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"The third dimension is interpretation."

**Design goal:** Can we augment current visualizations to better serve humanists and, at the same time, make humanistic methods into systematic visualizations that are useful across disciplines outside the humanities?

Guidelines for this design:

- Augment the impoverished visual vocabulary (graphical primitives/paintbox, elements, and attributes) and syntax (agent sheets).
- Work from data to display and display to data.
  Keep these principles in mind: design/implementation should be:
  - simple (close to existing standards with regard to vocabulary/formats);
  - general (from humanities methods but able to be used for other fields);
  - modular (extensible, we don't have to be exhaustive from the outset);
  - customizable (build in simple features like labels for customization).

Method for the design process:

- Identify what works and what we want to add to existing platforms/tools etc. (alternatively, design our project's functional specifications and then see if these exist in any current platform) (From the matrix, in relation to our design specs)
- Create specific cases as our common reference point. (See below: A).
- Identify aspects of interpretation (primitives) and establish some legible conventions for their implementation. (See below: B)
- Work through the visualization types to apply graphical, epistemological and/or hermeneutic principles to linked cases (with expanded justification of general principles for broader use in fields outside the humanities). (See below: C)
- Look systematically at graphical primitives and think logically and systematically about how to apply them to be legible (e.g. blur=uncertainty, toggle contrast=contradiction, etc.) (See below: D)
- Investigate the use of third dimension for interpretation: use of z-axis, 3-D rendering, perspective, tilting, distortion, projection, etc. (See below: E)

A systematic approach to the problem:

For each case, we will:
- look at what works and what can be added;
- consider all the possible visualization types used in relation to the project;
- address which interpretative/epistemological aspects we want to use;
- experiment with the ways the graphical vocabulary can be used most intuitively;
- consider the ways the third dimension can be activated for interpretation (and to indicate interpretation as an argument in relation to evidence);
- elaborate on ways these humanities projects and the 3DH solutions can be used for other fields and disciplines (or, why humanities methods can augment current data display/visualization techniques from other fields);
- create user personae and scenarios for the 3DH platform/project;
- consider what can be generalized to other disciplines/domains.

**A. Cases:**
- Slave revolt: History (map, timeline, texts), relation of argument to evidence; specific geographies, partial knowledge (already interpretative—but can we supply a way to make the argument apparent—argument layers?)
- Twitter: Data vis, social media (charts, plots, network graphs) (Can we get back to the original "data" and deal with "mass data" and the hairball problem?)
- Emily Dickinson: Editing Project: (variorum, text also data, mark-up) What visualizations will be of use here?
- Archaeological site: Objects, classifications: Archaeological: Fluid ontologies / resource allocation / naming (tables, maps, classification system, dating) Fiture out the data types, parameters, visual annotation etc.
- Catma_heureCLÉA: Text analysisStructured data / markup the hermeneutical dimensions is very explicit, so visualization serves to make it legible)
- Alphabet historiography: temporalities/timelines and vague geographies (models of history/diverse ontologies or relative taxonomies?)

**B. Epistemological / Interpretative dimensions** (n.b. these are mainly semantic, and work as descriptions of knowledge or interpretation; this is a partial/working list an can be extended as desired; should be able to be included in a sentence that begins, "This is an image showing _____").

Point of view (parallax) (deconstructive and synthetic—two types)
Unreliability (inconsistency)
Contradiction
Ambiguity
Uncertainty
Incompleteness (partial knowledge)
Analogy
Probability
Salience, etc.

**C. Visualization types:**

Facsimiles
Tables
Charts
Graphs (directed nodes/edges)
Maps
Timelines
Simulations/Renderings

**D. Graphical generators:** (How to go from data to visualization, when assigning a value to a data point, how does that translate into visualization? "If you dismember a word, you know what part of the word gives information about its modus, quantity, etc.—but how does that work with transforming data into visualization?")

Tone (white to black/brightness)
Value (saturation)
Color (hue)
Transparency
Texture
Shape
Orientation
Position

Size
Resolution
Blur
Direction of motion
Rate of movement
Acceleration
Rate of change
Duration
Form
Surface
Motion
Sound: tone, volume, rhythm, voice
Text

## E. Techniques for using 3-dimensionality (and 4$^{th}$—time/change/animation)
Perspective
Orthogonal use of z-axis
Projection (one plane to another, or coordinate mapping)
Dimensionalization (rendering/movement around)
Shadow
Scale change
Multiple views (top, side, etc.)
Tilt
Relative metrics
Duration, change, speed, etc. features of animation


**Exercises for working through the design problem (see Charettes for details).**

Exercise for Charette on Cases: Take the map, look at it, ask how do you implement the graphical display of each of the epistemological/interpretative primitives? TO do this, work through the graphical primitives systematically. Repeat for each of our cases;

Exercise for Graphics: Work through graphical exercises and see what is suggested (intuitively) by each graphical feature (blur suggests what? Mis-alignment suggests what? Etc.)

Exercise for Epistemological/Interpretative Primitives: link to graphical exercises, but also, work from these into graphical language/syntax.

Exercise for Visualization Types: Apply graphical approaches and epistemological/interpretative primitives to visualization types; include the 3-dimensionalization techniques in particular.

Exercise for 3-dimensionalization: Play with these techniques and explore what they suggest in terms of how they can hold/carry interpretation as a third dimension (literally, but also, conceptually).

Exercise for use cases/personae: Design user personae and create scenarios for use of the 3DH platform.

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**Functional specs**: Consider the input/export formats, how will images/models be saved, displayed, used, published as well as created/manipulated.

**Future Possibilities:** Make the interface function as a visual programming environment with pipelines and connections among "primitives" in the workflow. Consider connection to the "humanities work" primitives we listed earlier:

> Search: find, link, associate, aggregate evident/resources
> Reading: close, distant, middle etc.
> > Automated/mechanistic: Voyant
> > Coded/human-tagged: Catma
> Classify: order, name, sort, organize, structure
> Annotate
> Etc.
> Relation to the "outside" of the frame: code, controls, sources, etc.
> Connection to humanities work activities
> Communities of practice/use