# An interdisciplinary approach of urban evolution over long periods of time:
## theoretical and methodological aspects

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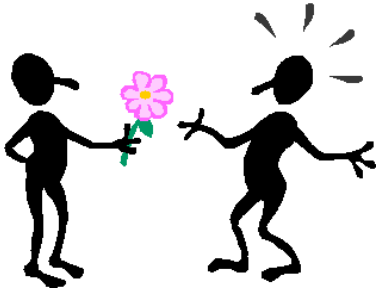
# Introduction



- Interdisciplinary approach
  - Urban archaeology: 1960's in England
  - Theories and concepts linked to spatial analysis
- Urban evolution over long periods of time
  - Scales
  - Trajectories

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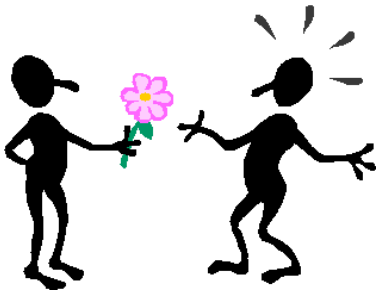
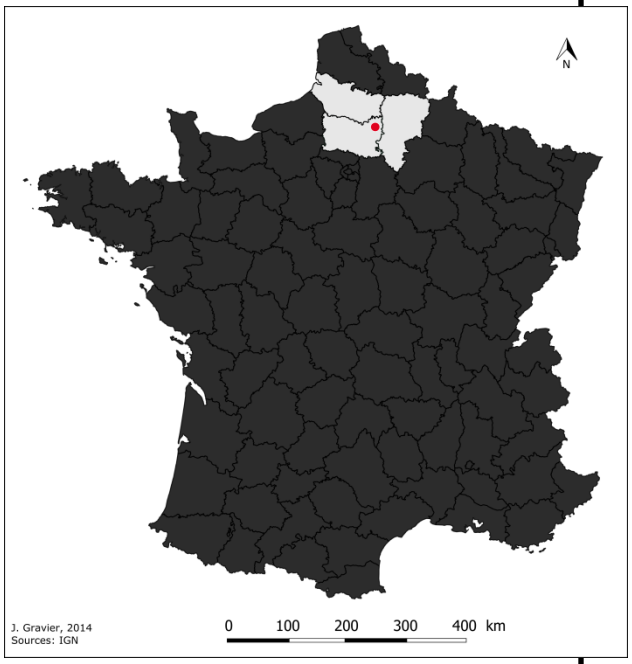


- Interdisciplinary approach
  - Urban archaeology: 1960's in England
  - Theories and concepts linked to spatial analysis
- Urban evolution over long periods of time
  - Scales
  - Trajectories
- The unit of analysis is named "urban entity"
  - A function
  - A location (or a spatial form)
  - A date (continuous duration of time)
- Case study: city of Noyon (Picardy, France)



# Introduction

- 1. The point of view of the archaeologist
- 2. Database SHAUN: some methodological aspects
- 3. Results: urban evolution of Noyon through a period of 2 000 years
- 4. Conclusion and discussion

# 1. The point of view of the archaeologist

# What is this ?

Boves Castle, J. Gravier 2009

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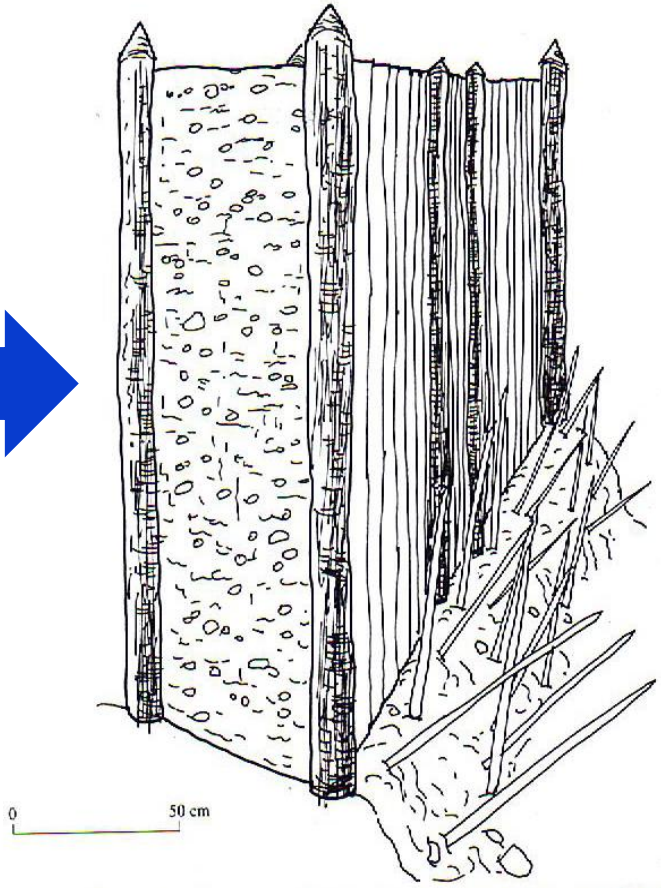
- A defensive system of a medieval castle

Boves Castle, J. Gravier 2009




Racinet et al. 2002

# What is observable? Material traces

- Material traces are "rejections" of human societies (Schiffer, 1972)
  - Consciously or not
  - They aren't similarly preserved through time
  - They are discovered *by* an archaeologist

Le-Mont-des-Trois-Pensées, INRAP 2010

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- View (colour, shape…)
- Touch (texture, compactness…)
- Hearing (trowel sounds…)
- Smell (ex: tannery)
- And for some... taste

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- Human activity is an inference (tannery)

# What exactly is an "urban entity" in this project?

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**Archaeology**

**Text**
**Iconography**

SAVN, 2013

*Observation of an archaeological structure* =
**a functional activity defined at the scale of the excavation**

- The scale of the excavation = interpretation system

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Epinal, SEV coll.

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Bibracte, INRAP coll.

➢ Only : ox bones

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Rennes, INRAP 2011

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➢ Artisanal district : a second level inference

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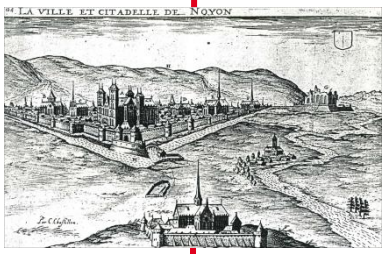
C. Chastillon

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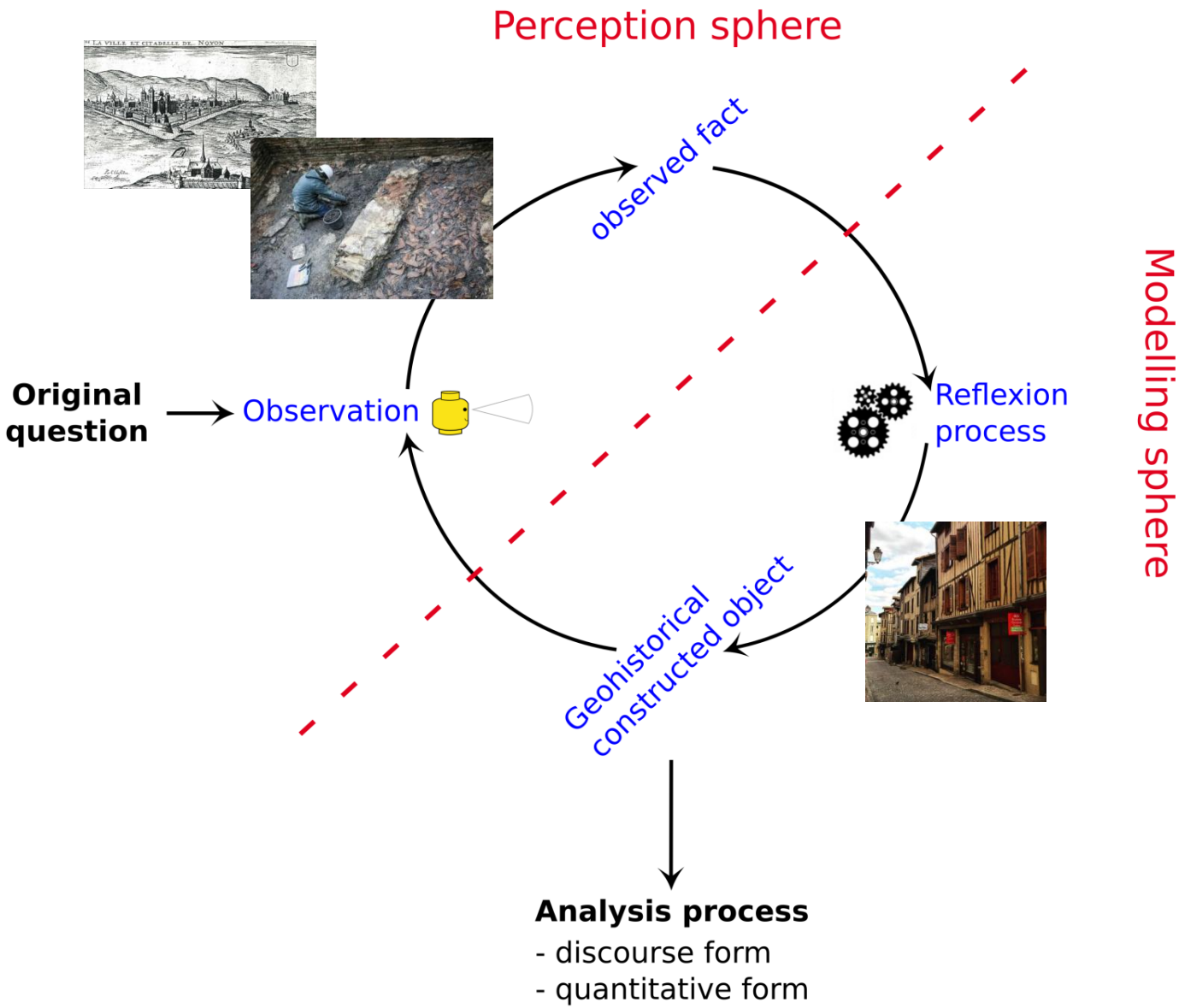
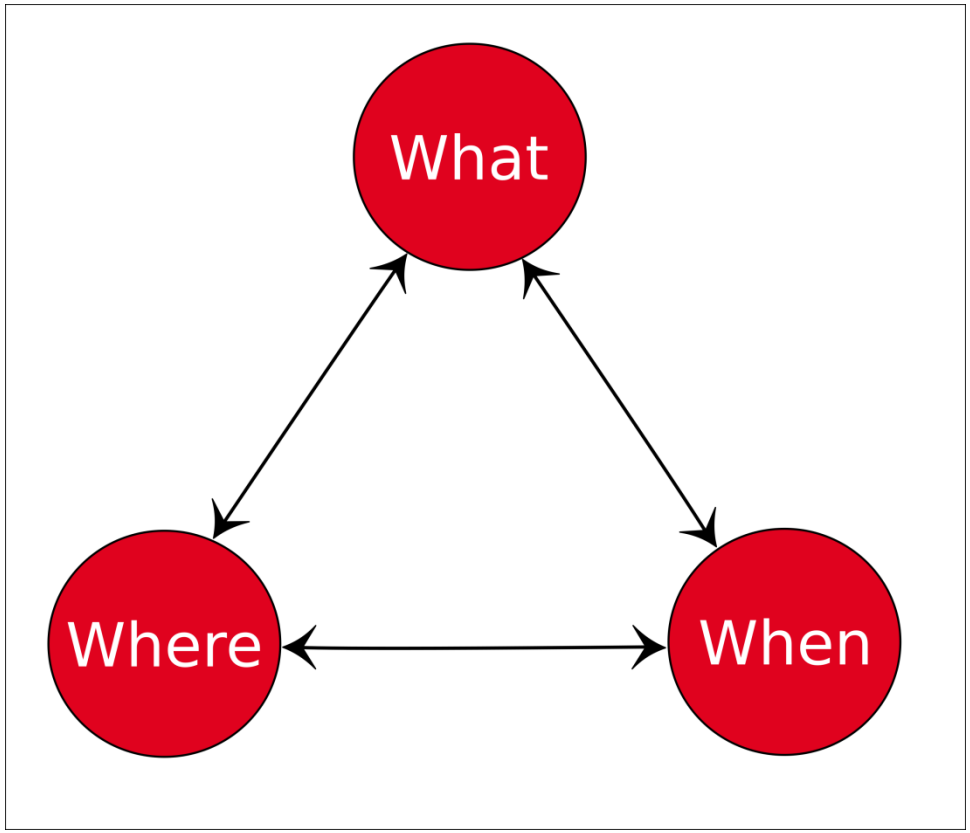
# Generic process between observations and "urban entities"



# 2. Database SHAUN: some methodological aspects

# Database SHAUN: characteristics of "urban entities"

- Three components of spatio-temporal objects (Peuquet, 1994)



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Orange, 2014

Antiquity

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Noyon, 1904

Antiquity → Modern age

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Orange, 2014

Noyon, 1904

Antiquity

Medieval ages

Modern age

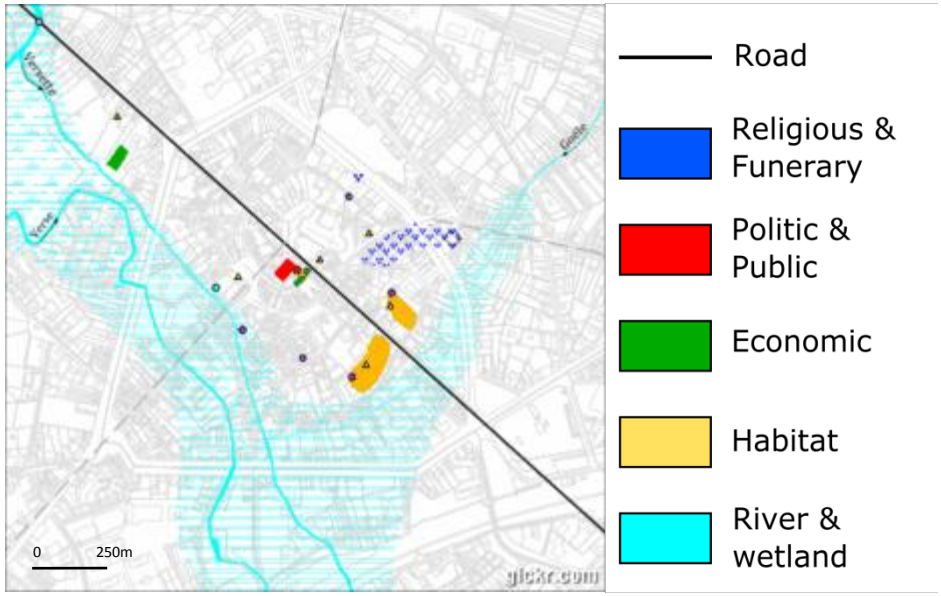
Fabliau, n.d.

# 3. Results: urban evolution of Noyon through a period of 2 000 years

# Urban evolution of Noyon through a period of 2 000 years

- 402 "urban entities"
- Different states of the urban system from 1st to 21st century based on
  - Spatial changes
  - Functional changes

7 phases of the urban system



# Factorial correspondence analysis: from first century AD to nowadays

- Variable: **urban functions**

- Units: **chronological periods** (50 years)

| | Road and free space | Bank, river, relief planning & crossing system | Water supply & evacuation system | Defensive & military system | Civilian & religious public spaces | Host establishment | Habitat | Religious establishment | Funerary | Production, trade and craft | Natural formation | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | 6 | 0 | 1 | 0 | 2 | 0 | 6 | 0 | 2 | 2 | 6 | 25 |
| P2 | 6 | 2 | 1 | 0 | 2 | 0 | 6 | 0 | 2 | 3 | 6 | 28 |
| P3 | 6 | 2 | 1 | 0 | 2 | 0 | 7 | 0 | 2 | 3 | 6 | 29 |
| P4 | 6 | 2 | 1 | 0 | 2 | 0 | 7 | 0 | 2 | 2 | 6 | 28 |
| P5 | 6 | 2 | 0 | 0 | 2 | 0 | 6 | 0 | 2 | 4 | 6 | 28 |
| P6 | 6 | 2 | 0 | 7 | 2 | 0 | 6 | 0 | 2 | 4 | 6 | 35 |
| P7 | 4 | 2 | 0 | 7 | 1 | 0 | 4 | 0 | 2 | 1 | 6 | 27 |
| P8 | 4 | 2 | 0 | 7 | 0 | 0 | 4 | 0 | 2 | 2 | 6 | 27 |
| P9 | 4 | 2 | 0 | 7 | 0 | 0 | 5 | 0 | 2 | 3 | 6 | 29 |
| P10 | 4 | 2 | 0 | 7 | 0 | 0 | 6 | 0 | 2 | 3 | 6 | 30 |
| P11 | 4 | 2 | 0 | 7 | 2 | 0 | 3 | 1 | 1 | 2 | 6 | 28 |
| P12 | 4 | 2 | 0 | 7 | 2 | 0 | 3 | 1 | 1 | 2 | 6 | 28 |
| P13 | 5 | 2 | 0 | 7 | 2 | 0 | 3 | 4 | 3 | 2 | 6 | 34 |
| P14 | 5 | 2 | 0 | 1 | 4 | 0 | 3 | 7 | 3 | 2 | 6 | 33 |
| P15 | 12 | 2 | 0 | 1 | 3 | 0 | 5 | 7 | 3 | 3 | 6 | 42 |
| P16 | 12 | 2 | 0 | 1 | 3 | 0 | 5 | 7 | 3 | 3 | 6 | 42 |
| P17 | 13 | 4 | 0 | 1 | 3 | 0 | 4 | 10 | 3 | 4 | 6 | 48 |
| P18 | 13 | 4 | 0 | 2 | 3 | 0 | 4 | 10 | 3 | 4 | 6 | 49 |
| P19 | 12 | 4 | 0 | 2 | 3 | 0 | 4 | 10 | 3 | 5 | 6 | 49 |
| P20 | 14 | 3 | 0 | 1 | 4 | 0 | 5 | 10 | 3 | 5 | 6 | 51 |
| P21 | 31 | 3 | 0 | 1 | 5 | 0 | 5 | 17 | 5 | 7 | 6 | 80 |
| P22 | 33 | 3 | 0 | 1 | 4 | 0 | 5 | 17 | 5 | 7 | 6 | 81 |
| P23 | 39 | 5 | 0 | 1 | 6 | 1 | 7 | 17 | 4 | 7 | 6 | 93 |
| P24 | 52 | 6 | 0 | 11 | 6 | 4 | 9 | 23 | 5 | 7 | 6 | 129 |
| P25 | 62 | 6 | 1 | 11 | 4 | 4 | 12 | 28 | 9 | 9 | 7 | 153 |
| P26 | 66 | 7 | 1 | 11 | 5 | 6 | 13 | 29 | 11 | 14 | 7 | 170 |
| P27 | 69 | 4 | 1 | 10 | 4 | 7 | 12 | 28 | 12 | 16 | 7 | 170 |
| P28 | 72 | 4 | 1 | 12 | 5 | 8 | 12 | 28 | 13 | 20 | 7 | 182 |
| P29 | 69 | 3 | 1 | 11 | 6 | 7 | 12 | 31 | 11 | 21 | 5 | 177 |
| P30 | 68 | 4 | 2 | 12 | 6 | 7 | 13 | 31 | 11 | 21 | 5 | 180 |
| P31 | 70 | 4 | 2 | 13 | 7 | 9 | 18 | 32 | 11 | 20 | 5 | 191 |
| P32 | 72 | 6 | 2 | 20 | 9 | 6 | 12 | 36 | 12 | 20 | 4 | 199 |
| P33 | 76 | 7 | 2 | 23 | 8 | 4 | 12 | 33 | 13 | 23 | 5 | 206 |
| P34 | 76 | 8 | 2 | 21 | 8 | 10 | 12 | 32 | 13 | 22 | 6 | 210 |
| P35 | 73 | 7 | 2 | 17 | 8 | 7 | 12 | 32 | 14 | 22 | 5 | 199 |
| P36 | 76 | 3 | 2 | 18 | 11 | 9 | 15 | 32 | 13 | 23 | 5 | 207 |
| P37 | 74 | 6 | 2 | 18 | 5 | 4 | 5 | 1 | 2 | 20 | 4 | 141 |
| P38 | 80 | 7 | 2 | 19 | 4 | 8 | 4 | 1 | 1 | 20 | 4 | 150 |
| P39 | 96 | 7 | 2 | 5 | 11 | 12 | 3 | 1 | 5 | 19 | 3 | 164 |
| P40 | 75 | 4 | 2 | 4 | 16 | 9 | 2 | 1 | 4 | 12 | 3 | 132 |
| P41 | 74 | 1 | 1 | 2 | 12 | 7 | 1 | 2 | 3 | 7 | 3 | 113 |
| TOTAL | 1549 | 150 | 32 | 306 | 192 | 129 | 292 | 519 | 223 | 396 | 229 | 4017 |

# Factorial correspondence analysis: from first century AD to nowadays

## Functions

1. Road and free space
2. Bank, river, relief planning & crossing system
3. Water supply & evacuation system
4. Defensive & military system
5. Civilian & religious public spaces
6. Host establishment (health, education)
7. Habitat
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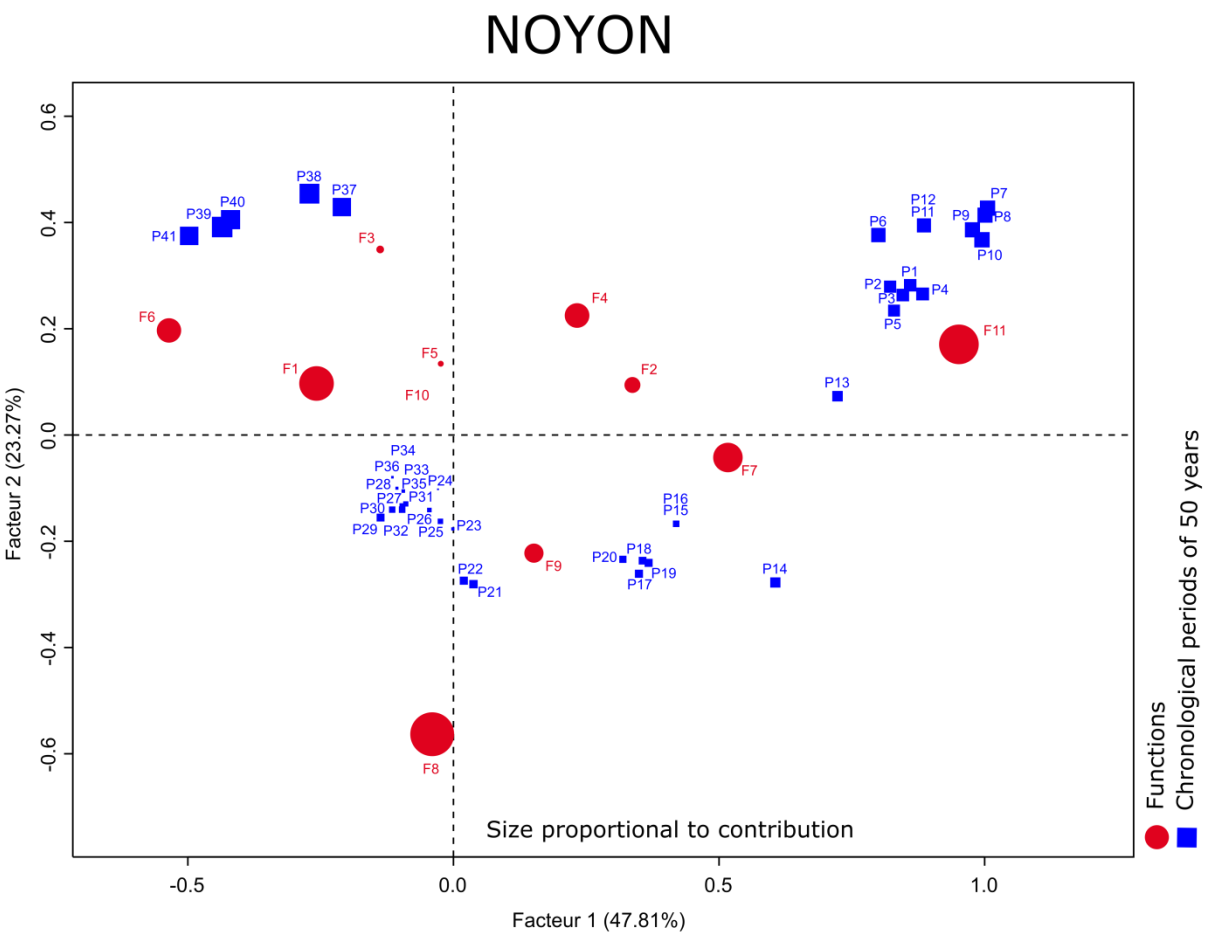


Made with Analyse – PIREH, R code

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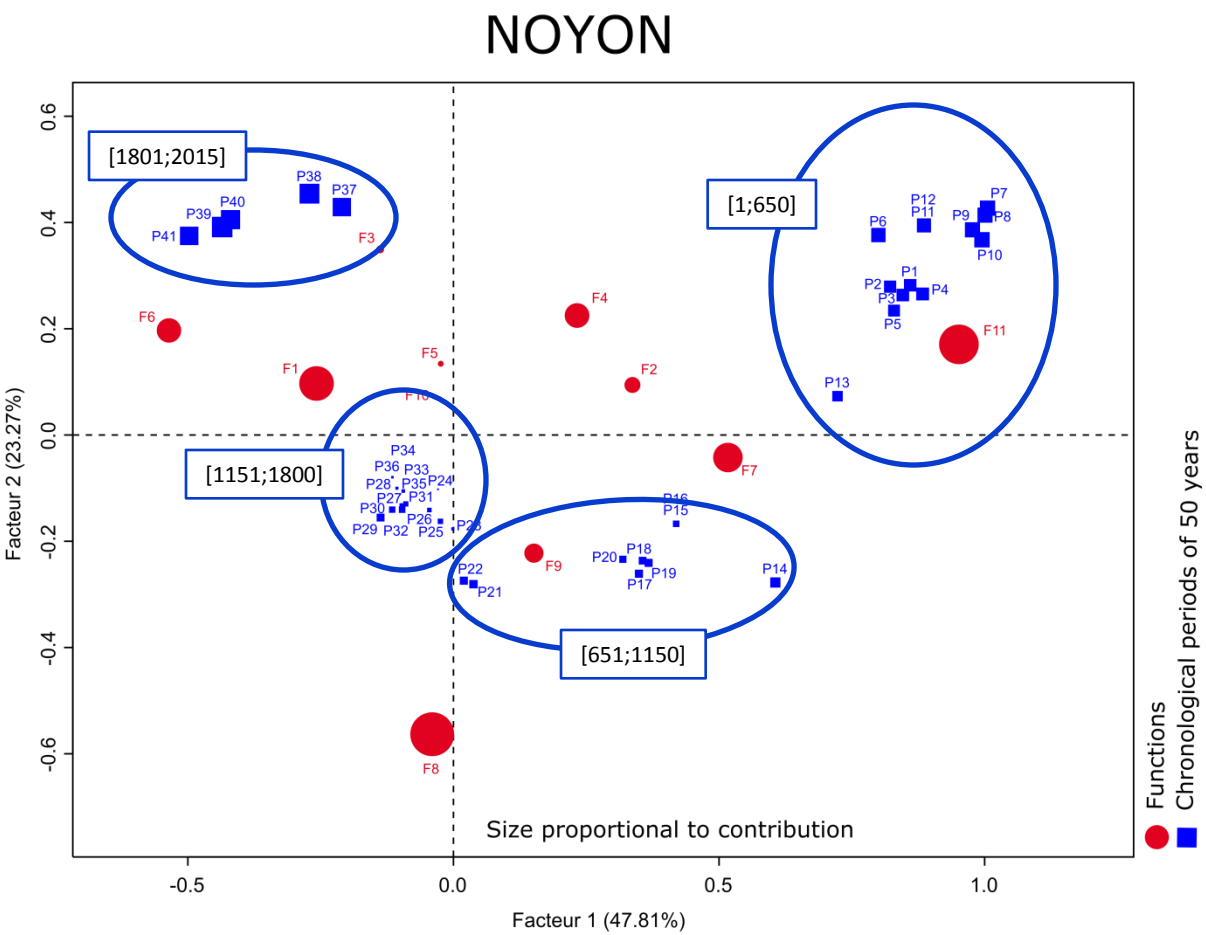


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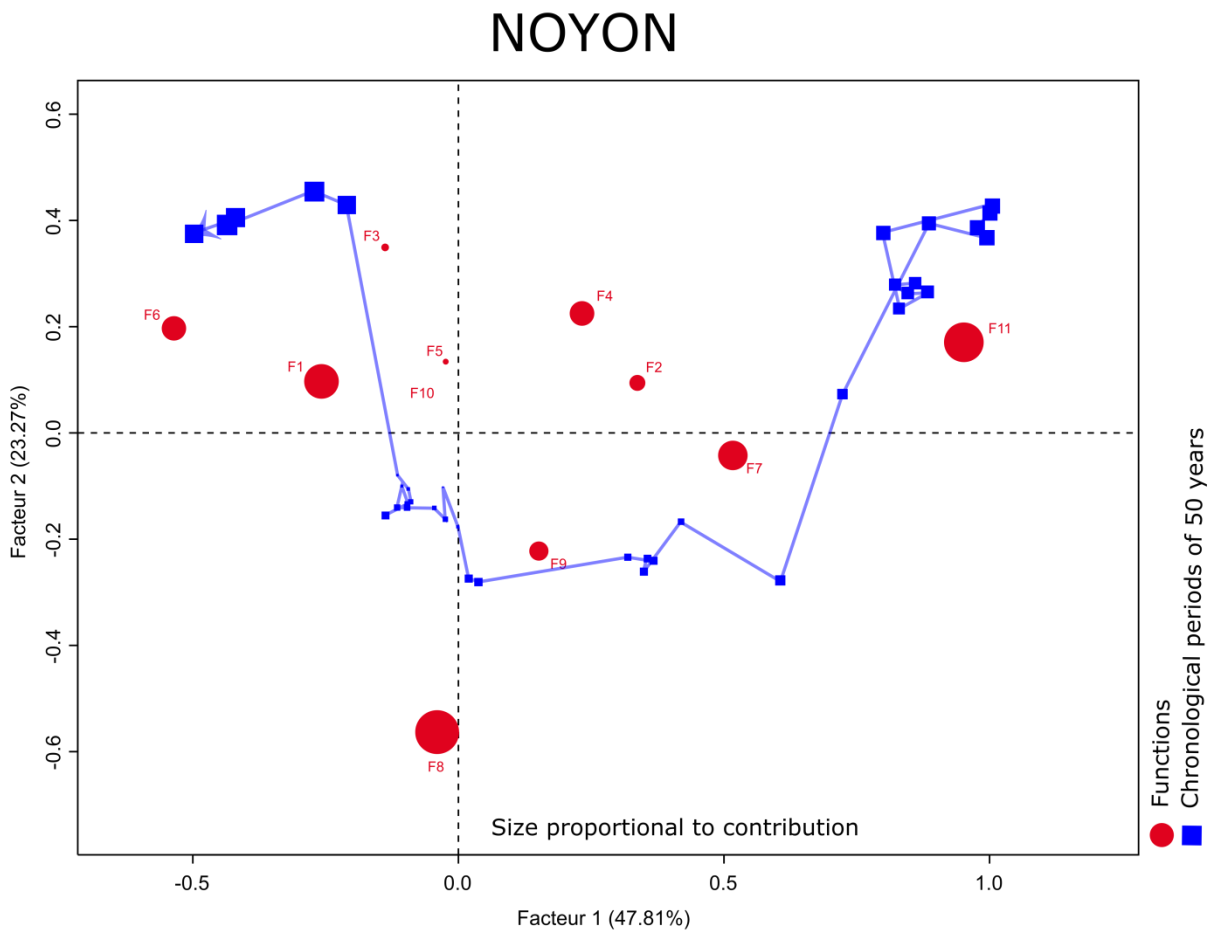


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# 4. Conclusion and discussion

- Scales
  - Four levels from remains to intra-urban system
  - Specific levels for archaeology: material traces and observation of structure
  - "Urban entity": an interdisciplinary constructed object
- Trajectories
  - Statistical approach: possible comparison (recurrences and specificities)

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**Thank you for your attention**