Critical Reflections of Visualization Authoring Systems

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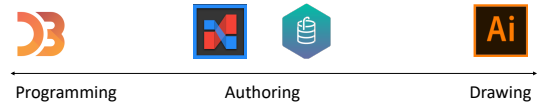
Presented by Nico Ritschel, November 26th 2019

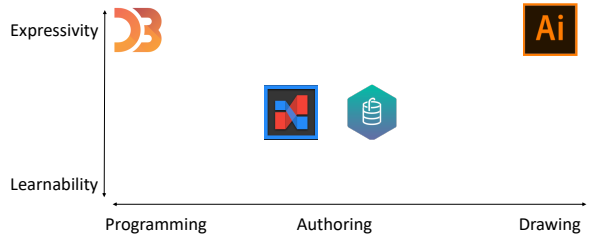
Two Contributions

1. Evaluation of 3 Visualization Authoring Systems
2. Critical Reflections methodology in general

Visualization Authoring Systems



Visualization Authoring Systems



Critical Reflections: A Novel Evaluation Approach for Vis Tools

Evaluation Method	Can evaluate expressiveness?	Can evaluate learnability?	Can compare tool to alternatives?	When can it be applied?
Design Gallery	✓	✗	✗	During development

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Comparative Study	(✓)	✓	(✓)	During development
User Adoption	✓	✓	✓	Long after release
Critical Reflection	✓	✓	✓	Immediately after release

Critical Reflections: A Novel Evaluation Approach for Vis Tools

General Idea:

- Authors of different tools discuss their work and reflect on their design choices

Here:

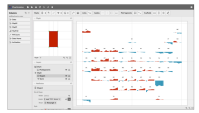
- Weekly 1-2-hour video conference for 3 months
- Focus on differences in handling marks, data binding, scales, axes, legends and layout

Visualization Authoring Systems in this Paper

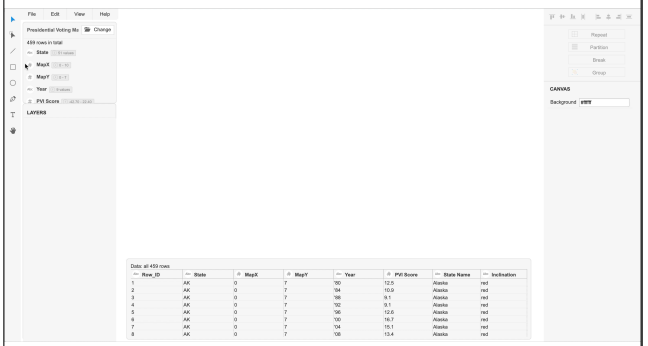
Lyra
University of Washington, 2014

Data Illustrator
Adobe Systems/Georgia Tech, 2018

Charticulator
Microsoft Research, 2018



Source of Screenshots: Fig. 1, "Critical Reflections on Visualization Authoring Systems," A. Satyanarayan et al., in *IEEE Transactions on Visualization and Computer Graphics*, vol. 26, no. 1, pp. 461-471, 2020. doi: 10.1109/TVCG.2019.2934281



Marks

	Lyra	Data Illustrator	Charticulator
What?	Predefined marks	Custom vector shapes	Predefined marks
How?	Drag and drop; Composition on main canvas	Vector-based drawing on canvas; Composition on main canvas	Drag and drop or drawing; Composition in glyph editor
Pros/ Cons	+ Simple, direct user interaction - Needs arbitrary default values - "Messy" mark composition	+ Highest expressivity - Stateful tool selection - "Messy" mark composition	+ Users choose preferred method + Easiest mark composition - Needs separate glyph canvas

Data Binding

	Lyra	Data Illustrator	Charticulator
What?	1+ data points per glyph; attributes map to visual channels	1+ data points per glyph; attributes map to visual channels	1+ data points per glyph; attributes map to visual channels
How?	One glyph for all data, then grouping by attribute; binding via "drop zones"	One glyph for all data, then "partition and repeat" by attribute; binding via menus	One glyph for each point, then grouping by attribute; binding via "drop zones" or menus
Pros/ Cons	+ Drop zones are very direct - No filtering of categorical and quantitative data - Grouping feature unintuitive - Long drags/small drop zones	+ Filtering of categorical and quantitative data + "Partition and repeat" allow uniform nesting operations - Menus are less direct	+ Users choose preferred method + Filtering of categorical and quantitative data - Limited nesting depth

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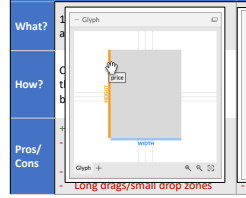

Source of Screenshots: Fig. 2, "Critical Reflections on Visualization Authoring Systems," A. Satyanarayan et al., in *IEEE Transactions on Visualization and Computer Graphics*, vol. 26, no. 1, pp. 461-471, 2020. doi: 10.1109/TVCG.2019.2934281

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Scales, Axes and Legends

	Lyra	Data Illustrator	Charticulator
What?	Full customization	Based on one or more attributes	Based on one attribute
How?	Scales/axes/legends generated manually or from data bindings and can be freely edited	Scales/axes/legends generated from data bindings; scales can be reused or merged;	Scales/axes generated from data bindings; scales can be reused;
Pros/ Cons	+ Maximum design freedom - Complex, indirect UI and overwhelming set of choices	+ Simple UI + Some flexibility for experts - Introduces hidden scale dependencies	+ Simplest UI - Lowest design freedom

Shared Assumptions of all Tools

- Familiarity with similar design tools (e.g. Adobe Illustrator)
- Concrete, mature design ideas in users' minds
  - None of the tools support non-linear design iteration
- Cleaned, pre-processed data set
  - Lyra supports some data wrangling, but limited and not easy to learn

Opinion on the Paper

+ Promising new evaluation approach
  + Analysis refers to related work on HCI and cognition
+ Interesting selection of highly related high-profile tools
  + Gathering so many industry people is an achievement in itself
- Non-empirical evaluation
  - Actual impact on usability/learnability unclear
- Does not consider time-line of development
  - Missed chance to discuss design inspirations and motivations

Questions?

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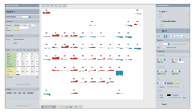

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