Passing Dynamics Across Top-Level Coaches: The Influence of the Quality of Opposition

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Abstract: The present study applied social networks analysis to objectively discriminate and describe interpersonal interaction dynamics of players coached by the top-level professionals Jürgen Klopp, Pep Guardiola, and Mauricio Pochettino, across the UEFA Champions League seasons from 2017 to 2020, considering different quality of opposition. Statistical analysis revealed that two of Jürgen Klopp's team passing network metrics differ according to the quality of opposition. Density ($U(34) = 202$; $p = 0.02$) and largest eigenvalue ($t(32) = -3.24$; $p = 0.03$) were lower when Liverpool played against strong opponents. Pochettino also showed lower values for density ($t(26) = -2.77$; $p = 0.01$) and largest eigenvalue when playing against strong opponents ($U(28) = 148$; $p = 0.01$), compared to when playing against weak opponents. Additionally, the average shortest-path length was significantly lower when playing against strong opponents ($U(28) = 148$; $p = 0.01$). This is novel evidence on sports teams' coordination and cooperation relationships through passing in football association, along seasons of a high-level European competition.

Keywords: coaching, football (soccer), notational analysis, social network analysis, collective behaviour.

1. INTRODUCTION

Previous work has dedicated efforts to unveil patterns in passing dynamics through social network analysis for the 3 finalists of the Best FIFA Men's Coach awards ins 2019: Jürgen Klopp, Pep Guardiola, and Mauricio Pochettino [1]. The authors investigated the potential of passing social networks to objectively discriminate match dynamics across different coaching framework styles. As a step forward, the analysis of teams' performance level according to specific constraints should yield practical information that can be more representative to elaborate models and help on coaches' operational decisions. Quality of opposition have been associated to influence positioning behaviour of players in matches [2], as well as a change in the average use of attacking and defensive style of play in association football [3]. Thus, we applied social networks analysis to objectively discriminate and describe interpersonal interaction dynamics of players coached by the top-level professionals Jürgen Klopp, Pep Guardiola, and Mauricio Pochettino, across the UEFA Champions League seasons from 2017 to 2020, considering different quality of opposition.

2. MATERIALS AND METHODS

2.1 Sample

In total, passing data of 92 games of the UEFA Champions League in the seasons of 2017/18, 2018/19 and 2019/20, while coaching Liverpool, Manchester City, and Tottenham Hotspur teams, were analysed, respectively. Data from the games were gathered from the media press kits of UEFA [4], and were divided according to 2 different qualities of opposition: strong (finished the group stage between the 1st and 2nd places) and weak opponents (placed in 3rd and 4th in their respective groups).

2.2 Social Network and Data Analysis

A dedicated toolbox for social network analysis [5] was applied, and the passing data from the 11 players that played most time during the matches were included. The network metrics were considered the following: local clustering coefficient, density, average shortest-path length, mean centrality, and largest eigenvalue. All variables were calculated from adjacent matrices normalized by the maximum number of passes performed, to avoid the bias of a different number of passes in each game to impact the interpretation of the results. After applying the Kolmogorov-Smirnov, for the normally distributed data, T-test was carried out. For not-normally distributed data, the U Mann-Whitney test was applied, with $p < 0.05$.

3. RESULTS

The results for the network metrics are described in Table 1. Jürgen Klopp's team passing network metrics showed to differ according to the quality of opposition. Density ($U(34) = 202$; $p = 0.02$) and largest eigenvalue ($t(32) = -3.24$; $p = 0.03$) were lower when Liverpool played against strong opponents. Pochettino also showed higher values for density ($t(26) = -2.77$; $p = 0.01$) and largest eigenvalue when playing

against strong opponents (U(28) = 148; p = 0.01), compared to when playing against weak opponents. Additionally, the average shortest-path length was significantly lower when playing against strong opponents (U(28) = 148; p = 0.01). Guardiola's network metrics were not statistically different according to the quality of opposition in the analysed matches.

Table 1. Mean ± standard deviation of passing network metrics for the coaches of Liverpool, Manchester City, and Tottenham Hotspur during 3 seasons of the UEFA Champions league (2017 to 2020), considering the quality of opposition.

		Jürgen Klopp	Pep Guardiola	Mauricio Pochettino
Matches	Strong	21	17	17
	Weak	13	12	11
Density [a.u.]	Strong	49.77 ± 26.53*	64.35 ± 21.69	45.01 ± 14.36*
	Weak	69.44 ± 26.25	63.10 ± 22.74	60.34 ± 15.81
Local clustering coefficient [a.u.]	Strong	0.54 ± 0.21	0.50 ± 0.18	0.53 ± 0.23
	Weak	0.52 ± 0.19	0.52 ± 0.20	0.56 ± 0.23
Average shortest-path length [a.u.]	Strong	2.47 ± 1.93	2.98 ± 0.44	2.57 ± 0.32*
	Weak	3.06 ± 0.59	2.83 ± 0.43	3.06 ± 0.51
Centrality dispersion [a.u.]	Strong	0.11 ± 0.03	0.14 ± 0.02	0.12 ± 0.04
	Weak	0.12 ± 0.03	0.14 ± 0.01	0.13 ± 0.03
Largest eigenvalue [a.u.]	Strong	40.23 ± 16.03*	64.16 ± 19.69	38.19 ± 12.13*
	Weak	58.67 ± 16.24	62.70 ± 13.48	50.78 ± 11.10

*Significantly different from weak (p<0.05).

4. DISCUSSION

Pep Guardiola is to be able to maintain a consistent work regarding passing, independently on his opponents, once the metrics showed no statistical difference when playing against weak and strong opponents. He presents higher largest eigenvalue overall, which indicates the promotion of a higher number of passes than the other coaches. His team also presents pairs of players less closely connected when compared to the other coaches', meaning that more intermediate players participate to connect passes among teammates [1]. He's been also reported to stand out by the capacity to adjust the important roles assigned to his players, thus affecting the centrality dispersion in the team [6]. Jürgen Klopp and Mauricio Pochettino coaching style are reported to share important similarities. Both explore more the flexibility of interpersonal linkages synergies, with fluid opportunities or levels of collaboration between all teammates [1]. The present study also found similarities for these coaches' passing networks when the quality of opposition is accounted. Both coaches had decreased values for density and largest eigenvalue when playing against stronger opponents, challenging their teams' ability in exploring passing options, thus, reducing the synergy in team coordination, when compared to the matches which they played against the weak opponents. The present results could reflect a certain difficulty in achieving the sweet spot between robustness and adaptability in the passing dynamics. Additionally, Pochettino also presented a lower average shortest-path length when playing against stronger opponents. Maybe, as a compensation for difficulties in maintaining quality of ball possessions, the exploration of interpersonal linkages synergies contributes to smaller topological distance between pairs of players and give Pochettino's team more options to distribute the ball. Therefore, it might be a sign of changing tactical patterns of plays when playing against strong opponents, which can alter the topological distances of players and altering the average shortest-path length.

5. CONCLUSIONS

Coaches' fundamental role is to elaborate and adjust the strategies underlying their teams' collective behaviour and most of coaches' work is discussed on the plane of impressions. Klopp and Pochettino, which stand out for more the flexibility of interpersonal linkages synergies in their passing dynamics, presented lower density and largest eigenvalue when playing against strong opponents. Guardiola is able to maintain his footprint which is related to integrated and coordinated connection between groups of players, thus keeping the relevant players connecting the attacking plays, regardless of the quality of opposition.

5. REFERENCES

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