Digital Humanities Module

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Research Methodology in
European Modern
Languages and
Literatures

Session 20 (Monday, 08.04.2024)
"DH4: Cultural significance of humanities work"

In this session, students will present the visualizations they have selected. The rhetoric of digital visualization will be discussed in terms of the models of knowledge they embody and in the light of the cultural significance of humanities work.

TEXT 4: Johanna Drucker, "Information visualization", *The Digital Humanities Coursebook: An Introduction to Digital Methods for Research and Scholarship.* New York: Routledge, 2021. pp. 86-109. [PDF available on GLOCAL]

Visualization in Digital Humanities: definition, history, examples, typologies, techniques and tools

Objectives:

1. To understand the notion of visualization
2. To understand the history of visualization
3. To distinguish types of visualization
4. To understand the uses and functions of digital visualization tools in the Humanities
5. To discuss examples of visualization techniques
6. To experiment with basic visualization techniques and tools

What is visualization?

Visualization is a computational representation strategy that is based on the metaphorical mapping between a set of quantitative data and a set of graphic elements. The graphic elements establish among themselves a system of relationships whose objective is to abstract and simplify a system of quantitative relationships.

What is visualization?

1. Typologies, techniques and tools.A schematic representation of visualization typologies: https://www.visual-literacy.org/periodic_table/periodic_table.html
2. Presentation of TAPoR (TextAnalysisPortal for Research): https://tapor.ca/home

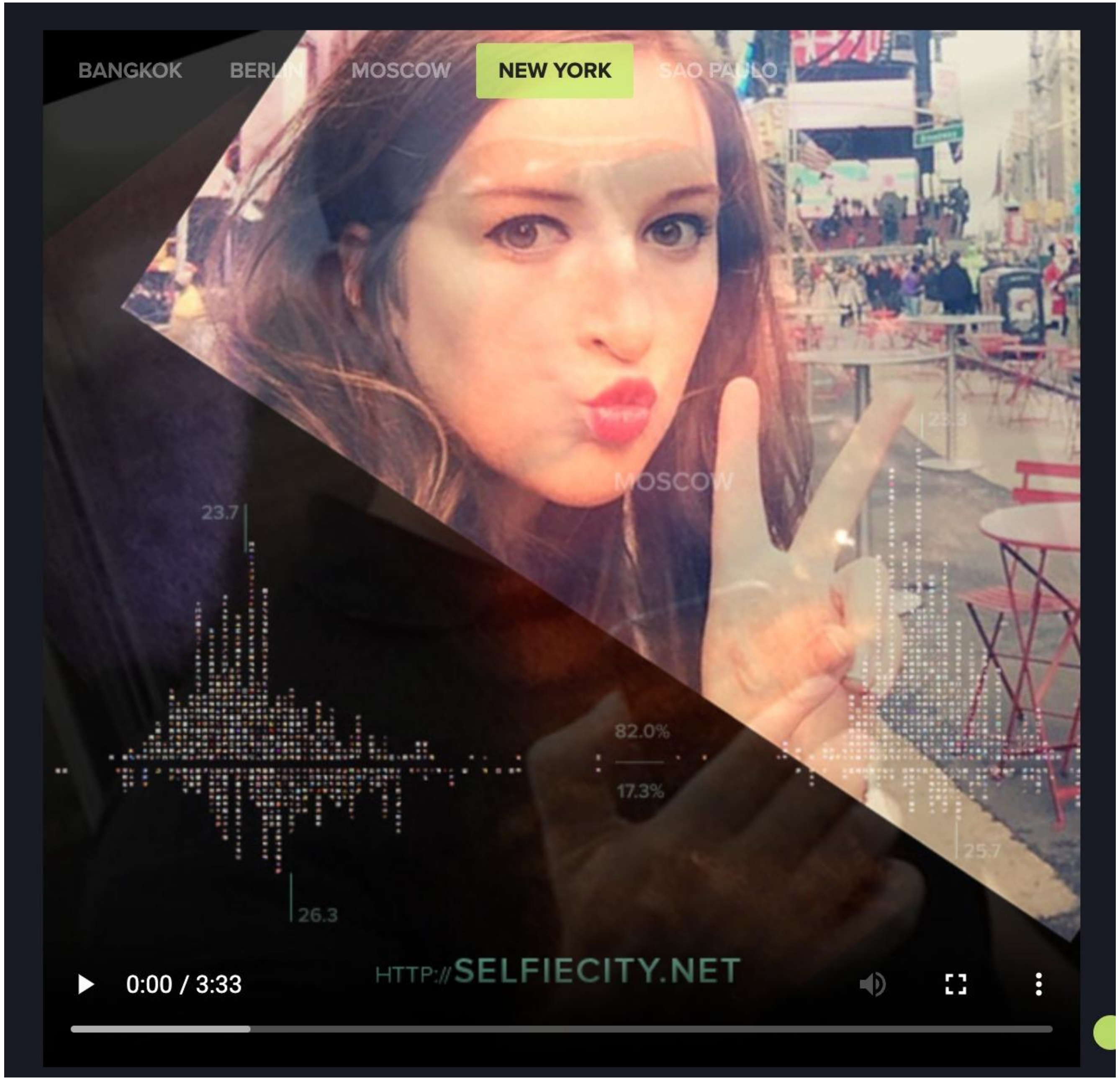
General principles of information visualization

1. **principle of reduction:** use of graphical primitives such as points, straight lines, curves, and simple geometric shapes to represent objects and relationships between objects
2. **principle of spatial variables**: use of variables such as position, size, shape and movement to represent key differences in data and reveal patterns and relationships.

"So let us start with a provisional definition that we can modify later. Let us define information visualisation as **a mapping between discrete data and a visual representation.**"
(Manovich, 2011: 37)

3. Direct visualization modalities: creating visualizations through the use of visual objects themselves as visualization elements (for example, an aggregated visualization of a set of paintings, or photographs, or comic book pages). According to Lev Manovich, this typology of visualization, carried out without reduction processes, is particularly relevant for the arts and humanities. (Manovich, 2011: 41-48)

Notions of visualization and direct visualization exemplified with the project "Selfiecity" (2014) by Lev Manovich: https://selfiecity.net/



“Selfiecity” (2014) by Lev Manovich: https://selfiecity.net/

1. Principle of reduction

The first principle is reduction. Infovis uses graphical primitives such as points, straight lines, curves and simple geometric shapes to stand in for objects and relations between them – regardless of whether these are people, their social relations, stock prices, income of nations, unemployment statistics, or anything else. By employing graphical primitives (or, to use the language of contemporary digital media, vector graphics), infovis is able to reveal patterns and structures in the data objects that these primitives represent. However, the price being paid for this power is **extreme schematisation**. (Manovich 2011: 38)

2. Principle of spatialization

This principle can be rephrased as follows: infovis privileges spatial dimensions over other visual dimensions. In other words, we map the properties of our data that we are most interested in onto a topology and geometry. Other less important properties of the objects are represented through different visual dimensions – tones, shading patterns, colours or transparency of the graphical elements. (Manovich 2011: 38)

modes of visualization

1. static visualizations
2. dynamic (animated) visualizations
3. interactive visualizations (user configurable)

An example of a visualization tools. Voyant Tools:
https://voyant-tools.org/

Manovich,Lev (2011). "What is visualisation?", *Visual Studies*, 26.1: 36-49. DOI:10.1080/1472586X.2011.548488

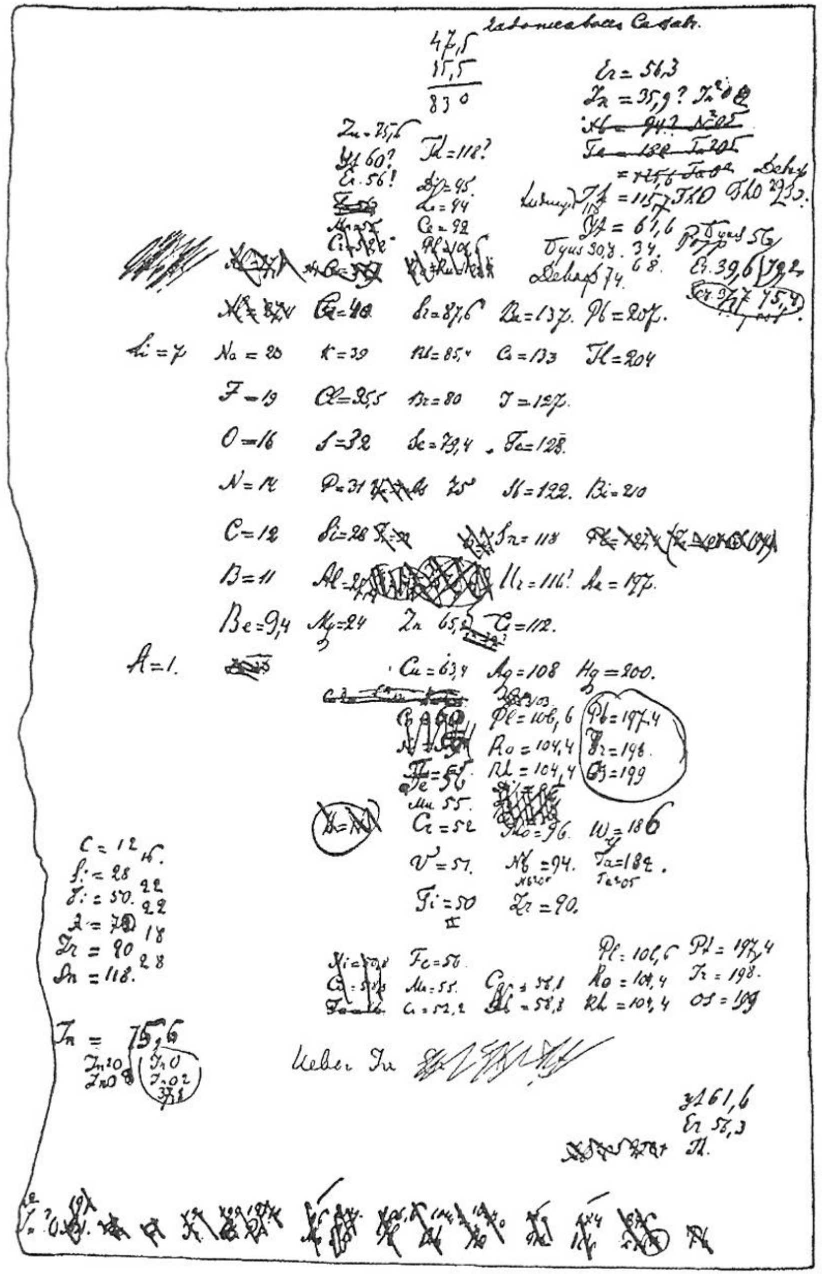
1. Distinction between:
    a) information visualisation(infoVis);
    b) scientific visualization;
    c) information design;

2. Principles of visualization:
    a) reduction;
    b) use of spatial variables (position, size, shape, and movement)
    c) direct visualisation

Let us define **information visualisation** as a mapping between discrete data and a visual representation. We can also use different concepts besides ‘representation’, each bringing an additional meaning. For example, if we believe that the brain uses a number of distinct representational and cognitive modalities, we can define infovis as a mapping from other cognitive modalities (such as mathematical and propositional) to an image modality. (Manovich 2011: 37)

Scientific visualisation developed in the 1980s along with the field of 3D computer graphics, which at that time required specialised graphics workstations. Information visualisation developed in the 1990s along with the rise of desktop 2D graphics software and the adoption of PCs by designers; its popularity accelerated in the 2000s – the two key factors being the easy availability of big data sets via Application Programming Interfaces (APIs) provided by major social network services since 2005, and new high-level programming languages specifically designed for graphics (e.g. *Processing*) and software libraries for visualisation (e.g. *Prefuse*). (Manovich 2011: 38)

Pierre-Joseph Redouté (1759–1840), Anemone Simplex



47,5
15,5
83 0

Er = 56,3
Yt 60?
Ce 56?
Th = 118?
Di = 95
La = 94
Ce = 92

Ca = 40 Sr = 87,6 Ba = 137. Pb = 207.
Li = 7 Na = 23 K = 39 Rb = 85,4 Cs = 133 Tl = 204
F = 19 Cl = 35,5 Br = 80 J = 127.
O = 16 S = 32 Se = 79,4 Te = 128.
N = 14 P = 31 75 Sb = 122. Bi = 210
C = 12 Si = 28 Sn = 118
B = 11 Al Ur = 116? Au = 197.
Be = 9,4 Mg = 24 Zn 65,2 Cd = 112.
H = 1. Cu = 63,4 Ag = 108 Hg = 200.
Pd = 106,6 Pt = 197,4
Ro = 104,4 Ir = 198.
Fe = 56 Rh = 104,4 Os = 199
Mn 55.
Cr = 52 Mo = 96. W = 186
V = 51. Nb = 94. Ta = 182.
Ti = 50 Zr = 90.

C = 12 16.
Si = 28 22
Ti = 50. 22
? = 70 18
Zr = 90 28
Sn = 118.

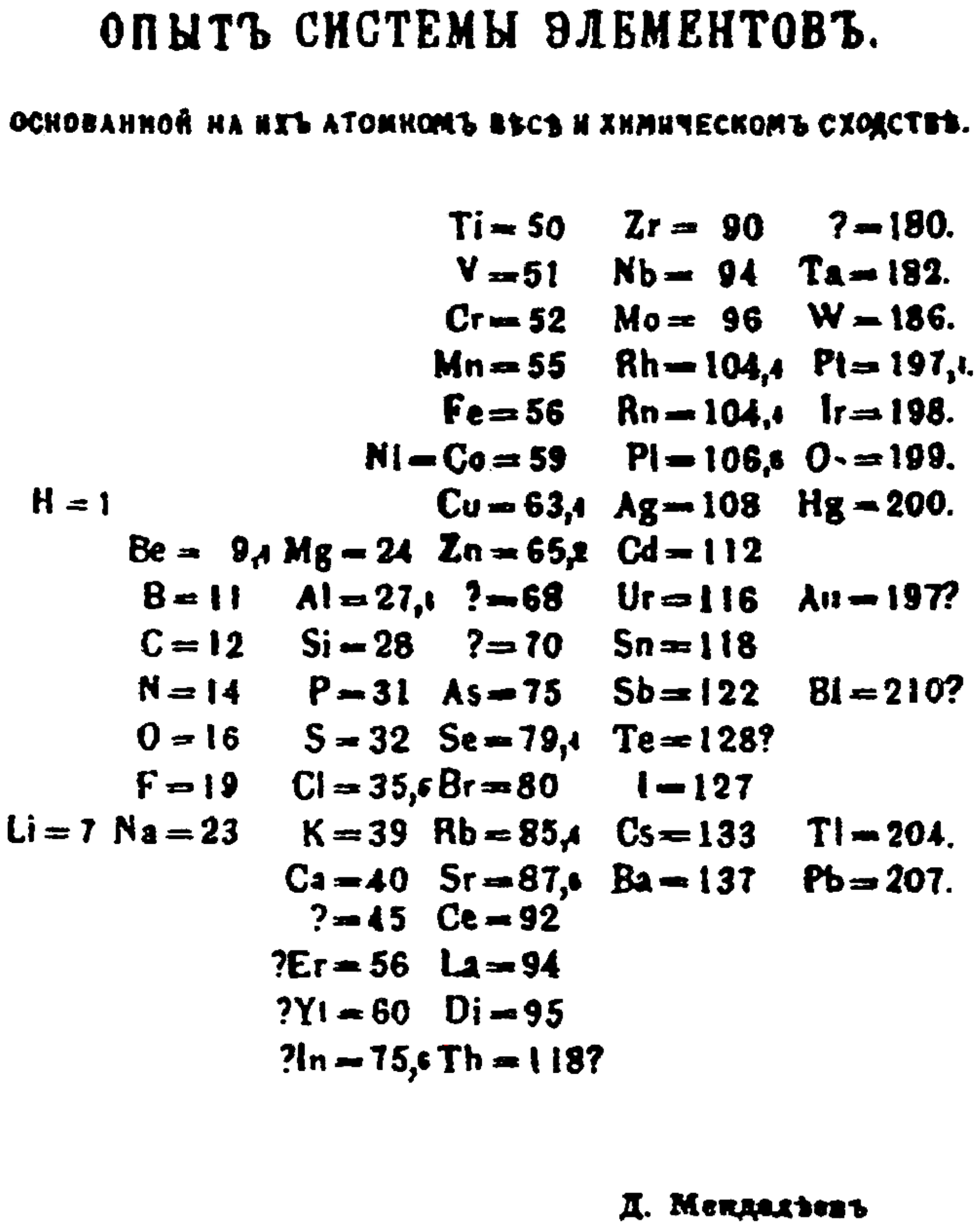
Fe = 56. Pd = 106,6 Pt = 197,4
Mn = 55. Co = 58,8 Ro = 104,4 Ir = 198.
Cr = 52,2 Ni = 58,8 Rh = 104,4 Os = 199

Ur = 75,6

Ueber Ur

Yt 61,6
Er 56,3

Dmitrii Mendeleev's First Periodic Table
(manuscript draft, 1869)



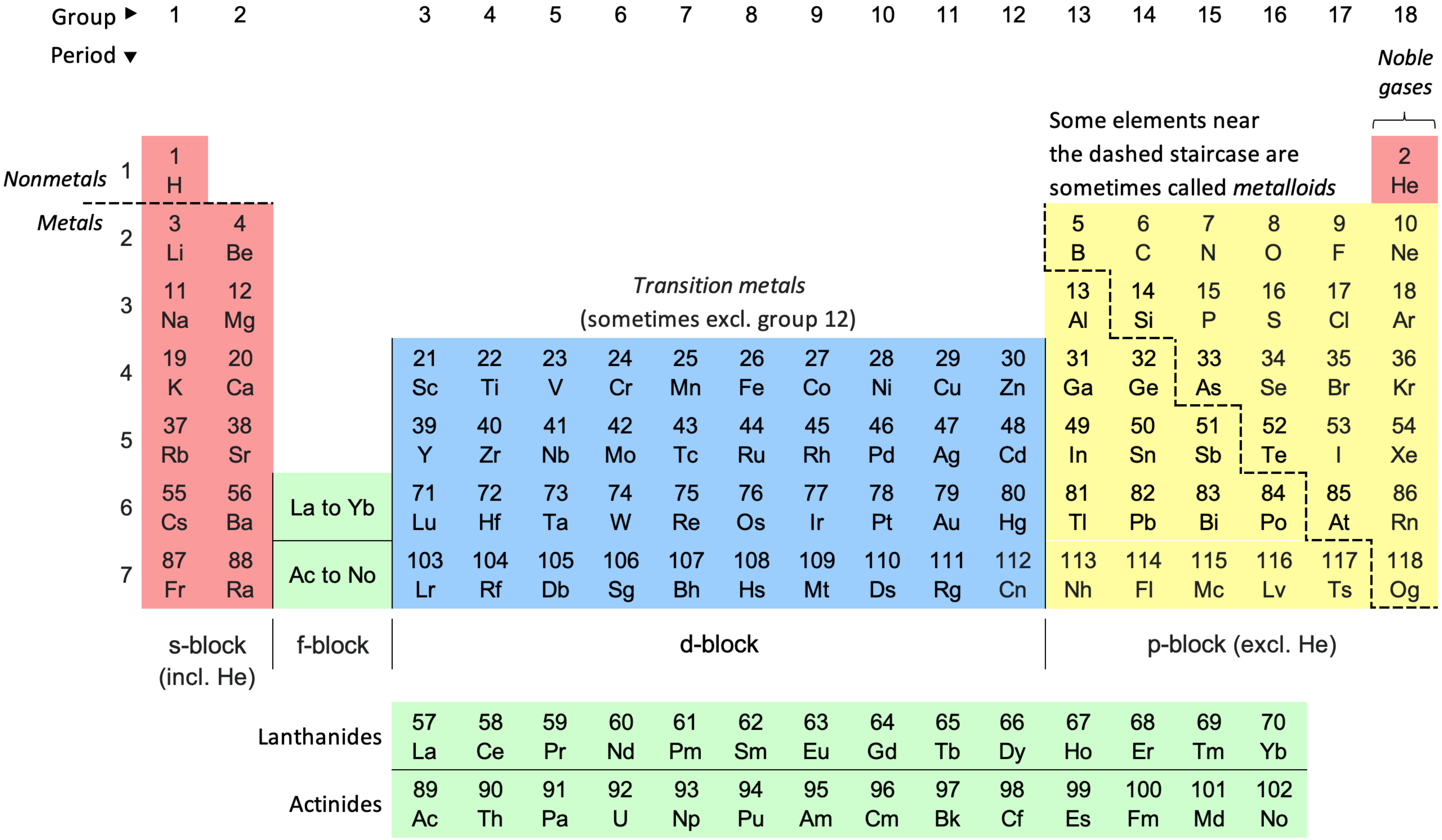
ОПЫТЪ СИСТЕМЫ ЭЛЕМЕНТОВЪ.

ОСНОВАННОЙ НА ИХЪ АТОМНОМЪ ВѢСѢ И ХИМИЧЕСКОМЪ СХОДСТВѢ.

			Ti = 50	Zr = 90	? = 180.
			V = 51	Nb = 94	Ta = 182.
			Cr = 52	Mo = 96	W = 186.
			Mn = 55	Rh = 104,4	Pt = 197,4.
			Fe = 56	Rn = 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 = 35,5	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?		

Д. Менделѣевъ

Dmitrii Mendeleev's First Periodic Table (1869)



Group ▶ Period ▼	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Nonmetals 1	1 H																		2 He
Metals 2	3 Li	4 Be												5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg												13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca		21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr		39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	La to Yb	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	Ac to No	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og
	s-block (incl. He)		f-block	d-block										p-block (excl. He)					

Noble gases

Some elements near the dashed staircase are sometimes called *metalloids*

Transition metals
(sometimes excl. group 12)

Lanthanides	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
Actinides	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No

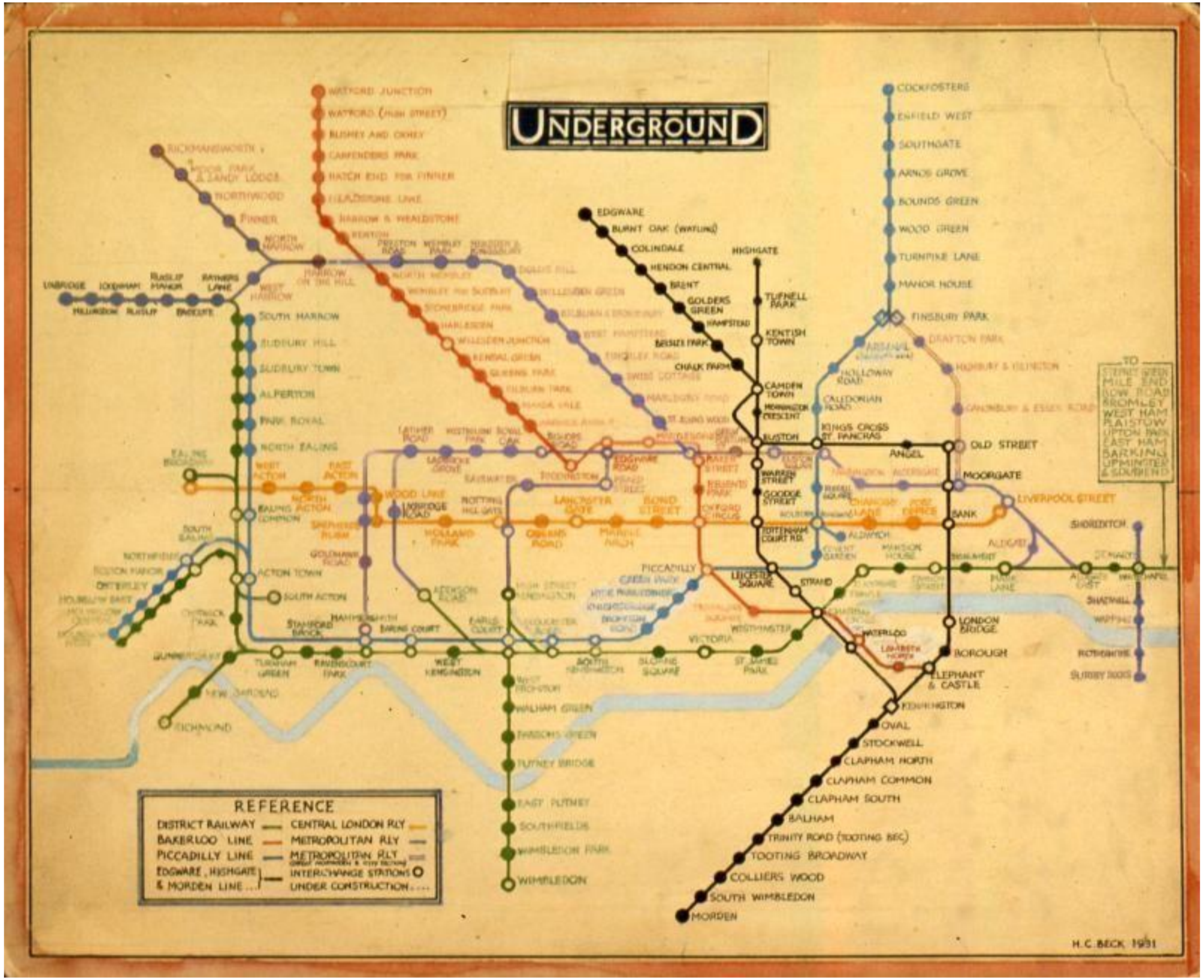
Periodic Table, *Wikipedia* https://en.wikipedia.org/wiki/Periodic_table
Interactive Periodic Table https://ptable.com/#Properties

Information design starts with the data that already have a clear structure, and its goal is to express this structure visually. For example, the famous London tube map designed in 1931 by Harry Beck uses structured data: tube lines, tube stations and their locations over London geography. In contrast, the goal of **information visualisation** is to discover the structure of a (typically large) data set. This structure is not known a priori; a visualisation is successful if it reveals this structure. (Manovich 2011: 38)

Information design *vs.* information visualization

1. Example of information design:
Diagram of the London Underground drawn by Harry Beck in 1931

2. Example of information visualization:
Diagram by Charles Joseph Minard, from 1869, representing the losses of soldiers in the campaign of Napoleon's troops in Russia, in 1812-1813.



London Underground
by Harry Beck, 1931.

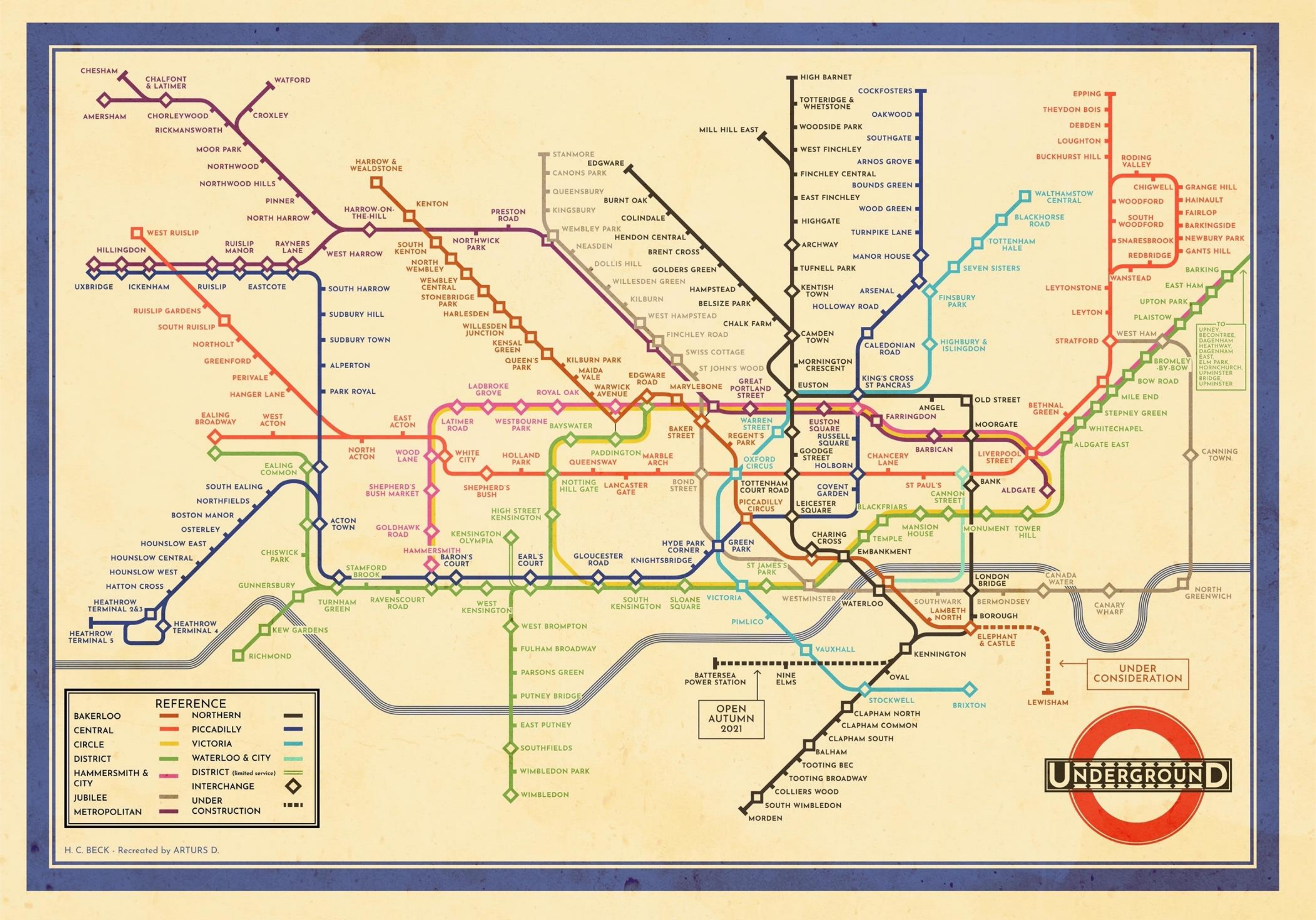
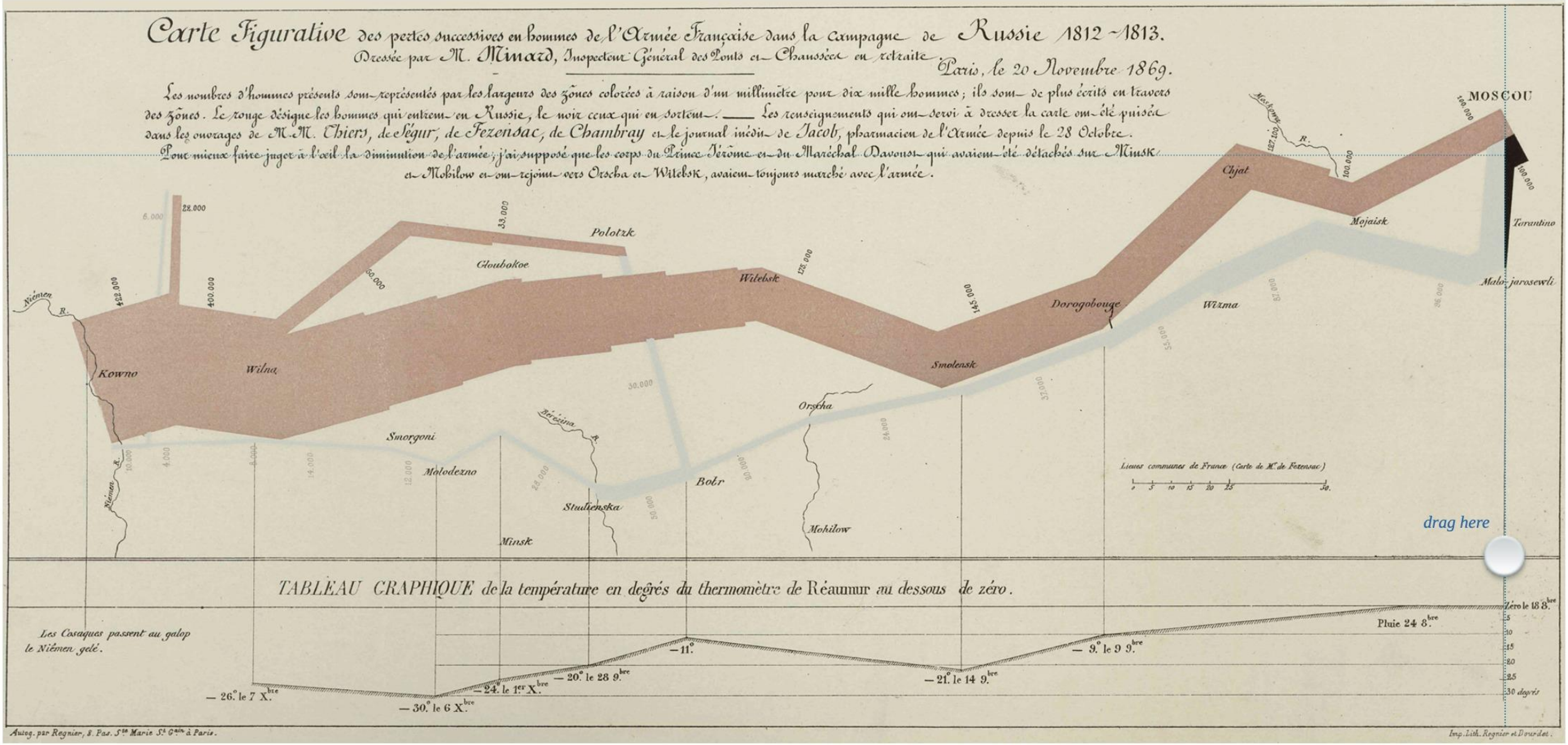


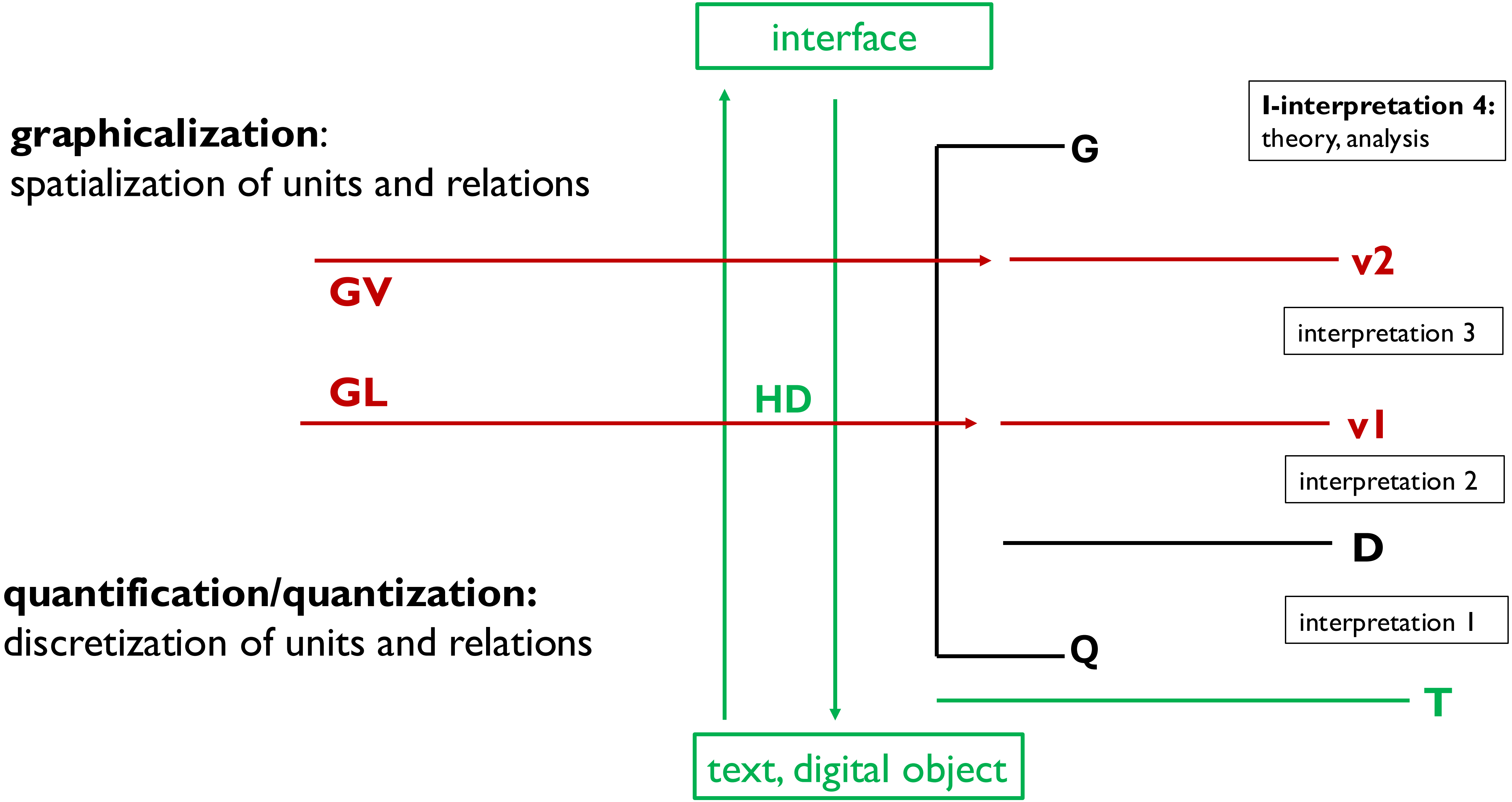
Diagram of the London Underground (2021, based on Harry Beck's 1931 drawing).



Charles Joseph Minard, «Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813»; Paris 1869.

Charles Joseph Minard: Napoleon's Retreat From Moscow(The Russian Campaign1812-1813) An Interactive Chart

https://www.masswerk.at/minard/



graphicalization:
spatialization of units and relations

quantification/quantization:
discretization of units and relations

interface

text, digital object

HD

GV

GL

G

Q

v2

v1

D

T

I-interpretation 4:
theory, analysis

interpretation 3

interpretation 2

interpretation 1

Visualization and interpretation

(NOTE: this an explanation of my conceptualization in the previous diagram)

Representation of several layers of interpretation involved in a visualization: data production (D-interpretation 1), selection of a graphic language for visual expression of data (V1-interpretation 2), translation of the selected data variables into specific visualizations mediated by the selected graphic language (V2-interpretation 3), macro-interpretation from visualizations (I-interpretation 4).

Data production results from possibilities for quantifying different types of discrete units and relationships in the text or digital object (Q). In turn, the metric that supports the data as data is translated graphically (G) using a spatialization scheme for relationships according to a given language graphics (LG) and a number of graphic variables (GV).

Digital Humanities (HD) would be the designation of the epistemology of a method of knowledge in which a **text or other digitized artifact** (T) undergoes various forms of computational processing, including visualizations, which are expressed in an **interface.**

References

TEXT 3: Lev Manovich, "What is visualisation?", *Visual Studies*, 2011, 26:1, 36-49. https://doi.org/10.1080/1472586X.2011.548488
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