

An Alternative Exploration of Global Political Relations in Southern Africa during the Cold War: Modularity in the Global Arms Trade Network from 1975 to 1988

Burgert Senekal

<https://orcid.org/0000-0002-1385-9258>

University of the Free State

burgertsenekal@yahoo.co.uk

Abstract

During the Cold War, two camps used arms to expand their influence in the Third World. In the present study, I used the concept of modularity (Q), developed within network theory, to study communities within the global arms trade network from 1975 to 1988. Using data provided by the Stockholm International Peace Research Institute, I showed that communities within this network reflected known political ties within South America, Asia and Southern Africa. As part of the study I sorted countries based on their arms trade transactions, and in the process I established that China was positioned with the West in the period under study. Not only did my study show that the arms trade network reflected political alliances during this period, but it also indicated that this network highlighted international relations and the alliances of political organisations. Based on the findings of my study I put forward suggestions for future research.

Keywords: complex networks; complex systems; modularity; arms industry; arms trade network; Cold War; Southern Africa

Introduction

During the Cold War, the National Party (NP) of South Africa told citizens on a regular basis that the communists, specifically the Soviet Union, wanted to control the world and also South Africa. For example, General Magnus Malan said in a speech in 1981 (1981, 2):

After a hundred years, the imperial motive again poses the greatest threat to the independence of our young republic—in this case in the form of the Russian expansionist urge. This time, it is the Soviet Union that is looking at South Africa with eager eyes, because of this country's resources and its strategic location with respect to the sea route that runs around the Cape. To satisfy its expansionist goals, Black African nationalism is being used and manipulated against the RSA with diabolical ingenuity.¹

This narrative was widely questioned by opponents of the NP. Stemmet and Senekal (2013), however, show that the threat of Soviet expansionism was also mentioned in former classified reports by the Central Intelligence Agency (CIA), and that the details of that threat were quite similar to those propagated by NP leaders (such as General Malan) of the time. Both claimed, for instance, that the Soviet Union wanted control over South Africa because of the country's strategic position in terms of shipping routes and because of its mineral wealth (CIA 1984, 1; Stemmet and Senekal 2013, 112 and further). The same view was also aired in the Soviet Union itself (Stemmet and Senekal 2013, 106). The African country in which the Soviet Union showed particular interest was Angola, but it also had an eye on and played a key role in Mozambique, Zambia and Tanzania.

The issue of complex networks has been studied in almost every academic discipline, including in the fields of history (e.g. Padgett and Ansell 1993; Senekal 2017) and economics (e.g. Glattfelder 2013). Studies that provide perspectives specifically on the global arms trade network (ATN) are those by Åkerman and Larsson-Seim (2014) and Senekal, Stemmet, and Stemmet (2015).

In the present study, I analysed the ATN during the Cold War, and for this purpose I used the Stockholm International Peace Research Institute (SIPRI) database of arms trade transactions. Åkerman and Larsson-Seim (2014, 543) indicate that there was a

1 Own translation from the original Afrikaans: “Na ’n honderd jaar vorm die imperiale motief wéér die grootste bedreiging vir ons jong republiek se onafhanklikheid—in hierdie geval in die vorm van die Russiese uitbreidingsdrang. Hierdie keer is dit die Sowjetunie wat met begeerte oë na Suid-Afrika kyk, vanweë hierdie land se bronnebegaafdheid en sy strategiese ligging ten opsigte van die seeroete wat om die Kaap loop. Om sy uitbreidingsoogmerke te bevredig, word Swart Afrika-nasionalisme met diaboliese vernuf teen die RSA ingespan en gemanipuleer.”

clear link between arms trade relations and political ties during the Cold War: “Since the Cold War stemmed from ideological differences, the ATN of that era closely reflects the military alliances at the time: the democracies within NATO traded with each other, as did the autocracies within the Warsaw Pact” (a view which Kinsella (2008, 8) concurs with). In addition, the CIA (1985, 3) noted that the supply of weapons was “Moscow’s key instrument of influence building” during the Cold War, and that the Soviet Union even resisted negotiations because violence stimulated a demand for Soviet weapons (CIA 1982, 14). In providing armaments, the Soviet Union thus expanded its influence in Southern Africa, and it forged political ties at the same time. Therefore, an examination of the ATN during this period may shed light on the international relations that were established between countries and organisations.

The present study focused on the period from 1975 to 1988. This period was chosen as it represented a time when South Africa was closely involved in conflicts in Southern Africa. In this article I discuss network theory’s concept of modularity (Q) and the use of the algorithm developed by Blondel et al. (2008) as well as the resolution principle developed by Lambiotte, Delvenne, and Barahona (2009) to calculate modularity in respect of the ATN. I sorted countries into groups based on their arms trade transactions, and indicated which countries and organisations (for example the African National Congress (ANC)) fell into the camp of the Soviet Union, and which into the camp of the West. The aim of the study was to determine the extent to which the ATN could be used to highlight political alliances in Southern Africa during the time of the Cold War.

Methods

Data

Data for this study was gathered from the arms trade database of the SIPRI.² This database includes conventional weapons but not small arms (e.g. assault rifles, landmines, hand grenades), non-lethal weapons, or chemical, biological and nuclear weapons. It includes all categories of conventional weapons, namely, aircraft, air defence systems, armoured vehicles, anti-submarine weapons, artillery, missiles, sensors, satellites, engines for military aircraft, armoured vehicles, and warships. This database is the most comprehensive database currently available on the global arms trade industry, and, considering the categories at issue in the present study, any omissions can be regarded as negligible (Åkerman and Larsson-Seim 2014, 537). Contrary to the study of Åkerman and Larsson-Seim (2014, 537), the present study did not remove substate role players, such as insurgency movements, from the data set as they were of particular importance.

² <https://www.sipri.org>.

Identifying Communities in Networks

The study of global trade as a network can be traced back to Quesnay (1758). In 1942, the League of Nations published *The Network of World Trade*, which describes international trade as “much more than the exchange of goods between one country and another; it is an intricate network that cannot be rent without loss” (League of Nations 1942, 7). Since the 1970s, when Snyder and Kick (1979) and Steiber (1979) published studies on global economic interactions as networks, a variety of studies on the global trade network have been conducted (e.g. De Benedictis and Tajoli 2008, 2011; Fagiolo 2010; Fagiolo, Schiavo, and Reyes 2008, 2009, 2010; Fagiolo, Squartini, and Garlaschelli 2013; Fagiolo, Valente, and Vriend 2007; Schiavo, Reyes, and Fagiolo 2010; Senekal 2017; Squartini, Fagiolo, and Garlaschelli 2011; Vicarelli et al. 2013).

Since the late 1990s, various developments have been made within network theory, including the development of measurements with which concepts such as the average path length (Watts and Strogatz 1998), clustering (Newman, Moore, and Watts 2000), small-worldness (Humphries and Gurney 2008) and modularity (Newman 2006) can be calculated in respect of a network.³ Such concepts contribute to the characterisation of complex networks and the exploration of how complex networks, including economic networks, are constructed and function. The present study focused on modularity (Q) and its application within the ATN from 1975 to 1988. In the study, countries were represented as nodes (n) and their arms trade transactions as edges (m).

Community formation, which is a key facet of networks, has been studied since the 1970s through block modelling (Breiger, Boorman, and Arabie 1975; White, Boorman, and Breiger 1976) and hierarchical grouping (Everitt 1974). A community occurs where there are more links between nodes within a group than between nodes in the group and those outside (Caldarelli 2013, 35). For example, if one were to study the daily interactions of academics at a university, with staff represented as nodes (n) and their social interactions with other staff represented as links or edges (m) between them, then more links could be expected to exist between the staff within the History Department and between the staff within the Political Science Department than between the staff of the History and the Political Science departments. In other words, more intra-departmental links than inter-departmental links could be expected.

The phenomenon described in the preceding paragraph occurs in a variety of networks. For example: more communication occurs between speakers of the same language than between speakers across different languages (Blondel et al. 2008); relationships are predominantly established between people of the same race (Newman 2003); and co-authorship occurs more frequently among researchers affiliated with the same institution (Wang and Zhu 2014). Therefore, in any network there are communities

3 For reviews of network theory, see Caldarelli (2013), Estrada (2012) and Newman (2010).

where the number of intra-community ties is higher than the number of inter-community ties.

Although the concept of community formation is intrinsically simple, the issue that presents a challenge is measuring how many edges between nodes are statistically significant to identify a community. A statistically significant number of edges can be measured by implementing the concept of modularity (Q), which investigates the number of edges that are found minus the number of edges that would be expected if link formation occurred at random (Blondel et al. 2008, 2; Lambiotte, Delvenne, and Barahona 2009, 13; Newman 2006, 8578). Modularity (Q) is calculated using Equation 1 (see below) (Lambiotte, Delvenne, and Barahona 2009, 13; Meunier et al. 2009, 3).

$$Q = \frac{1}{2m} \sum_{C \in P} \sum_{i,j \in C} \left[\frac{A_{ij}}{k_i k_j} - \frac{1}{2m} \right] \quad (1)$$

In Equation 1, A represents the adjacent matrix of the network, m is the total number of edges, and $k_i = \sum_j A_{ij}$ is the number of edges of node i . The indices i and j extend over the N nodes of the graph. The index C extends over the modules of the partition P .

However, Equation 1 is only suitable for calculating modularity in networks where the weights of edges are not assigned. Weights are important in the current analysis, as more transactions are indicative of a stronger tie between countries. It is significant, for example, that the second largest number of arms deals (125 transactions) during this period—taking into account all arms trade transactions throughout the network during this period, i.e. globally—took place between the Soviet Union and Angola. The largest number of transactions took place between the Soviet Union and India during this period. To calculate modularity for a network where weights have been allocated (Q_w), Blondel et al. (2008, 2–3) suggest using Equation 2 (see below).

$$Q_w = \frac{1}{2m} \sum \left[A_{ij} - \frac{k_i k_j}{2m} \right] \delta(c_i, c_j) \quad (2)$$

In Equation 2, A_{ij} represents the weight of the edge between i and j , $k_i = \sum_j A_{ij}$ is the sum of the weights of the links of node i , c_i is the cluster assigned to node i , the δ function $\delta(u, v)$ is 1 when $u = v$ and otherwise 0 and $m = \sum_{ij} A_{ij}$.

Several algorithms have been developed to calculate modularity (e.g. Clauset, Newman, and Moore 2004; Duch and Arenas 2005; Newman 2006; Pons and Latapy 2006; Wakita and Tsurumi 2007). However, one of the most successful algorithms to date is that of

Blondel et al. (2008), which has already been used successfully in a variety of studies, including studies that highlight clusters in the human brain (Meunier et al. 2009; Onoda and Yamaguchi 2013) and studies on economic networks (Glattfelder 2010, 2013; Piccardi, Calatroni, and Bertoni 2010). Blondel et al.'s algorithm was used in the present study.

The identification of communities using modularity is also influenced by resolution, in other words by the level at which the network is analysed. To return to the example of the social interactions of staff at a university: If one were to take a broader perspective and not investigate only the interactions between staff members of departments but also the interactions between faculty members, one might expect more interactions between members within the Humanities and members within Economics than between these two faculties' members (i.e. more intra-faculty than inter-faculty interactions). This issue of resolution has been addressed by Lambiotte, Delvenne, and Barahona (2009). Resolution can be used in conjunction with Blondel et al.'s algorithm, and when that is done, resolution changes the levels at which groupings are identified within the network, allowing one to study community formation at different scales.

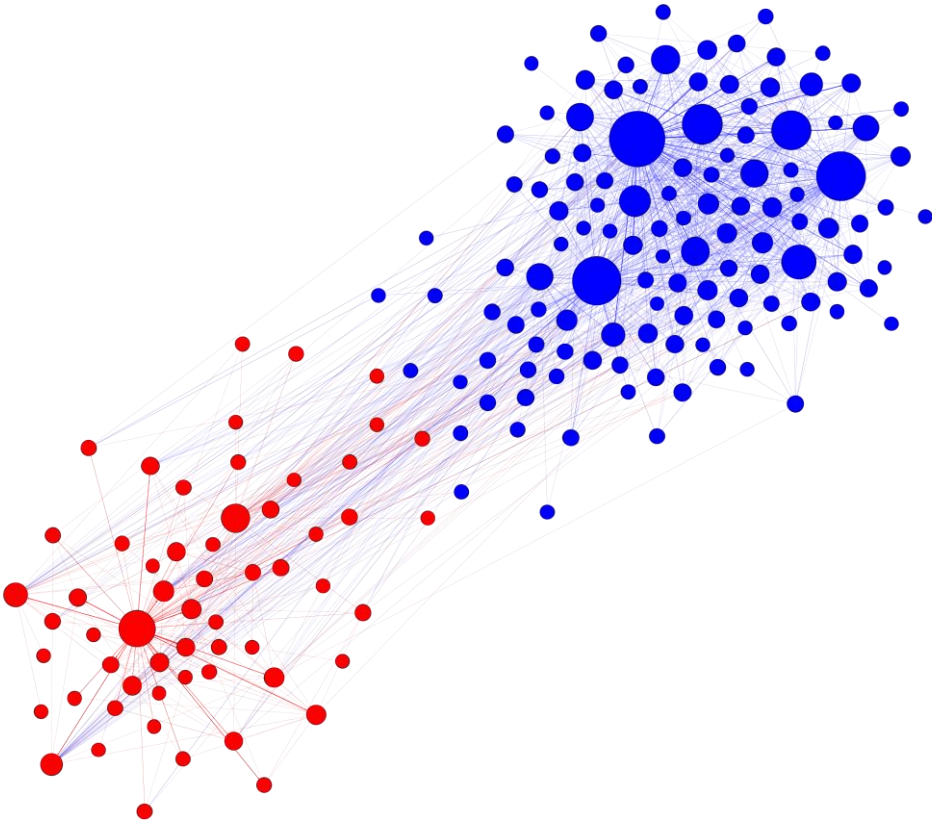
In the ATN, the resolution can be specified to highlight two communities only, or the resolution can be reduced to identify more clusters. Since the purpose of the present study was to investigate a simple Cold War dichotomy, the resolution was used to identify two communities only.

Note, however, that belonging to a community does not mean there are no ties with countries in other communities, but only that more ties are found within the community than between those inside and those outside. This is an important distinction: a country or insurgent movement may be supplied with arms from both camps involved in the Cold War but be grouped on one side because it has more trade partners in this group. Indeed, in the ATN from 1975 to 1988, the entire network was connected.

Results

Åkerman and Larsson-Seim (2014, 544) used a force-directed layout algorithm to visualise the ATN from 1970 to 1974 and they showed that the ATN had been divided into two parts during that period. Using data from 1975 to 1988 and the force-directed layout algorithm of Martin et al. (2011), the present study found that the same division occurred in this period (see Figure 1). As stated earlier, it should be noted, however, that the formation of communities did not mean that no ties (trade relations) were found between communities. Space constraints prohibit the use of node labels in the network visualisation in Figure 1, and the identification of the countries in each group is rather presented in Table 1 and figures 2, 3 and 4.

Figure 1: The ATN between 1975 and 1988, based on data supplied by SIPRI



In Figure 1, nodes in red are countries associated with the Soviet Union and nodes in blue are countries associated with the United States. The size of the nodes reflects the number of trade partners (*degree* in network theory). The largest blue node is the United States and the largest red node is the Soviet Union.

Using the modularity algorithm by Blondel et al. (2008) and the resolution principle by Lambiotte, Delvenne, and Barahona (2009), two groups could be highlighted in the ATN from 1975 to 1988 in a more accurate and detailed way. There were 180 nodes (n = countries) and 2 256 edges (m = arms transactions) in this network. The modularity coefficient (Q) of the network was 0,353 at a resolution of 1,0 and it was 0,757 at a

resolution of 1,5. This meant that a relatively high degree of modularity occurred in this network, and significantly more when a resolution of 1,5 was used. Thus, there was a statistically significant level of community formation in this network, which meant that some groups of countries traded more among themselves than with countries of different groups.

Table 1 shows the top 20 countries in both groups and their degree centralities, which in this case refers to the number of countries they traded with during this period. Groups were identified using the modularity algorithm by Blondel et al. (2008) and the resolution principle by Lambiotte, Delvenne, and Barahona (2009). The present study found that the majority (122 or 67,78%) of 180 countries and insurgent movements belonged to Group 1, whereas 58 countries and insurgent movements (32,22% of all countries and insurgent movements) belonged to Group 0. The majority of transactions also belonged to Group 1 (1 762 or 78,1% of all trade relations). Table 1 is discussed in the next section.

Table 1: Arms trade relations among countries and communities in the ATN , sorted by degree

Country	Group	Degree	Country	Group	Degree
Soviet Union	0	68	United States	1	125
Unknown country	0	44	United Kingdom	1	106
Libya	0	31	France	1	104
Iraq	0	25	Italy	1	78
India	0	21	Germany	1	76
Romania	0	19	Canada	1	62
Czechoslovakia	0	18	Switzerland	1	52
Angola	0	17	Spain	1	45
Yugoslavia	0	16	Netherlands	1	44
Korea, North	0	14	Sweden	1	41
Poland	0	14	Brazil	1	41
Ethiopia	0	14	China	1	38
Syria	0	13	Israel	1	36
Algeria	0	12	Egypt	1	29
German Democratic Republic	0	11	Singapore	1	28
Somalia	0	10	Australia	1	21
Nicaragua	0	9	Iran	1	21
Seychelles	0	8	Argentina	1	21
Tanzania	0	8	Denmark	1	19
Bulgaria	0	8	Austria	1	18

Figure 2 displays, in geographic format, the results of the present study. This world map shows countries' groupings; countries in Group 0 are in red, and countries in Group 1 are in blue. Figures 3 and 4 show an enlargement of Africa and Asia respectively. The blank countries on the map in Figure 2 represent those countries that were not independent at the time under study, for example, South Sudan, Eritrea and Namibia. Note that these groupings are based on arms trade transactions and not on other international relations, political systems or ideology.

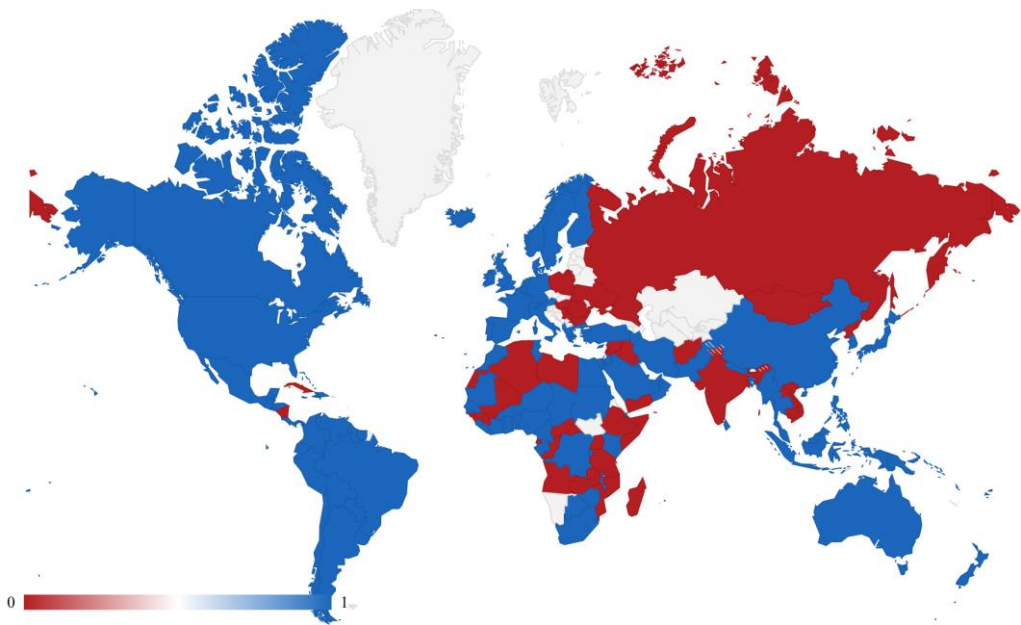


Figure 2: Grouping of countries using modularity and data supplied by SIPRI. Countries in red belong to Group 0, and countries in blue to Group 1.

11

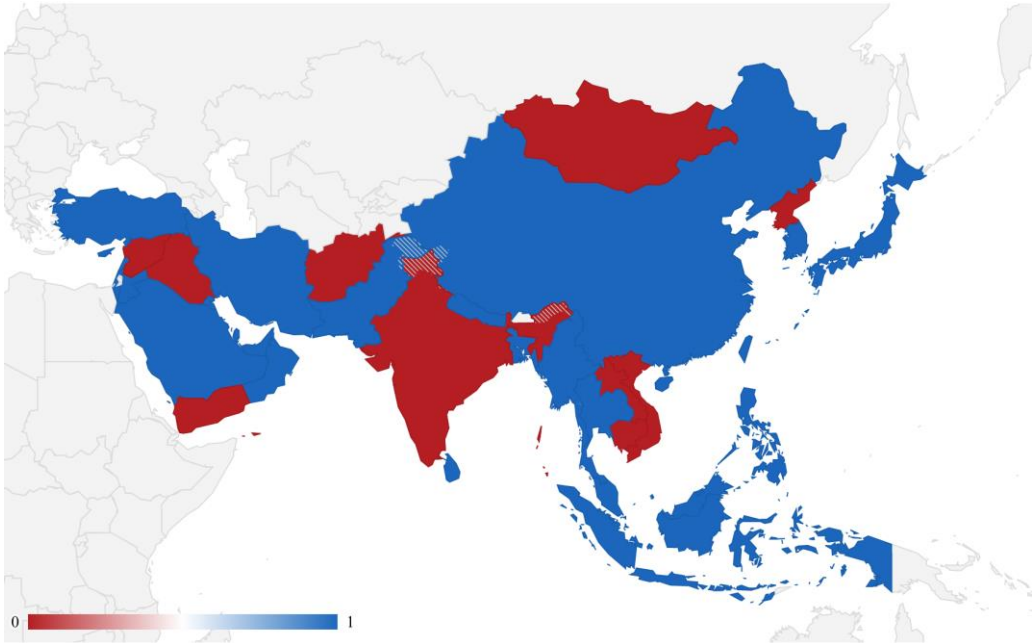


Figure 4: Grouping of countries in Asia using modularity and data supplied by SIPRI. Countries in red belong to Group 0, and countries in blue to Group 1.

In the following section, I discuss the results of the present study.

Discussion

Table 1 and figures 2, 3, and 4 clearly show that Group 1 represents countries and substate role players associated with the West, whereas Group 0 represents countries and substate role players grouped on the side of the Soviet Union. For example, the United Kingdom (UK), United States of America (USA), South Korea and West Germany are in Group 1, whereas Cuba, North Korea, Vietnam and Poland are in Group 0.

The present study found that North and South America were dominated by Group 1 countries. However, there were two notable exceptions: two Group 0 countries (i.e. Cuba and Nicaragua) were in the Soviet group (see Figure 2). Cuba's inclusion in Group 0 was not a surprise; a 1976 CIA report referred to Cuba as "Moscow's surrogate" (CIA 1976a, 11). Although Nicaragua was positioned in Group 0, the Nicaraguan Contras (not included in Table 1) was positioned in Group 1. The Reagan administration's support for the Contras had led to a major scandal in the United States (Walker 2019), providing evidence that, in such a case, community formation in the ATN closely mirrored known political ties.

As far as the Far East was concerned, the present study found that China and Japan fell into Group 1. During the Cold War there was continuous conflict between the Soviet Union and China (Stemmet and Senekal 2013), and in 1985 a CIA *National Intelligence Estimate* (1985, 9) claimed that the Soviet Union had attempted “To supplant or undermine Western and Chinese political, economic, and military influence in the region [Southern Africa].” China supplied arms to, among others, Angola’s União Nacional para a Independência Total de Angola (UNITA) and the Zimbabwe African National Union (ZANU) in Southern Africa, whereas the Soviet Union supplied arms to the opposition groups in these countries.⁴ A 1976 CIA report reads as follows:

An anti-Chinese editorial in the Cuban party daily on Tuesday suggests that Havana is determined to play a more aggressive role, in parallel with Moscow, in trying to undermine Chinese influence in the Communist and Third World. The commentary said, “The Angolan trenches define the real ideological and political positions” of nations, and denounced China for allying with “the US imperialists and the South African racists.” Chinese policies elsewhere, particularly on Chile, also were attacked. (CIA 1976b, 11)

China’s position in Group 1 is therefore interesting, as the modularity algorithm showed that China did not function in the Soviet Union’s ATN community despite it being ideologically in a similar camp (i.e. communism). Vietnam, Cambodia and Laos were, in turn, grouped in Group 0, showing their well-known ties to the Soviet Union. The war in Vietnam (1955–1973), in particular, was fought against (Soviet) communist expansion (see, for example, Summers 2007 and Wiest 2006). According to the present study, the Khmer Rouge, which is known to have been supported by the West (O’Donoghue 2015), was positioned in Group 1, whereas Cambodia was positioned in Group 0.

The present study positioned Afghanistan in Group 0, showing this country’s relationship with the Soviet Union, whereas it positioned the mujahedeen (not shown in Table 1), which is known to have been supported by the US and China (Hess 2014, 45; Venugopalan 2016), in Group 1 with the US. Iraq also deserves mention: Sicherman (2011) notes that Saddam Hussain emulated Joseph Stalin in many ways, and this tie with the Soviet Union is therefore reflected in Iraq’s position in Group 0.

Within a Southern African context, the grouping of Angola, Zambia and Mozambique in Group 0 was no surprise. It is well known that these countries received significant material support from the Soviet Union (CIA 1989, 45; Hess 2014). For instance, the CIA noted in 1976 as follows:

4 China supplied arms to all three liberation movements in Angola until 1973, after which they concentrated on UNITA and FNLA until their withdrawal in 1975 (Hess 2014, 26, 29).

The Popular Movement's [i.e. the MPLA] victory in Angola was one of Moscow's most important and visible foreign policy successes in the past few years. It refurbished the Soviets' revolutionary credentials, enhanced their status among the radical black African states, and gave them an important win over their Chinese competitors in Africa. (CIA 1976b, 16)

The present study placed the Zimbabwe African People's Union (ZAPU) in Group 0, whereas it placed Zimbabwe (ruled by the Zimbabwe African National Union (ZANU)) in Group 1 with the West. According to the study, Malawi, Botswana, Swaziland and Lesotho were also in Group 1, together with the National Union for the Total Independence of Angola (UNITA). This organisation was, of course, the ally of the US and South Africa in the period under study (Hess 2014, 9), and thus modularity highlighted this relationship in the global ATN.

Notably, the modularity calculation positioned South Africa in Group 1 with the West, whereas it positioned the ANC (not shown in Table 1) in Group 0 with the Soviet Union. In 1988, the ANC ordered six Strela-2/SA-7 Grail surface-to-air missiles, and in a report of the CIA (1986, 26) the ANC was called "an organization with considerable Communist influence and has extensive and longstanding ties to the Soviet Union, a pro-Soviet posture, and it promotes revolutionary violence." The ANC's ties with the Soviet Union were therefore supported based on its trade relations in the global ATN. However, according to the present study, South Africa's ANC was in Group 0 and Zimbabwe's ZANU in Group 1; therefore these organisations were on opposite sides during the period under study. On the other hand, South Africa's position as an ally of the West (Stemmet and Senekal 2013) was also reflected in the ATN, but, again, the country's position in Group 1 placed it on the same side as China and Zimbabwe. Notably, although the NP government in South Africa supported insurgent movements in Mozambique (Resistência Nacional Moçambicana (RENAMO)) and Angola (UNITA), it did not do so in Zimbabwe, Botswana or Lesotho—countries that all belonged to Group 1.

Little of the above is surprising, since these relations are well documented. However, grouping countries based on the use of arms trade data and Blondel et al.'s (2008) algorithm highlights issues that are often overlooked about this period:

- The Soviet Union and China did not represent a united communist front. They were on opposite sides as they supplied arms to different groups, both globally and in Southern Africa.
- Zimbabwe's ZANU and South Africa's ANC, although both were liberation movements, were also on opposite sides, at least in the sense that they purchased arms from different camps in the ATN. ANC solidarity with Robert Mugabe's ZANU, as recently expressed after his death (see, for example,

Tandwa 2019), was not reflected in arms trade relations during the period under study.

- The Cold War was a reflection of issues that were much more complex than the simple opposition of ideologies.

Conclusion

This study used the ATN, which was constructed using SIPRI data and a network analysis (which was done using the modularity algorithm by Blondel et al. (2008) and the resolution principle by Lambiotte, Delvenne, and Barahona (2009)) to group countries into two camps in respect of the period from 1975 to 1988. According to the study, the communities identified reflected known political alliances, but, more interestingly, China was more closely associated with the West than with communist countries during this period. It was shown how the method that was used highlighted alliances in a Southern African context: Mozambique, Angola and South Africa's ANC were part of the communist community of nations, whereas South Africa, Lesotho, Botswana, Swaziland and Zimbabwe were associated with the Western community of nations.

Contrary to Åkerman and Larsson-Seim (2014, 543) who claim that the ATN reflected ideology during the Cold War, the present study indicated that the ATN highlighted political alliances rather than ideology. Future studies could explore how the end of the Cold War changed these alliances in terms of the ATN.

References

- Åkerman, A., and A. Larsson-Seim. 2014. "The Global Arms Trade Network 1950–2007." *Journal of Comparative Economics* 42 (3): 535–51. <https://doi.org/10.1016/j.jce.2014.03.001>.
- Blondel, V.D., J.-L. Guillaume, R. Lambiotte, and E. Lefebvre. 2008. "Fast Unfolding of Communities in Large Networks." *Journal of Statistical Mechanics: Theory and Experiment* 10: P10008. <https://doi.org/10.1088/1742-5468/2008/10/p10008>.
- Breiger, L., S. A. Boorman, and P. Arabie. 1975. "An Algorithm for Clustering Relations Data with Applications to Social Network Analysis and Comparison with Multidimensional Scaling." *Journal of Mathematical Psychology* 12 (3): 328–83. [https://doi.org/10.1016/0022-2496\(75\)90028-0](https://doi.org/10.1016/0022-2496(75)90028-0).
- Caldarelli, G. 2013. *Scale-Free Networks: Complex Webs in Nature and Technology*. Oxford: Oxford University Press.
- Central Intelligence Agency. 1976a. "Cuba–China–USSR." *Central Intelligence Bulletin*, January 29: 11.

- Central Intelligence Agency. 1976b. "USSR–Angola: Neto Welcomed Warmly." *National Intelligence Daily Cable*, October 8: 15–17.
- Central Intelligence Agency. 1982. "Moscow and the Namibia Peace Process." *Interagency Intelligence Memorandum*, April 7: 1–14.
- Central Intelligence Agency. 1984. "Moscow's Response to the Diplomatic Situation in Southern Africa. An Intelligence Assessment." Langley: Central Intelligence Agency.
- Central Intelligence Agency. 1985. "Soviet Policies in Southern Africa." *National Intelligence Estimate*, February 13: 1–24.
- Central Intelligence Agency. 1986. "The African National Congress of South Africa: Organization, Communist Ties, and Short-Term Prospects." *Special National Intelligence Estimate*, July: 1–37.
- Central Intelligence Agency. 1989. "Special Issue: South Africa Entering the 1990s." *Africa Review*, January 20: 1–70.
- Clauset, A., M. E. J. Newman, and C. Moore. 2004. "Finding Community Structure in Very Large Networks." *Physical Review E* 70 (6): 066111.
<https://doi.org/10.1103/physreve.70.066111>.
- De Benedictis, L., and L. Tajoli. 2008. *The World Trade Network*. Macerata: University of Macerata.
- De Benedictis, L., and L. Tajoli. 2011. "The World Trade Network." *World Economy* 34 (8): 1417–54. <https://doi.org/10.1111/j.1467-9701.2011.01360.x>.
- Duch, J., and A. Arenas. 2005. "Community Detection in Complex Networks Using Extremal Optimization." *Physical Review E* 72 (2): 027104.
<https://doi.org/10.1103/physreve.72.027104>.
- Estrada, E. 2012. *The Structure of Complex Networks. Theory and Applications*. Oxford: Oxford University Press.
- Everitt, B. S. 1974. *Cluster Analysis*. New York, NY: John Wiley.
- Fagiolo, G. 2010. "The International Trade Network: Gravity Equations and Topological Properties." *Journal of Economic Interaction and Coordination* 5 (1): 1–25.
- Fagiolo, G., S. Schiavo, and J. Reyes. 2008. "On the Topological Properties of the World Trade Web: A Weighted Network Analysis." *Physics Review* 387: 3868–73.

- Fagiolo, G., S. Schiavo, and J. Reyes. 2009. "World Trade Web: Topological Properties, Dynamics, and Evolution." *Physics Review E* 79: 036115. <https://doi.org/10.1103/physreve.79.036115>.
- Fagiolo, G., S. Schiavo, and J. Reyes. 2010. "The Evolution of the World Trade Web: A Weighted-Network Approach." *Journal of Evolutionary Economics* 20: 479–514.
- Fagiolo, G., T. Squartini, and D. Garlaschelli. 2013. "Null Models of Economic Networks: The Case of the World Trade Web." *Journal of Economic Interaction and Coordination* 8: 75–107. <https://doi.org/10.1007/s11403-012-0104-7>.
- Fagiolo, G., M. Valente, and N. J. Vriend. 2007. "Segregation in Networks." *Journal of Economic Behavior and Organization* 64 (3): 316–36. <https://doi.org/10.1016/j.jebo.2006.09.003>.
- Glattfelder, J. B. 2010. "Ownership Networks and Corporate Control: Mapping Economic Power in a Globalized World." Doctoral dissertation, Swiss Federal Institute of Technology, Zurich.
- Glattfelder, J. B. 2013. *Decoding Complexity: Uncovering Patterns in Economic Networks*. Heidelberg: Springer.
- Hess, M. 2014. "U.S.–Chinese Cooperation and Conflict in the Angolan Civil War." Master's dissertation, City University of New York, New York.
- Humphries, M. D., and K. Gurney. 2008. "Network 'Small-World-Ness': A Quantitative Method for Determining Canonical Network Equivalence." *PloS one* 3 (4): e0002051. <https://doi.org/10.1371/journal.pone.0002051>.
- Kinsella, D. T. 2008. "The Illicit Arms Trade: A Social Network Analysis." *Political Science Faculty Publications and Presentations*. Paper 12: 1–39.
- Lambiotte, R., J.-C. Delvenne, and M. Barahona. 2009. "Laplacian Dynamics and Multiscale Modular Structure in Networks." <https://arxiv.org/abs/0812.1770>.
- League of Nations. 1942. *The Network of World Trade*. Princeton: Princeton University Press.
- Malan, M. 1981. *Toespraak gelewer by Krugerdagviering te Bokfontein*. Unpublished speech in personal collection.
- Martin, S., W. M. Brown, R. Klavans, and K. W. Boyack. 2011. "OpenOrd: An Open-Source Toolbox for Large Graph Layout." *SPIE Proceedings Volume 7868: Visualization and Data Analysis*: 1–11. <https://doi.org/10.1117/12.871402>.

- Meunier, D., R. Lambiotte, A. Fornito, K. D. Ersche, and E. T. Bullmore. 2009. "Hierarchical Modularity in Human Brain Functional Networks." *Frontiers in Neuroinformatics* 3: 1–12. <https://doi.org/10.3389/neuro.11.037.2009>.
- Newman, M. E. J. 2003. "Mixing Patterns in Networks." *Physical Review E* 67 (2): 026126.
- Newman, M. E. J. 2006. "Modularity and Community Structure in Networks." *Proceedings of the National Academy of Sciences* 103 (23): 8577–82.
- Newman, M. E. J. 2010. *Networks*. Oxford: Oxford University Press.
- Newman, M. E. J., C. Moore, and D. J. Watts. 2000. "Mean-Field Solution of the Small-World Network Model." *Physics Review Letters* 84: 3201–4. <https://doi.org/10.1103/physrevlett.84.3201>.
- O'Donoghue, B. 2015. "Ford, Carter and Cambodia: US Foreign Policy and the Khmer Rouge." Doctoral thesis, University College Cork, Cork.
- Onoda, K., and S. Yamaguchi. 2013. "Small-Worldness and Modularity of the Resting-State Functional Brain Network Decrease with Aging." *Neuroscience Letters* 556: 104–8. <https://doi.org/10.1016/j.neulet.2013.10.023>.
- Padgett, J. F., and C. K. Ansell. 1993. "Robust Action and the Rise of the Medici, 1400–1434." *American Journal of Sociology* 98 (6): 1259–319. <https://doi.org/10.1086/230190>.
- Piccardi, C., L. Calatroni, and F. Bertoni. 2010. "Communities in Italian Corporate Networks." *Physica A* 389: 5247–58. <https://doi.org/10.1016/j.physa.2010.06.038>.
- Pons, P., and M. Latapy. 2006. "Computing Communities in Large Networks Using Random Walks." *Journal of Graph Algorithms and Applications* 10: 191–218. <https://doi.org/10.7155/jgaa.00124>.
- Quesnay, F. 1758. *Tableau Economique*. s.l.: s.n.
- Schiavo, S., J. Reyes, and G. Fagiolo. 2010. "International Trade and Financial Integration: A Weighted Network Analysis." *Quantitative Finance* 10 (4): 389–99. <https://doi.org/10.1080/14697680902882420>.
- Senekal, B. A. 2017. "'n Verkenning van Suid-Afrika se Veranderende Posisie in die Wêreldhandelnetwerk 1948–1994." *Journal for Transdisciplinary Research in Southern Africa* 13 (1): a430. <https://doi.org/10.4102/td.v13i1.430>.
- Senekal, B. A., J.-A. Stemmet, and K. Stemmet. 2015. "South Africa in the International Arms Trade Network (ATN) during National Party Rule (1948–1994): A Network Analysis." *Journal for Contemporary History* 42 (2): 48–70.

- Sicherman, H. 2011. "Saddam Hussein, Stalin on the Tigris." *Orbis* 55 (3): 489–97. <https://doi.org/10.1016/j.orbis.2011.04.016>.
- Snyder, D., and E. Kick. 1979. "Structural Position in the World System and Economic Growth: A Multiple Network Analysis of Transnational Interactions." *American Journal of Sociology* 84: 1096–112. <https://doi.org/10.1086/226902>.
- Squartini, T., G. Fagiolo, and D. Garlaschelli. 2011. "Randomizing World Trade. I. A Binary Network Analysis." *Physical Review E* 84 (4): 046117. <https://doi.org/10.1103/physreve.84.046117>.
- Steiber, S. 1979. "The World System and World Trade: An Empirical Explanation of Conceptual Conflicts." *Sociological Quarterly* 20: 23–36. <https://doi.org/10.1111/j.1533-8525.1979.tb02182.x>.
- Stemmet, J.-A., and B. A. Senekal. 2013. "Threats of Communist Expansion in Apartheid South Africa: NP Claims versus CIA Intelligence Perspectives in the Years 1960 to 1990." *New Contree* 68: 99–120.
- Summers, H. G. 2007. *American Strategy in Vietnam: A Critical Analysis*. New York: Dover Publications.
- Tandwa, L. 2019. "Mugabe's Life Epitomised the 'New African'—ANC Extends Condolences after Former Zimbabwean Leader Dies." *News24*, September 6, 2019. Accessed January 2, 2020. <https://www.news24.com/SouthAfrica/News/mugabes-life-epitomised-the-new-african-anc-extends-condolences-after-former-zimbabwean-leader-dies-20190906>.
- Venugopalan, H. 2016. "State Support to Insurgents in Other States: Resolution or Worsening of Conflict?" New Delhi: Institute of Peace and Conflict Studies.
- Vicarelli, C., L. de Benedictis, S. Nenci, G. Santoni, and L. Tajoli. 2013. "Network Analysis of World Trade Using the BACI-CEPII Dataset." CEPII Working Paper: 1–60. <https://doi.org/10.2139/ssrn.2374354>.
- Wakita, K., and T. Tsurumi. 2007. "Finding Community Structure in Mega-Scale Social Networks." *Proceedings of the 16th International Conference on the World Wide Web*: 1275–76. <https://doi.org/10.1145/1242572.1242805>.
- Walker, T. W., ed. 2019. *Reagan versus the Sandinistas: The Undeclared War on Nicaragua*. New York, NY: Routledge. <https://doi.org/10.4324/9780429303852-1>.
- Wang, Z.-Z., and J. J. H. Zhu. 2014. "Homophily versus Preferential Attachment: Evolutionary Mechanisms of Scientific Collaboration Networks." *International Journal of Modern Physics C* 25 (5): 1–8. <https://doi.org/10.1142/s0129183114400142>.

Watts, D. J., and S. H. Strogatz. 1998. "Collective Dynamics of 'Small-World' Networks." *Nature* 393 (6684): 409–10. <https://doi.org/10.1038/30918>.

White, H. C., S. A. Boorman, and R. L. Breiger. 1976. "Social Structure from Multiple Networks. I. Blockmodels of Roles and Positions." *American Journal of Sociology* 81 (4): 730–80. <https://doi.org/10.1086/226141>.

Wiest, A. 2006. "Introduction: An American War?" In *Rolling Thunder in a Gentle Land. The Vietnam War Revisited*, edited by Andrew Wiest. Oxford: Osprey. <https://doi.org/10.5040/9781472895905.ch-001>.