

PASSING THE BALL AND TALKING TO YOUR ENEMY: A CONVERSATIONAL ANALYSIS IN TEAMS WITH A SINGLE TOPIC



First presented by Johan Koskinen and Thomas Grund:

15 March 2012, SUNBELT XXXII Redondo Beach

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OUTLINE



- Aspects of REM that needs attention
- The ball is one topic
- The importance of the single topic
- Dynamics
 - Short-range
 - Spatial embedding
 - Long-range
- Settings
- Model
- Results
- Conclusion

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ANTECEDENTS

- Relational events models (Butts and co)
- Time-stamped SAOM (Brandes, Lerner and Snijders)
- Conversation analysis (Gibson; McFarland)
- Multilevel relational events (Pierski, et al)
- Taxonomy (Kovanen, et al)

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DATA

- Detailed narratives of 760 Premier League football matches based on video footage.
- 1,050,411 in-match events (including referee decisions and player behaviours).
- 283,259 passes between professional football players.
- All matches in the seasons 2006/07 and 2007/2008.
- 76 matches for 17 teams, 38 matches for 6 teams.



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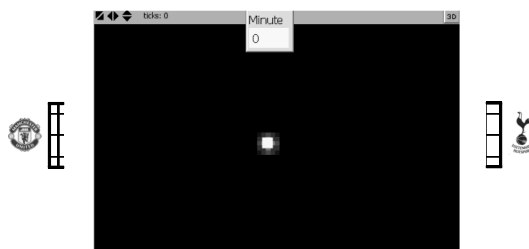
9/9/2006, Old Trafford



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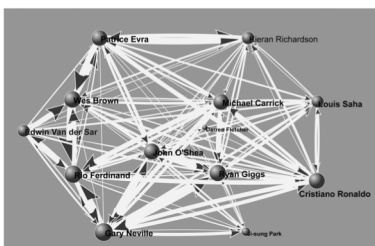
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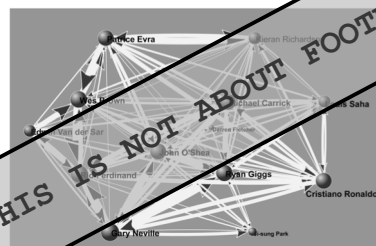
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9/9/2006, Old Trafford



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CONVERSATION AS METAPHOR – ONE TOPIC



9

CONVERSATION AS METAPHOR – ONE TOPIC

Turn receiving
AB-BA



10

CONVERSATION AS METAPHOR – ONE TOPIC

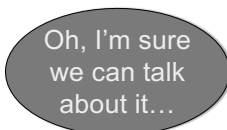
Turn receiving
AB-BA



11

CONVERSATION AS METAPHOR – ONE TOPIC

Turn receiving
AB-BA



12

CONVERSATION AS METAPHOR – ONE TOPIC

Turn receiving
AB-BA

... hmm, I
really don't
know...



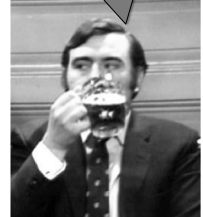
13

CONVERSATION AS METAPHOR – ONE TOPIC

Turn receiving
AB-BA

no...?

hmph...



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CONVERSATION AS METAPHOR – ONE TOPIC

Turn receiving
AB-BA

Well, I
would...



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CONVERSATION AS METAPHOR – ONE TOPIC

Turn usurping
AB-XA

ANYONE
FOR
TENNIS?!



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CONVERSATION AS METAPHOR – ONE TOPIC



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CONVERSATION AS METAPHOR – ONE TOPIC



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CONVERSATION AS METAPHOR – ONE TOPIC



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CONVERSATION AS METAPHOR – ONE TOPIC



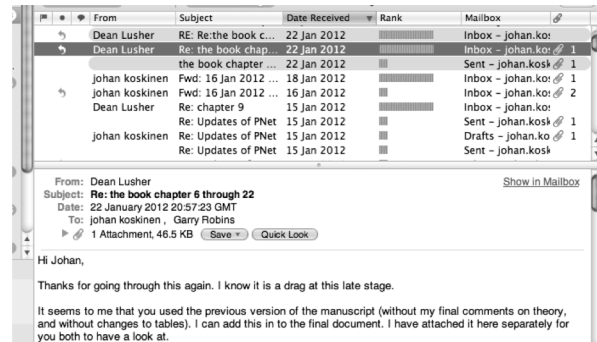
20

CONVERSATION AS METAPHOR – ONE TOPIC



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CONVERSATION AS METAPHOR – ONE TOPIC



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CONVERSATION AS METAPHOR – ONE TOPIC



23

CONVERSATION AS METAPHOR – ONE TOPIC



24

CONVERSATION AS METAPHOR – ONE TOPIC

From	Subject	Date Received	Rank	Mailbox
Dean Lusher	Re: the book chap...	22 Jan 2012		Inbox - johan.ko
	Re: the book chap...	22 Jan 2012		Sent - johan.kosk 1
Dean Lusher	Re: the book chap...	22 Jan 2012		Inbox - johan.ko
	Re: the book chap...	22 Jan 2012		Sent - johan.kosk
Dean Lusher	Re: the book chap...	22 Jan 2012		Inbox - johan.ko
Dean Lusher	Re: the book chap...	22 Jan 2012		Sent - johan.kosk 1
the book chapter ...		22 Jan 2012		Sent - johan.kosk 1
johan koskinen	Fwd: 16 Jan 2012 ...	18 Jan 2012		Inbox - johan.ko 1

From: Dean Lusher
Subject: **Re: the book chapter 6 through 22**
Date: 22 January 2012 21:04:08 GMT
To: johan koskinen

Dude - late on a Sunday - much appreciated!

Also, I forgot to say Happy Birthday to you when you were here. It was on the day that we met at Garry's place, right, if I recall correctly? Shame on me.

Cheers
Dean

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CONVERSATION AS METAPHOR – ONE TOPIC

From	Subject	Date Received	Rank	Mailbox
Carl Johan Nordlund	SNA på svenska!	23 January 2012	19:32	
Carl Johan Nordlund	Sv: Re: SNA på svenska!	24 January 2012	15:47	
Carl Johan Nordlund	Strukturell ekvivalens	9 February 2012	23:36	
Carl Johan Nordlund	Sv: Re: SNA på svenska!	9 February 2012	23:51	
Carl Johan Nordlund	Sv: Sv: Re: SNA på svenska!	15 February 2012	20:14	
Carl Nordlund	Konferensråd	29 April 2011	11:32	
Carl Nordlund	SV: Konferensråd	6 May 2011	22:10	
Carl Nordlund	SV: SV: Konferensråd	7 May 2011	01:26	
Carl Nordlund	[SOCNET] SV: [SOCNET] Plotting...	17 May 2011	13:22	
Chris Bremer	[MEMO] SNA - from a student	26 July 2011	13:43	

From: Carl Johan Nordlund
Subject: **Strukturell ekvivalens**
Date: 9 February 2012 23:16:23 GMT
To: johan koskinen

Hej!

Har du nånsin implementerat Pearson-correlation-baserad strukturell ekvivalens? Hittar det inte i Siena, men kanske bara jag som ser dåligt?

Håller på och brottas med structural equivalence (IGEN - been here before) och beräkningar därav. Har utan problem implementerat Euclidean-varianten därav, men får helt enkelt inte Pearson product-moment correlation-varianten att funka. Iallafall får jag inte samma resultat som genereras av Ucinet 6.

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CONVERSATION AS METAPHOR – ONE TOPIC

From	Subject	Date Received	Rank	Mailbox
Carl Johan Nordlund	[SOCNET] NETWORK SCIENCE FRO...	9 January 2012	17:43	
Carl Johan Nordlund	SNA på svenska!	23 January 2012	19:32	
Carl Johan Nordlund	Sv: Re: SNA på svenska!	24 January 2012	15:47	
Carl Johan Nordlund	Strukturell ekvivalens	9 February 2012	23:36	
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Carl Nordlund	SV: SV: Konferensråd	7 May 2011	01:26	
Carl Nordlund	[SOCNET] SV: [SOCNET] Plotting...	17 May 2011	13:22	
Chris Bremer	[MEMO] SNA - from a student	26 July 2011	13:43	

From: Carl Johan Nordlund
Subject: **Sv: Re: SNA på svenska!**
Date: 9 February 2012 23:31:31 GMT
To: johan koskinen

Du...

Jag tror jag löste det. En konceptuell tabbe - vad gäller beräkningar av genomsnittsvärden för rader/kolumner...! Som jag misstänkte så var det jag som var idioten! :)

/Carl

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CONVERSATION AS METAPHOR – ONE TOPIC

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Carl Nordlund	[SOCNET] SV: [SOCNET] Plotting...	17 May 2011	13:22	
Chris Bremer	[MEMO] SNA - from a student	26 July 2011	13:43	

From: Carl Johan Nordlund
Subject: **[SOCNET] "Sunbelt"?**
Date: 1 March 2012 17:32:34 GMT
To: SOCNET@LISTS.UFL.EDU
Reply-To: Carl Johan Nordlund

***** To join INSNA, visit <http://www.insna.org> *****

Sort of a silly question - but how come the upcoming Sunbelt conference is called "Sunbelt"? Hamburg is a bit off from the southern regions of the US, no?

And see you there!

Carl

Turn claiming
A0-X0
Accumulated
turn receiving
A(B,C)-BA

broadcast vs genuin multiple recipients

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CONVERSATION AS METAPHOR – ONE TOPIC



Chain of command
(c.p. Varese's mafiosos)

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CONVERSATION AS METAPHOR – ONE TOPIC



Chain of command
(c.p. Varese's mafiosos)

order



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CONVERSATION AS METAPHOR – ONE TOPIC



Chain of command
(c.p. Varese's mafiosos)

order



order



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CONVERSATION AS METAPHOR – ONE TOPIC

Negotiations?



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WHAT MAKES A GOOD TEAM?



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WHAT MAKES A GOOD TEAM?



The team is a nicely **bounded** organisation confining the action set

C.p., I could send an **email to anyone** with an email account

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SETTING – COMPETING ORGANISATIONS



Two unambiguously defined organisations **competing** for the **same scarce resources**

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KICK-OFF: THE CURSE OF INITIAL CONDITIONS



Where and **when** did the conversation get started?

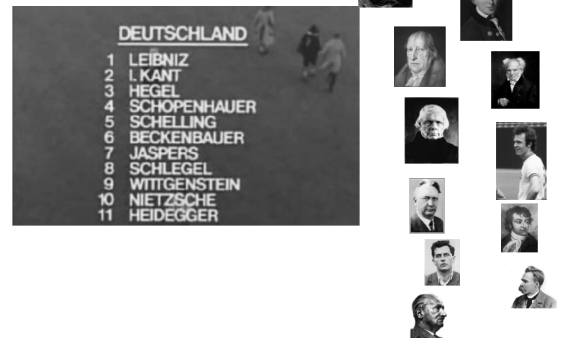
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THE ACTION SET AND "MOTIFS"/P-SHIFTS/N-GRAMS



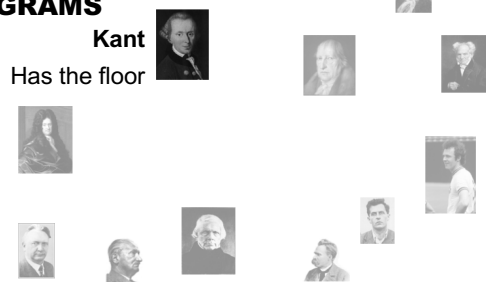
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THE ACTION SET AND "MOTIFS"/P-SHIFTS/N-GRAMS



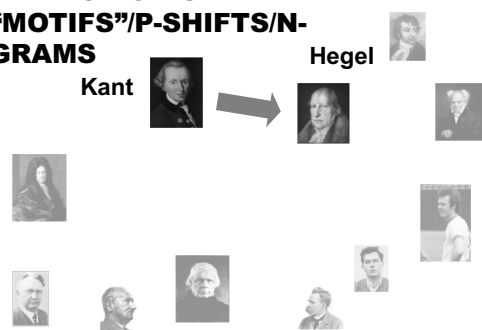
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THE ACTION SET AND "MOTIFS"/P-SHIFTS/N-GRAMS



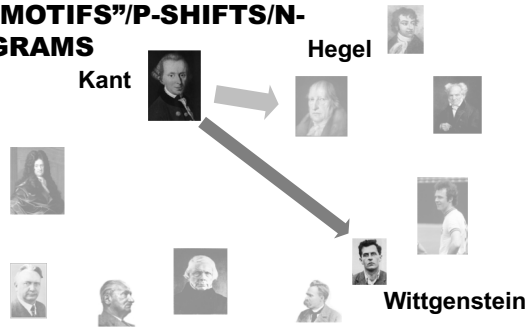
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THE ACTION SET AND "MOTIFS"/P-SHIFTS/N-GRAMS



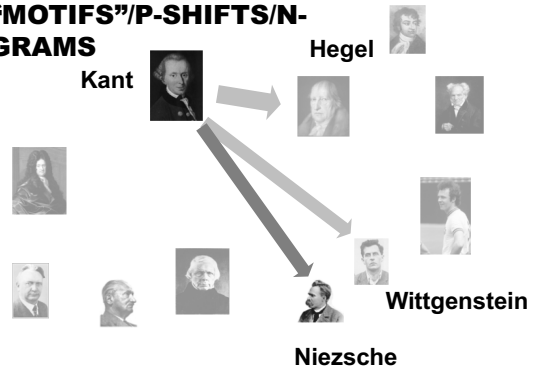
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**THE ACTION SET AND
“MOTIFS”/P-SHIFTS/N-
GRAMS**



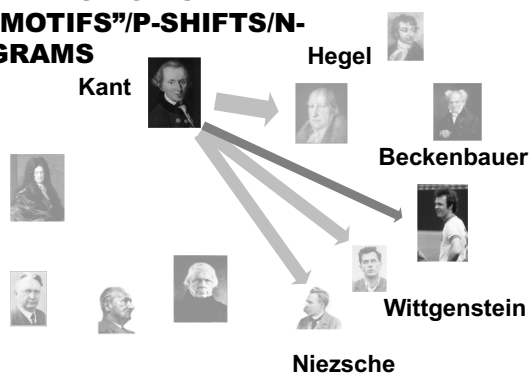
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**THE ACTION SET AND
“MOTIFS”/P-SHIFTS/N-
GRAMS**



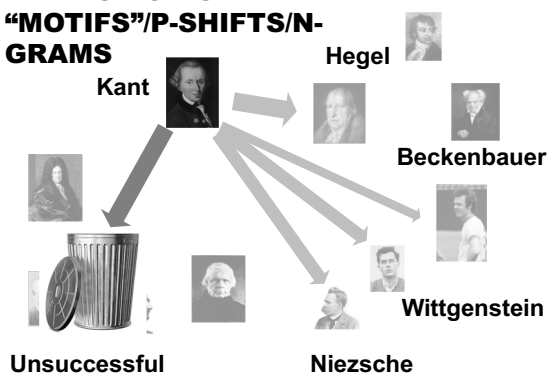
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**THE ACTION SET AND
“MOTIFS”/P-SHIFTS/N-
GRAMS**



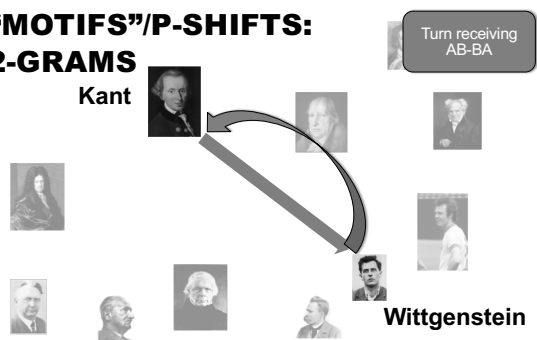
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**THE ACTION SET AND
“MOTIFS”/P-SHIFTS/N-
GRAMS**



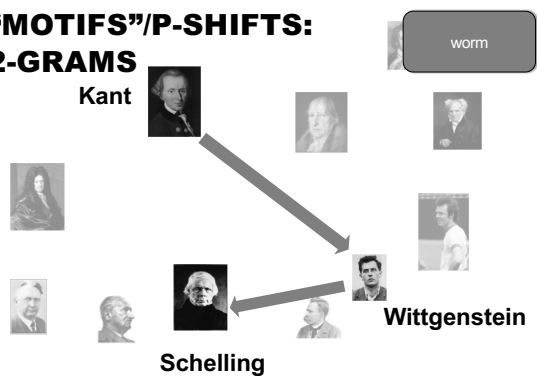
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**“MOTIFS”/P-SHIFTS:
2-GRAMS**



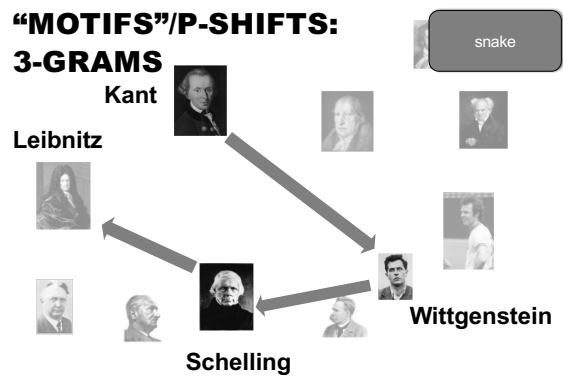
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**“MOTIFS”/P-SHIFTS:
2-GRAMS**



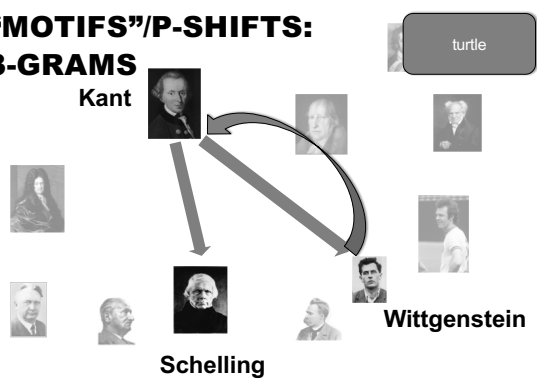
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**“MOTIFS”/P-SHIFTS:
3-GRAMS**



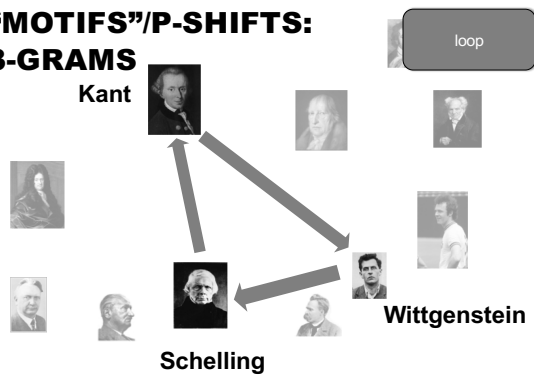
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**“MOTIFS”/P-SHIFTS:
3-GRAMS**



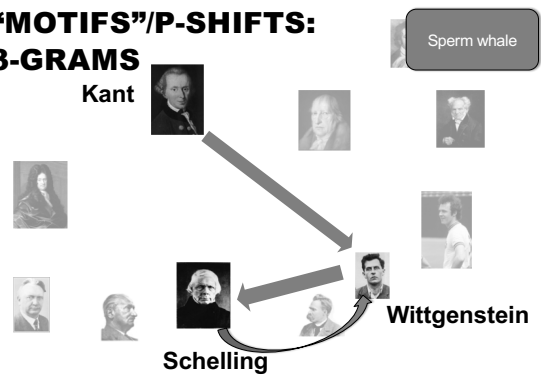
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“MOTIFS”/P-SHIFTS: 3-GRAMS



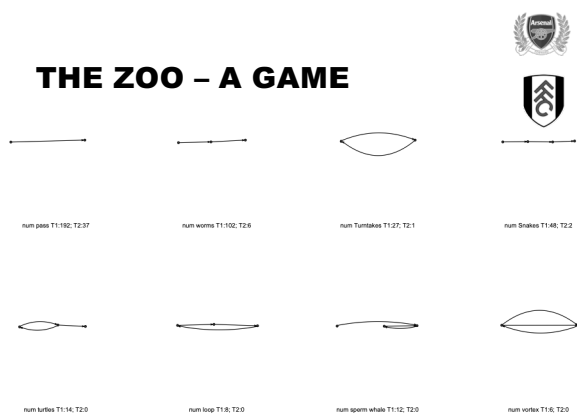
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“MOTIFS”/P-SHIFTS: 3-GRAMS



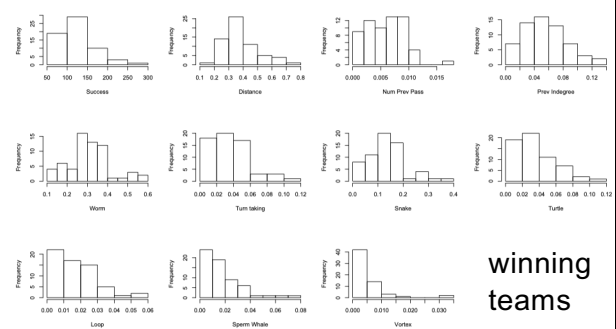
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THE ZOO – A GAME



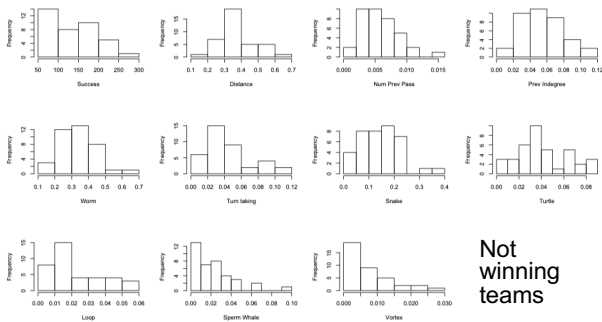
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THE ACTION SET AND “MOTIFS”/P-SHIFTS/N-GRAMS



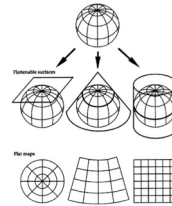
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THE ACTION SET AND “MOTIFS”/P-SHIFTS/N-GRAMS



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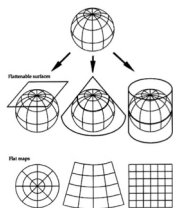
THE ACTION SET SPATIAL EMBEDDING



Social interaction is embedded in space
Spatial embedding as mechanism difficult
Many constraints combine to make relational events
towards proximate others more likely than distant others

54

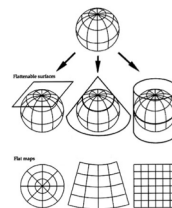
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55

THE ACTION SET SPATIAL EMBEDDING



Social interaction is embedded in space
Spatial embedding as mechanism difficult
Many constraints combine to make relational events
towards proximate others more likely than distant others

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THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



We only **know** position of **passer** and **passee**
Not out of play players - A lot of **unknown** positions

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THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Solution: assume players move randomly (Brownian motion)

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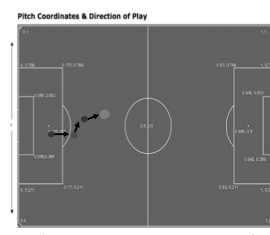
THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Solution: assume players move randomly (Brownian motion)

63

THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Solution: assume players move randomly (Brownian motion)

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THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Solution: assume players move randomly (Brownian motion)

65

THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Solution: assume players move randomly (Brownian motion)

66

THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Solution: assume players move randomly (Brownian motion)

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THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Conditional on
Observed positions:
Intermediate Position
given by a Brownian
bridge

Solution: assume players move randomly (Brownian motion)

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THE ACTION SET SPATIAL EMBEDDING – DATA CONSIDERATIONS



Conditional on
Observed positions:
Intermediate Position
given by a Brownian
bridge

Solution: assume players move
randomly (Brownian motion)

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THE ACTION SET SPATIAL EMBEDDING

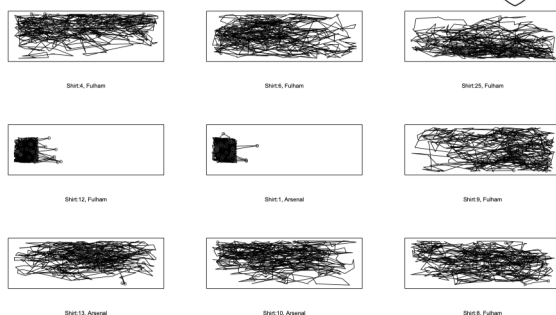


Conditional on
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bridge

Solution: assume players move
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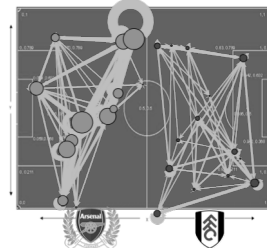
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THE ACTION SET SPATIAL EMBEDDING



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LONG RANGE DYNAMICS



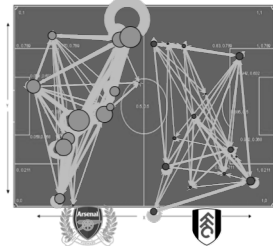
Bernard, Killworth and
Sailor:

dualism between **stable
social ties** and
interactional behavior

Giving precedence to
either form tenuous.

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LONG RANGE DYNAMICS



Stable long-range patterns reflecting real **social structure**

Bernard, Killworth and Sailor:

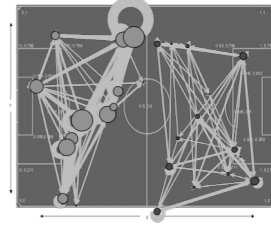
dualism between **stable social ties** and **interactional behavior**

Giving precedence to either form tenuous.

Email, phone calls, and notice boards - direct **observations** on the interactional behavior.

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LONG RANGE DYNAMICS



In REM:

- (i) Frequency previous passes to passee by passer
- (ii) Frequency previous passes to passee by anyone

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SOCIAL SETTING - CROSSED DATA

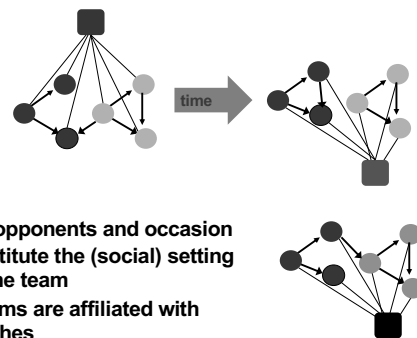
"In football everything is complicated by the presence of the opposite team."

Jean-Paul Sartre



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SOCIAL SETTING - CROSSED DATA



The opponents and occasion constitute the (social) setting for the team
– teams are affiliated with matches

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NON-PASSING EVENTS?



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NON-PASSING EVENTS?



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THE MODEL

Actors: $i \in V = \{1, 2, \dots, n\}$

Person with the topic at time t $\{i \in V : z_i(t) = 1\}, \sum_{i \in V} z_i(t) = 1, \forall t \in [t_0, T]$

Relational event
At time t of type a : $e(i, j, a, t)$

Set of events up to time t : $E_t = \{e(i, j, a, s) : s < t\}$

Time until $e(i, j, a, t)$ $Exp(\lambda(E_t))$ for i if $z_i(t) = 1$

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THE MODEL

Conditional Action set: $A(E_t)$

Conditional change probability

$\Pr\{e(i, j, a, t) | E_t\}$

$$= \begin{cases} \frac{\exp\{g(e(i, j, a, t); E_t)\}}{\sum_{h \in V \setminus \{i\}, a' \in A(E_t)} \exp\{g(e(i, h, a', t); E_t)\}} & \text{if } z_i(t) = 1 \\ 0 & \text{if } z_i(t) = 0 \end{cases}$$

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THE MODEL

The objective function:

$$g(e(i, j, a, t); E_t) = \sum_{r=1}^p \theta_p f(e(i, j, a, t) \otimes E_t)$$

where:

$$f(e(i, j, a, t) \otimes E_t)$$

Are counts of temporal motifs, the distance between i and j , etc

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HYPOTHESES

Stable patters v short-range dynamics v setting

Given that a relational event occurs it is directed towards

Stable patters:

- Previous interaction
- Emergent "leadership"
- Someone proximate in relevant space

Short-range dynamics

- Responding
- Referral
- Delegating

Setting

- Effects moderated by context of competitor



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THE MODEL – TEAM SETTING

To take dependence on team into account

We assume Hierarchy on parameters

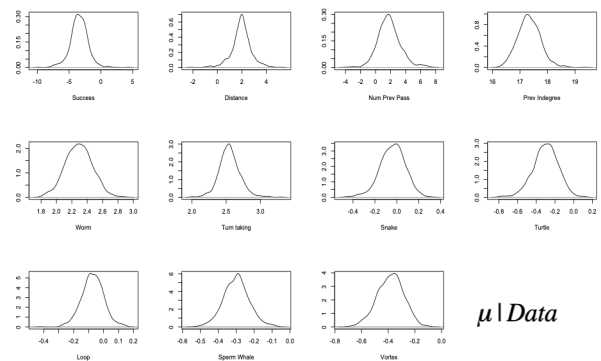
$$\theta_{\text{TEAM}_i} = \mu + \eta_{\text{TEAM}_i}$$

Where

$$\eta_{\text{TEAM}_i} \sim N_p(0, \Sigma)$$

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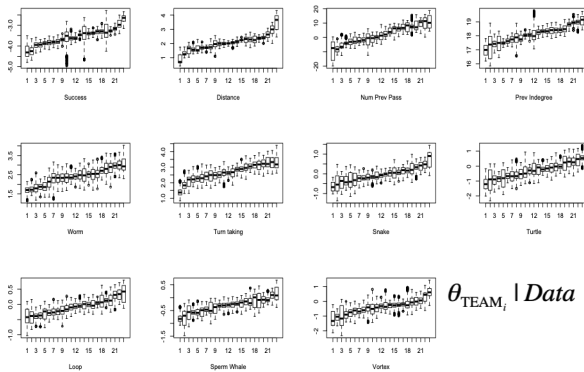
POSTERIOR MEANS



$\mu | \text{Data}$

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RANDOM EFFECTS



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CONCLUSION

- We have looked at central aspects of REMs
 - "Proper" Short-range dynamics
 - "Emergent" long-range dynamics
 - Spatial embedding
 - ... the role of the social setting
- Using
 - Topic following
 - Bounded action
 - ✓ Space
 - ✓ Action
 - ✓ Time



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FURTHER RESEARCH

- Model selection
- Crossed effects

$$\theta_{\text{TEAM A, GAME}} \quad \theta_{\text{TEAM B, GAME}}$$

- The ability to act is constrained by competing team



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PASSING THE BALL AND TALKING TO YOUR ENEMY: A CONVERSATIONAL ANALYSIS IN TEAMS WITH A SINGLE TOPIC



Thank you!

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Johan Koskinen, SSDA, Manchester
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www.ccsr.ac.uk/staff/jk.htm
15 March 2012, SUNBELT XXXII Redondo Beach



Mitchell Centre for
Network Analysis

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