

Representing Place in World Historical Gazetteer



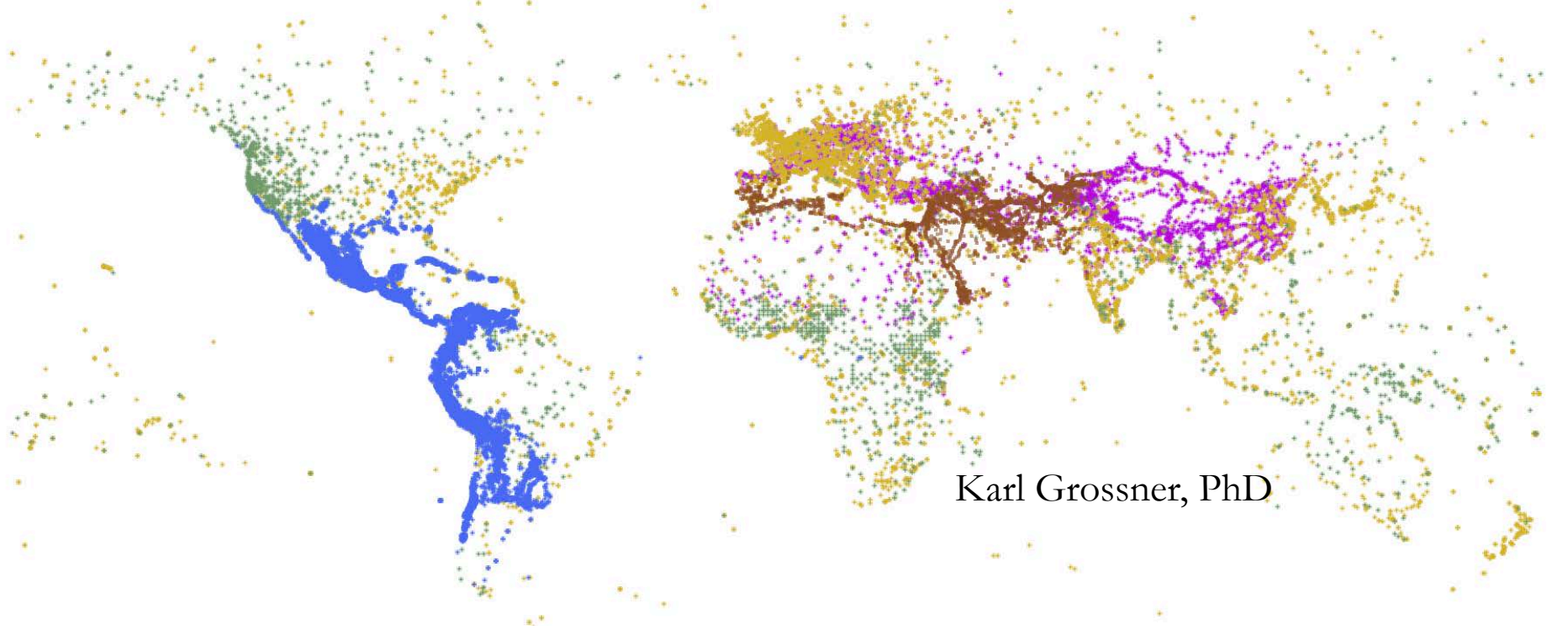
I'm very pleased to be back at UCSB and the Spatial Center, my almae maters. This talk is about representing knowledge of places in the new World Historical Gazetteer platform, and about my now 10-year engagement with Digital Humanities.

Karl Grossner, PhD

Pitt
World History
Center

spatial@ucsb
27 Oct 2020

Computing Place with World Historical Gazetteer



Karl Grossner, PhD

One day I hope to give a talk with this title. My personal research agenda can be summed up by the phrase “computing place.” I see this platform as supporting, among other things, my own research on computation of historical cultural landscapes. Quality of analysis depends in part on quality of description.

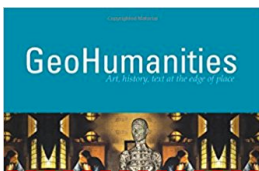
Outline

- Some Context
- Place
- World Historical Gazetteer
- Linked Places
- Next

Context

Geo-, Spatial-, Geospatial Humanities

A research trajectory

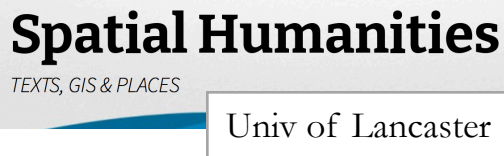
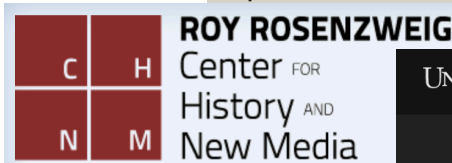
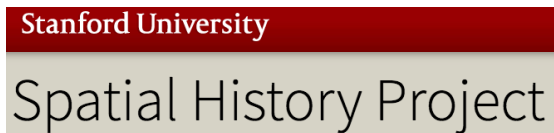
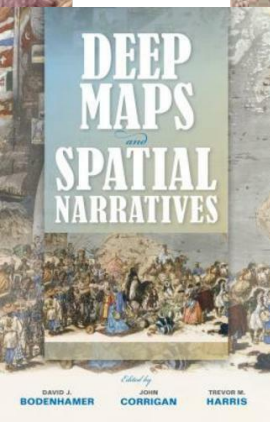
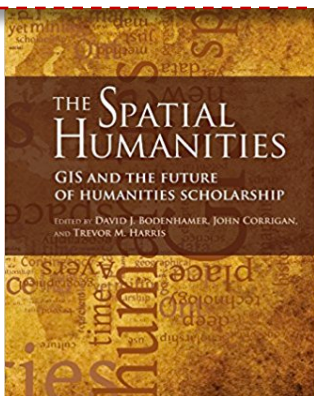


Geography and GIS/GIScience have been connecting with the humanities in several ways over the last couple of decades.

Disciplinary perspectives vary. Anyone who attends the AAG conference will know that cultural geography is well represented, and digital methods are rare. In the AAG journal GeoHumanities, qualitative methods predominate. Historians and geographers have engaged in developing Historical GISes. Historians are generally not keen on including the terms "geo" or "geography" with "history" – claim to want only spatiality.

GeoHumanities

Spatial Humanities/History



Summer 2019, UCGIS hosted a meeting on Geospatial Humanities, and produced a special issue of the International Journal of Humanities and Arts Computing, Volume 14 (1-2), 2020

GeoHumanities Spatial Humanities Geospatial Humanities



University Consortium for
GEOGRAPHIC INFORMATION SCIENCE

The Geospatial Humanities:
Transdisciplinary Opportunities for the
for GIScience Community
June, 2019 Washington DC

“While humanities scholars have increasingly shown interest in GIS and GIScience, the reciprocal interest is not often as expressed...”

“...a possible methodological path to the **geospatial humanities...**”

Whether or not a new term is needed (or would ever be adopted) advancing the connections between GISci and the Humanities is desirable



Alberto Giordano, Shih-Lung Shaw and Diana Sinton

The Geospatial Humanities: Transdisciplinary Opportunities

International journal of humanities and arts computing,
2020, Vol.14(1/2)

<https://www.eupublishing.com/toc/ijhac/14/1-2>

2013



Literary Studies, History, Philology, Linguistics, Archaeology, Arts

“...a venue for pooling knowledge and best practices for relevant existing **digital tools and methods**, to foster the collaborative development of **shared resources and new tools and extensions to geospatial software**, and to keep humanist scholars at large informed about the possibilities and inherent pitfalls in their use.”

I entered this meeting ground between history and geography via ECAI at Berkeley, then HGIS and the Social Science History Association. As you probably know, historical research is carried out in most of the social sciences, but many historians do not consider themselves scientists at all. In time I made my way to Digital Humanities, and 2013 co-founded one of the first special interest groups in the Alliance of Digital Humanities Organizations – ADHO. My goal was to make clear to that community that GIScience is NOT static, and if there are deficiencies in geospatial methods and software, these could be addresses, IF the two domains met. In 2015, AAG launched a GeoHumanities journal dominated by qualitative methods and critical theory. Appropriation!!

2015



Bible Geography
Black Geographies
Cultural Geography
Ethnic Geography
Feminist Geographies

...

Spatial Humanities

A Project of the Institute for Enabling Geospatial Scholarship

Spatial Turn

Step By Step

Projects & Groups

Resources

About

Contribute

What is the Spatial Turn?

What is the Spatial Turn?

by Jo Guldi

What is a turn? Humanities scholars speak of a quantitative turn in history in the linguistic and cultural turn of the 1980s in history and literature, and even more recently an animal turn. Beyond the academy, to turn implies retrospection, a process of slowing in the road and glancing backwards at the way by which one has come.

*May the weary traveler turn from life's dusty road and in the w
shade, out of this clear, cool fountain drink, and rest*

R. E. Speer, "Robert Burns," Nassau Literary Magazine 43 (1888): 469.

"Landscape turns" and "spatial turns" are referred to throughout the academic discourse often with reference to GIS and the neogeography revolution that puts mapping v

[What is the Spatial Turn?](#)

[The Spatial Turn in Anthropology](#)

[The Spatial Turn in Psychology](#)

[The Spatial Turn in Architecture](#)

[The Spatial Turn and Religion](#)

[The Spatial Turn in Literature](#)

[The Spatial Turn in Art History](#)

[The Spatial Turn in Sociology](#)

[The Spatial Turn in History](#)

Jo Guldi, Associate Professor of History, SMU

<http://spatial.scholarslab.org/spatial-turn/what-is-the-spatial-turn/>

Representing historical knowledge in geographic information systems

(Grossner 2010)

- **digital historical atlases**
- spatial-temporal RDBMS
- “story/deep” maps
- web maps generally
- desktop GIS (esri ArcMap, QGIS)

gazetteers

~~triple stores~~

My background: a 2010 dissertation at UCSB. In my work, “geographic information system” is a generic term, not at all limited to desktop GIS software. Gazetteers are certainly geographic information systems, but I did not consider them in that work. I worked with relational databases queried with SQL, and not triple stores queried with SPARQL.

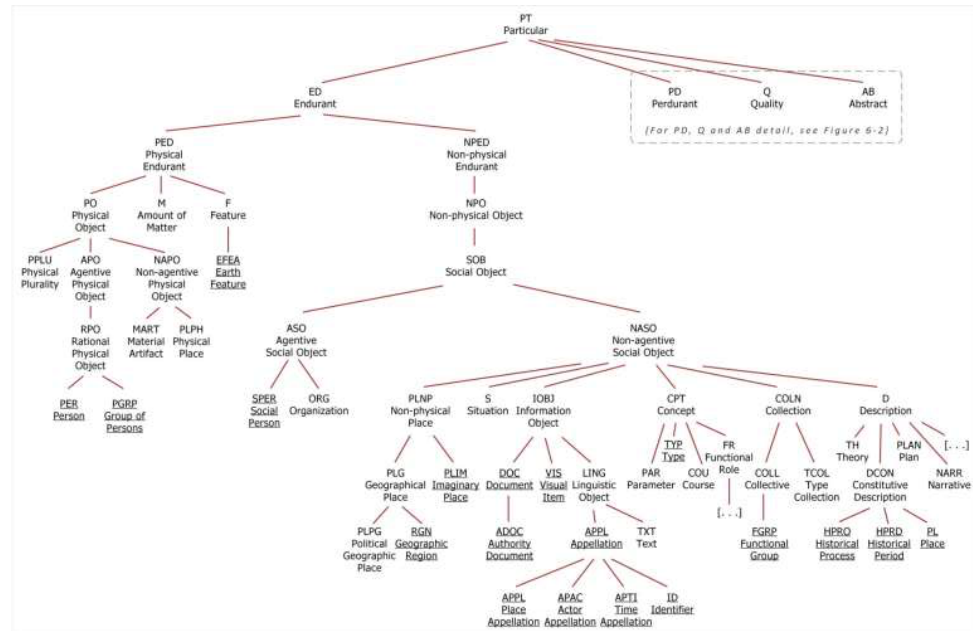
The work did delve into geo-semantics and their formalization, and I relied on work from the Muenster group at the time – with whom UCSB had a strong connection.

Committee: M. Goodchild, H. Couclelis, K. Clarke, M. Raubal, R. Mostern
Muenster allies: W. Kuhn, K. Janowicz, C. Keßler

Spatial History Ontology (SHO)

“...the introduction of logical formalisms to historical knowledge representation in GIS should be attempted incrementally.

Fortunately for those who want to make maps right away, a **useful level of reasoning** can be accomplished in a relational model...”



One product of my dissertation work was a Spatial History Ontology, which I instantiated in a relational database, PostgreSQL. I aimed for what I called “a useful level of reasoning” and “sufficient logic.”

Extending DOLCE

(and adopting its First Order Logic notation)

I studied historical atlases extensively, and delved into historiography, knowledge representation, and cognitive science. I ended up extending DOLCE, and defining entities, relations, and axioms in first order logic, as DOLCE does.

“...all Achievements x are either directly constituted (DK) by some Activity y for some time t during the interval bounding the Achievement, or specifically generically constituted (SK) by some Activity throughout that interval (sho11).”

$$\forall x(\text{ACH}(x)) \exists y ((\text{DK}(x, y, t) \vee \text{SK}(x, y)) \wedge A(y)) \quad (\text{sho11})$$

In English:

Events, and occurrents generally, are composed of one or more activity, or “temporal substance” – much as material objects are composed of physical substances in some combination.

“sufficient logic”

I discovered I could express the ontology in the RDBMS, and achieve most of the logical constructs and reasoning I was after.

Table 6-1. Logical capabilities compared

RDF/S or OWL capability	Achieved in RDBMS
<u>Schema definitions</u> , e.g. PoliticalEvent hasType rdfs:Class hasParticipant hasType rdf:Property	Tables for Class and Relation ('property'); all instance records have foreign key to Class and/or Relation
<u>Class and property propagation</u> (is-a; sub-relation) <u>Property intersection</u> (A <i>subproperty-of</i> B; A <i>subproperty-of</i> C → if x A y, then x B y, x C y)	Hierarchy established with parent_id value for each; recursive queries using SQL's WITH, WITH RECURSIVE and UNION
<u>Class definitions</u>	Table columns incl. custom data types (ENUM); check constraints incl. NOT NULL; DEFAULT
<u>Property definitions</u> - Domain and range - Cardinality	Check constraints
<u>Transitivity</u> of parthood, and is-a relations	Recursion, using SQL's WITH, WITH RECURSIVE and UNION
<u>Complex classes</u> , e.g. NewClass \triangleq intersectionOf [ConditionA, ConditionB,...]	Materialized views
<u>Differentiating individuals</u> , e.g. owl:distinctMembers, owl:allDifferent	UNIQUE constraints, including primary keys
<u>Instance checking</u>	SQL: SELECT...WHERE...
<u>Graph query patterns</u>	SQL: SELECT...WHERE...AND...AND...FROM...JOIN
<u>Reification</u> ; blank nodes	Association classes
<u>Unions and intersections</u>	SQL: UNION and INTERSECT

"representing information about the world in a form that a computer system can utilize"

KR meets DH

- maps w/time
- networks of weighted relations
- linked data discovery
- uncertainty

KR: $\forall x(\text{ACH}(x)) \exists y ((\text{DK}(x, y, t) \vee \text{SK}(x, y)) \wedge A(y))$

“events are composed of activities for some period”

DH: “huh?”

or

“so what?”

or

“my data doesn’t look like that; what is cost/benefit?”

I left UCSB and went to Stanford Libraries to work as a Digital Humanities Research Developer. My ideas, for example of event-entered data systems did not get a great reception with my DH colleagues. DHers wanted visualizations of quantified relations between people, objects, concepts, and places. They wanted to represent uncertainty and the absence of data, and my advocacy of event-centered data fell flat.



Topotime v0.1 gallery & sandbox

A pragmatic data model, D3 layout, and Python functions
for representing complex and/or uncertain periods and events. [*in progress*]

The D3 Javascript track

There are several examples demonstrating a new timeline layout built upon [D3.js](#):

All timespan types (singular, multi-part, cyclical, durations, etc.); *part-of* and *participates* relations.

Lifespans of 50 US states linked to a map.

Stacked layout displays timespans as geometric figures; temporal density band and profile.

Simple example rendering Topotime data written as CSV.



The Python-ic track

Our Python functions generate "temporal geometry" with the help of [Shapely](#).



These are rendered to a browser with D3 in [this sample web page](#), providing some basic query capability.

While at Stanford, Elijah Meeks I began developing Topotime, in our "spare time," to model uncertain and complex temporal extents. It was well received, but we couldn't implement the data model, visualizations and computational libraries for lack of time. My takeaway from the 5 years at Stanford was that in DH, development of new models had to be coupled with development of specific software applications that test and demonstrate their utility in a compelling way so they might get some uptake and maybe find widespread adoption.



Figure 1 – A timespan with uncertain start and end

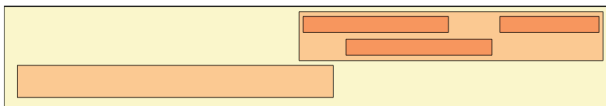


Figure 2 – A composite event rendered as its timespan with two levels of sub-event parts.

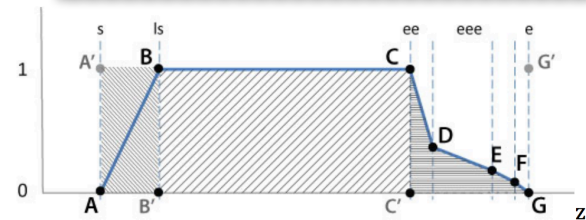
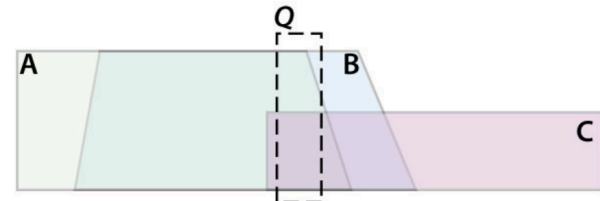


Figure 5 – Percentages of "potential certainty"



KR meets DH

KR: $(PLG(x) \vee GOBJ(x)) \wedge \exists y(APPL(y) \wedge identifies(y, x) \rightarrow \exists t(T(t) \wedge identifies(y, x, t))$

(sho38)

If a Place referent has a name, that name is valid at some time

DH: “huh?”

or

“so what?”

Back in my SHO, I expressed the temporal scoping of place names this way...something I needed, but not interesting to Dhers or directly useful to them.

Place

Defining Place

- experienced space (paraphrasing Yi-Fu Tuan)
- “a meeting up of histories” – Doreen Massey
- a function of events and activity that *have happened* there, and *can happen* there – K. Grossner
 - buildings, monuments, streets, squares, parks built
 - lives led, works created, performances
 - commerce, conflict, meetings, dominion
- places are dynamic, they change over time
- the answer to “where?”

My interest in describing places led me to humanistic geographers' conceptions of Place, which led me first to event-centered models and formats

CIDOC-CRM

Of course that led to investigating CIDOC-CRM, which is a popular “ontology” within the digital humanities, at least within the GLAM domain (for which it was developed). It’s definition of Place does not correspond with broad requirements within DH. Scope notes for `place_is_defined_by` were recently amended to account for “phenomenal places,” which are not differentiated formally in CRM

E53 Place

This class comprises **extents in space**, in particular on the surface of the earth, **in the pure sense of physics: independent from temporal phenomena and matter.**

P168 place_is_defined_by

“phenomenal places”

Note that it is possible for a place to be defined by phenomena causal to it or other forms of identification rather than by an instance of E94 Space Primitive.

E93 Space Primitive

This property associates an instance of E53 Place with an instance of E94 Space Primitive that defines it.

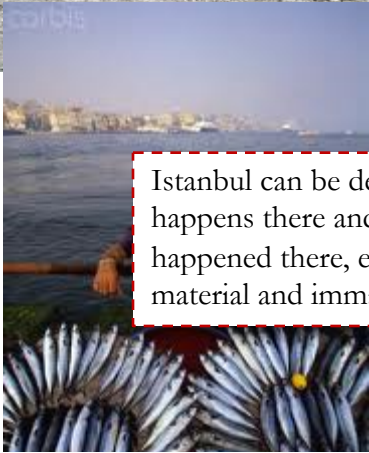


Fort Duquesne, Fort Pitt,
Fort Trent, The Manor of Pittsburgh
Pitts-Bourg, Pittsburgh, ...



Byzantion, Byzantium, Constantinople,
Constantinopoli, Constantinopolis,
Costantinopoli, Estambul, Istamboul, Istanbul,
Istanbul, Konstantinopel, Konstantinoupolis,
Kustantiniyah, Mikligard, New Rome, Stamboul,
Stambul, Tsargrad, Tsarigrad, İstanbul, ...

Place is not Location, and places
are not defined by their location.
The red markers indicate a
representative location for the
cities of Pittsburgh and Istanbul,
and that is all they represent.



Istanbul can be defined by what happens there and what has happened there, evidenced in material and immaterial culture.



Pécs, Hungary



Pécs always was a multicultural city where many cultural layers are encrusted melting different values of the history of two thousand years. Hungarians, Croats and Swabians still live in peace together in economic and cultural polarity.

The same goes for Pecs, Hungary, which is typical of all places in a way – what is there is evidence of what has happened there and what happens there now.





The structure important to several religions – dominant or ascendant at different times



Cultural practice of performance, costumes



(Some) of what happens there now...



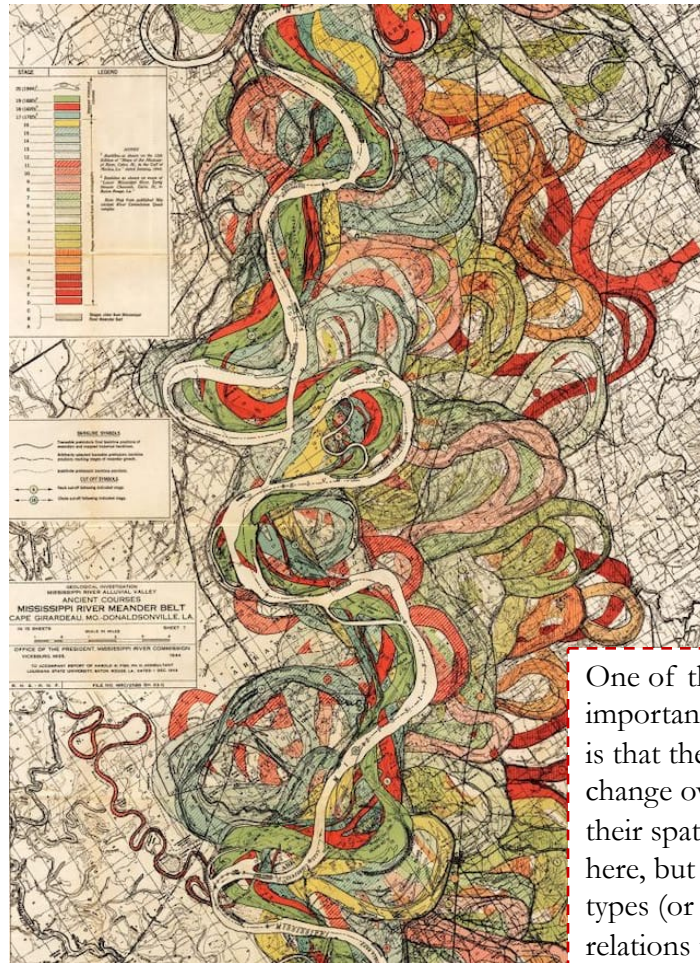
Purves, R. S., Winter, S., & Kuhn, W. (2019). **Places in information science.** *Journal of the Association for Information Science and Technology*, 70(11), 1173-1182.

"A **place** is an object resulting from a **shared identification of a location.** As an object, it may become a part of a network and participate in events."

"An **object** is a uniquely **identifiable entity existing in space and time** and having well-defined properties as well as relations with other objects."

I very much like this recent paper on 'Places in information science.' I particularly like its pragmatic approach, relating the difficult term 'place' with information systems – each of which have particular requirements.

"...we can productively work with many existing definitions about places and move toward **a shared understanding of the general properties expected from information systems dealing with place.**"



Mississippi River



“Poland”

One of the very most important attributes of places is that they are dynamic – they change over time. Not only their spatial extents, as shown here, but their names, their types (or functions), and their relations to other places – their membership in networks and their parthood in regions and territories.

World Historical Gazetteer

“What do humanists want?
What do humanists need?
What might humanists get?”

Peter K. Bol (2011)

In Dear, M. et al (Eds.) *GeoHumanities: Art, history, text at the edge of place*.

- a. Maps and some spatial analysis
- b. A world-historical gazetteer
- c. ??? (“we’ll see”)

In 2011, Harvard historian Peter Bol asked these questions in a chapter with that name. His answers follow.

