

From Street Network Analysis to Urban History

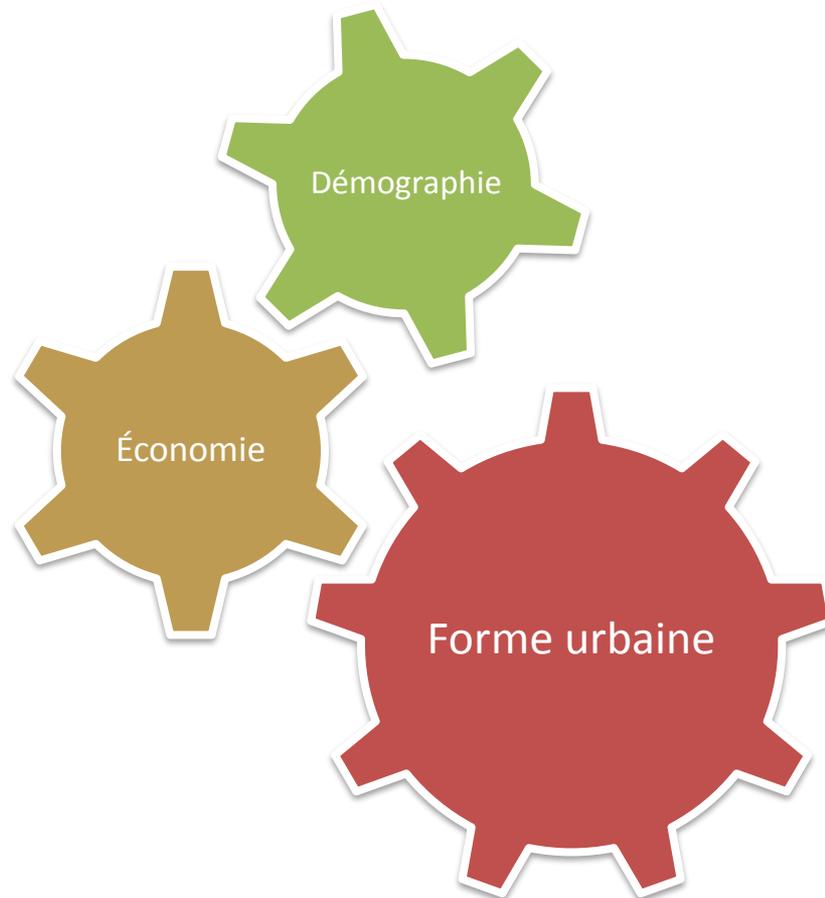
Ryma Hachi, Doctorante

UMR Géographie-cités

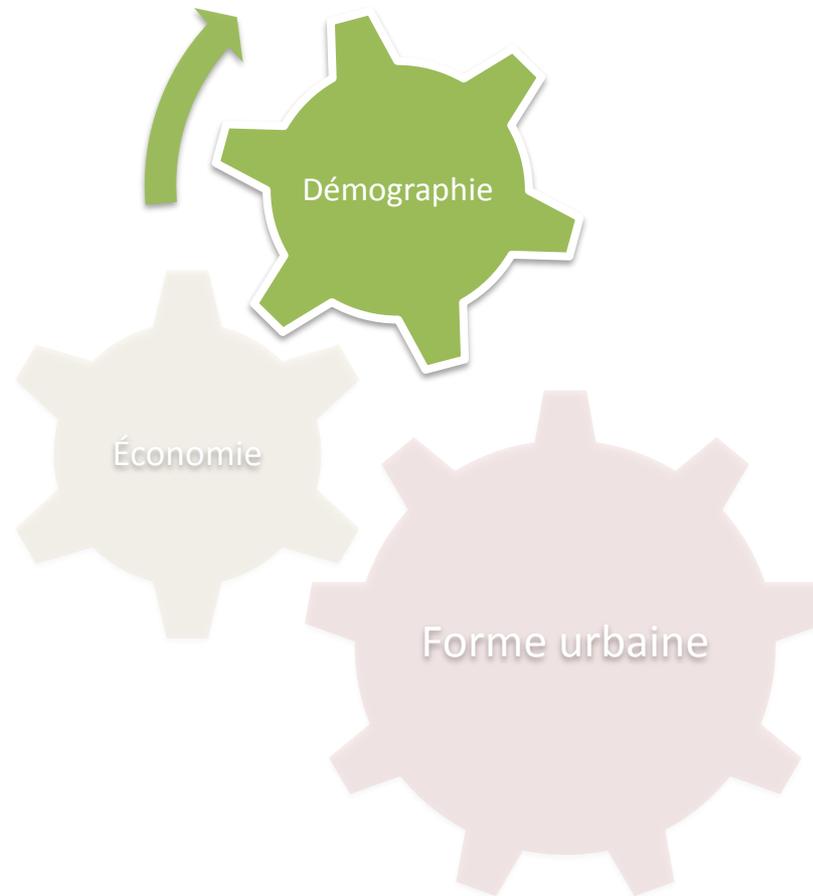
Équipe P.A.R.I.S

Université Paris 1 Panthéon-Sorbonne

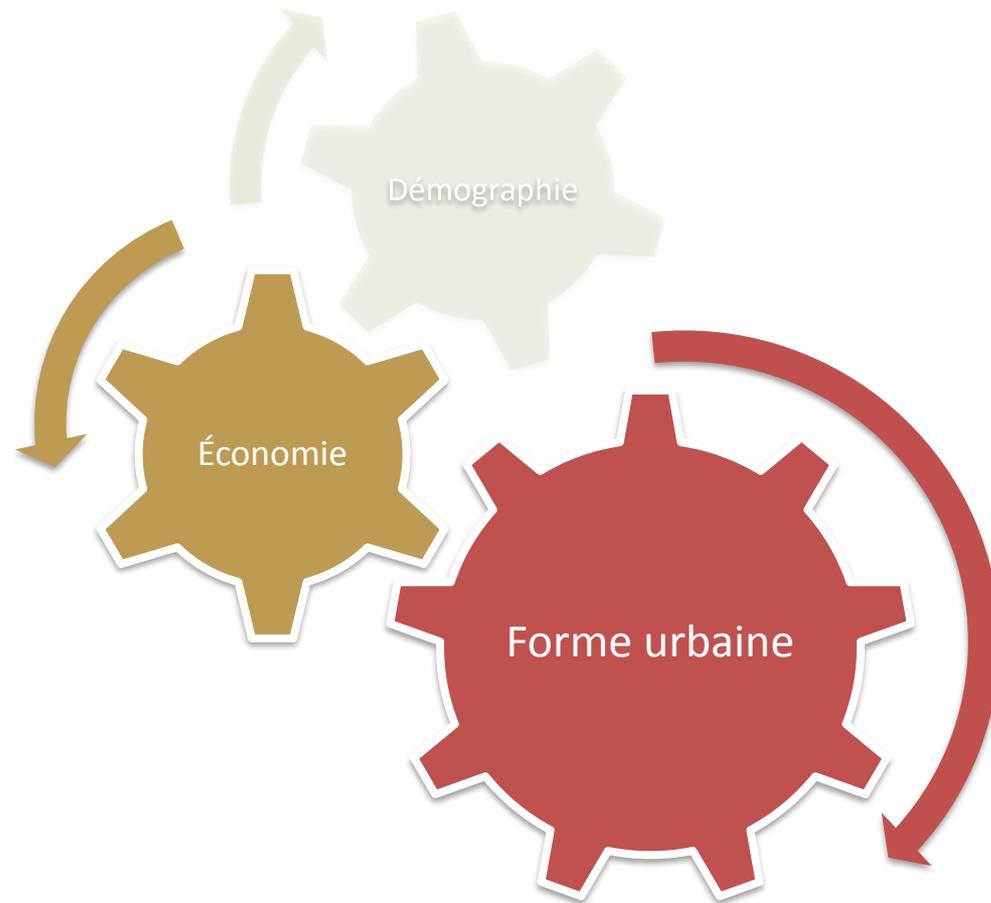
Les transformations intra-urbaines



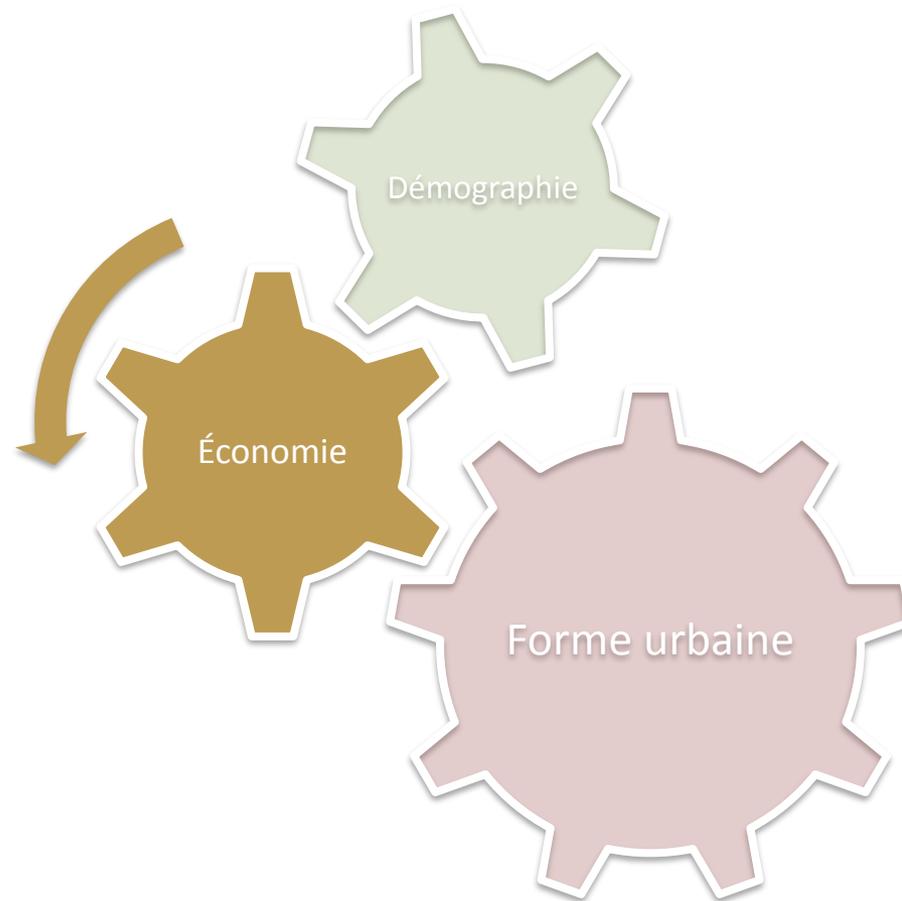
Croissance démographique



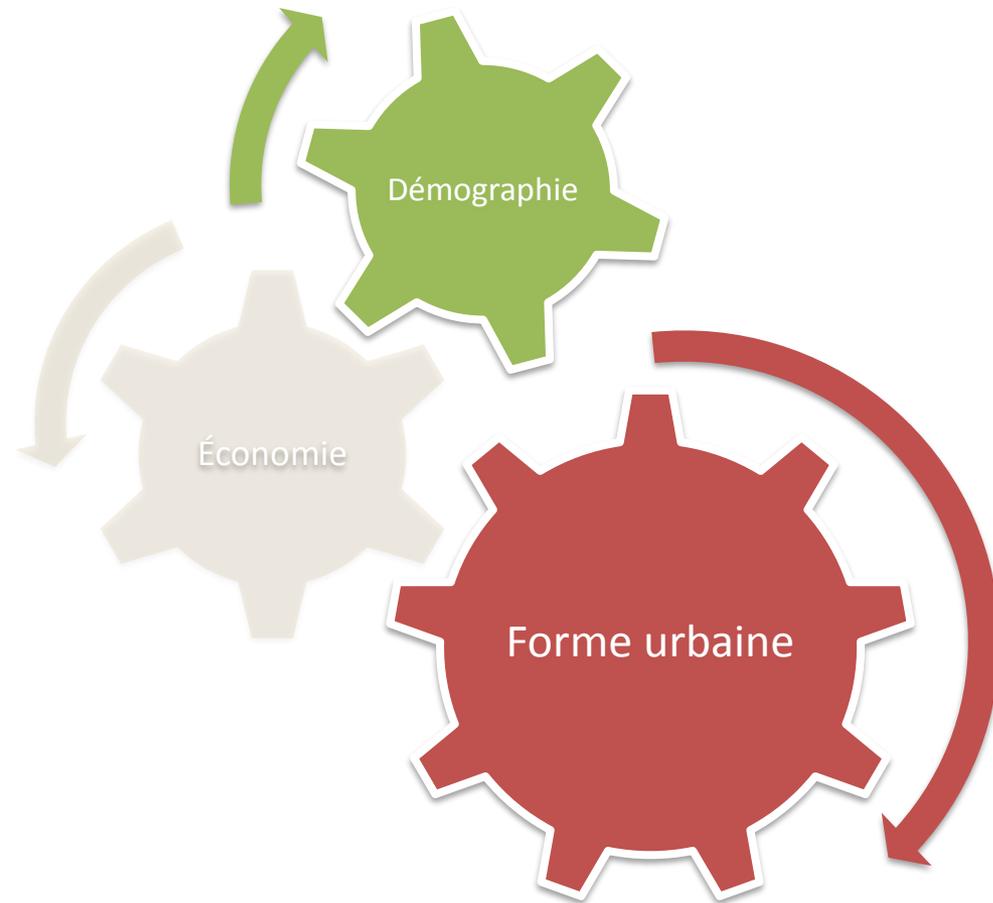
Croissance démographique



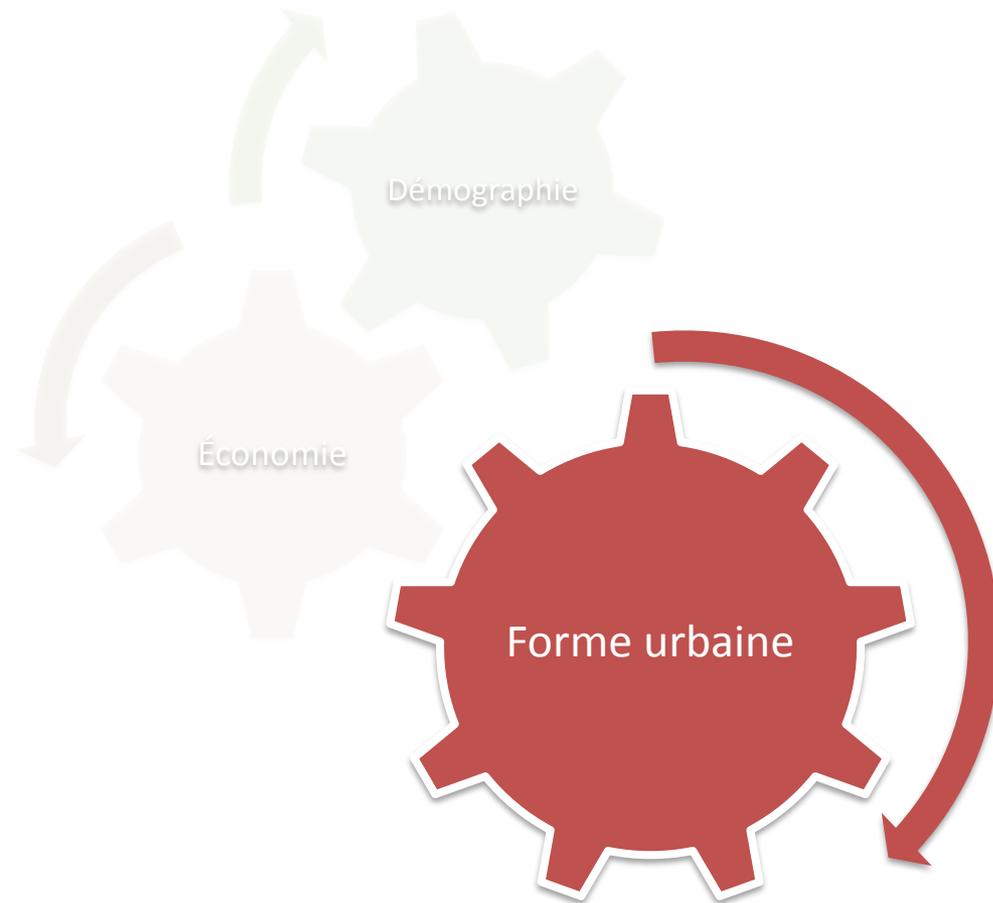
Révolution industrielle



Révolution industrielle



Impact sur la forme urbaine



Croissance démographique

Industrialisation

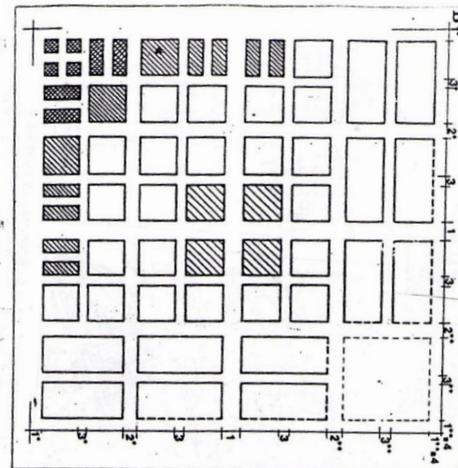
Forme
urbaine

Extension de la ville,
Densification, ...

Restructuration (voies de
liaison,
centre nouveau, ...)

Apparition d'éléments nouveaux
(gare, usines...)
Centre nouveau

Saturation du
centre



Caniggia et al., 2000

Quid de la forme des réseaux viaires?

- *Comment les diverses transformations qui touchent une ville impactent-elles la forme de son réseau viaire?*
- *Est-ce qu'une même transformation se produisant dans deux villes différentes aura le même impact sur la forme de leur réseau viaire?*

Croissance démographique

Industrialisation

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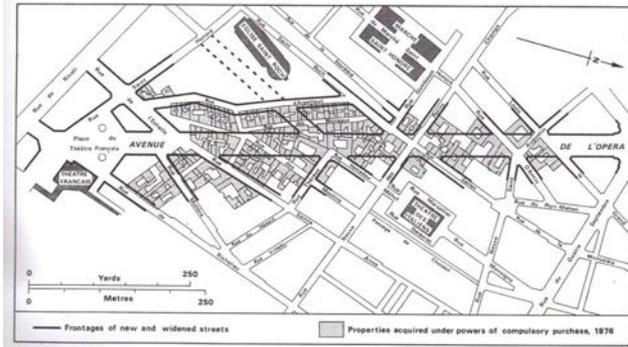
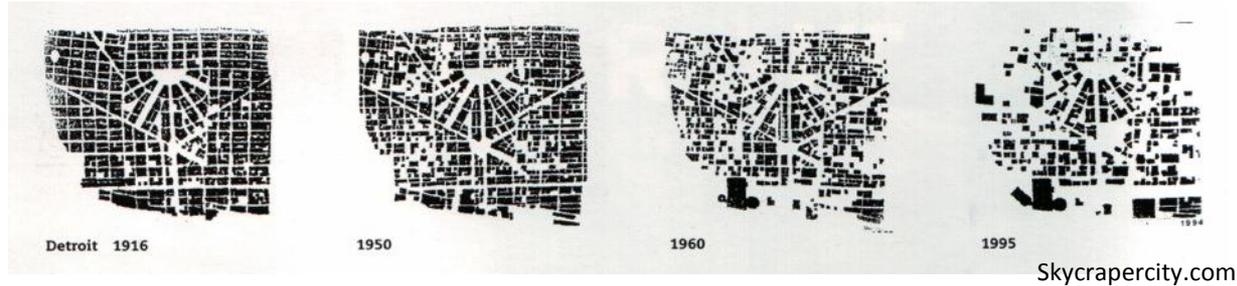
Forme
du réseau
viaire

...?

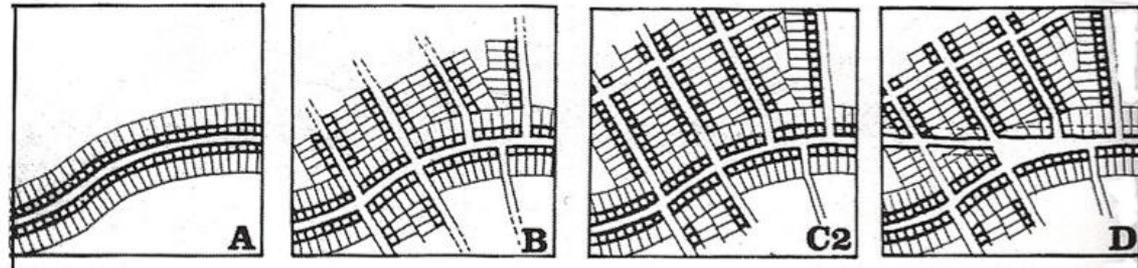
...?

...?

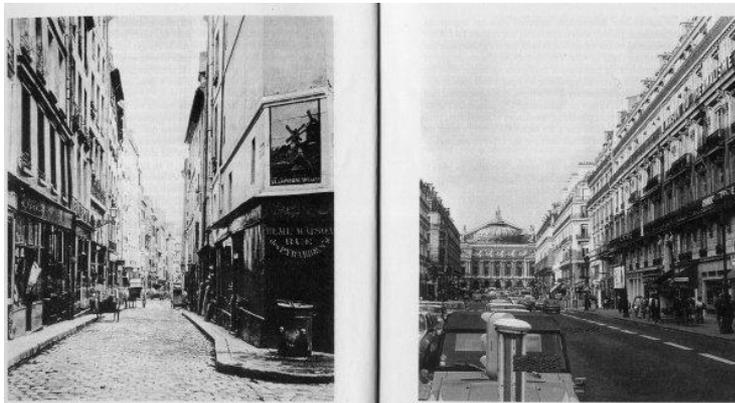
Cette question a fait l'objet de quelques travaux, qui comparent la forme des réseaux, avant et après une certaine transformation dans la ville



Benevolo, 1983



Caniggia & Maffei, 1979



Exposition « Paris Hausmann », 1991

Ces travaux ont souvent recours à des analyses quantitatives

Development of a Nationwide Road Change Database for the U.S. in the Post-Recession Years (2008–2012)

Christopher L.B. Brown and Xiaobai Angela Yao

Table 8 Top twenty-five counties for new road length, normalized by percent change (2008–2012)

County or Equivalent	Percent change in roads	% Δ Population	Population (2012)
Forsyth County, GA	38.65	12.98	187,927
Barrow County, GA	29.72	4.16	70,165
Gilmer County, GA	28.68	0.00	28,212
Henry County, GA	24.08	7.17	208,622
Paulding County, GA	23.55	5.73	144,920
Jackson County, GA	22.89	1.81	60,497
Polk County, NC	21.36	-0.60	41,160
Jefferson County, WV	21.15	4.55	54,558
Horry County, SC	20.57	8.22	282,024
Pickens County, GA	20.40	-0.56	29,365
Union County, GA	19.98	0.70	21,434
Douglas County, GA	19.35	3.44	133,957

Et à la théorie des graphes



Tissu urbain

Graphe primaire

Graphe dual

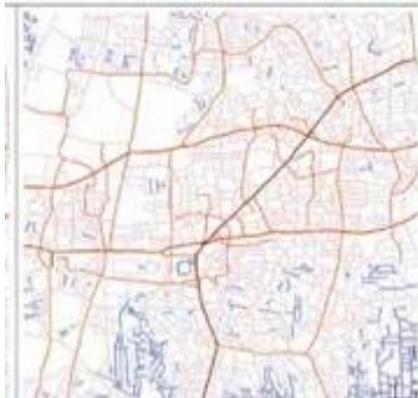




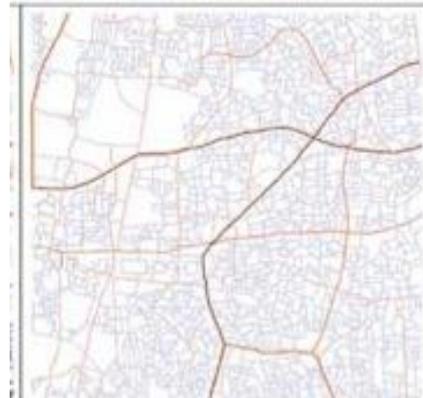
Closeness centrality



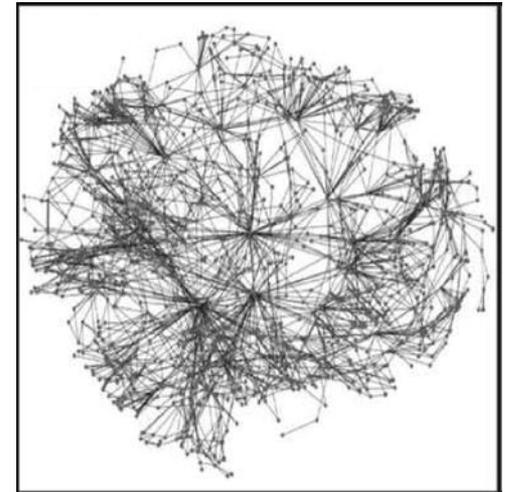
Betweenness centrality



Straightness



Information



- Calculer les propriétés du graphe

- Et étudier leur distribution

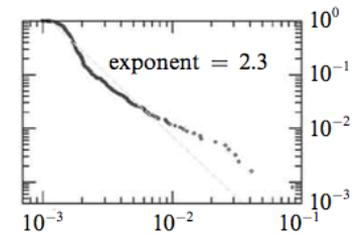
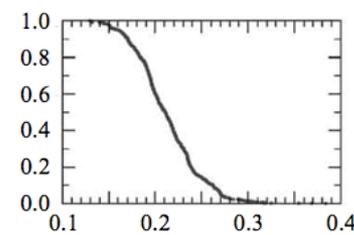
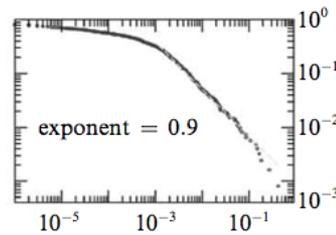
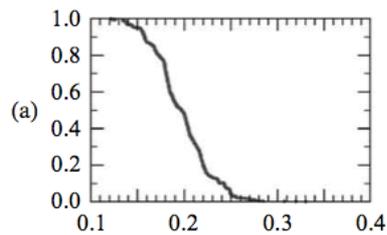


Closeness centrality

Betweenness centrality

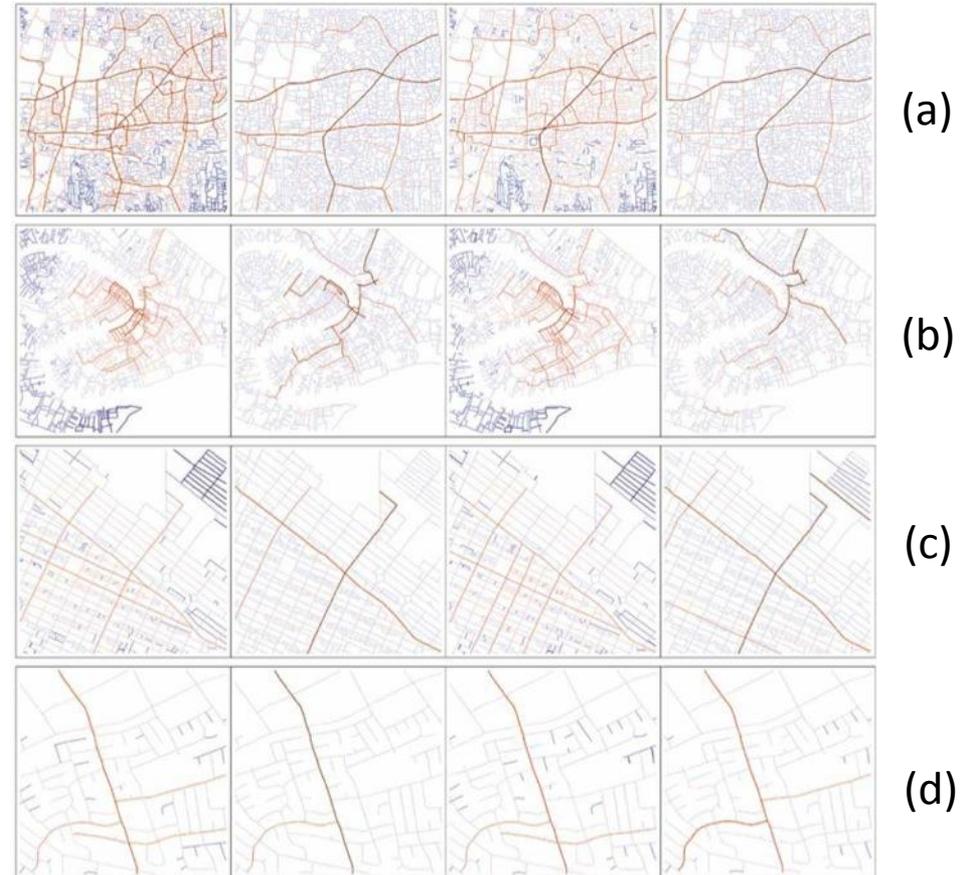
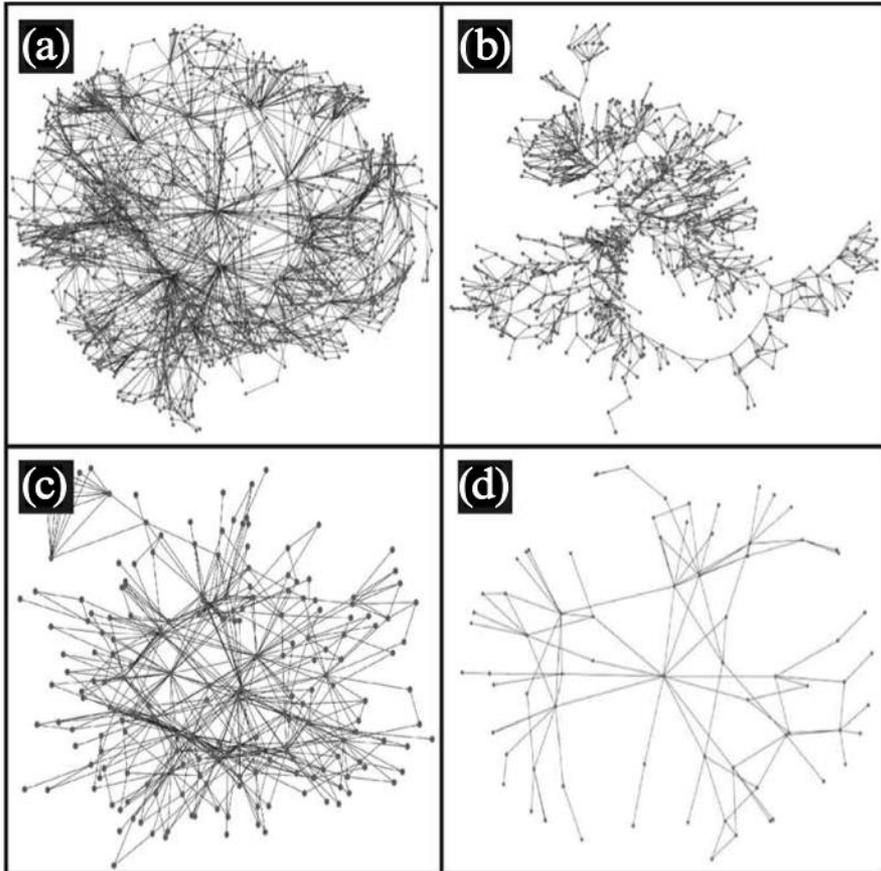
Straightness

Information



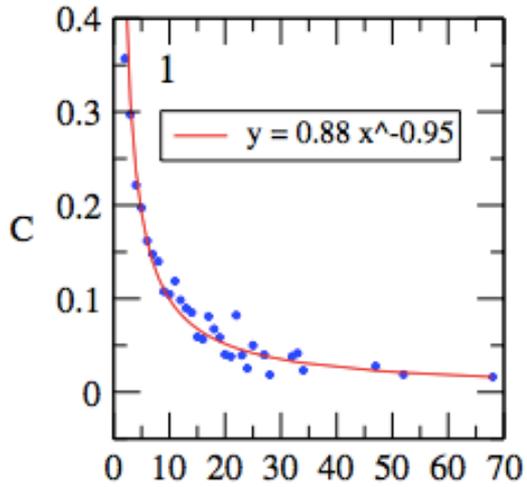
Distribution cumulée des quatre indices de centralité

- Comparer plusieurs réseaux

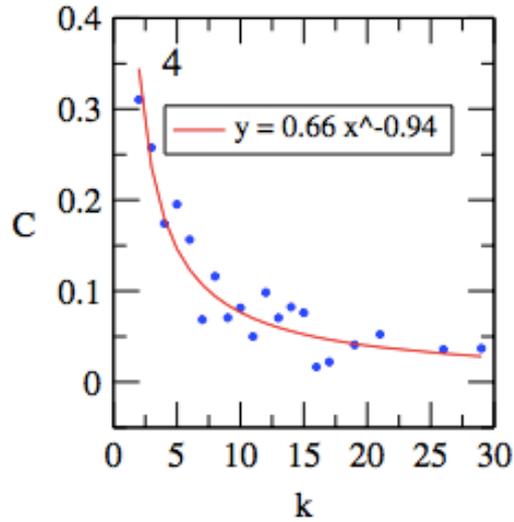


a. Ahmedabad; b. Venice; c. Richmond; d. Walnut Creek. Porta *et al.*, 2006

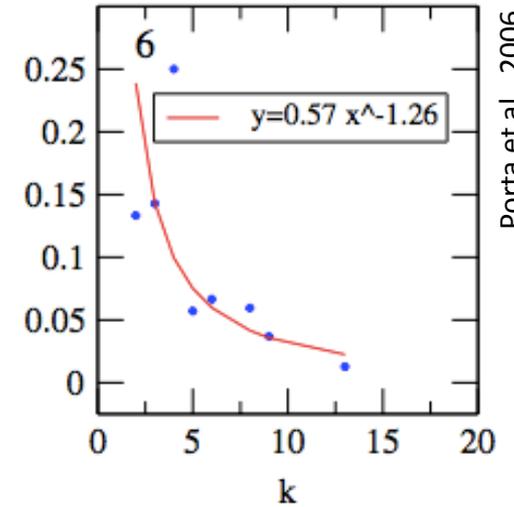
- En comparant la distribution de ces propriétés



Ahmedabad



Venice



Walnut creek

Distribution du coefficient de clustering moyen

Elementary processes governing the evolution of road networks

Emanuele Strano^{1,2}, Vincenzo Nicosia^{3,4}, Vito Latora^{4,5,6}, Sergio Porta² & Marc Barthélemy^{7,8}

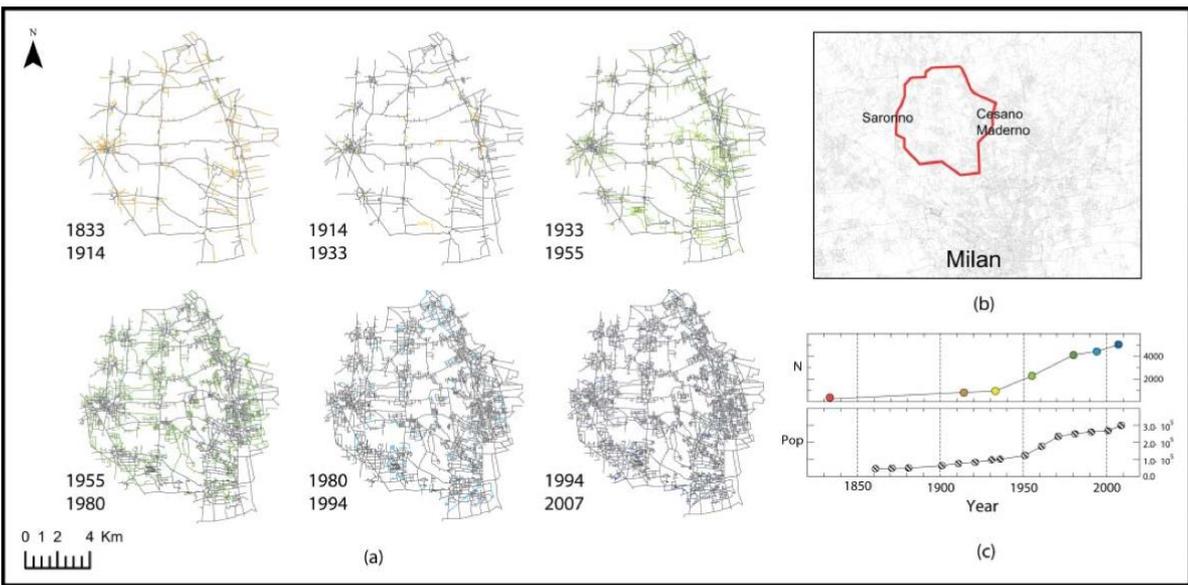


Figure 1 | (a) Evolution of the road network from 1833 to 2007. For each map we show in grey all the nodes and links already existing in the previous snapshot of the network, and in colors the new links added in the time window under consideration. (b) Map showing the location of the Groane area in the metropolitan region of Milan. (c) Time evolution of the total number of nodes N in the network and of the total population in the area (obtained from census data).

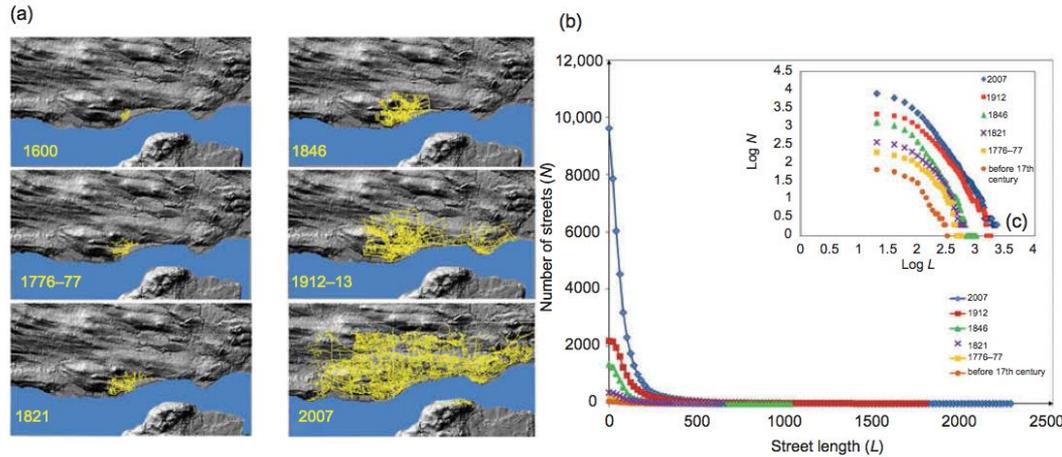


Figure 7. DEMs (Digital Elevation Models) showing the situation of Dundee (a) in the six sampled time periods from before seventeenth century to 2007, (b) cumulative length distributions of streets in Dundee during time from before seventeenth century to the year 2007 and (c) log-transformed plots of street number versus street length.

Annals of GIS

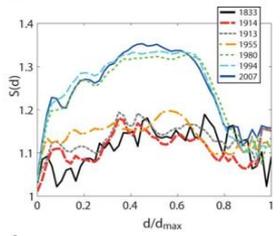
Publication details, including instructions for authors and subscription information: <http://www.tandfonline.com/loi/tagi20>

Evolution and entropy in the organization of urban street patterns

Nahid Mohajeri^a, Jon R. French^b & Michael Batty^c

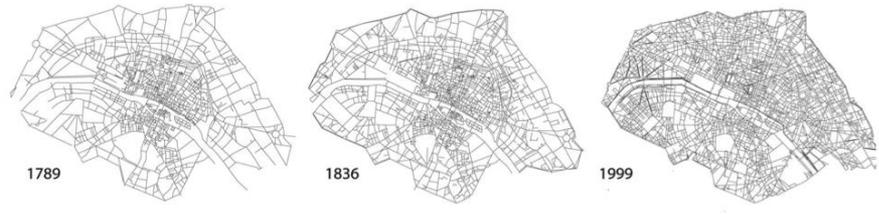
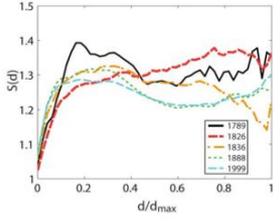
a

Groene evolving street network 10 km



b

Paris evolving street network 4 km

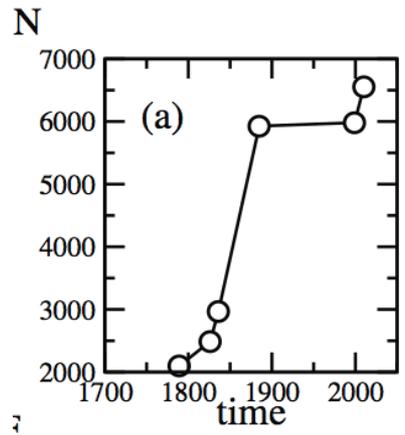


The simplicity of planar networks

Matheus P. Viana¹, Emanuele Strano², Patricia Bordin^{3,4} & Marc Barthelemy^{5,6}

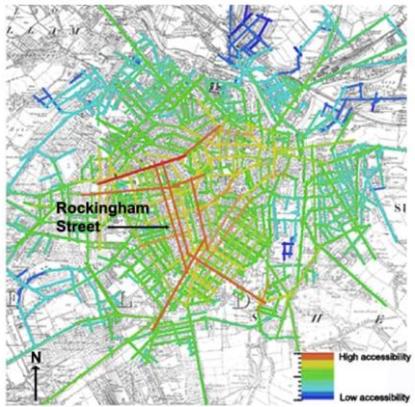
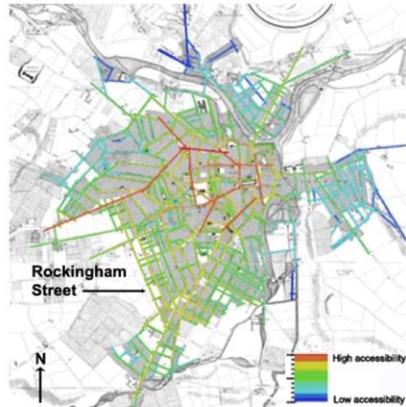
Self-organization versus top-down planning in the evolution of a city

Marc Barthelemy^{1,2}, Patricia Bordin^{3,4}, Henri Berestycki² & Maurizio Gribaudi⁵



(b) 1808 – Fairbanks' map

(c) 1851 Ordnance Survey first series



PAPER REF # 8193
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Santiago, PUC, 2012

THE USE OF SPACE SYNTAX IN HISTORICAL RESEARCH: current practice and future possibilities

AUTHOR: Sam GRIFFITHS
UCL Bartlett School of Graduate Studies, United Kingdom
e-mail: sam.griffiths@ucl.ac.uk

Mon approche

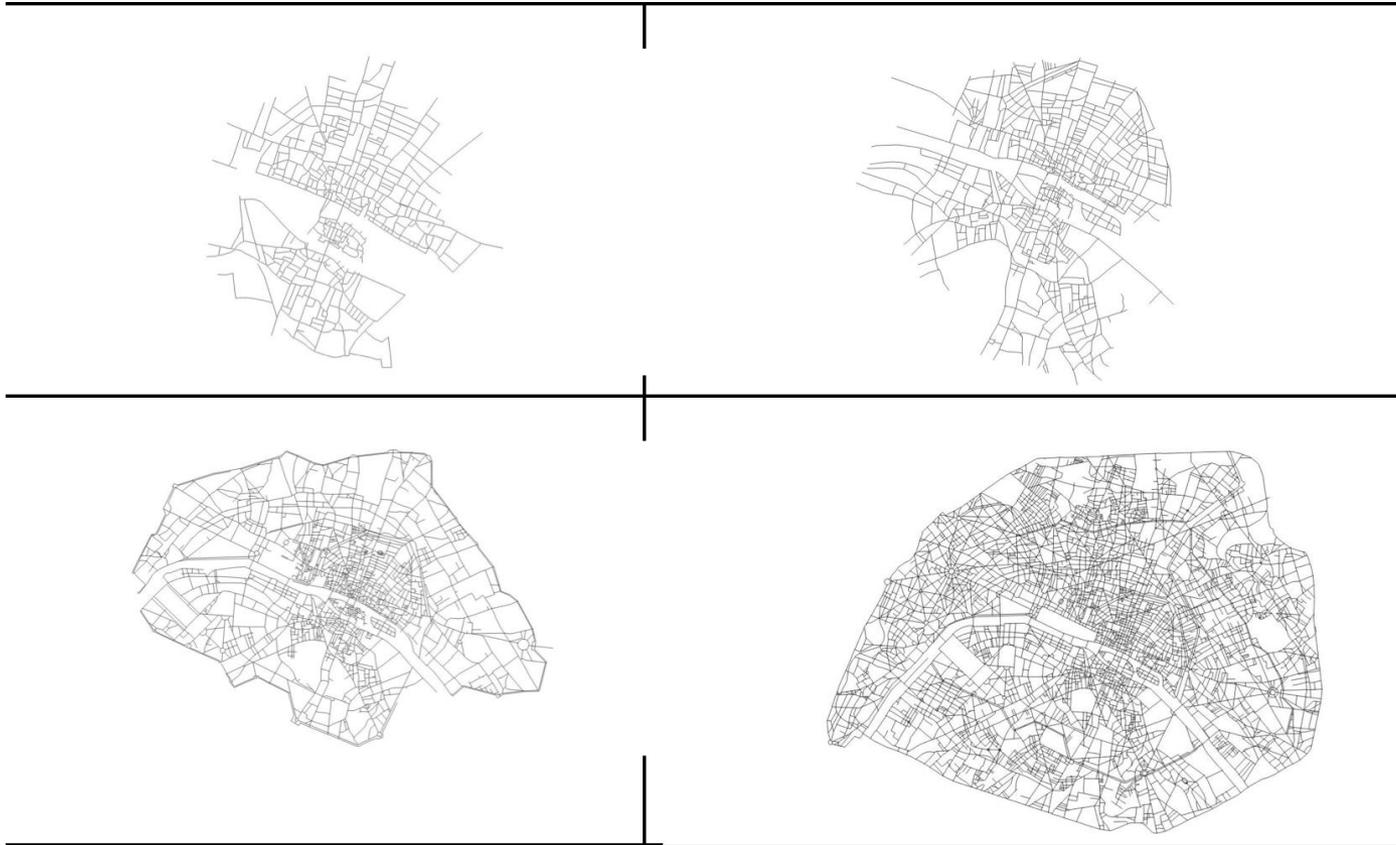
- Sélectionner, dans l'histoire des villes (et en me basant sur les travaux précédents), quelques transformations intra-urbaines **susceptibles d'avoir un impact sur la forme globale du réseau viaire;**
- Pour chaque transformation, choisir un corpus de réseaux viaires les ayant subies;

Transformations intra-urbaine	Réseaux viaires	Période
Croissance démographique (extension, densification, restructuration)	<ul style="list-style-type: none"> • Paris • Dundee • Sheffield • Milan • Beauvais • Chester • Wake county • Waterloo, Cambridge, Kitchener • New York 	<ul style="list-style-type: none"> • De 1300 à nos jours • De 1600 à 2007 • De 1736 à 1851 • De 1833 à 2007 • De 1845 à 1960 • 1850 - nos jours • 1999 - nos jours • 1955 - nos jours • 1930- nos jours
Révolution industrielle	<ul style="list-style-type: none"> • Beauvais • Détroit • Sheffield 	<ul style="list-style-type: none"> • 1845-1888 • 1796-1879 • 1736-1851
Introduction de l'automobile	<ul style="list-style-type: none"> • Beauvais • Milan 	<ul style="list-style-type: none"> • 1888-1960 • 1933-1980

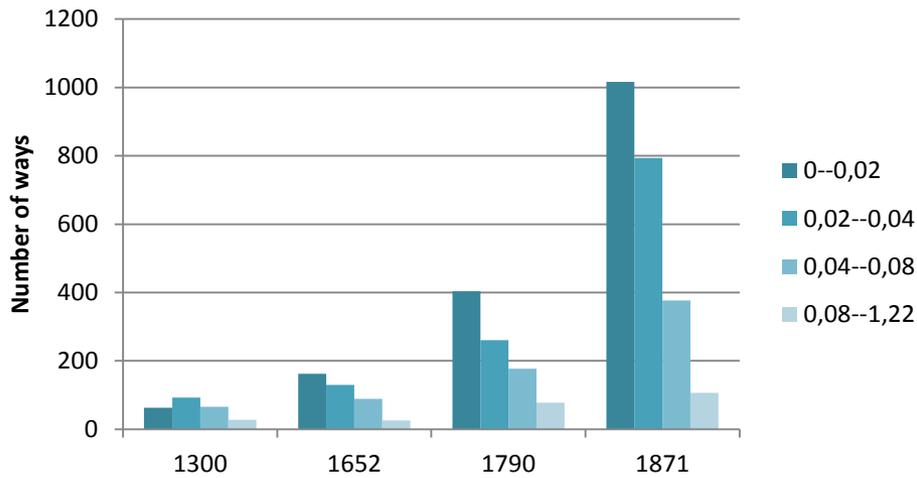
- Analyser chacun de ces réseaux avant et après la transformation en question;
- Identifier son impact, et voir si il est similaire entre les réseaux étudiés

Résultats préliminaires

La croissance démographique

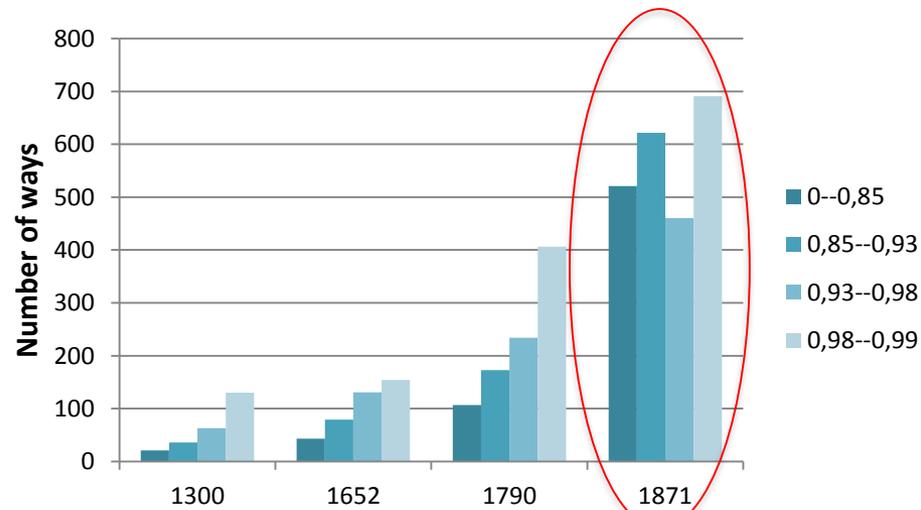


Haut gauche: 1300; haut droite: 1652; bas gauche: 1790; bas droite: 1871.



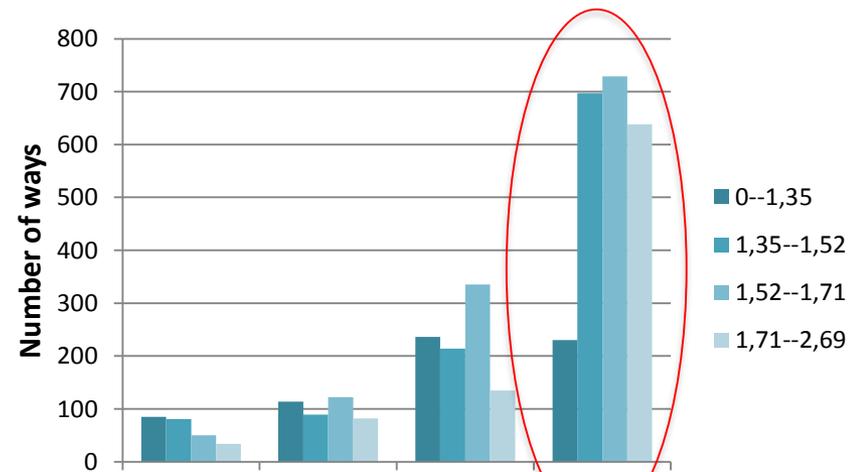
Distribution de la densité linéaire

Extension et densification du réseau?



Distribution de l'orthogonalité

Restructuration?



Distribution de la closeness centrality (multipliée par le nombre de voies en log)

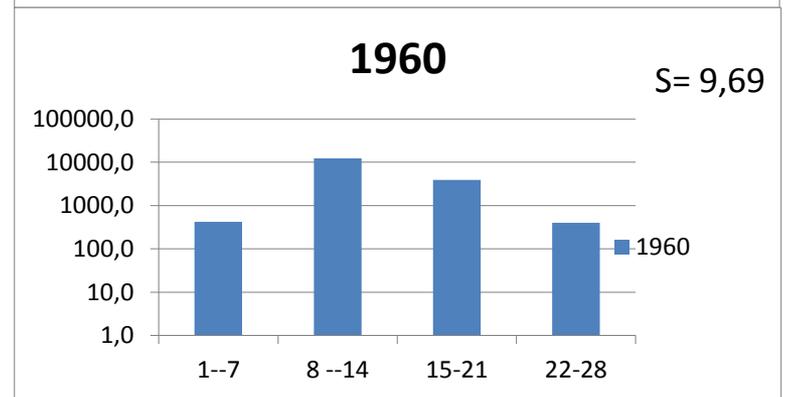
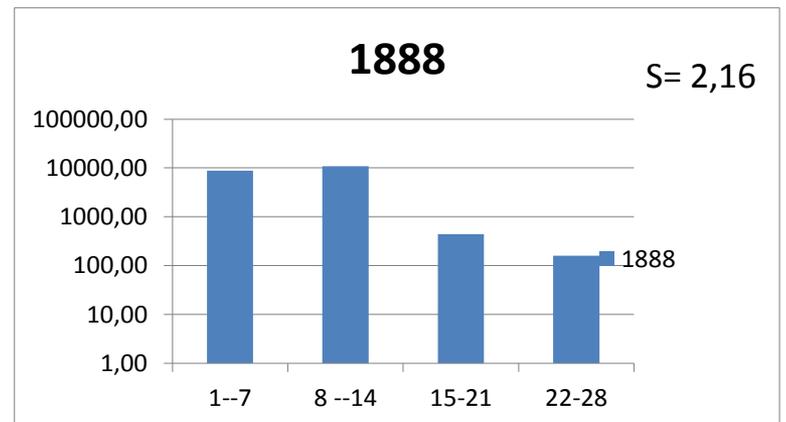
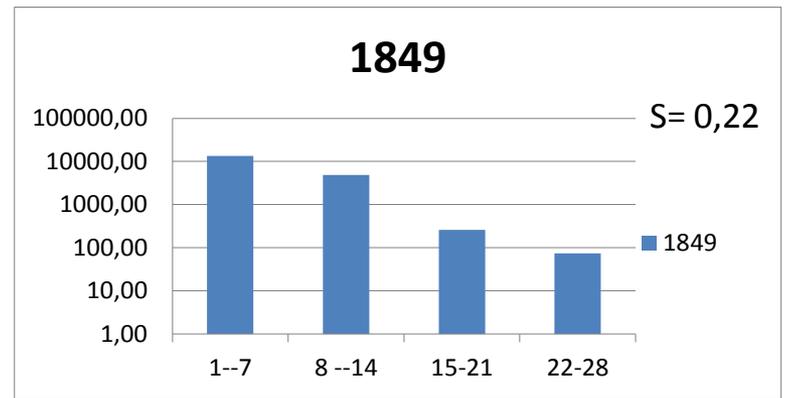
L'introduction de l'automobile à Beauvais



Beauvais, 18th century, Ganiage, 1999.



Beauvais today, www.tourisme.fr



Distribution des largeurs de rues. Beauvais, Hachi, 2014.

Merci de votre attention