

# La Ville en Économie

Arthur Charpentier, Ewen Gallic (Université de Rennes 1)

Alfred Galichon (NYU) & Lucas Vernet (IEP Paris)



Journée CartoStats, Paris, June 2017

## Économie spatiale (et urbaine)

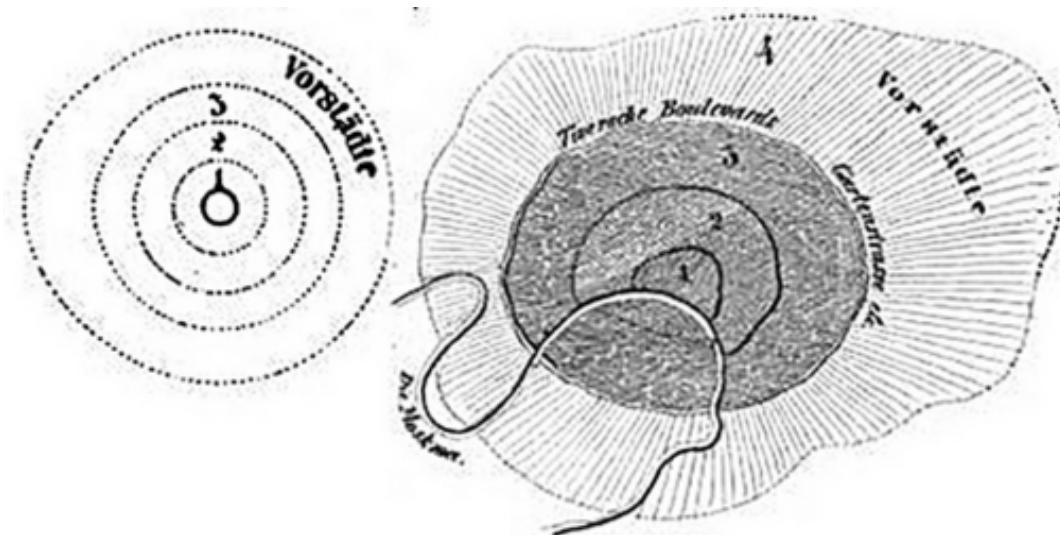
Économie géographique : les individus éprouvent le besoin de se regrouper (division du travail et autres économies d'échelle) mais doivent faire face aux difficultés inhérentes à ce regroupement.

*“Without recognizing **indivisibilities** - in human person, in residences, plants, equipment, and in transportation - . . . location patterns, down to those of the smallest village, cannot be understood”*

Koopmans (1957) Three Essays on the State of Economic Science

## La “ville”

Travaux initiaux de von Thünen (1826) ou Kohl (1841)



Concentration circulaire justifié par des valeurs de rentes foncières

Ville monocentrique, cf Fujita (1989) Urban Economic Theory

## La “ville linéaire”

Hoteling (1929) Stability in Competition

Consider the following illustration. The buyers of a commodity will be supposed uniformly distributed along a line of

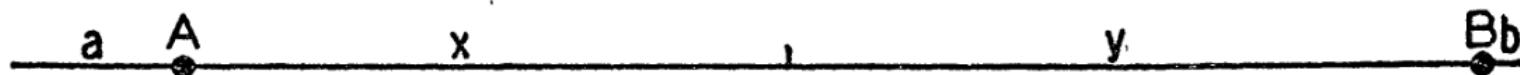


FIG. 1.

Market of length  $l = 35$ . In this example  $a = 4$ ,  $b = 1$ ,  $x = 14$ ,  $y = 16$ .

length  $l$ , which may be Main Street in a town or a transcontinental railroad. At distances  $a$  and  $b$  respectively from the two ends of this line are the places of business of A and B (Fig. 1).

voir aussi Kaldor (1935) Market Imperfection and Excess Capacity

## Équilibre(s) dans la “ville linéaire” et le CBD

Les parts de la **firme A** et de la **firme B** sont obtenues en cherchant la plus proche

Les deux firmes se concentrent au centre de la ville (*principe d'Hotelling*)

Si la population n'est plus uniforme, mais plus concentrée au centre, davantage d'incitations à la concentration.

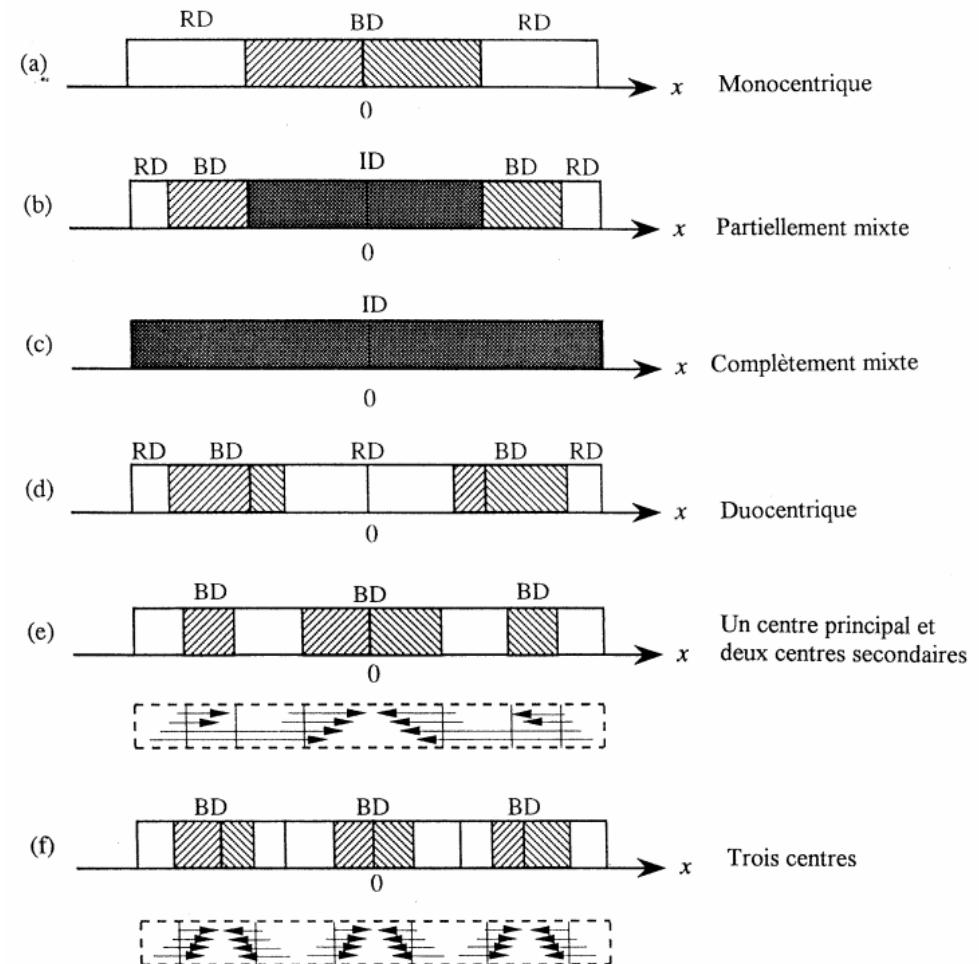
Voir aussi [Alonso \(1964\) Location and land use](#), avec la notion de centre d'emploi, ou [Perroux \(1950\) Economic Space: Theory and Applications](#) et la notion de pôle de croissance (cf discussion dans [Meardon \(2001\) Modeling Agglomeration and Dispersion in City and Country](#))

## Les autres équilibres possibles de la “ville linéaire”

En relâchant les hypothèses d’autres équilibres peuvent être obtenus, cf Fujita & Ogawa (1982) *Multiple equilibria and structural transition of non-monocentric urban configurations*

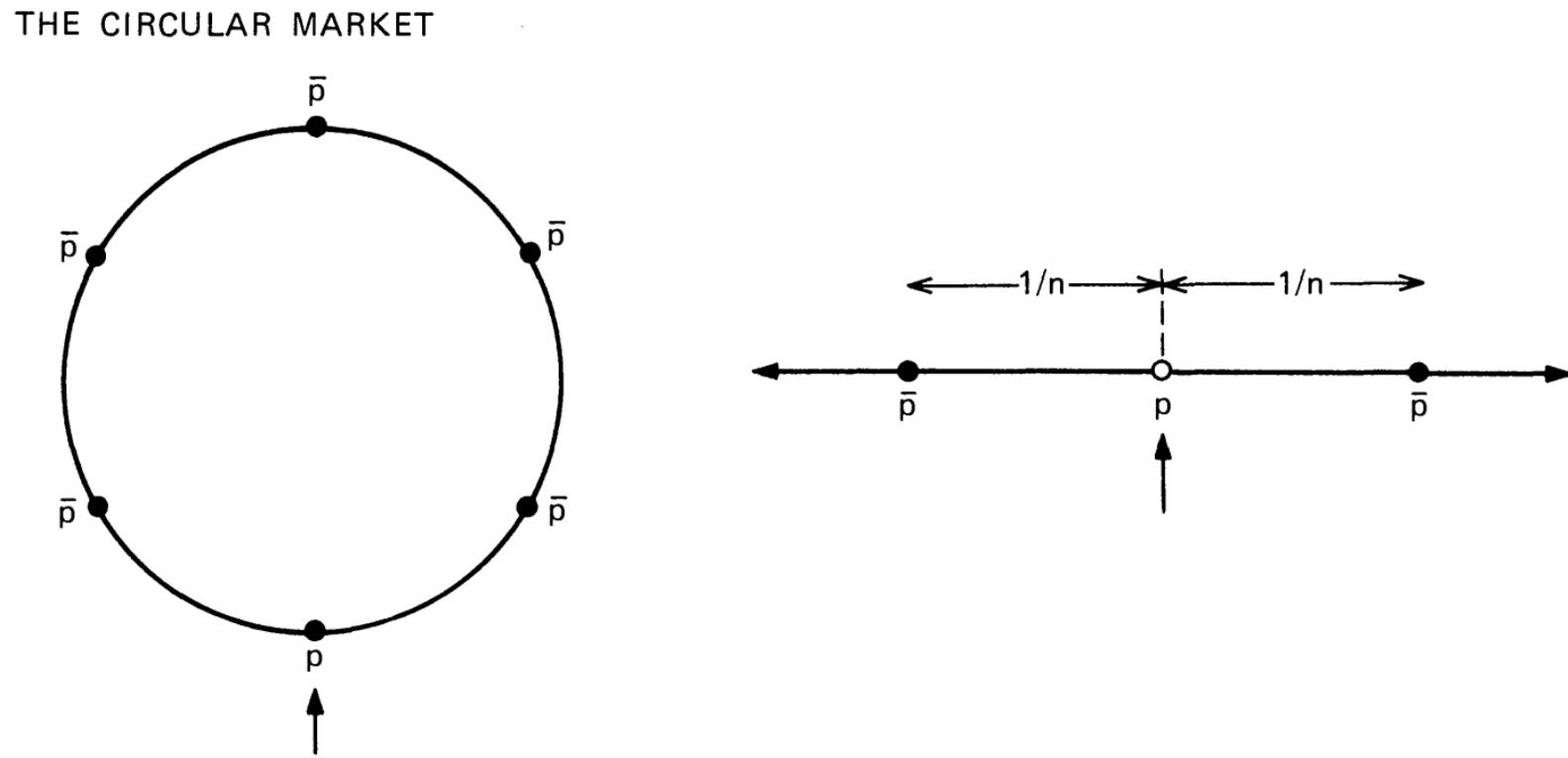
Opposition RD (*residential district*), BD (*business district*) et ID (*integrated*)

cf Fujita & Thisse (1997) *Économie géographique*



## Quitter le monde unidimensionnel (?) : la “ville circulaire”

Salop (1979) Monopolistic Competition with Outside Goods



Extension Lucas & Rossi-Hansberg (2002) On the Internal Structure of Cities

## Quitter le monde unidimensionnel : la “ville étoilée”

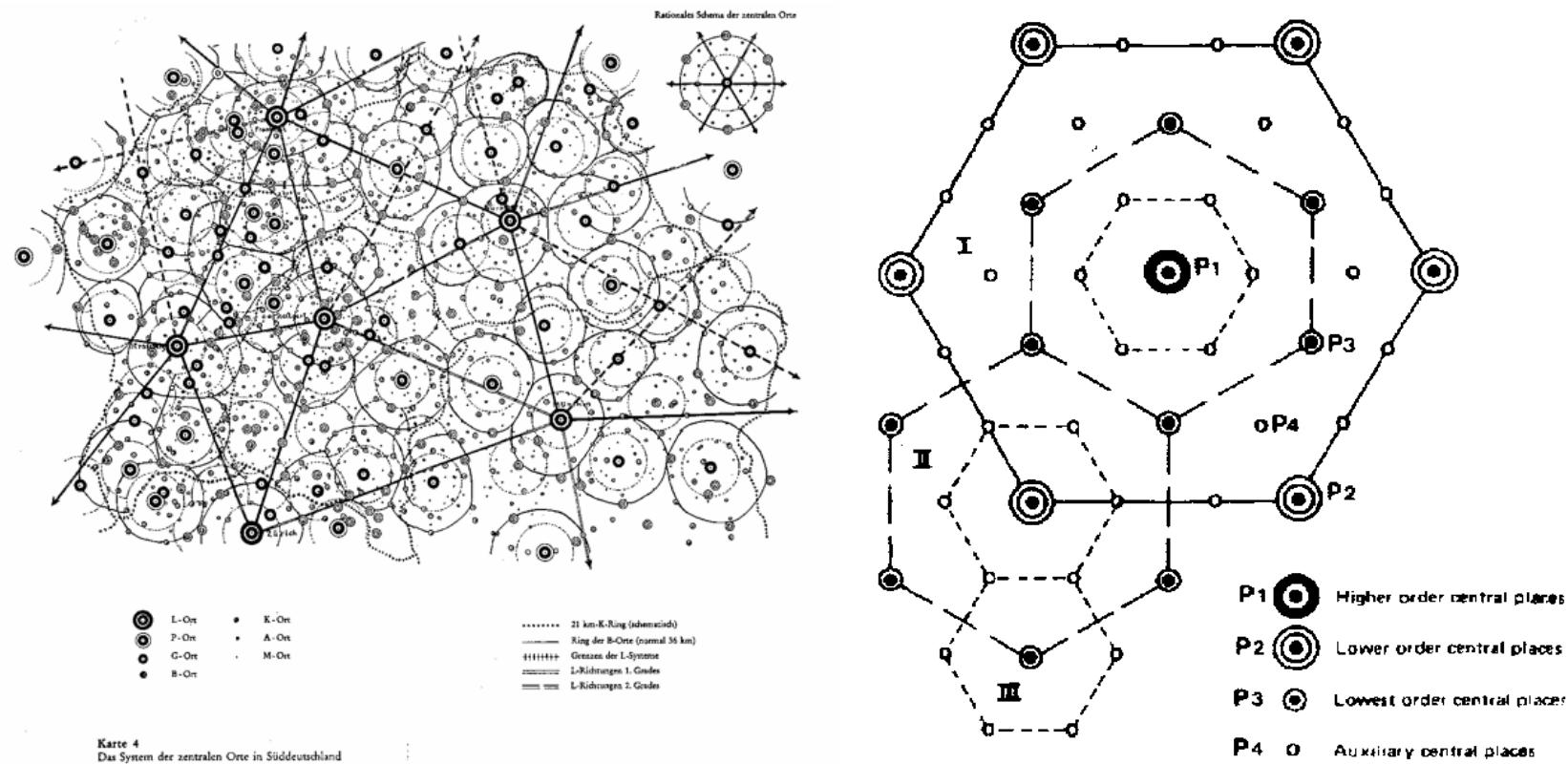
Comment étendre en dimension 2 ?

Nécessité de tenir compte des coûts de transports (théorème d'impossibilité de Starrett) et de penser la ville en temps que réseau

Starrett (1978) Market allocations of location choice in a model with free mobility

## La ville en deux dimensions et la ville en réseau

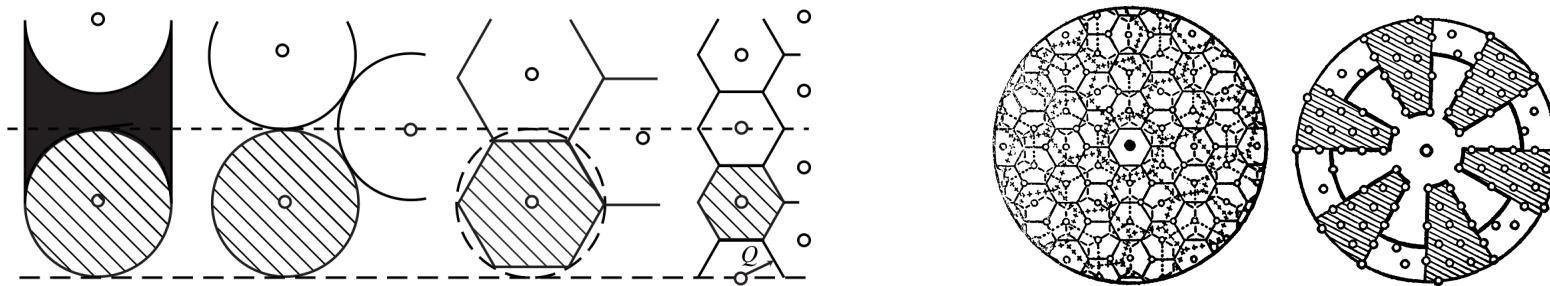
Christaller (1933) Die zentralen Orte in Süddeutschland



et la théorie des “lieux centraux”

## La ville en deux dimensions et la ville en réseau

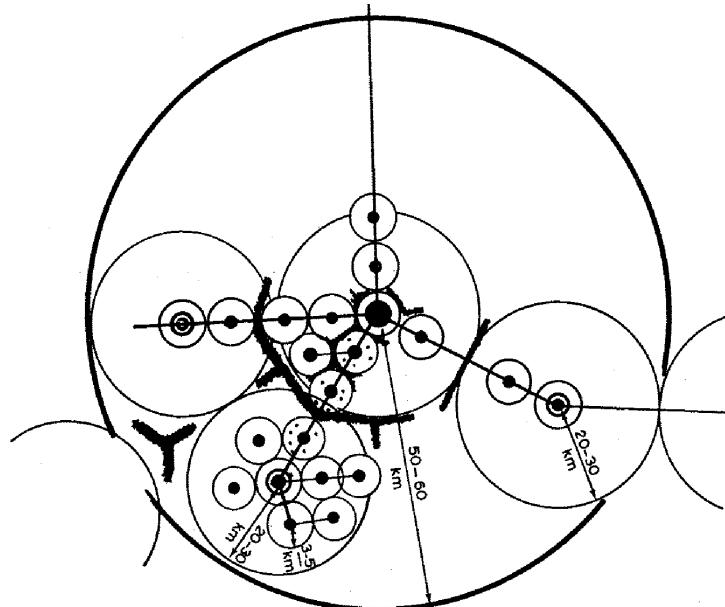
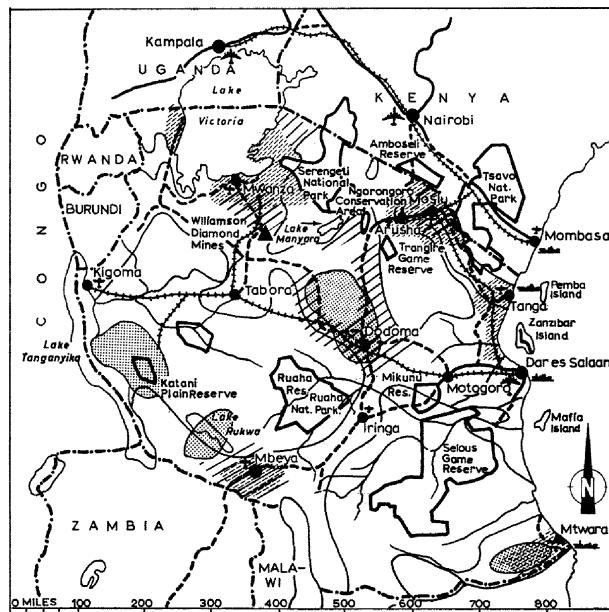
Lösch (1940) Die räumliche Ordnung der Wirtschaft or The Economics of Location a suggéré le développement de réseaux de marché hexagonaux,



*“growth pole theory was being forced upon the less-developed countries to explain and convince them of the inevitability of concentration in corporate capitalist expansion ” Conroy (1973) Rejection of Growth Center Strategy in Latin American Regional Development Planning*

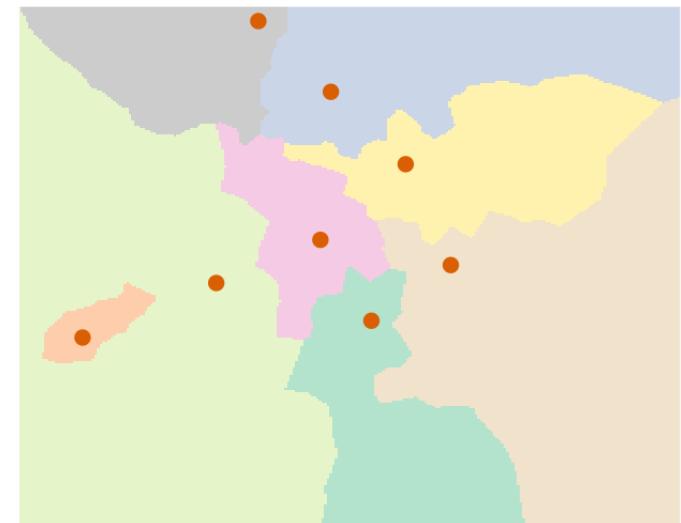
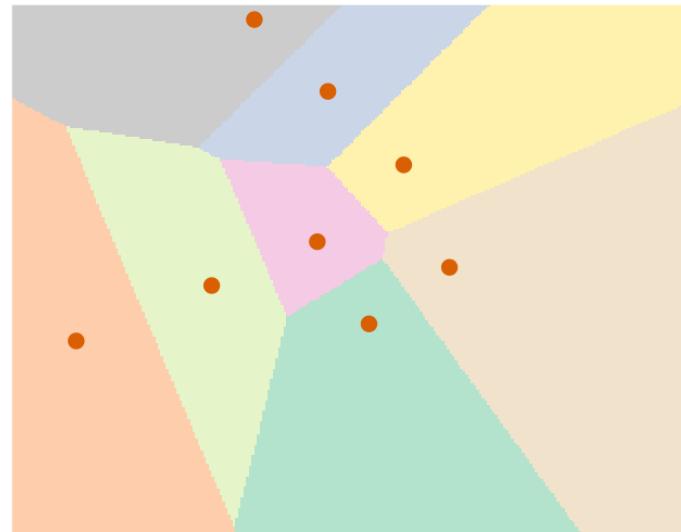
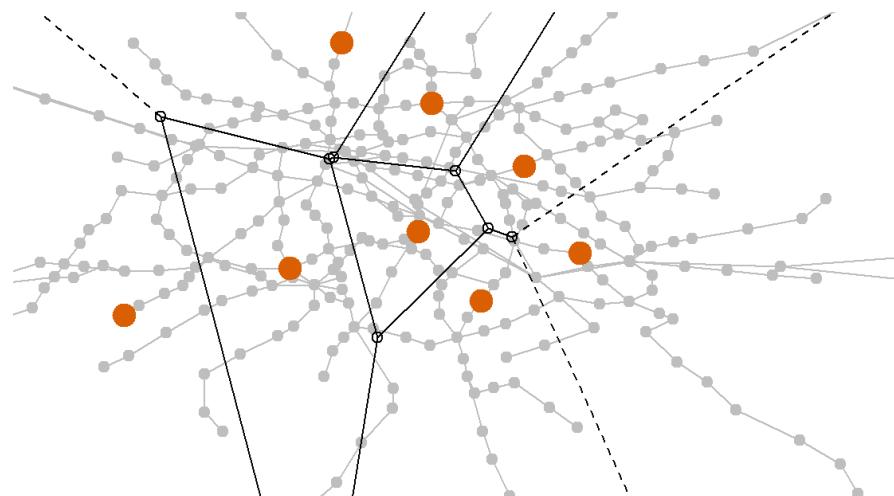
## La ville en deux dimensions et la ville en réseau

## Pióro (1972) Growth Poles and Growth Centres Theory as Applied to Settlement Development in Tanzania



## La ville en deux dimensions et la ville en réseau

Nécessité de penser la ville sous forme de réseau, mais il n'existe pas de réseau générique (en dehors des hexagones de Christaller (1933))



Influence beaucoup les distances...

## La ville en deux dimensions et la ville en réseau

De plus en plus de données géolocalisées (“producteurs-consommateurs”)

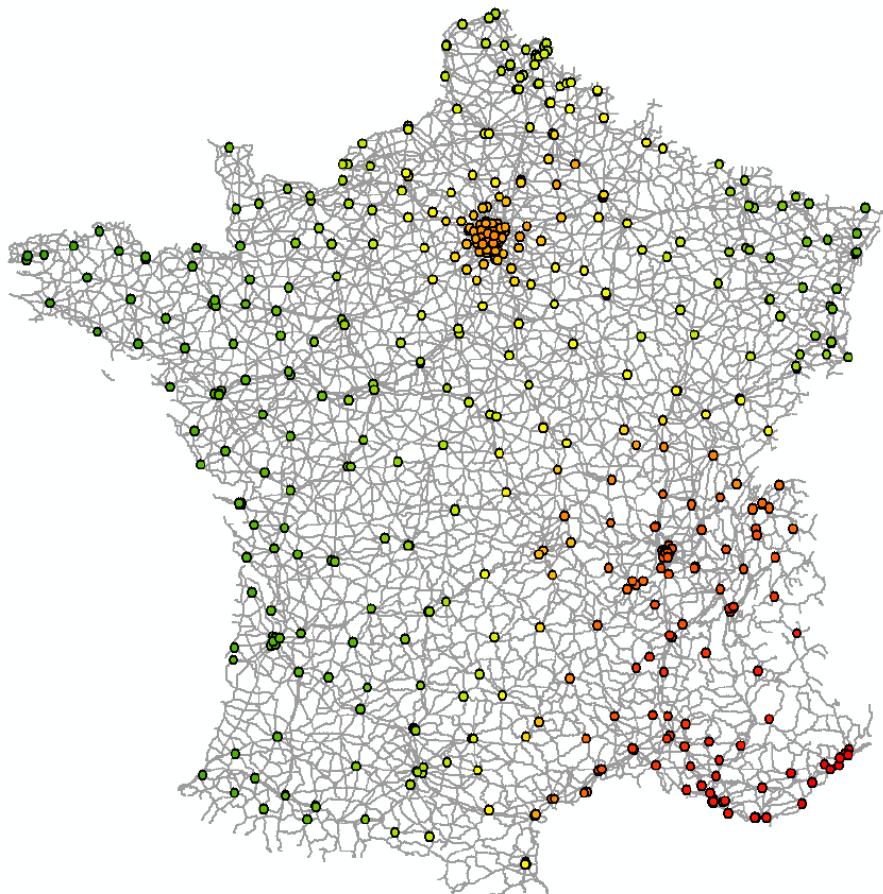
Matching bipartite  $(c_i, p_j)$ ,  $c_i \in \mathcal{C}, p_j \in \mathcal{P}$   
fonction de la distance  $d(c_i, p_j)$ , cf Galichon  
(2016) Optimal Transport Methods in Eco-  
nomics

voir problème d'affectation et problème du  
flot de coût minimum de Ahuja *et al.* (1993),  
voir aussi simple plant location problem  
(SPLP) de Cornuejols, Nemhauser & Wolsey  
(1990) *in* Francis & Mirchandani (Eds.)

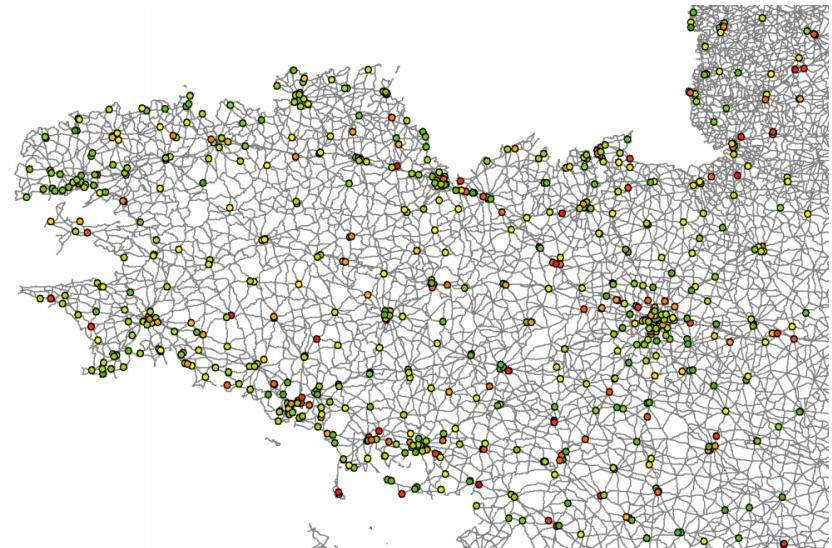
Discrete Location Theory, The Uncapacitated Facility Location Problem.

## La ville en deux dimensions et la ville en réseau

Géolocalisation de “producteurs-consommateurs”, cf Charpentier, Galichon & Vernet (2017) *A Toolbox for the Modeling of Competition in Geographic Networks*

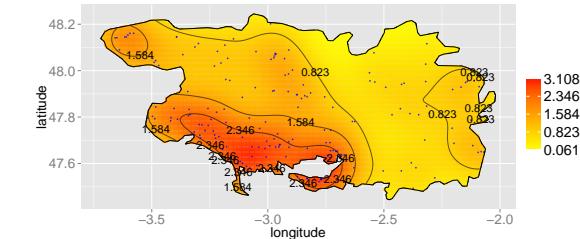
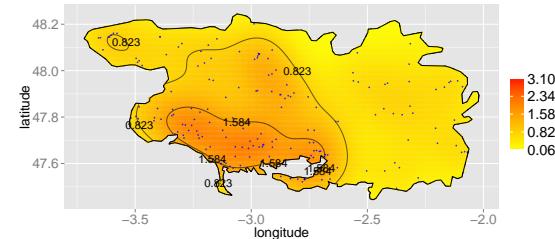
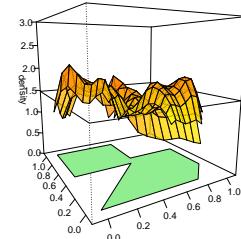
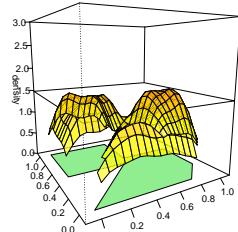
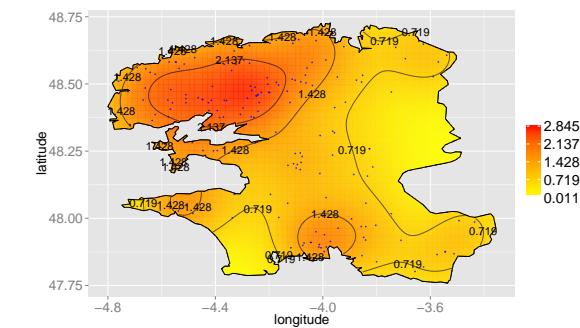
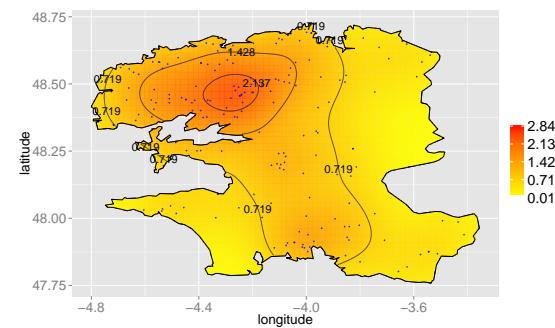
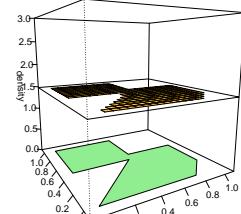
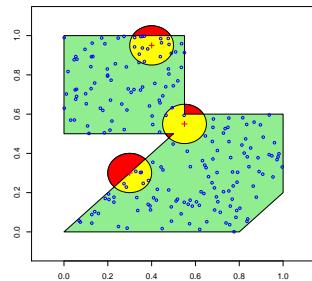


- Maternités en France
- Stations essence en Bretagne

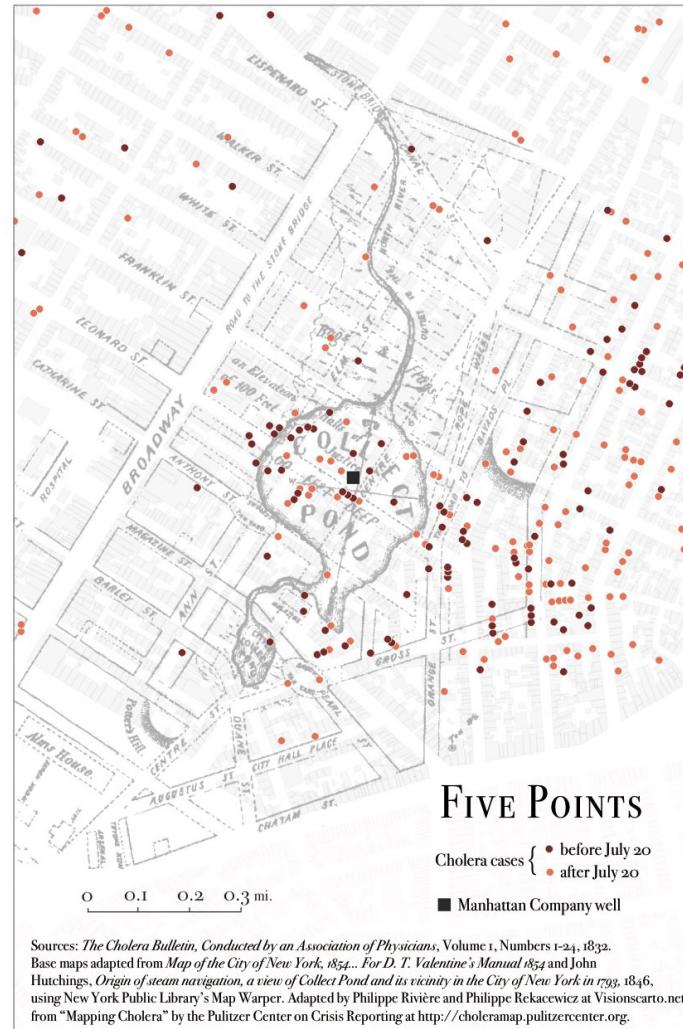
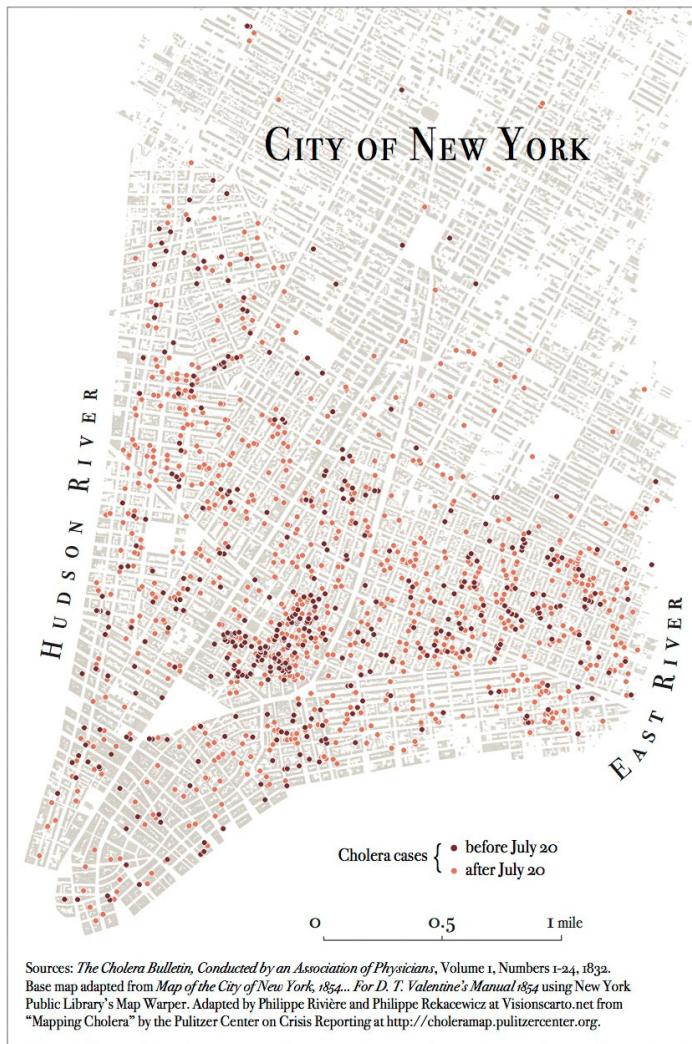


## L'espace en deux dimension

Charpentier & Gallic (2015) Density Estimation & Ripley Correction



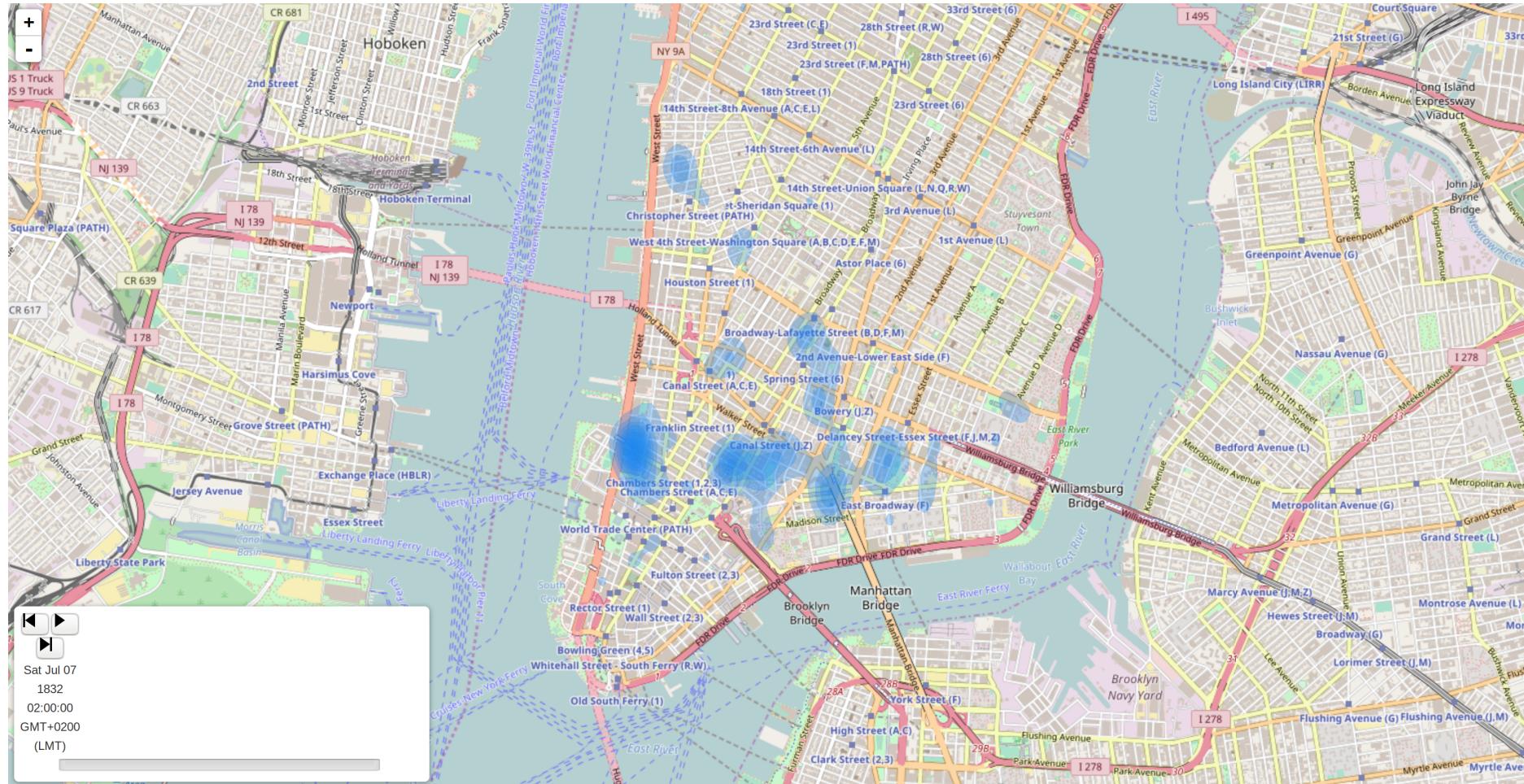
## La ville en trois dimensions



P. Rekacewicz & P. Rivière, dans Shah (2016) Pandemic

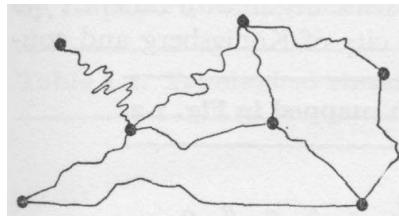
# La ville en trois dimensions

Cf discussion de Karine Hurel ce matin

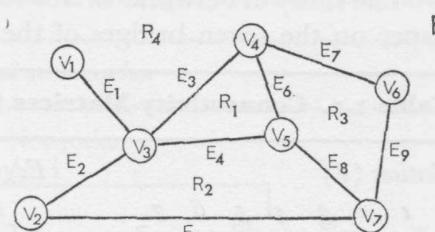


<https://freakonometrics.github.io/git/cholera/map.html>

## Conclusion : rien de bien très nouveau... (?)



a



b

Fig. 1.2. Reduction of a map of a transport network (A) to a graph (B).

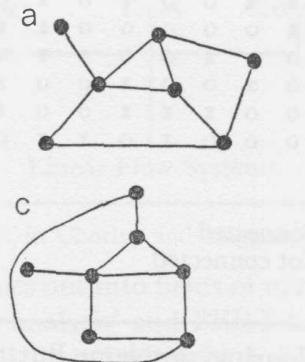
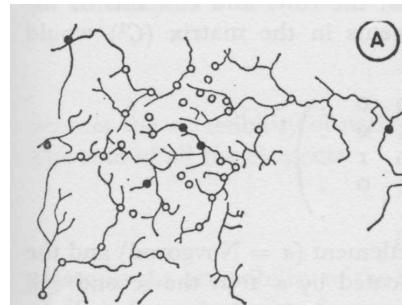
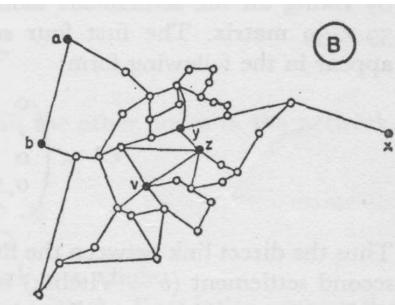


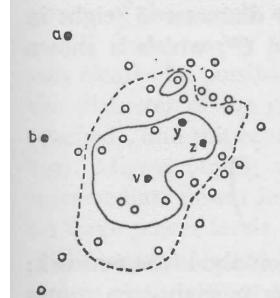
Fig. 1.3. Alternative topologic forms for the graph mapped in Fig. 1.2.



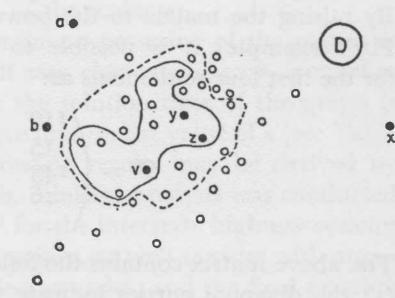
(A)



(B)



(C)



(D)

Fig. 1.22. The use of graph-theoretic measures to compute the relative accessibility of Moscow (y) in twelfth- and thirteenth-century Russia. In both (C) and (D) the heavy line encloses the ten 'most connected' places and the broken line the twenty 'most connected' places. Source: Pitts, 1965.

## Haggett (1969) Network Analysis in Geography

## Références

Charpentier, Galichon & Vernet (2017) A Toolbox for the Modeling of Competition in Geographic Networks

Fujita, Thisse (2013) Economics of agglomeration: cities, industrial location, and globalization, CUP.

Fujita (1989) Urban Economic Theory, CUP

Guesnerie (2008) L'équilibre spatial : économie urbaine et économie géographique  
Cours au Collège de France

Hoteling (1929) Stability in Competition *The Economic Journal*

Lucas & Rossi-Hansberg (2002) On the Internal Structure of Cities *Econometrica*

<https://freakonometrics.github.io/git/cholera/map.html>

<https://freakonometrics.github.io/git/famille/map.html> (in progress)

<https://freakonometrics.github.io/git/shp/> (in progress)