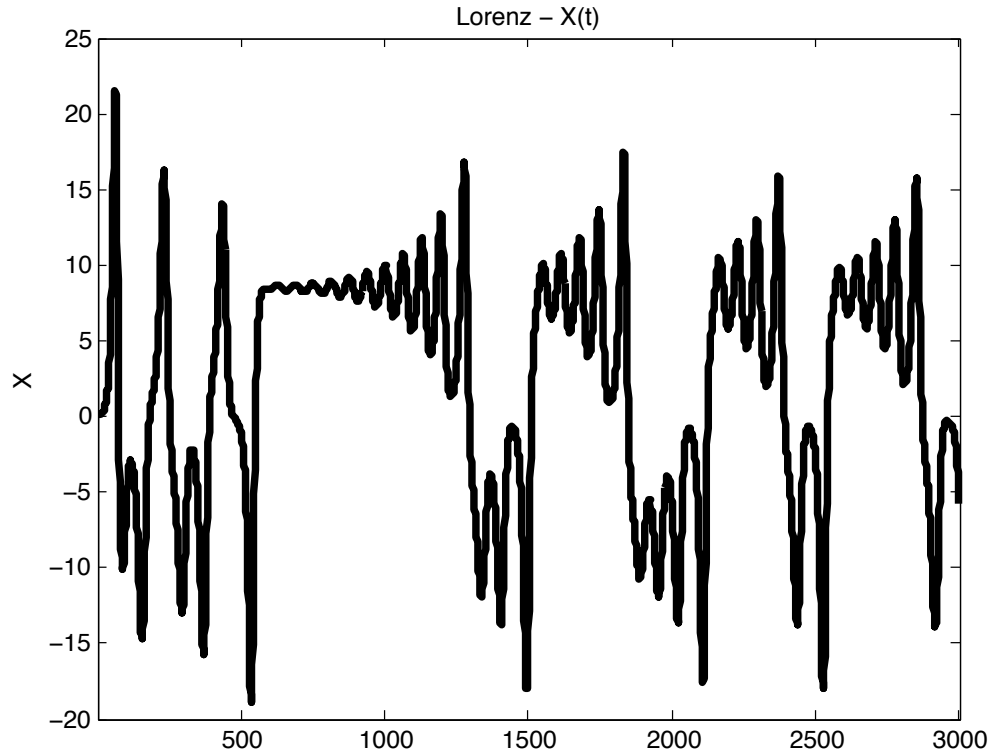
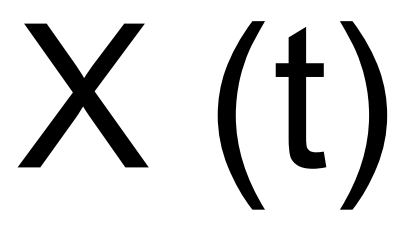
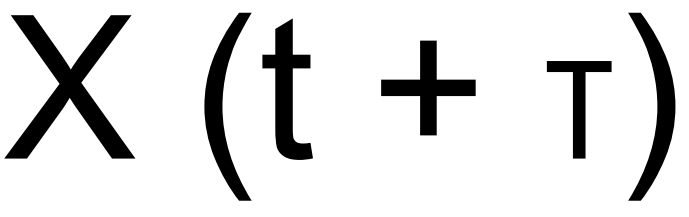
Radboud University Nijmegen

Behavioural Science Institute


Lorenz – X(t)
X
25
20
15
10
5
0
−5
−10
−15
−20
500
1000
1500
2000
2500
3000


X (t)


X (t + T)

$$X\left(t+2_{T}\right)$$

Creating surrogate dimensions using the method of delays

The embedding lag reflects
the point in the time series at
which we are getting
new information about the system…

In theory any lag can be used, everything is interacting...

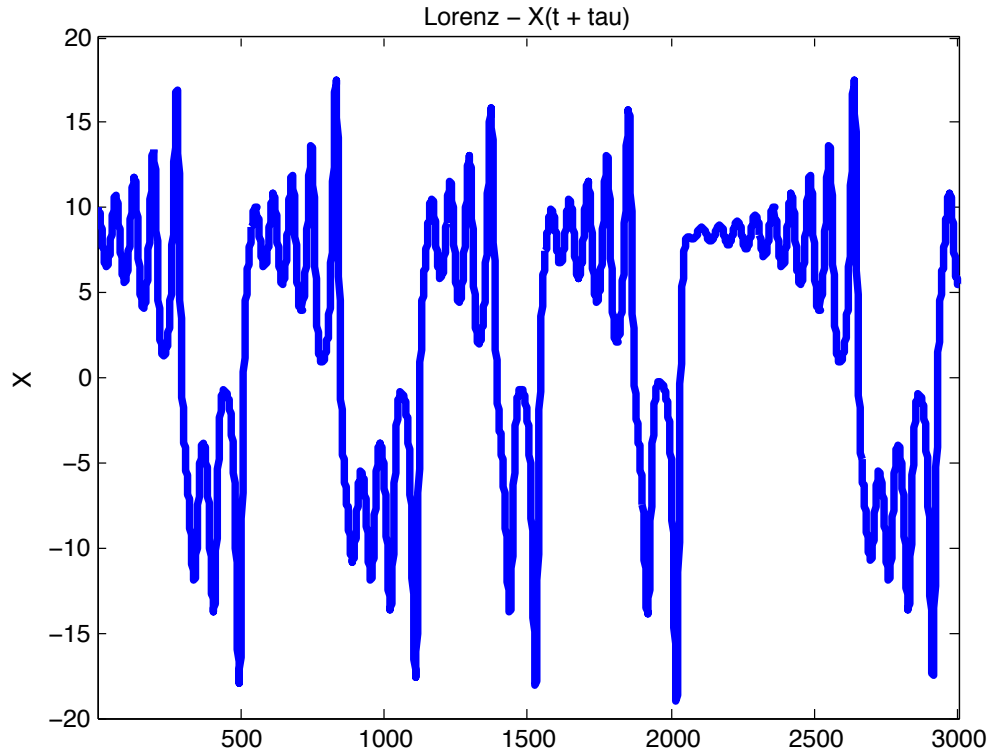
We are looking for the lag which is optimal, gives us maximal new information about the temporal structure in the data…

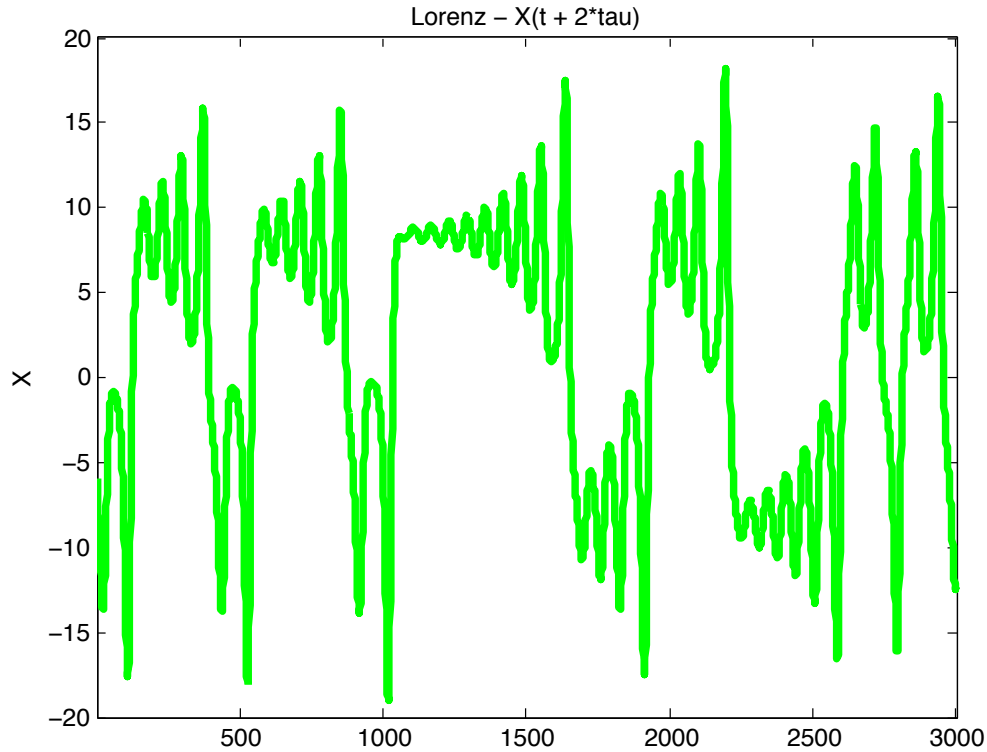
Intuitively:

Where the autocorrelation is zero

We are creating a return plot to examine the systems' state space!

29


Lorenz – X(t + tau)
X
20
15
10
5
0
−5
−10
−15
−20
500
1000
1500
2000
2500
3000

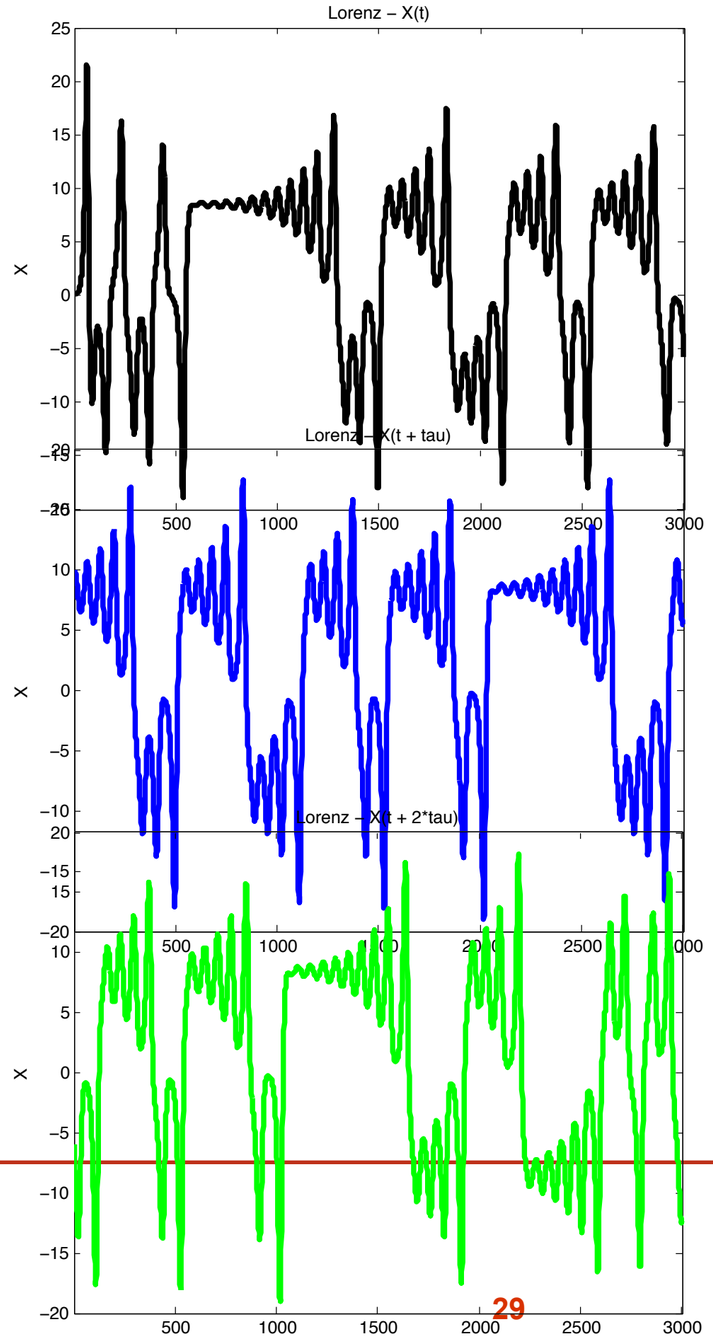

Lorenz – X(t + 2*tau)
X
20
15
10
5
0
−5
−10
−15
−20
500
1000
1500
2000
2500
3000

Creating surrogate dimensions using the method of delays

X (t)

X (t + τ)

X (t + 2τ)



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Intuitively:
Where the autocorrelation is zero

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How to determine embedding lag?

- We saw that the autocorrelation function is not very helpful when you are dealing with long range correlations in the data.