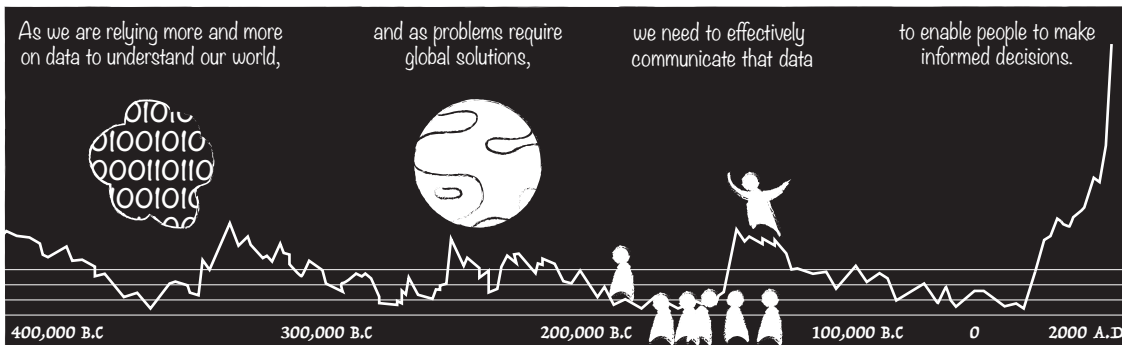# The Emerging Genre of Data Comics

Benjamin Bach, *Harvard University*
Nathalie Henry Riche, *Microsoft Research*
Hanspeter Pfister, *Harvard University*
Sheelagh Carpendale, *University of Calgary*

Comics are an old art, familiar to many.

[6]

HERE'S THE

An art to tell stories in engaging ways.

HEY! WHAT IS GOING ON?

[7]

One that works by established elements and rules

Panels

Context

Once upon a time...

HI!

Comics & Co.

Text

BOOM!

Symbols

Characters

many of which are well studied.

[6]

[8]

[9]

[10]

...

At the same time, comics allow for great expressive freedom.

Langauge

Word+Picture

BOOM!

Flow

Visual Notation

Here, we explore **data comics** as a new genre, inspired by how comics function,

to convey information in data,

telling a story,

and communicating through visualizations.

Data Comics

Data

+

Story

+

Visualizations

Examples of data comics started to pave the way...

We start with a ring of *n* vertices

where each vertex is connected to its *k* nearest neighbors

n = 12

k = 4

like so.

We choose a vertex, and the edge to its nearest clockwise neighbour.

[11]

QueryMarvel

10 DAYS LATER

[12]

[13]

1907

Triple Entente

Triple Alliance

1914

[8]

Progress:

Definition

Guidelines

Examples

Conversation

Tools

... but the vast field is mostly empty.

Four Essential Components of Data Comics

Visualization
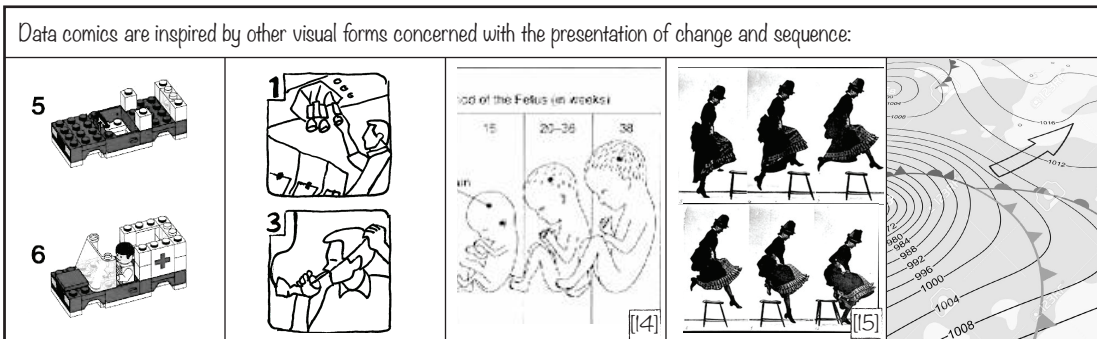
Flow

Narration

Words and pictures

To explore that design space and to characterize data comics, we discuss four essential components of data comics.

Our goal will be to spot

the Island of Data Comics

... in the ocean of storytelling.

We believe it is timely to start this journey now. We start exploring different angles , trying to describe what makes it special and what is the potential of data comics.

Data comics are inspired by other visual forms concerned with the presentation of change and sequence:

We call this component **visualization**, ranging from iconic **realistic** pictures to **abstract** and conceptual visualizations.

Realistic ← Visualization → Abstract
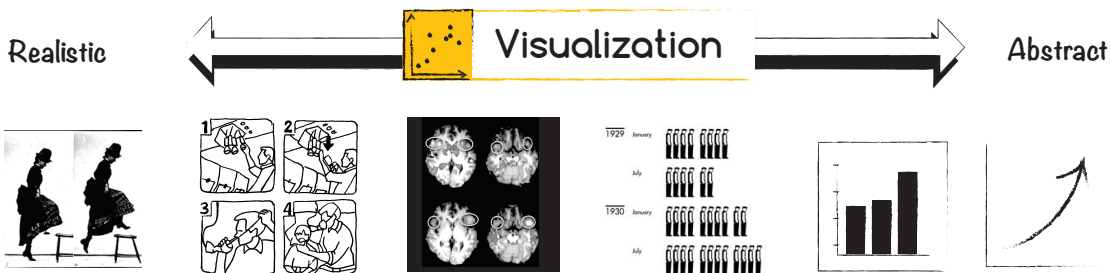
While all of these pictures are visualizations, not all of them show **data.**

Data visualizations provide a visual form to something otherwise **invisible**.

In fact, data does not actually have to exist,

nor can we be sure the representation is true.

Data comics can vary style and detail to support a message..

We're all good!   ..this is unstable!

... or use alternative representations to highlight a different point.

Node-link Diagram   Adjacency Matrix

one central node.   many missing connections.

A chosen visualization must fit the data, but...

?   !

most importantly, it must be understood by readers ...

Bertin

... even those who have never seen a visualization.

Data visualizations are designed to allow for a variety of discoveries and insights:

Trends

relations

outliers

clusters

comparisons

1974   1975

126   13?

change

distributions, ...
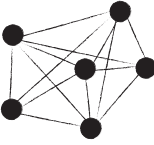
... which eventually will be shown to the audience.
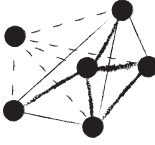
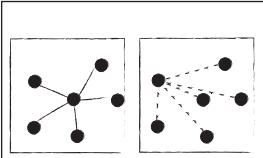In storytelling, it is imporant that people understand the presented content easily.

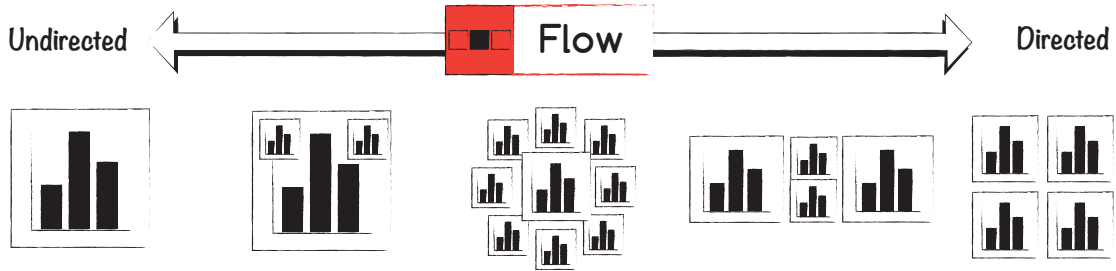Even more when data and visualizations are complex.

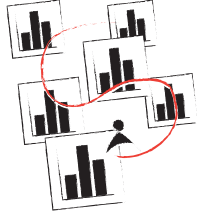Yet, comics offer a fascinating and simple way:

one | message | per | panel.

We call this component **flow**, ranging from an **undirected** non-explicit flow to a **directed** flow indicated by the order of the panels.
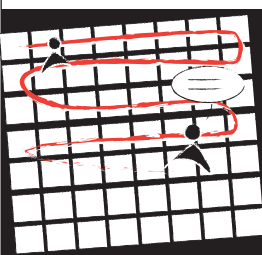
Undirected ← **Flow** → Directed

No reading order requires readers to explore by themselves.
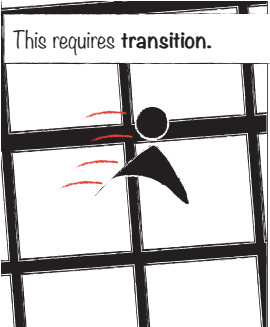
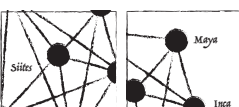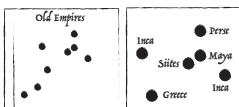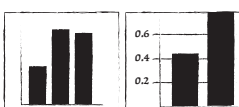Comics can explain complex processes by splitting them into less complex units.
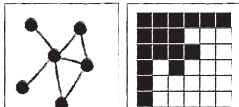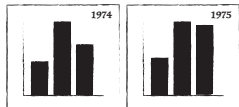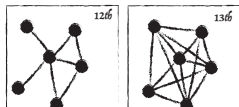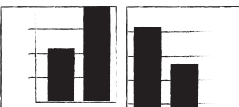
Linear order provides **guidance** and aids argumentation.
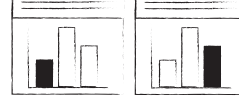
This requires **transition.**
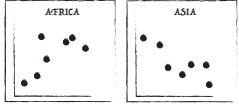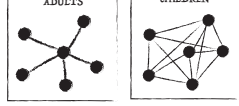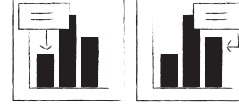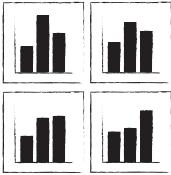
For example:
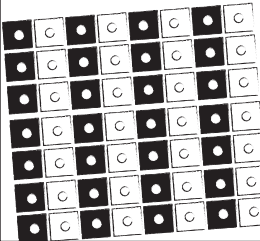
Visualization-To-Visualization

Moment-to-Moment

1974   1975

12th   13th

Detail-to-Detail

Siites   Maya

Inca

Level-of-Detail

Old Empires

Inca   Persie

Siites   Maya

Greece   Inca

0.6
0.4
0.2

Data-to-Data

AFRICA   ASIA

ADULTS   CHILDREN

Visualization-to-Context

AFRICA   AFRICA

Message-to-Message

But sometimes, a linear order is not desired or just too simple.

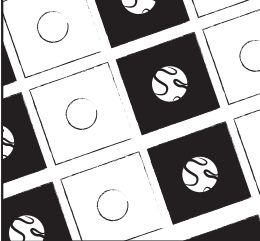However, sequential visualizations do not yet make a good story nor explanation.
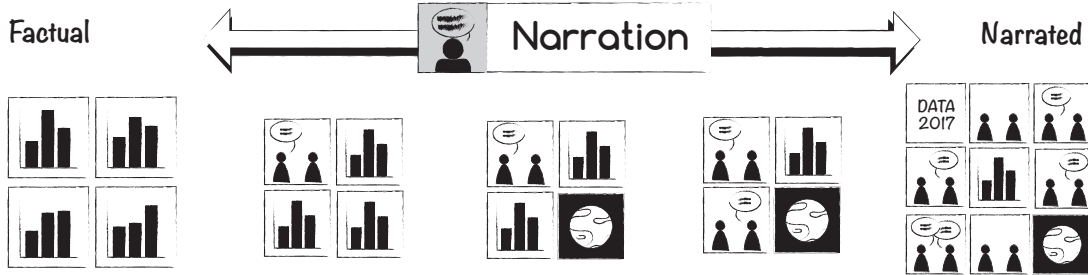
A good story has a **rhythm**,

it draws readers in, it immerses ...

but, most important, it has a message to the world.

We call this component **narration**, ranging from **factual** arrays of visualizations to richly **narrated** graphic novels.
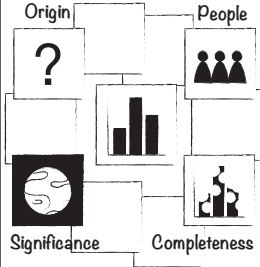
Factual ← **Narration** → **Narrated**

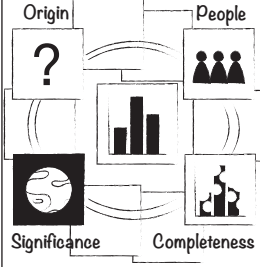Data never comes alone,

data always has a **context**.

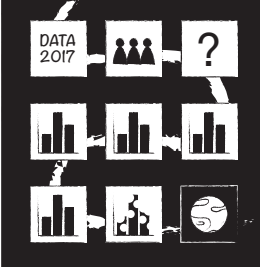Origin ? People

Significance Completeness

Context creates **story** which wants to be **narrated**.

Origin ? People

Significance Completeness

DATA 2017
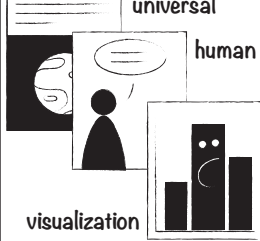
A good narration requires balance;

Data Context
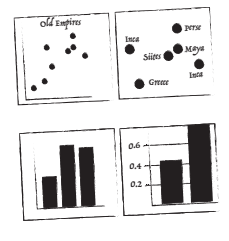
it can use different types of narrators:

universal

human
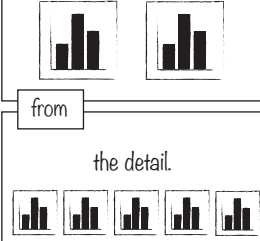
visualization
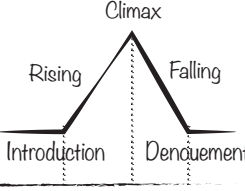
It makes use of transitions between panels

Old Empires

Inca Perse
Sites Maya
Inca
Greece

0.6
0.4
0.2

and separates

the important

from

the detail.

But storytelling is an old **art** and learning from the masters

Climax

Rising Falling

Introduction Denouement

... can help to create truly
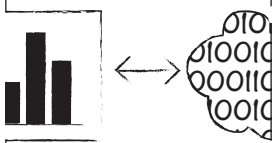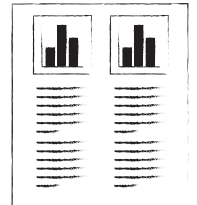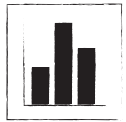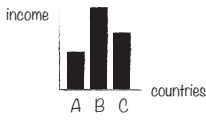
dramatic **walkthroughs**.

THE END
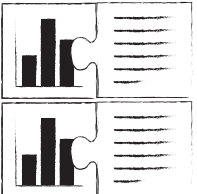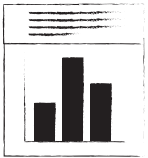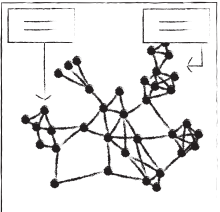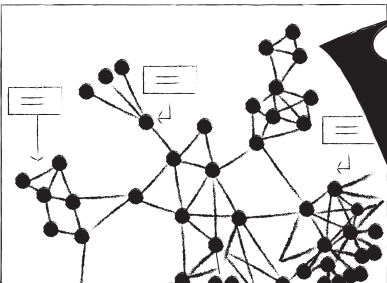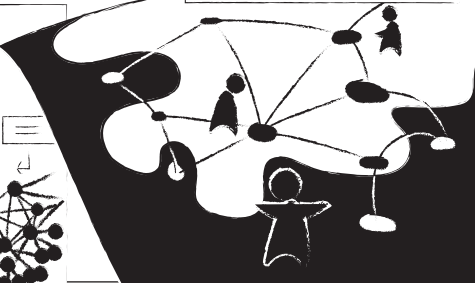
The narrative power of comics comes from

pictures and **words**

in symbiosis.

Words can be considered the realm of the **verbal**:

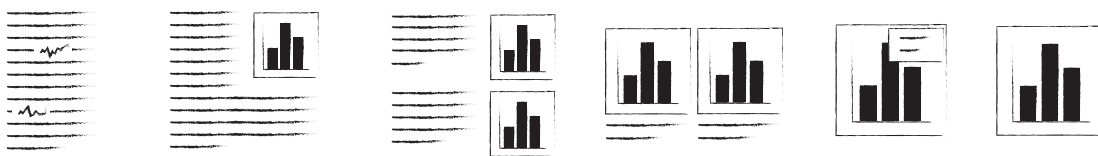the logical
the sequential
the abstract
the learnt
the slow
...

Pictures can be considered the **non-verbal**:

the factual
the parallel
the concrete
the perceived
the fast
...

We call this component **Word and Picture**, ranging from almost entirely **verbal**, to **non-verbal** and visual.

Verbal ⟵ **Word and Picture** ⟶ Non-verbal

In data comics, pictures are mostly visualizations that show evidence in data.

Pictures can be mere reference to the logic in the words,

or stand-alone where no words are required to convey the intention.*

*) understanding can come from context, but more text may be better than less.

Words can help understand a picture; explaining and telling us what to look at.

income

countries

A B C

Can you figure out which countries are shown?

Data comics embrace both words and pictures to create a better understanding.

A combination can mean associating paragraphs to pictures,

or integrating text into pictures,

or pictures into text.

For example, showing increase or any other pattern in temporal data ⌇⌇⌇ . Others showed soccer games ⌐ , or the amount of change in data ⌐, changes in networks ⧨ , and small maps ⌐ .

[16-20]

Eventually, text can become mere annotations,

leaving more space for the visualization

and for the observers to explore.

This comic* and our 4 components can only be the beginning of the journey.

We wanted to start the discussion, as we believe there is potential in pursuing this journey,

discussing the benefits and limitations, the scenarios, intentions,

doing the research, fueling the discussion, and exploring the space.
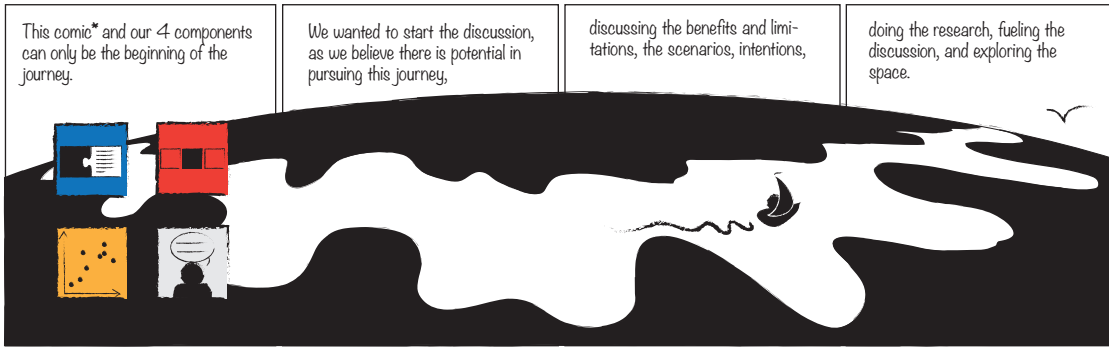
We believe, data comics can lead to engaging visual and narrative artifacts

by **combining verbal and visual content**, leveraging each one's strength as well as their synergy;

by delivering one **message at time** and creating an explicit guided tour for the observer;

by leveraging the richness of **data visualizations** to provide visual evidence for facts;

and by allowing to factual visualizations to blend with **other styles and types** of pictures and narratives,

by exploring visual styles,

inventing narrative patterns,

adapting to the audience,

and blending comics with other genres.

Magazine Style · Annotated Chart

Flow Chart · Slide Show

Partitioned Poster · Film/Video/Animation

There are many open questions in exploring this space:

Human factors

Effectiveness

Good Examples
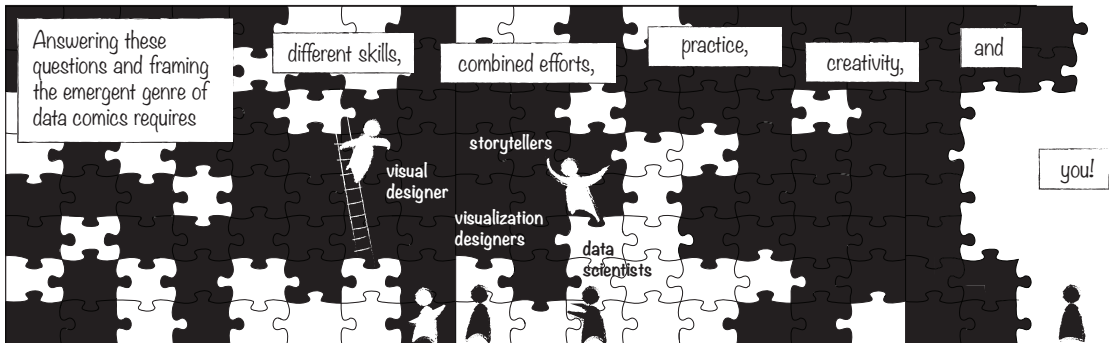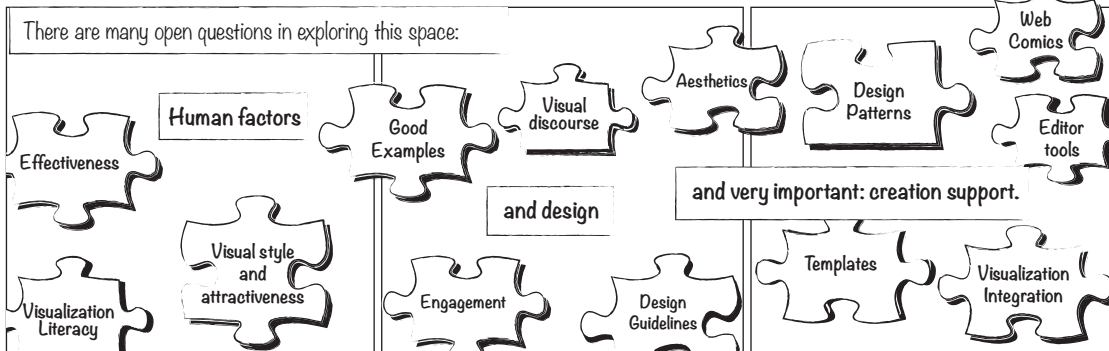
Visual discourse

Aesthetics

Web Comics

Design Patterns

Editor tools

and very important: creation support.

Visual style and attractiveness

Visualization Literacy

Engagement

Design Guidelines

and design

Templates

Visualization Integration

Answering these questions and framing the emergent genre of data comics requires

different skills,

combined efforts,

practice,

creativity,

and

storytellers

visual designer

visualization designers

data scientists

you!

*) Note that this is actually **not** a data comic, as it does not tell a story about data. It is our homage to Scott McCloud.

www.datacomics.net

[1] www.nytimes.com
[2] http://www.dear-data.com
[3] http://www.humantific.com/tag/isotype-institute
[4] http://www.gapminder.org
[5] Segel, Heer: Narrative visualization: Telling stories with data, IEEE TVCG, 2010
[6] McCloud: Understanding Comics, 1993
[7] Farinella: Neurocomics, 2014
[8] Bach, Kerracher, Hall, Carpendale, Kennedy, Riche: Telling Stories about Dynamic Networks with Graph Comics, 2016
[9] Visual Language Lab: http://www.visuallanguagelab.com
[10] W. Eisner: Comics and Sequential Art: Principles and Practices from the Legendary Cartoonist, 2008
[11] B. Victor: http://worrydream.com

[12] Jin, Szekely: QueryMarvel: A visual query language for temporal patterns using comic strips, IEEE VL/HCC, 2009
s[13] Zhao, Marr, Elmqvist: Data Comics: Sequential Art for Data-Driven Storytelling, Tech Report, University of Mayland, 2015
[14] Critical Periods in Human Development
[15] Eadward Muybridge
[16] Tufte: The Visual Display of Quantitative Information, 1983
[17] Perin, Vuillemot, Fekete: SoccerStories: A kick-off for visual soccer analysis, 2013
[18] Bach, Shi, Heulot, Madhyastha, Grabowski, Dragicevic: Time Curves: Folding Time to Visualize Patterns of Temporal Evolution in Data, 2016
[19] Brandes, Nick: Asymmetric relations in longitudinal social networks, IEEE TVCG, 2011
[20] Goffin, Willet, Fekete, Isenberg: Exploring the placement and design of word-scale visualizations, IEEE TVCG, 2013