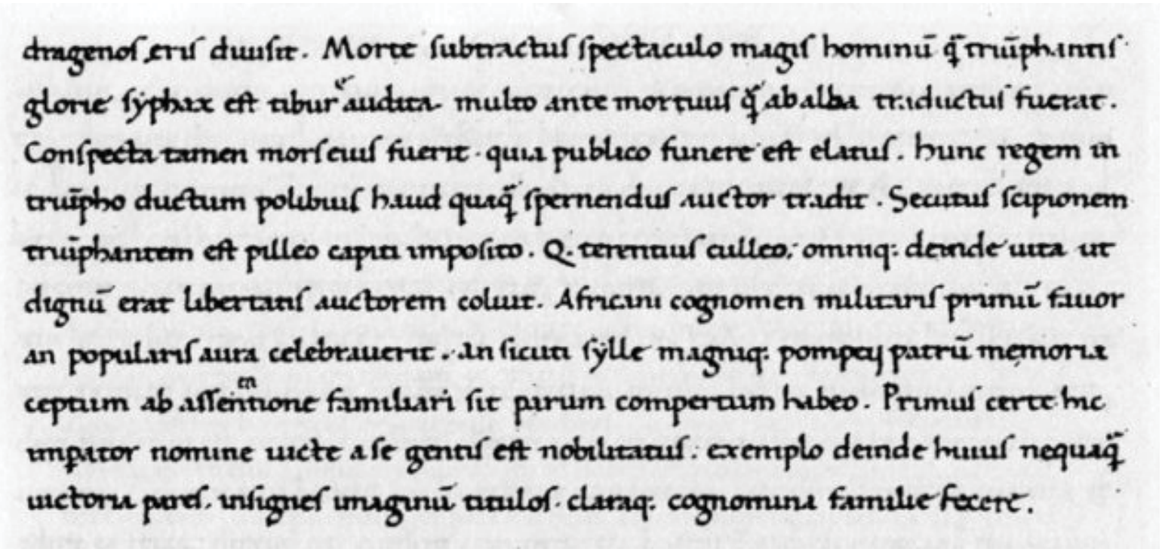
Majuscules and Minuscules

ABC abc

Majuscules (uppercase) Minuscules (lowercase)

Poggio Bracciolini, 1400 A.D.

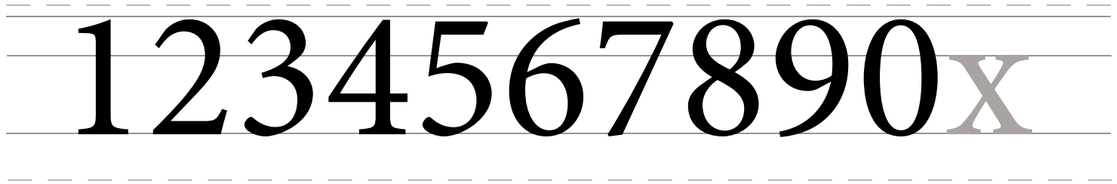
First pairing of majuscules and minuscules in the modern manner which evolved the Humanistic script. The pairing is also known as uppercase and lowercase characters.


dragenoſ ſeruſ duuſit. Morte ſubtractuſ ſpectaculo magiſ hominū q̄ triūphantiſ
glorie ſyphax eſt tibur audita. multo ante mortuuſ q̄ ab alba traductuſ fuerat.
Conſpecta tamen morſ eiuſ fuerit. quia publico funere eſt elatuſ. hunc regem in
triūpho ductum polibuſ haud quaq̄ ſpernendus auctor tradit. Secutuſ ſcipionem
triūphantem eſt pilleo capiti impoſito. Q. terentiuſ culleo. omniq; deinde uita ut
dignū erat libertatiſ auctorem coluit. Africani cognomen militariſ primū fauor
an populariſ aura celebrauerit. an ſicuti ſylle magnīq; pompeij patrū memoria
ceptum ab aſſentatione familiari ſit parum compertum habeo. Primuſ certe hic
imp̄ator nomine uicte a ſe gentiſ eſt nobilitatuſ. exemplo deinde huiuſ nequaq̄
uictoria parē. inſignes imaginū titulos. claraq. cognomina familie fecere.

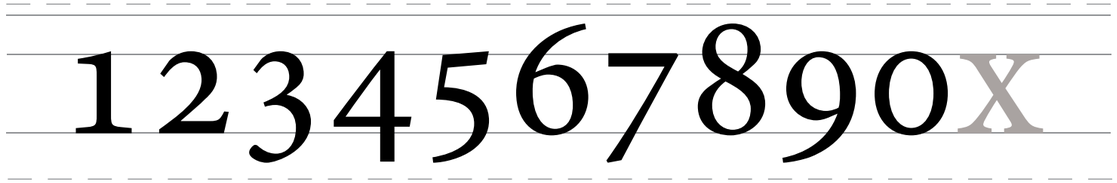
Old Style Figures

12th century

Text figures that have varying heights and alignments based off of the lining figures. Old style figures are usually preferred in a running block of text to create a harmonized look. They were introduced into European typography in 1788.



Lining figures



Old style figures

Small Caps

Glyphs that resemble majuscules or uppercase letters but have a reduced x-height to harmonize with minuscules or lowercase letters.

Lining figures

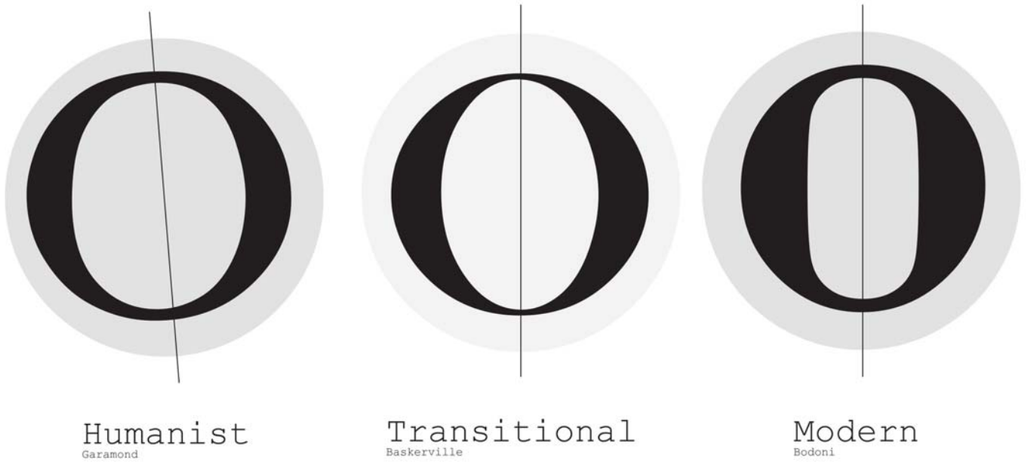
Small caps

GOOD MORNING, EVERYONE. Today, the Senate is poised to pass tax cuts and unemployment insurance, putting the House of Representatives in the position to send me this critical economic package so I can sign it into law.

I am absolutely convinced that this tax cut plan, while not perfect, will help grow our economy and create jobs in the private sector. It

A Range of Stresses

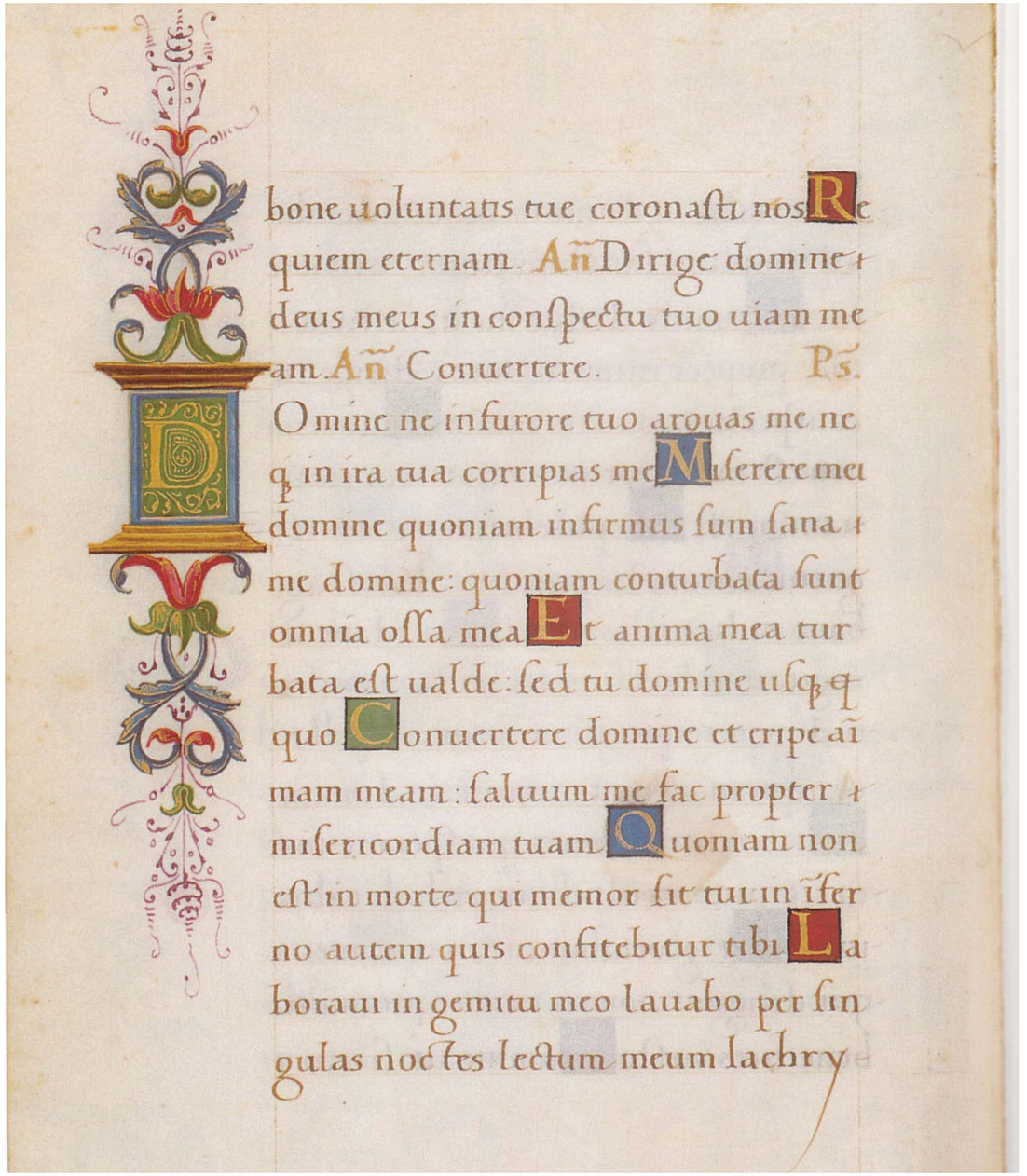
Old Style Typefaces, 15th century
Bembo is an example of an Old Style typeface which emphasized stress and were based on pen-drawn strokes.



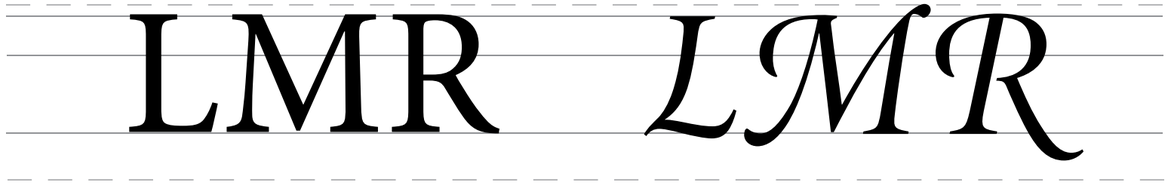
Roman and “Flourish” Form

Humanist cursive handwriting, late 1400’s

Style of script base on Carolingian minuscule.



Roman and Swash Characters



Roman Swash

16th century

Embellishments that extend off the standard character that were inspired by the period of handwriting.

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

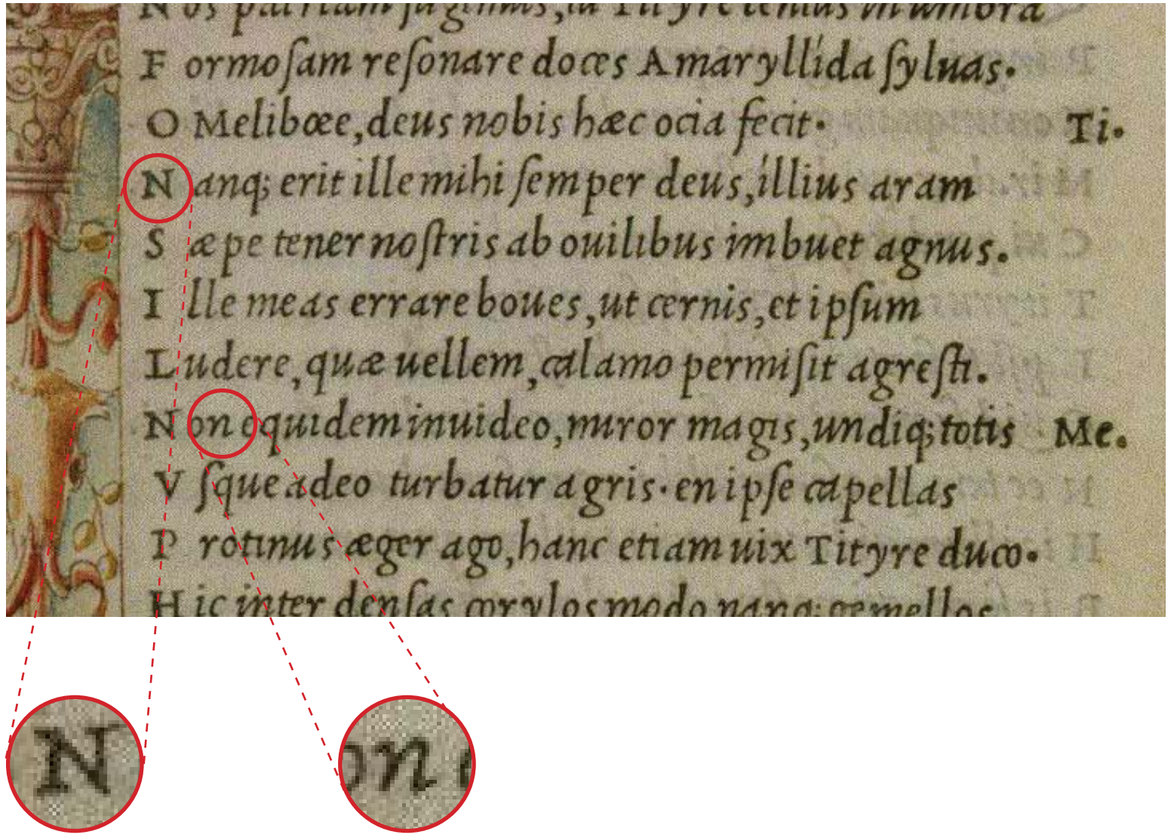
Roman and Italic

Francesco Griffo & Aldus Manutius, 1501

This edition of the *Aldine Virgil* was designed in a smaller format and italic type allowed for more information to be printed while saving space.

Nn Nn

Roman Italic



Roman and Bold

Clarendon, 1845

Robert Besley's Clarendon typeface is the first type designed as a related bold; made to harmonize and align with its roman type.

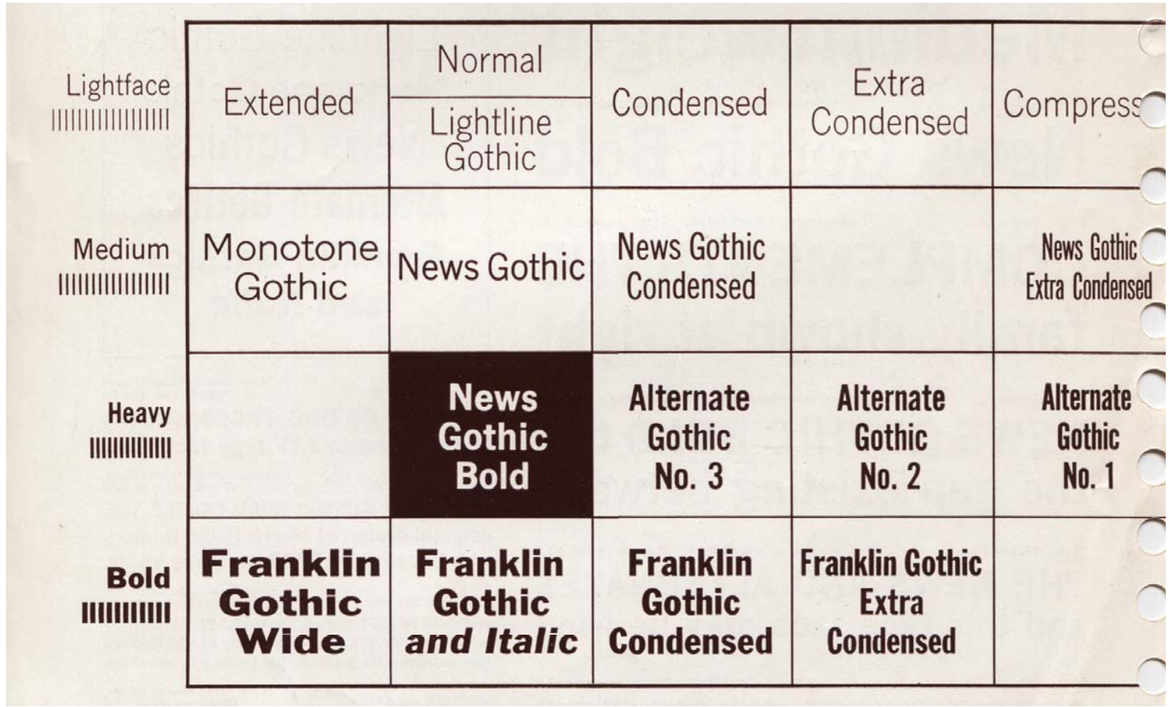
Roman Bold

PIRACY is the great sin of all **manufacturing communities**:—there is scarcely any Trade in which it prevails so generally as among **TYPE FOUNDERS. Messrs. BESLEY & Co.** originally introduced the **Clarendon Character,** which they registered under the **Copyright of Designs' Act,** but no sooner was the time of Copyright allowed by that Act **expired,** than the **Trade was inundated** with all sorts of **Piracies and Imitations,** some of them **mere effigies of letters.** Notwithstanding this, nearly all the **respectable Printers in Town and Country** who claim to have either **taste** or **judgment,** have adopted the **original Founts,** and treated the Imitations with the contempt they deserve.

Roman and Bold

Franklin Gothic, 1902

At American Type Founders (ATF), Morris Benton created large families of typeface designs to create consistency in different sizes and weights.



	Extended	Normal / Lightline Gothic	Condensed	Extra Condensed	Compress
Lightface					
Medium	Monotone Gothic	News Gothic	News Gothic Condensed		News Gothic Extra Condensed
Heavy		**News Gothic Bold**	**Alternate Gothic No. 3**	**Alternate Gothic No. 2**	**Alternate Gothic No. 1**
Bold	**Franklin Gothic Wide**	**Franklin Gothic *and Italic***	**Franklin Gothic Condensed**	**Franklin Gothic Extra Condensed**	

Condensed, Regular & Extended

Century, 1894

Originally designed by Linn Boyd Benton, Century was expanded over years creating extensions of the typeface.

Bold as a System

Cheltenham, 1902

Designed by Morris Fuller Benton, Cheltenham and its Bold are well-balanced with strong symmetry in various letters.

Cheltenham Bold

Cheltenham Bold Italic

Cheltenham Bold Condensed

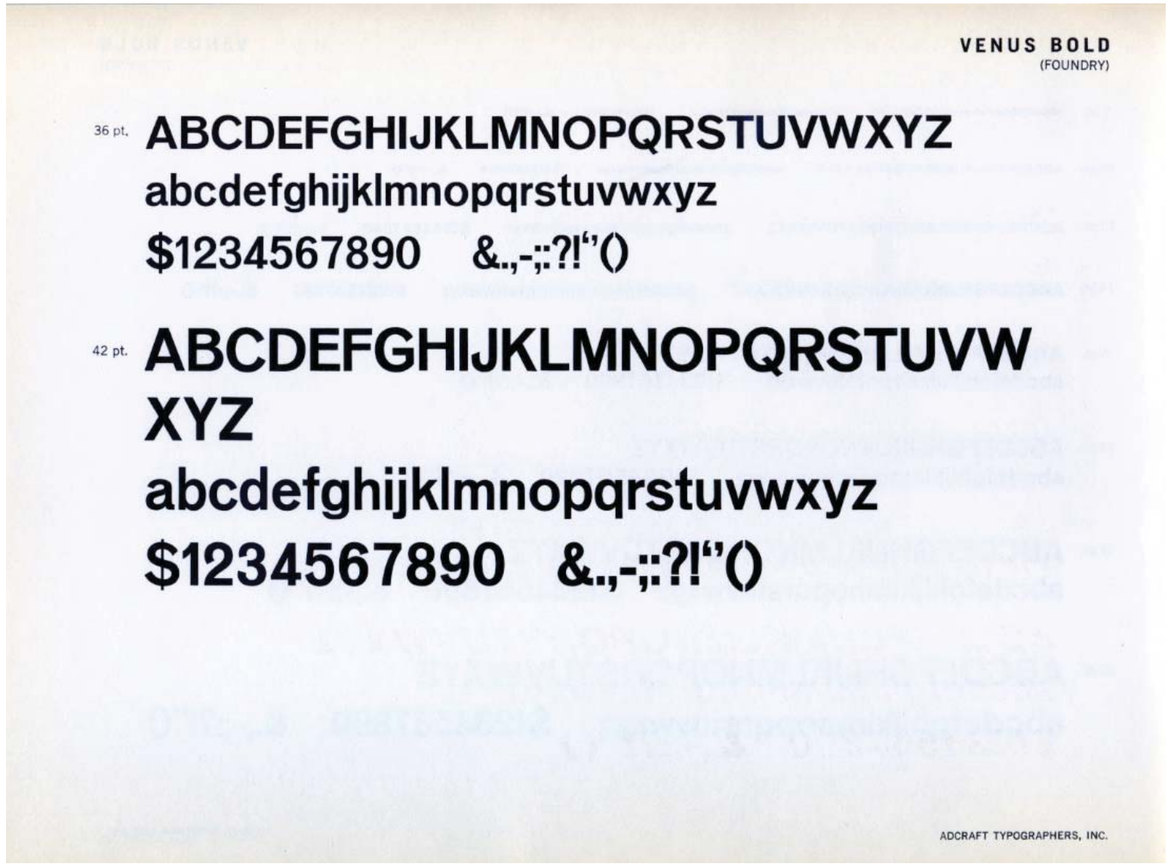
Cheltenham Bold Condensed Italic

Cheltenham Bold Extra Condensed

Font Families

Venus Font Family, 1907

Released by the Bauer Type Foundry, this popular early twentieth century type series included condensed and extended weights.



Serif and San-serif

Jan van Krimpen, 1935

The Romulus serial type family was the first to include both serif and san-serif.

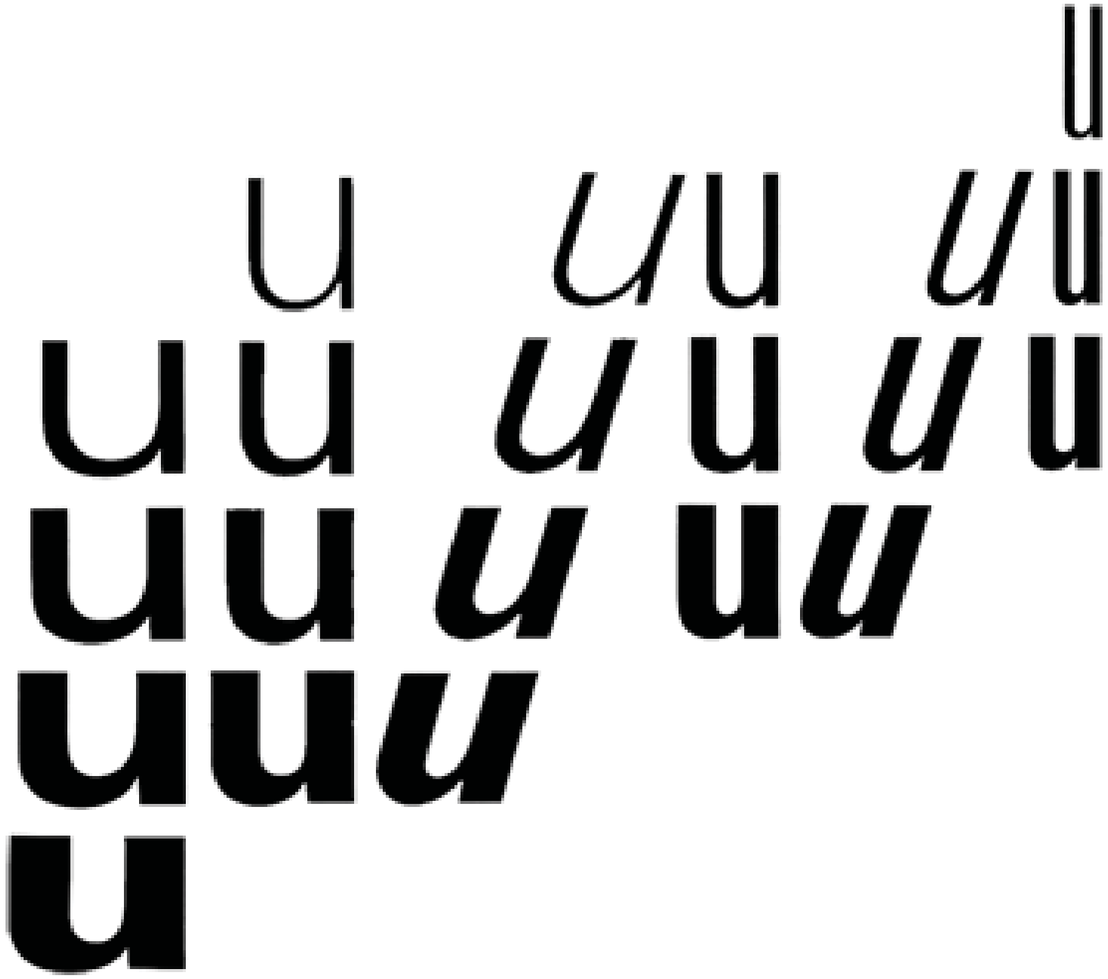
Optical Scaling

Harry Carter, 1937

A design method where characters of the same typeface differ from each other in both size and shape for legibility.

Univers Font Family, 1957

Designed by Adrian Frutiger as a full system of fonts with a wide range of weight and variations through a numbering system as opposed to names for the weight.



Univers Font Family, 1957

Univers 55

Weight

30 = Thin

40 = Light

50 = Roman

60 = Bold

70 = Black

80 = Extra Black

Width & stress

3 = Extended

5 = Roman

* 6 = Oblique

7 = Condensed

* 8 = Oblique

9 = Ultra Condensed

* even value = oblique

39 Thin Ultra Cond.

45 Light

46 Light Oblique

47 Light Condensed

48 Light Cond. Oblique

49 Light Ultra Cond.

53 Extended

55 Roman

56 Oblique

57 Condensed

58 Condensed Oblique

59 Ultra Cond.

63 Bold Extended

65 Bold

66 Bold Oblique

67 Bold Cond.

68 Bold Cond. Oblique

73 Black Extended

75 Black

76 Black Oblique

83 Extra Black Extended

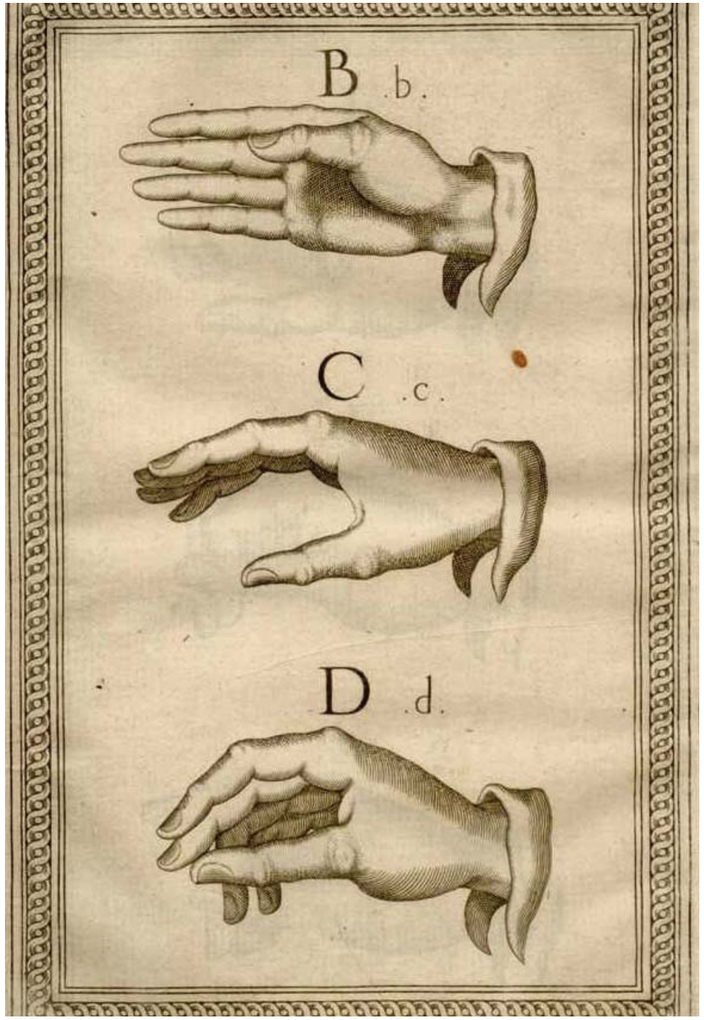
Encoding Systems

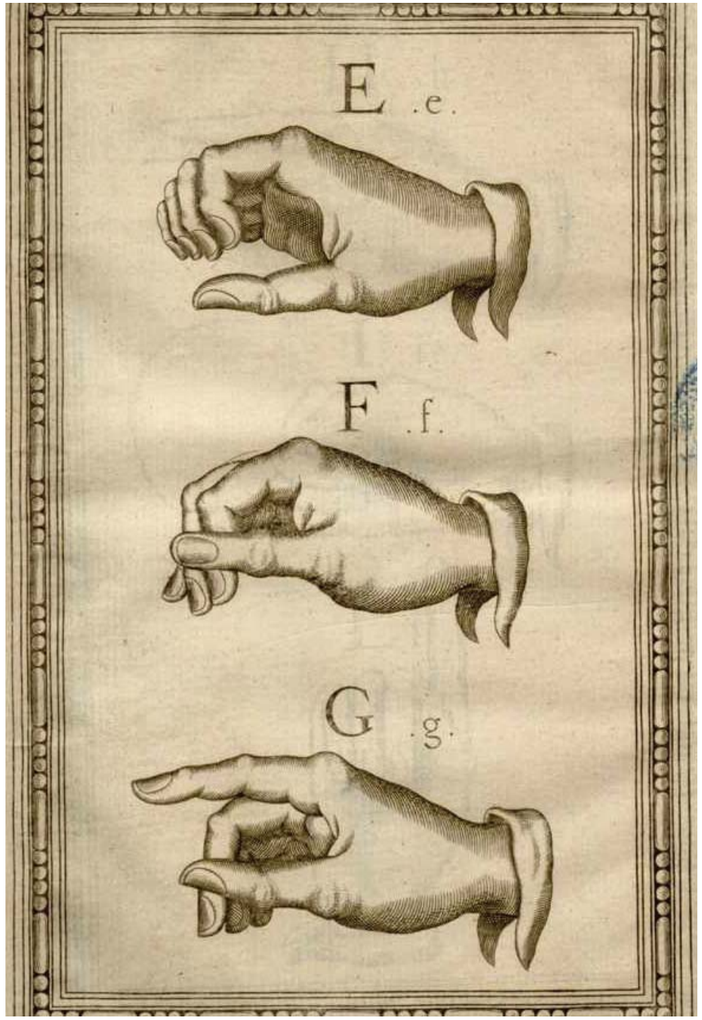
Encoding Systems

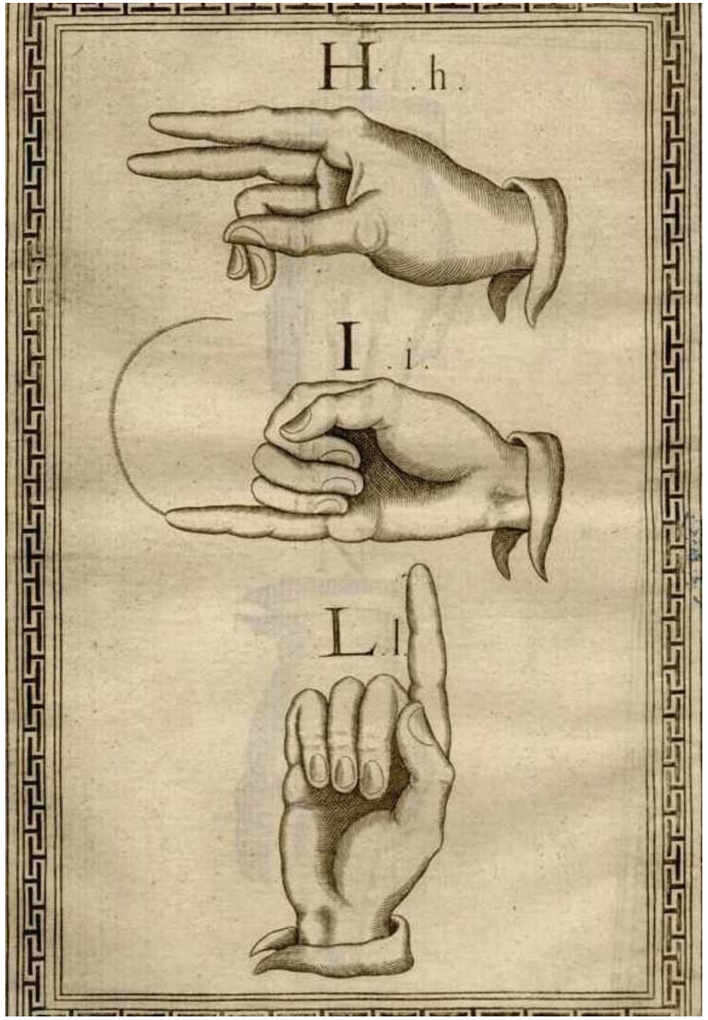
A rules system that pairs each character in a character set with a unique ID number or code to signal the application what glyph to display on screen.

Sign Language

Juan Pablo de Bonet, 1620
Spanish priest, Bonet, published a dictionary and book demonstrating a manual sign language alphabet system through handshapes for the deaf community.


B .b.
C .c.
D .d.

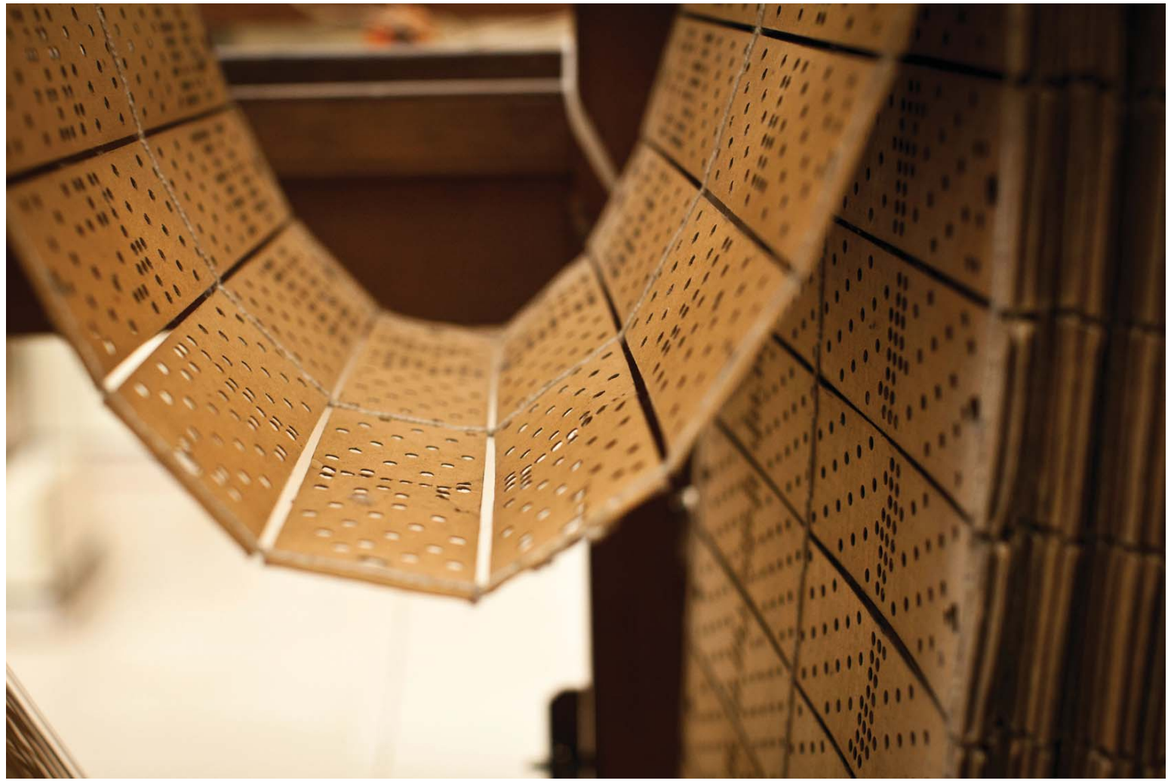

E .e.
F .f.
G .g.


H .h.
I .i.
L .l.

Jacquard Loom Punchcards

Joseph Marie Charles “Jacquard”, ~1804

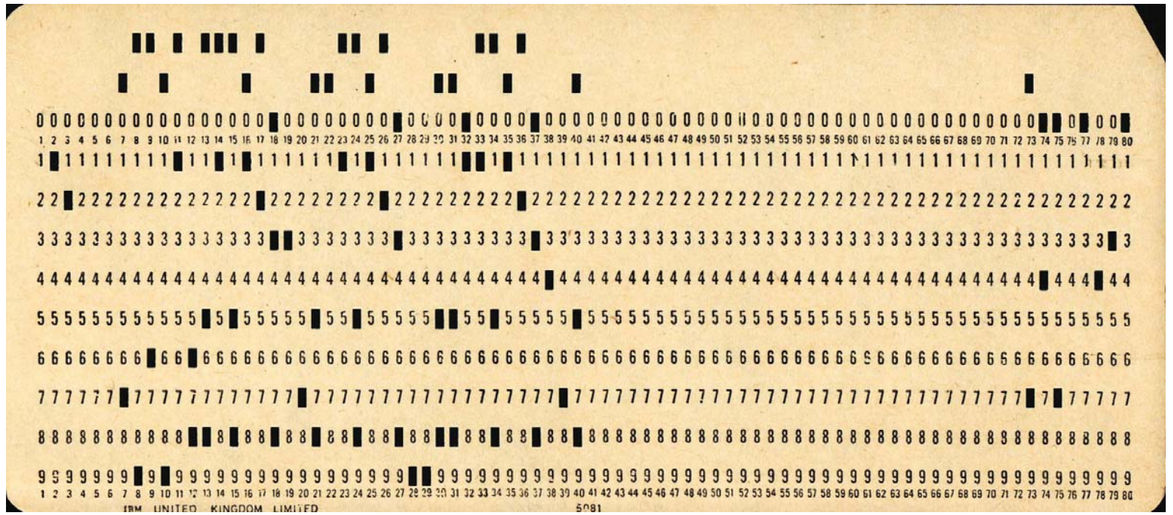
A weaving loom that could base its pattern upon the punched wooden cards. The ability to store and repoduce complex operations was applicable in textile manufacturing.



Computer Punchcard

Semyon Korsakov, 1832

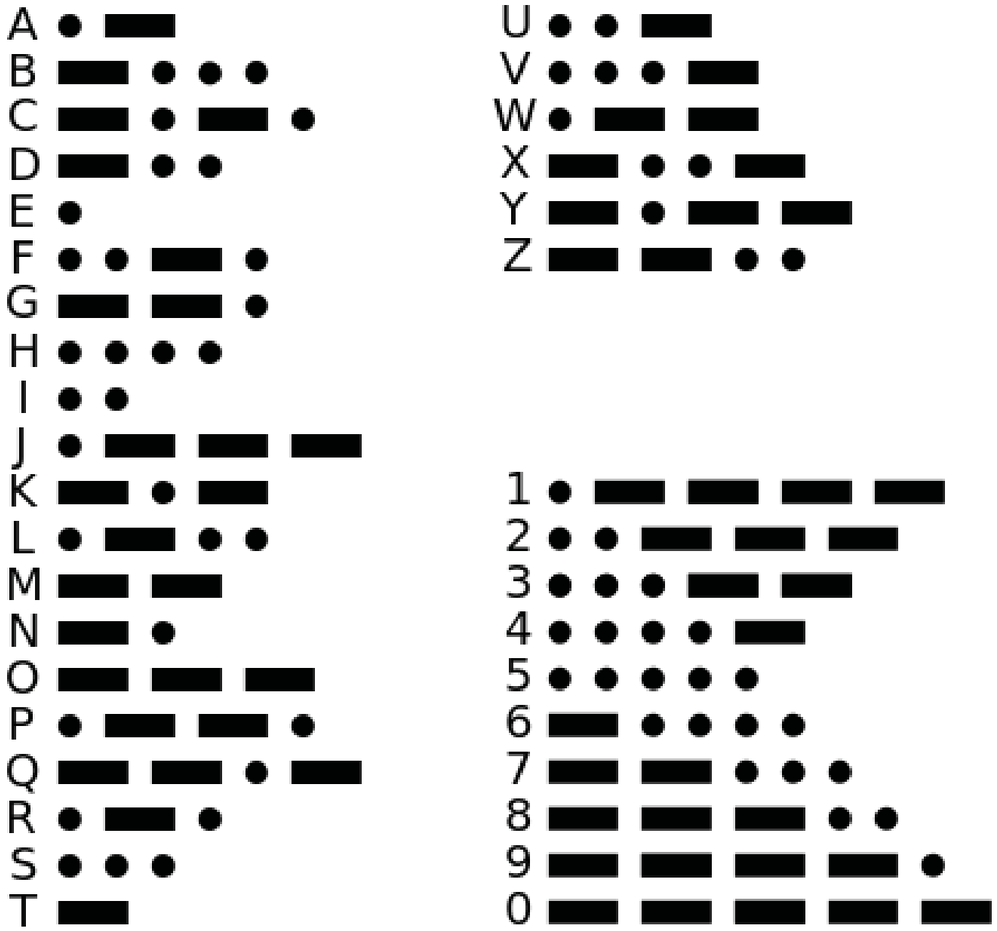
A piece of paper that can be used to represent digital data through the presence or absence of holes in defined positions. They were widely used in the data processing industry during the 20th century.



Morse Code

Samuel B. Morse, 1836

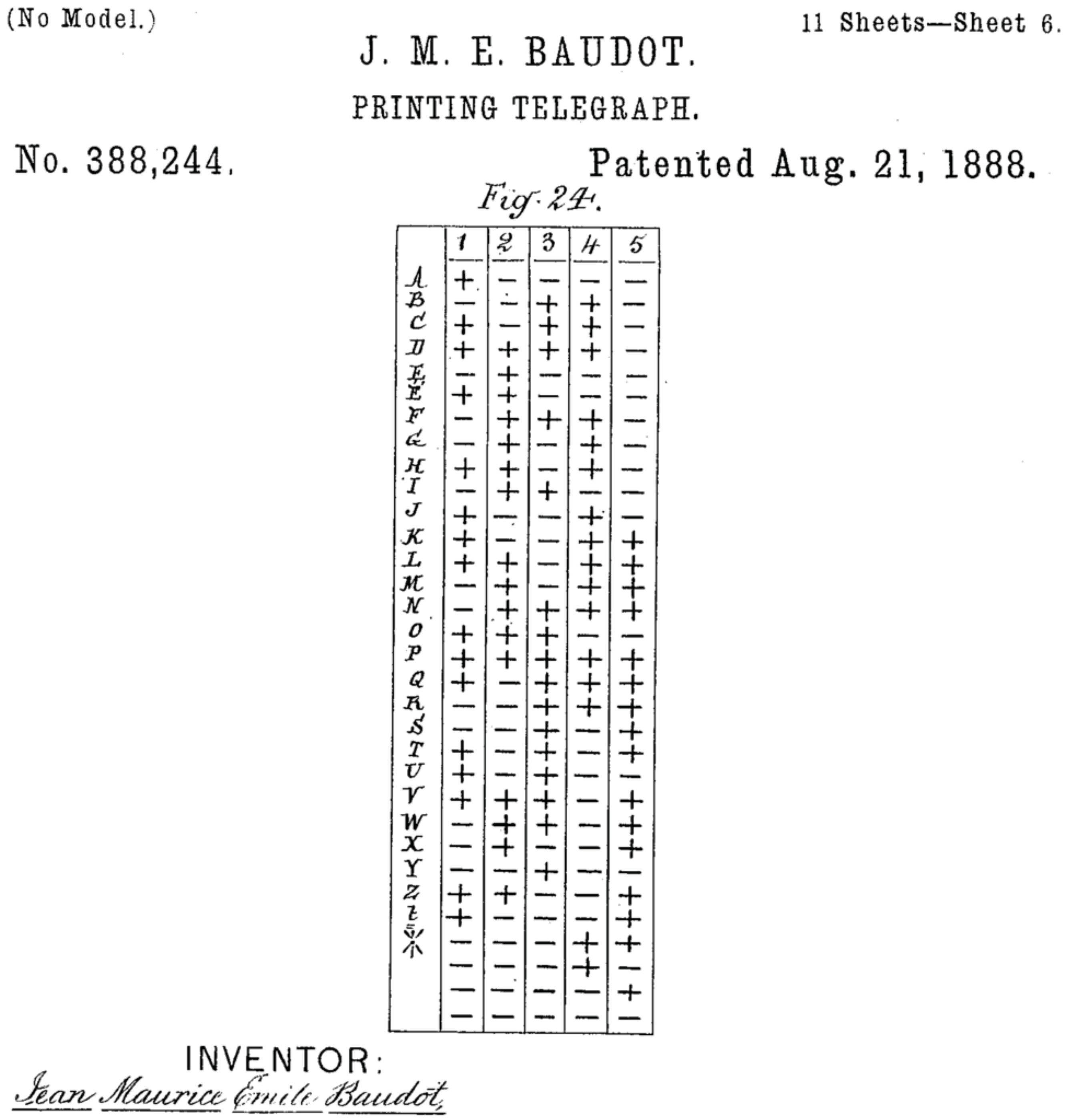
A system that transmits text as a series of on-off tones, lights, or clicks developed for sending text via telegraph.



Baudot Code

Émile Baudot, 1874

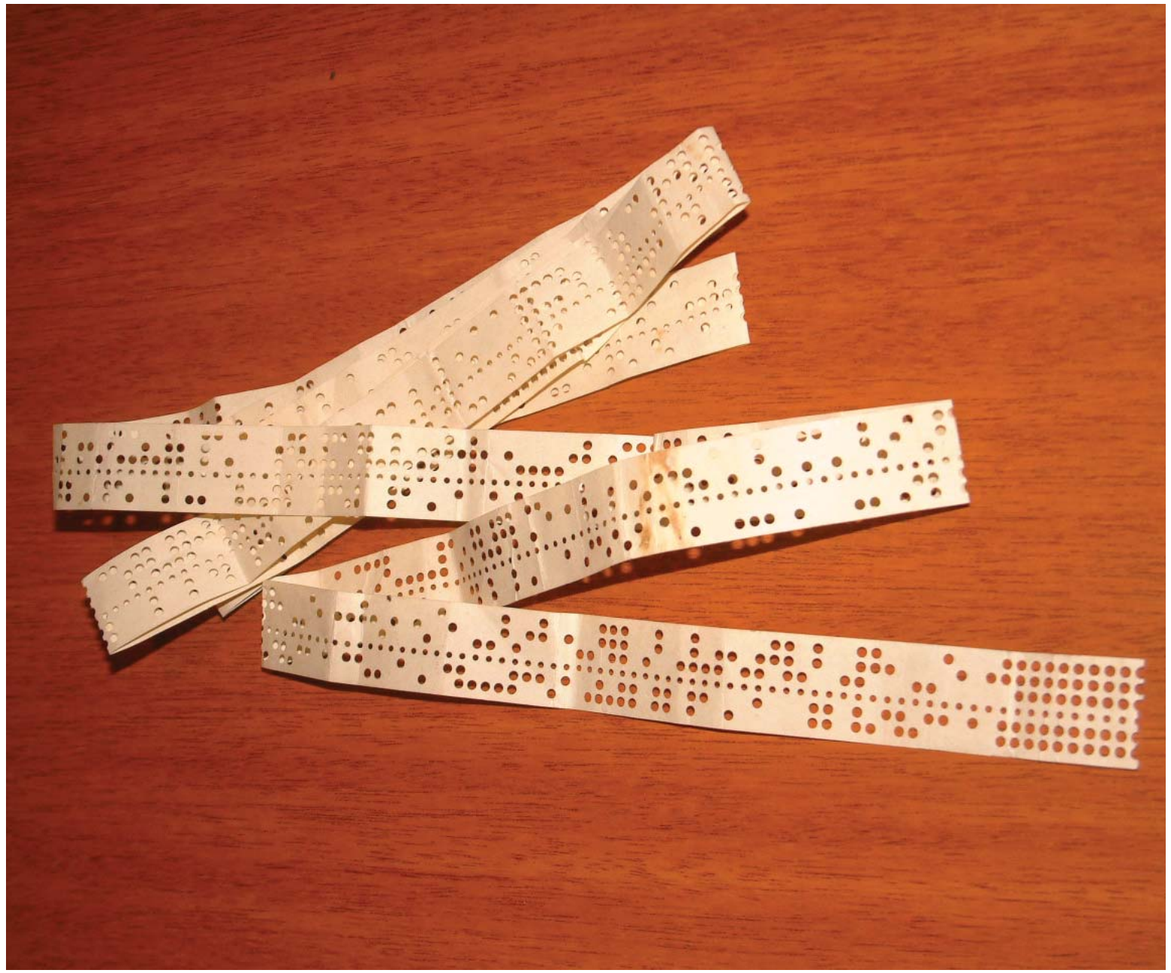
A 5-bit binary coding system which was later known as the International Telegraph Alphabet No.1 (ITA1).



Murray Code

Donald Murray, 1901

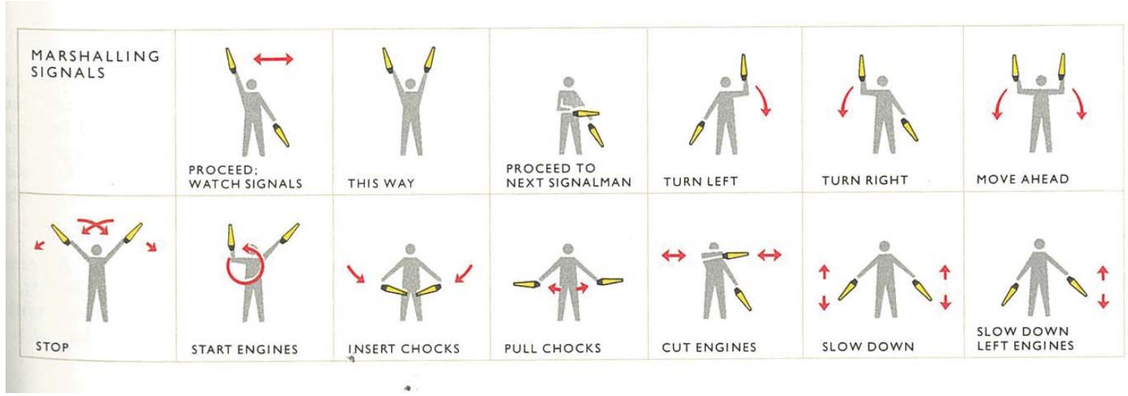
A modification of the Baudot code which was prompted by the development of a typewriter-like keyboard. This system introduced control characters and later would be known as the International Telegraphy Alphabet 2 (ITA2).



Aircraft Marshalling Signals

International Civil Aviation Organization, 1955

Specific movement system of signals that one must perform to direct the flight crew of an aircraft.



ASCII

American Standards Association, 1963

The American Standard Code for Information Interchange is a 7-bit character encoding system based on the order of the English alphabet.

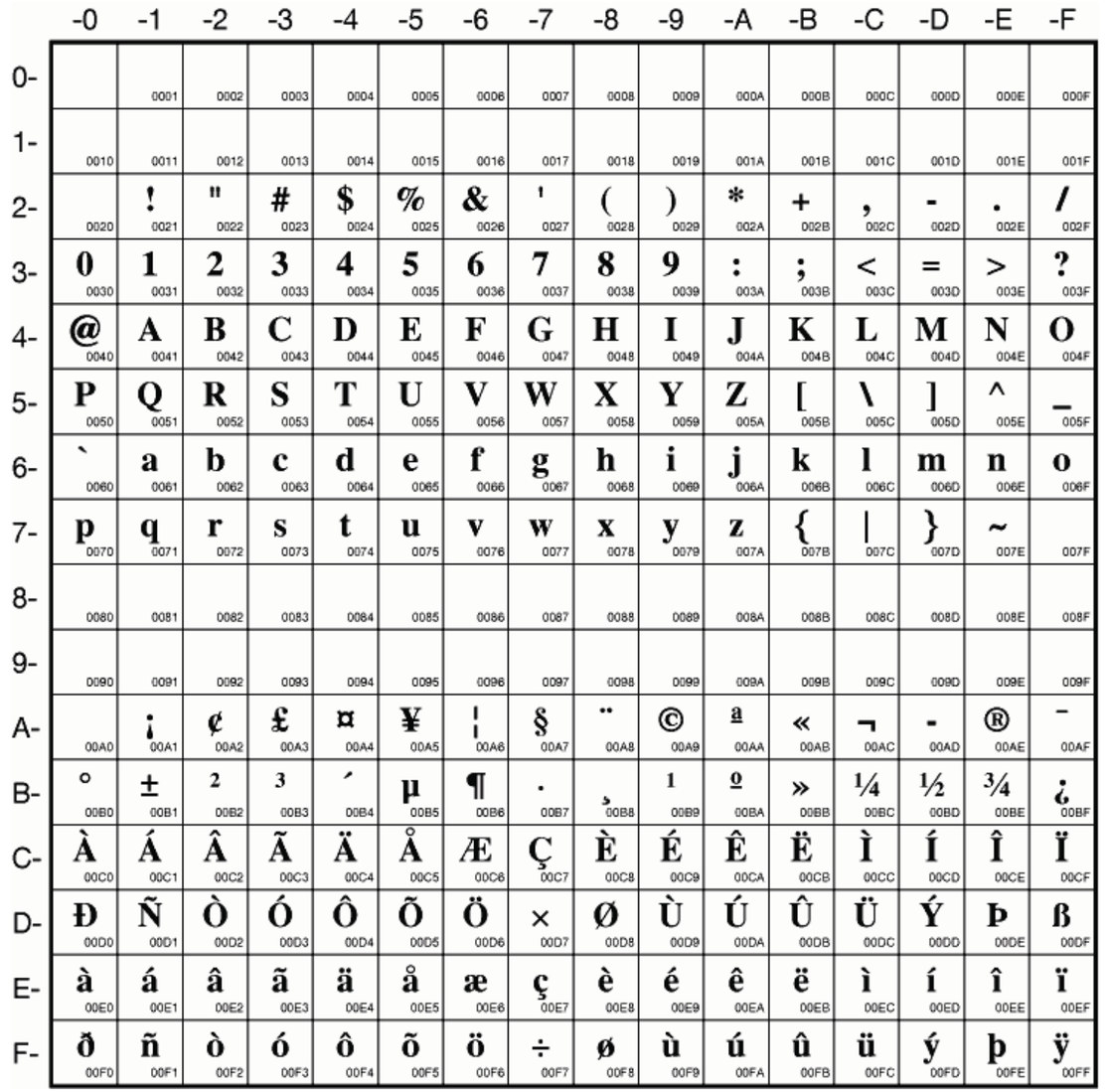
USASCII code chart

b_7 b_6 b_5 → / Bits					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b_4	b_3	b_2	b_1	Row ↓ / Column →	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

ISO/IEC 8859

European Computer Manufacturer's Association, 1986

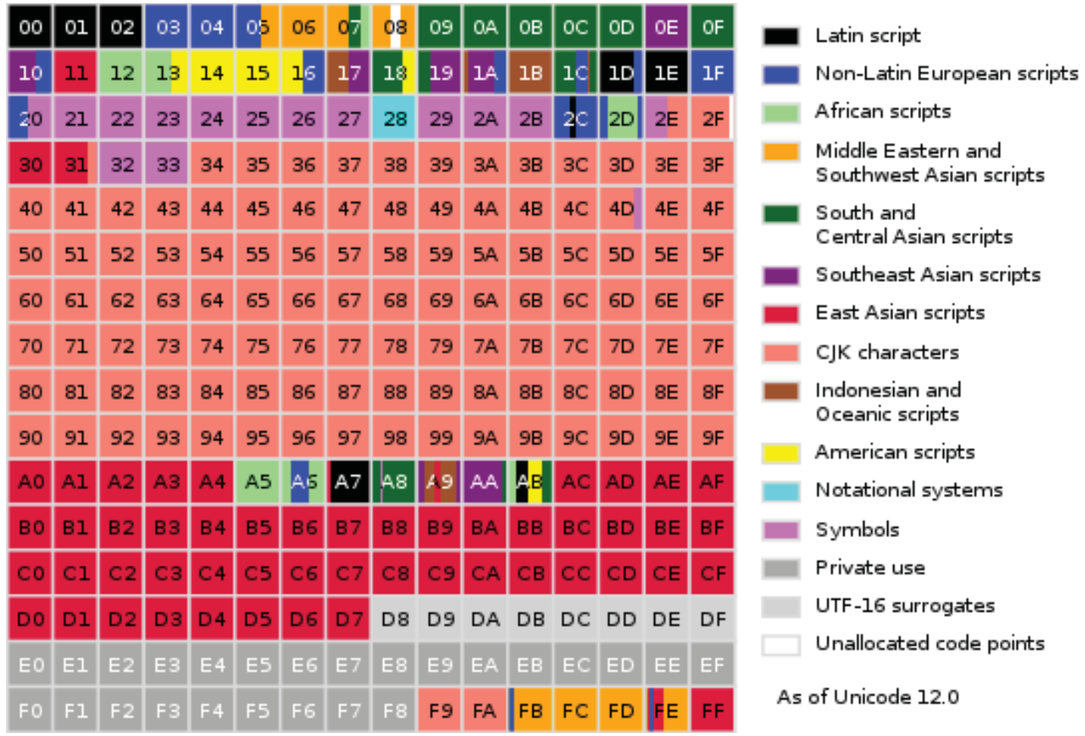
A universal standard for codepages and 8-bit character encodings. It later grew to 16 codepages covering all Latin-based scripts and more.



	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-	0000	0001	0002	0003	0004	0005	0006	0007	0008	0009	000A	000B	000C	000D	000E	000F
1-	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	001A	001B	001C	001D	001E	001F
2-	0020	! 0021	" 0022	# 0023	$ 0024	% 0025	& 0026	' 0027	(0028	) 0029	* 002A	+ 002B	, 002C	- 002D	. 002E	/ 002F
3-	0 0030	1 0031	2 0032	3 0033	4 0034	5 0035	6 0036	7 0037	8 0038	9 0039	: 003A	; 003B	< 003C	= 003D	> 003E	? 003F
4-	@ 0040	A 0041	B 0042	C 0043	D 0044	E 0045	F 0046	G 0047	H 0048	I 0049	J 004A	K 004B	L 004C	M 004D	N 004E	O 004F
5-	P 0050	Q 0051	R 0052	S 0053	T 0054	U 0055	V 0056	W 0057	X 0058	Y 0059	Z 005A	[005B	\ 005C	] 005D	^ 005E	_ 005F
6-	` 0060	a 0061	b 0062	c 0063	d 0064	e 0065	f 0066	g 0067	h 0068	i 0069	j 006A	k 006B	l 006C	m 006D	n 006E	o 006F
7-	p 0070	q 0071	r 0072	s 0073	t 0074	u 0075	v 0076	w 0077	x 0078	y 0079	z 007A	{ 007B	| 007C	} 007D	~ 007E	007F
8-	0080	0081	0082	0083	0084	0085	0086	0087	0088	0089	008A	008B	008C	008D	008E	008F
9-	0090	0091	0092	0093	0094	0095	0096	0097	0098	0099	009A	009B	009C	009D	009E	009F
A-	00A0	¡ 00A1	¢ 00A2	£ 00A3	¤ 00A4	¥ 00A5	¦ 00A6	§ 00A7	¨ 00A8	© 00A9	ª 00AA	« 00AB	¬ 00AC	- 00AD	® 00AE	¯ 00AF
B-	° 00B0	± 00B1	2 00B2	3 00B3	´ 00B4	µ 00B5	¶ 00B6	· 00B7	¸ 00B8	1 00B9	º 00BA	» 00BB	¼ 00BC	½ 00BD	¾ 00BE	¿ 00BF
C-	À 00C0	Á 00C1	Â 00C2	Ã 00C3	Ä 00C4	Å 00C5	Æ 00C6	Ç 00C7	È 00C8	É 00C9	Ê 00CA	Ë 00CB	Ì 00CC	Í 00CD	Î 00CE	Ï 00CF
D-	Ð 00D0	Ñ 00D1	Ò 00D2	Ó 00D3	Ô 00D4	Õ 00D5	Ö 00D6	× 00D7	Ø 00D8	Ù 00D9	Ú 00DA	Û 00DB	Ü 00DC	Ý 00DD	Þ 00DE	ß 00DF
E-	à 00E0	á 00E1	â 00E2	ã 00E3	ä 00E4	å 00E5	æ 00E6	ç 00E7	è 00E8	é 00E9	ê 00EA	ë 00EB	ì 00EC	í 00ED	î 00EE	ï 00EF
F-	ð 00F0	ñ 00F1	ò 00F2	ó 00F3	ô 00F4	õ 00F5	ö 00F6	÷ 00F7	ø 00F8	ù 00F9	ú 00FA	û 00FB	ü 00FC	ý 00FD	þ 00FE	ÿ 00FF

Unicode

Joe Becker & Lee Collins, 1987
Character encoding standard that supports the unification of prior character sets as well as character for writing.



Character Set Expansions

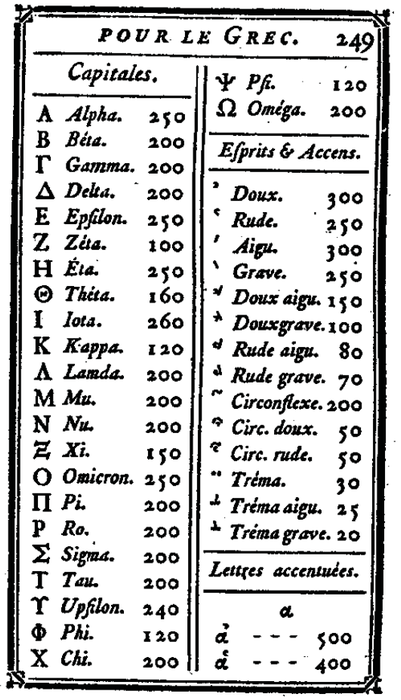
Character Set Expansions

A group of letters, numbers, punctuation, ideograms, and other symbols that together compromise a ‘font’.

GRANDE POLICE
de cent cinquante milliers de lettres,
POUR UN CARACTÈRE GREC.

Lettres ſimples.

α	*Alpha.*	3000	μ	*Mu.*	1500
β	*Béta.*	400	ν	*Nu.*	5000
ϐ	- - -	400	ξ	*Xi.*	800
γ	*Gamma.*	1500	ο	*Omicron.*	3500
ϒ	- - -	400	π	*Pi.*	1000
ϓ	- - -	200	ϖ	- - -	600
δ	*Delta.*	2000	ρ	*Ro.*	1500
ϑ	- - -	300	ῥ	- - -	500
ε	*Epſilon.*	3800	ς	*Sigma.*	300
ζ	*Zéta.*	700	σ	- - -	1200
ϛ	- - -	300	ϛ	- - -	1500
η	*Éta.*	3000	τ	*Tau.*	2000
θ	*Théta.*	700	ϒ	- - -	1000
ϑ	- - -	800	υ	*Upſilon.*	3000
ϑ	- - -	300	φ	*Phi.*	600
ι	*Iota.*	3500	ϕ	- - -	400
κ	*Kappa.*	2000	χ	*Chi.*	1200
λ	*Lamda.*	1600	ψ	*Pſi.*	800
			ω	*Oméga.*	2500



POUR LE GREC. 249

Capitales.

A	*Alpha.*	250
B	*Béta.*	200
Γ	*Gamma.*	200
Δ	*Delta.*	200
E	*Epſilon.*	250
Z	*Zéta.*	100
H	*Éta.*	250
Θ	*Théta.*	160
I	*Iota.*	260
K	*Kappa.*	120
Λ	*Lamda.*	200
M	*Mu.*	200
N	*Nu.*	200
Ξ	*Xi.*	150
O	*Omicron.*	250
Π	*Pi.*	200
P	*Ro.*	200
Σ	*Sigma.*	200
T	*Tau.*	200
Υ	*Upſilon.*	240
Φ	*Phi.*	120
X	*Chi.*	200
Ψ	*Pſi.*	120
Ω	*Oméga.*	200

Eſprits & Accens.

᾽	*Doux.*	300
῾	*Rude.*	250
´	*Aigu.*	300
`	*Grave.*	250
῀	*Doux aigu.*	150
᾽`	*Douxgrave.*	100
῾´	*Rude aigu.*	80
῾`	*Rude grave.*	70
~	*Circonflexe.*	200
᾽~	*Circ. doux.*	50
῾~	*Circ. rude.*	50
¨	*Tréma.*	30
¨´	*Tréma aigu.*	25
¨`	*Tréma grave.*	20

Lettres accentuées.

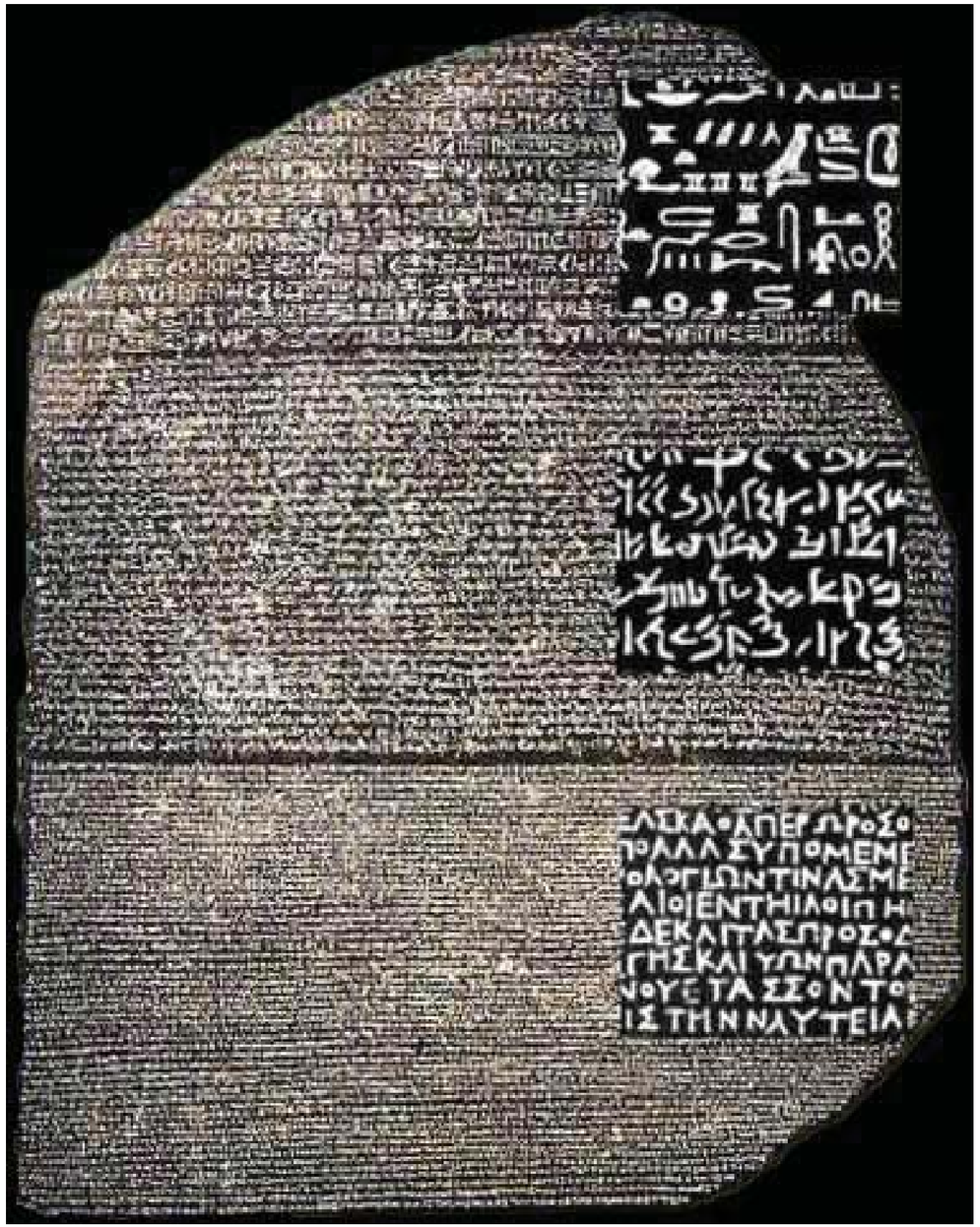
α

ᾶ	- - -	500
ᾷ	- - -	400

Similar Mixed Texts

Rosetta Stone, 196 BC

The Stone is written in two languages; Egyptian and Greek and contains three writing systems; hieroglyphic, demotic, and Greek. This was intended so that all people could read and understand the content.



Chinese Characters

***Hunminjeongeum*, 1446**

A new alphabet created by King Sejong of Korea, known as hangul, that incorporated hanja characters within the new language.

Latin and Greek

Helvetica Greek, 1971

Designed as a phototype by Matthew Carter, Helvetica Greek marked the beginning of a period in type development for Greek letters.

Latin and Hebrew

Oron, 1966

Designed by Asher Oron, this typeface was the Hebrew companion to Univers.

Pan-European Accent Sets

Times New Roman

Basic Latin and Latin 1

ABCDEFGHIJKLMN

OPQRSTUVWXYZ

ÀÁÂÃÄÅÆÇÈÊËÌÍÎÏÐÑ

ÒÓÔÕÖØÙÚÛÜÝÞß

abcdefghijklmnopqrstuvwxyz

àáâãäåæçèéêëìíîïñ

ðòóôõöøùúûüýþÿ

Japanese Characters

The Japanese writing system consists of three separate alphabets, Kanji, Hiragana and Katakan. Kanji is used for regular Japanese words, Hiragana is to write foreign loan words and sounds, and Hiragan is used for grammatical purposes and simple words.

Non-Latin Character Sets

Lucida Sans Unicode, 1993

Typeface which contained Latin, Cyrillic, Greek and Hebrew characters in hope to be used as a default core font for different operating systems and languages.

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

1234567890

!@#$%^&*()_+-=[]{};:' "\|/.,

АБВГДЕЖЗИКЛМНОПРСТУФХЦЧШЩЬЫЪЭЮЯ

абвгдежзиклмнопрстуфхцчшщьыъэюя

Bitmaps Paired with Outlines

Lucida, 1984

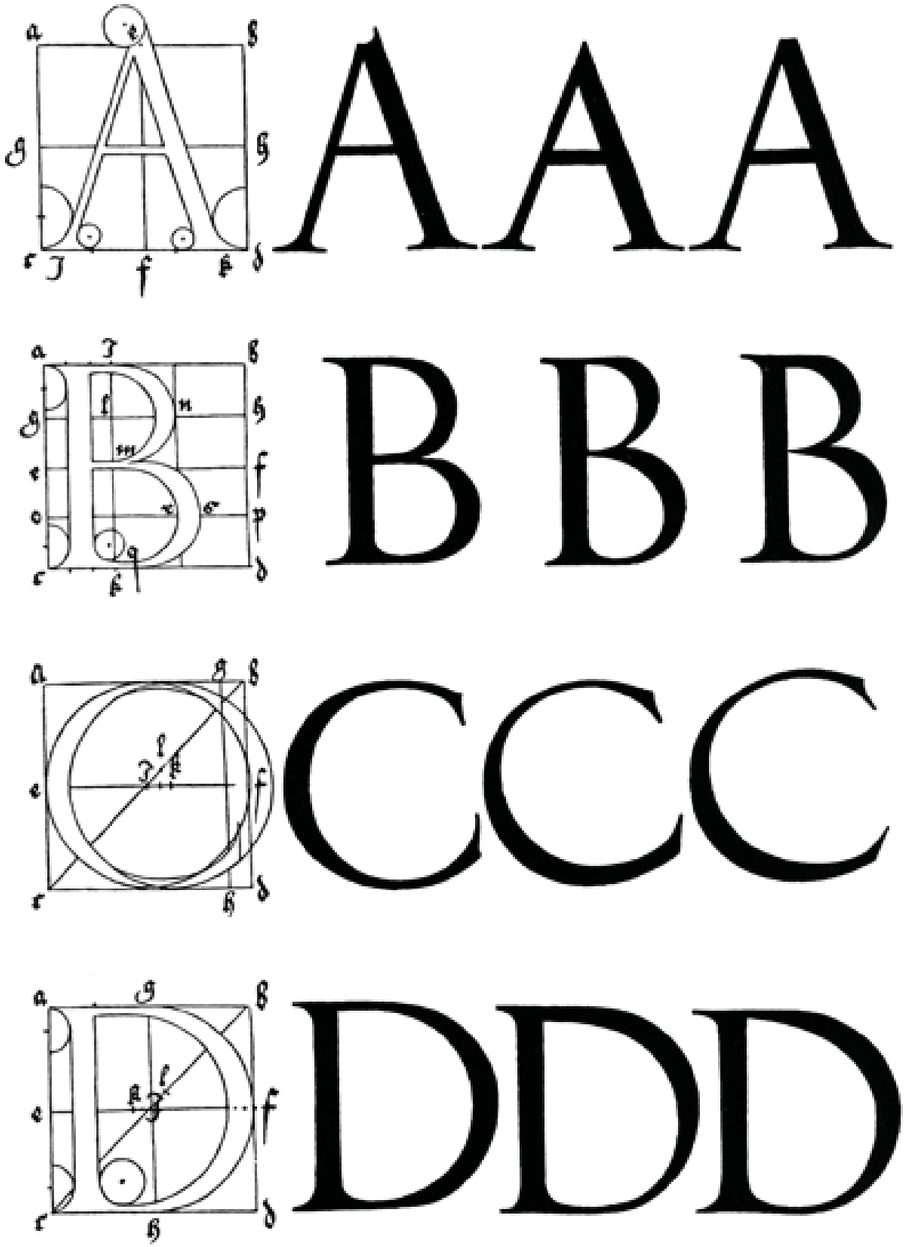
Designed by Charles Bigelow and Kris Holmes, to show that original digital designs could be effective and successful.

Programmatic Descriptions

Construction of Roman Letters

Albrecht Dürer, 1525

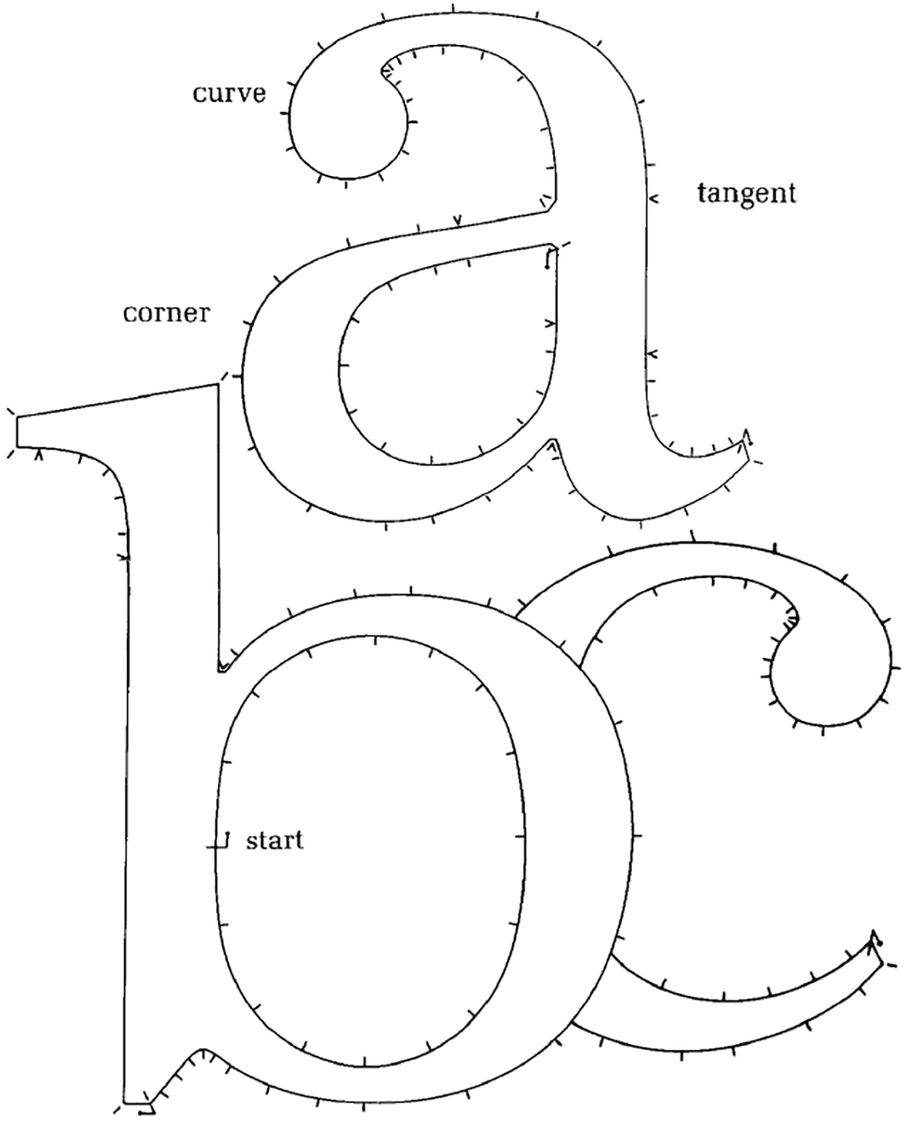
His typographic guide, *Underweysung der Messung mit dem Zirckel und Richtscheyt*, detailed how his Roman typeface is based on mathematical principles.



Ikarus

Peter Karow, 1975

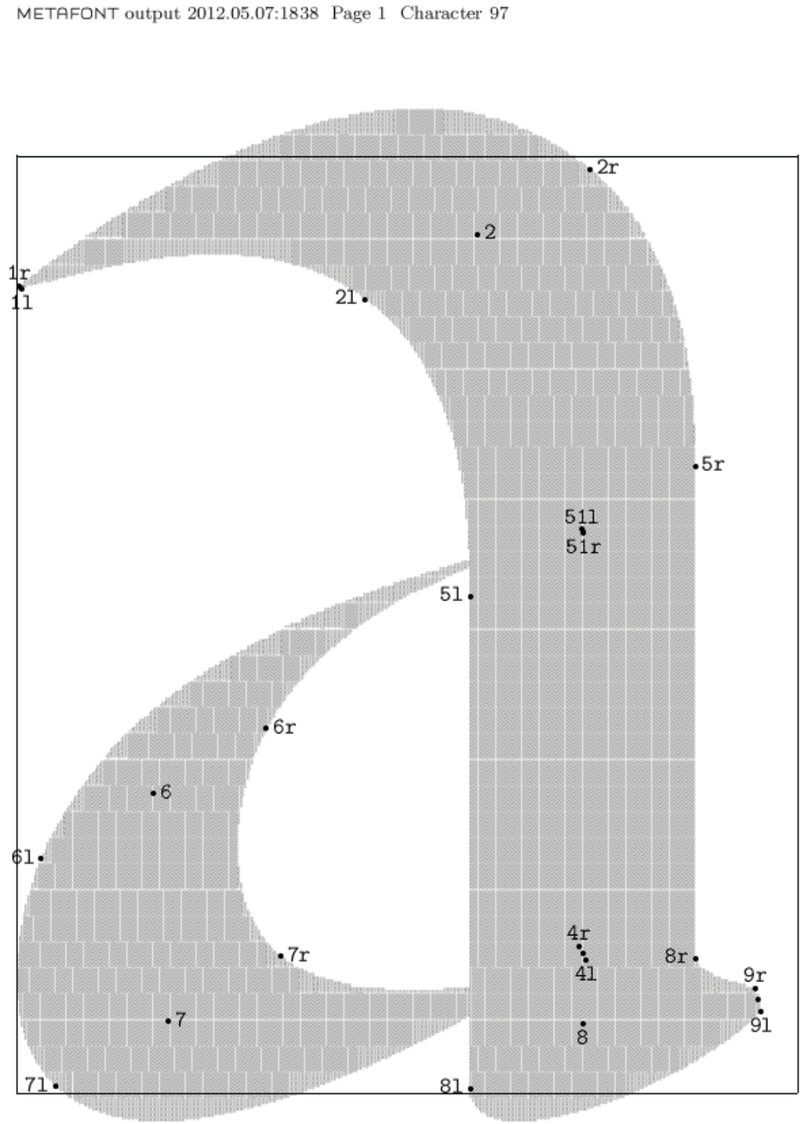
Type design and production software used for converting existing typefaces and artwork into a digital.

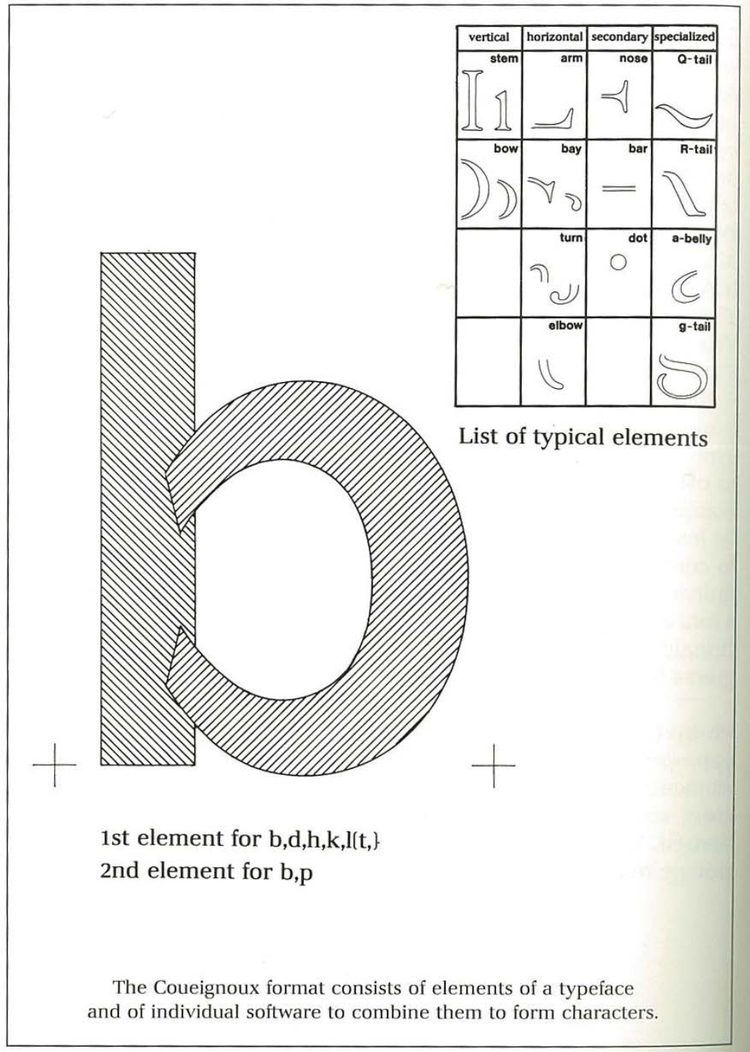


Metafont

Donald Knuth, 1979

A programming language used to define vector fonts and created as a companion to the TeX typesetting system.





The Coueignoux format consists of elements of a typeface and of individual software to combine them to form characters.

92

SSSSSS

FIGURE 12. Different S's obtained by varying the slope in the middle. (This shows $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, 1, $\frac{4}{3}$, $\frac{3}{2}$, and 2 times the "correct" slope.)

Interpress

Xerox PARC, 1983

Xerox's commercial page description language which encoded printer output. Each character is defined in a character coordinate system.

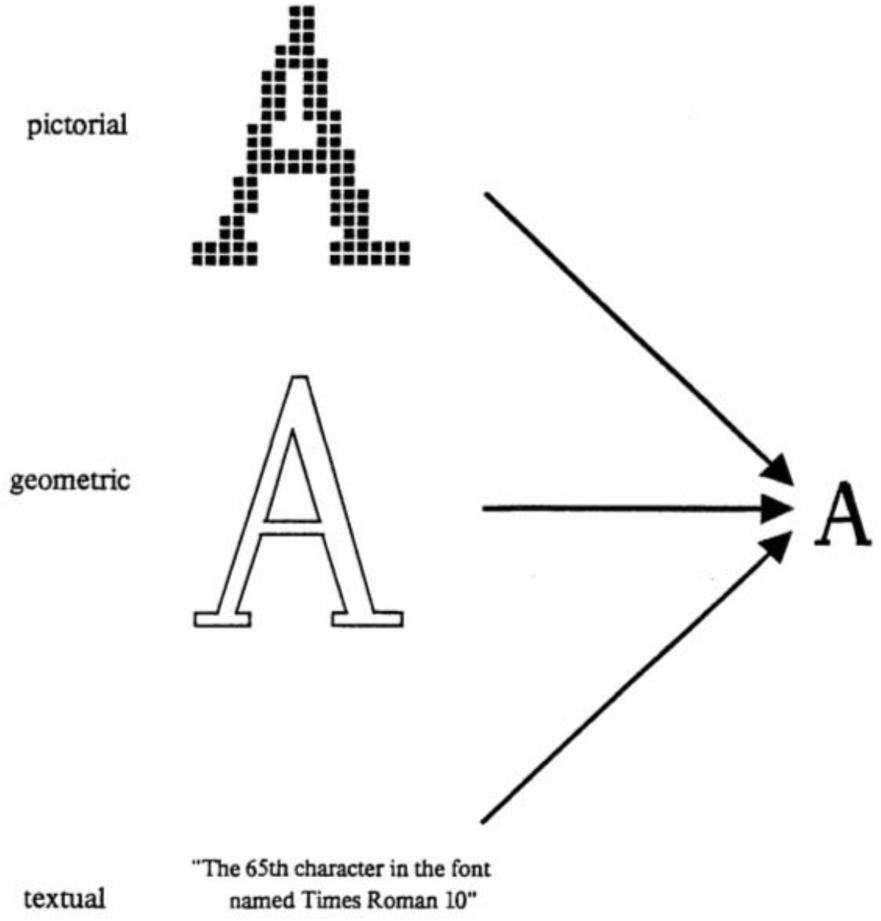
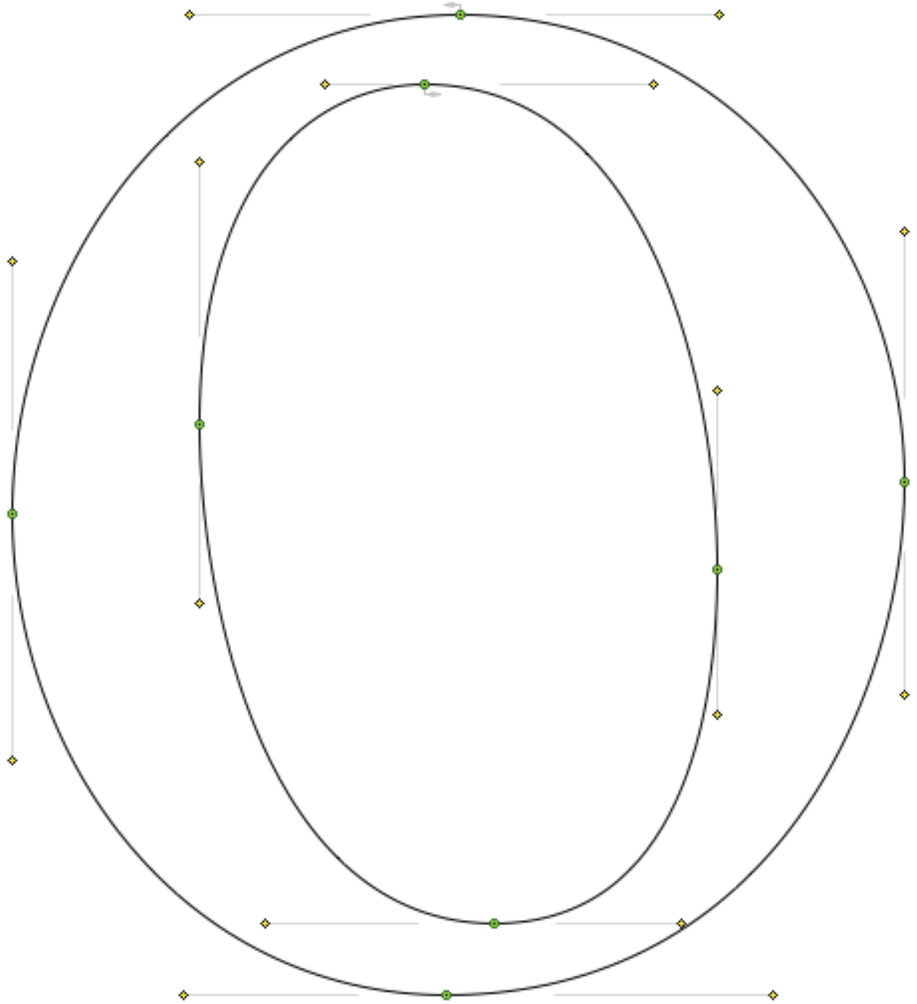


Figure 1.4. Three ways of printing the letter "A" on a page

PostScript

Adobe, 1984

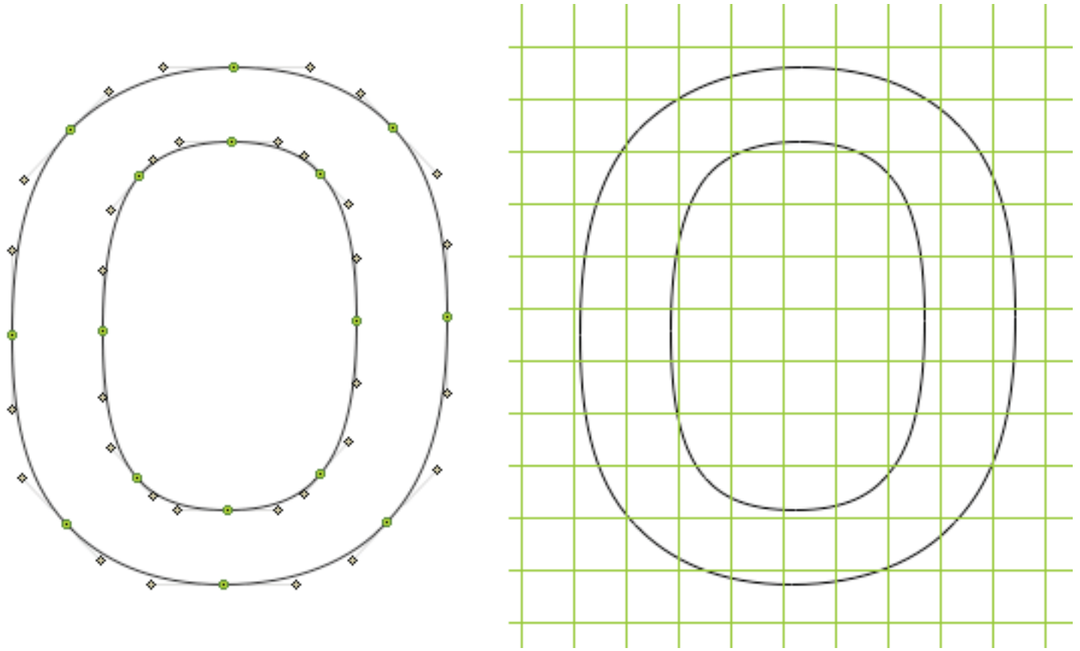
Type 1 PostScript included support for hinting to help low resolution rendering which used cubic Bézier curves to communicate complex graphic printing instructions to digital printers.



TrueType

Apple, 1991

A competitor to PostScript, it offered type developers pixel-level control of how fonts were displayed at various sizes based on a robust hinting system from outlines.



Adobe's Multiple Master Fonts

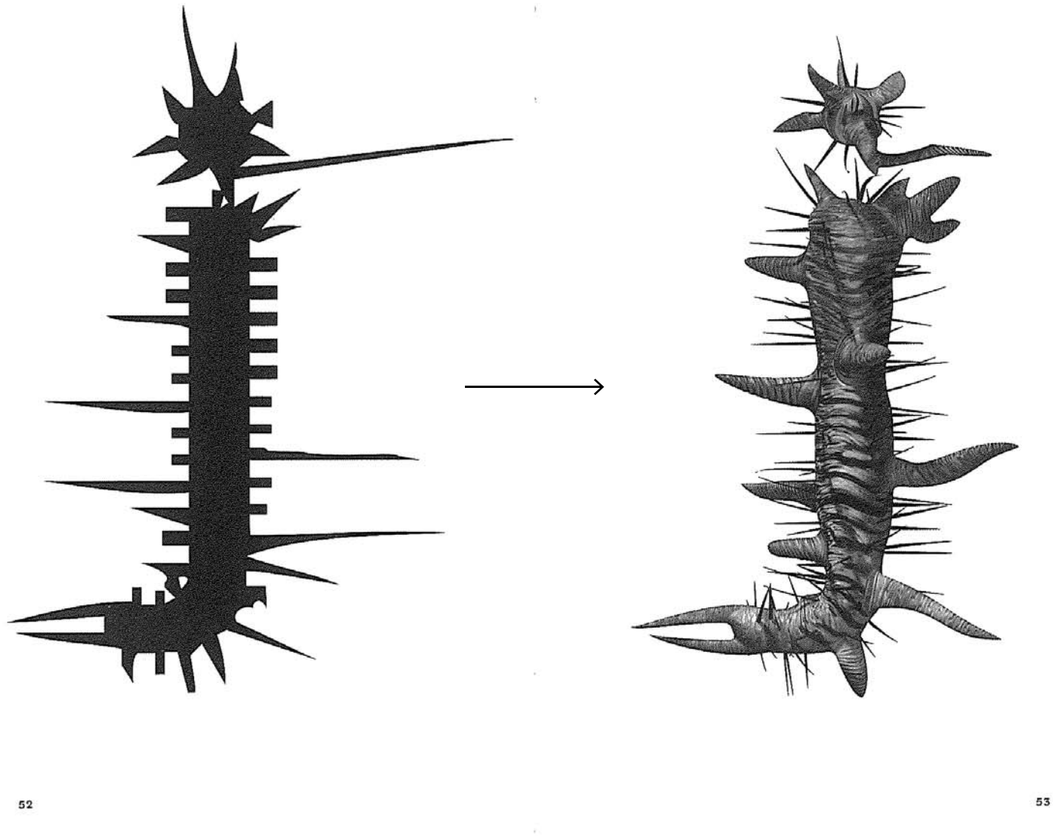
Adobe, 1991

Fonts which contain two or more 'masters' and enable a user to interpolate between them along a continuous range of 'axes'.

Randomness Within Fonts

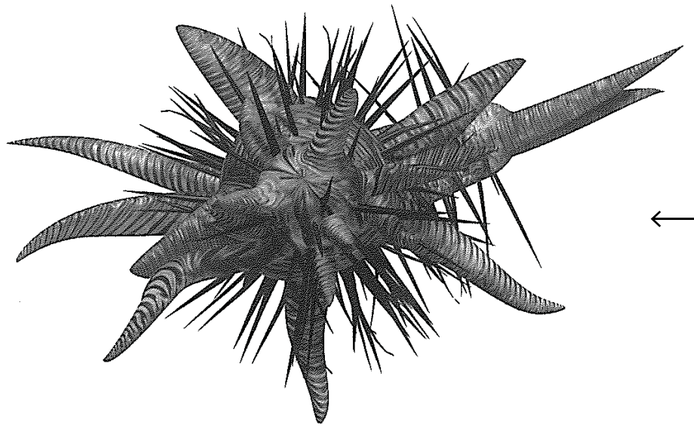
Rhizome, 1996

A dimensional typography set designed by Guy Williams that interprets the silhouettes of font, *Jesus Loves You,* and creates it in to a botanical motif.



JESUS LOVES YOU

Designed by Lucas de Groot in 1995, the font *Jesus Loves You,* and its companions, *Jesus Loves Your Sister and Jesus Loves Your Brother* exhibit an agitated crown-of-thorns-like complexity.



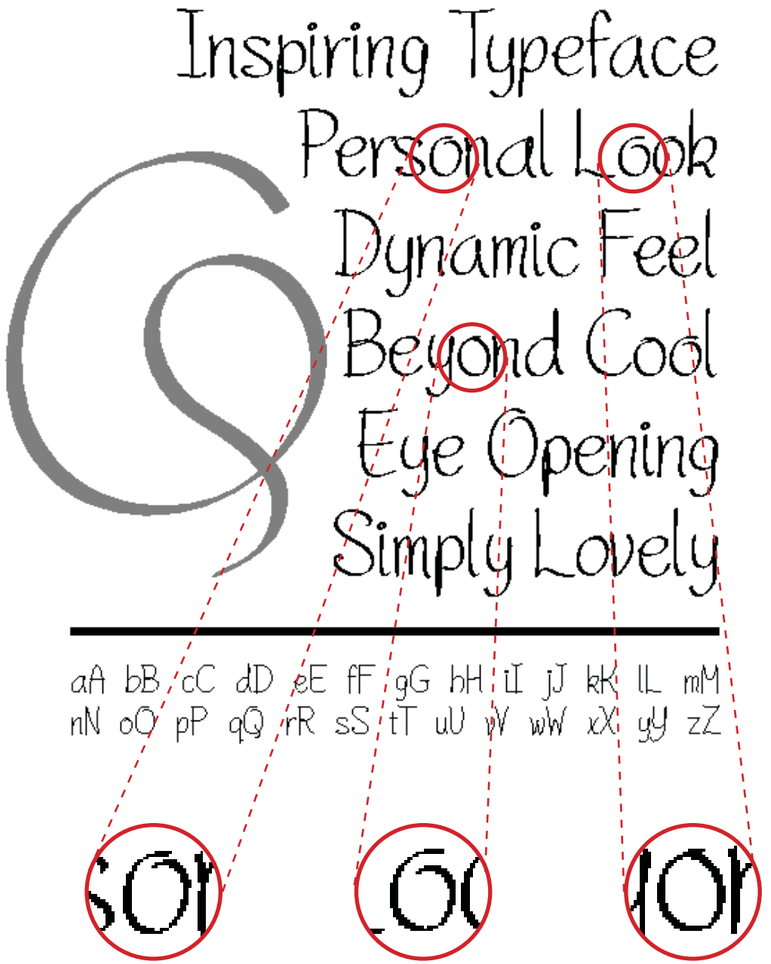
RHIZOME

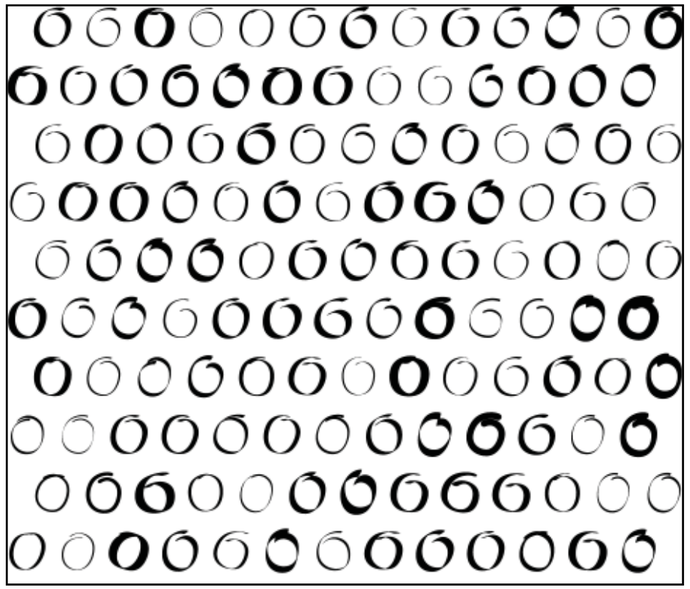
Overhead view of the lowercase letter j

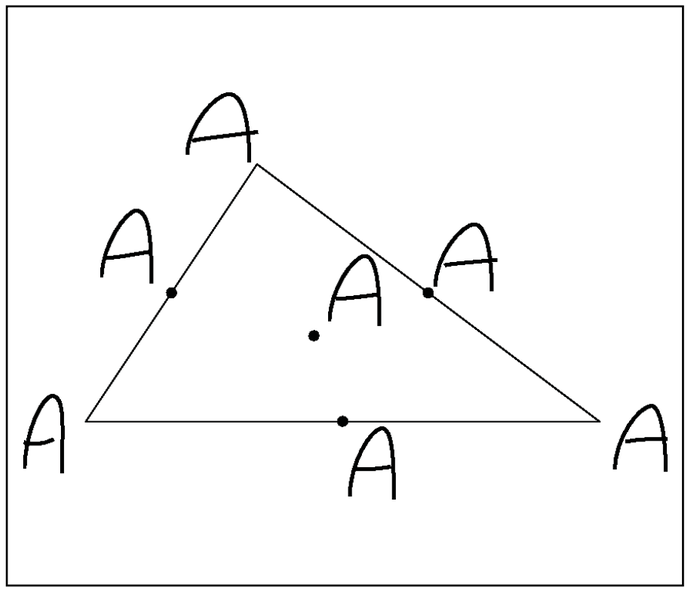
Random dynamic fonts

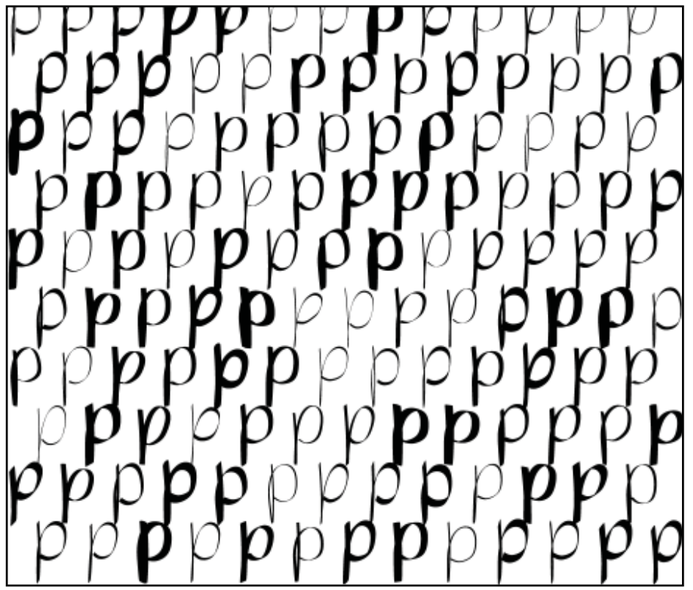
Bernard Desruisseaux, 1996

A thesis which set out to prove that one could build a font in which all glyphs were changed randomly, while controlling the randomness by parameters. Its six major axes create subtle changes in the glyphs.









This is Bernard Desruisseaux's type 3 font. Enjoy.

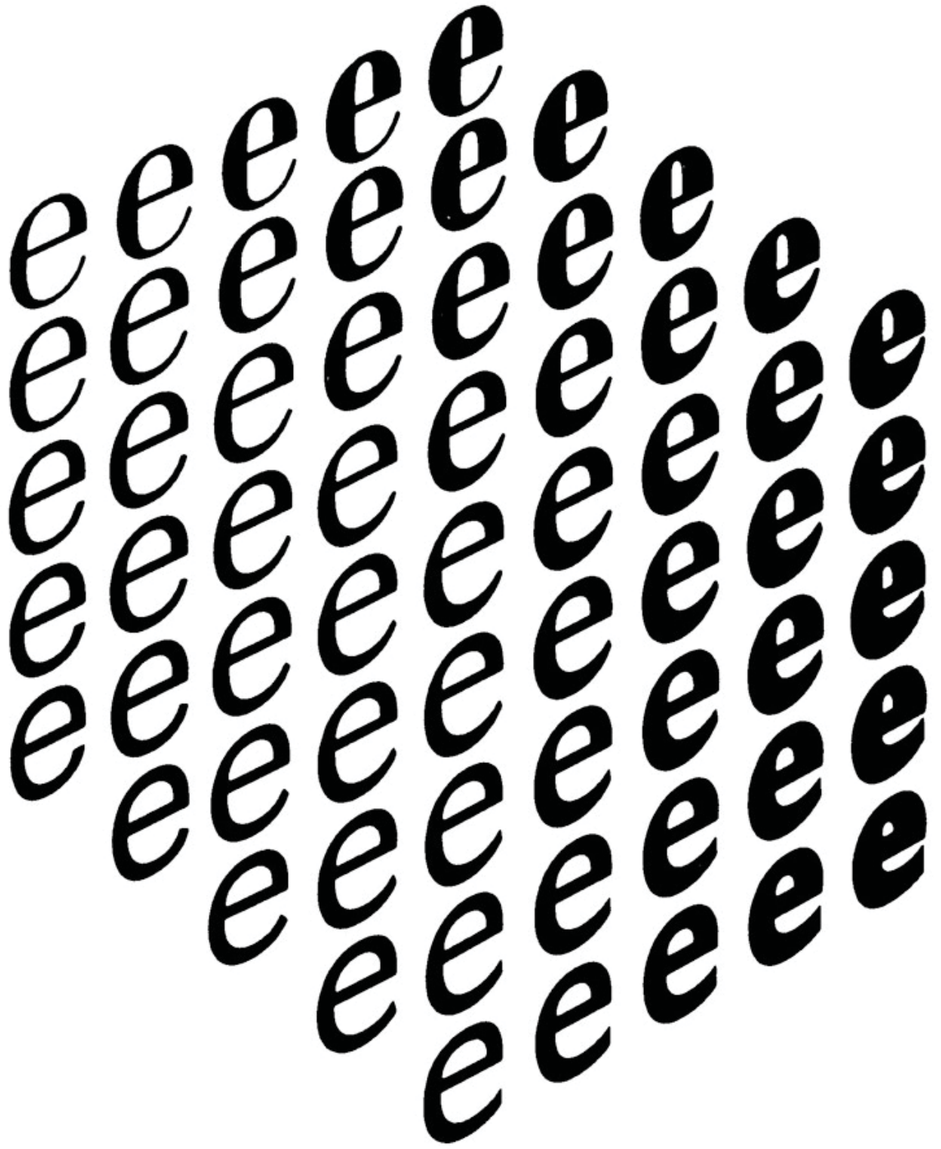
This is Bernard Desruisseaux's type 3 font. Enjoy.

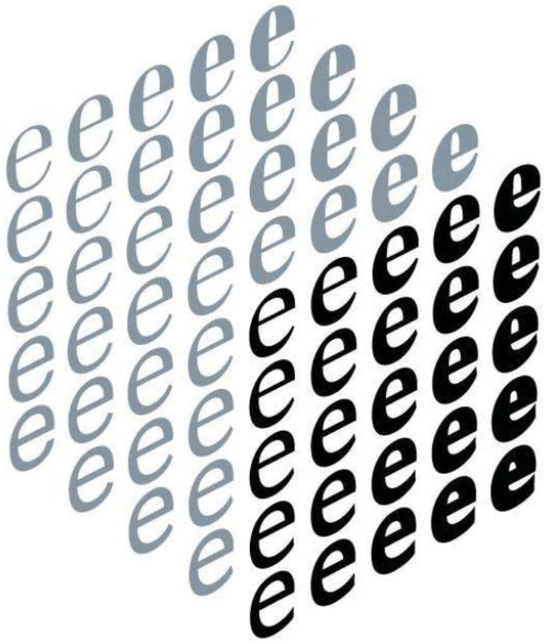
This is Bernard Desruisseaux's type 3 font. Enjoy.

This is Bernard Desruisseaux's type 3 font. Enjoy.

The Gerrit Noordzij Cube

Gerrit Noordzij, 1985
Introduced in his book, *The Stroke: Theory of Writing*, Noordzij created his cubic visualization of translation, expansion and contrast of letters in typography.

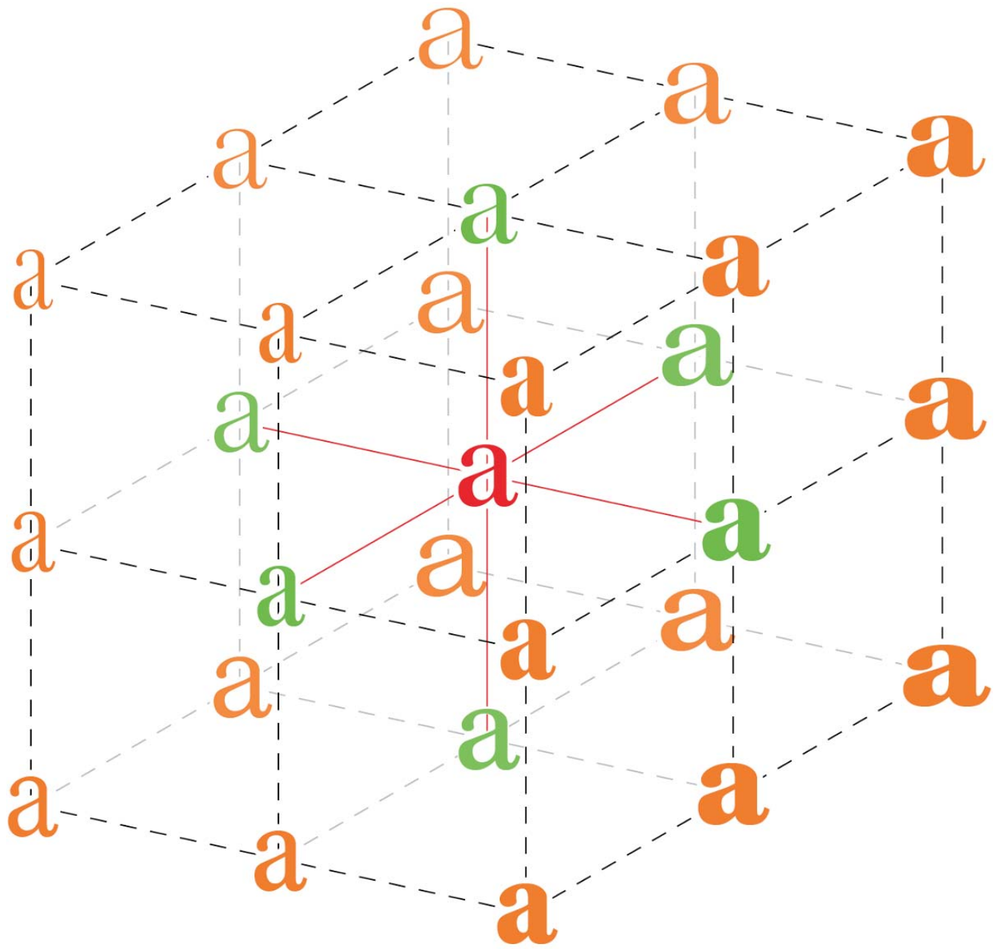




Variable Fonts

OpenType 1.8, 2016

An extension of OpenType, variable fonts are a single digital file that can produce a multitude of style variants. Developed by Google, Apple, Microsoft and Adobe, variable fonts offer flexibility and responsive typography.

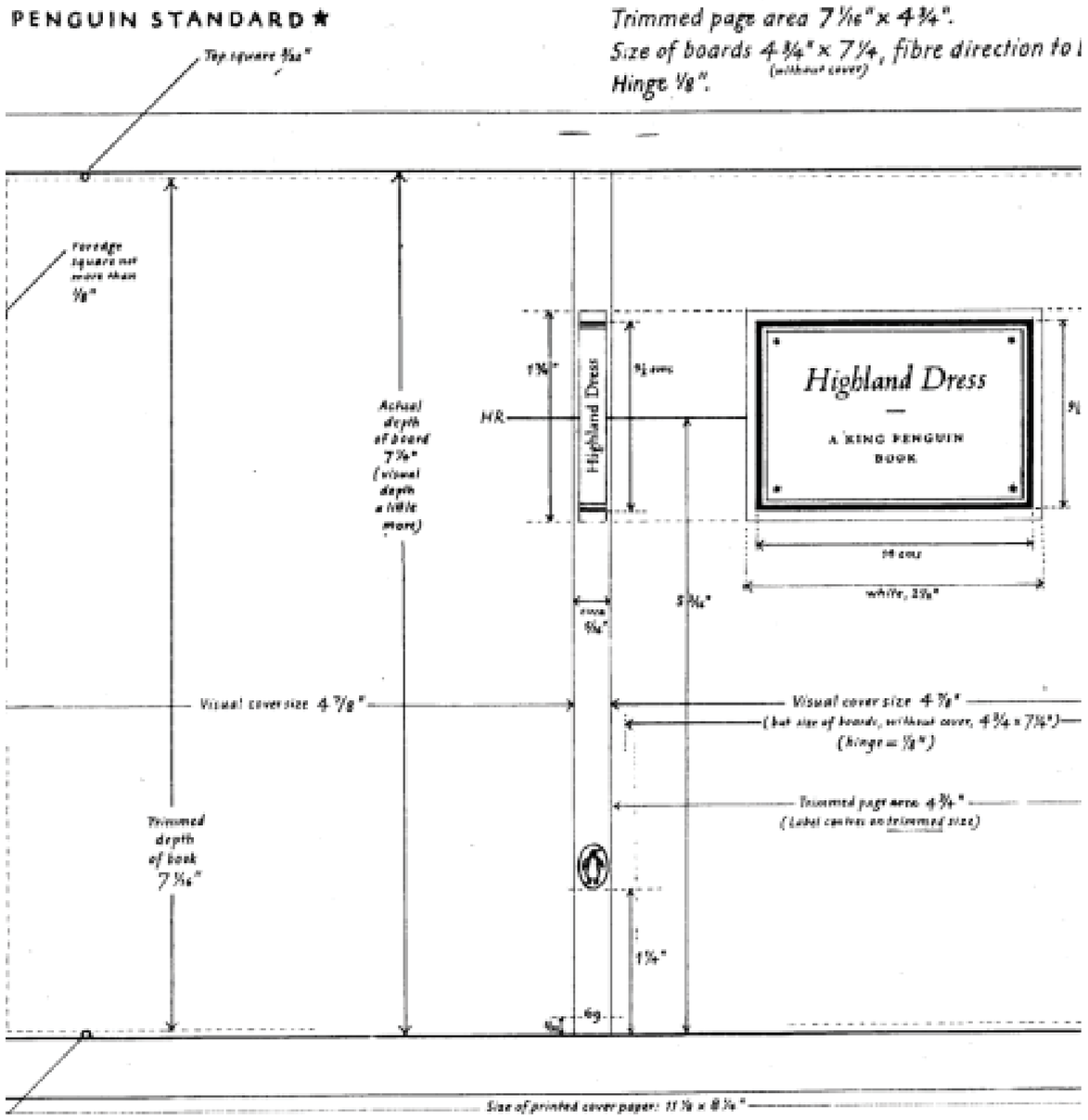


Design systems as **typography.**

Penguin Books Composition Rules

Jan Tschichold, 1947

Guidelines used for composing the pages and typography which later influenced its graphic standards.



Smithsonian Magazine

Bradbury Thompson, 1969
Thompson created the layout for the magazine and his design remained for more than a quarter of a century.

April 1989

Smithsonian

Volume 20, Number 1

Table of Contents

Smithsonian (ISSN 0037-7333) is published monthly by the Smithsonian Associates, 900 Jefferson Drive, Washington, D

Subscription price $20 a year in U.S. possessions, $35 elsew
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Advertising and circulation offices at 420 Lexington Ave.,
New York, NY 10170.
Members: Please address all subscription correspondence a
change of address information to Smithsonian, P.O. Box 55
Boulder, CO 80322-5595.
Postmaster: Send address changes to Smithsonian, P.O. Box
Boulder, CO 80302-5595.

4

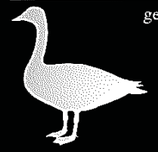
Smithsonian

The Audubon Society Field Guides

Massimo Vignelli, 1977

A series of books which followed a design system to keep a uniform look.

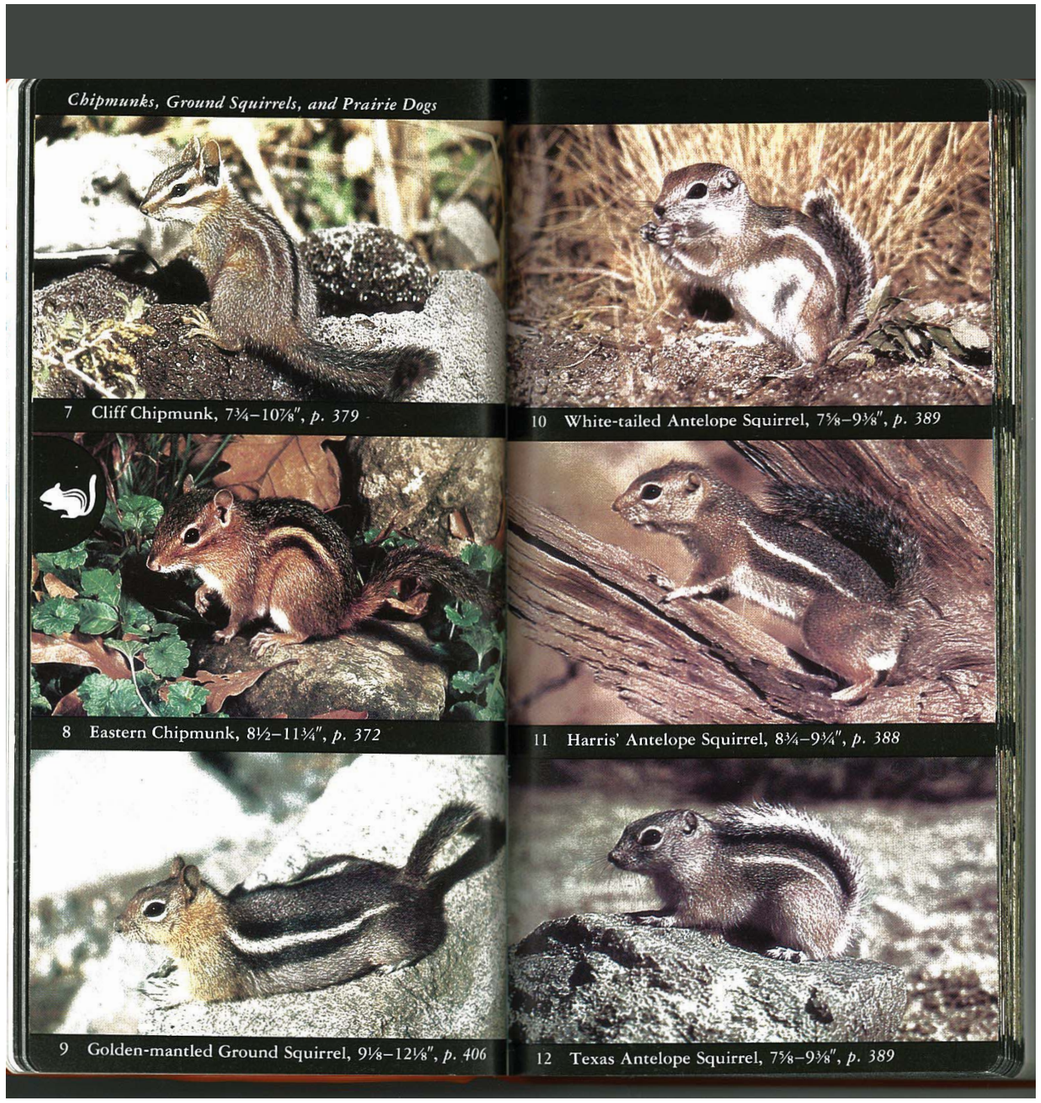
Symbol	Category
	Duck-like Birds

Family Symbols		Plate Numbers
	stiff-tailed ducks	111, 159
	mergansers	113–114, 128, 161–163
	coots	134
	whistling-ducks	165–168
	geese	169–172
	swans	173–174
	pelicans	175–176
	grebes	177–185
	loons	186–190

Thumb Tab	Group
	Hoofed Mammals (with antlers)

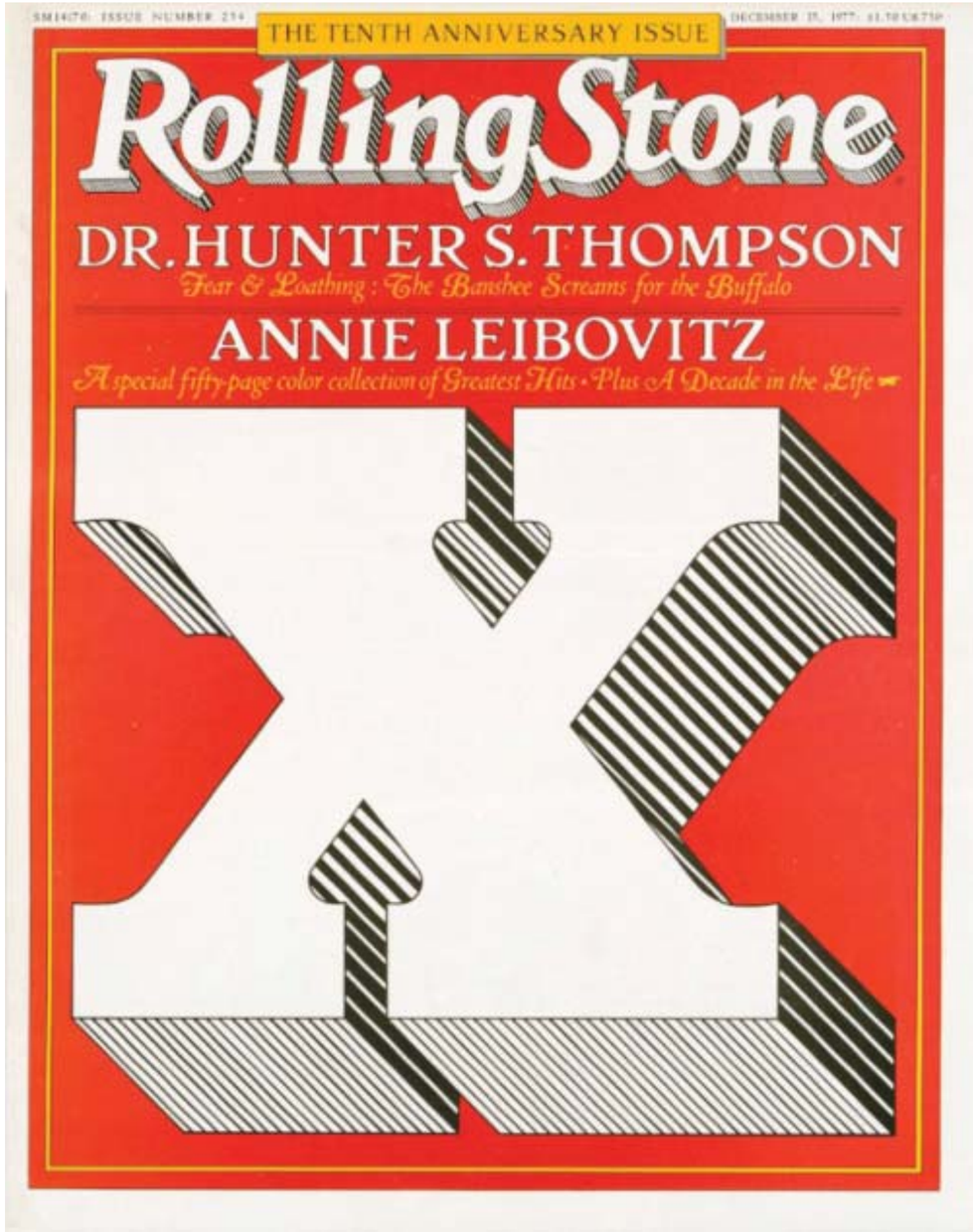
Mammals		Plate Numbers
	white-tailed deer	285, 286
	elk	287
	fallow deer	288
	mule deer	289
	caribou	290
	moose	291


Perching Birds
363 Prairie Warbler, 5″, p. 571
366 Magnolia Warbler, 5″, p. 687
364 Pine Warbler, 5½″, p. 686
367 Canada Warbler, 5″, p. 688
365 Palm Warbler, 5½″, p. 509
368 Cape May Warbler, 5″, p. 688


Chipmunks, Ground Squirrels, and Prairie Dogs
7 Cliff Chipmunk, 7¾–10⅞″, p. 379
10 White-tailed Antelope Squirrel, 7⅝–9⅛″, p. 389
8 Eastern Chipmunk, 8½–11¾″, p. 372
11 Harris' Antelope Squirrel, 8¾–9¾″, p. 388
9 Golden-mantled Ground Squirrel, 9⅛–12⅛″, p. 406
12 Texas Antelope Squirrel, 7⅝–9⅜″, p. 389

Rolling Stone

Roger Black, 1970's
Established a typographical identity and established the magazine's look of taking the underground to mainstream media.



STANDING NAKED

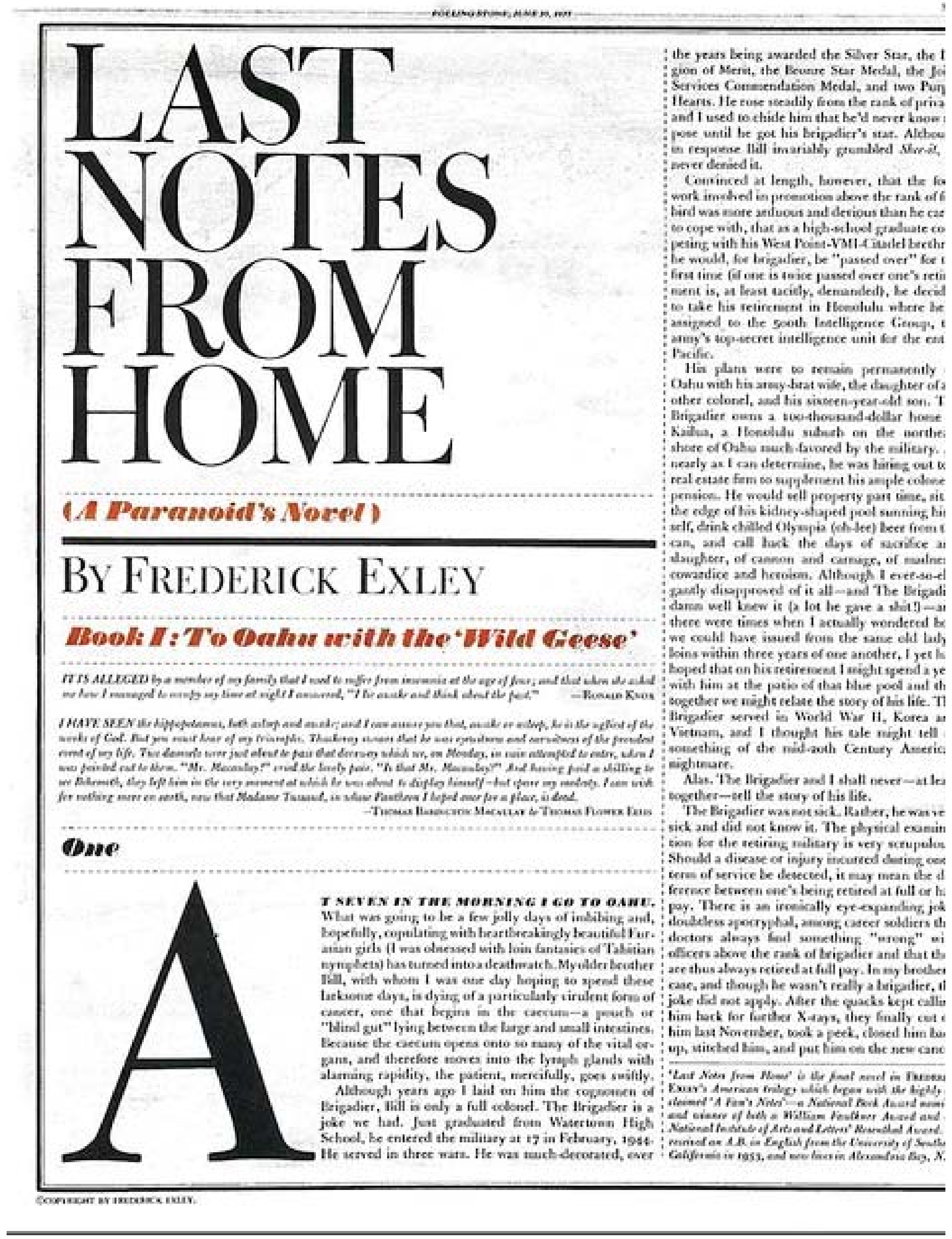
THE ROLLING STONE INTERVIEW

'I have to get back to playing music because unless I do I don't really feel alive. I don't feel I can be a filmmaker all the time. I have to play in front of the people to keep going.'

BOB DYLAN

BY JONATHAN COTT

WITH PHOTOGRAPHS BY ANNIE LEIBOVITZ



ROLLING STONE, JUNE 19, 1975

LAST NOTES FROM HOME

(A Paranoid's Novel)

BY FREDERICK EXLEY

Book I: To Oahu with the 'Wild Geese'

IT IS ALLEGED by a member of my family that I used to suffer from insomnia at the age of four; and that when she asked me how I managed to occupy my time at night I answered, "I lie awake and think about the past." —Ronald Knox

I HAVE SEEN the hippopotamus, both asleep and awake; and I can assure you that, awake or asleep, he is the ugliest of the works of God. But you must hear of my triumphs. Thackeray swears that he was eyewitness and earwitness of the proudest event of my life. Two damsels were just about to pass that doorway which we, on Monday, in vain attempted to enter, when I was pointed out to them. "Mr. Macaulay!" cried the lovely pair. "Is that Mr. Macaulay?" And having paid a shilling to see Behemoth, they left him in the very moment at which he was about to display himself—but spare my modesty. I can wish for nothing more on earth, now that Madame Tussaud, in whose Pantheon I hoped once for a place, is dead. —Thomas Babington Macaulay to Thomas Flower Ellis

One

AT SEVEN IN THE MORNING I GO TO OAHU. What was going to be a few jolly days of imbibing and, hopefully, copulating with heartbreakingly beautiful Eurasian girls (I was obsessed with loin fantasies of Tahitian nymphets) has turned into a deathwatch. My older brother Bill, with whom I was one day hoping to spend these larksome days, is dying of a particularly virulent form of cancer, one that begins in the caecum—a pouch or "blind gut" lying between the large and small intestines. Because the caecum opens onto so many of the vital organs, and therefore moves into the lymph glands with alarming rapidity, the patient, mercifully, goes swiftly.

Although years ago I laid on him the cognomen of Brigadier, Bill is only a full colonel. The Brigadier is a joke we had. Just graduated from Watertown High School, he entered the military at 17 in February, 1944. He served in three wars. He was much-decorated, over

©COPYRIGHT BY FREDERICK EXLEY.

Design systems as **art process.**

The Nuremberg Chronicle

Hartmann Schedel, 1493

One of the most densely illustrated and technically advanced incunables of early printing which contains 1809 images that were made from 645 different woodcut blocks. Certain woodcuts were reproduced more than once for the depiction of different people and cities.

Birds of America

John James Audubon, 1827–1838
435 life-sized engravings of America's birds which details ornithological importance and history.


N°38.
PLATE CLXXXVIII
Tree Sparrow.
FRINGILLA CANADENSIS.
Male 1 Female 2.
Passerina Canadensis

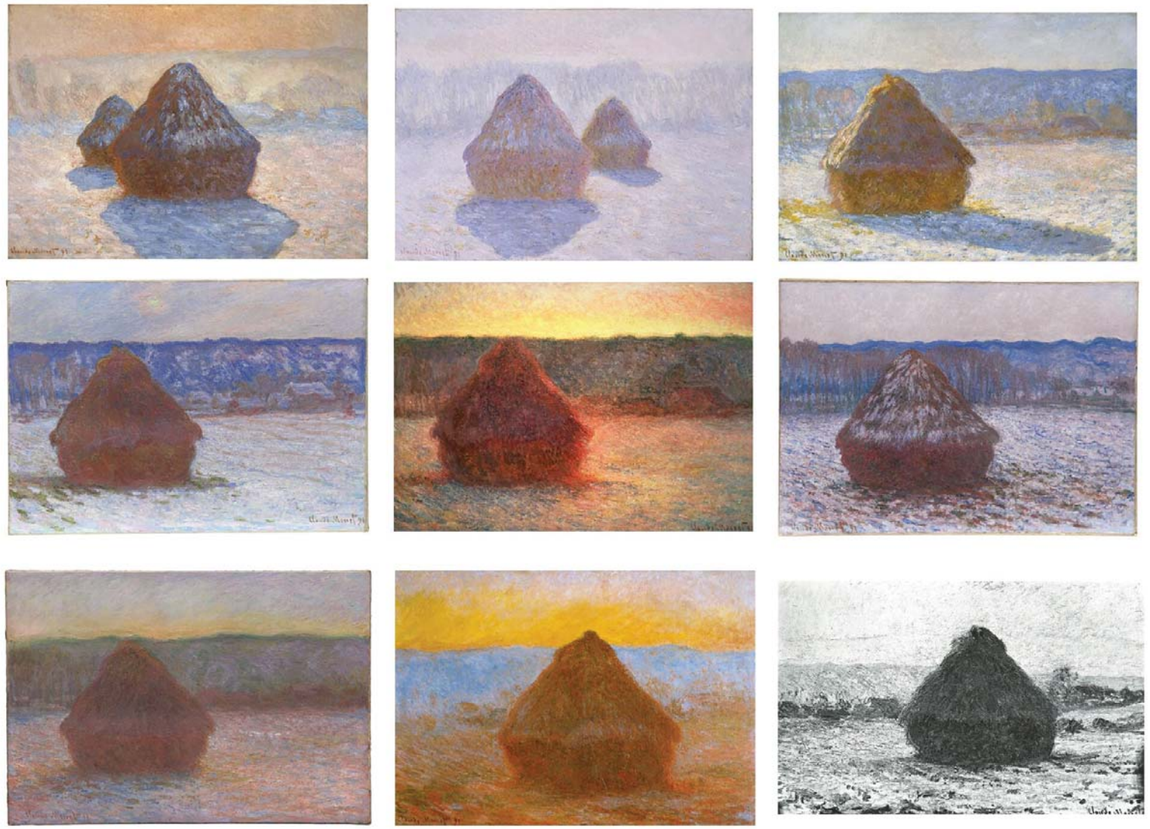

N°29.
PLATE CXLV
Yellow Red-poll Warbler
SYLVIA PETECHIA.
Male 1 female 2.


N°12.
PLATE LVIII.
Hermit Thrush.
TURDUS MINOR.
Male 1. Female 2.

Haystacks

Claude Monet, 1890–1891

A series of 25 impressionist paintings which repeated the same subject in different lighting and atmospheres during various times of day across many seasons.



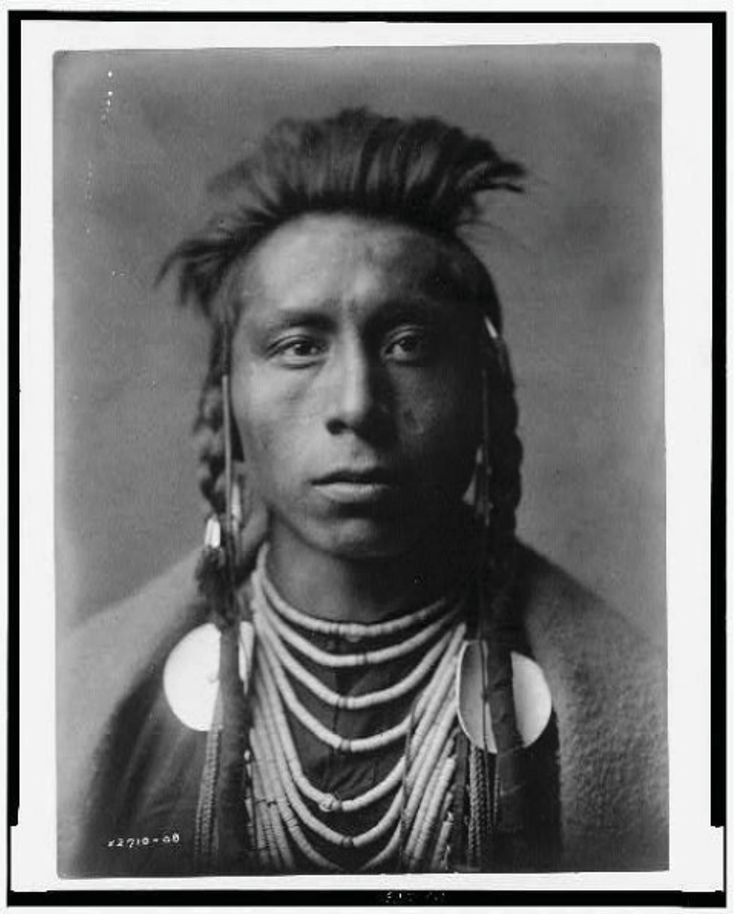
Rouen Cathedral

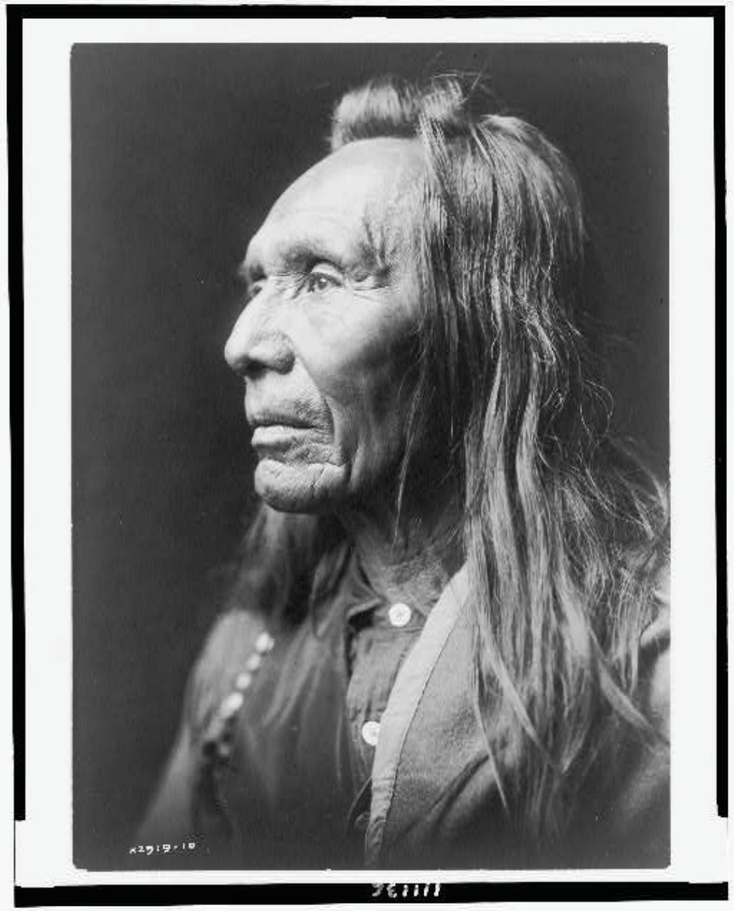
Claude Monet, 1892–1894

A series of paintings that consisted of more than 30 canvases showcasing the facade of the Gothic Rouen Cathedral during different conditions of light and weather.

The North American Indian

Edward S. Curtis, 1907–1930
A 20 volume set of portraits, photographs, and ethnographic descriptions of the Native American traditional life.

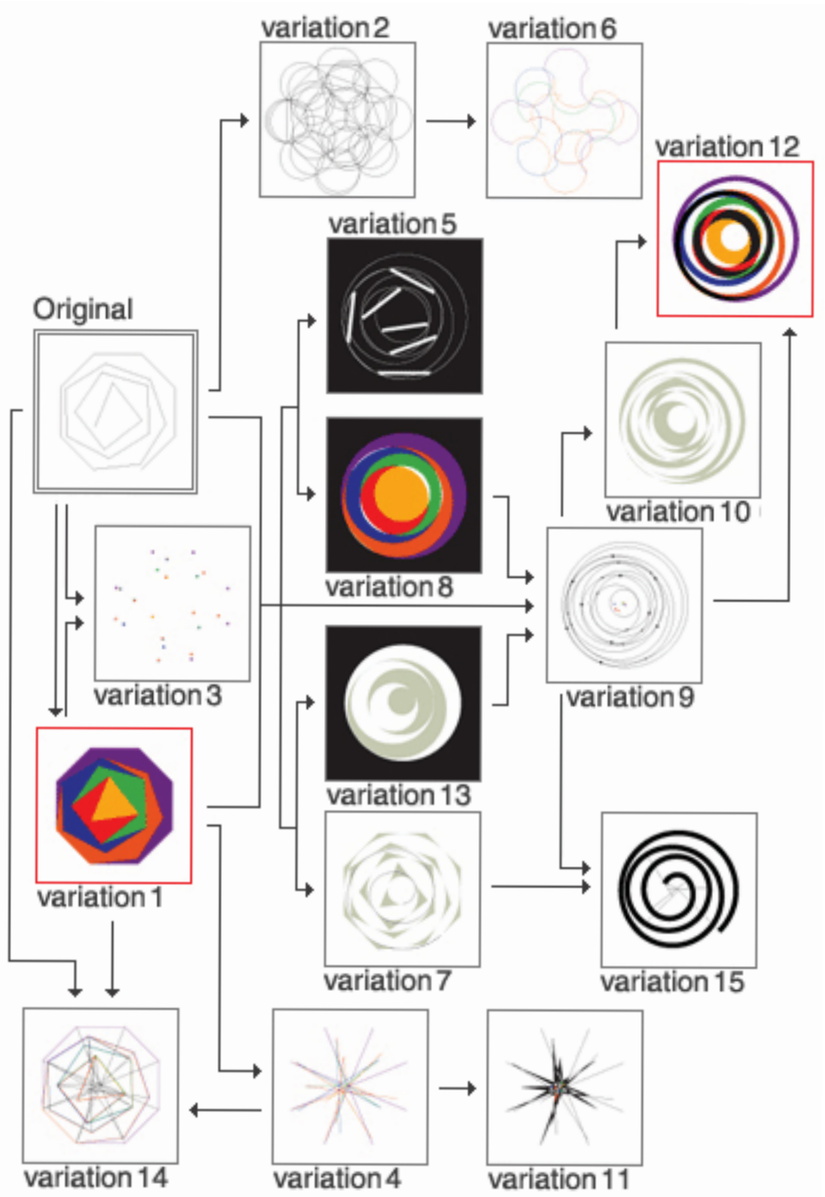




Quinze variations sur un même thème

Max Bill, 1935–1938

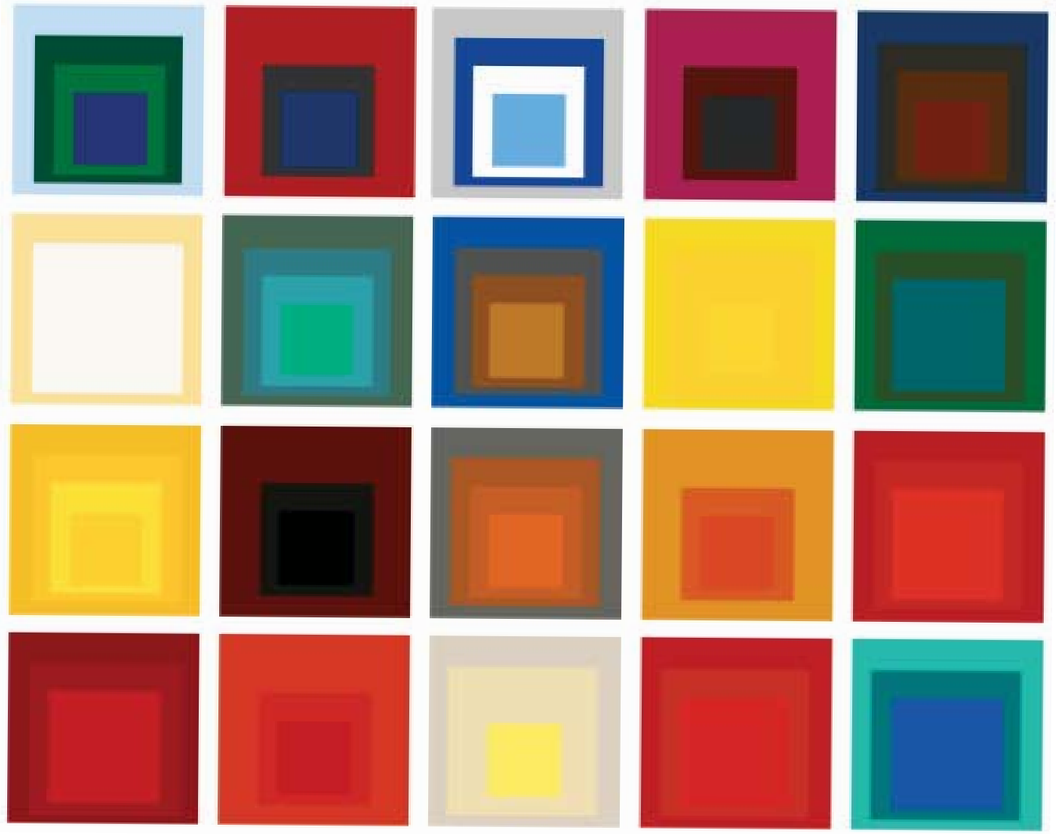
Fifteen variations on a single theme is based on one original drawing as the nucleus of idea and sets the modular rules.



Homage to the Square

Josef Albers, 1950

A geometric abstraction series based on a mathematically determined format of several squares that are overlapping or nested within one another.



Stedelijk Museum Posters

Wim Crouwel, 1960

Silk-screened posters for group exhibitions at the modern and contemporary art museum of Stedelijk in Eindhoven, Netherlands.

Musica Viva

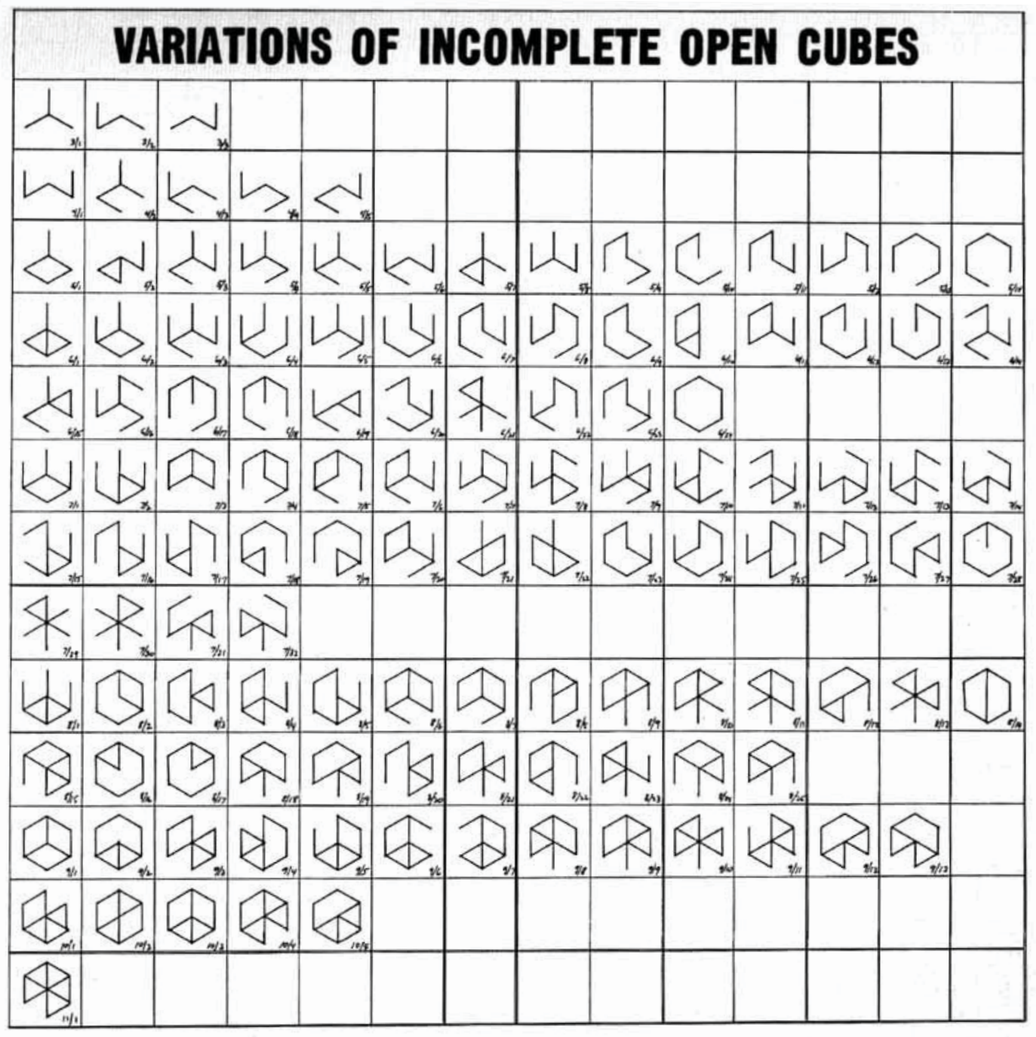
Josef Müller-Brockmann, 1969

A series of concert posters for the Zürich Tonhalle that represented the International Typographic Style.

Incomplete Open Cubes

Sol LeWitt, 1974

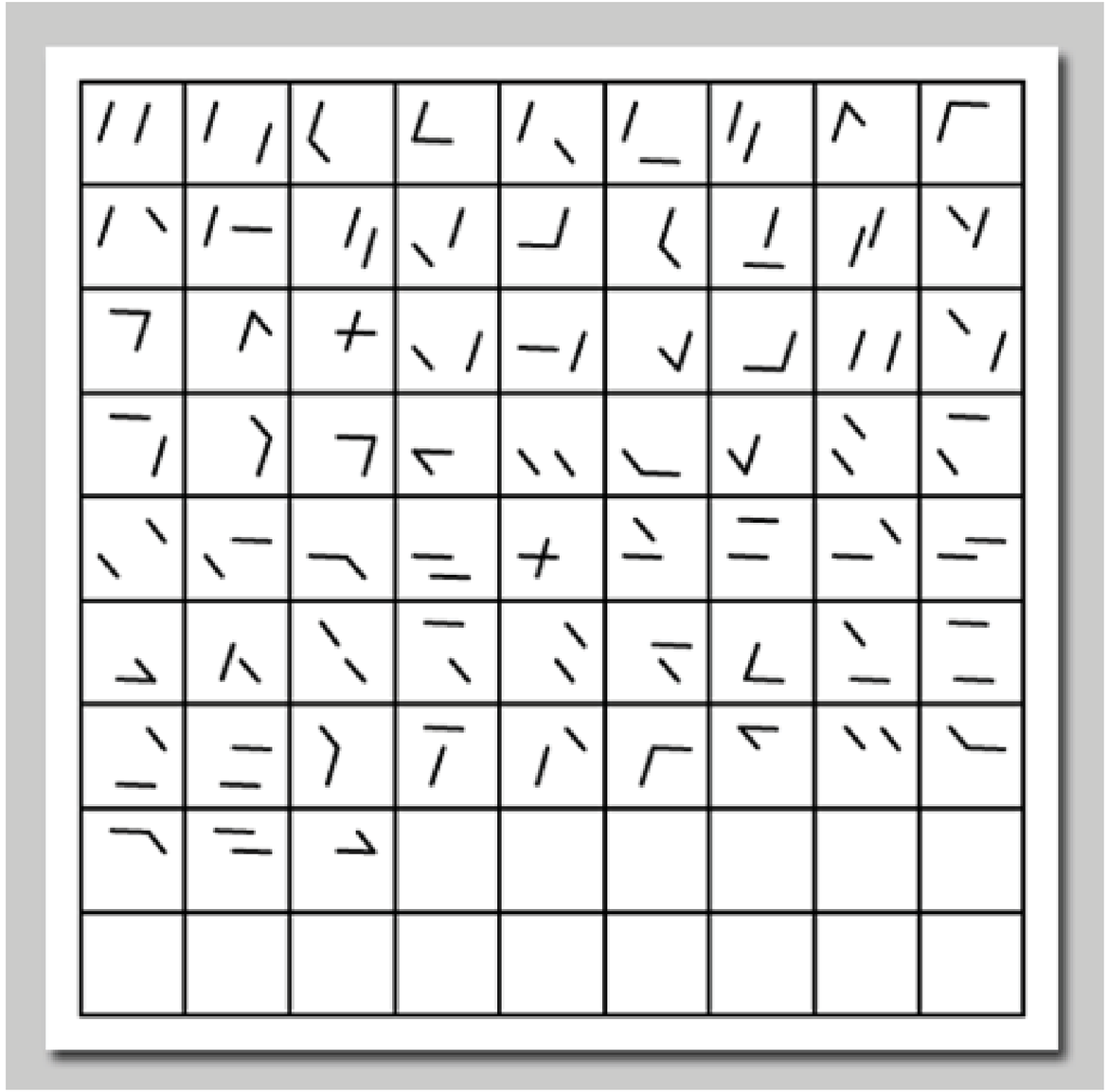
An arithmetic concept that identifies all variations in which a cube can be incomplete. The titles explain where each piece falls in the schematic progression.

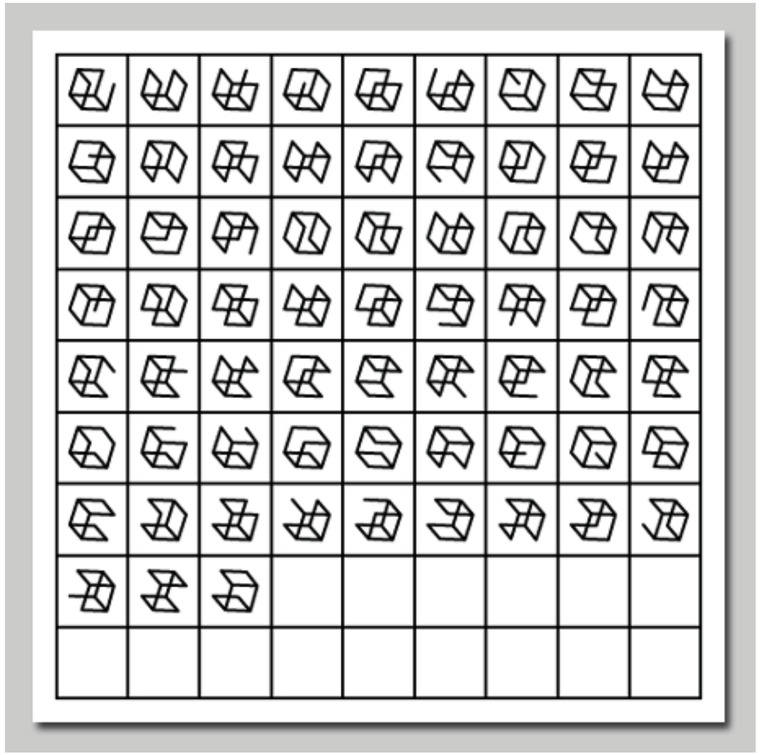


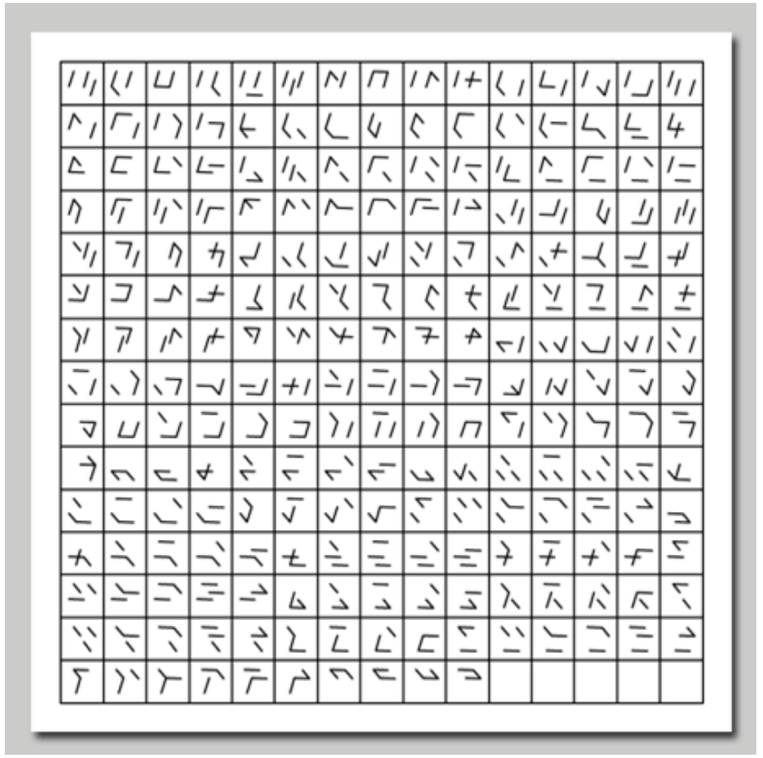
Cubic Limit I

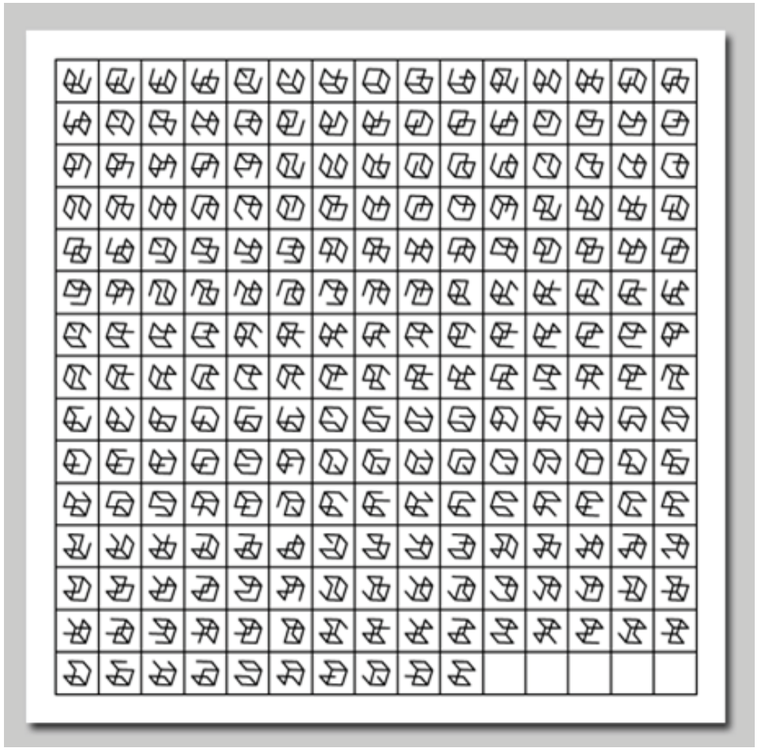
Manfred Mohr, 1973–1976

A pioneer of digital art, his work consists of computer generated algorithmic geometry. He dubbed the phrase 'programmed expressionism' through his abstract computer drawings.





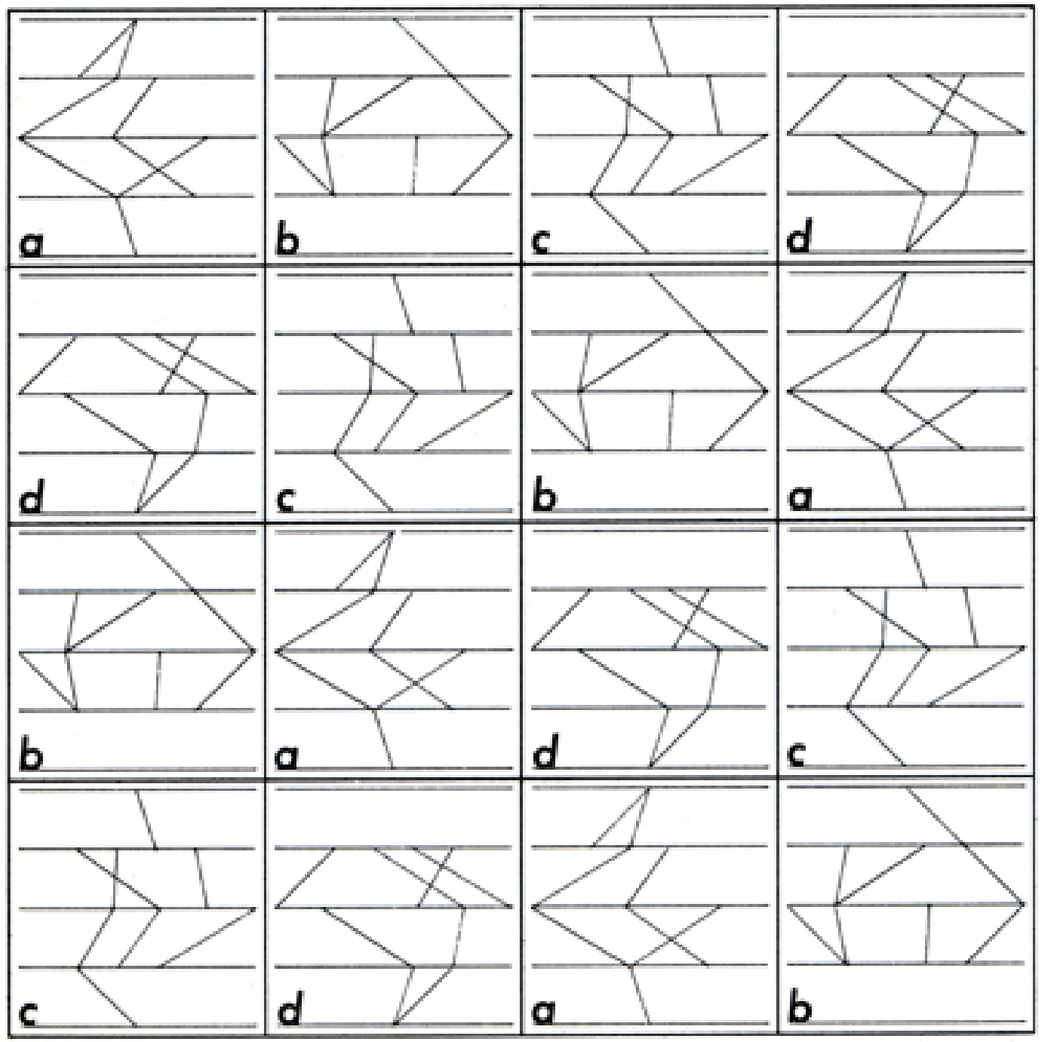


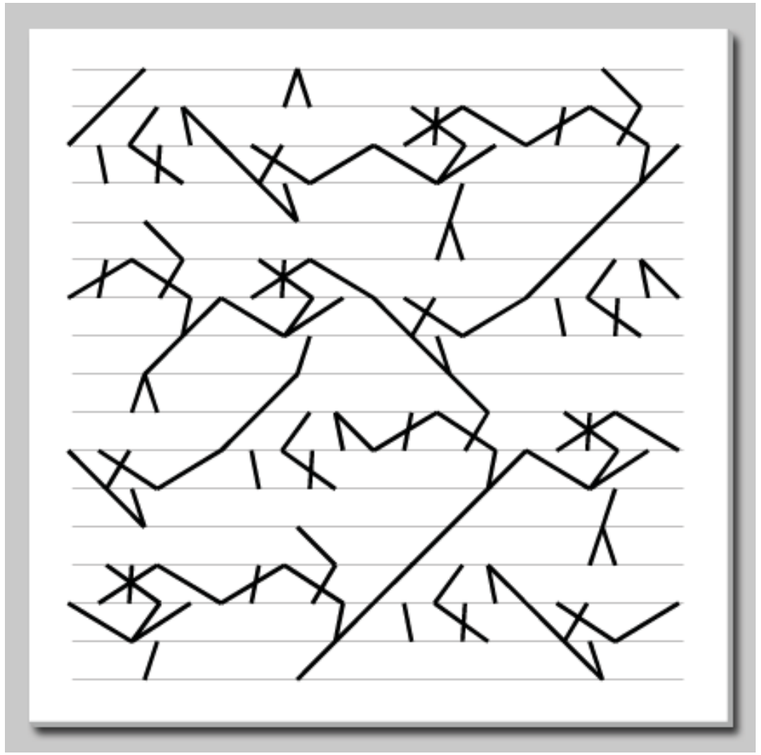


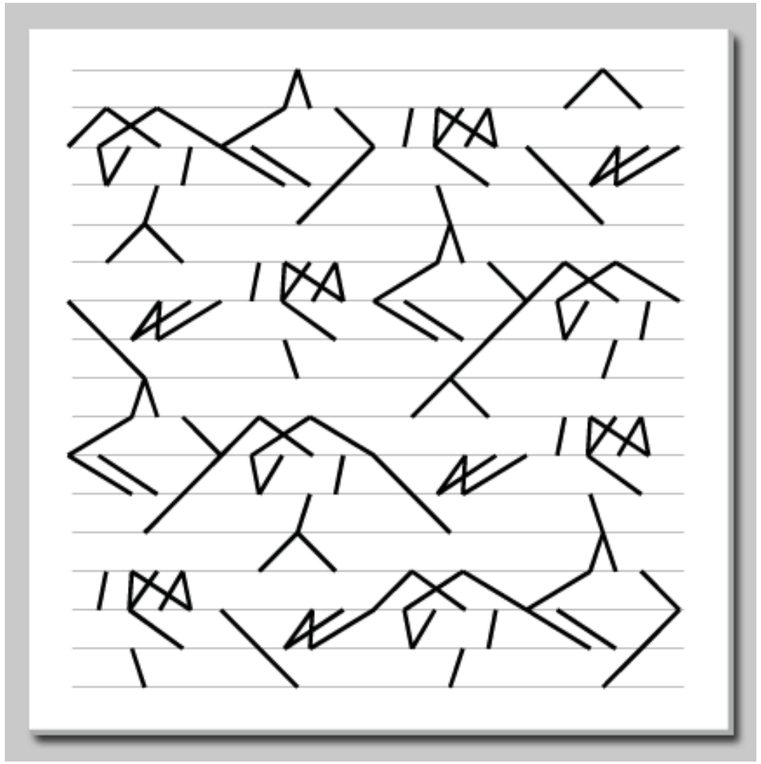
Dimensions I

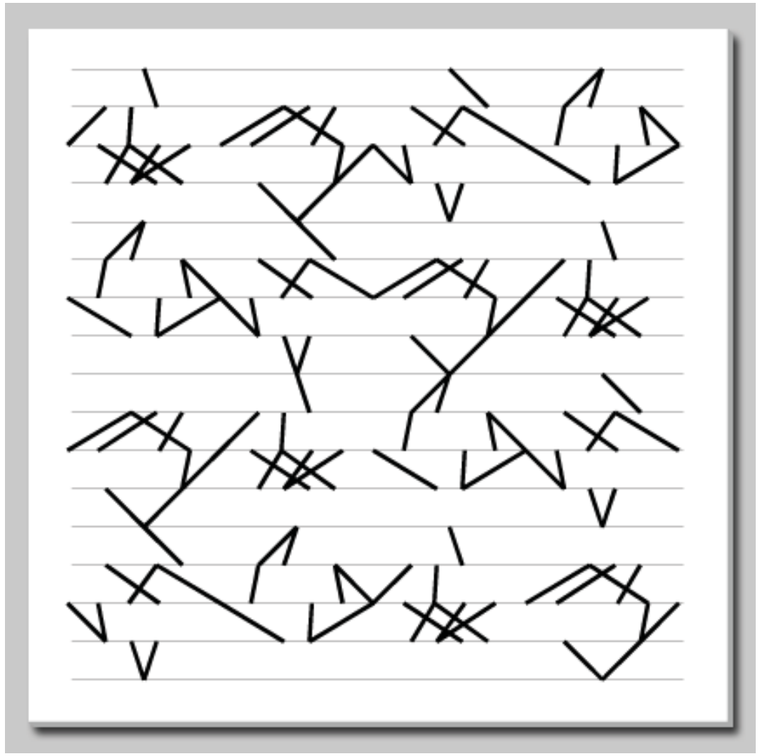
Manfred Mohr, 1977–1979

Based on the graph of a 4-Dimensional hyper-cube as the basic generator of signs. It is a representation of showing relationships between points, lines, squares and cubes in this structure.





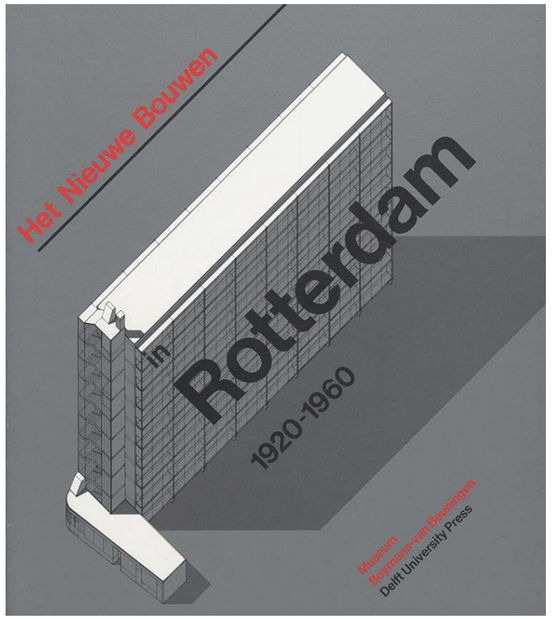


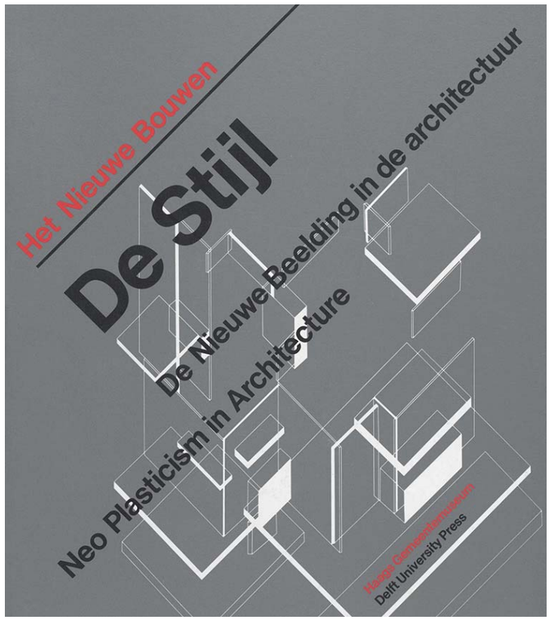


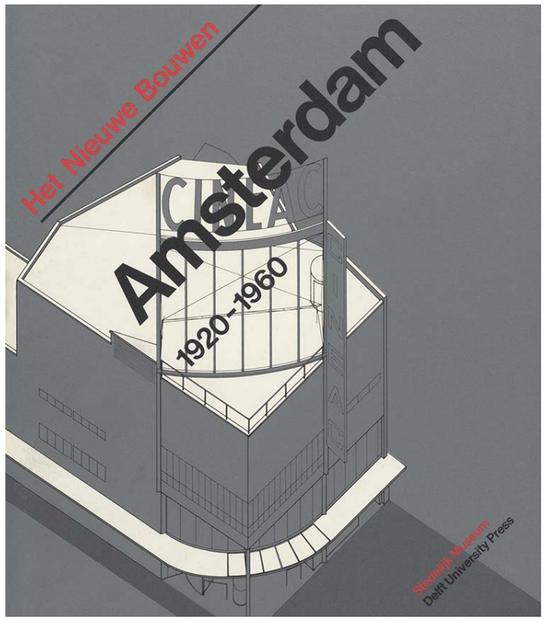
Het nieuwe bouwen Series

Wim Crouwel, 1982–1983

Crouwel's artwork was used for both posters and book covers to accompany a series of exhibitions on architecture across various museums.



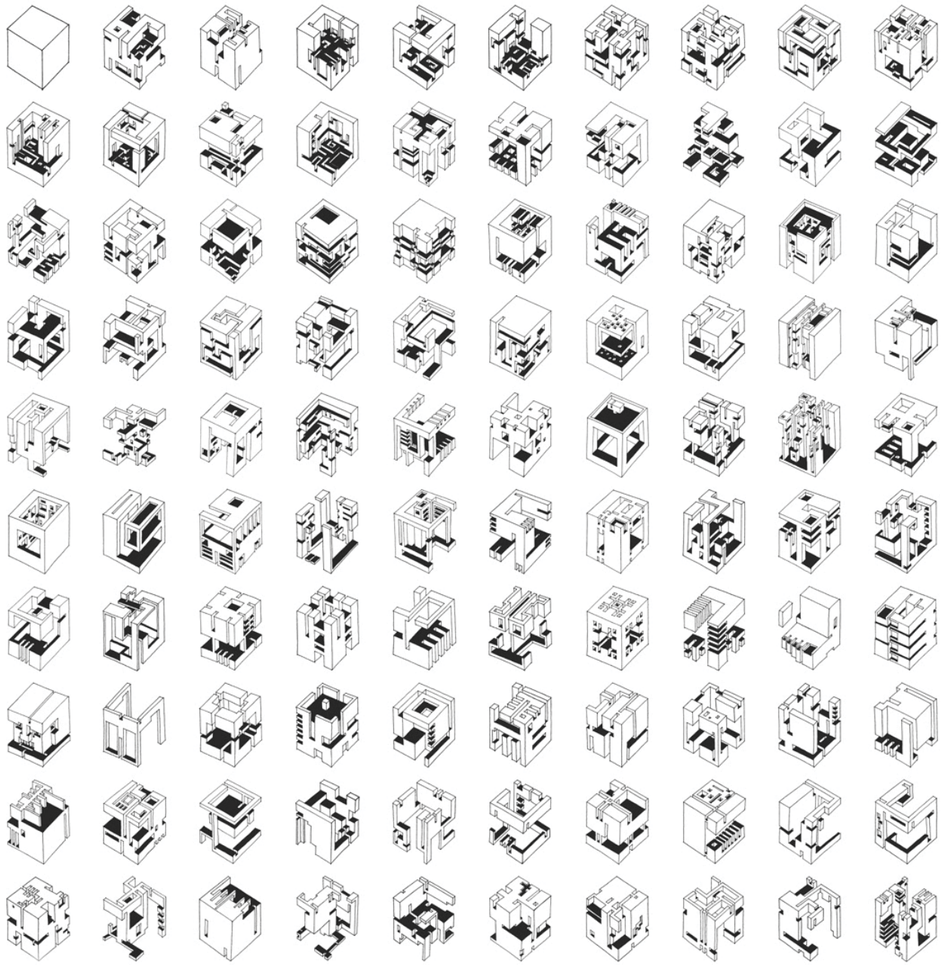




100 Restless Cubes

Atelier Reza Aliabadi, 2012

A space-making exercise which consisted of drawing different isometric cubes with only the operation of subtraction to create a family of variations.

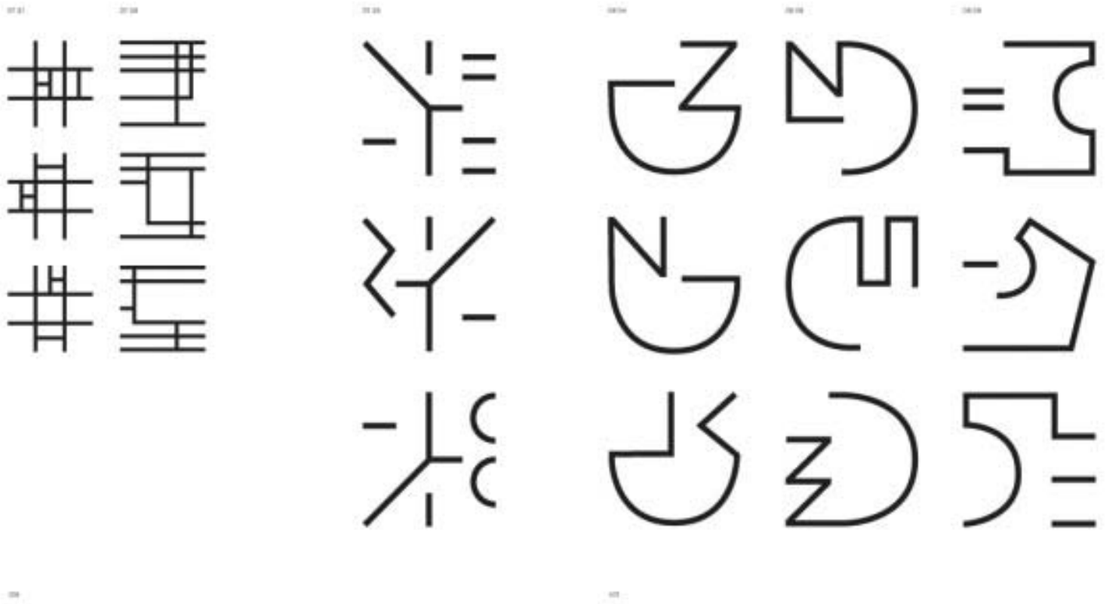


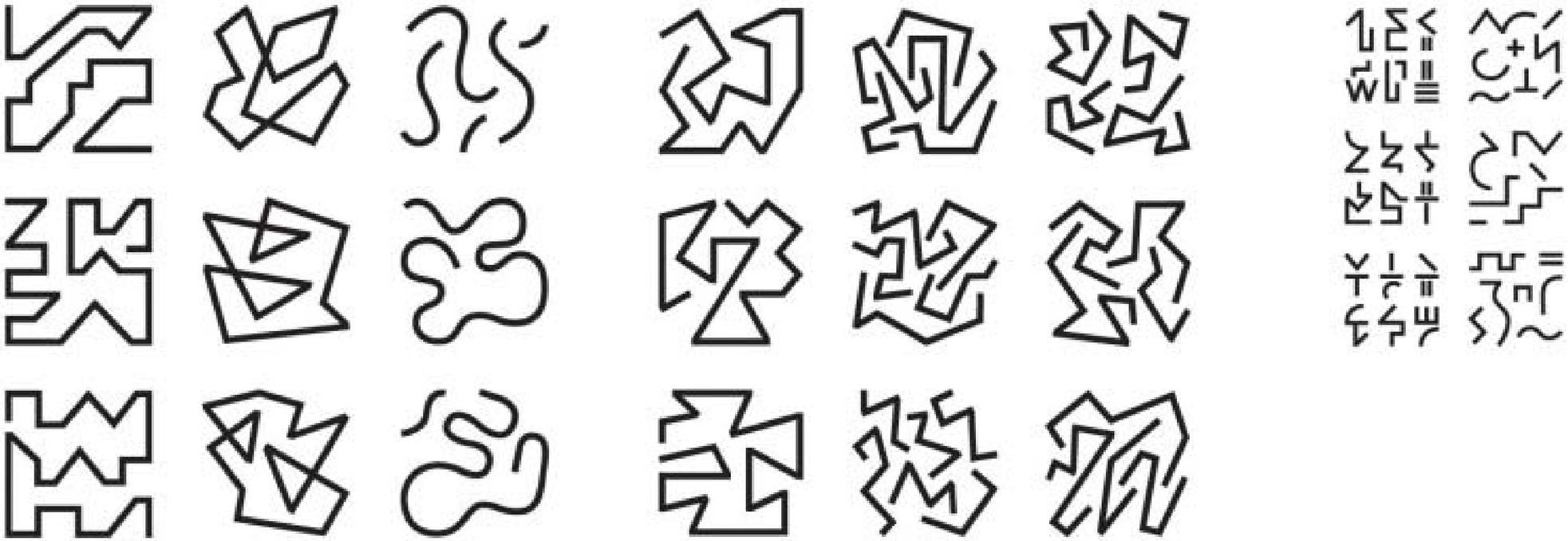
https://www.youtube.com/watch?v=GClrb7mCm54&feature=youtu.be
https://www.behance.net/gallery/84546847/100-Restless-Cube

Phantasmagorias: Daydreaming with Lines

Willi Kunz, 2017

A documentation of his creative thoughts, Kunz is inspired by alphanumeric characters, symbols and geometric elements. He produces three aesthetically connected line drawings defined by dimensions of a square.





Design systems as **artifact.**

Design systems as **toys.**

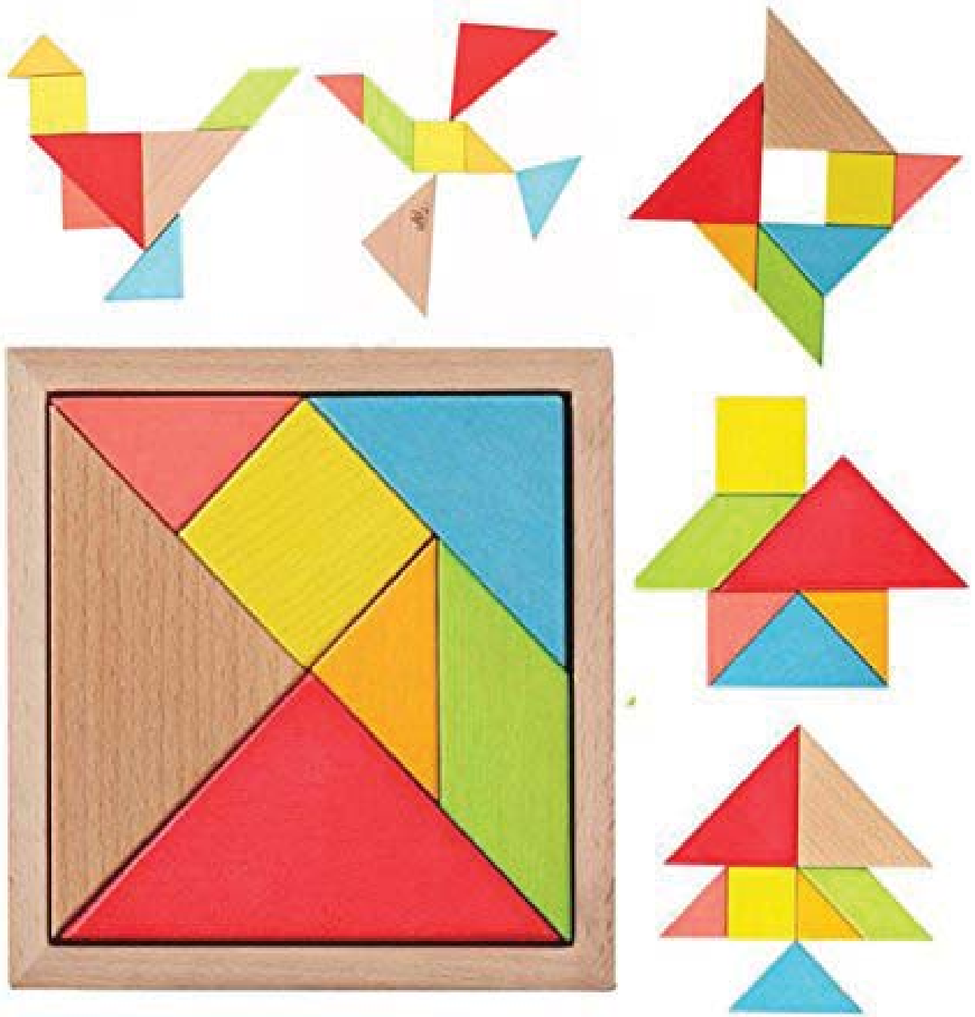
Froebel Blocks

Friedrich Fröebel, early 1800's
Educational toys that were created in a series system to expand child brain development and creativity.

Tangram

China, early 1800's

A dissection puzzle formed from seven polygons used to create specific shapes which was popularized in the early 19th century.



Meccano Kit

Frank Hornby, 1898
Construction set that explored the principles of mechanical engineering through interchanging components.

Erector Set

Alfred Carlton Gilbert, 1913

Educational toy encouraging constructive instincts through both static and dynamic structures.

Tinker Toys

Charles H. Pajeau & Robert Petit, 1914

Set of rods and spools that exercised spatial intelligence based on the Pythagorean theorem.

Lincoln Logs

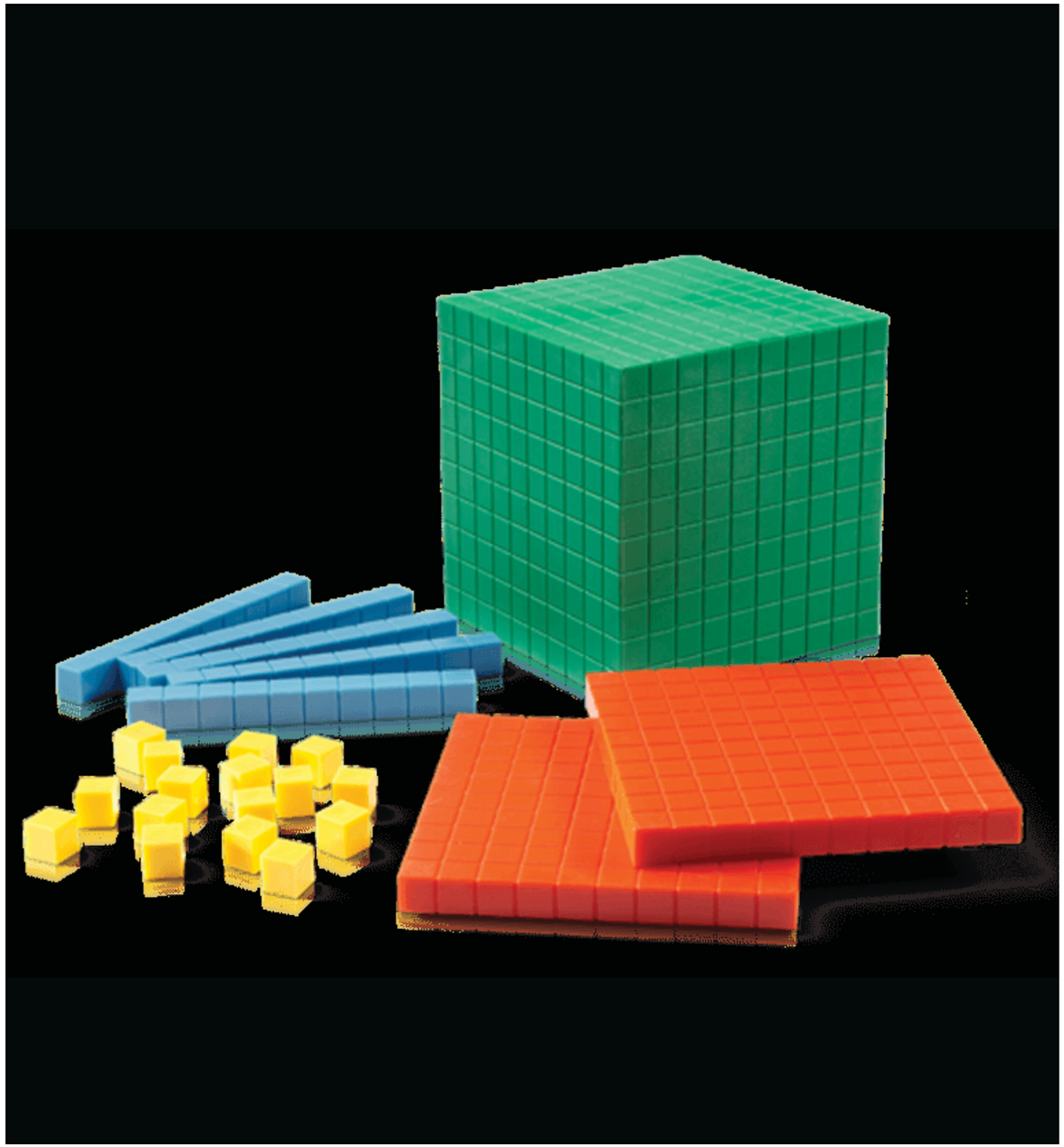
John Llyod Wright, 1916

A system of interlocking wooden beams that could construct different log buildings.

Base 10 Blocks

Stern & Stern, 1948

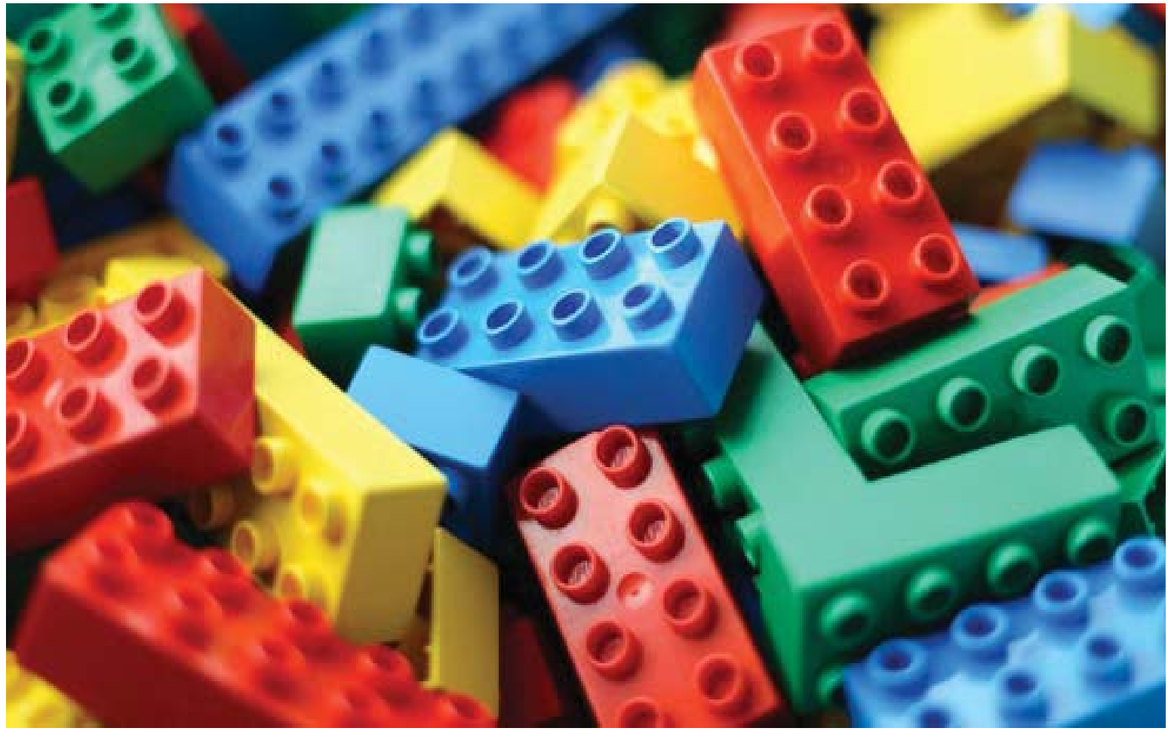
Blocks that provide a spatial model of the base ten number system and can be used as a mathematical manipulative learning tool.



Legos

The Lego Group, 1949

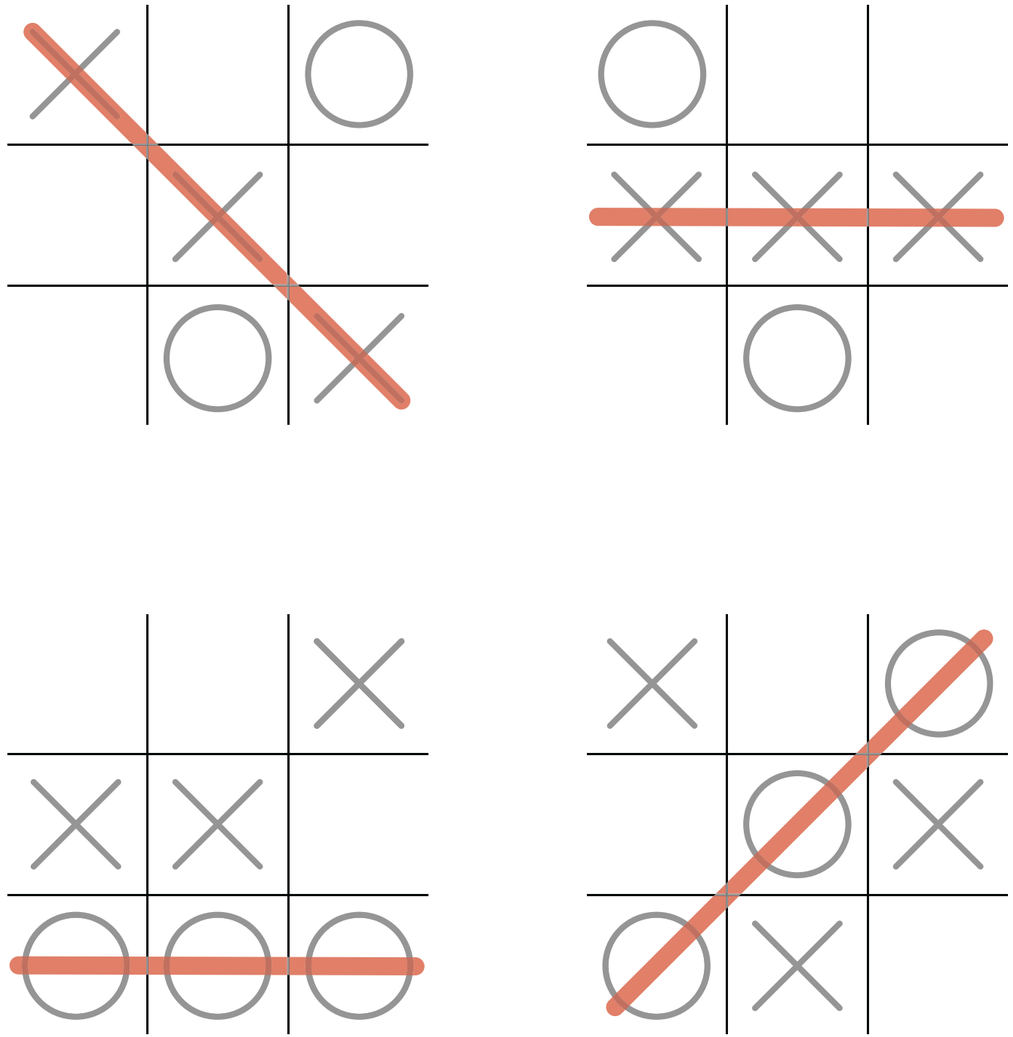
Interlocking plastic bricks system that allows unlimited creativity and design combinations.



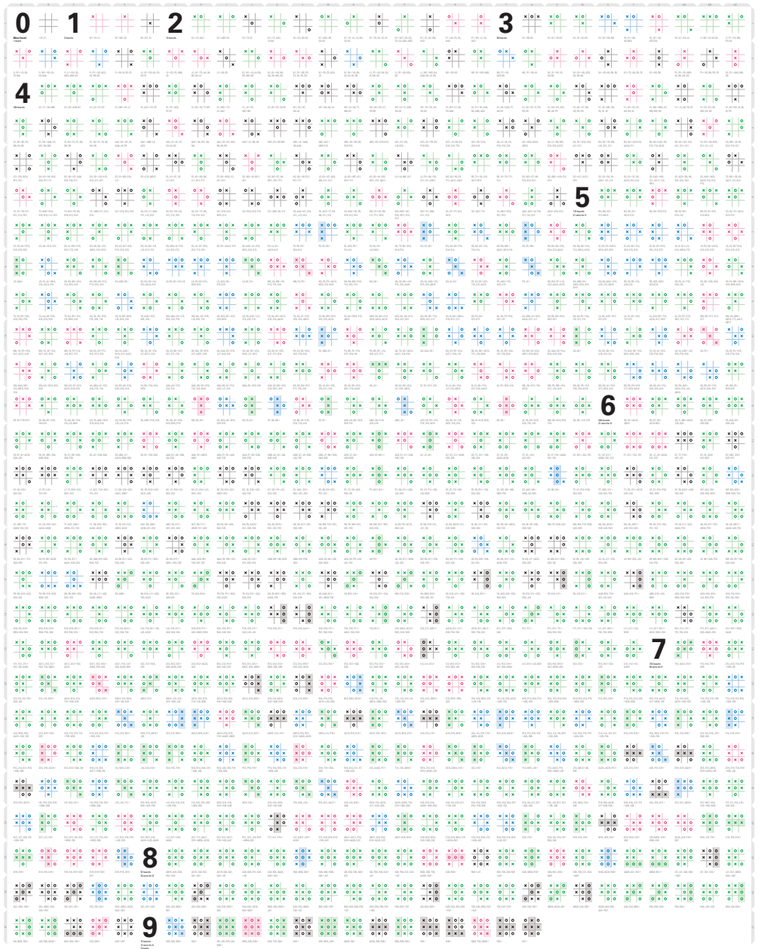
Design systems as **games.**

Tic-tac-toe

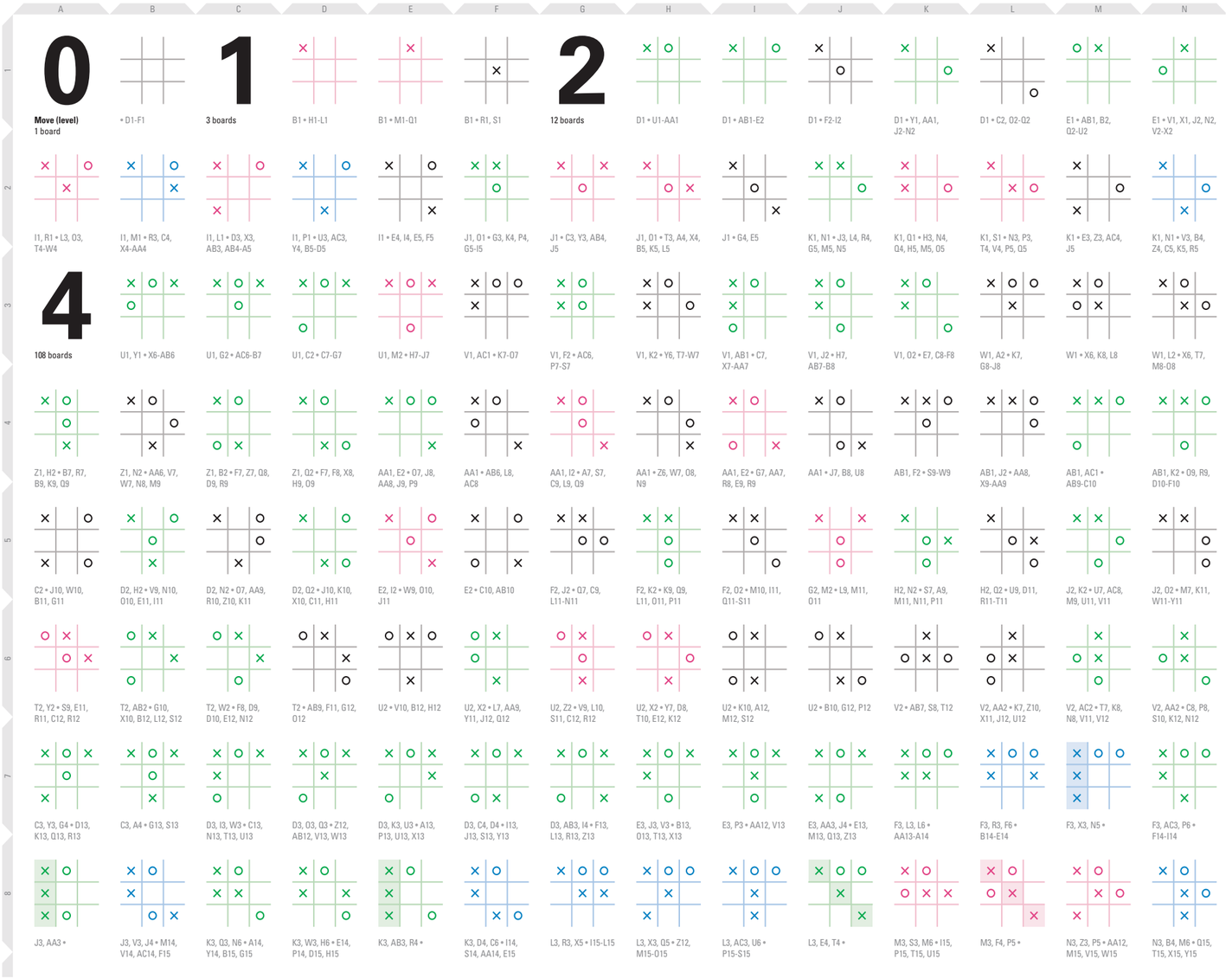
Roman Empire, 1st century B.C.
Usually played as a paper and pencil game on a 3x3 grid, the objective of this game is to connect three of your symbols in a row before your opponent.



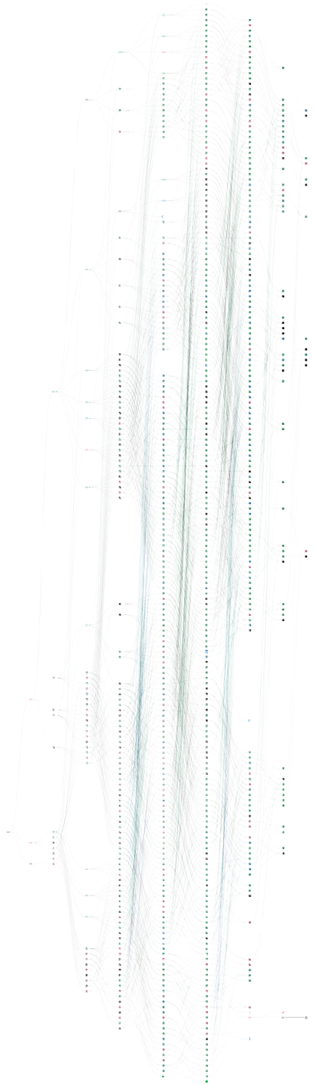
The tic-tac-toe solution space

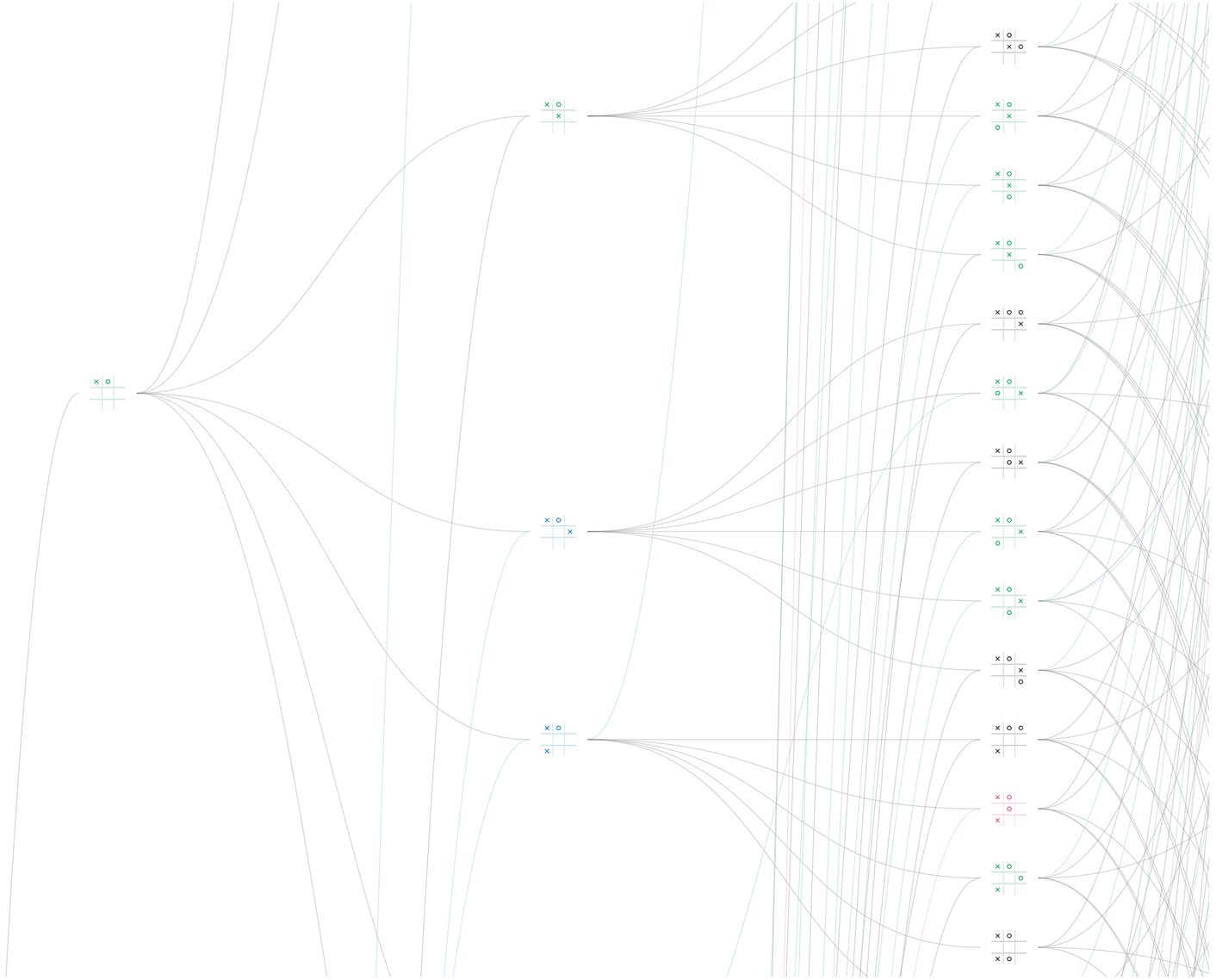


The tic-tac-toe solution space



The tic-tac-toe solution space



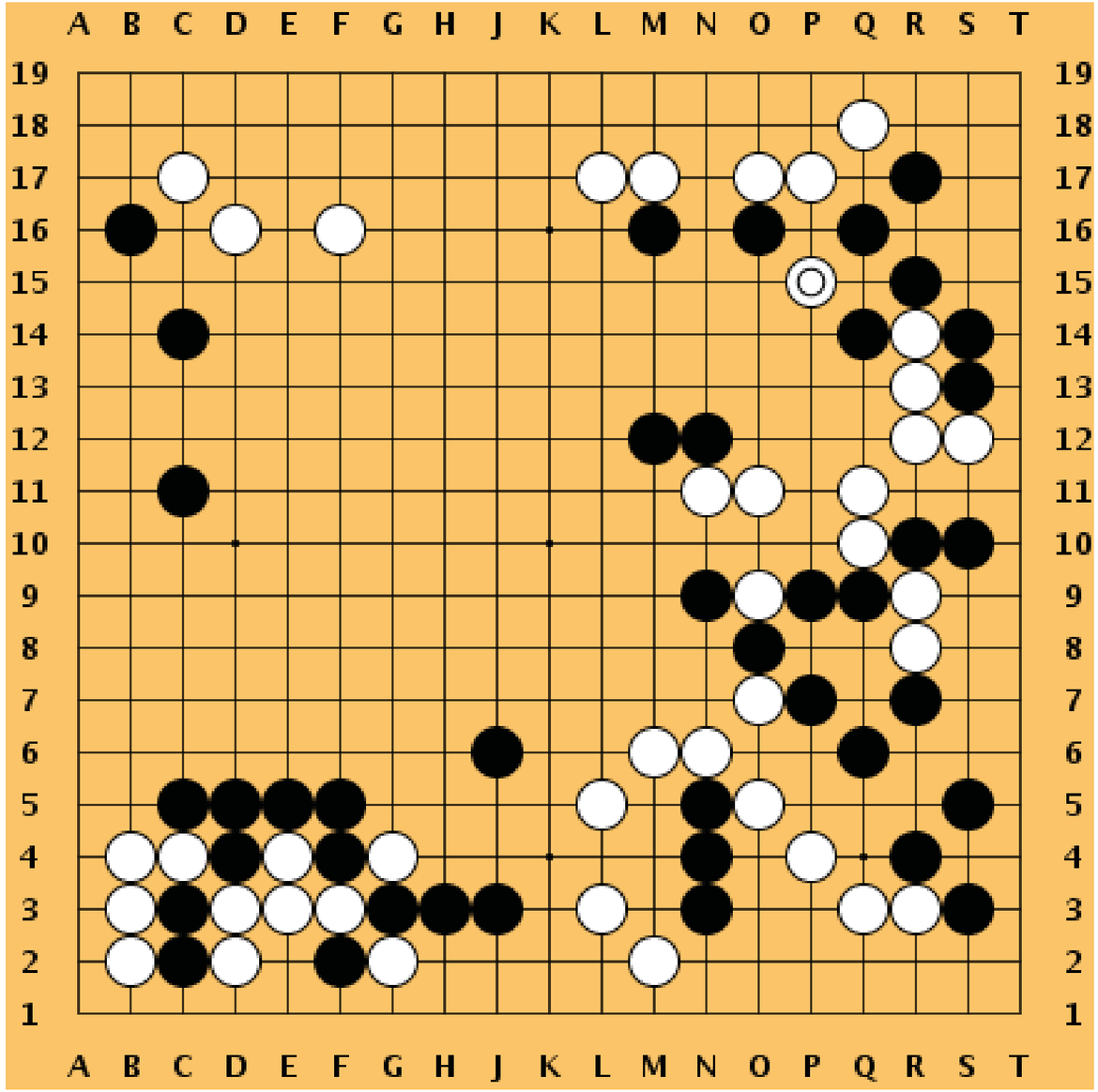


http://tictactoe.dubberly.com/

Go

China, 4th century B.C.

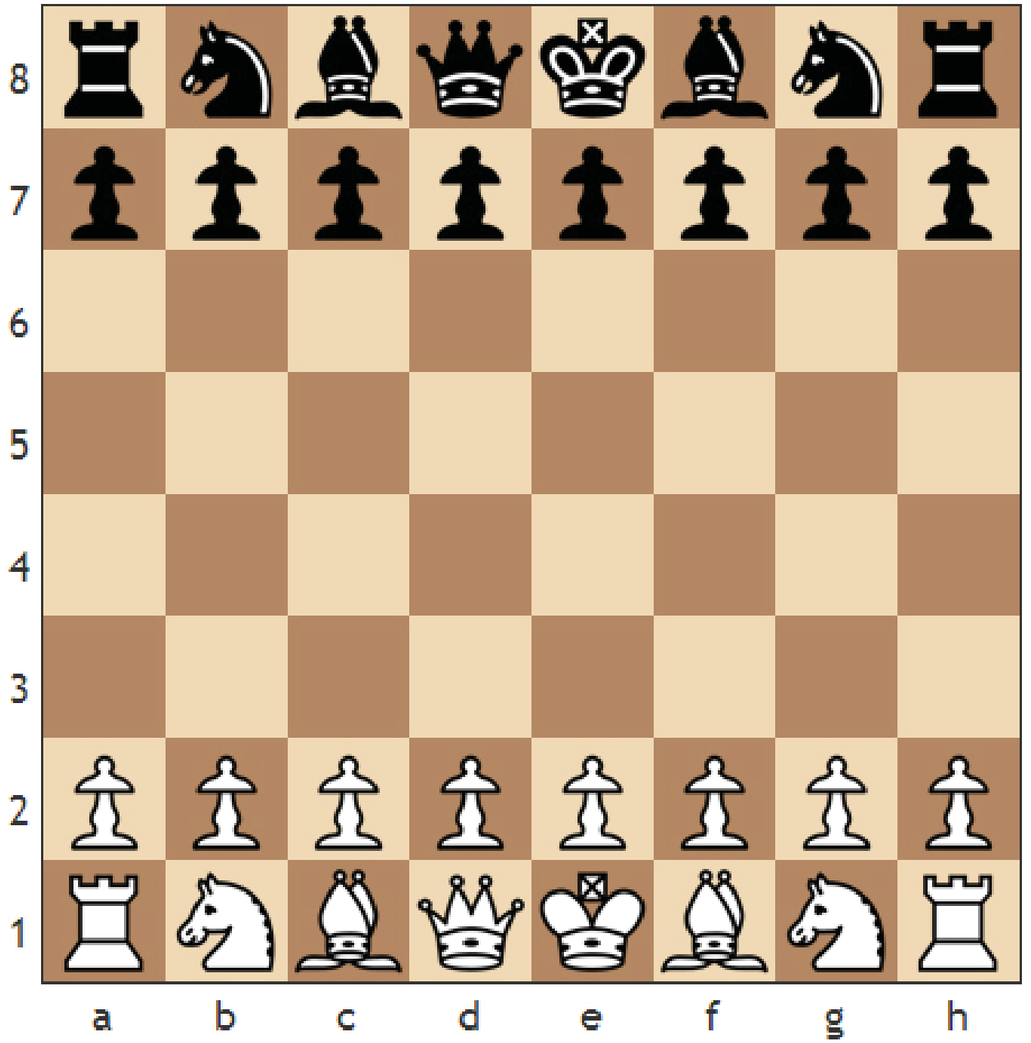
An abstract strategy board game that is played on a 19x19 grid with black and white pieces called stones. The objective of the game is to control more territory than your opponent by the end of the game.



Chess

Romantic Era, 1880's

Derived from the Indian game, chaturanga, chess is a strategic board game played on an 8x8 grid. The primary objective of chess is to checkmate your opponent's King piece.

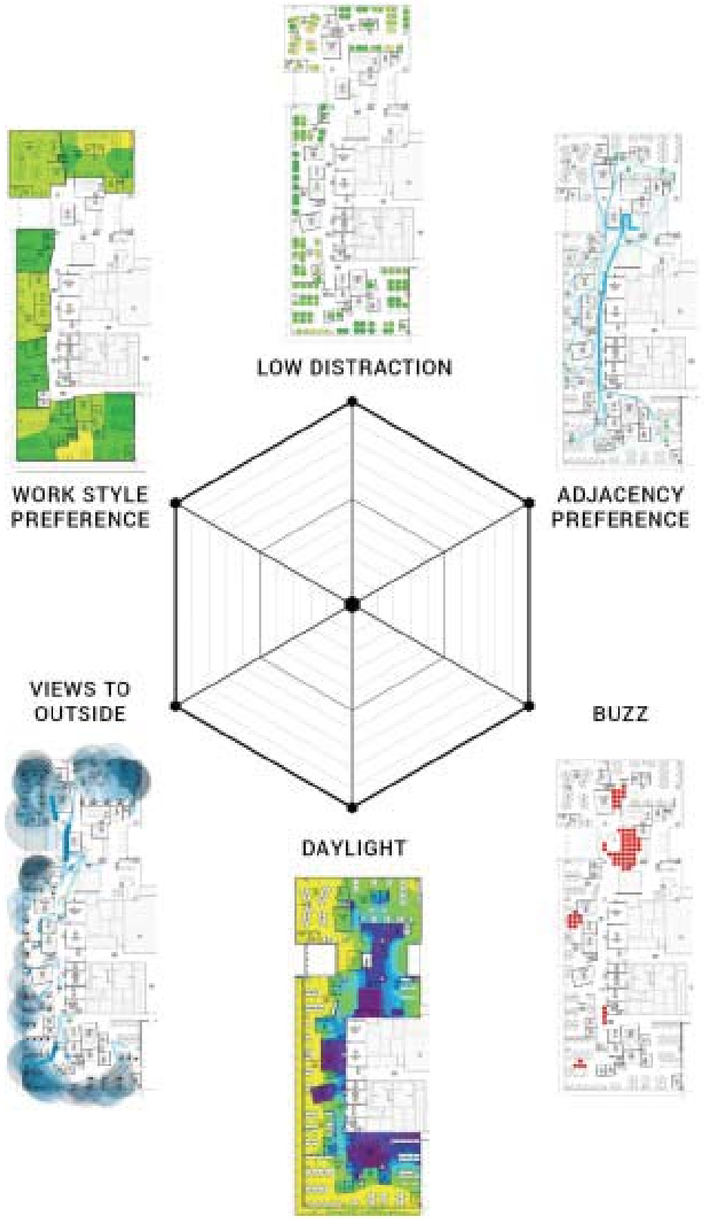


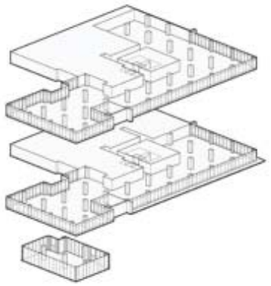
Design systems as **genetic algorithms** for **generative design systems.**

Autodesk MaRS Office

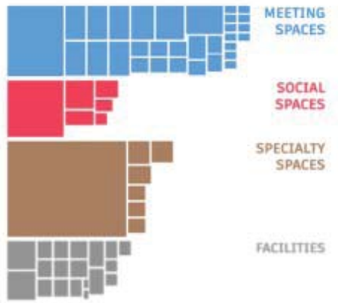
The Living & Autodesk, 2016

Founded by David Benjamin, The Living explored design methods and contextual projects using generative design. Design constraints and objectives were taken into consideration when determining goals for the office layout.

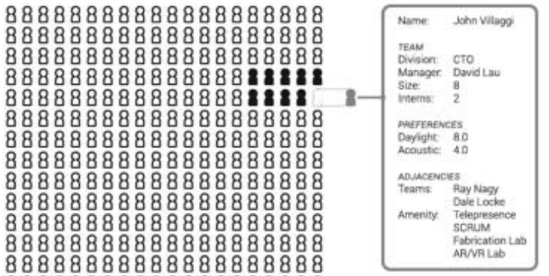




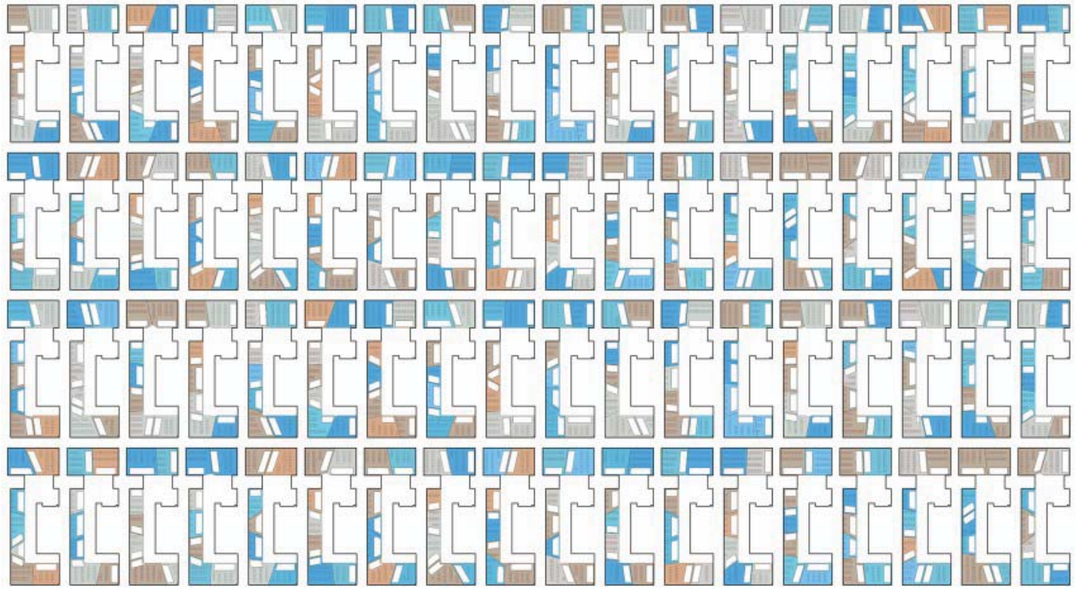
3 floors
48,000 square feet



11 meeting rooms
6 multi-purpose rooms
11 phone booths



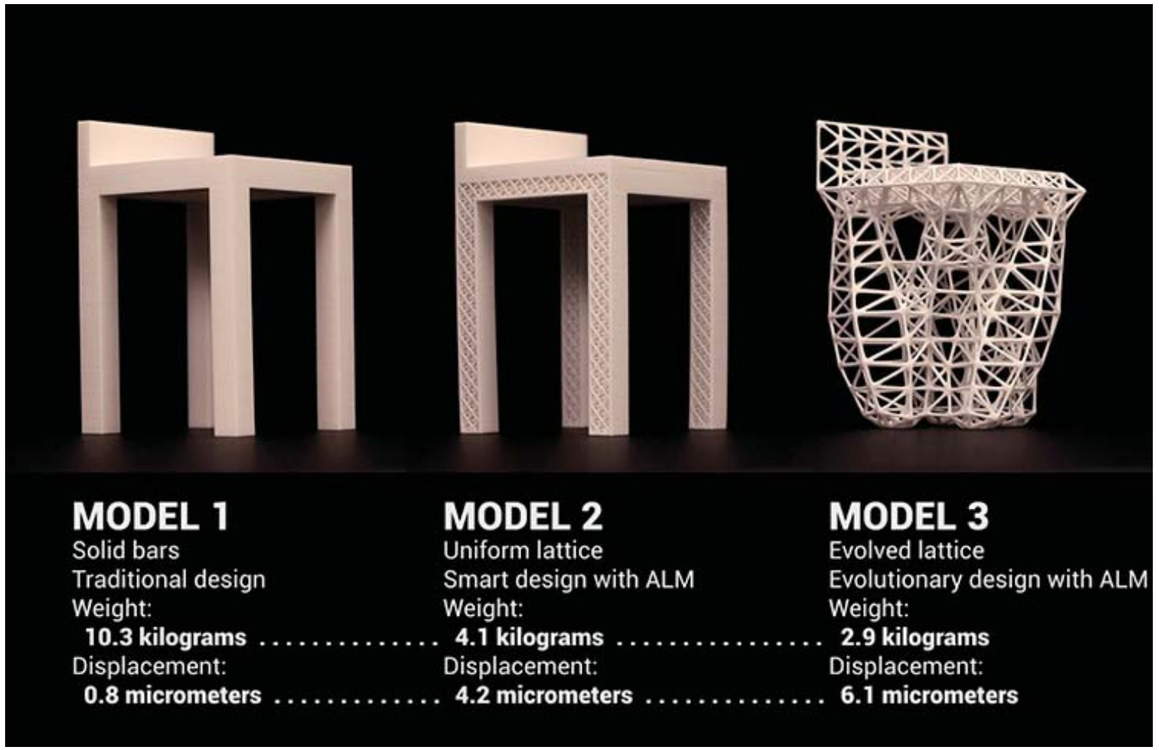
250+ people
25+ teams

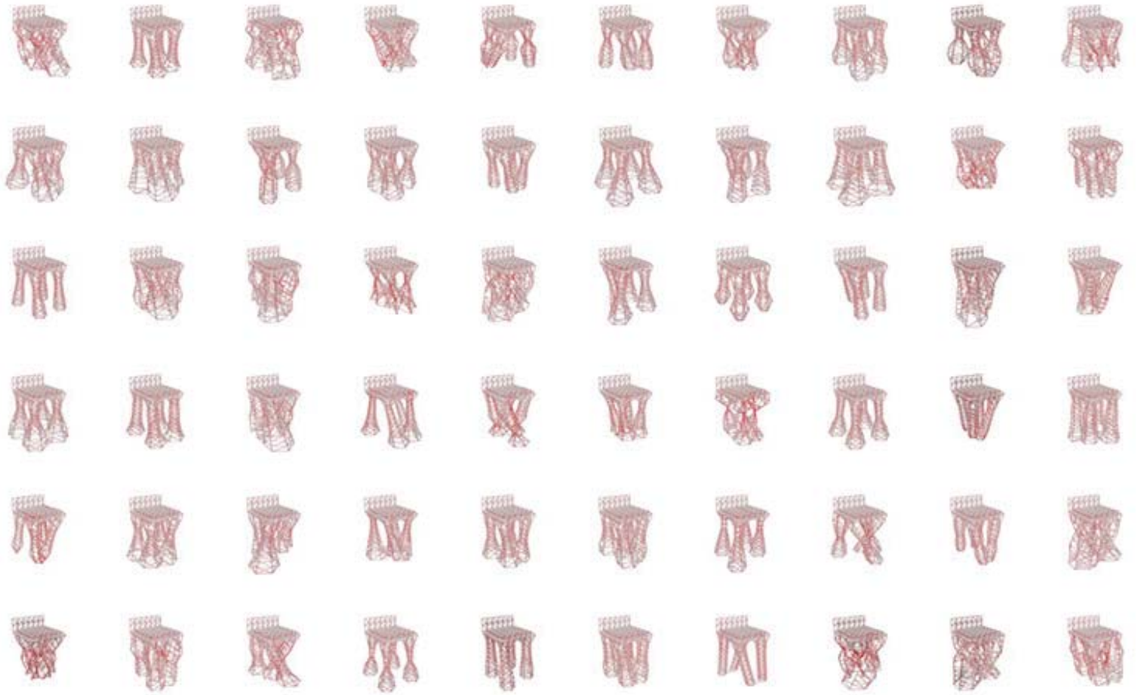


Project Dreamcatcher

Autodesk, 2018

A generative design algorithm which generates high-preforming design alternatives and all the possible permutations of a solution based on a designer's input.


MODEL 1
Solid bars
Traditional design
Weight:
10.3 kilograms
Displacement:
0.8 micrometers
MODEL 2
Uniform lattice
Smart design with ALM
Weight:
4.1 kilograms
Displacement:
4.2 micrometers
MODEL 3
Evolved lattice
Evolutionary design with ALM
Weight:
2.9 kilograms
Displacement:
6.1 micrometers

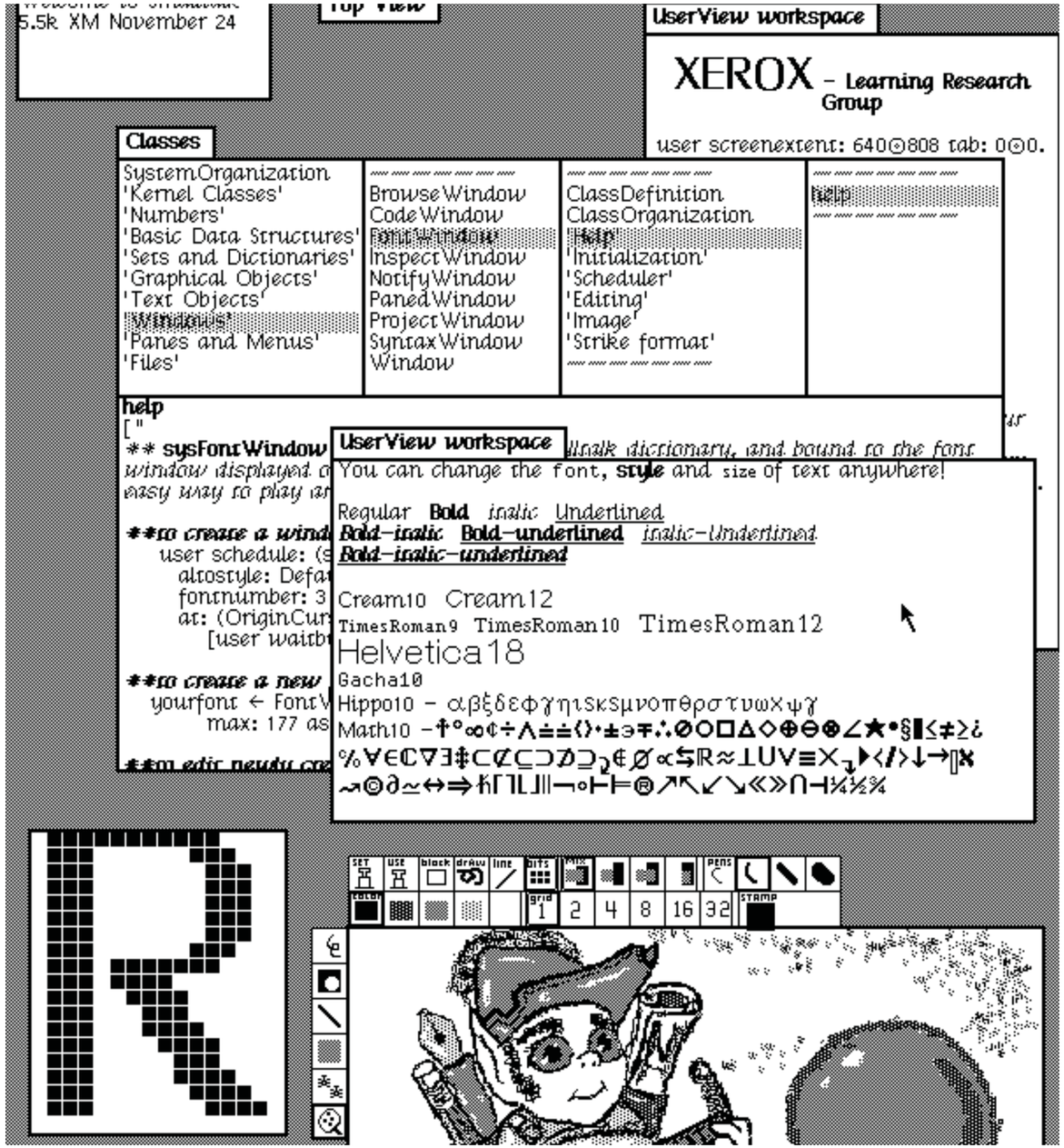


Design systems as **graphical user interface (GUI).**

Xerox Alto

Xerox, 1973

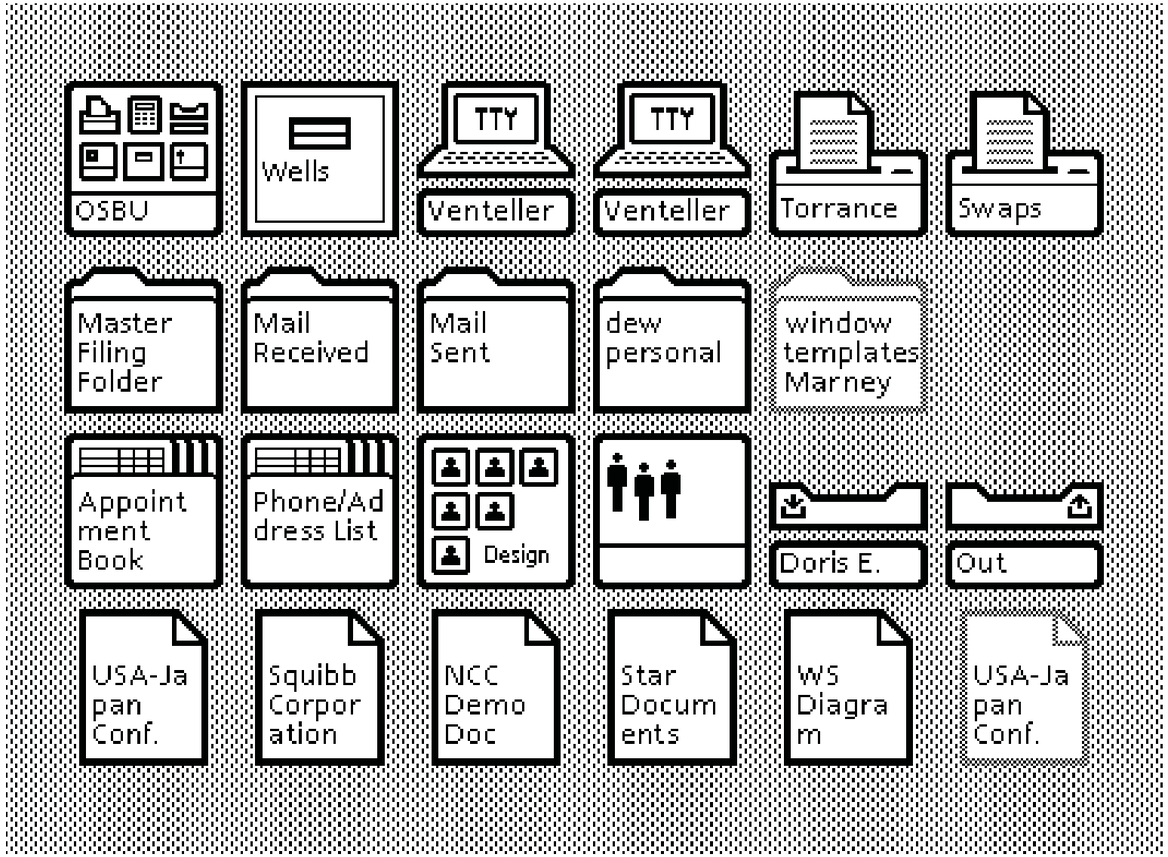
The first personal computer designed to support an operating system based on a mouse driven graphical user interface.



Xerox Star (Xerox 8010 Information System)

Xerox, 1981

The first commercial office automation system to incorporate the desktop metaphor and WYSIWYG technology.



Apple Mac Standards

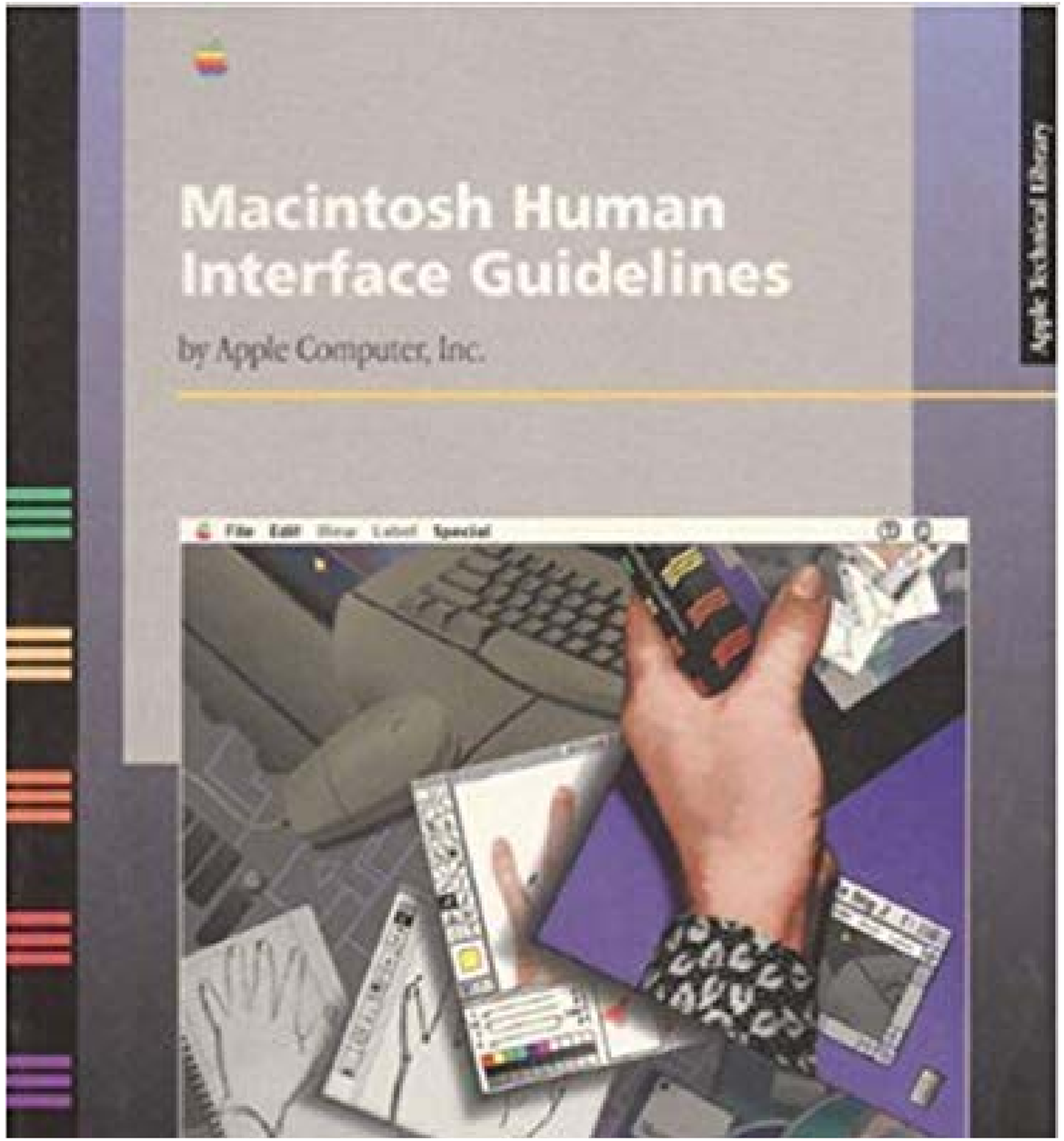
1984 Design System

System Software with graphical user interface; consistent look and feel among applications.

Apple Mac Standards

1985 Standards for Developers

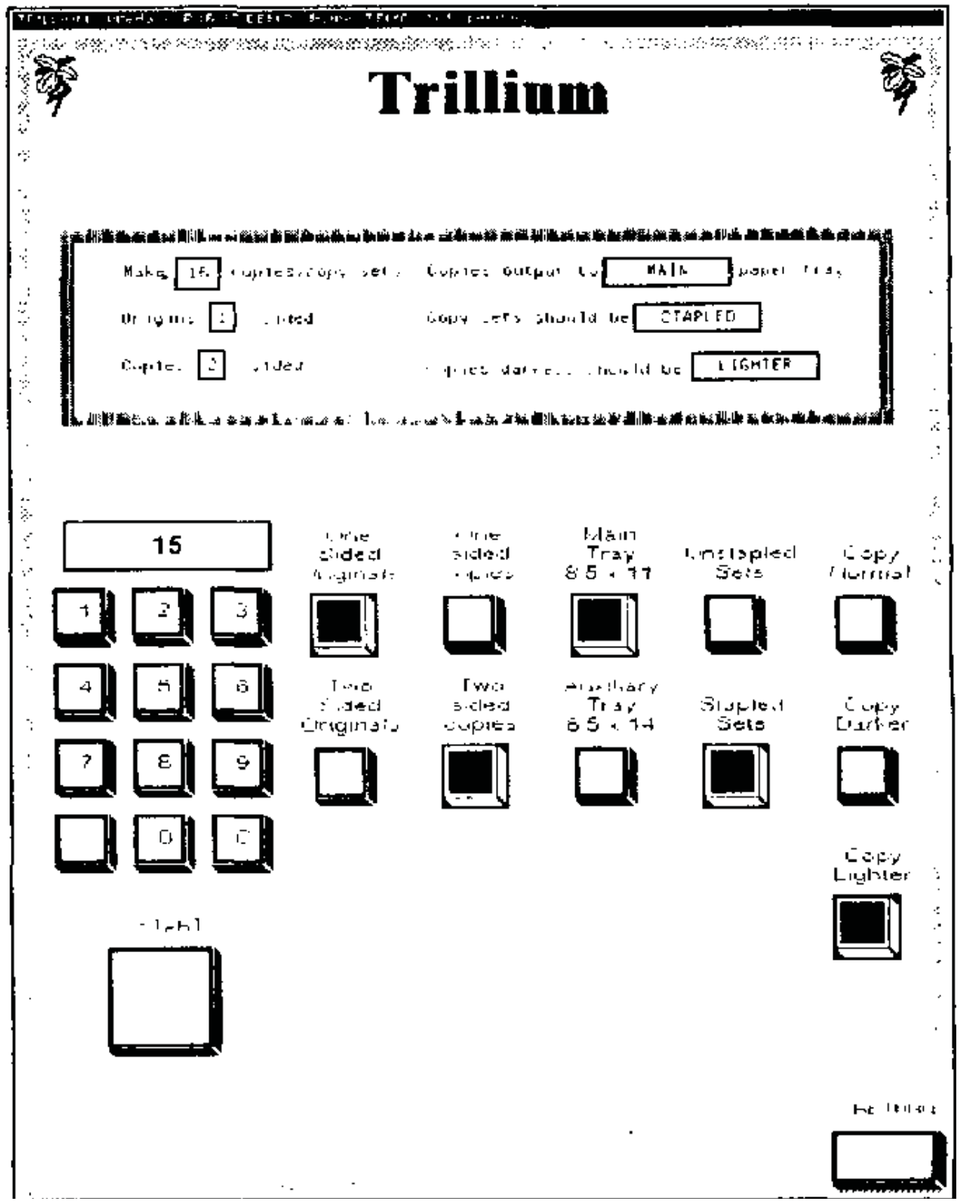
The Macintosh Human Interface Guidelines which was an essential resource for developing software for the Macintosh.



Xerox Trillium

D. Austin Henderson Jr., 1986

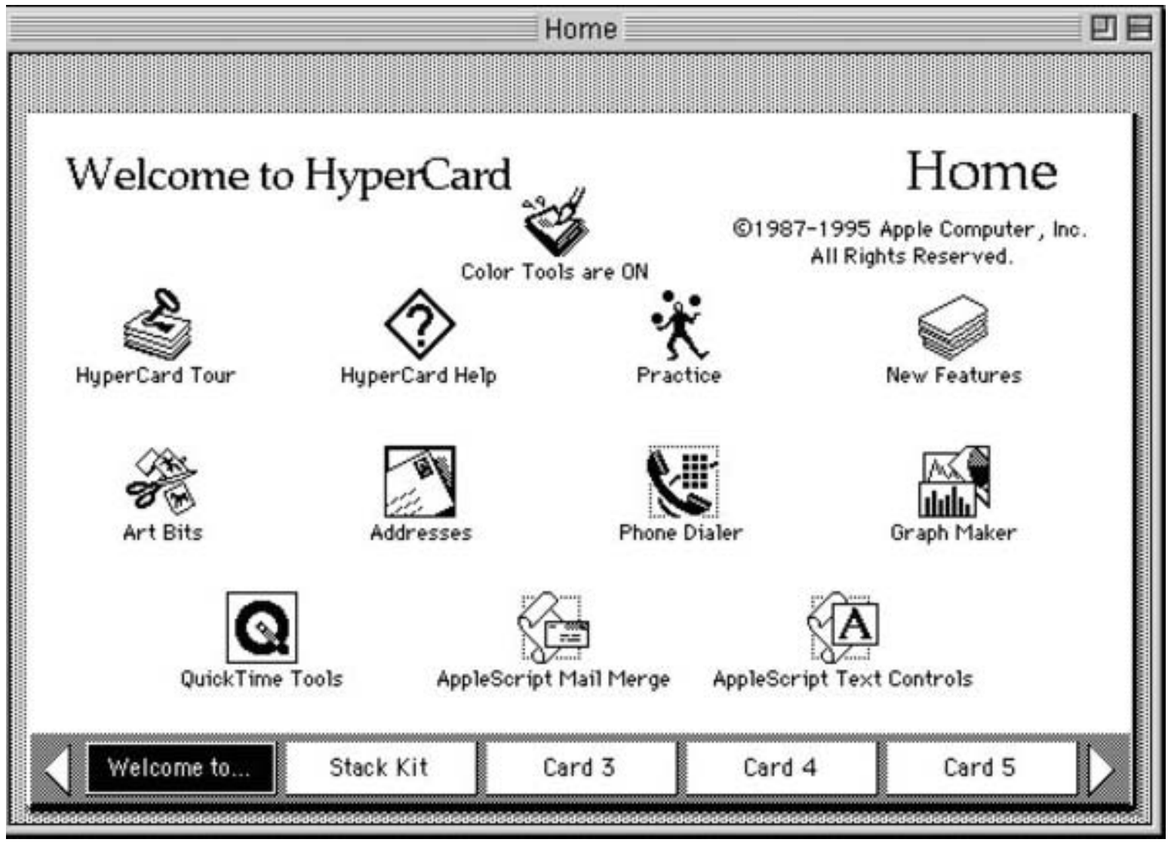
A computer-based environment for simulating and experimenting with interfaces for simple machines.



Apple Hypercard

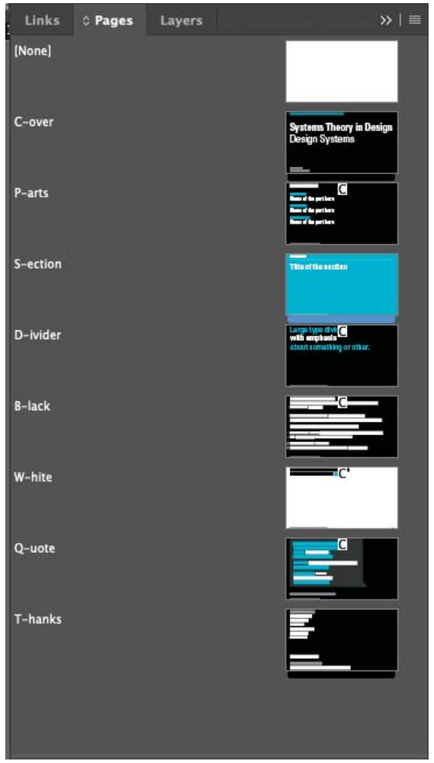
Bill Atkinson, 1987

Software application and development kit that combines a flat-file database with a modifiable user interface.

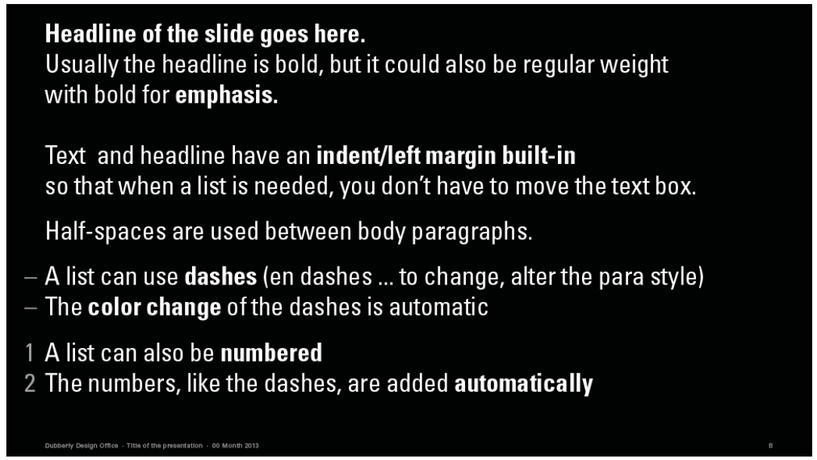


Software applications contain

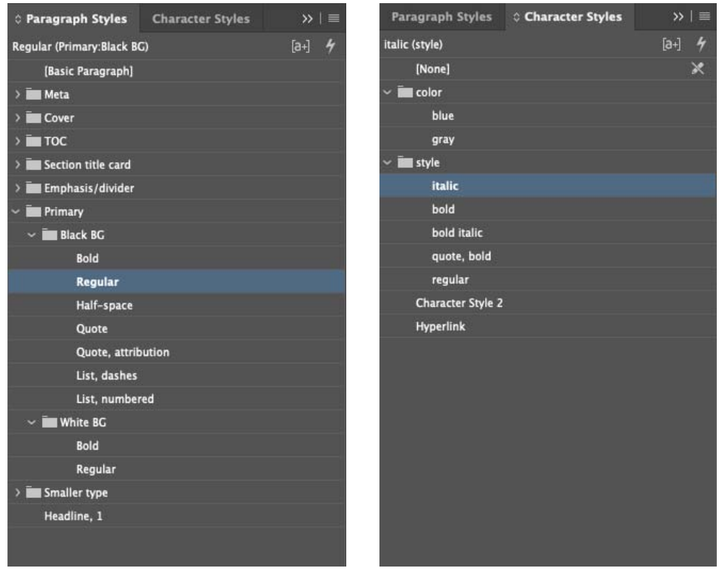
Master pages
Page templates
Symbols
Libraries



Master Pages can be used to keep a consistent layout throughout the entire document.



Page Templates allows for customization within each page and its unique content.

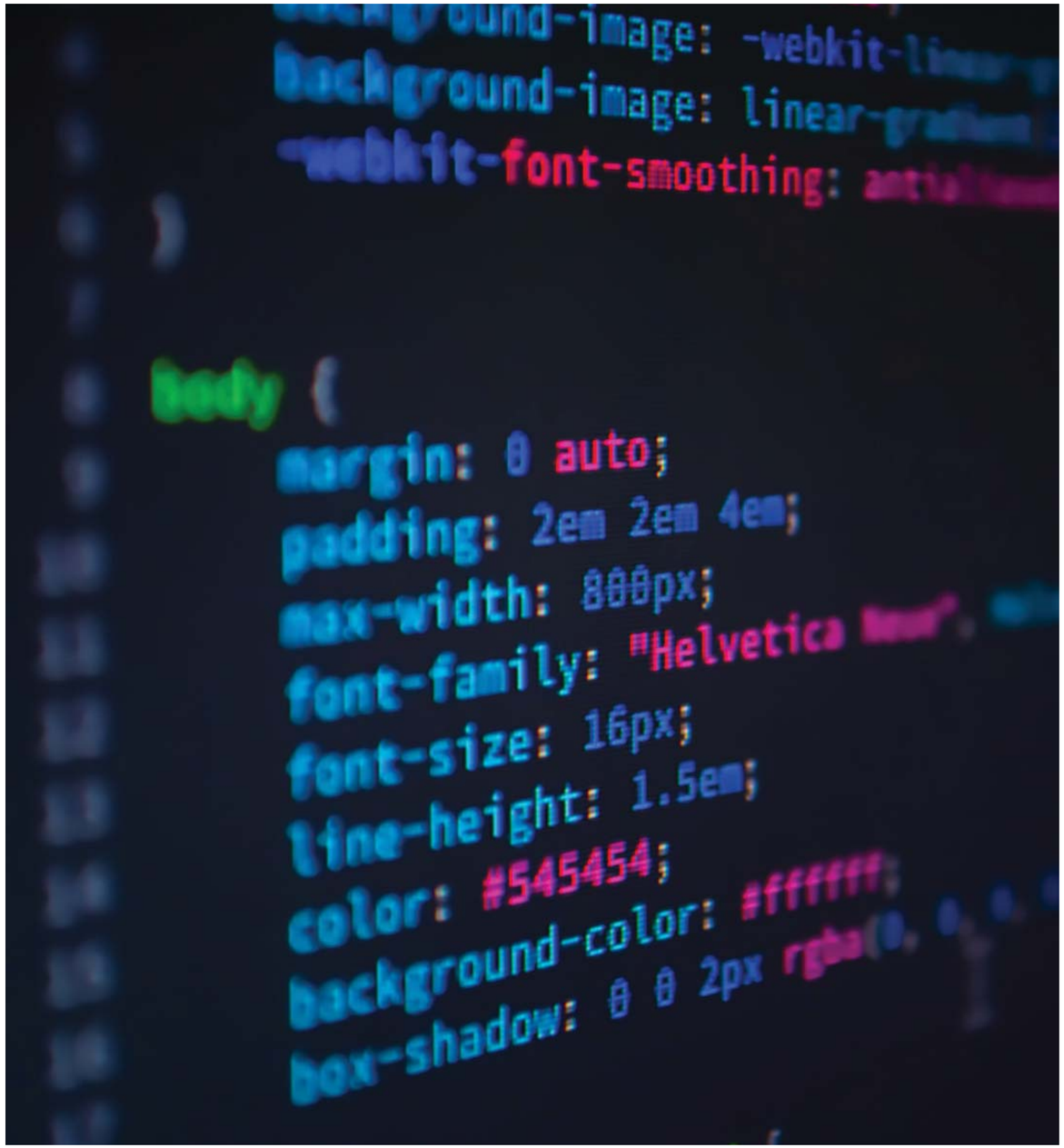


Paragraph Styles and Character Styles allows for further customization within the pages while still keeping a uniformed feel.

CSS (Cascading Style Sheets)

Proposed by Håkon Wium Lie, 1994

Declarative programming language.



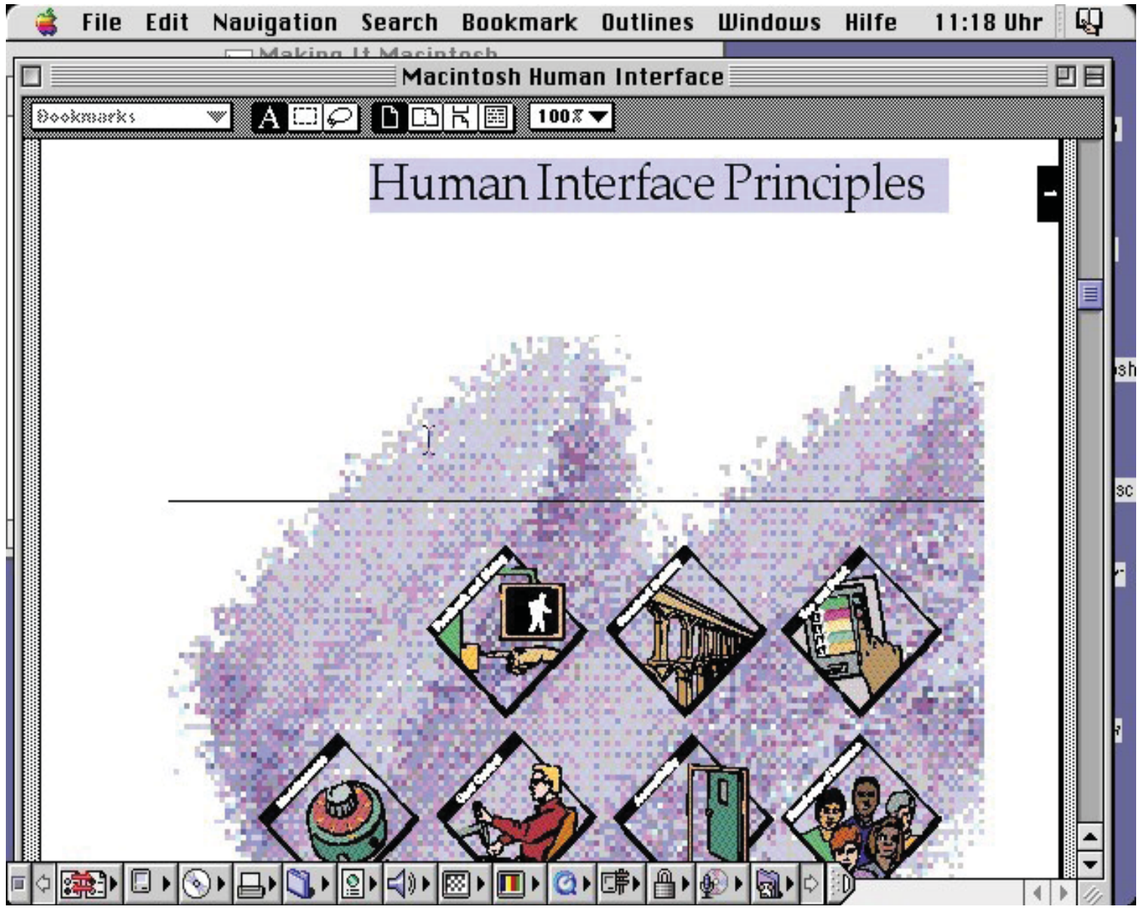
Apple II Human Interface Guidelines

Bruce Tognazzini et al., 1987
First document that outlined how Macintosh applications should work in consideration with HCI (human-computer interaction).

Making It Macintosh

Apple Computer Inc., 1993

Interactive guide that documented the Macintosh human-computer interface and showcased the applications consistent design principles.



Yahoo! User Interface Library (YUI)

Thomas Sha, 2006

Open-source JavaScript and CSS library for building richly interactive web applications which were compatible across all browsers.

jQuery

John Resig, 2006

JavaScript Library that simplifies a variety of programming operations by inputting less code.

jQuery UI

Paul Bakaus, 2007

Curated set of user interface interactions, effects, widgets and themes built on top of the jQuery JavaScript Library.

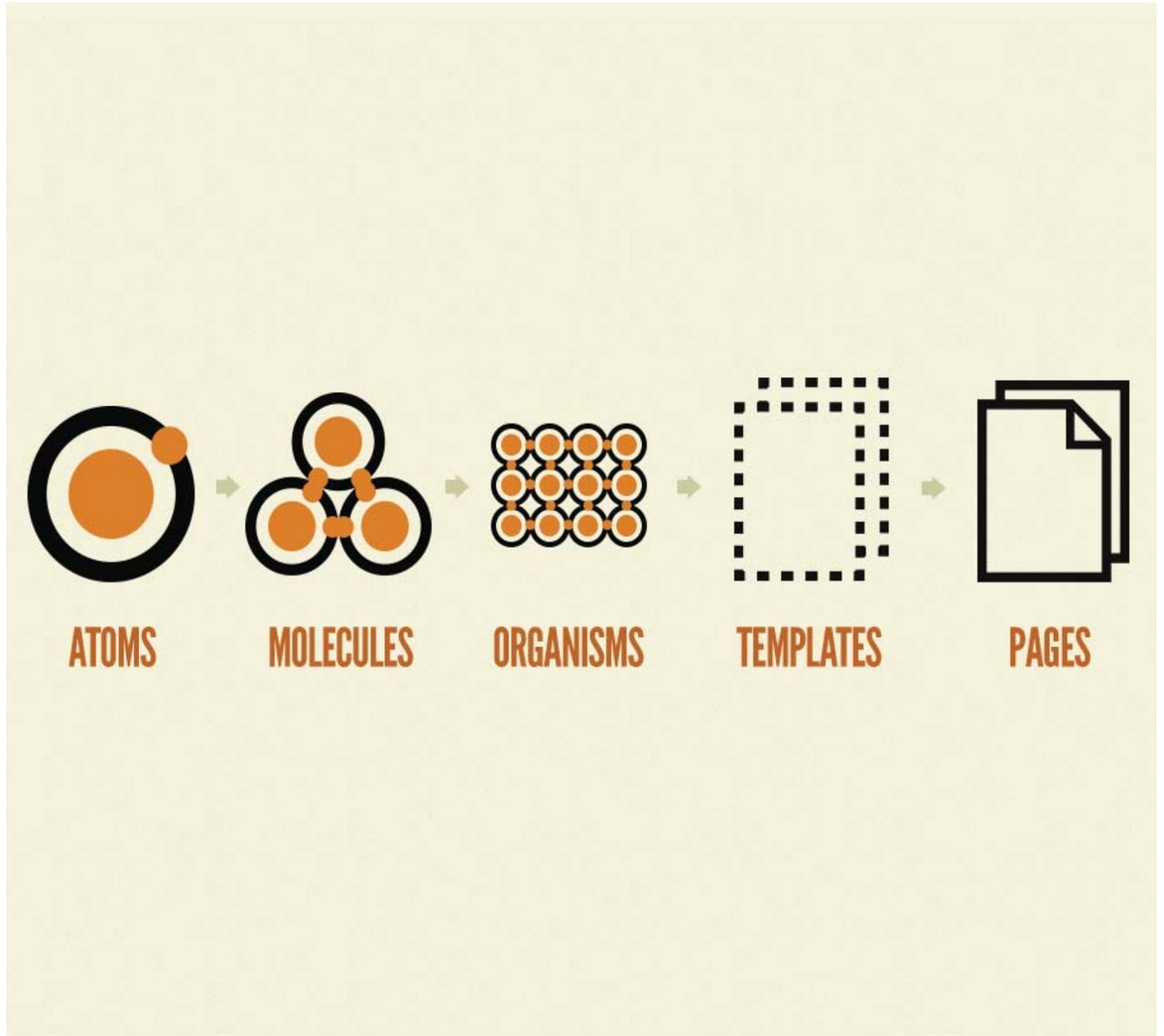
Bootstrap

Mark Otto & Jacob Thorton, 2011
CSS framework for responsive mobile-first front-end web development which encourages consistency across internal tools.

Atomic Design

Brad Frost, 2013

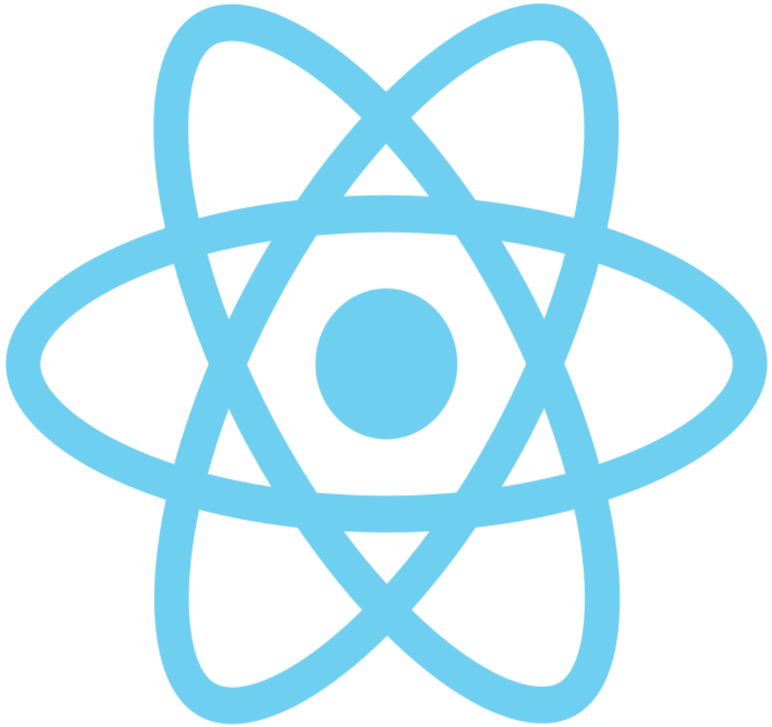
A methodology for creating and maintaining robust interface design systems in a deliberate and hierarchal manner.



React

Jordan Walke, 2013

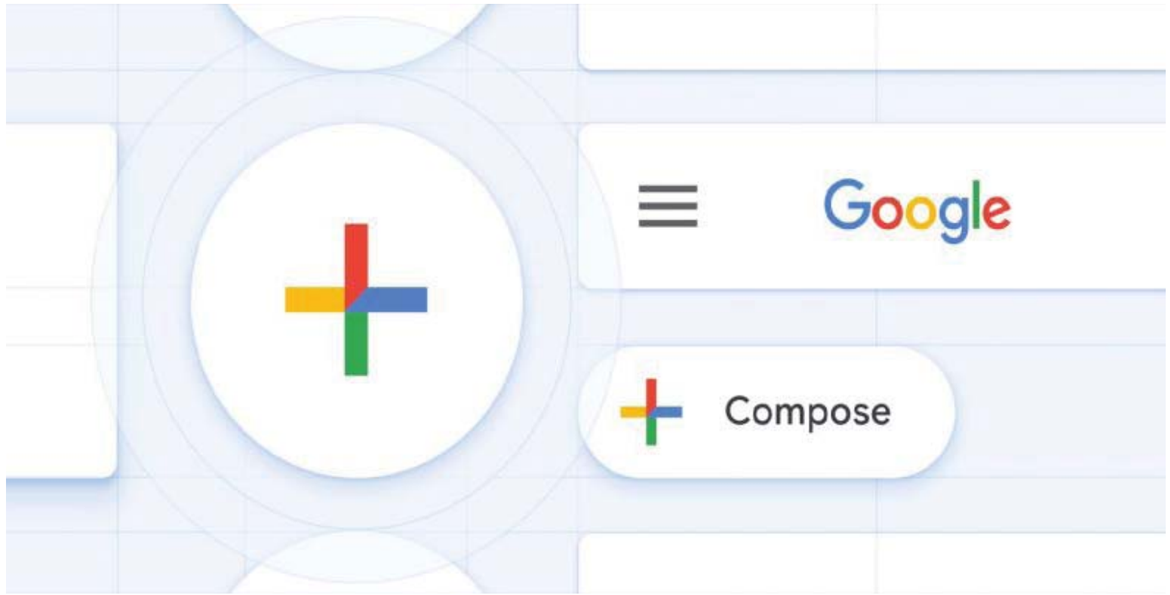
JavaScript Library for building user interfaces and allows creation of reusable UI components.



Material Design

Released by Google, 2014

Design language which included a comprehensive set of guidelines and tools for developers to create a consistent interface hierarchy intended for the Android.



Cloud Hosting/Cloud Computing

Resources for maintaining your website are spread across more than one web server and are rendered as per need basis.

Cloud Hosting/Cloud Computing

Amazon Web Services (AWS)
2006

On-demand cloud computing platform that provides IT infrastructure services and tools.

- **Bezos 2002 Mandate**

Human API (application programming interface) Manifesto

Libraries

Suite of data and programming code that is used to help both the programmer and programming language compiler develop software programs and applications.

Ruby on Rails

David Heinemeier Hansson, 2004
MVC (model view controller) framework providing structures for a database, web service and web pages.

Node.js

Ryan Dahl, 2009

JavaScript run-time environment that executes JavaScript outside of a browser before the page is sent to the web browser.

Version Control

Software tools that manage revisions to source code over time.

Git

Linus Torvalds, 2005

Distributed version-control system that can track changes in any set of files.

GitHub

Chris Wanstrath, P.J. Hyett, Tom Preston-Werner & Scott Chacon, 2008

Provides hosting for version control and SCM (source code management) functionally.

Package Manager/Package Management System (PMS)

Program used to install, uninstall, and manages a computer's operating system and its module libraries.

Node Package Manager (NPM)

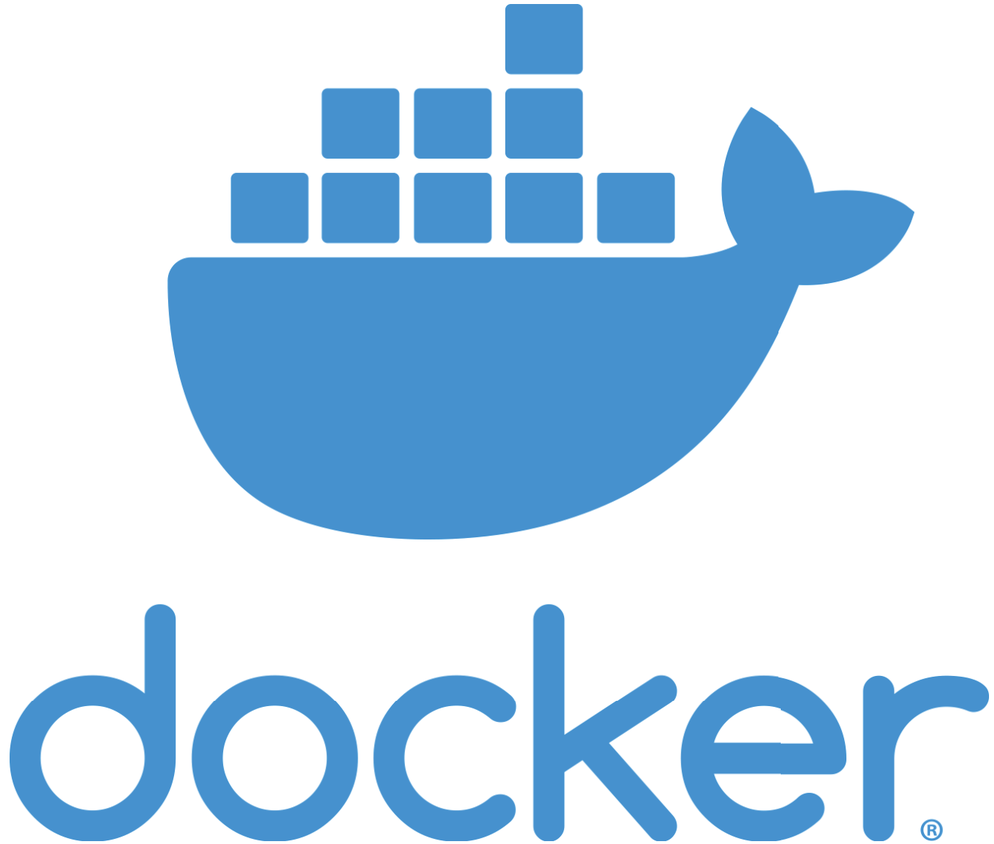
Issac Z. Schlueter, 2010
Software registry for JavaScript programming language.

Containerization

OS (Operating system)-level virtualization method used to deploy and run distributed applications without launching an entire VM (virtual machine) for each app.

Docker

Docker, Inc., 2013
Set of platform-as-a-service products that provides the ability to package and run an application in a container.



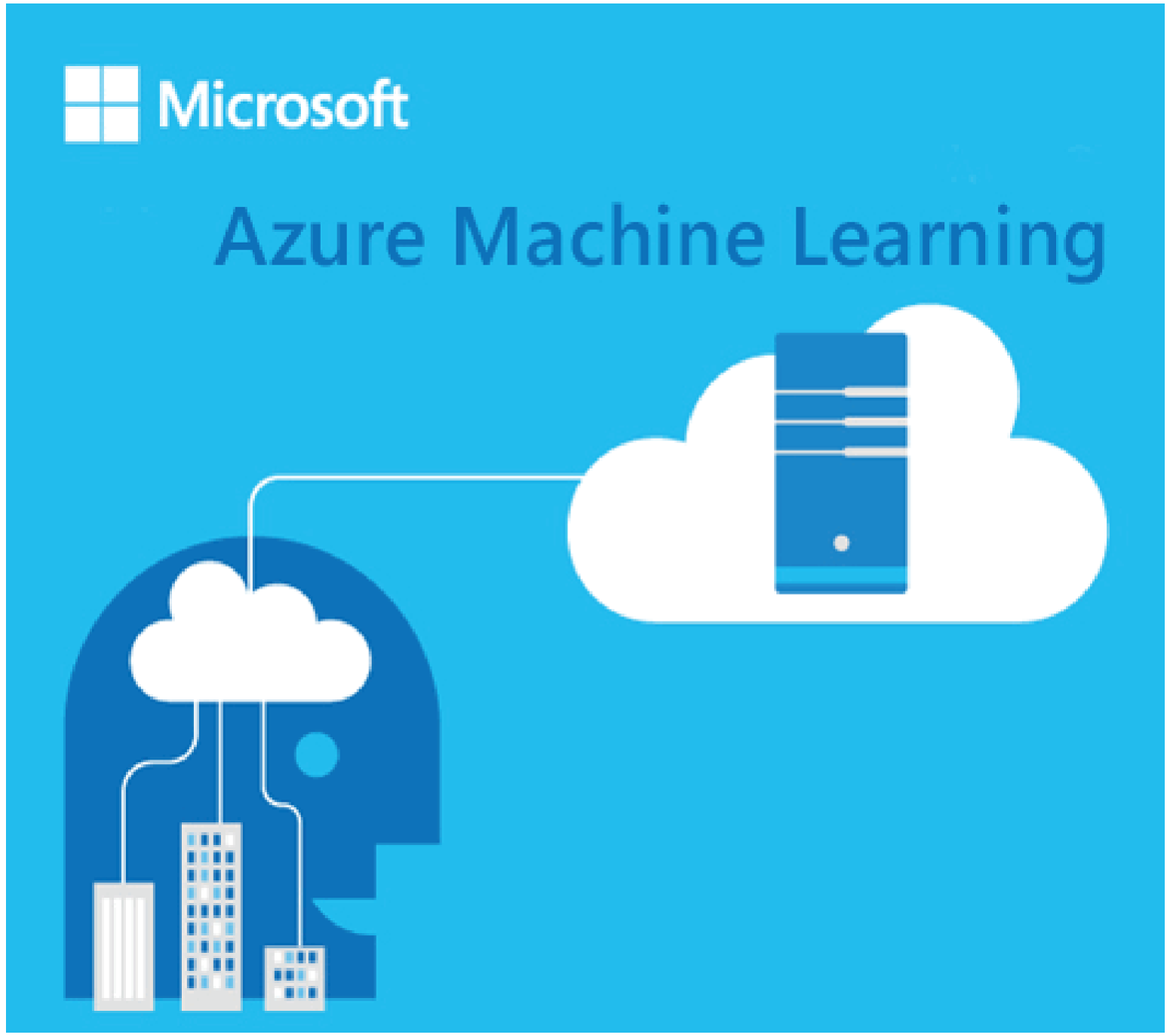
AI Platforms

Provide a tool kit which combines intelligent, decision-making algorithms with data to enable developers to create business solutions and applications.

Microsoft Azure Machine Learning

Mircosoft, 2015

Provide a tool kit which combines intelligent, decision-making algorithms with data to enable developers to create business solutions and applications.



Google Cloud Prediction API

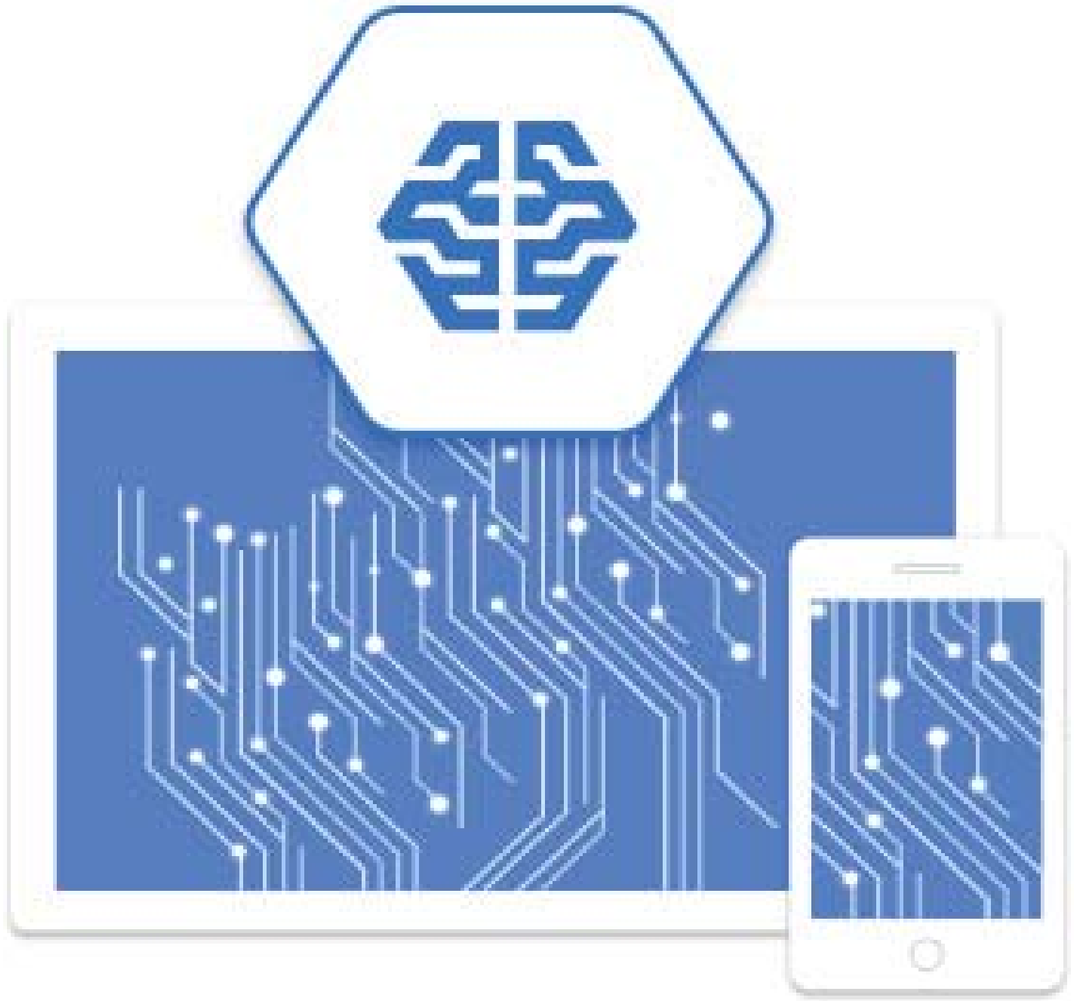
Google, 2010

Provides a RESTful (representational state transfer) to build machine learning models and analyzes data to add features to applications.

Google Cloud Machine Learning Engine

Google, 2016

Managed service for training and building machine learning models based on mainstream frameworks.



Appendix:

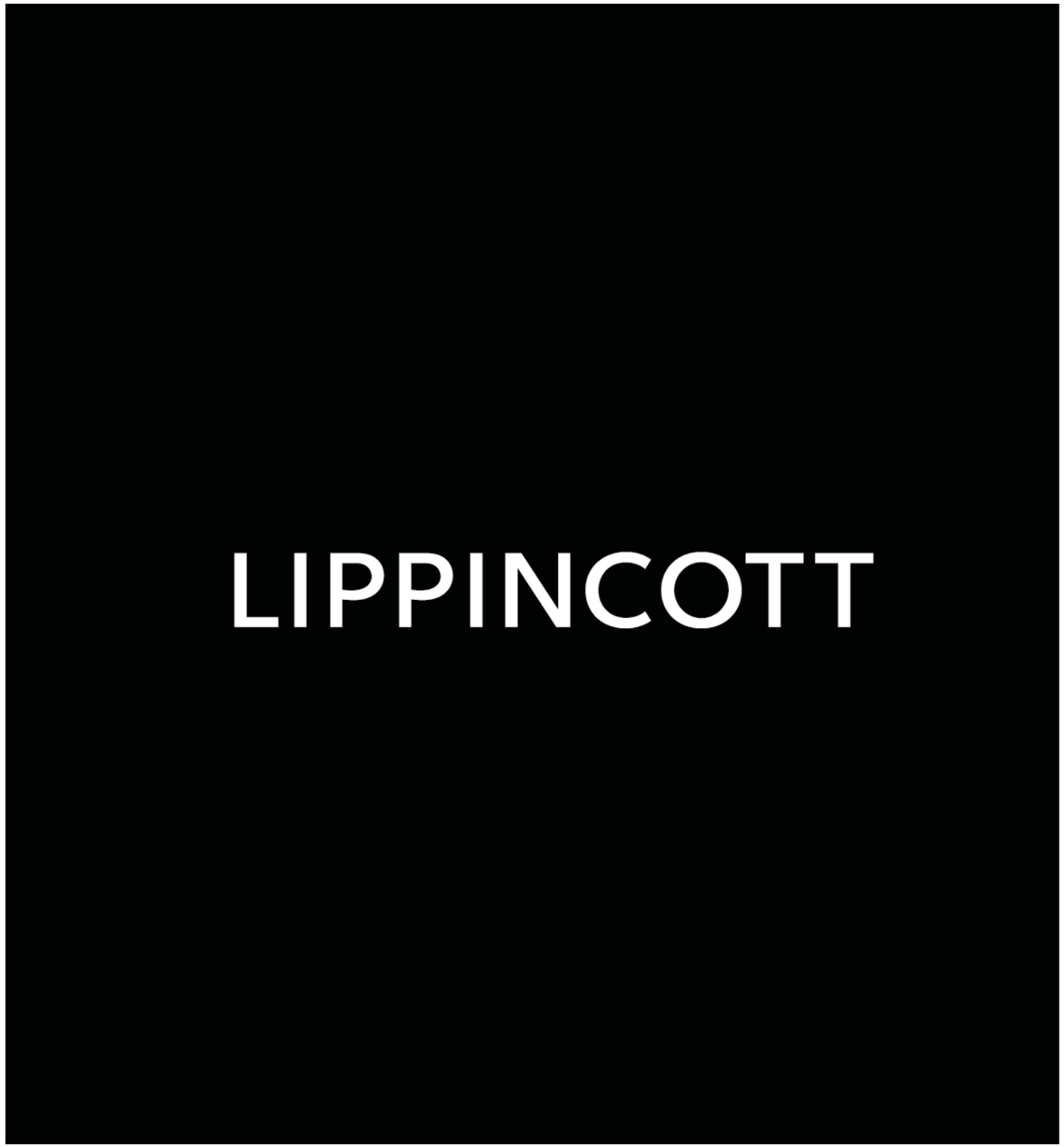
Pioneering systems in design firms

Landor

Founded by Walter Landor, 1941
Pioneer in branding the use of consumer research for establishing a corporate identity.

Lippincott

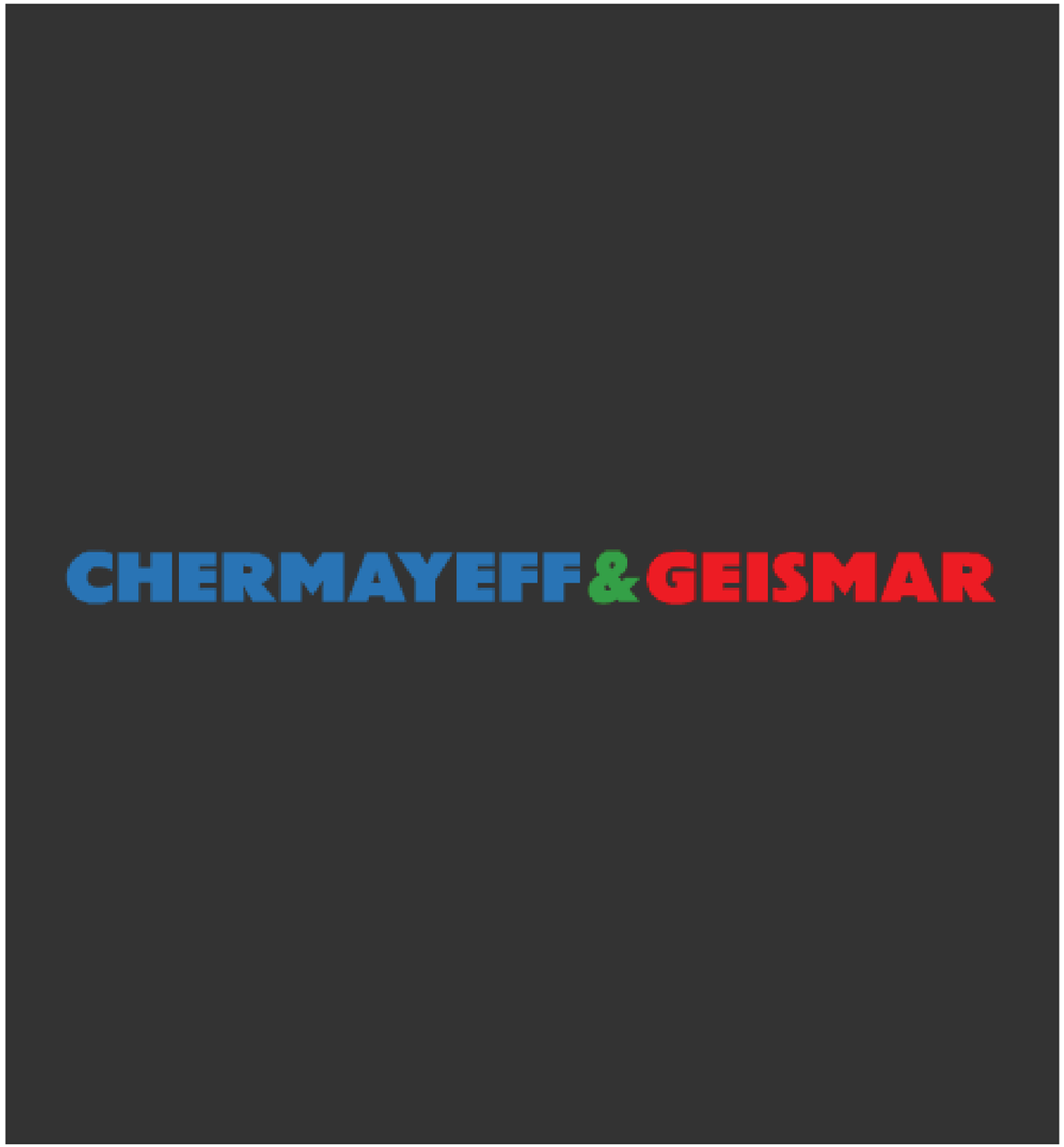
Founded by Gordon Lippincott & Walter Margulies, 1943
Intersection of design and strategy. They helped create the field of corporate identity by combining product design and storytelling.



Chermayeff & Geismar

Ivan Chermayeff & Tom Geismar, 1957

Shaped how corporate identity systems influenced culture.



Total Design

Wim Crouwel, Friso Kramer, Benno Wissing, Paul Schwarz & Dick Schwarz, 1963

Incorporated total design; a system of design used across all variations of media to unify and reassure corporate identity.

Unimark International

Ralph Eckerstrom, Massimo Vignelli, Bob Noorda, James Fogelman, Wally Gutches, Larry Klein & Jay Doblin,1965

Embraced standardization and use of grid system for corporate communicates and a pioneer of the modernist philosophical direction.

Pentagram

Founded by Alan Fletcher, Theo Crosby, Colin Forbes, Kenneth Grange & Mervyn Kurlansky, 1972
A Sign Systems Manual, 1970
Illustrates and describes a basic system for designing and displaying signs.

Appendix:

Design systems in **language.**
in **music.**
in **food.**

Language

Limerick

England, 18th century

A short humorous verse consisting of five lines with a rhyme scheme of AABBA. Edward Lear, a famous British poet and writer popularized the limerick form during the 19th century.

A *What is a limerick, Mother?*

A *It's a form of verse, said Brother*

B *In which lines one and two*

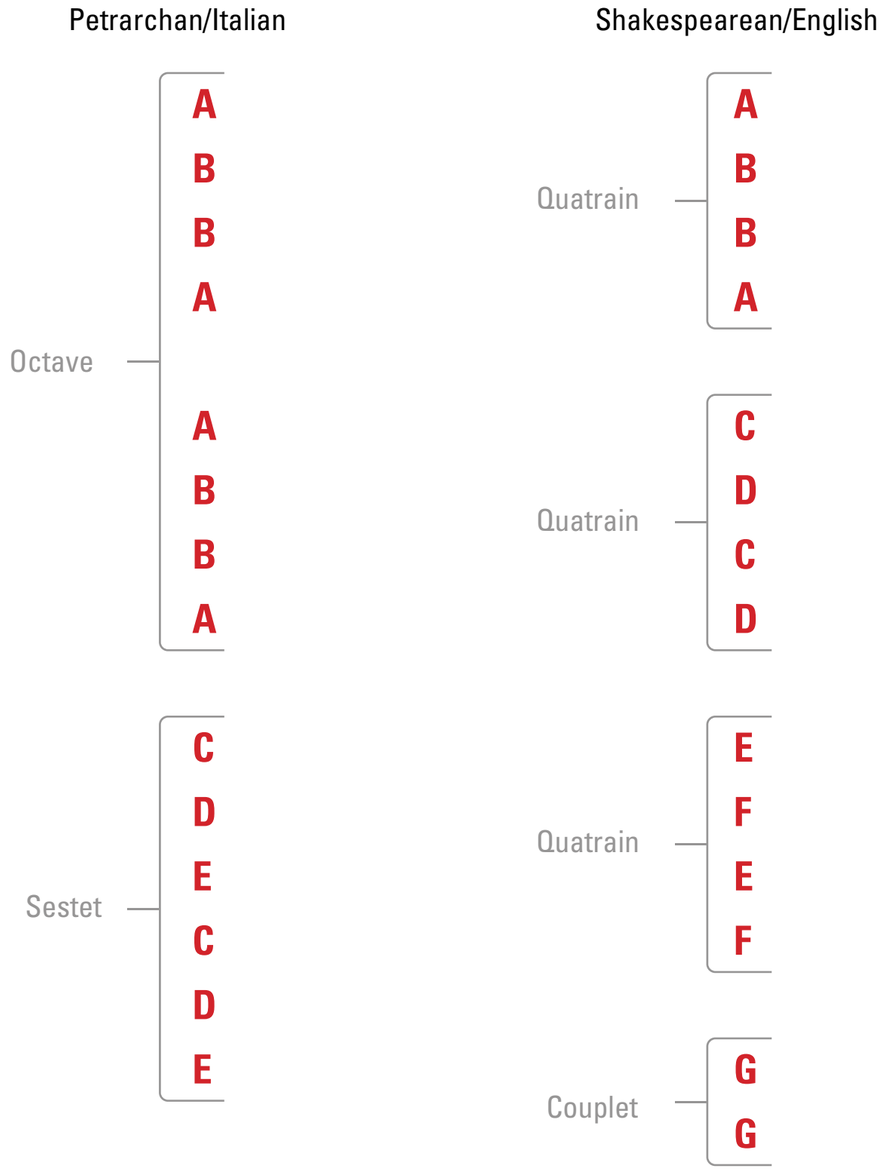
B *Rhyme with five when it's through*

A *And three and four rhyme with each other.*

Sonnet

Giacomo de Lentini, 13th century

A fourteen-line poem written in iambic pentameter relating to a specific rhyme scheme and structured thematic organization. Petrarchan/Italian sonnets and Shakespearean/English sonnets are the most popular forms of this type of poetry.



Haiku

Japan, 13th century

A short three-line poem composed of seventeen syllables that mainly focus on images from nature, simplicity, and direct expression. These Japanese poems are written in a 5/7/5 syllable pattern and were mastered by Matsuo Basho in the 17th century.

5 *An old silent pond...*

7 *A frog jumps into the pond,*

5 *Splash! Silence again.*

- Matsuo Basho

Jueju

China, 5th-6th century

A form of Chinese modern poetry that grew popular during the Tang Dynasty. These poems are limited to only four lines, also known as quatrains, and exactly twenty or twenty eight characters requiring authors to use symbolic language to a high degree.

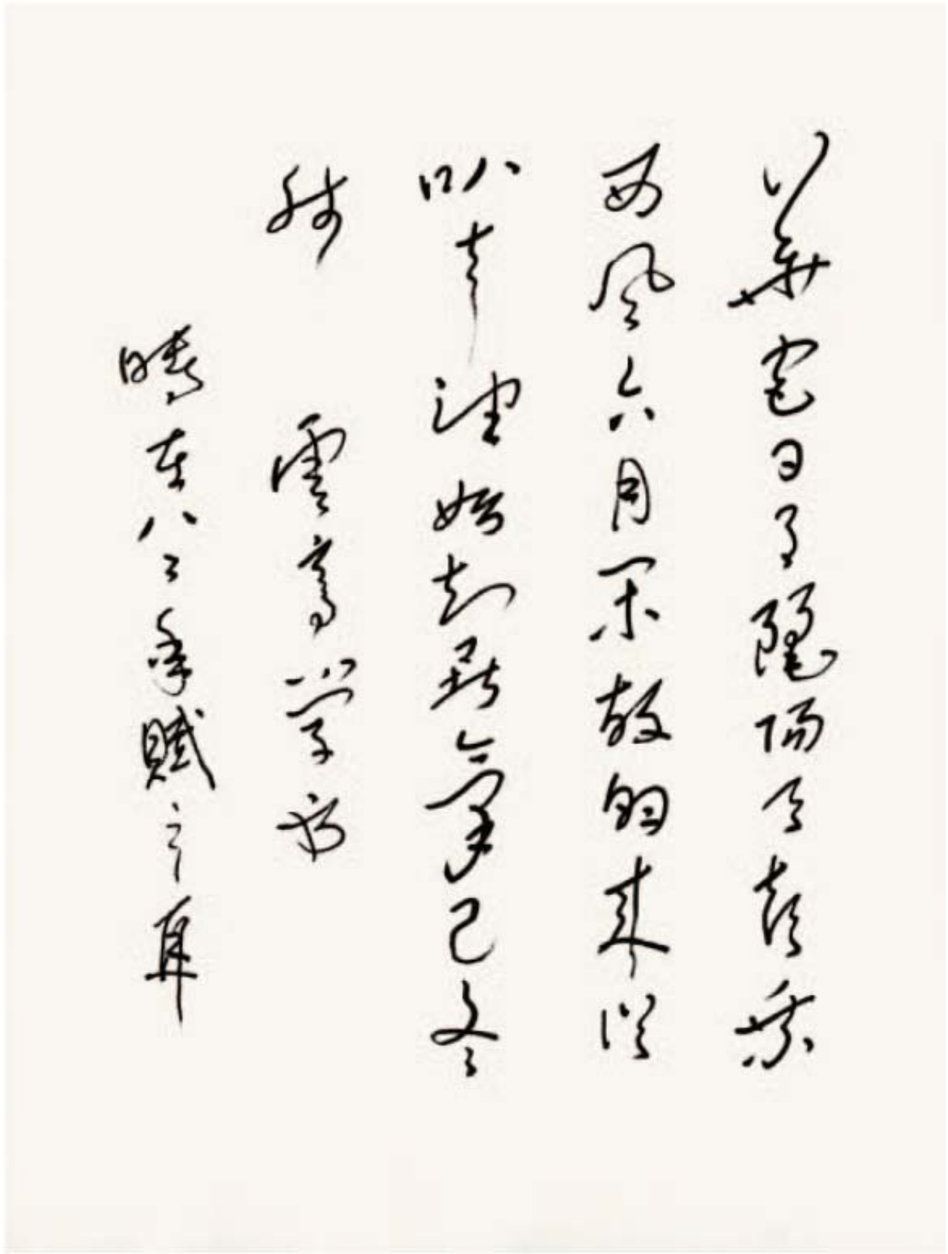
Wujue

The five syllable form of a jueju poem.

夜雪	Yè Xuě
已讶衾枕冷	Yǐ yà qīn zhěn lěng
复见窗户明	Fù jiàn chuāng hu míng
夜深知雪重	Yè shēn zhī xuě zhòng
时闻折竹声	Shí wén zhé zhú shēng

Qijue

The seven syllable form of a jueju poem.

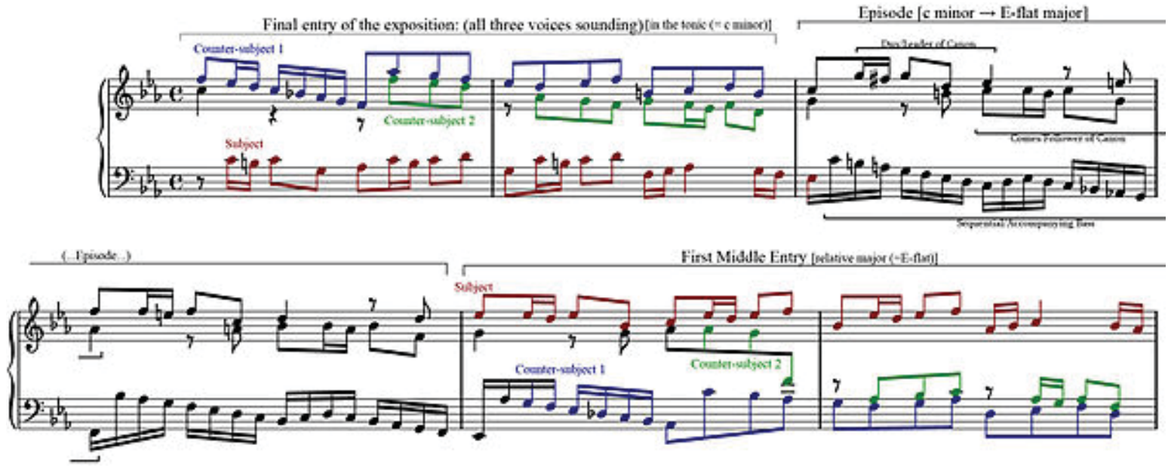


Music

Fugue

13th century

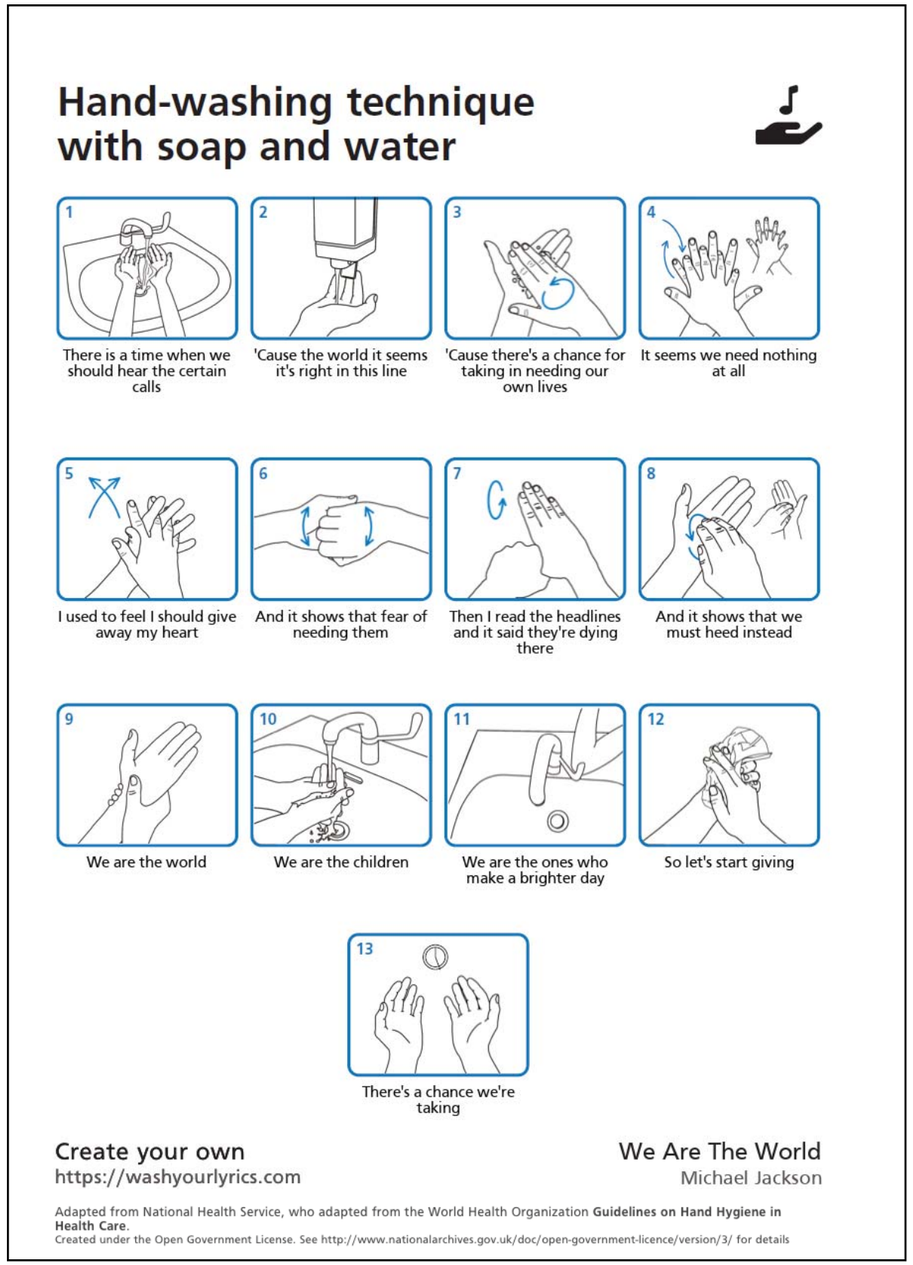
A musical composition technique consisting of two or more contrapuntal voices interweaving. It gained popularity in the Baroque Period during 1600-1750.



Wash Your Lyrics

William, 2020

A generator tool used to create infographic posters on proper hand-washing instructions based on your favorite song lyrics. Enter in the song title and artist to automatically generate your custom poster.



Hand-washing technique with soap and water

Create your own
https://washyourlyrics.com

Don't Stop Believin'
Journey

Hand-washing technique with soap and water

Create your own
https://washyourlyrics.com

Dancing Queen
ABBA

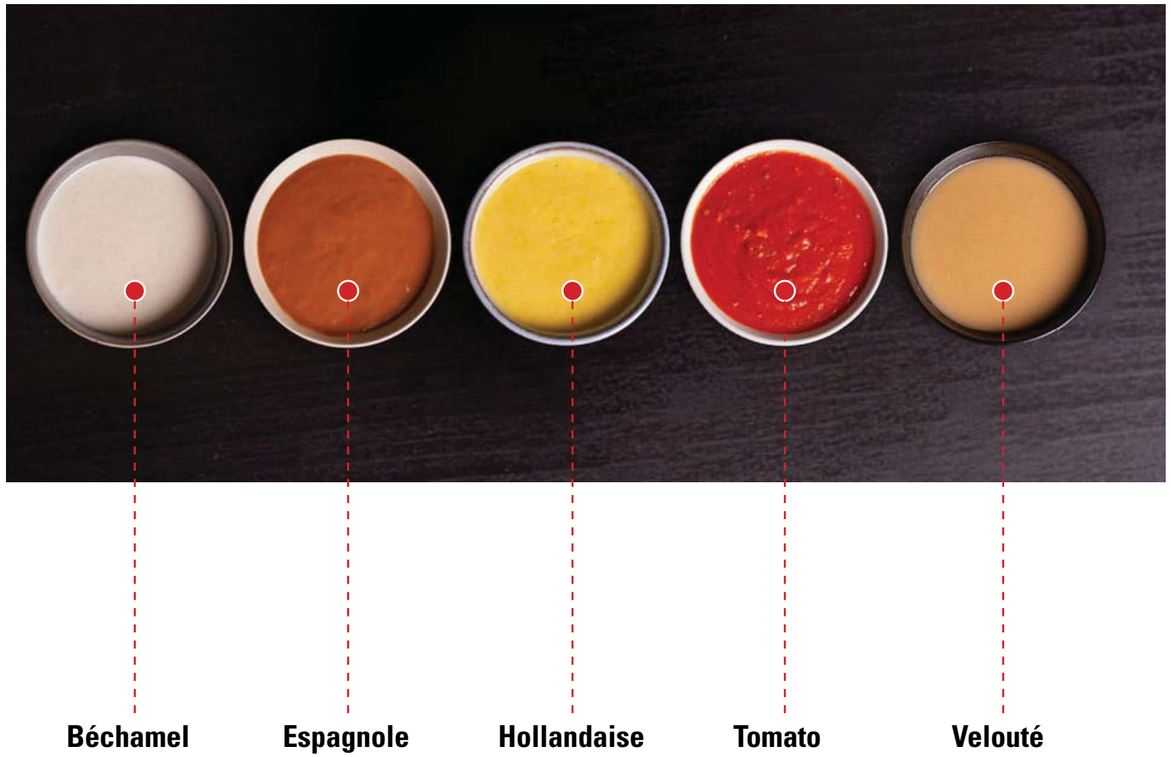
Adapted from National Health Service, who adapted from the World Health Organization **Guidelines on Hand Hygiene in Health Care**.
Created under the Open Government License. See http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ for details

Cooking

Mother Sauces

Marie-Antoine Carême, 19th century

Refers to any of the five basic sauces which are the starting points for making various secondary sauces known as small sauces.



Béchamel
(Roux + Dairy)

Cream · Cheddar · Mornay · Nantua · Soubise

Espagnole
(Roux + Brown Stock)

Chausseur · Chateubriand · Bordelaise · Robert · Duxelle

Hollandaise
(Butter + Egg Yolk)

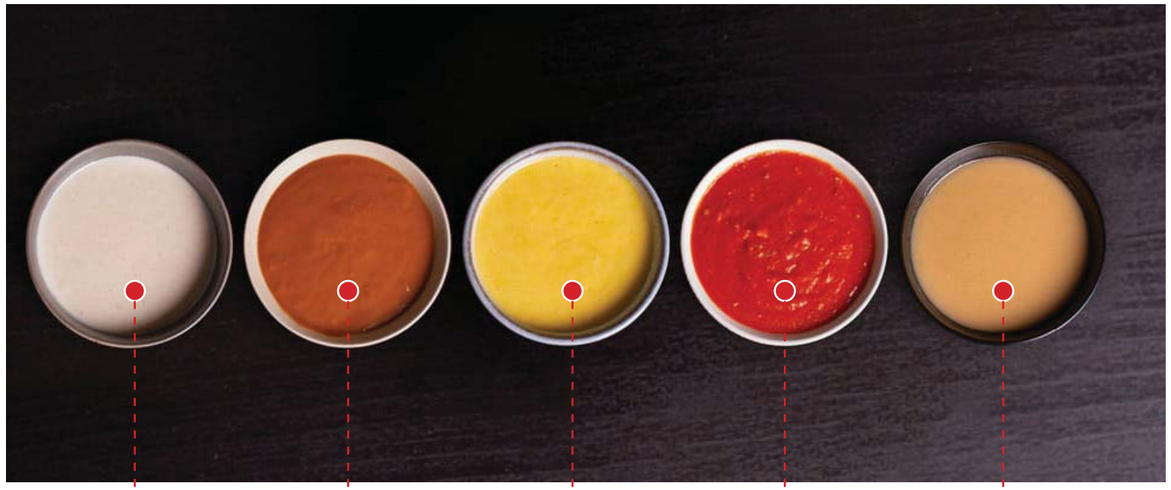
Bernaise · Mousseline · Maltaise · Grimrod · Choron

Tomato
(Roux + Tomatoes)

Creole · Spanish · Milanaise · Neapoltan · Bolognese

Velouté
(Roux + White Stock)

Bercy · Allemande · Supreme · Aurora · Cardinal



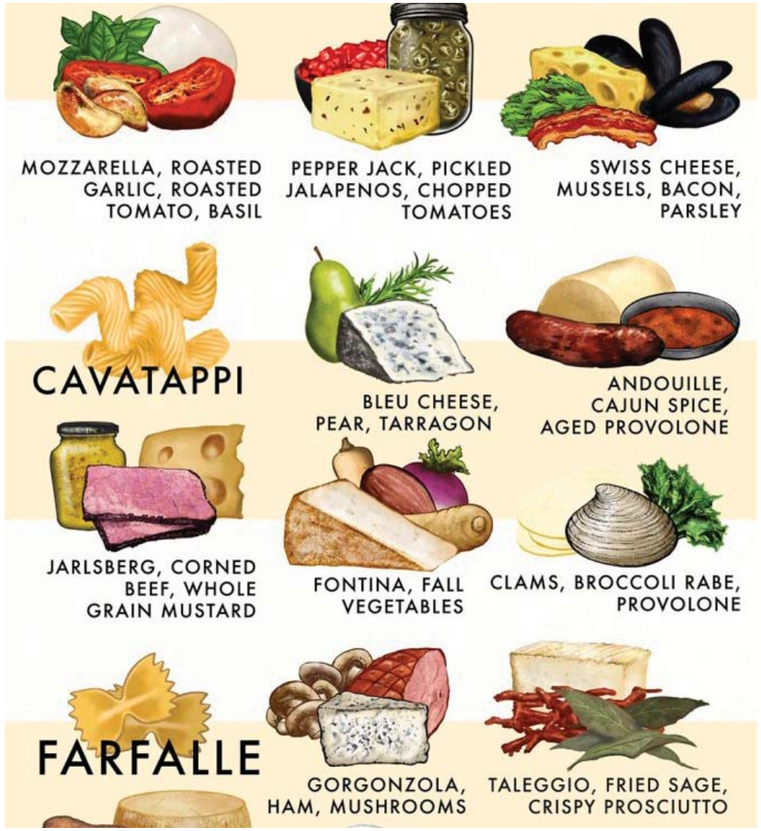
Béchamel · **Espagnole** · **Hollandaise** · **Tomato** · **Velouté**

Mac and Cheese

Food Republic, 2014

An idea generator of different combinations you can do to make a mac and cheese dish.


PENNE
EDAM, CAULIFLOWER, PUMPKIN SEEDS
PIMENTO, GREEN CHILIS
RACLETTE, THYME, JAMBON DE PAYS
IRISH CHEDDAR, WALNUTS, SAUTEED GREEN CABBAGE
CAMEMBERT, FIGS, ROSEMARY
ROTINI
MANCHEGO, CHORIZO, SAFFRON
MELTED LEEKS, AGED WHITE CHEDDAR, SLICED RED CHILIS
MOZZARELLA, ROASTED GARLIC, ROASTED TOMATO, BASIL
PEPPER JACK, PICKLED JALAPENOS, CHOPPED TOMATOES
SWISS CHEESE, MUSSELS, BACON, PARSLEY


MOZZARELLA, ROASTED GARLIC, ROASTED TOMATO, BASIL
PEPPER JACK, PICKLED JALAPENOS, CHOPPED TOMATOES
SWISS CHEESE, MUSSELS, BACON, PARSLEY
CAVATAPPI
BLEU CHEESE, PEAR, TARRAGON
ANDOUILLE, CAJUN SPICE, AGED PROVOLONE
JARLSBERG, CORNED BEEF, WHOLE GRAIN MUSTARD
FONTINA, FALL VEGETABLES
CLAMS, BROCCOLI RABE, PROVOLONE
FARFALLE
GORGONZOLA, HAM, MUSHROOMS
TALEGGIO, FRIED SAGE, CRISPY PROSCIUTTO


EGG YOLK, GUANCIALE, GRANA PADANO, BLACK PEPPER
KALAMATA OLIVES, ORANGE ZEST, GOAT CHEESE
SMOKED SALMON, CREME FRAICHE, NEUFCHATEL
CAMPANELLE
CHIMAY ALE CHEESE, FRIED SHALLOT, BACON
PULLED BEEF BRISKET, HORSERADISH, SHARP CHEDDAR
RICOTTA, PECORINO, LEMON ZEST, BLACK PEPPER
PANCETTA, SMOKED GOUDA, ROASTED CELERY ROOT
JAMON IBERICO, MANCHEGO, GREEN APPLE
ORECCHIETTE
MUSTARD GREENS, WHITE CHEDDAR
FETA, SPINACH, ARTICHOKE
HAVARTI, FRIED GARLIC, CARRAWAY SEEDS
GRUYERE, BREADCRUMBS, CARAMELIZED ONIONS
SMOKED MOZZARELLA, OLIVES, MINT, EGGPLANT

Wraps and Burritos

Wraps and burritos are made up of a sum of many simple parts that are put together in an assembly line order.

E.g., Chipotle assembly line

- White
- Brown

- Black
- Pinto

- Chicken
- Steak
- Carnitas
- Sofritas
- Veggie

- Tomato
- Medium
- Hot
- Corn

- Sour Cream
- Cheese
- Guacamole
- Lettuce

Ramen

Like many other Asian oriented soups, ramen has a basic set of components that can be mixed in different combinations to create a soup to fit a customers needs.

SELECT YOUR NOODLES

STRAIGHT
Accompanies a hearty meat base

CURLY
Complements miso broths

INSTANT
Ideal for lighter soups

CHOOSE A PROTEIN

LAND	SEA	VEGETARIAN
 GROUND BEEF	 SHRIMP	 TOFU
 PORK BELLY Cured and cubed or thinly sliced	 CRAB MEAT	 SEITAN
 CHICKEN BREAST	 SCALLOPS	TEMPEH  EGG Soft boiled

ADD THE AROMATICS

ONION

GARLIC

GINGER

SELECT AND PREPARE VEG

carrots

cabbage

bok choy

scallion

mushrooms

bean sprouts

spinach

bamboo shoots

CHOOSE YOUR SOUP BASE

TONKOTSU	MISO	SHOYU	SHIO
			
rich base of boiled pork bones	A nutty fermented bean paste soup	A light broth made with soy sauce	A salty, clear broth

GARNISH

KIMCHI
Fermented cabbage for a punch

NORI
Dried seaweed

PICKLED GINGER

GREEN SCALLION

SOFT BOILED EGG

SEASONING OPTIONS

TOGARASHI
Japanese spice powder

COLD BUTTER
A thick-cut pat for richness

MAYU
Slow-cooked sesame oil and garlic

SESAME SEEDS
A great complement to miso broths

CHILI PASTE
For heat

CURRY POWDER
To add body to broths

SALT

PEPPER

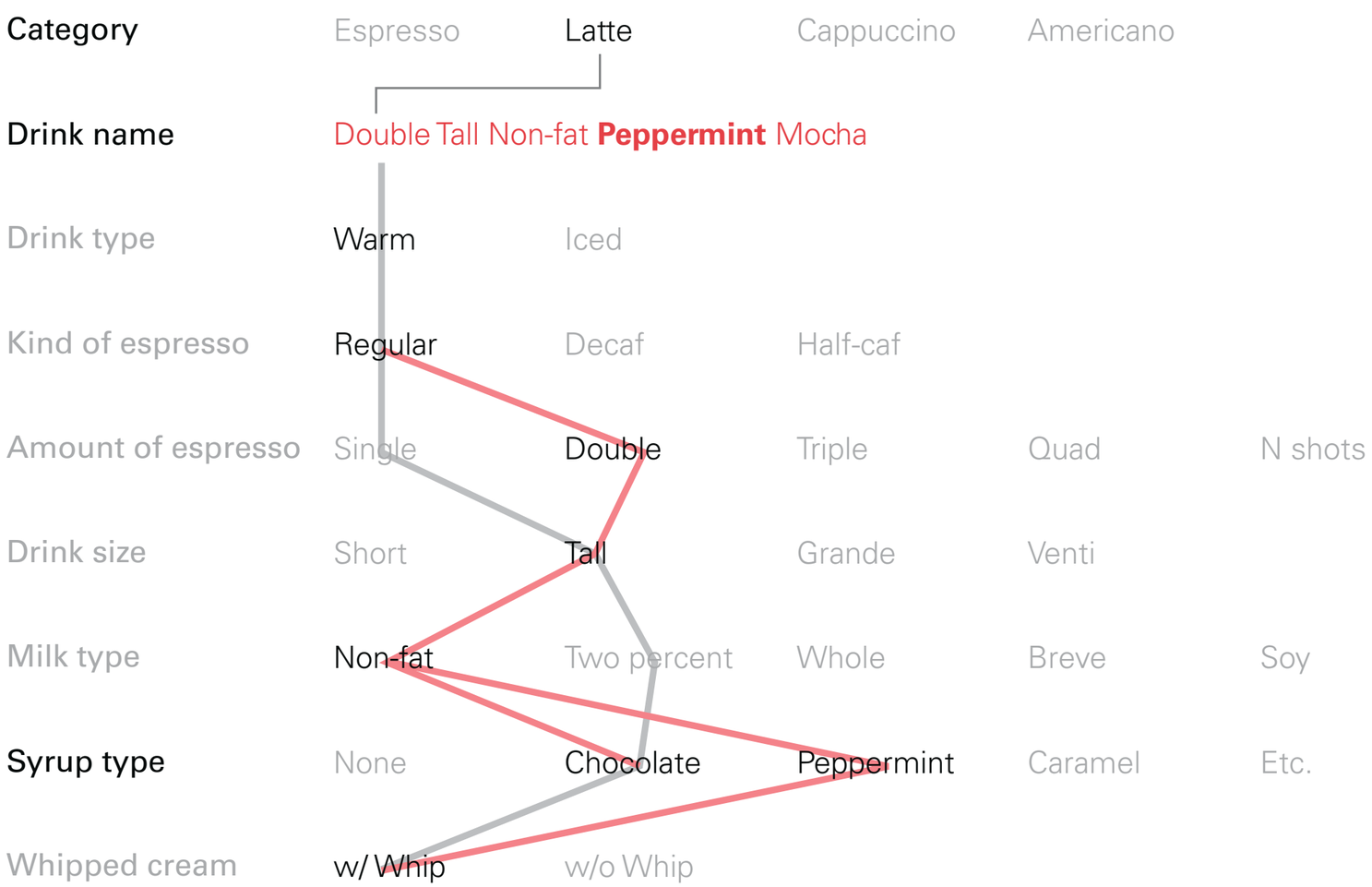
SOY SAUCE

Starbucks latte framework offers nearly 200 million variations.

Cup type	To-go	For-here	Personal cup		
Drink type	Warm	Iced			
Kind of espresso	Regular	Decaf	Half-caf	Tea	None
Amount of espresso	Single	Double	Triple	Quad	N shots
Drink size	Short	Tall	Grande	Venti	
Milk type	Non-fat	2%	Whole	Soy	(2 more)
Syrup combinations	(Choose from about 15 flavors)				
Whipped cream	w/ Whip	No whip	Light whip		
Temperature	Extra hot	Cooler	Specific degree	Standard (160°F)	
Build order	Upside down	Right-side up	Macchiato	Otherwise	
Long/Short pull	Long	Short	Normal		
Amount of foam	Dry	Wet	Normal	None	
Amount of syrup	1 pump	2 pumps	3 pumps	4 pumps	N pumps

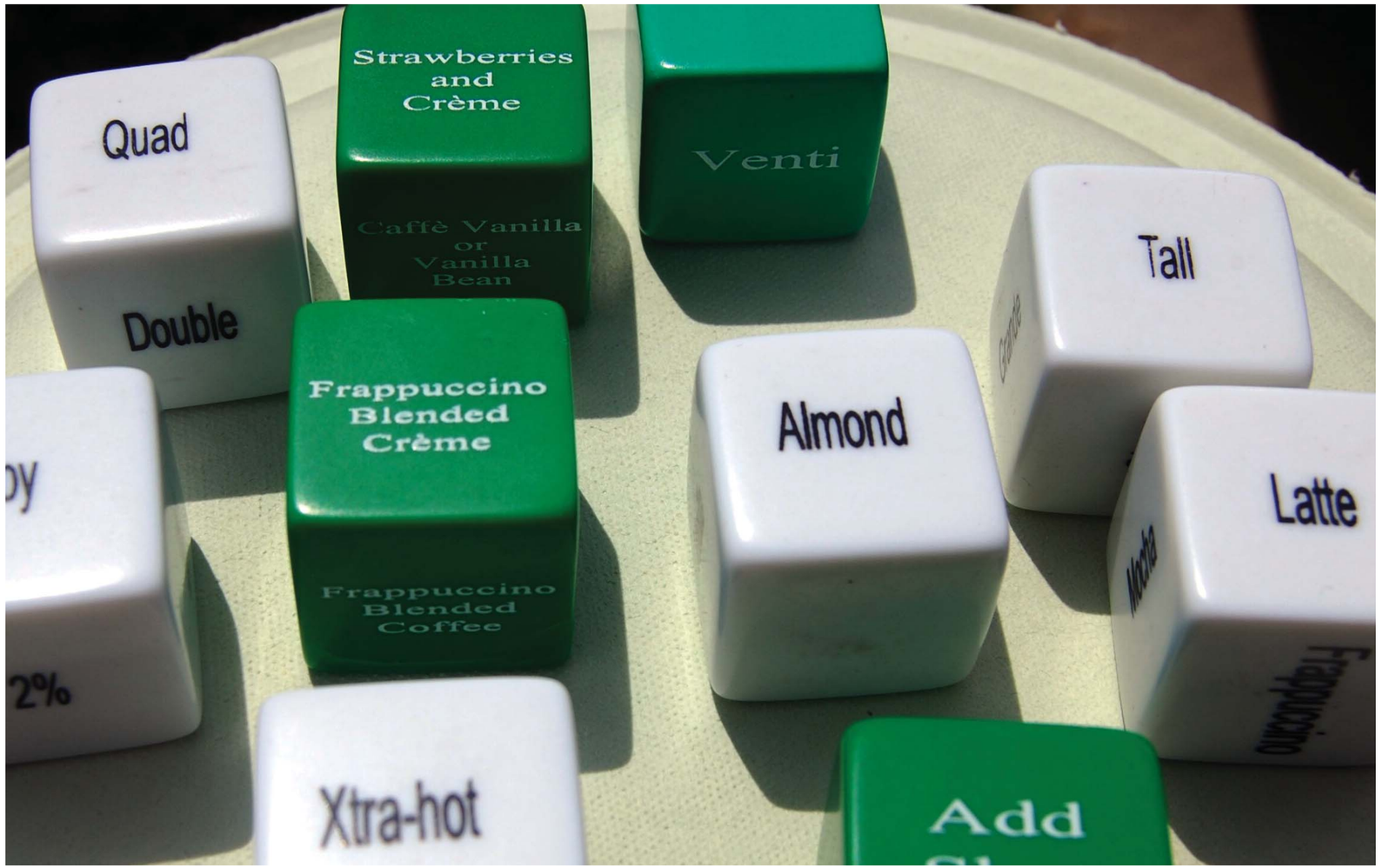
Simple for beginners and rich for aficionados: How Starbucks' drink framework and ordering language engage customers at all levels

Starbucks latte framework offers nearly 200 million variations.



Simple for beginners and rich for aficionados: How Starbucks' drink framework and ordering language engage customers at all levels

Starbucks even has training dice for new baristas.



Simple for beginners and rich for aficionados: How Starbucks' drink framework and ordering language engage customers at all levels

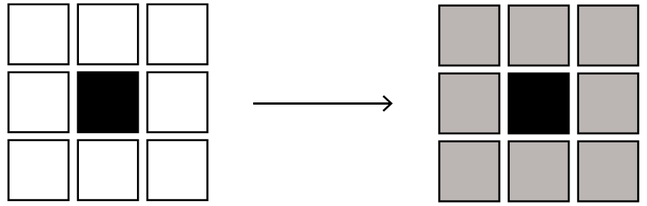
Computational Systems

The Game of Life

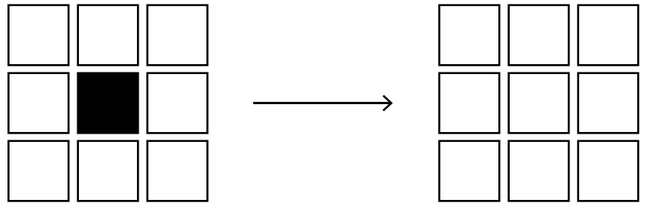
John Conway, 1970

A 2D cellular automation zero-player game, meaning that its evolution is determined by the initial state requiring no input.

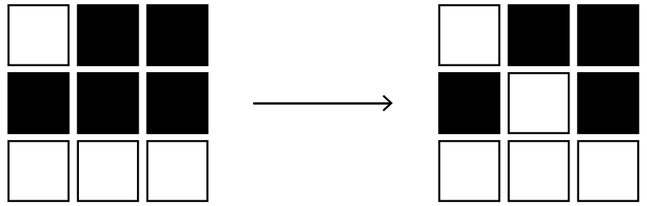
Rules of The Game of Life



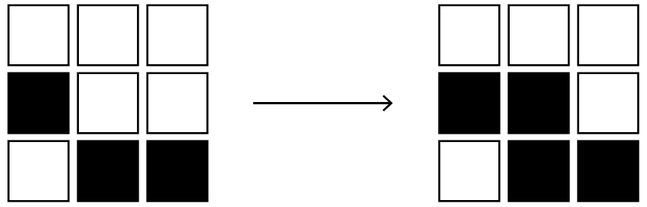
Each cell has 8 neighbors



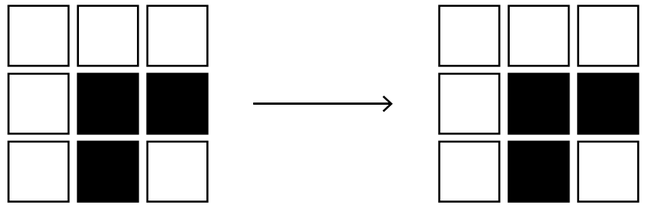
1. Isolation—each live cell with one or fewer live neighbors will die in the next generation



2. Overcrowding—each live cell with four or more live neighbors will die in the next generation



3. Births—each dead cell adjacent to exactly three live neighbors will become live in the next generation

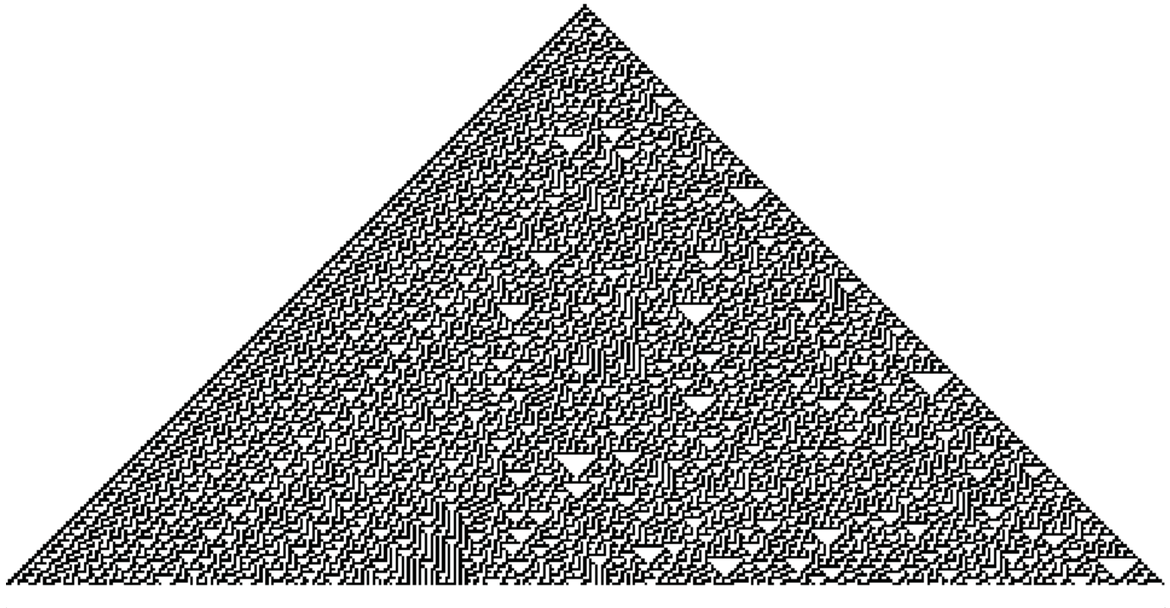


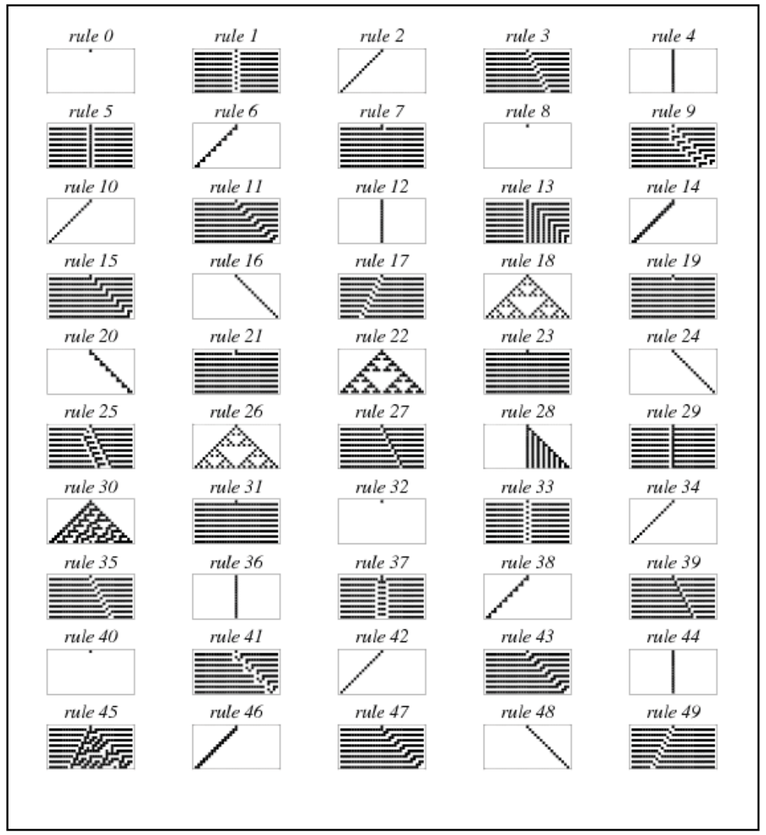
4. Survival—each live cell with either two or three live neighbors will remain alive for the next generation

Cellular Automata

Stanislaw Ulam & John von Neumann, 1940's

A discrete model which consists of a grid of cells where each has two possible states, 'on' and 'off'. It evolves through a number of time steps according to a set of rules based on neighboring cells.

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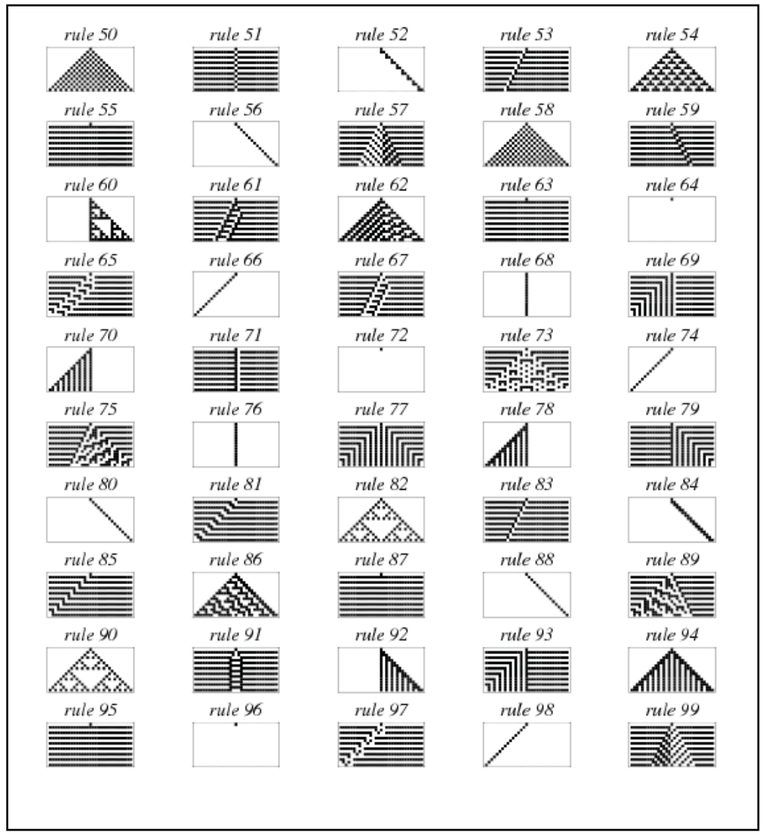
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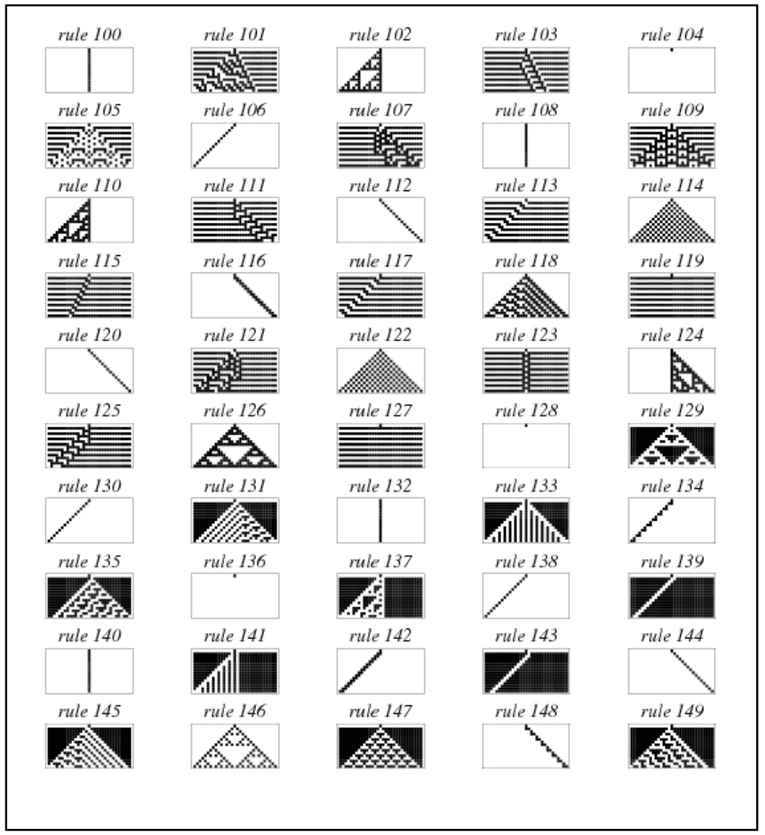
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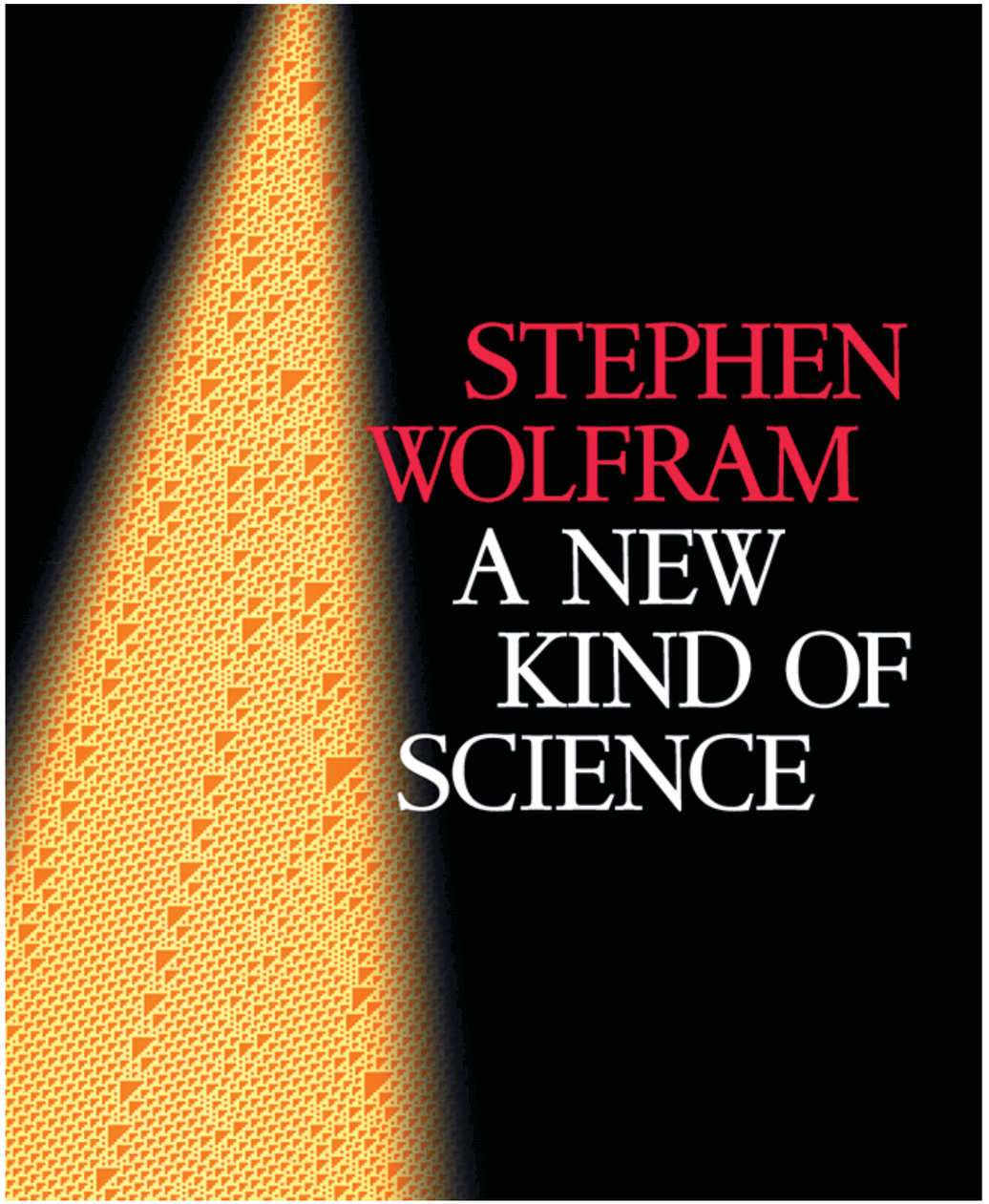
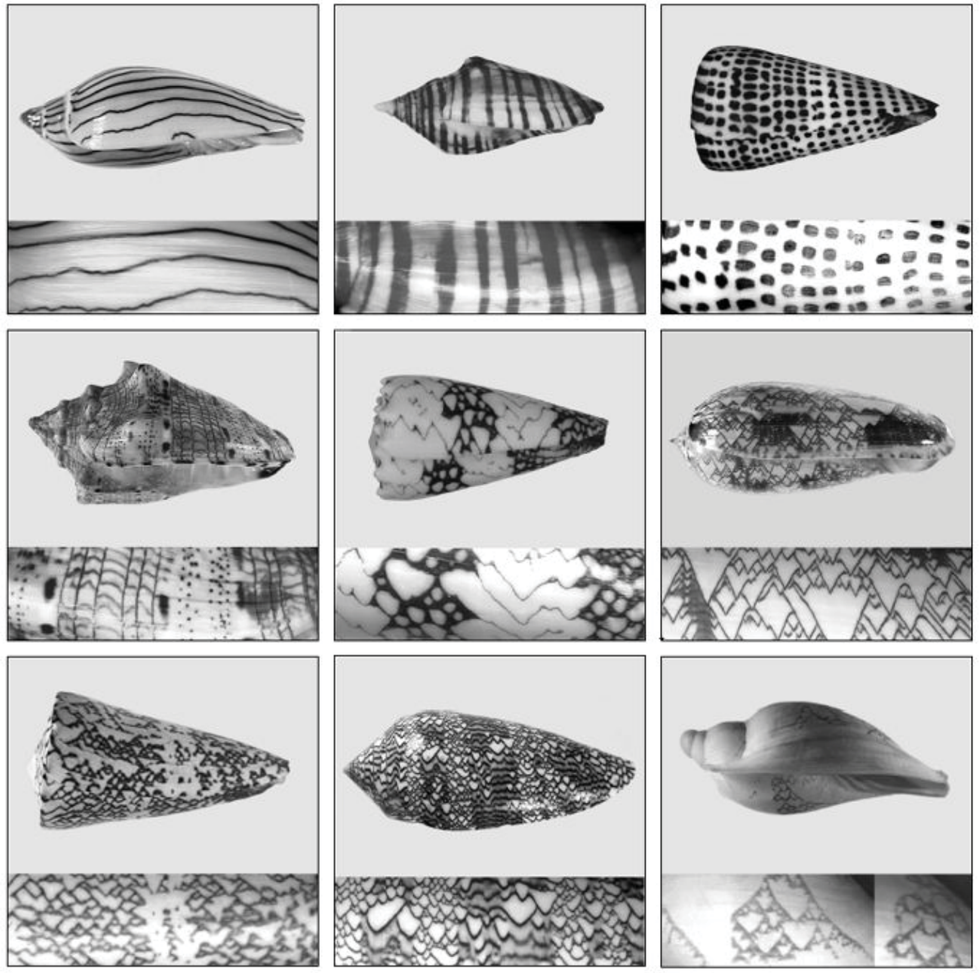
A New Kind of Science

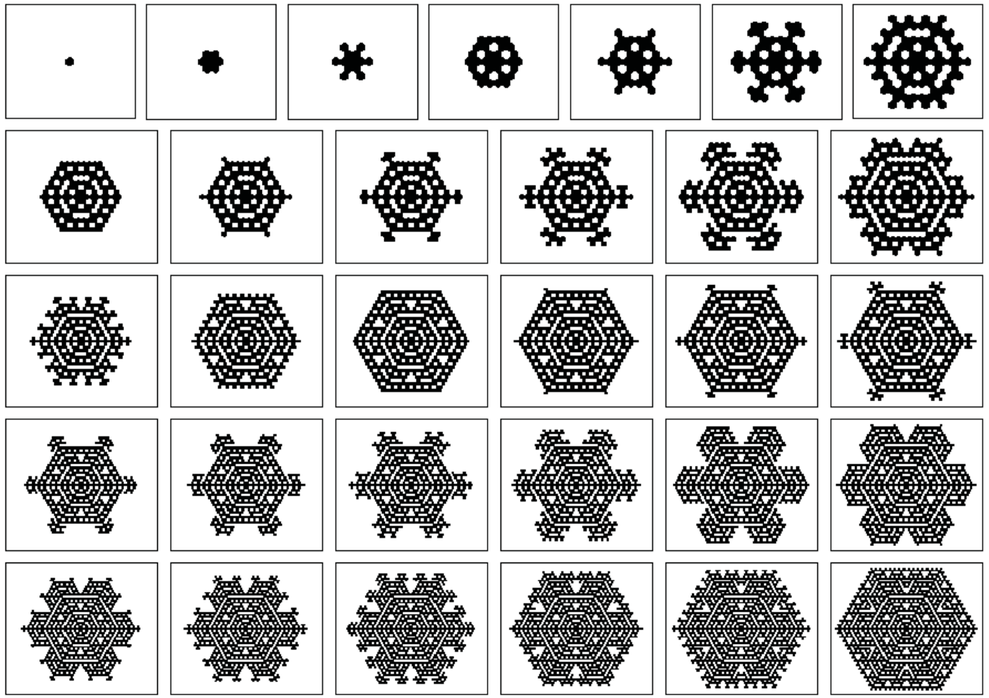
Stephen Wolfram, 2002

A book that contains empirical and systematic studies of computational systems. Wolfram refers to these systems as simple programs and argues they are relevant to other fields of science.





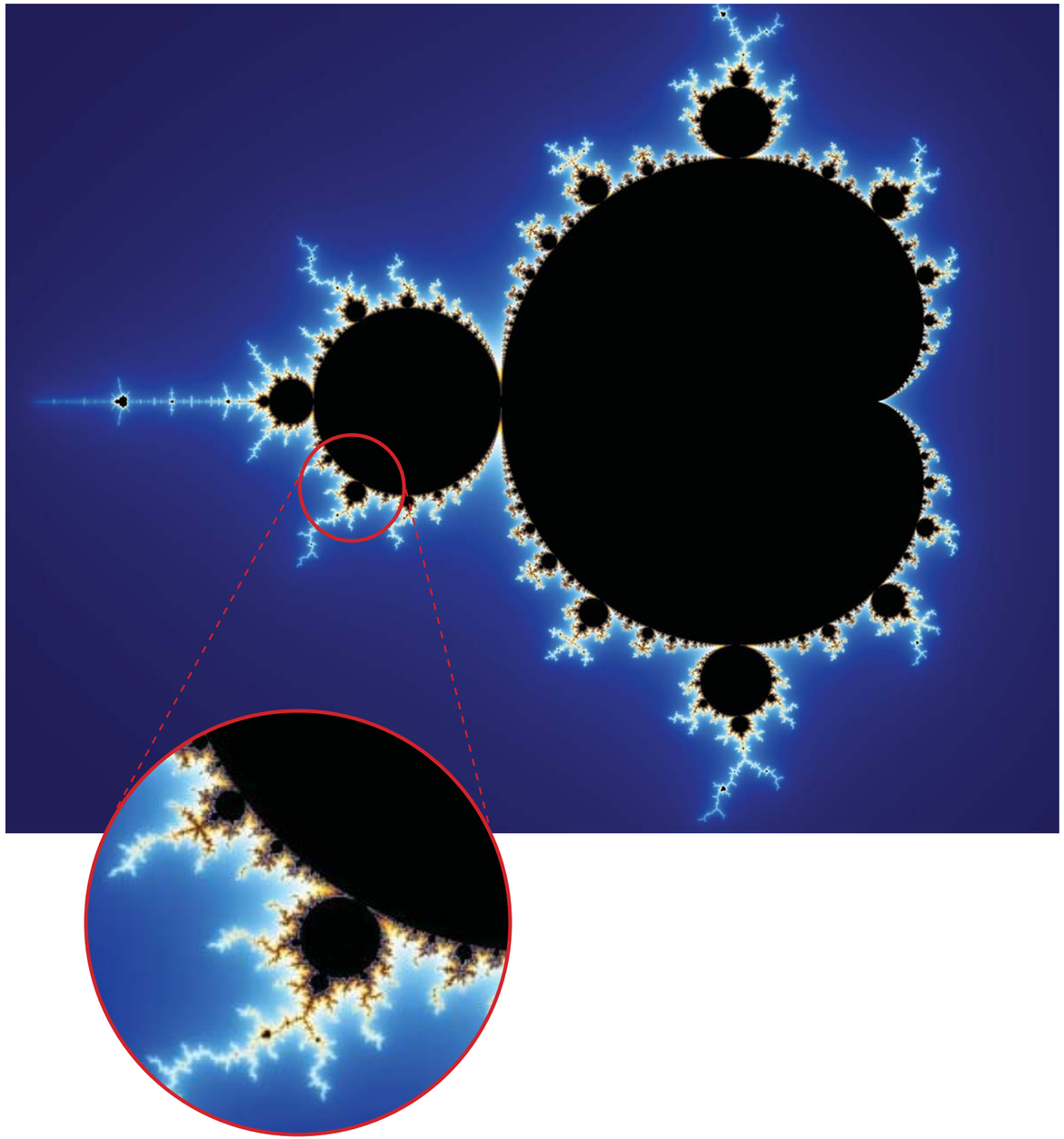
Pigmentation patterns on mollusc shells

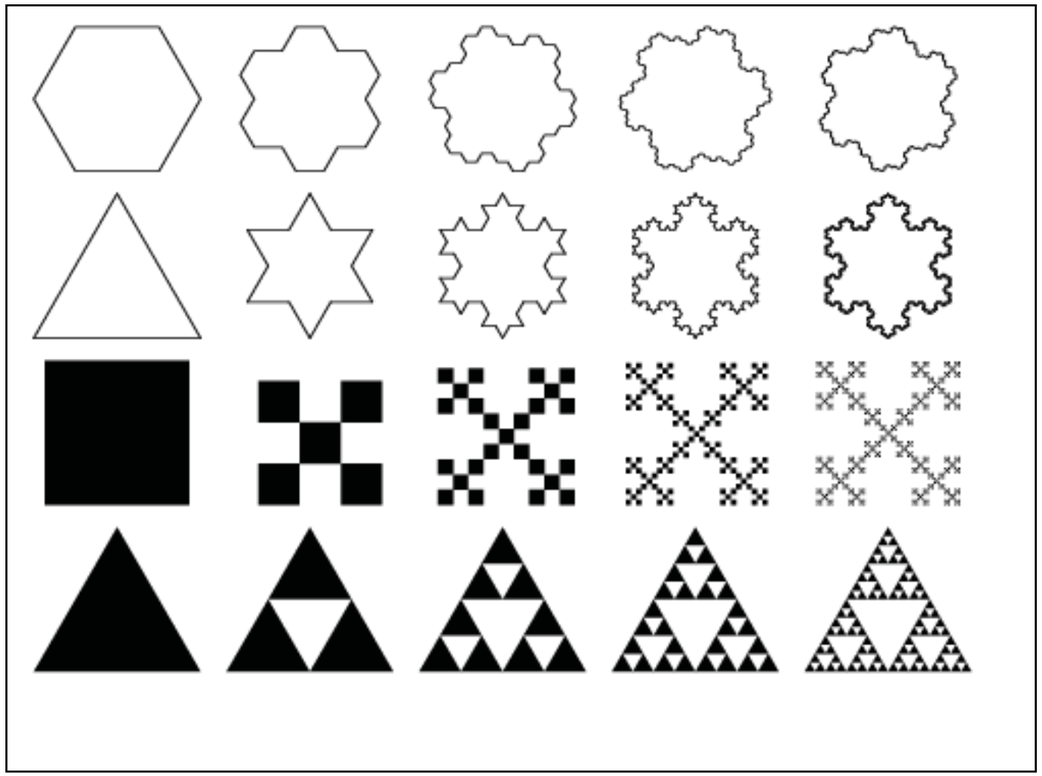


The evolution of a cellular automaton which occurs in snowflake formation

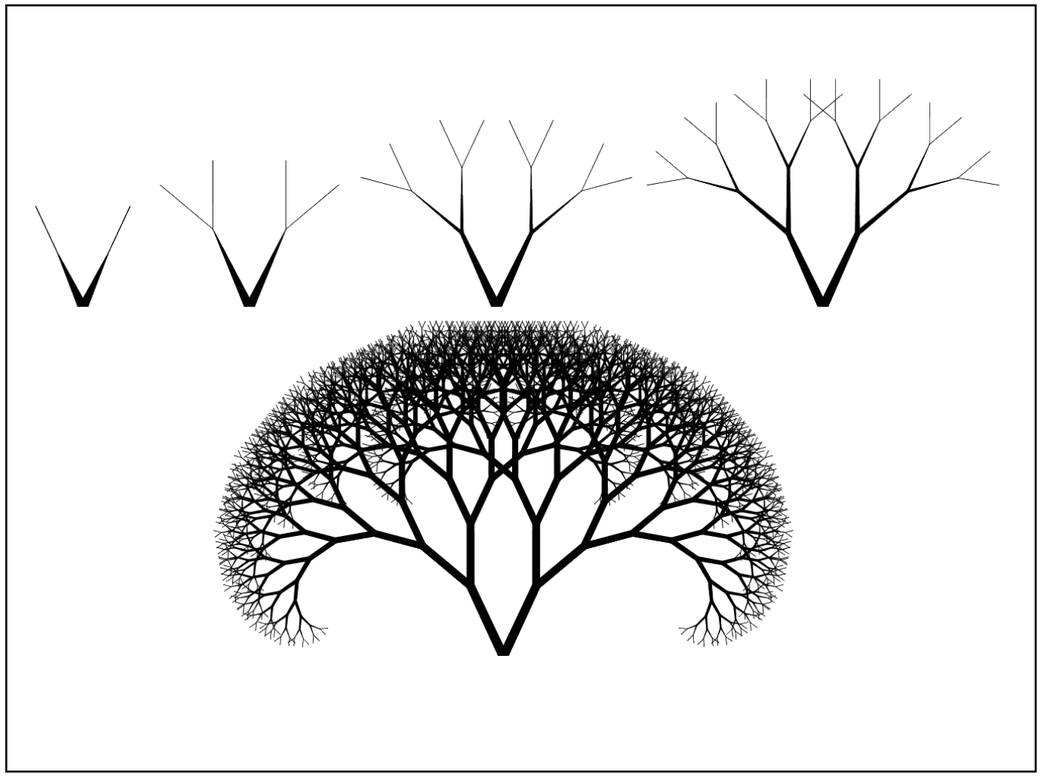
Fractals

Benoit Mandelbrot, 1975
Mathematician, Mandelbrot, coined the term "fractal" to describe repeating or self-similar mathematical patterns of scale. It is a set that is invariant under unlimited transformations.





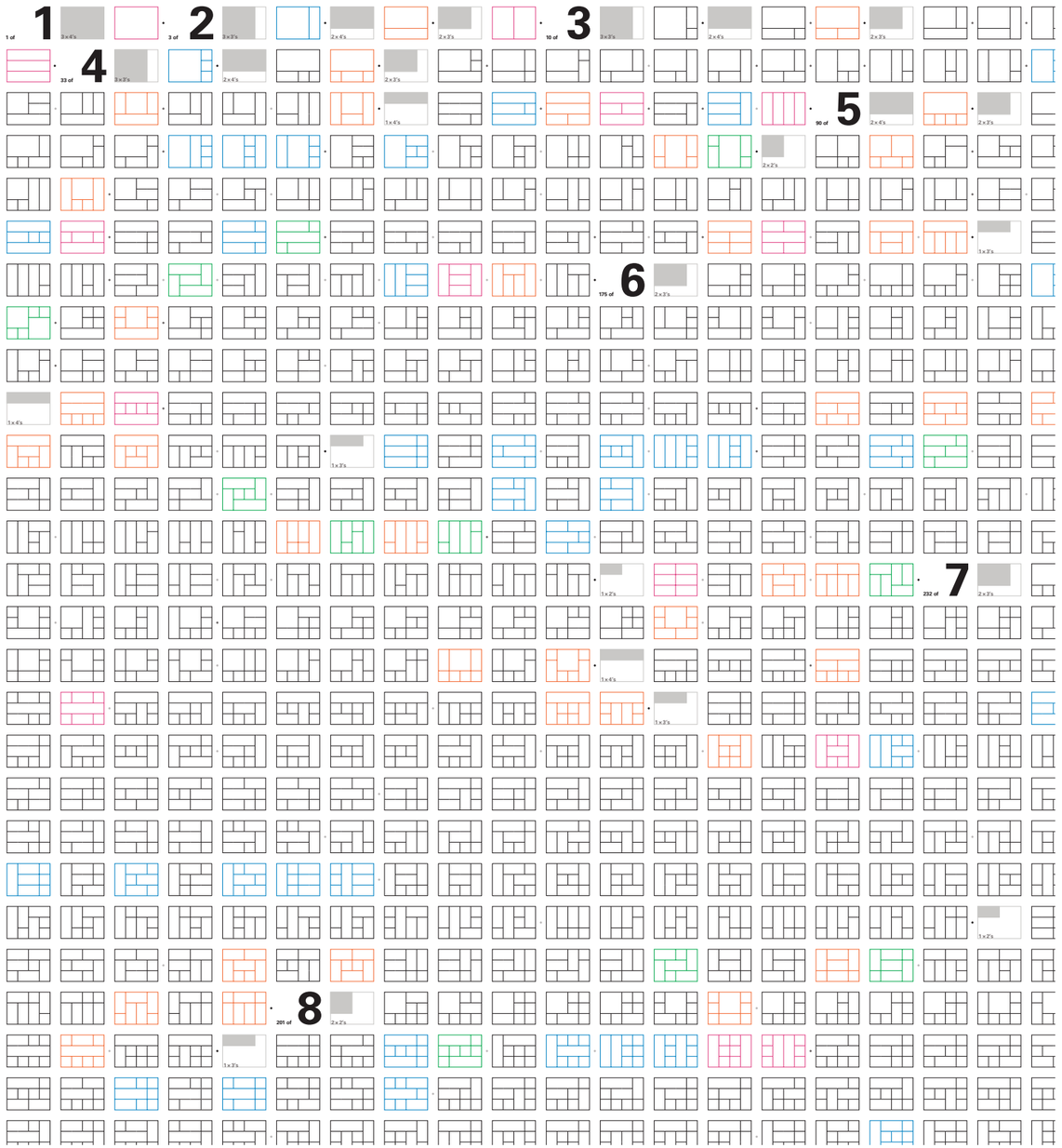
The Gosper Island, Koch Snowflake, Box Fractal and Sierpinski Triangle



An example of a fractal tree

Permutations

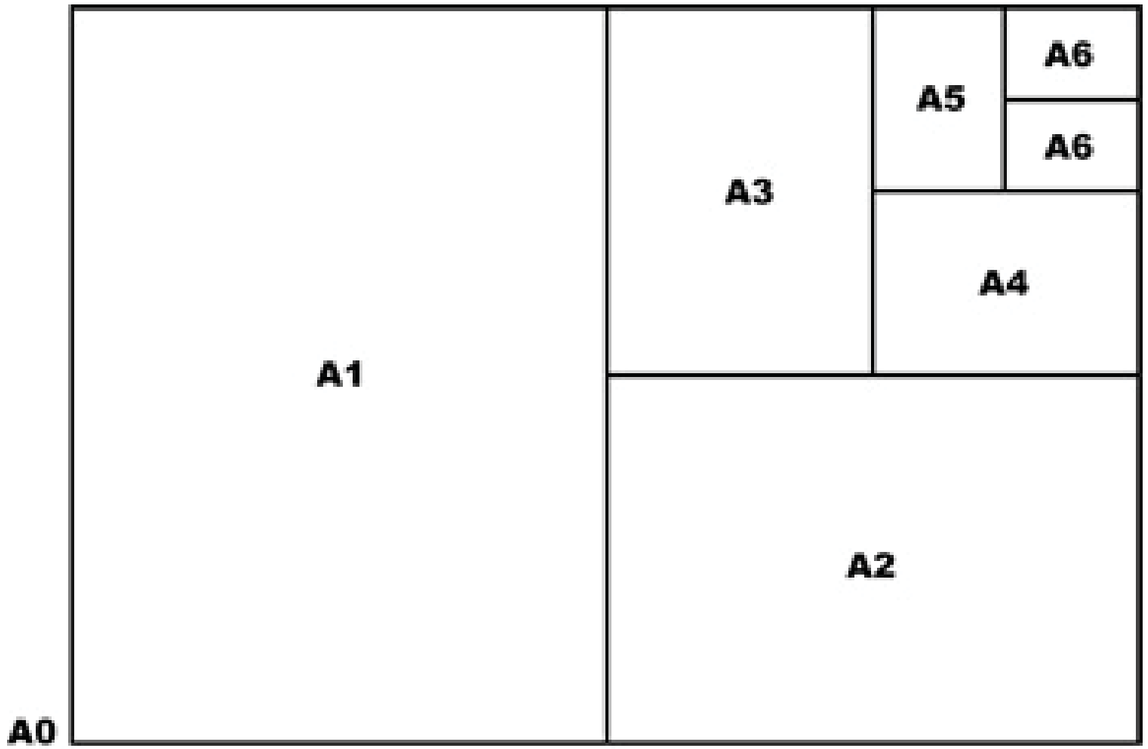
The various ways in which members from a set may be rearranged to form subsets with consideration of the order.



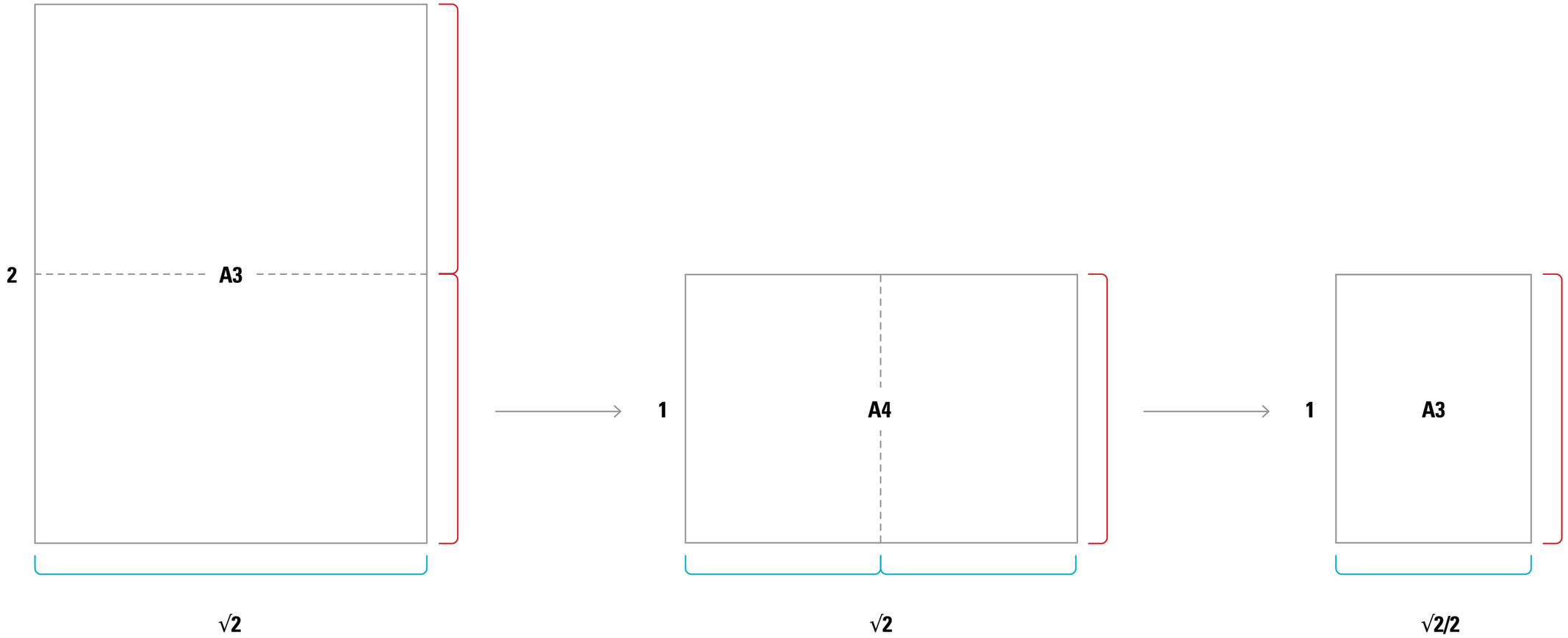
ISO Paper Sizes

International Organization for Standardization, 1975

ISO 216 is based on the German DIN 476 for international paper sizing. ISO paper sizes are all based on the aspect ratio of 1:√2.

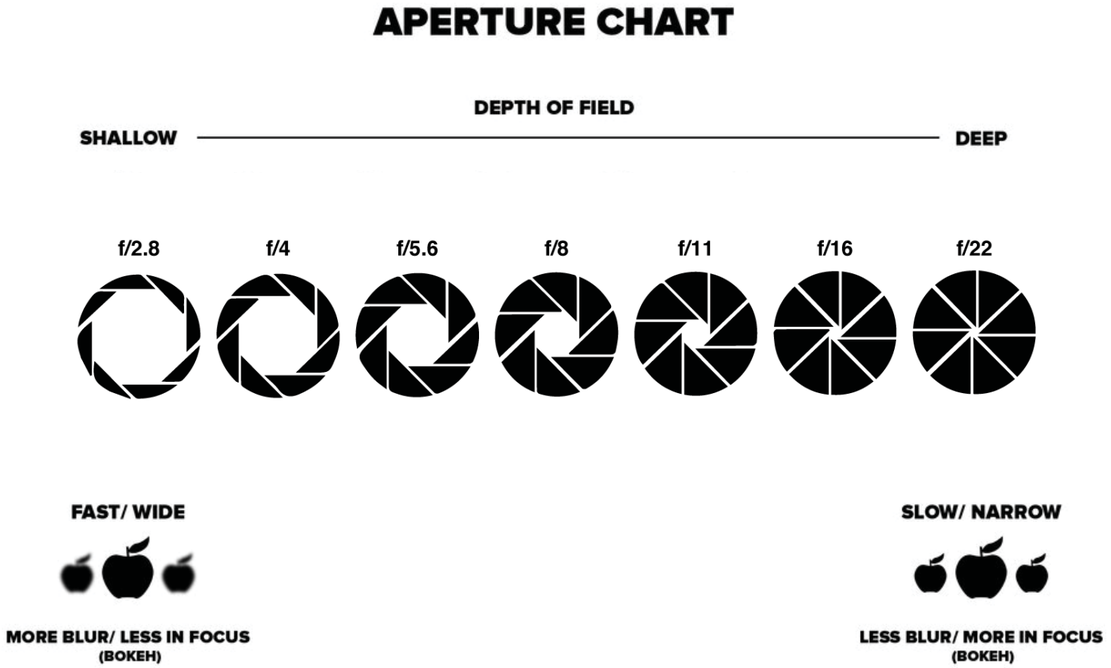


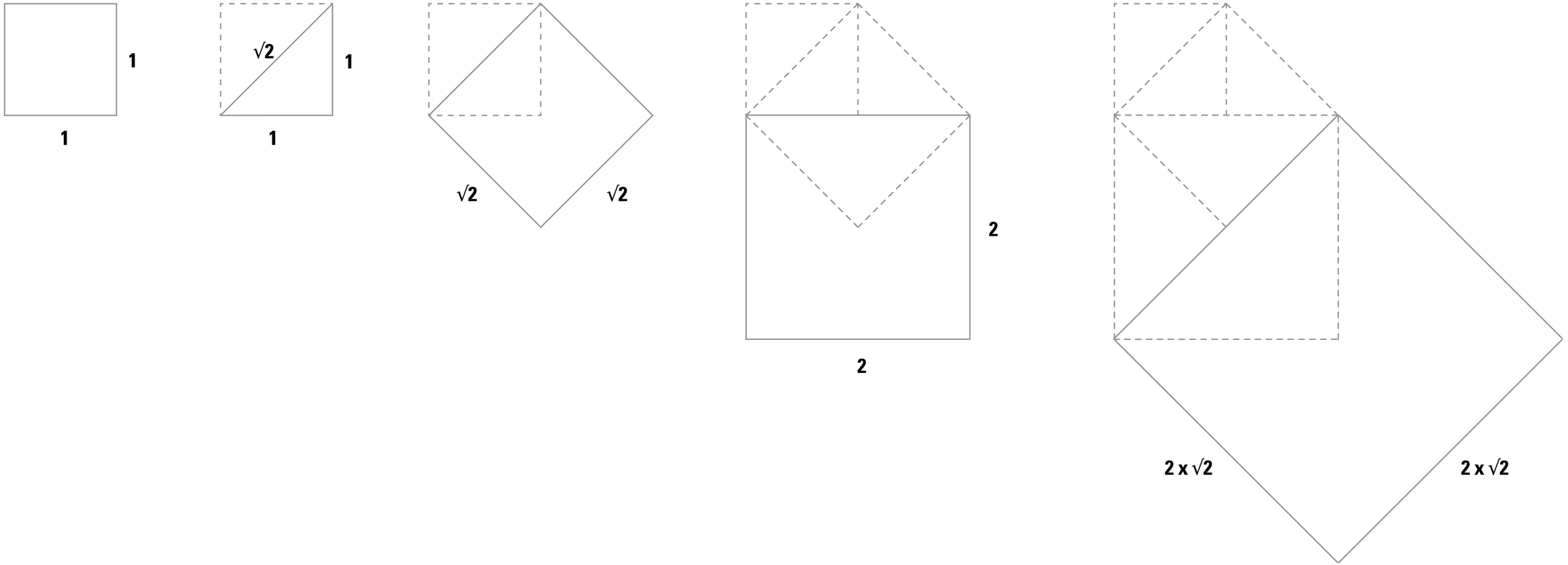
An aspect ratio of 1:√2, and the other sizes in the series are defined by folding the paper in half, parallel to its smaller side.

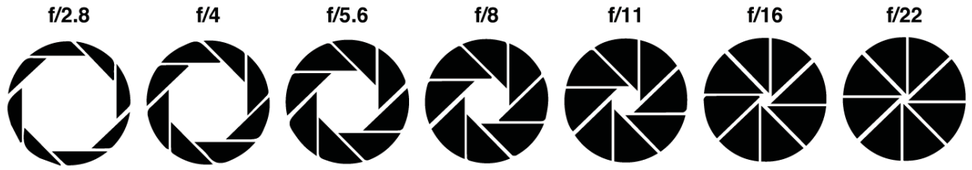


F-stop System

The f-stop is the ratio of the camera lens focal length to the diameter of the entrance pupil. The f-stop numbering is a system in relation to the lens aperture based on the square root of 2.




1
1
√2
1
1
√2
√2
2
2
2 x √2
2 x √2



$2 \times \sqrt{2} = 2.8$ → **f/2.8**

$2.8 \times \sqrt{2} = 4$ → **f/4**

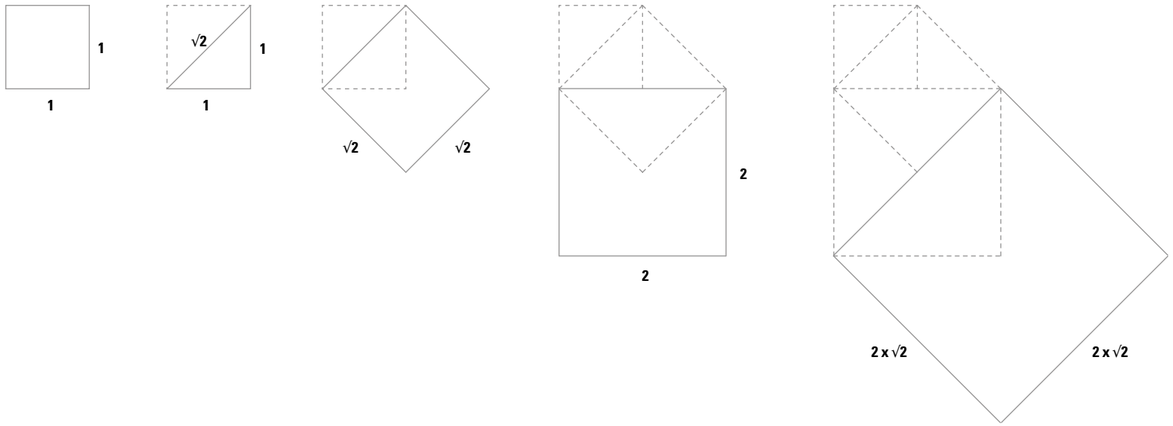
$4 \times \sqrt{2} = 5.6$ → **f/5.6**

$5.6 \times \sqrt{2} = 8$ → **f/8**

$8 \times \sqrt{2} = 11$ → **f/11**

$11 \times \sqrt{2} = 16$ → **f/16**

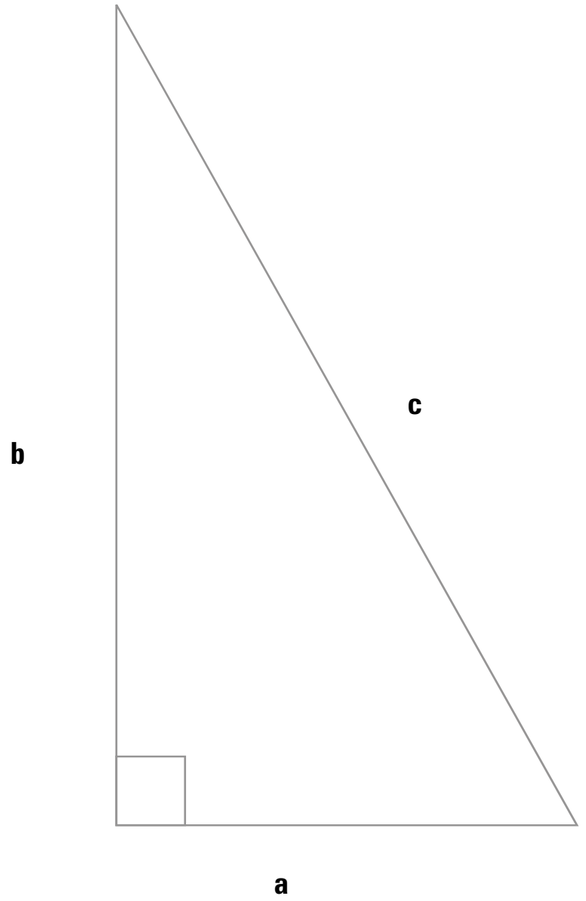
$16 \times \sqrt{2} = 22$ → **f/22**

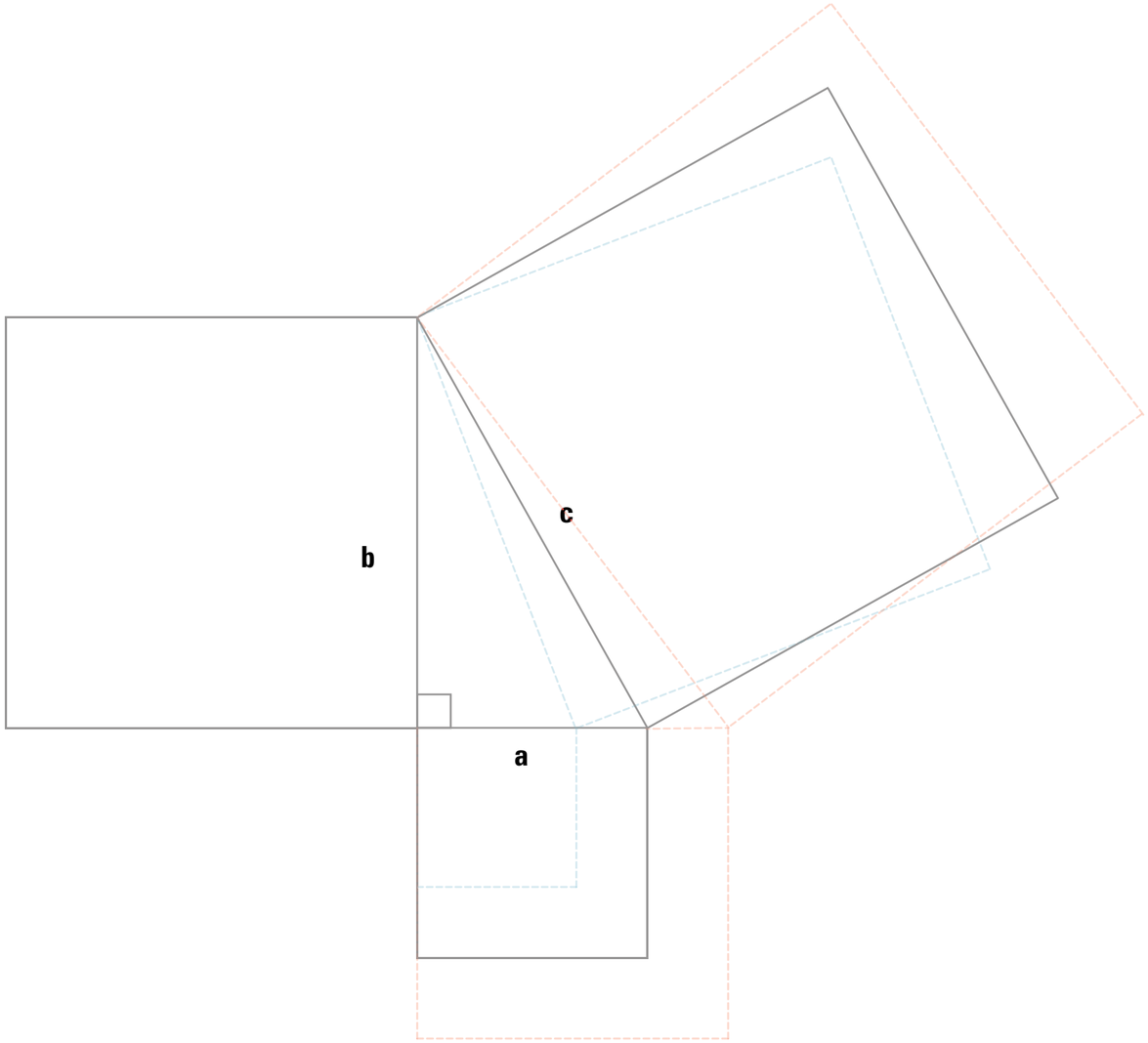


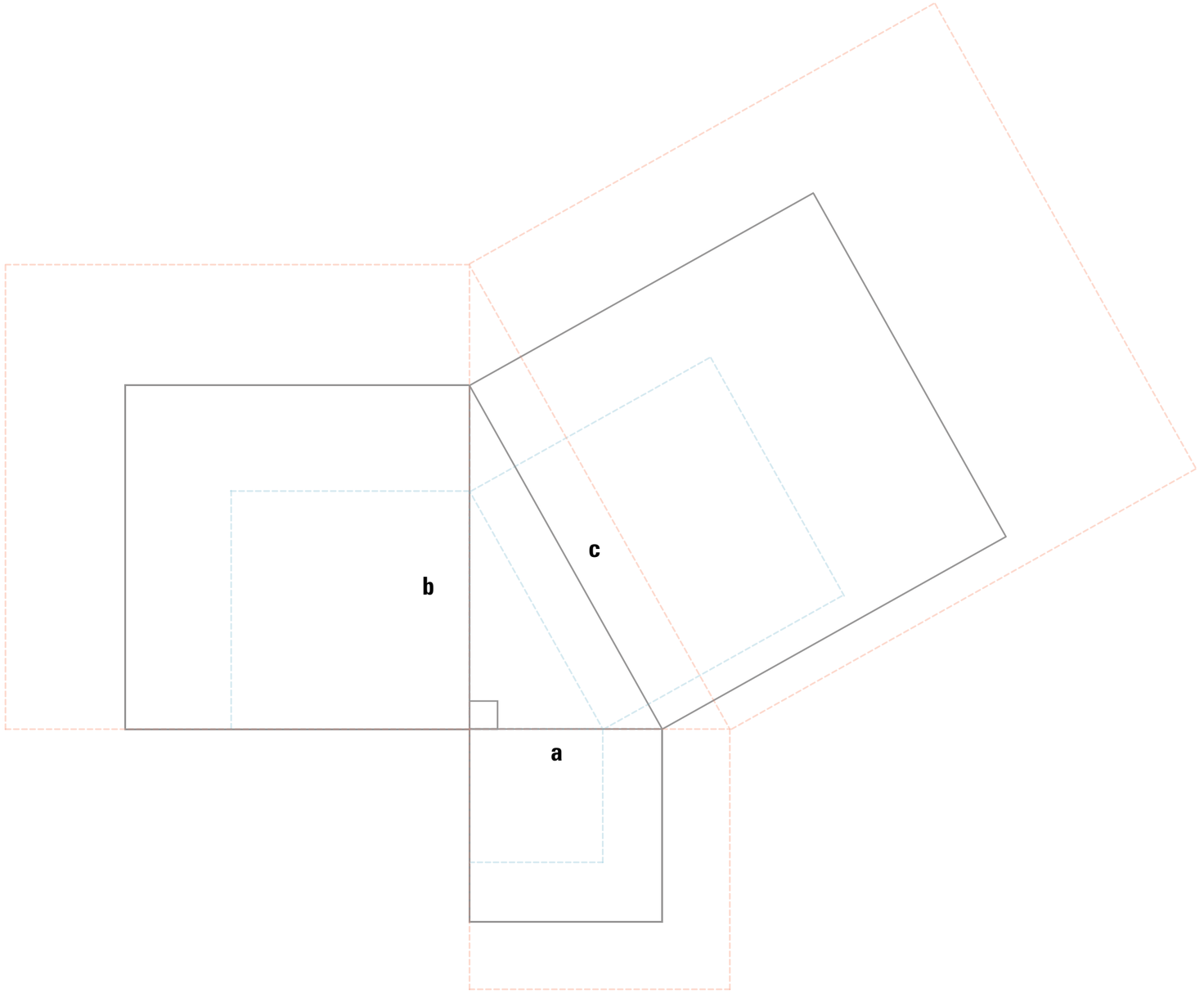
Pythagorean Theorem Proof

$$a^2 + b^2 = c^2$$

The Pythagorean Theorem states that in a right triangle, the square of side a plus the square of side b is equal to the square of side c, often referred to as the hypotenuse. The length of the hypotenuse is dependent on the length of the two sides of the triangle.

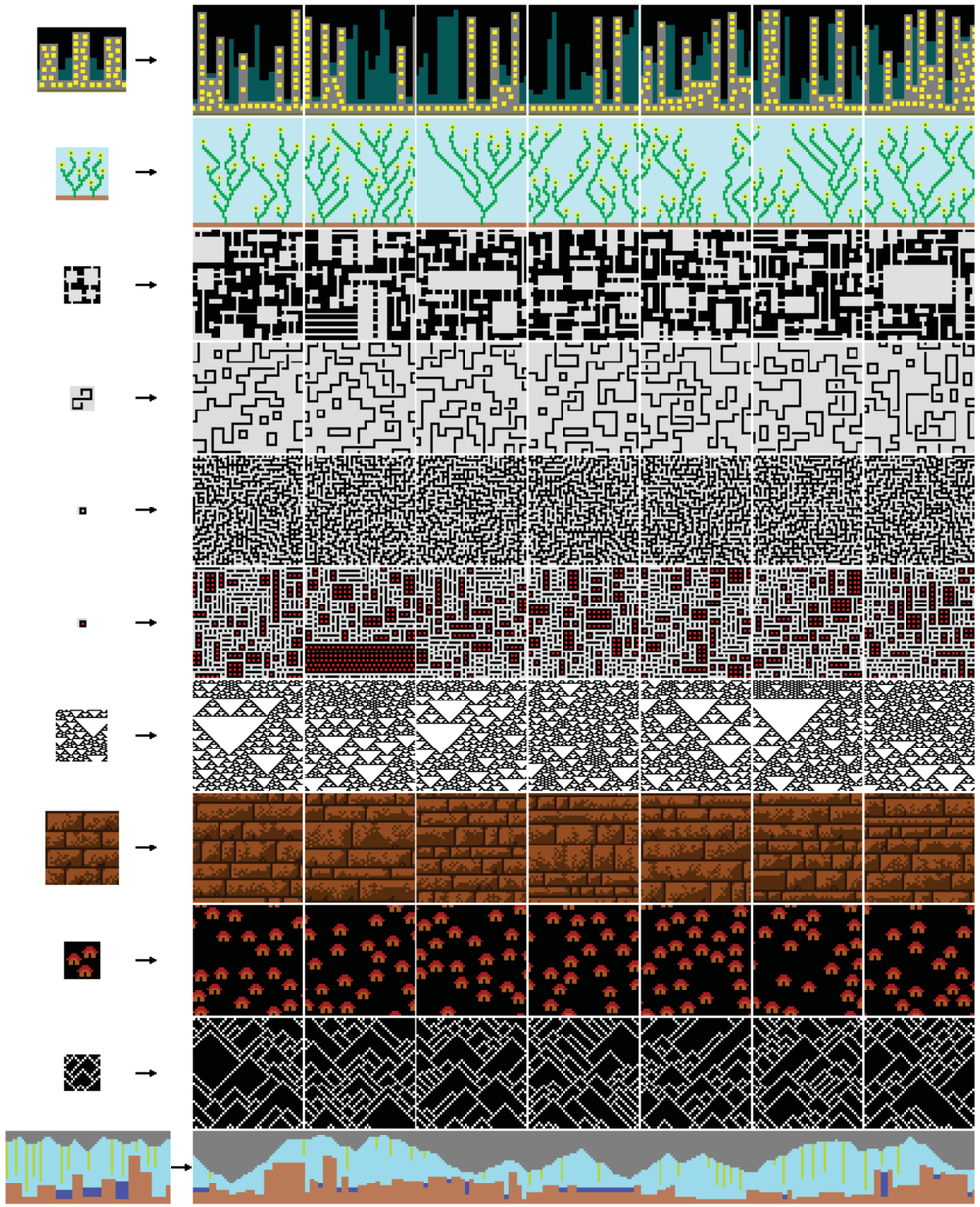


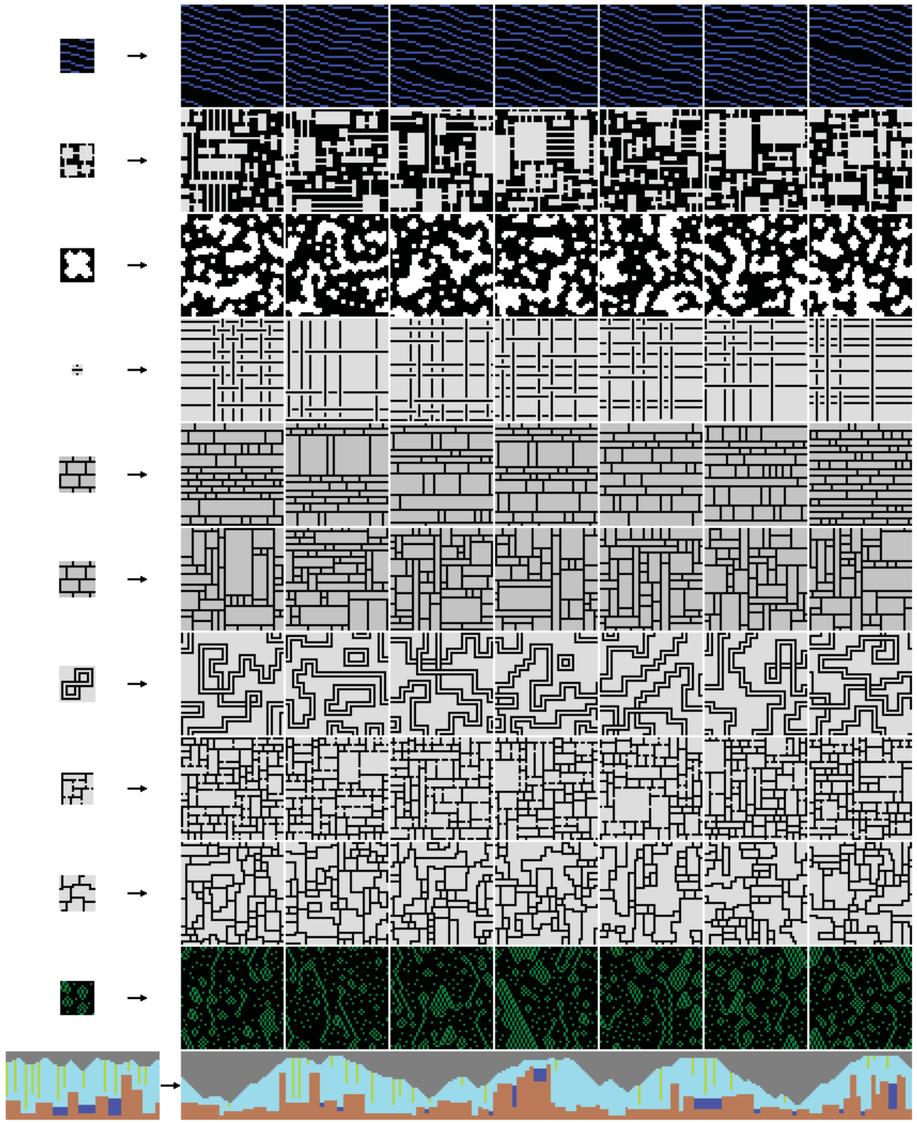

c
b
a

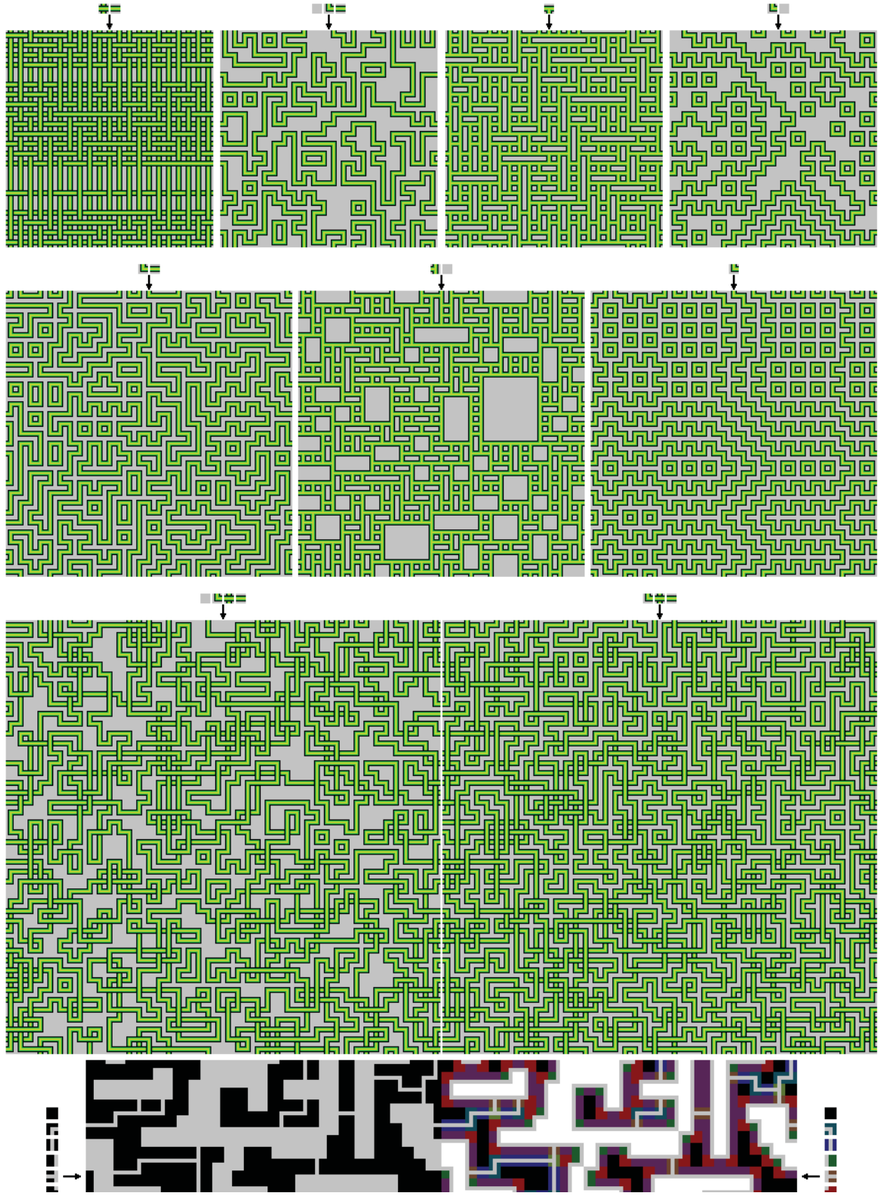

c
b
a

Wave Function Collapse

A program that generates bitmaps that are locally similar to the input bitmap.





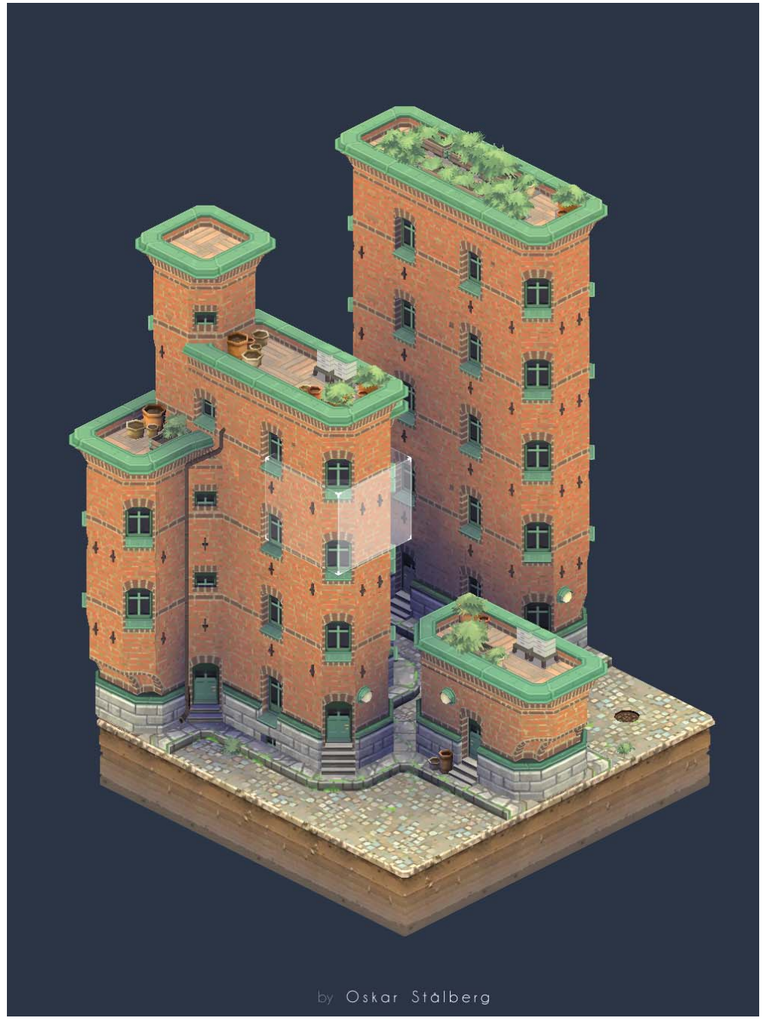


https://github.com/mxgmn/WaveFunctionCollapse

Brick Block

Oskar Stálberg

A browser-based procedural building generator.


by Oskar Stålberg

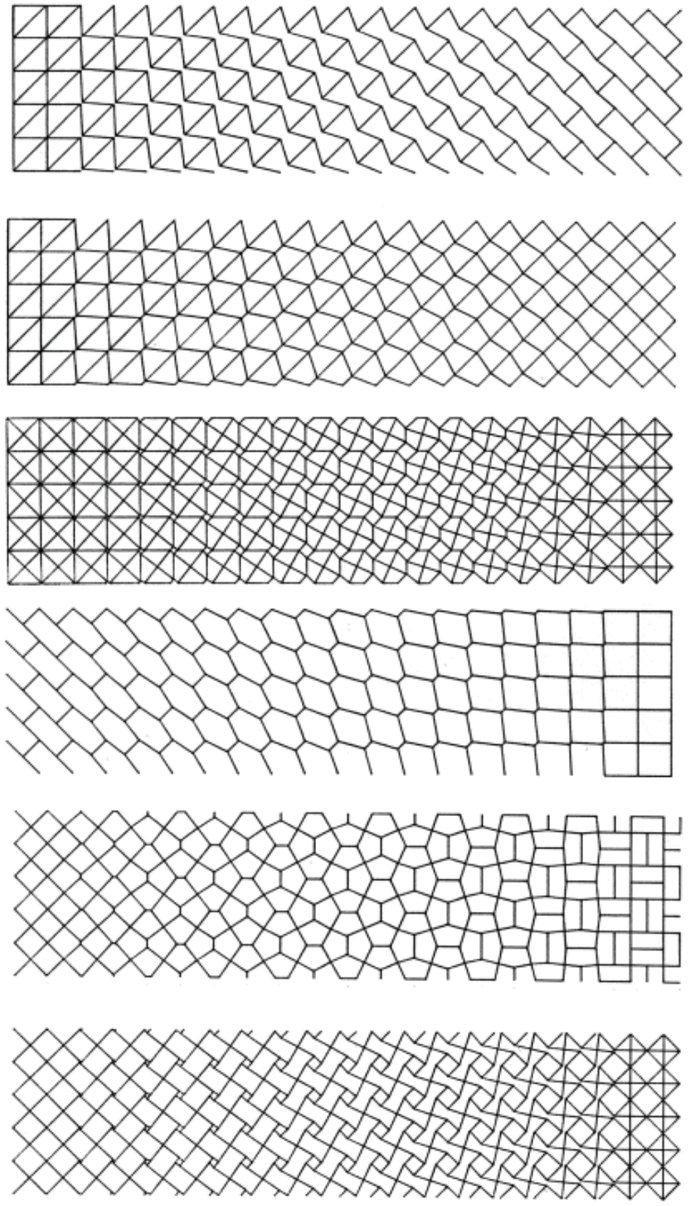

by Oskar Stålberg

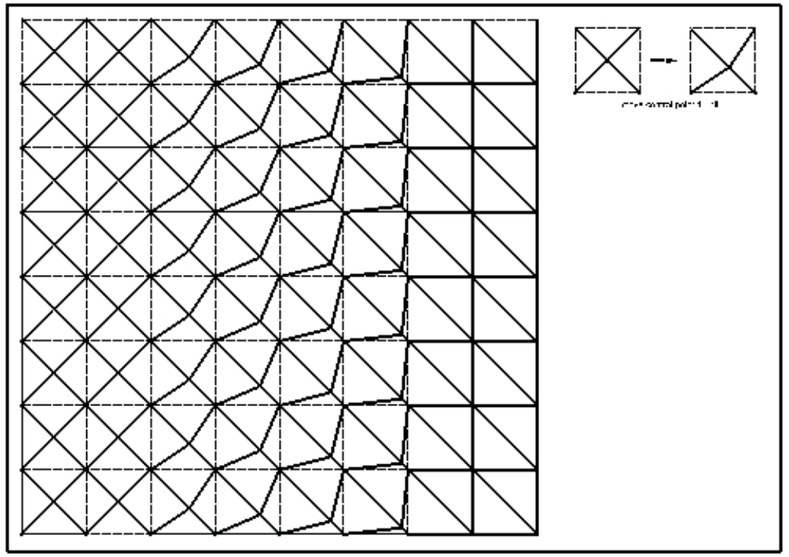

by Oskar Stålberg

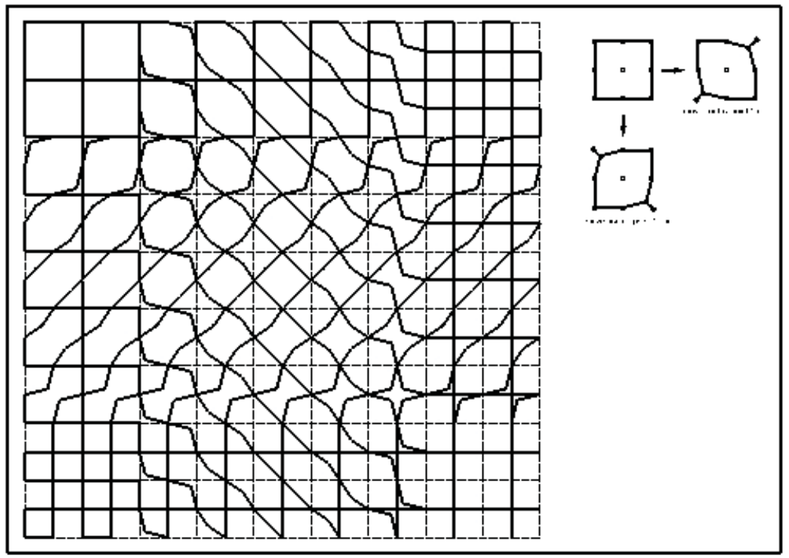
Parquet Deformation

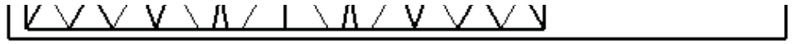
William Huff, 1960's

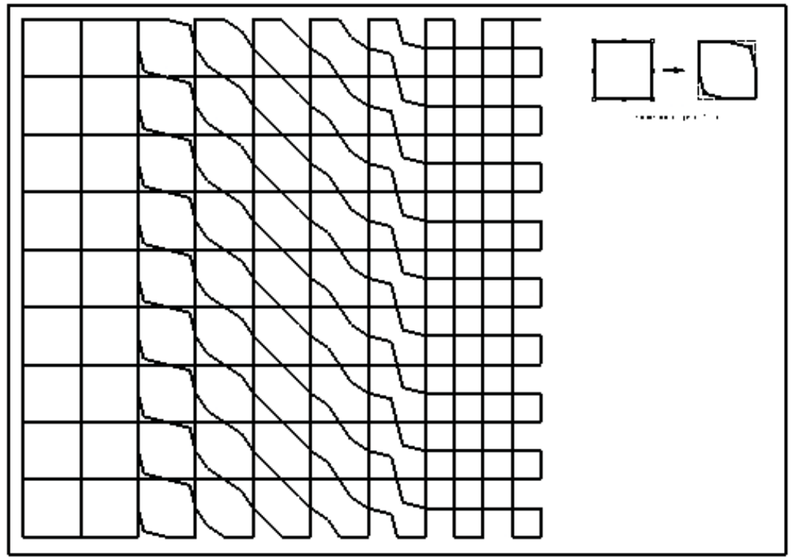
A term to describe a regular pattern of tiles that transforms from left to right whilst maintaining the regularity of the tiling.

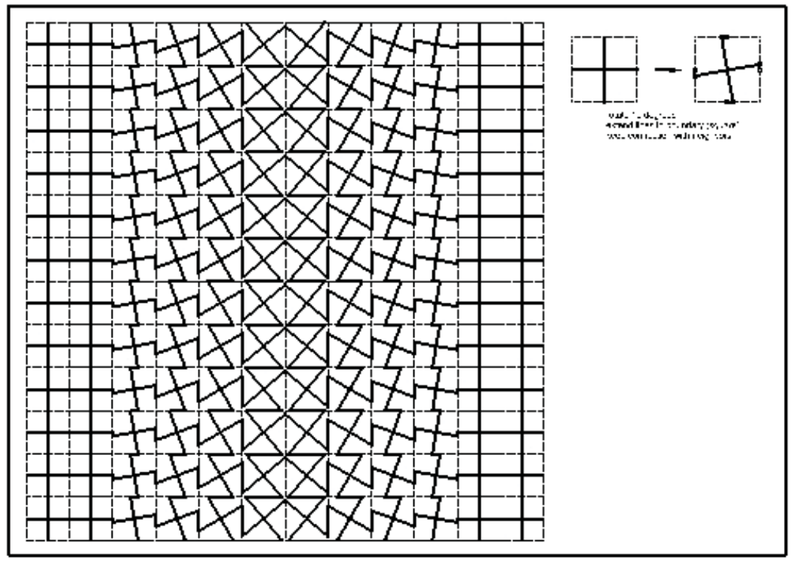








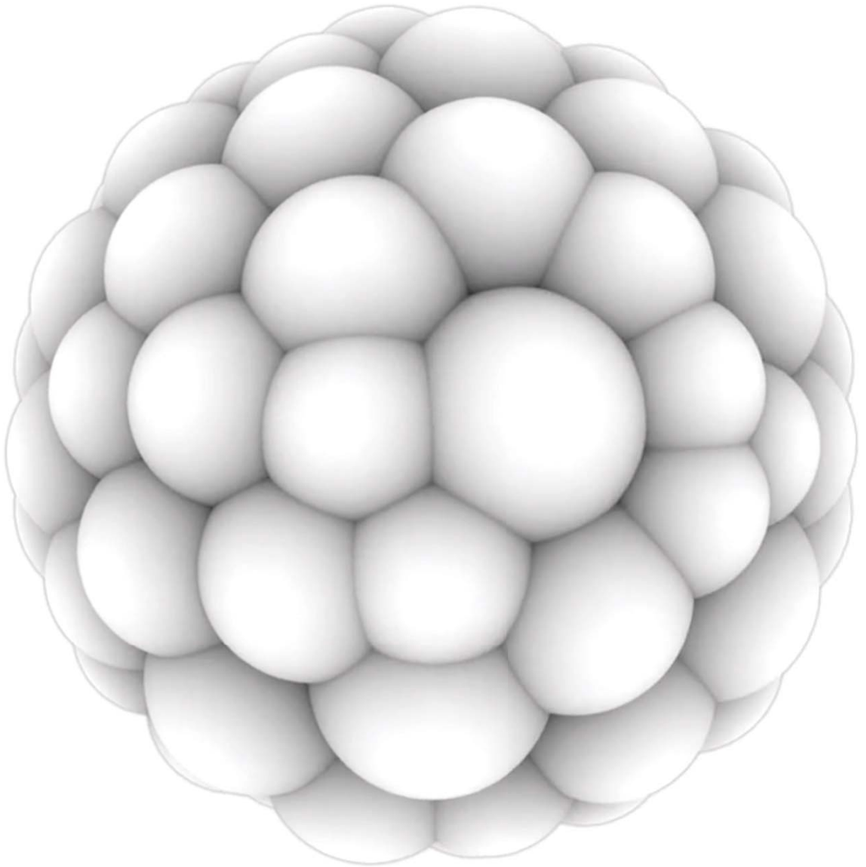


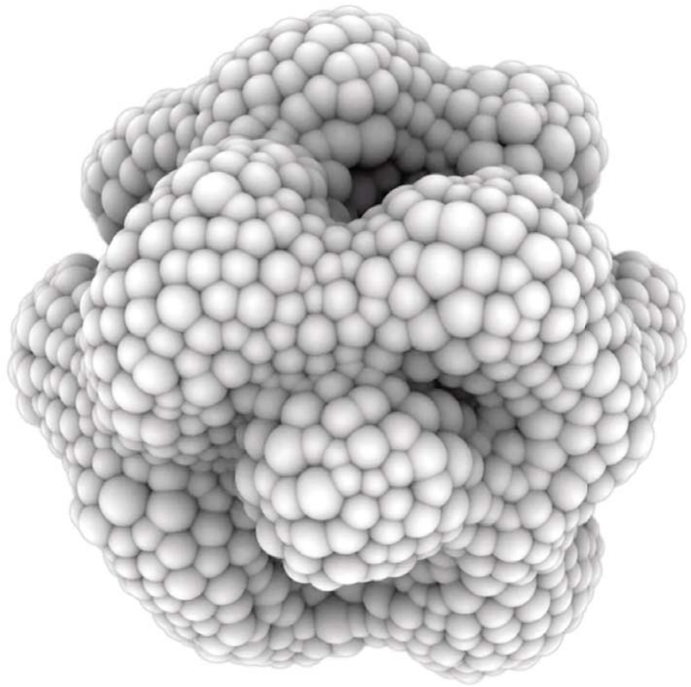


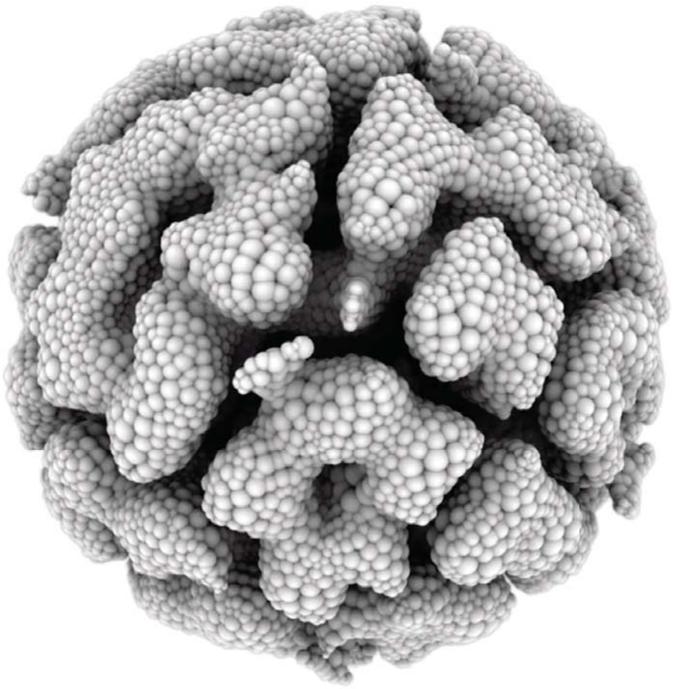
Cellular Forms

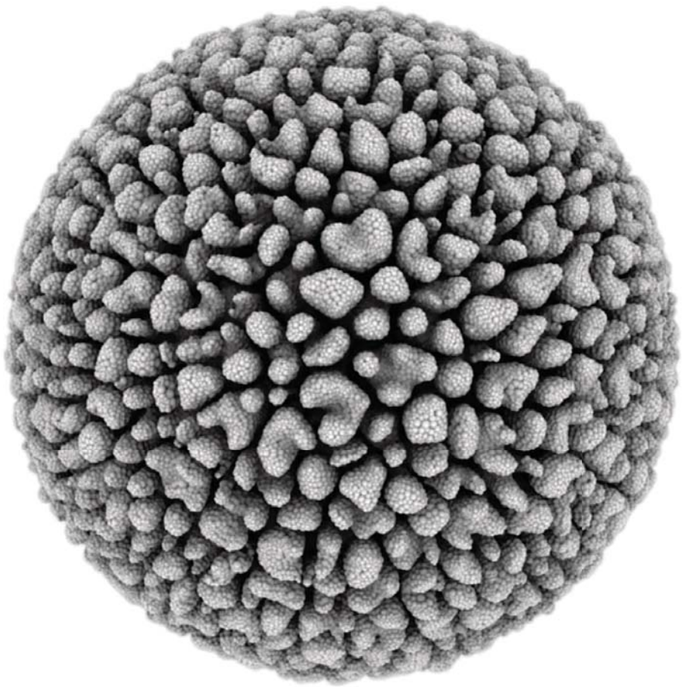
Andy Lomas

Digitally generated structures using simulation of morphogenesis.





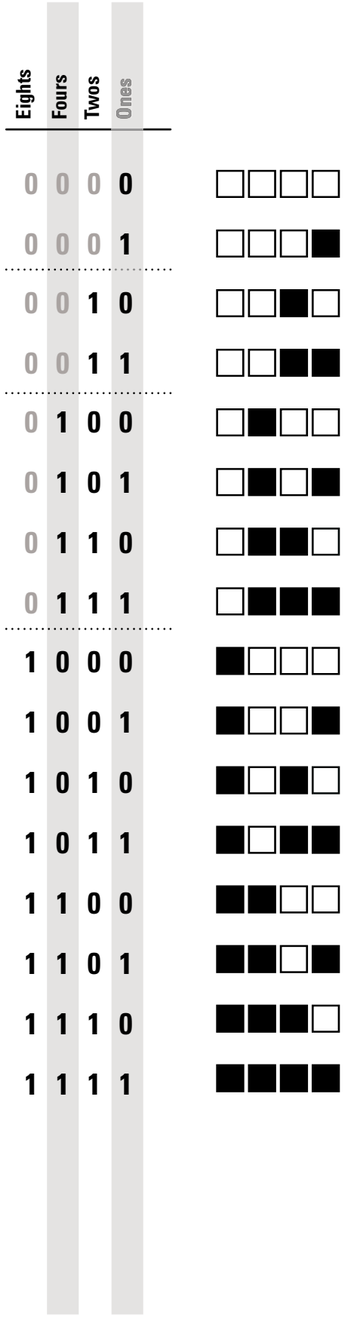




Numbering Systems

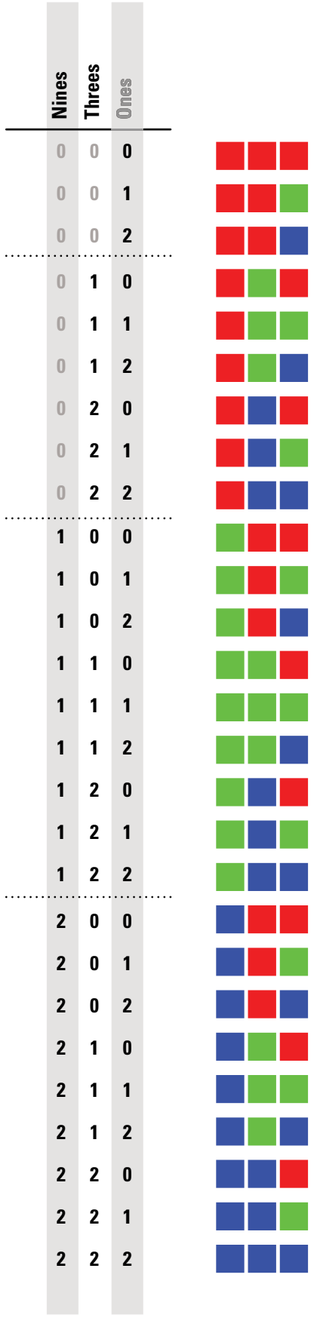
Binary

Expressed in the Base-2 numeral system which is comprised by 0's and 1's. This system is used by almost all modern computers and computer-based devices.



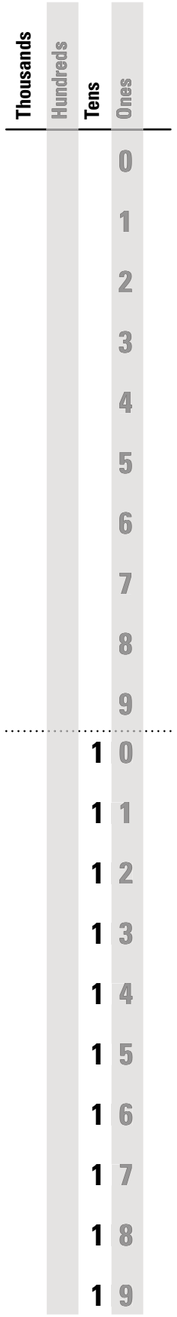
Base-3

Also known as the ternary number system, it shows all possible combinations of the elements.



Base-10

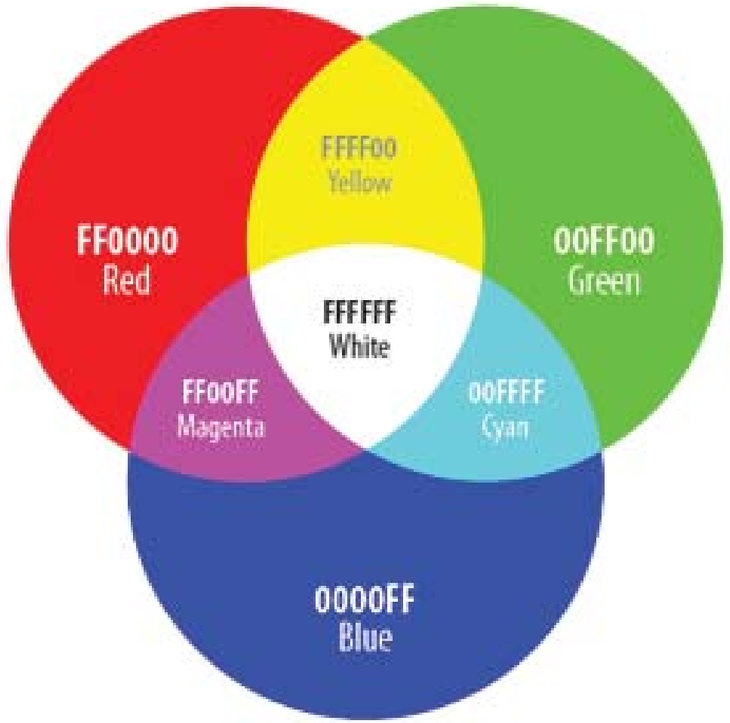
Also known as the decimal system because a digit's value in a number is determined by its relationship to the decimal point. It is made up of 10 digits to possibily represent the 10 fingers on a human hand.

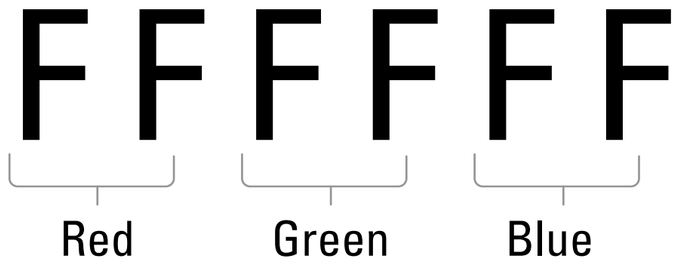


Hexadecimal

A Base-16 positional system made up of 16 distinct symbols; 0–9 to represent vales zero through nine and symbols A–F to represent values ten through fifteen

$16^5 = 1048576$	$16^4 = 65536$	$16^3 = 4096$	$16^2 = 256$	$16^1 = 16$	$16^0 = 0$
0	0	0	0	0	0
0	0	0	0	0	1
0	0	0	0	0	2
0	0	0	0	0	3
0	0	0	0	0	4
0	0	0	0	0	5
0	0	0	0	0	6
0	0	0	0	0	7
0	0	0	0	0	8
0	0	0	0	0	9
0	0	0	0	0	A
0	0	0	0	0	B
0	0	0	0	0	C
0	0	0	0	0	D
0	0	0	0	0	E
0	0	0	0	0	F
0	0	0	0	1	0
0	0	0	0	1	1
0	0	0	0	1	F
F	F	F	F	F	F


FFFF00
Yellow
FF0000
Red
00FF00
Green
FFFFFF
White
FF00FF
Magenta
00FFFF
Cyan
0000FF
Blue


F F F F F F
Red
Green
Blue

Unique Combinations

$$\frac{(n^2-n)}{2}$$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
B	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ
C	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ
D	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ
E	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ
F	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ
G	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ
H	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ
I	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ
J	JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ
K	KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ
L	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ
M	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ
N	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ
O	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ
P	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ
Q	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ
R	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ
S	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
T	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ
U	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ
V	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ
W	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ
X	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ
Y	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ
Z	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ

Movable Type

Bi Sheng, 990–1051 AD

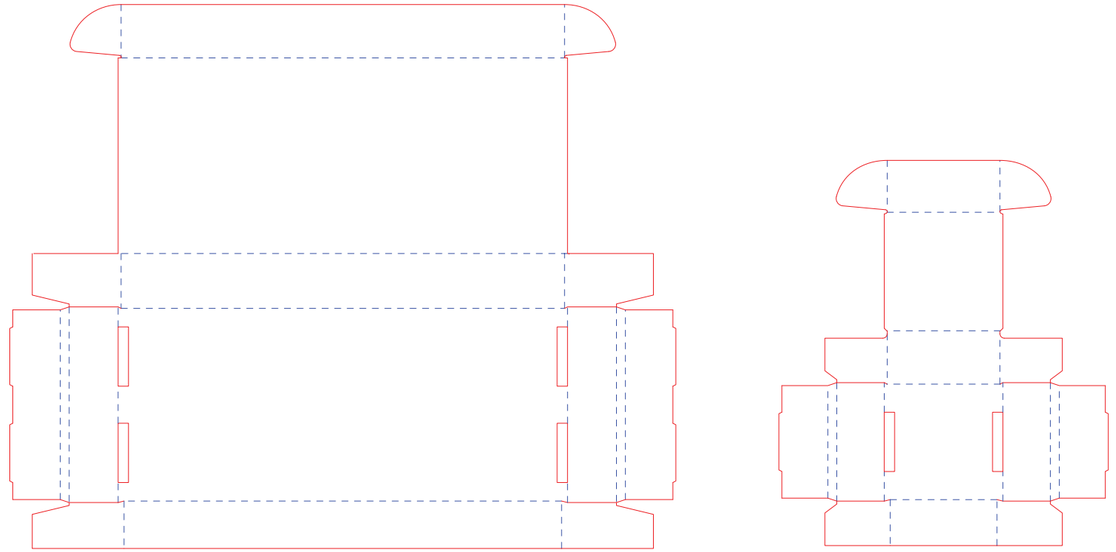
Originating in China, the first movable type was constructed out of small clay blocks. The blocks are able to be rearranged to make the printing process more efficient and easier.

Metal Type

Johannes Gutenberg, 1450

Dielines

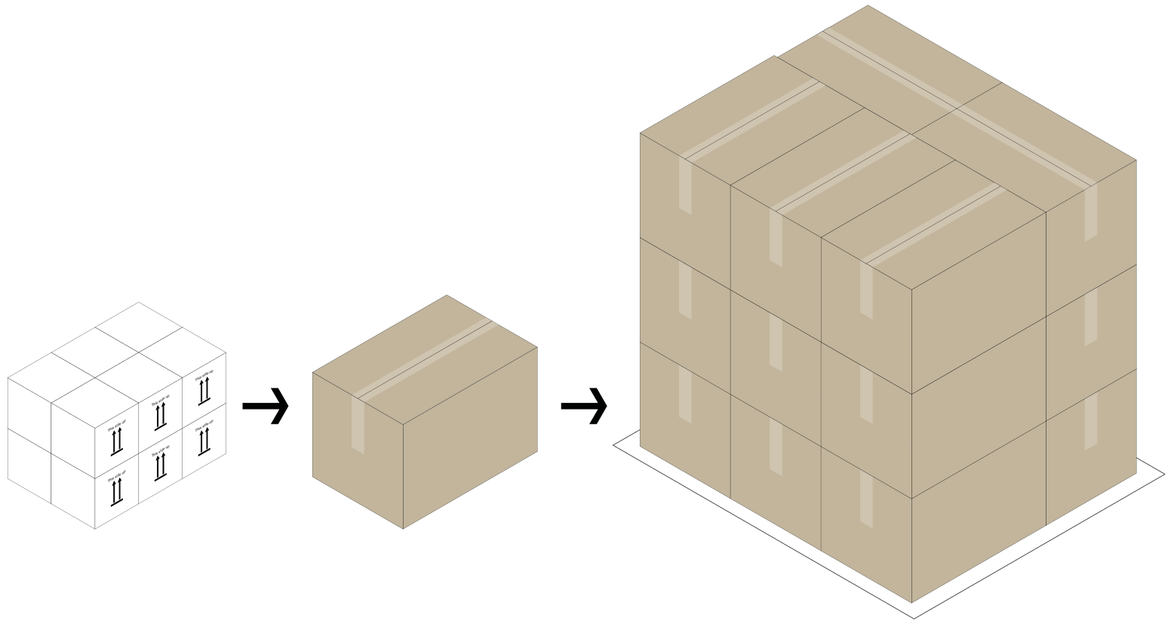
Usage of the same dieline for different sized boxes.

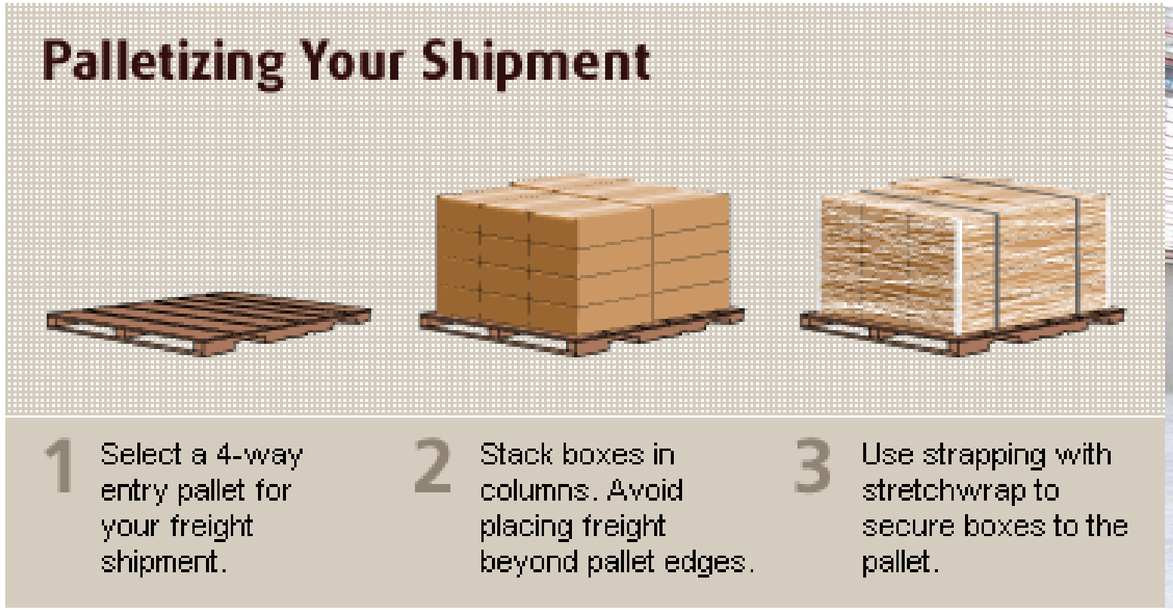


Responsive Design

Palletization

The process of placing and arranging goods or materials onto pallets for shipping and storage.





Once a pallet sized is determined, the boxes are configured in a specific layout that is both efficient and effective for the shipping process.

An example of filled pallets with stacked boxes inside warehouse shelving units.

An example of a filled shipping container.

Intermodal transportation of containers.

Containerization

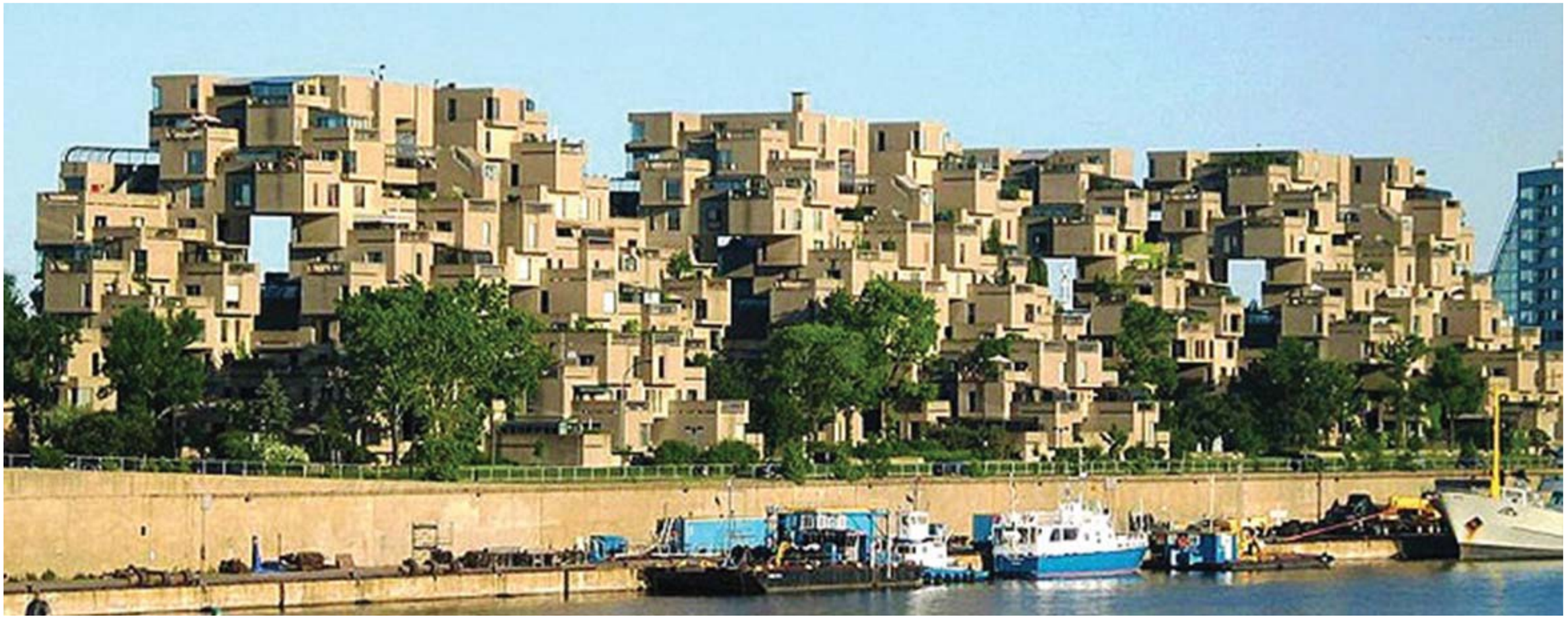
SeaLand, 1960

Originally founded by American trucking entrepreneur, Malcom McLean, revolutionized the shipping industry by packing goods through a system of uniform intermodal containers.

Habitat 67

Moshe Safdie, 1967

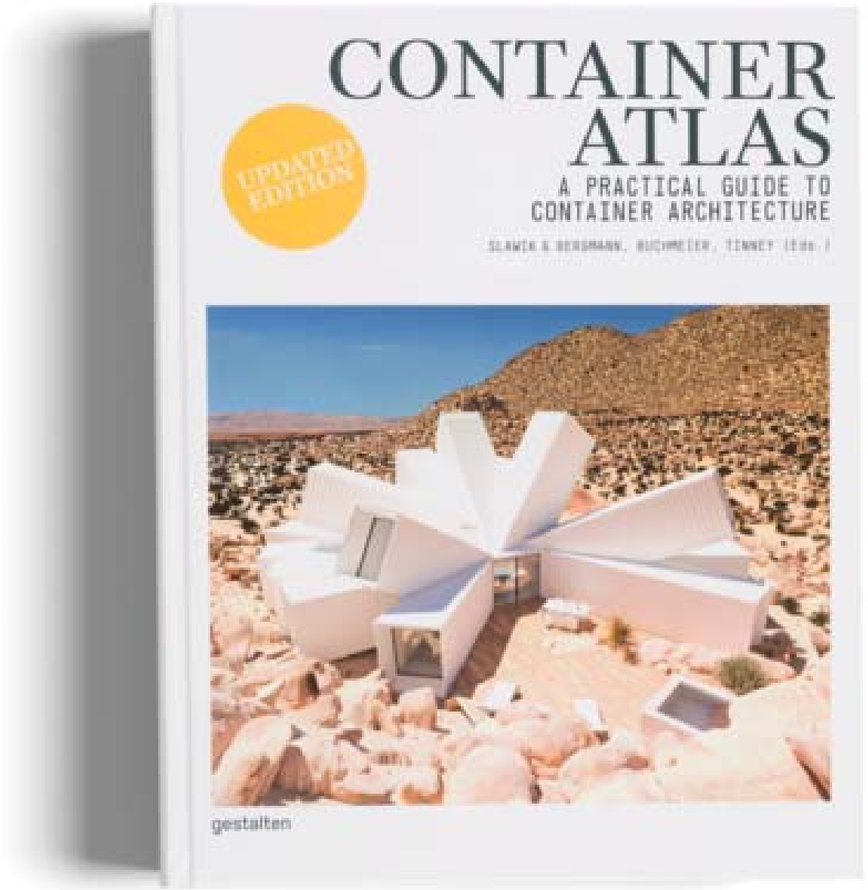
This minimalist housing complex is compromised of 354 identical concrete modules arranged in various combinations to create one of the most recognizable architectural landmarks in both Montreal and Canada.



Container Atlas: A Practical Guide to Container Architecture

Hans Slawik, 2010

Architect and professor Han Slawik, provides insight into container architecture and its evolution around the world. He reclaims and reuses modular shipping containers to create different structures.




Project
PACHACUTEC HOUSE
Architect
TRS STUDIO
Project location Pachacutec, Peru
Estimated size Residential
Container type Freight container
This conceptual design considers the shipping container as a solution for low-cost housing issues in Peru, taking the small town of Pachacutec as a case study. Much of the housing in this region is improvised, whereas TRS Studio suggests an organized, structurally sound alternative that fosters the entrepreneurial spirit of the local community. The proposal chooses two parallel containers per unit, topped with recycled polycarbonate roofing, selected for its resistance to harsh weather conditions. Shipping containers are a viable option for their modularity and strength, as well as being a recycled material. Their standardized dimensions also simplify the architecture process to adapt the concept across different climates and contexts. The project is still in its experimental phase. The architects suggest that the first round of construction would prove a valuable learning curve to understand the replicability of the scheme. The ambition is for this project to evolve the urban image of Pachacutec as a beacon of long-term sustainable construction.
01
Single family dwelling concept, based on two 40-foot containers.
02
The roof to make true corporate sulfuor polycarbonate plates.
03
Front elevation.
04
Repurposed shipping containers were proposed for their ease of transport and ability to withstand harsh environments.

Project
JOSHUA TREE RESIDENCE
Architect
WHITAKER STUDIO
Project location Joshua Tree, USA
Estimated size Residential
Container type Freight container
01, 02
Interior renders showing bedrooms branching out from the entrance hall.
03, 04
Exterior renders showing the home against the dramatic Californian landscape.


Project
DEL POPOLO
Architect
JON DARSKY
Project location San Francisco, California, USA
Estimated size Hospitality
Container type Freight container
Perhaps the only thing better than fresh pizza is pizza delivered fresh. The Del Popolo pizzeria takes this a step further with its mobile pizza truck, a freight container on wheels kitted out with a handmade 2,268 kg Stefano Ferrara wood-fired brick oven and is mounted to the bed of a Freightliner M2 truck. With its hulking weight, the structure required a heavy duty truck to accommodate the load. One wall of the container has been replaced almost entirely with windows, which, when open, have what the designers describe as a "wraparound" of almost nine metres like a transparent awning. In the end, the truck does not just serve food, it is also a glass enclosed exhibition kitchen, "seating" pedestrians and passersby at an impromptu chef's table. Aboard the truck, chefs churn out pipping hot Neapolitan-style style pizzas to the pedestrian. Indeed, the pizzeria takes its name from the Italian words "of the people," chosen to reflect the egalitarian character of pizza. Now on wheels roaming the streets of San Francisco, the pizza is more accessible than ever.

Science Classification Systems

Periodic Table

Dmitri Mendeleev, 1871

Russian chemist, Dmitri Mendeleev, arranged the elements based on atomic mass and arranged them in groups with similar properties.

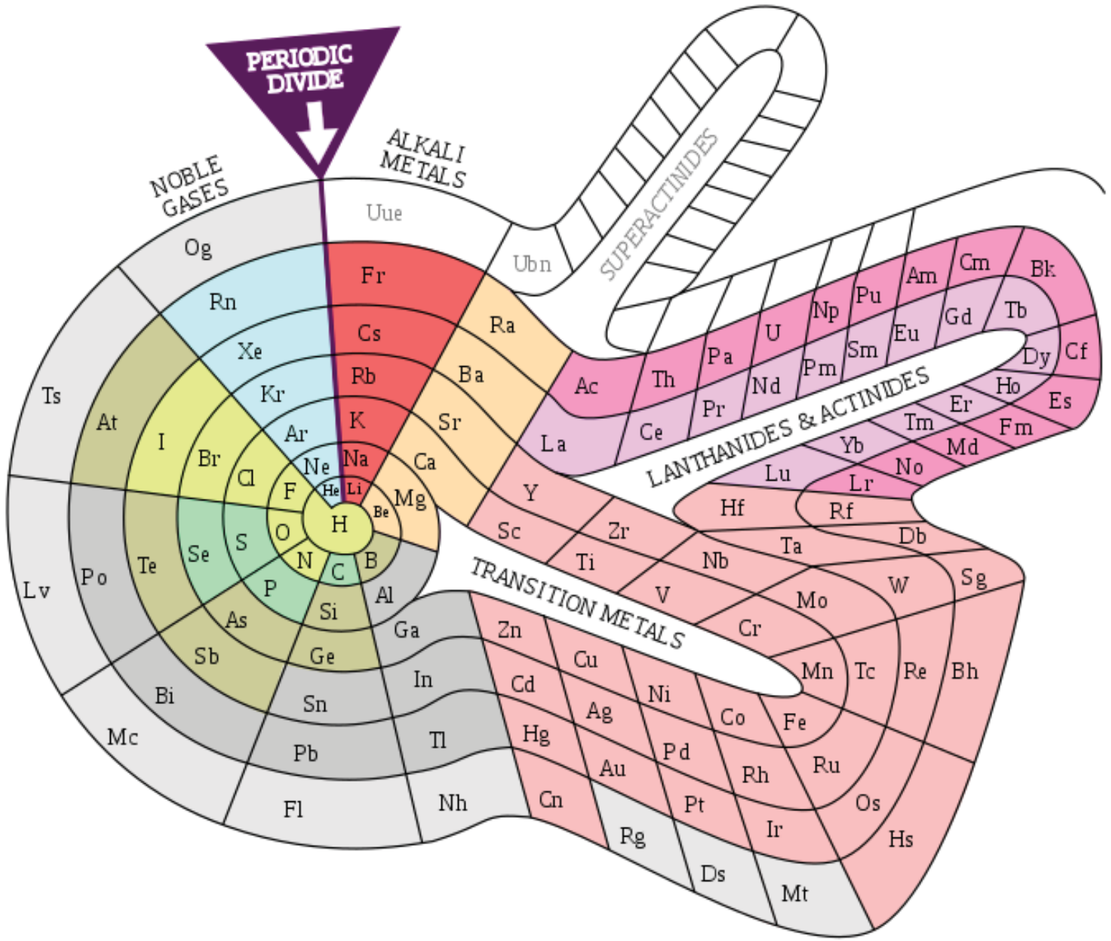
Reihen	Gruppo I. — R^1O	Gruppo II. — RO	Gruppo III. — R^2O^3	Gruppo IV. RH^4 RO^2	Gruppo V. RH^3 R^2O^5	Gruppo VI. RH^2 RO^3	Gruppo VII. RH R^2O^7	Gruppo VIII. — RO^4
1	H=1							
2	Li=7	Be=9,4	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=27,3	Si=28	P=31	S=32	Cl=35,5	
4	K=39	Ca=40	—=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59, Ni=59, Cu=63.
5	(Cu=63)	Zn=65	—=68	—=72	As=75	Se=78	Br=80	
6	Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	—=100	Ru=104, Rh=104, Pd=106, Ag=108.
7	(Ag=108)	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8	Cs=133	Ba=137	?Di=138	?Ce=140	—	—	—	— — — —
9	(—)	—	—	—	—	—	—	
10	—	—	?Er=178	?La=180	Ta=182	W=184	—	Os=195, Ir=197, Pt=198, Au=199.
11	(Au=199)	Hg=200	Tl=204	Pb=207	Bi=208	—	—	
12	—	—	—	Th=231	—	U=240	—	— — — —

			Ti=50	Zr=90	?=180.
			V=51	Nb=94	Ta=182.
			Cr=52	Mo=96	W=186.
			Mn=55	Rh=104,4	Pt=197,1.
			Fe=56	Ru=104,4	Ir=198.
			Ni=Co=59	Pl=106,6	Os=199.
H=1			Cu=63,4	Ag=108	Hg=200.
	Be=9,4	Mg=24	Zn=65,2	Cd=112	
	B=11	Al=27,4	?=68	Ur=116	Au=197?
	C=12	Si=28	?=70	Sn=118	
	N=14	P=31	As=75	Sb=122	Bi=210?
	O=16	S=32	Se=79,4	Te=128?	
	F=19	Cl=35,6	Br=80	I=127	
Li=7	Na=23	K=39	Rb=85,4	Cs=133	Tl=204.
		Ca=40	Sr=87,6	Ba=137	Pb=207.
		?=45	Ce=92		
		?Er=56	La=94		
		?Yt=60	Di=95		
		?In=75,6	Th=118?		

Spiral Periodic Table

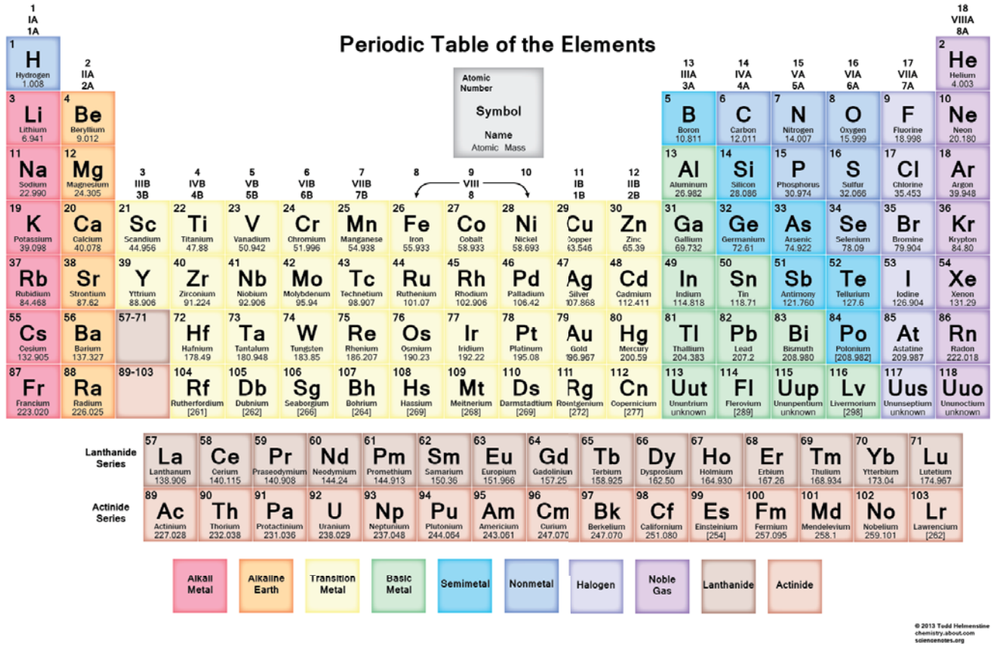
Theodor Benfey, 1964

A two-dimensional spiral that was a model of an extended periodic table.



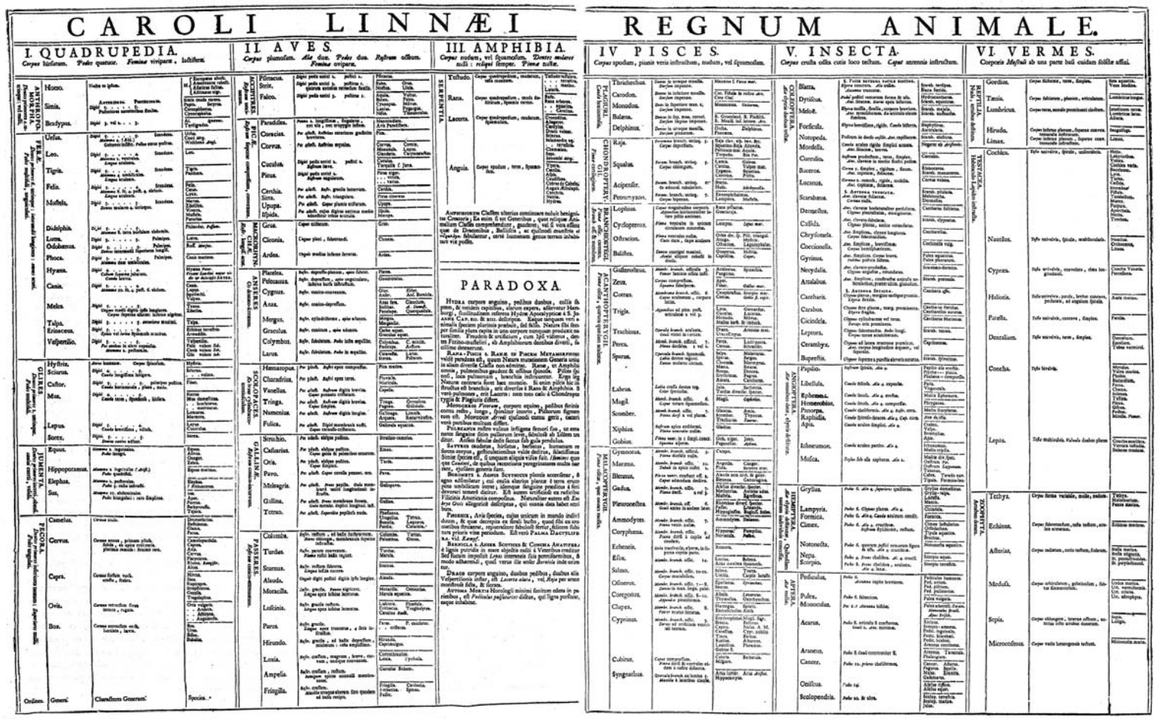
Modern Periodic Table

An arrangement of chemical elements organized by their atomic numbers, electron configurations and recurring properties. The standard table consists of rows (periods) and columns (groups).



Binomial Naming

Carl Linnaeus, 1735


CAROLI LINNÆI
REGNUM ANIMALE.
I. QUADRUPEDIA.
II. AVES
III. AMPHIBIA.
IV. PISCES.
V. INSECTA.
VI. VERMES.
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