



Preference and neglect amongst countries in the Eurovision Song Contest

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Abstract

The Eurovision Song Contest (ESC) has been a growing source of entertainment for millions of viewers. Countries are represented by a single song during a live performance and in an award ceremony scores are exchanged according to their preference. It has been speculated that socio-economic ties influence the awards. The work presented here aims at investigating a different explanation for the voting patterns which deviate significantly from a uniform distribution. A perspective which is not covered is whether an audience member sees bias as a route towards increasing a country's score rank. Given that much of the biased voting is apparent to the audience, the question whether these biased connections present themselves as a path to increasing score rank is explored. The results show that countries which attracted more biased preferential edges (preference in degree) and produced bias towards other countries (preference out degree) had a significant rank correlation with their total accumulated score. This adds to the theory explaining the biased voting patterns, in that they assist towards the simple goal of an audience member seeking to win by utilizing exchange partnerships with those countries where socio-economic ties already exist.

Keywords Eurovision · Edge dynamics · Network inference · Collusive behavior · Voter behavior

Mathematics Subject Classification 62-07 · 91F99 · 91D99

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Introduction

Technology and engineering has enabled people across the globe to share and exchange in new ways previously not possible without overcoming great challenges. In the course of these new possibilities, changes are produced, and the umbrella term ‘globalization’ is used for many facets of the observations. One of the factors which is considered to have great importance is that of the interplay of globalization and culture [1]. One direction in which to study the trends and behaviors of the cross-connections between people around the globe is to follow the cultural adoptions/evolutions. As noted in the work of [2], this topic is considered to be important amongst social scientists, but is a challenge in conducting systematic research. Attention has been directed towards the Eurovision Song Contest (ESC) to provide insight, since in 2018 it had 43 countries participating and combines multiple languages coming from different cultures in an annual event of artistic expression. Countries have a single ‘song’ represent them and in a tournament where the countries cast votes between themselves; it is wondered if there are significant patterns in the scores. The patterns of bias can be used to support various socio-economic theories which would predict these observations. For this reason, there has been considerable attention given towards the ESC and what insight can be drawn. A brief history of the contest is provided in [3] and more detail can be found in [4, 5] along with interesting questions which have been posed.

The work of [6, 7] discusses the connection between politics and European identity from the perspective of the voting patterns seen in the ESC. A look into the histories which shaped the current state of identities can be found in [8] and provides background for the formation of the ties that possibly explain the score observations. In relation to the questions regarding historical ties, the competition is considered to play an important role; “create common spectacles that tie together far-flung viewers” and competition is considered to play an important role; “the Eurovision Song Contest (ESC) has become a key arena for staging a unifying Europe’s capacity to accommodate an expanding range of national and cultural differences...” from [9]. To add to this, the recent work of, [10] goes as far as to say “Eurovision has seemed to reflect the political zeitgeist of Europe, even to anticipate certain political developments...”. For the 2012 ESC competition week, the Twitter hashtag ‘#eurovision’ produced 688K tweets, [11] supporting the presumption that the competition representation reaches a significant sample of the populous. Although other sources of data regarding European opinions can be found (eg. *europeansocialsurvey*) to search for insight regarding questions of this nature, the ESC dataset stands unique in a similar manner as the Enron email corpus does [12].

Notable efforts have been put into inferring significant ties between countries in the ESC based upon score awards between countries, [13–18]. With all the merits of these different models proposed, there is a need to provide a greater emphasis on filtering out false positives. The approaches presented in [19, 20] provide a flexible framework for analyzing the scores using an unbiased score

generator under a null model from which scores are sampled over a period of consecutive years (time window). By designing a null model under explicit assumptions, samples of score assignments which would be expected void of the socio-political phenomena are produced so that deviations from this distribution, for whatever reason, can be considered as significant or not.

Focusing on the significantly large score deviations, the work of [19] looks at collusive edges (bi-directional preference) within specified time windows. Other studies such as [13, 21], focuses on the one-way edges (directed preference), and [20] on aggregate networks from both types of edges over consecutive time windows. In [22], the two types are examined to see if the one-way or two-way biases provide a functionality similar to a cultural bridge between clusters of countries with edges between themselves. [23] shows a model which separately models negative affinity is used to look at how such a model fits the activity of the complete country set.

A common set back for most of these models applied to the voting data of the ESC is that they do not permit a full-scale analysis of the score dataset which begins in 1957. The voting schemes, as discussed in Section 2, have changed multiple times since the beginning of the competition and do not permit a trivial application of a homogeneous sampling scheme. Most approaches utilize data from 1975 onwards and fix the time windows for when the voting scheme is homogeneous. The work of [20], presents a methodology with a sampling scheme for a null model of unbiased score allocations allowing for cases where the voting scheme is heterogeneous. Utilizing this methodological framework gives the freedom to choose a time period of analysis of the ESC scores since 1957 onwards over any consecutive set of years.

What is noteworthy is that many of the significant edges of bias uncovered in [19, 20] such as Greece↔Cyprus and between the Nordic countries did not come as a surprise. Even without the computational support many consistencies of large accumulated score exchanges between certain countries can be inferred easily if significant and consistent enough. It is not anticipated that the average viewer will look at all the country patterns, but that the significantly biased patterns are of a greater interest and are used to develop an internal mental model of the voting dynamics in relation to the competition outcome. These are considered to fall into four categories; preference (directed edge of large scores), collusion (bi-directional preference), neglect (directed edge of low scores) and avoid (bi-directional neglect). With this subset of edges attracting attention, it is a question whether they act as a proxy for predicting success for the country's score rank. Such behavior may act as a driving force to amplify the cultural factors which may be used to derive biased edges, so that the chances of success are increased via the production of biases.

Using the methodology adapted from [20], described in Section 3, the significant aforementioned edge types are uncovered. Assessing the perceived benefit of producing bias could previously be done for the whole competition by including only the large score deviations while ignoring the significant lower allocations. Without the edges of neglect being taken into account, the possible penalizations a country could receive by producing neglect (even if merely as a by product of preference) would be ignored. The formulation for the ESC is presented with the manner in which the threshold parameters are inferred.

The aggregate view of the edge type accumulation for countries over different time periods is shown in Sect. 4. Of the various significant rank correlations presented, most important is that the rank for the total number of preferential edges received over a time period is significantly correlated with the accumulated score rank. Significant rank correlations are also found for the biased preference for other countries and score rank, and that the edges of neglect do not have as large a rank correlation. These brings to question whether an incentive for those willing to base their votes upon a simple route for success choose to be biased. This allocation of votes may be done to promote an emerging ‘alliance’ [24] of score exchange.

Data

Since the beginning of the contest in 1956, the ESC has had a significant number of changes to the structure of the award system for how countries vote for songs between themselves. Although the work of [20] presents a methodology to allow a transparent analysis of the scores awarded regardless of the voting schemes, the first year of the dataset begins in 1957. In the 1956 competition, the countries were allowed to have two independent song representations (never-reintroduced) and after various failed attempts to obtain its score data, the authors exclude it from the analysis. Therefore, in this study, 1957 will be considered as the first year for the dataset. It is available for public use at github.com/mantzaris/eurovision with csv files for each year in tabular form containing intuitive headers indicating the score award from one country to another. There are years in which a panel of judges represented the scores from each country and in others a ‘televoting’ service enabled residents in a country to cast a vote for their choice resulting in a ranked consensus of preference. The years 2009 onwards have incorporated a mix of the scores (50/50) from both sources. This study uses the votes originating from the judges where there is a choice between the two.

Each year in the ESC, competition is denoted with t , where $\min(t) = 1957$, and the total number of countries per year is c_t . A country has $|c_t| - 1$ candidate countries in which to give points to as they are not allowed to vote for themselves. Since the beginning of the competition there have been different voting schemes introduced which define the manner in which a country i can distribute the values of a score set \mathbf{s} towards another country j , given that $i \neq j$. These can be grouped into three categories; *allocated*, *sequential*, and *rated*. The reason that some of the voting schemes can be grouped together is because with a re-parameterization of the vector \mathbf{s} , the change between schemes is possible, and for different schemes, a re-parameterization does not suffice to change a scheme into that of another category due to a lack of procedural overlap. Each scheme defines the constraints for $\sum_{j=1}^{|c_t|-1} c_{i \rightarrow j, t}$

which is the manner in which a country i can award points to j with $i \neq j$, and at the

end of the competition a country's performance is determined by the max rank of, $\sum_{i=1}^{|\mathbf{c}|-1} c_{i \rightarrow j, t}$ over a set of years \mathbf{T} :

$$\max_j \left(\sum_{t=\mathbf{T}(1)}^{|\mathbf{T}|} \sum_{i=1}^{|\mathbf{c}|-1} c_{i \rightarrow j, t} \right) \quad (1)$$

The *allocated* voting scheme applies to the year spans (inclusive) 1962, 1963, 1975–2003 and 2004–2018. The year 1962 had a score set of $\mathbf{s} = [3, 2, 1]$ in which each point is sampled by c_i without replacement and applied to another sample of $j \in \mathbf{c}$ (where $j \neq i$) without replacement, and in 1963, the score set was $\mathbf{s} = [5, 4, 3, 2, 1]$. For the years 1975–2003 and 2004–2018, the score set was in both periods $\mathbf{s} = [12, 10, 8, 7, 6, 5, 4, 3, 2, 1]$. What differentiates these two periods is that from 2004–2018, the tournament set of stages allowed a subset of \mathbf{c} , $\mathbf{c}' < \mathbf{c}$, to participate in the final stage, and therefore, be eligible to receive points; $\sum_{j=1}^{|\mathbf{c}'|-1} c_{i \rightarrow j, t} = |\mathbf{s}|$ where ($i \neq j$ and $j \in \mathbf{c}'$). If $\mathbf{c}' > \mathbf{s}$, the score vector is appended

with values of zero to create an equal cardinality so that the allocation of $i \times j$ is possible (without self reference).

The *sequential* voting scheme was applied in the year spans (inclusive) 1957–1961, 1964–1966, 1967–1970, and 1974. This involves a set of scores which can be applied with replacement towards a sample of countries for each year. For the years 1957–1961, 1967–1970 and 1974, the score set available to each country $c_{i, t}$ for each year is a set of ones, $\mathbf{s} = \mathbf{1}$ where $\sum_{k=1}^{|\mathbf{s}|} s_k = 10$. In the years 1964–1966, the score set was $\mathbf{s} = [5, 3, 1]$. The sample from the score set occurs without replacement and each assignment $c_{i \rightarrow j, t}$ is independent of the previous one so that $\sum_{j=1}^{|\mathbf{c}|-1} c_{i \rightarrow j, t} = 9$

for the sequential voting scheme in 1964–1966, and $\sum_{j=1}^{|\mathbf{c}|-1} c_{i \rightarrow j, t} = 10$ for the rest of

those years of this scheme (with $i \neq j$). The repeated allocations of the scores allow for a minimum of 0 points and total of $\max(\mathbf{s})$. The main differentiation here with *allocated* is that the possibility for repeated samples of the score set for the same country are permitted.

The *rated* voting scheme occurs for a single period in the ESC, 1971–1973 inclusive. Here, two jury members from each country i independently allocate a single sample of a score from $\mathbf{s} = [5, 4, 3, 2, 1]$ to j . This sample, $X \in \mathbf{s}$, is taken by each jury member and then added together for the score country allocates $c_{i \rightarrow j, t} = X_1 + X_2$. Each country j has a final score that it receives from other countries and is the sum over the individual country score assignments towards j $\sum_{i=1}^{|\mathbf{c}|-1} c_{i \rightarrow j, t} = X_1 + X_2$.

Regional label assignment

Table 1 presents a color assignment used in the work for the network diagrams visualized so that countries in a region have the same color. These assignments are

Table 1 Country color labels chosen for network visualizations. These choices merely facilitate the ease of differentiating regions when there is an edge set inferred for viewing a network.

Region color	Countries
South West (red)	Portugal, Spain, Malta, San Marino, Andorra, Monaco, Morocco, Italy
North West (turquoise)	United Kingdom, Ireland, Belgium, France, Luxembourg
North (blue)	Iceland, Denmark, Norway, Sweden, Finland
Central (gray)	Germany, Austria, The Netherlands, Switzerland, Slovenia, CzechRepublic, Hungary
South East (orange)	Greece, Montenegro, Cyprus, Albania, Bulgaria, Croatia, Bosnia Herzegovina, Turkey, FYRM Macedonia, Romania, Serbia, Israel, Yugoslavia, Serbia & Montenegro
East (green)	Russia, Ukraine, Moldova, Belarus, Poland, Georgia, Armenia, Azerbaijan, Estonia, Lithuania, Latvia
Other (soft white)	Australia

useful when examining significant voting patterns between countries that have biased neglect or preference, because upon inspection, an edge between countries of the same color will point towards regional reinforcement rather than an act of extraversion. There are countries which could be included in the same or different groupings such as, Moldova and Romania, which are currently separated between South East and East, or that of Luxembourg being in the North West but a possible member of Central. The colors are chosen based upon a convenience found experimentally. The category Other which holds Australia is there as a proximity is difficult to determine.

Methodology

The methodology used is aimed at uncovering the directed edge set for significantly biased exchanges of points between countries in the ESC. These edges of significance E between countries can be determined for a country label set \mathbf{c} , by various methodologies and the approaches built upon here for the objective are [19, 20]. The methodology of [20] allows a use of the full ESC score history, and incorporates aggregates of both the one-way (directed edges) of preference and the two-way (bidirectional) collusive preference to be inferred and displayed in a network diagram. What is not inferred is the edges of neglect which are the one-way directed edges with significantly low score exchanges between pairs of countries. Accounting for this does require a change in the manner in which the thresholds for significance were chosen. The code at github.com/mantzaris/eurovision implements the methodology shown in [20] and is altered to account for the description here. The code is

written in *Julia Lang* [25] due to its speed, clear syntax for numerical computing and speed.

A set of vertices that have country name labels for a time period \mathbf{T} are a subset of the full ESC participation history, $\mathbf{c}_T \subseteq \mathbf{c}$ where $\mathbf{T} = [t_1, \dots, t_{max}]$. The time window is user chosen and exists to smooth out the spurious values intrinsic of the stochastic process. For the directed edges, the sum of the scores satisfies the threshold excess:

$$E_{i \rightarrow j, \mathbf{T}} = \sum_{t=\mathbf{T}[1]}^{\mathbf{T}} (c_{i \rightarrow j, t}) > s_{\alpha, \mathbf{T}}, \tag{2}$$

for this time period E_T , where $s_{\alpha, \mathbf{T}}$ is the threshold for the significance of an aggregate score allocation over a set of years from country i to country j . Creating the complete edge set for the time period:

$$E_T = : \left\{ \sum_{t=\mathbf{T}[1]}^{\mathbf{T}} (c_{i \rightarrow j, t}) > s_{\alpha, \mathbf{T}} : i \times j, \forall i \in \mathbf{c}_T, \forall j \in \mathbf{c}_T, i \neq j \right\} \tag{3}$$

examines the product space of the $(|\mathbf{c}_T| - 1)^2$ possible edges between countries and includes those which satisfy the inequality for an accumulated score greater than the sampled threshold value produced from an unbiased score generator. The investigation for the edge set of significant neglect requires that the inequality sign be pointed in the opposite direction so that it looks for the lower end of the distribution.

The value $s_{\alpha, \mathbf{T}}$ is the determining threshold value for whether a score allocation between a pair of countries is considered to be a significant indicator of bias. A random sample of $c_{i \rightarrow j, t}$ is produced by a sample from the discrete uniform distribution of the score vector applicable to the specific year as, $U_1^{|\mathbf{s}|}(\mathbf{s}_t)$. The threshold for score significance $s_{\alpha, \mathbf{T}}$ is the rank index of a sorted sample set of the scores:

$$\mathbf{s}_T = \left[\sum_{t=\mathbf{T}[1]}^{\mathbf{T}} U_1^{|\mathbf{s}|}(\mathbf{s}_t)_1, \dots, \sum_{t=\mathbf{T}[1]}^{\mathbf{T}} U_1^{|\mathbf{s}|}(\mathbf{s}_t)_N \right], \tag{4}$$

where $\sum_{t=\mathbf{T}[1]}^{\mathbf{T}} U_1^{|\mathbf{s}|}(\mathbf{s}_t)_n \leq \sum_{t=\mathbf{T}[1]}^{\mathbf{T}} U_1^{|\mathbf{s}|}(\mathbf{s}_t)_{n+k}$ and the threshold is assigned to the rank index value according to alpha:

$$s_{\alpha, \mathbf{T}} = \mathbf{s}_T \llbracket \lfloor \alpha N \rfloor \rrbracket. \tag{5}$$

Here N is the sample size, and is 3K in the simulation of the score sample used. An α can be chosen to account for the right or left tail of the distribution which corresponds to the preference and neglect bias, respectively. These values are typically of symmetric significance, eg., 0.05 and 0.95. The algorithmic outline for an implementation is taken from [20]. The use of the time window, \mathbf{T} , to explore features of the data has been used successfully in other computational sociological settings such as [26].

Those countries in c_T but not in c_t are given the expected value of $E[U_1^{|\mathcal{S}_t|}(s_t)]$. This is not as stringent as the approach for the preferential edges, taken in [20] which sets the score to zero. A zero value in this application would increase the chance for neglect edges to be inferred as it would decrease the distance to the lower end of the score distribution.

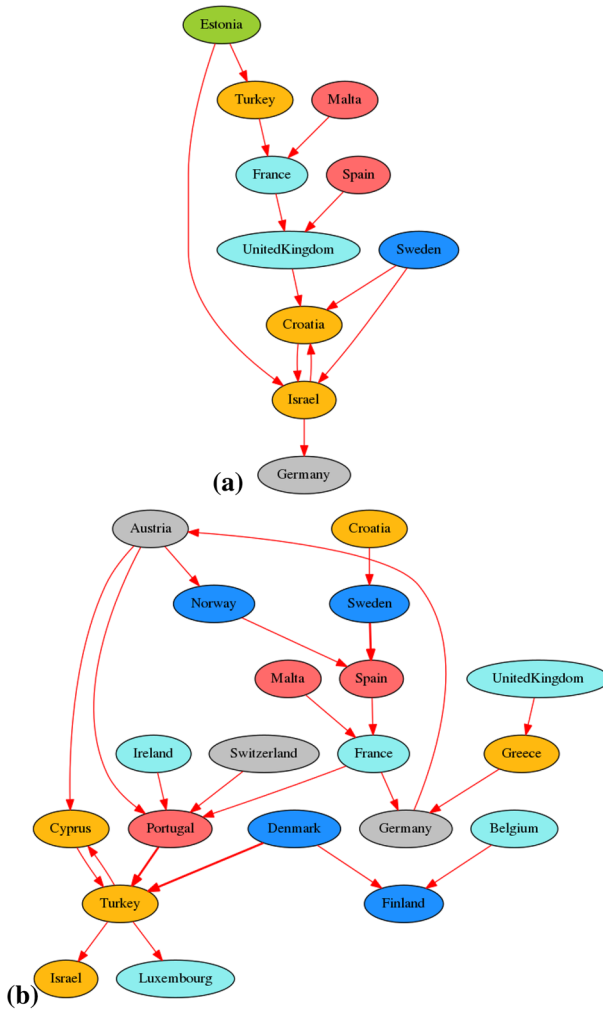


Fig. 1 Presented are two networks showing the significant edges between countries where the low scores indicate neglect. The edges are directed and have each been tested against an unbiased model of score generation. **a** examines the years, 2000–2005 as a single time window. **b** presents the analysis of the years, 1980–2000 using a time window of 5 years for each consecutive period. With more than a single time window, where the observations for edges occurs more than once, the weight is increased

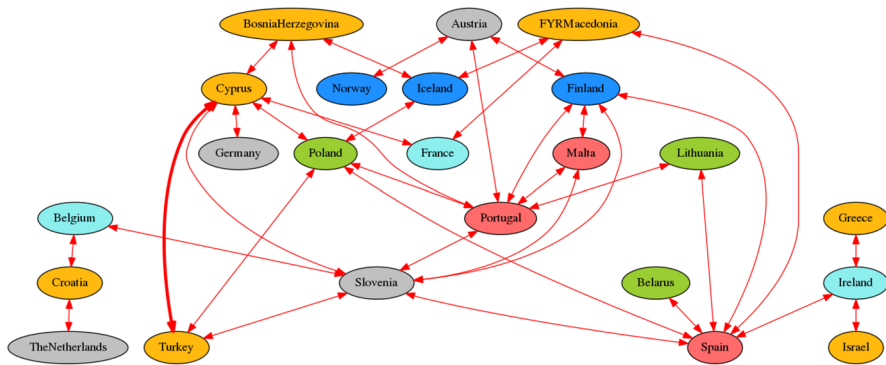


Fig. 2 This network shows the aggregate edge pairs of avoidance (two-way neglect) for the years, 1975–2015 with a time window size of 20 years. The only edge encountered in both time windows is between Cyprus and Turkey. The analogous networks previously uncovered for the edges of detriment collusion (two-way preference) display a set of patterns not shown here

Results

This section provides the results for the extension of [20] which allows for both significantly large and low score allocations between countries to be inferred from chosen time periods over the entire ESC dataset. Subsection 4.1 provides a sample set of network visualizations of the significantly low score edge country pairings, termed as neglect for the one-way directed edges and avoid for the bi-directional edge case. Subsection 4.2 presents scatter plots for the rank correlations of edge type and score rank accumulation of countries (found with the Spearman's ρ at $\alpha = 0.05$). The rank correlations between total edge types is also investigated for the same time period.

Network diagrams of neglect and avoid edges between countries

The work of [19, 20] looked at the use of generating a score sample set from an unbiased process in which a significance level would provide an ability to examine large score deviations indicative of collusion, and presented network diagrams of the edge sets. Figures 1, 2 display network diagrams of the edge pairs of neglect and avoid respectively for different year periods and at different confidence levels (as shown in equation 3, 5). These were drawn using Graphviz [27, 28], and are shown to demonstrate that the neglect/avoid edges have different regional connectivity patterns in comparison to the preference/collusion investigations cited.

Figure 1 shows a set of examples for the networks produced from different periods based upon the significant edge pairs of neglect. These are directed one-way edges and in some cases country pairs have edges produced in both directions. **a** shows the network for the time period 2000–2005 as a single time window. Each edge is significant at the level of $\alpha = 0.05$ (according to equation 3, 5) and the network is unweighted as each edge can be counted only once with a single time window. In the preference networks of the work cited, the connectivity of these countries is not seen, with the exception of France and the United Kingdom. **b** Shows an analysis of

the years 1980–2000 with 5-year windows at significance $\alpha = 0.001$. With different time windows, recurring edges are aggregated to produce a weighted edge drawn in a thicker line width. In this network, the edges of Portugal and Denmark towards Turkey occur more than once and the other edges are found in one of the two time periods. Various connections not seen in the preference networks are displayed and occasional ones such as Denmark to Finland is commonly found in the preference/collusion network. The countries Cyprus and Turkey both neglect each other and is an example of what is termed here an avoid edge (two-way bi-directional neglect).

Figure 2 presents the network of mutual neglect (avoid) edges between countries for the years 1975 to 2015 with time windows of 20 years at a significance level of $\alpha = 0.05$. For these edges to be included, two edges of neglect had to be present between pairs of countries within the same time period. In the network, the weight of the edges drawn is proportional to the number of occurrences from each time window. The opposite behavior of collusion is displayed in [19, 20], and the regional connectivity between countries colluding is not seen in the network shown here. Namely the dense edge sets between countries in the same region are not shown. With the exception of the South East and Portugal with Malta, countries in the same region are not avoiding each other. The larger time window requires that the score allocation patterns are more consistent to be counted as significant.

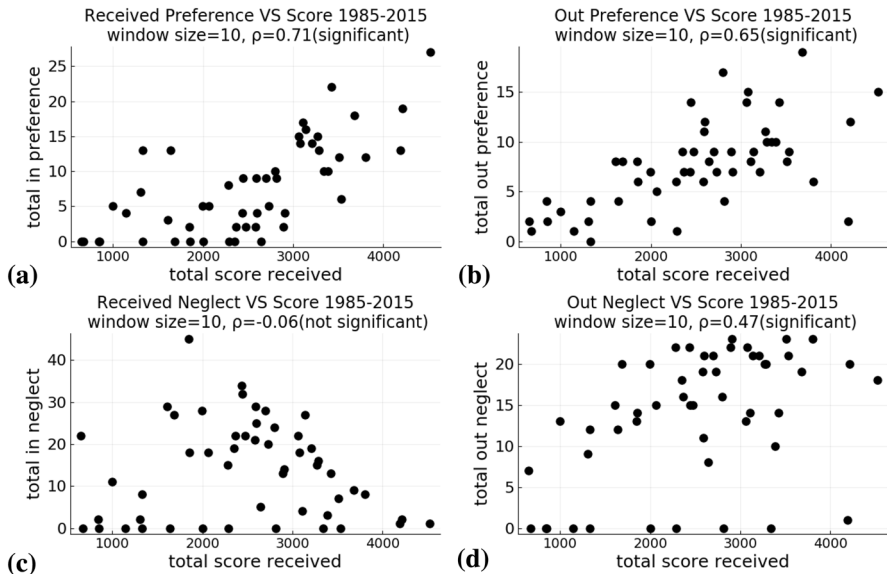


Fig. 3 These plots display edge-type aggregates against the total accumulated score for the period 1985–2015 with time windows of 10 years. There are four types of edges according to significant voting patterns, neglect received or given, and preference received or given. The rank correlation is found via the spearman ρ at $\alpha = 0.05$

Edge bias associations and score rank correlation

Figure 3 shows a set of figures exploring the associations of the total accumulated score a country received with different biased edge types over the years 1985–2015 with a window size of 10, at significance $\alpha = 0.05$ (according to equation 3, 5). **a** looks at the number of edges of significant preferential bias a country received and the rank correlation with total accumulated score. The correlation is significant and a trend can be seen which supports the idea that without a country having biased support over various time periods a lower overall position is anticipated. **b** shows the number of significant preferential edges a country produced and the total accumulated score. A significant rank correlation is found here as well which reinforces the view that countries which participate in an exchange of bias, possibly as a strategy or allegiance, accumulate more points. **c** looks at the number of edges of neglect a country has received against the total accumulated score. The rank correlation is not significant, although a trend could be perceived, there are many outliers to both a flat line and a decreasing linear slope. Since there are exceptions to the trend that receiving neglect will incur a reduction in score rank, the biased behaviors may not experience the necessary deterrent from other countries that negates the benefit from biased voting. **d** shows the rank correlation of accumulated score with the total number of edges of neglect produced towards other countries in each time window. The significant relationship supports a view that countries which accumulated a large number of points also had a high rank of neglecting other countries

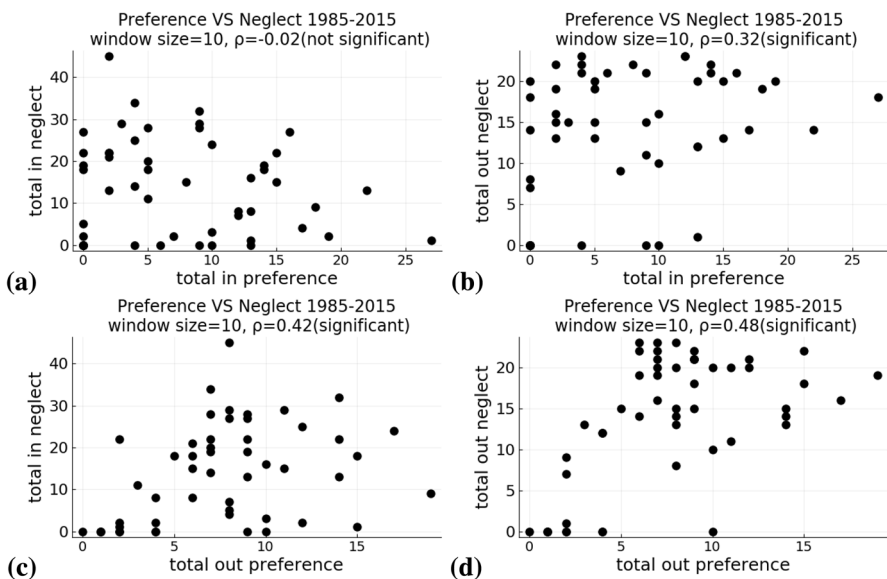


Fig. 4 The subfigures here examine the rank associations between the aggregate of different biased edges types produced by countries in the years 1985–2015 with time windows of 10 years. The rank correlation with the spearman ρ is found with its significance at $\alpha = 0.05$. The strongest association of rank is between the number of preferential and neglect edges produced

in these decade-long periods. It can be seen that neglecting countries to increase biased preference produces neglect given that the allocatable points are constrained. This reinforces the premise that the negative effects from neglecting countries is not significantly detrimental to the score rank so that the cost of such a biased strategy is minimized.

Figure 4 shows the rank correlations between the type of edge bias for the years 1985–2015 in 10 year periods. Each country has a single position in the figures and for each of the three decades the number of edges denoted on the x and y axis are aggregated. The weakest rank correlations are in **a** and **b** which shows the number of preferential edges a country received against the neglect inwards and outwards respectively. **a** Does show that high neglect received and having lots of preference is not present but the most important point to not that a country can evade being the target of neglect and still receive fewer edges of preference. **b** Has a significant rank correlation for the number of preferential edges a country received and the neglect it produced. This supports the idea that such trends would promote tactical voting since there does not seem to be a reduction in preference reception from all countries. The strongest rank correlations are in **c** and **d** where the number of edges of preference produced by a country is significantly rank correlated with both the neglect produced and received. This shows that countries which have produced a behavior of consistent bias from their focus on score exchange partnerships incur neglect but not from all countries. The subset participating in the exchange apparently provides enough points to counter balance the neglect, as shown in Figure 3.

Discussion

The work here extends a methodological framework for further understanding the voting patterns in the Eurovision Song Contest (ESC). The extension of [20] now allows for both the significant edges of preference (larger score deviations) and edges of neglect (lower score deviations) to be determined based upon a comparison with an unbiased generator. This methodology differs from most of the previous approaches in that time windows are used to filter sporadic score changes that reduces the false positives. The methodology does not restrict the investigation to be over time periods where the voting schemes are homogeneous across each year (which have changed considerably and frequently). As a result, both types of significant score excesses between countries can be uncovered from the beginning of the competition and their respective networks visualized. This follows from the formulation of the competition provided here where the parameters defining the thresholds of significance can be sampled.

A sample set of networks produced from the significant edge pairs of neglect between countries and avoid (bi-directional neglect) are shown as they are not explored in the previous literature using a similar methodology. These networks provide a set of edges not commonly found in the analogous networks for preference (directed edges) and collusion (bi-directional preference). Some of the edges are representative of antagonistic socio-economic ties which could be expected if current affairs were used as a predictor of low score assignments.

The aggregate-significant edges of preference (given/received) and neglect (given and received) over 30 years in 5-year time windows are examined along with the total accumulated score for each country. This provides an aggregate edge analysis for the patterns of different edge types in scatter plots, which is difficult to perceive in the works of [19, 20] as it requires such information to be gathered from the country node representation within the drawn networks. Having the aggregate edge information provided in the scatter plots for a large proportion of the competition's life span provides a means to examine different associations between the edge types and a country's success in the competition.

Significant rank correlation for the total accumulated score with the number of biased preference edges received and produced is found. The edges of neglect have a weaker relationship and there does not appear to be an indication that countries which produce more significant neglect receive less preference. This describes a situation where the production and attraction of biased preferential edges leads to an overall greater score accumulation over time. Using the number of the estimated biased edges (even from hearsay) a country has in comparison to another country, can be used to develop an expectation for the score rank. This may lead to the initiative in choosing to promote further biased voting with regional partnerships that begins from socio-economic ties.

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