Russian vs. English drama in the context of network theory

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Abstract

The interrelations between characters in Russian and English classical drama by interdisciplinary means are investigated. The results of this comparative analysis are discussed. Results of an experimental investigation show that there exist deterministic regularities that can explain the reasons of correspondence between the number of characters in a classical drama and the number of participants in the situation of real social communication.

Keywords: Drama, artificial network, parameter, correlation, cluster

1. Introduction

Drama could help to describe its functioning as the detailed simulation of key aspects of reality, is pretty effective because it augments our understanding of human behavior and social relationship.

Classical drama could be used as a good example of fictional or in other words artificial social systems, sometimes called networks, which seem to be typical across cultural and social milieu. We decided to prove this hypothesis by developing a comparative analysis of Russian and English samples of classical drama, comparing their parameters of social interaction between each other and finding parallels with situations of spontaneous social interaction.

It goes without saying that all theaters are eager to use Chekhov's, Shakespeare's and Bernard Shaw's plays from the moment of their writing, because they represent examples of dramatic texts equally interesting both for the potential spectator and for the potential reader. All characters of these plays address not only to the intellect, but also to the soul of the reader and spectator.

Therefore, we may suggest that the dramas that work best, or in other words, classical dramas, are those that reflect the interrelations between characters maximally similar to the social interactions in reality, like in the situation of spontaneous human interaction, including hunter-gatherer societies.

2. Comparative analysis of dramatic and social network properties

So, the networks of the plays exhibit some properties of the systems observed in many social and natural systems [1, 2] biological and chemical structures [3, 4], World Wide Web, collaboration networks, mobile users networks, etc. And the most vivid property of a network is the number of actors in the natural and artificial social systems [5].

Table 1. Comparative table of the total number of participants in real-life and artificial networks.

Source	Total number of actors in real and artificial networks
Hunter-gatherer camps [5]	25
British social networks [5]	35
Russian social networks	24,8
Mean scores for real networks	28,26
W. Shakespeare	
Hamlet	34
Othello	28
King Lear	27
Mean scores for artificial networks	30,33
A. Chekhov	
The Seagull	13
Uncle Vanya	10
Three sisters	14
The Cherry Orchard	18
Mean scores for artificial networks	13,75
B. Shaw	
Pygmalion	12
Heartbreak House	13
Mean scores for artificial networks	12,5

So, it is clear even from these comparisons, that the worlds of Chekhov's and Shaw's plays are so to say 'closer' or 'smaller' than the fictional worlds of Sheakespeare's plays.

For us it means that the potential spectator is afforded to make lesser efforts for making structural inferences. Although we should not forget about the fact that Shakespeare's characters do not appear on the stage simultaneously, rather, as Nettle and Dunbar [5] pointed out, they are presented interacting in subgroups in different scenes, where the number of speaking characters comes from the range of 3-5 up to 12-15. But in Sheakespeare's dramas there are scenes with uncountable groups like court or guards or servants. For example, in a well-known scene from Hamlet, called 'The Mouth Trap', it is uneasy task to count all actors, because some of them do not have names. This never happens to Chekhov's plays, where all speaking and even silent characters have been named by the author.

There is one more interesting point – the distribution of characters through acts via total amount of characters in the plays.

Table 2. Summary table of mean-total correlation of characters in the plays.

Play Title	Mean per act	Total
Uncle Vanya	8,3	10
Pygmalion	5,8	12
Heartbreak House	10,7	12
The Seagull	11,8	13
Three sisters	13,0	14
Cherry Orchard	12,0	18
King Lear	13,8	27
Othello	10,6	28
Hamlet	12,8	34

From this table and the diagram it is clear that despite of the fact that the number of characters in Shakespeare's plays is bigger, than in Chekhov's and Shaw's plays, the average parameter of the number of actors in all plays mentioned fluctuate on the average level 6-13 that agrees with the number of characters in the situation of real communication.

But here it is important to note that for Shakespeare's plays it is compared to the total amount of speaking characters which is two times bigger that the average amount of characters in a play. Here the second time we have proved that the world of Chekhov's and Shaw's plays is smaller. Additionally, the inference is that the larger the number of characters, the higher is the probability of making smaller groupings, or clusters, with stable 5-15 number of characters [5].

Like real systems, the social space of textual structures also possesses definite coordinates inside the boundaries of the text of the play, such as the specific position of a character in a communicative pair, triangle or cluster, formed in the process of their interaction.

But can it be said that such systems are nonsystematic or random interrelations, or they are ruled by some hidden laws or regularities?

3. Main principles of networks functioning

These systems, both natural and artificial, are frequently called networks, or small worlds [5], because they possess certain working principles of networks: small world properties, high clustering coefficient and the free-scale principle.

The notion of small world properties means that they combine a short pathway (i.e. distance), linking any two individuals (1 or 2 degrees of separation) in the network [6]. The vivid example of the term degree of separation may be the number of "handshakes' calculated by Stanley Milgram in 1967 [7] which are not more than 6 degrees of separation

High clustering coefficient is explained in the following way: if the node A and the node B are linked, the nodes A and C will probably also be linked.

As for the free-scale principle, sometimes called hierarchical behavior, it is prevalent for Shakespeare's plays where there are a large number of characters. Here the number of links per character follows a power law, with many individuals with a few communication links and fewer individuals with many links, who are sometimes called "communication hubs" [8], because vertices or nodes with many links easily recruit other additional linkages.

The network structure measurements are based on the idea to perceive each speaking character as a node [5], which is linked to another character in case of their appearing in one scene. It is important to notice that their communication can be direct (without intermediates or with a minimum number of intermediates) or indirect – this is the primary feature of Shakespeare's plays where communication partners are addressing to each other with the help of other speaking characters (equal to/ more than 2 degrees of separation).

4. Analysis of experimental data

At first, we calculated the cluster coefficient (T), the path length (D), sometimes termed as degrees of separation, and finally, the connectivity (C) of the networks for 9 classical plays.

Cluster coefficient (T) is a tendency of the system to separate into clusters. The more participants in a system exist, the greater the probability of making separate subgroups, possessing strong links inside the group and less external links. The cluster coefficient is the basis for more precise calculations of percolation level, which indicates the possibility of clusters to penetrate into each other. Percolation theory is widely used in physics and medicine for the study of epidemiologic data.

Average path length /distance (D) is defined as the probability of making direct links (edges) between characters without /with a min number of intermediates. Parameter D indicates a minimal amount of links (edges) that connect one character, or node with another.

Connectivity (C) is the proportion of the amount of realized links in the system to maximum number of all possible links. Thus, the connectivity is calculated if to divide the number of realized links to the sum of all possible links. It ranges from 0 (no links) to 1 (maximum number of links) and it indicates how closely the characters in the system are linked [5].

Table 3. Comparative characteristics of drama parameters.

	Shakespeare				Chekhov					Shaw		
	Hamlet	Othello	King Lear	Mean	The Seagull	Three Sisters	The Cherry Orchard	Uncle Vanya	Mean	Heartbreak House	Pygmalion	Mean
T	0,38	0,43	0,47	0,43	0,78	0,77	0,73	0,79	0,77	0,82	0,79	0,80
D	1,76	2.16	2,05	1,99	1,35	1,33	1,32	1,49	1,37	1,36	1,49	1,42
C	0,11	0,16	0,23	0,17	0,67	0,67	0,68	0,58	0,65	0,67	0,58	0,62

Table 3 shows that the average cluster coefficient for Shakespeare's plays is significantly lower then for Chekhov's and Shaw's plays. This means, that the networks of Shakespeare's plays possess greater tendency for cluster formation, because of larger amount of speaking characters.

In contrast to Shakespeare's networks, Chekhov's and Shaw's plays possess greater network stability to organizing a unique cluster, and these networks do not break up (separate) into smaller clusters. Therefore, the connection between characters in Chekhov's and Shaw's plays is straight. i.e. the characters of Chekhov's plays apprehend stronger inclinations for the constructing of social cliques inside their community, than Shakespeare's characters. This indicates a higher level of organizational effectiveness. This is considered to be an ideal situation of not only fictional, but even real communication pattern.

Another important property of aforementioned drama networks is the path length, or distance. The 2nd line of the table shows that the average path length in Shakespeare's plays tends to the value of 2 in comparison with the path length in Chekhov's and Shaw's plays, which tends to 1.

5. Conclusion

Thus, in Chekhov's and Shaw's plays the probability of forming direct links between speaking characters without intermediates is pretty higher. Taking into consideration the fact that the period of 300 years separation between Shakespeare and Chekhov the world becomes more communicative, and keeping in mind the well-known openness of the Russian character, all our inferences seem to be quite vivid.

The final proof of our hypothesis about the fact, that the worlds Chekhov's plays are smaller, is the analysis of the connectivity parameter, represented in the last row of the table.

For Shakespeare's plays, the parameter of connectivity is considerably less (mean connectivity parameter is 0,17) in contrast to Chekhov's and Shaw's plays (0,58 and 0,62 respectively). This is the consequence of the fact that the number of characters in Chekhov's plays is less, then the connectivity increases, and the fragmentation onto groups is coming to maximum boundary for the number of characters involved in the communicative process and they are closely connected with each other. This shows that we can really name them small worlds in all sense of this word and eloquently witnesses the idea to call Bernard Shaw "the English Chekhov".

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