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How diaspora knowledge networks make difference to post-Soviet scientists' migration, research and career

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CHAPTER 2

Migrating Step by Step: Russian Computer Scientists in the UK[39]

39 The text is published as: Irina Antoshchuk, "Migrating step by step: Russian computer scientists in the UK", in From Russia with Code: programming migrations in Post-Soviet times, ed. Mario Biagioli and Vincent Lepinay, (Durham: Duke University Press, 2019).

In the 90s we started to accumulate all sorts of Russian people here. But I don't know, if I hadn't got here, maybe there would not be this Russian diaspora.

Yevgeniy, professor of computer science

The trend towards the internationalization of science is advancing as never before. Research is becoming increasingly collective and collaborative, with more papers produced through cross-border cooperation involving authors from a variety of different countries (Glänzel, Schubert 2005; Wagner 2008; Leydesdorff 2013). The emergence of global networks of scientific collaboration incorporating more and more countries from the developing world is associated (as both cause and effect) with the rise of academic mobility and growing flows of academic migration (Tremblay 2005; Kim 2010). Movement is considered a normal and positive element of an academic career. Mobile scholars typically build larger and more diverse collaborative networks and achieve greater scientific productivity and visibility (Scellato, Franzoni and Stephan 2012; Stephan and Levin 2001). Yet, we know little about academic migrants and scientific migration as a particular stream within highly skilled migration (HSM). If the impact of territorial mobility on scientific work has been a popular research topic, the role of professional contacts among scientists in the migration process has been rarely documented and analyzed in detail. What contacts are utilized by scholars moving from one country to another? What kind of ties are more important in that context? This chapter explores these issues by analyzing the stories of Russian computer scientists (RCS) living and working in the UK, seeking to understand how professional connections are involved in different stages of RCS migration and how they affect migration trajectories and scientific careers.

Social Networks in Migration Studies

The social-network perspective departs from an individual-centered explanation of migration and concentrates on migration as an inherently collective phenomenon

deeply embedded in social structures and social relations.[40] Moving beyond its comprehension as the sole result of individual decision or the sole result of economic or political parameters, network framework enables us to reveal the complexity and combinations of structural factors and agency in order to grasp their cumulative interactive outcome (Boyd 1989, 642). A network perspective also compensates for the deficiencies of predominantly economic- or policy-oriented research, focusing instead on the "social foundations of migration" (Massey 1990, 68), which act as an independent force sustaining migration flows even in deteriorating economic conditions and restrictive legal regulations. Social ties transform migration into a self-feeding process as they compose "the social structure needed to sustain it" (Ibid, 69). Migration not only depends on social networks but simultaneously becomes "a process of network building," which "reinforces social relationships across space" (Portes and Bach 1985, 10). Thus, network perspective is based on the vision of social ties as a central social structure in the migration process—its integral part, its driver, and its outcome.

What can network perspective reveal about HSM and academic migration? Vertovec asserts that networks of skilled specialists are characterized by a "different nature" and lead to "different migratory outcomes" in comparison to migrants with lower qualifications (2002, 5). Qualified professionals are supposed to rely on "networks of colleagues and organizations," whereas kin and family ties are much less utilized (Ibid), though research produces controversial evidence on this point. Bagchi (2001) confirmed the crucial role of formal employment contacts in professional migration of Asian immigrants to the US, but Kanjanapan (1995) showed that reliance on formal contacts depends on occupation, with health specialists being more likely to utilize kinship ties in contrast to engineers and computer scientists. Different types of contacts might also be mobilized for different pursposes (Johnston et al 2006)[41] and lead to different occupational outcomes for skilled migrants (Poros 2001). For example, migration of IT professionals through recruitment agencies may be associated with a particular visa status and employment contract in the host country (Xiang 2006). But while more is known about interpersonal contacts, including kin/house-

40 According to Charles Tilly (1990), migration cannot be reduced to "individual characteristics and intentions" (5) and "isolated individual decision-makers," but is based on "clusters of people bound together by acquaintance and common fate" (3). Individuals migrate "as participants of social processes that extended beyond them"; therefore, "effective units of migration [are] sets of people linked by acquaintance, kinship and work experience" (Ibid: 3).

41 Thus, while "friends and relatives may have provided a great deal of general information and encouragement, most of the participants in the study did not rely on them for migration assistance or to find employment or housing » (Johnston et al 2006, 1246).

hold, friends and community ties, commonly referred to as chain migration (Macdonald and Macdonald 1964, Banerjee 1983, Boyd 1989, Poros 2001, Johnston 2006), many issues regarding involvement and use of organizational and professional connections by highly skilled migrants in their transnational movement remain unclear and underexplored. The study presented in this chapter intends to contribute to this discussion, investigating the role of professional connections in RCS migration trajectories and career.

Ties based on common origin, ethnicity, or nationality are also recognized to be of importance for skilled specialists. Research on transnational intellectual or scientific diaspora networks (Meyer 2006; Meyer 2007, Kuznetzov 2006) shows that migrant professionals establish collaborative ties and form associations on the basis of their national belonging, striving to benefit their home country. Ethnic networks of technical specialists and scientists also prove serviceable as channels for transnational and regional knowledge exchange (Saxenian 2006), for knowledge diffusion, and innovation transfer (Kerr 2008, Breschi et al. 2013). Examining ethnic ties of immigrants in Silicon Valley, Saxenian (1999) demonstrated that foreign-born specialists engage in local ethnic networks and associations in search of resources for a successful career as well as opportunities for entrepreneurship and business development. A special significance of ethnic/national connections for highly skilled migrants was found to consist in a peculiar coupling of professional ambitions and national feelings. Thus, in the Caldas and SANSA associations scholars observed a process of "re-identification through professional motives" (Meyer 2007, 10); that is, a proactive renewal of a sense of national belonging and reconnection to the home country through participation in professional networks (Meyer 2006, Meyer 2007). Ethnic professional associations in Silicon Valley revealed a similar merge between the national and professional as they "combine elements of traditional immigrant culture with distinctly high-technology practices: they simultaneously create ethnic identities within the region and facilitate the professional networking and information exchange" (Saxenian 1999, 31). The integration of national belonging and professional aspirations accounted for the proliferation and success of these organizations in the region, showing that professional diasporic ties should be differentiated from other types of connections as they have a special meaning for highly skilled migrants. But even putting ethnic ties between migrant professionals at the core of the analysis, these studies do not discuss their role in HSM and do not question their impact on the migration trajectory of skilled professionals. Departing from their findings, my study seeks to fill this gap: it distinguishes ties based on common origin (diasporic) in a wider network of RCS professional connections and explores the place of RCS dias-

poric versus non-diasporic contacts in transnational movement.

Research on social networks in academic migration concentrates on its consequences for the evolution of scientific networks and international collaboration. Mobile researchers typically have a greater number of scientific connections covering more countries, including their home country, thus they "contribute significantly to extending the international scope and quality of the research network" (Scellato et al. 2012, 26). Diasporic academics are asserted to occupy a central position in developing global knowledge networks (Larner 2015). Even short-term stays of academics were found to contribute to scientific cooperation between countries (Jöns 2009). But the opposite question—how scientific contacts and networks are involved in the migration process itself—has not yet been properly addressed. In this chapter, I aim to shed some light on this issue exploring the movement and professional connections of RCS.

Another aim is to characterize academic migration within larger picture of Russian presence in the UK.[42] Though diverse in terms of ethnicity, language and religion, migrant population from FSU is referred to as post-Soviet or Russian-speaking diaspora[43] and is supposed to be united by broad "historically-specific socio-cultural background » rooted in postwar and late socialism period (Byford 2009). As a country with a much restricted entry UK accepted a relatively moderate quantity of such migrants for the last 20-30 years represented mostly by highly qualified professionals and scholars (Morgunova 2009, Pechurina 2017)[44], with considerable share of IT specialists (Salt and Millar 2006). This chapter seeks to highlight the specificity of Russian academic migration in comparison to the movement of specialists for employment in IT industry, which was found to be largely determined by such push and pull factors as socioeconomic situation in the home country and migration policies in destination country (Zemnukhova 2015).

42 Studies of Russian-speaking population in the UK include research on language communities (Kliuchnikova 2016), friendship connections (Malyutina 2013), Russian diaspora as a performative community (Byford 2014), online community (Morgunova 2012) and even invisible community (Kopnina 2005) as well as Russian identity through homemaking (Pechurina 2010).

43 Scholars underline the interactional and experiential character of these categories (Byford 2009, Pechurina 2017).

44 Outside of numerous migrants from Baltic countries (Estonia, Latvia, Litva) who as citizens of European Union are subject to a different set of policies and regulations.

The current study is based on semi-structured interviews with RCS[45] as a primary source of biographical and migration trajectory data,[46] supplemented by open internet sources[47] and by information on co-authorship from publications on official web pages or specialized databases.[48] I identify RCS by common origin (Russia and FSU republics), Russian language (native speaker/educated in Russian), and scientific activity in computer science (current research, teaching position, publications). They work in British universities of different ranking, occupying positions ranging from PhD students to professors. Professional connections mean a variety of scientific ties established in the home or destination country, from brief acquaintance at conference meetings to regular scientific collaboration in research projects and joint publications, including ties between fellow students and mentorship relations. Specific attention is paid to diasporic connections defined as contacts with Russian-speaking scientists (native speaker/educated in Russian) from Russia and the former FSU republics.[49]

Findings

The study identified two social mechanisms of RCS migration, characterized by a particular configuration and the use of scientific ties in each stage of the migration process. The first mechanism is typical for RCS having moved in the 1990s, while the second is common to the RCS migration of the 2000s. The first mechanism is distinguished by the limited use of non-diasporic professional ties for relocation as well as by the importance of non-diasporic connections for the integration into the UK academy. The second mechanism is marked by the utilization of diasporic contacts with UK-based scholars both in migration and afterwards. But while being distinct, the two mechanisms are also interconnected. The first is demonstrated by the earliest RCS

45 All interviews with computer scientists were conducted in Russian, transcribed and translated by the author.

46 Seventeen interviews were conducted in the UK in February 2015. Respondents are males born between 1946 and 1992, who migrated to the UK between 1983 and 2014. They come from the former Soviet Union: Russia, Ukraine, Belarus, and Kyrgyzstan (exclusion: a Bulgaria national from Bulgaria, who received higher education in Russia and is Russian-speaking). Some persons had several places of residence in the USSR/CIS before migration (Kazakhstan-Ukraine-Russia; Russia-Estonia-Russia) or migrated to the UK from Europe (Denmark and the Netherlands).

47 CVs, university and personal websites, online professional networks.

48 The dblp computer science bibliography (https://dblp.org/): last access and calculations were made in August 2015.

49 Nondiasporic connections imply all other professional ties outside of diasporic contacts: thus, they include all non-Russian-speaking members of British and European academia, represented by scientists of British origin as well as by researchers from different European countries and other regions of the world.

migrants, who have since gained top positions in British academia, while the second is visible among their successors, now junior researchers, who relied on connections with these first migrants. The two migration mechanisms are analyzed below on the basis of the illustrative case of the RCS community working at an institution I refer to as "M. University."[50] This case was chosen in order to show the functioning of both mechanisms separately and in interaction as the RCS community at M. University is comprised of professors—pioneer migrants—as well as junior researchers and PhD students who moved to the UK through their connections with senior scholars.

First Mechanism: Pioneer Migrants and the Role of Non-Diasporic Ties

Yevgeniy and Anatoliy, currently professors of computer science, were the first RCS who came to M. University with an ambition to do high quality science and develop an academic career. Yevgeniy migrated to the UK in 1990, being accepted as a lecturer at a Welsh university for a year. Then, in 1991, he was able to secure a long-term lecturer position at M. University, an institution he found particularly attractive, having held a postdoctoral fellowship there in 1984. Yevgeniy has been working there ever since, being subsequently promoted to reader and then to professor. Anatoliy moved to the UK in 1996, when he joined the department of computer science at M. as a research associate to work on a three-year European research project. But his acquaintance with the university also started earlier, from a postdoctoral internship in 1993/1994. From 1996 on, Anatoliy worked at M. University on temporary contracts until he successfully obtained a lecturer position in 2000. After several years and after winning a large European research grant, he was promoted to a professorship.

Anatoliy's biography included multiple relocations across the Soviet Union and beyond before moving to the UK. He was born in 1954, grew up in Kazakhstan, and completed his higher education in Moscow, graduating from Moscow State University with a degree in Applied Mathematics in 1976. Upon graduation, he was appointed a programmer at Glushkov Institute of Cybernetics in Kiev, where he worked for several years. There, Anatoliy developed a strong interest in computer science, which led him to move to Leningrad to pursue a PhD at the Leningrad Polytechnic University. After defending his thesis, he continued to work there as an assistant professor

50 Currently, the RCS community in M. University consists of eleven scholars and includes two professors, one senior lecturer, two lecturers, one senior research associate, three research associates, and two PhD students. Interviews were conducted with eight scientists, excluding two research associates and one lecturer.

from 1984 to 1996. He also went to Italy and Switzerland as a visiting researcher in the early 1990s, finally obtaining a one-year postdoctoral fellowship in the UK. Thus, his migration to Britain took place when he was already a mature scientist with a PhD degree, a stable position at a Russian university, and considerable teaching and research experience. Yevgeniy was also an academic with a permanent position in Russia, having several years of scientific and teaching work behind him when he decided to move to the UK. Born in St Petersburg in 1956, he received a higher education diploma in 1979, [51] and subsequently defended a PhD in computer science in 1982 at Leningrad Electrotechnical Institute. This became his home institution for thirteen years—from 1977 until moving to the UK—including eight years as an assistant and then associate professor.

A distinct feature of Anatoliy's and Yevgeniy's migration trajectories was their temporary relocation to the UK prior to moving there permanently. In Anatoliy's case it was the Royal Society grant for post-Soviet scientists that enabled him to come to Britain in 1993 as a postdoctoral researcher. For Yevgeniy, it was an exchange program for young postdoctoral fellows conducted by the Ministry of Education in partnership with the British Council. These temporary relocations allowed them to learn the organization of scientific life in a foreign country, the system of research funding, and structure of the academic community. It also helped them to build professional contacts. It became a sort of trial migration: scholars could taste academic life abroad and assess their chances for migration and a career in the UK without leaving their position in their home country, thereby avoiding the risks of failure.

Temporary migration is the starting point for the analysis of RCS professional contacts and their involvement in migration. For Anatoliy, a connection with a famous British scientist turned out to be crucial, as the fellowship program required the applicant to find a host institution and obtain its support. Anatoliy secured such assistance by applying to a scientist at M. University, with whom he had corresponded but whom he did not know personally: "I just had connections here with the main person, who is a major world star, Ben [...]. And we already knew each other somehow through emails [...]. In short, I sent him an email and said, that I want to write this [grant], he—fine, write and I'll see. And that's all, I got this grant." [52]

51 This is a so-called specialist degree, a typical five-year higher education qualification in USSR.

52 It should be noted that Yevgeniy was also indirectly involved in bringing Anatoliy to M., as he knew the working scheme of Royal Society grants, and Ben asked for his advice when he got an enquiry from Anatoliy.

Other circumstances also led Anatoliy towards a fellowship abroad. His intention to go to the UK and the choice of M. University was affected by his specific scientific background and expertise: "I read a lot of articles and I understood that M. is such a strong world centre exactly in the field I was engaged in, and it somehow stuck in my memory." The fellowship was also inspired by Anatoliy's interest in cooperating with European colleagues, his previous short-term visits to Europe, and the contacts he established during those trips: "Then Perestroika started, and I tried to make contacts. I wanted to cooperate, in general, with Europe [...]. I built some connections and went to different places a couple of times. But M. was already like a dream, I [...] clearly knew what I would like to do in science, and I had some connections to people there."

Similar circumstances are found in Yevgeniy's story. Explaining his choice of a particular university for his fellowship, Yevgeniy remarks that it "was very well-known. K. worked here. I read their articles, I grew up on that when I wrote my PhD." Yevgeniy's application also included a reference to a prominent scholar in the UK, an acquaintance of his supervisor, maintained from his previous research visit to Britain: "In Petersburg, my supervisor, not the last man, well-known in many places, had connections in England, he had collaboration with a professor from Edinburgh." Thus, Yevgeniy mobilized a distant non-diasporic tie abroad, but it was mediated by a close diasporic connection in the home country. The fellowship in Edinburgh did not materialize, but Yevgeniy was accepted at M. University, which he had chosen as a second option because of the high-quality research produced there, despite the absence of any personal contacts. In this way, the scientific expertise and research interests of both scholars directed them towards M. University, acting as a substitute and compensation for the lack of direct professional ties.

In general, temporary relocation was characterized by a rather limited involvement of distant non-diasporic contacts, which served as a formal support or were altogether absent. Their temporary moves became possible largely due to specific institutions and programs for young Soviet scientists, and were prepared by their previous scientific background, their research experience, and knowledge of European science through journals and conferences. Close engagement with research in Europe contributed to the development of "outward-looking perspectives" making scientists feel "in some sense already abroad" (Introduction, this volume). Subsequently, it grew into an intensified communication with European colleagues through confer-

ence attendance and visits and was followed by temporary migration, signifying a literal movement abroad into European academic scene.

Long-term migration and permanent residence in the UK is the next stage of the RCS migration trajectory, and is linked to the previous temporary relocation insofar as the non-diasporic contacts established at that time played a significant role in determining the direction of their future movement and the location of their employment. For instance, a postdoctoral fellowship enabled Anatoliy to build a strong professional connection with Ben. The initial supporter of his grant application became his collaborator and colleague. Their cooperation continued upon Anatoliy's return to St Petersburg, and was sustained by a UK grant secured by Anatoliy that allowed him to visit regularly and conduct research at M. University. During one such visit, Ben informed him about the vacancy in a European research project and advised him to apply: "When I came next time, the second time, he told me, I have a contract, I have a place for a research associate, and if you apply, there is a chance that you get the position." As a result, Anatoliy submitted the application, passed the interview, and was accepted.

Yevgeniy's migration trajectory was also influenced by his postdoctoral internship. Despite a wide time gap between his first visit in 1984 and his migration in 1990, it was the contacts at M. University that he wanted to renew. He recognizes that he was eager to return to this university as "I had many relations formed back in 80s" and "in the computer science department there were my own people, my own in a sense, and I was interested in working with them." Being employed in Wales, he sought opportunities to return to M., and having applied for a lecturer position, was successfully appointed there in 1991, where he has since remained.

Professional connections significantly shaped the second stage of RCS migration. They were represented by non-diasporic contacts with UK-based scholars and founded on a substantial experience of cooperation. Short-term scientific work in Britain proved to be of consequence for the subsequent long-term relocation, with researchers showing a strong preference to return and build their academic career in the same institution where they had held previous fellowships. Non-diasporic ties developed through collaborations during the fellowship period became the invisible glue binding the first and the second stage of migration, while being the driving engine of the first mechanism of migration.

The third migration stage of the RCS pioneer migrants involves their settling down in the host country and integrating themselves into the new workplace and academic environment. Anatoliy's and Yevgeniy's experiences demonstrate two ways to establish and mobilize scientific connections. Anatoliy's strategy consisted in the active development of non-diasporic connections with British and European colleagues, especially in the first years after migration. Diasporic collaboration appeared and gradually expanded at a later period and was based on newly established ties. In contrast, Yevgeniy's strategy was to build non-diasporic contacts but he combined them with diasporic ties even during the initial period after his move to the UK. His collaborative network was growing more evenly in both directions, increasing the number of non-diasporic as well as diasporic connections.

In Anatoliy's case it was the temporary position of research associate that forced him to realize the need to build up his reputation to obtain a permanent place at the university. His solution was to widen the number and scope of non-diasporic connections, and he started to initiate contacts both inside and outside of his project and his department: "I wrote articles not only with Ben, but with some Germans, with whomever was there. I wrote articles, wrote some grants, got rejected, but I wanted to learn to write grants, so that I can apply on my own, to depend only on myself."

In the first four years of his employment, active collaboration is reflected in Anatoliy's publications: he started with two papers in 1996, but by 2000 he produced ten to eleven articles per year, all in non-diasporic co-authorship. It was a productive strategy as these connections enabled him to prepare a successful grant proposal and secure further funding: "Then I wrote a big European grant, I wrote, but people helped me, they believed in me [...], and I took the responsibility for writing the big European grant. There were amazingly clever people out there in Europe, but I wrote, it was my project, but, of course, nothing could have happened without them." This proposal brought Anatoliy the lecturer position he strove for and after securing the next large grant he was appointed a professor:

> *When I got this big European grant, I made a huge and quick progress through the department's ranks, because I was guaranteed a teaching position, permanent, without time limits, because the department believed in me. It was an important step, not scientific step, but in my position [in] the department. And afterwards I got one more European grant, and they made me a professor.*

As for diasporic contacts, Anatoliy began to activate them much later. Russian-speaking co-authors started to appear in his publications only in 2000–2001, after he was granted a permanent position. All of them were UK-based scholars with whom Anatoliy had established connections after his move to the country, including Yevgeniy, his colleague at M. Though Anatoliy and Yevgeniy both studied and worked in St Petersburg in the 1980s, doing research in different areas of computer science, they never met or collaborated prior to their migration to the UK. They met at M. University and their cooperation started to develop in 2000, when they were both involved in the Tempus project in partnership with K. University in one of the CIS (Commonwealth of Independent States) countries.[53] Their collaboration was made possible by Yevgeniy's connection with a former colleague from St Petersburg, at that time the Chair of the Information and Computer Technologies Department at K. University. Regular visits led to a long-term cooperation and subsequently M. University became one of the major sites for recruiting Russian-speaking PhD students for both Anatoliy and Yevgeniy. Their collaboration served as a source of research staff for their projects in the UK [54] and for the growth of the RCS community at M., across the schools of computer science and electrical engineering. This growth was accompanied by a deepening collaboration among RCS and an increase in joint publications, especially since 2014, when the majority of RCS became involved in a large collaborative research project.

The independent and pioneering moves of Anatoliy and Yevgeniy to the UK and to M. University then led to the development of professional connections between them, which in turn created a framework for the movement of other Russian-speaking junior researchers and their integration into British academia. Thus, diasporic ties between senior RCS formed during the third stage of their migration trajectory became a crucial component in the second mechanism of migration. Noteworthy, both in securing and working on large grants as well as in recruiting new students for these projects, Anatoliy and Yevgeniy demonstrated outstanding managerial skills and much organizational effort without losing earnest enthusiasm for the technical content of their research. It surprisingly contrasts to common Russian IT specialists' disinterestedness and avoidance of managerial involvement perceived as a "sacrifice to technical interest" and explained by persistent influence of Soviet work experience (West on Boston, this volume, p.282; Fedorova on Israel, this vol-

53 The specific country is not named for anonymity purposes.

54 In total, seven PhD students were found this way, including five currently working at M. University as research associates and lecturer.

ume). Probably, fruitful combination of organizational and technical work became possible because of the specificity of the university as an institutional setting perceived by senior RCS as a totally different sphere of activity compared to commercial enterprise.

Since 2004, Anatoliy's diasporic connections experienced an active expansion: he attracted his first Russian-speaking PhD student, with whom he published thirty papers, and formed strong ties with Russian-speaking research teams in Ukraine (three scholars) and Finland (three scholars). Initiated several years after migration, these relations were not rooted in prior contacts in the home country but grew out of conference meetings in the UK or common work on European research projects; these relations have developed into stable and fruitful collaborations that have lasted for more than ten years and generated twenty-eight collaborative publications. Thus, Anatoliy's diasporic connections, characterized by long-term and productive cooperation, made a direct and positive contribution to his scientific activity; however, they hardly served the need of advancing his academic status, as he initiated them while already in a stable university position and continued them after his promotion to a professorship, the latter being largely the result of successful collaborative research with his non-diasporic colleagues. The role of diasporic connections and their meaning for migrant scholars seem to differ from non-diasporic ties, but what this difference consists of requires further elaboration.[55]

Another strategy consists in using both non-diasporic and diasporic ties after migration, relying on collaboration with Russian-speaking scholars in the first few years after settling into British academic life. In Yevgeniy's case, it was the strong connections with former colleagues from his research group in St Petersburg that dominated the initial period of his scientific activity in the UK. From his arrival in 1991 until 2000 he published the majority of his papers (30 out of 44, or 68%) with RCS from this group. [56] However, only a limited number of papers (13,6%) were produced exclusively with Russian scientists. Typically, his publications from that

55 They may be viewed as more reliable and personal, with diasporic cooperation felt as more comfortable and trustworthy in a highly competitive university environment. For instance, Anatoliy remarks that diasporic "connections are maintained even when there are no contracts. They turn into something more..., into warm relationships. [...] I mean that relationships with Russian-speaking become more personal." This perceived difference may be important for understanding RCS migration and collaboration processes.

56 The group was initially based in St Petersburg but moved abroad soon after Yevgeniy left Russia for the UK; still, they managed to sustain collaboration ties for many years after migration.

period featured European, British, and Russian co-authors. Yevgeniy continued to be actively engaged in diasporic collaborations until 2006, generating the majority of publications with other RCS (32 out of 49 papers, or 65%). But from 2001 onward, there was a shift from former home-country contacts to new connections in the UK, most of them being colleagues in the same department, including newly recruited PhD students from the former USSR. This shift was also accompanied by an expansion of non-diasporic contacts, which began to grow considerably from 2007 and eventually came to dominate Yevgeniy's scientific activity, accounting for 65% of his publications (93 out of 143). In this period, the number of papers with RCS remained at almost the same level (5,5 publications per year in comparison to 4,5 during the previous period).

Thus, Yevgeniy's contacts with Russian researchers maintained from his previous institution played a significant role in the period immediately after migration. They supported his scientific endeavors and allowed him to achieve substantial productivity even when he still had only few non-diasporic ties in his new academic environment. It helped him to successfully adapt to the new system, fully integrate into UK academy, and successfully progress to a top position in the university. Continuous collaboration with British and European scholars along with former Russian colleagues and then the proactive establishment of new diasporic connections at his university enabled Yevgeniy to build a large and heterogeneous collaboration network, incorporating colleagues inside and outside of his institution, which resulted in a considerable rise in scientific output and brought him a reputation as an outstanding scholar.

To summarize, the first mechanism of migration is distinguished by several features: 1) non-diasporic professional connections acted as a driving force in the RCS migration process, but their significance varies with the stage of migration; 2) temporary relocation was realized with the limited use of distant non-diasporic connections, while institutional conditions (programs of postdoctoral internship) and RCS scientific expertise and knowledge of European science were more important; 3) the permanent movement of RSC relied much more on non-diasporic contacts, which considerably influenced the choice of migration destination and place of work; 4) the integration stage was marked by expansion and extensive use of non-diasporic ties, enabling RCS to achieve stable positions and build a successful career in British university; diasporic connections were also activated and extended, but performed different roles at different periods of the RCS' scientific activity.

Second Mechanism: Opportunities and Traps of Diasporic Connections

The second mechanism of migration, typical for the RCS who migrated in the 2000s, differs substantially from the first, both in the conditions surrounding migration and the use of professional contacts. The RCS' move to the UK in the 2000s took place directly from their home country, without any prior study or work experience abroad. They entered the UK to pursue a PhD degree immediately after graduation from a university in Russia or one of the CIS countries or, more rarely, after some work experience in their home country. In contrast to the first RCS migrants, these successors had almost no postgraduate research experience, and their development as professional scientists took place in the British academic environment. Their motivation to move was also different: while for the first migrants academic prospects were a priority and they sought an opportunity to do high quality science, the next wave of junior researchers was not eager to pursue an exclusively scientific career and considered a PhD degree in the UK an advantageous alternative to employment in industry in terms of work conditions, salary, and career prospects. The second migration mechanism is also characterized by a specific use of professional contacts. Migration to Britain was realized through direct personal connections with RCS who had already established themselves in UK universities. It was these pioneer migrants who initially acted as scientific supervisors and afterwards became senior colleagues for the newcomers. The stories of two such "newcomers," Leonid and Dmitriy (the first a research associate and the second a senior research associate at M. University), reveal key features of the second mechanism of migration, and its typical outcomes.

Leonid moved to the UK in 2004, to enter a PhD program after completing his higher education in Applied Mathematics in one of the CIS countries. After a successful defense in 2008, he was offered a research associate position at M. University—a position he has kept in the school of computer science throughout different research projects. Leonid's diasporic connection to Anatoliy (a personal acquaintance through the Tempus project discussed above) played a crucial role in Leonid's move and subsequent career. Meetings at Leonid's university were followed by correspondence, resulting in the offer of a place in the PhD program at M. University. It is noteworthy that Leonid considered various options: a position in a well-known company and a place in the PhD program at a Swedish university. But the decisive factor in deciding to go to M. University was the personal connection to Anatoliy and the presence of a group of Russian-speaking scientists in the department, including Dmitriy, a young researcher who was an acquaintance from his university:

> *I chose M. exactly because I personally met him [Anatoliy], and I liked what he was doing. And as I looked through, in G. [Swedish university] there was no Russian-speaker in that group, and it was partly the reason to come here. And I knew Dima personally, he studied in my university […] I knew that he went to that university as well. Partly, perhaps, therefore I chose M., though I haven't heard about M. before. Partly because I assumed that there will be a small group of Russians, and it will not be so scary to go.*

Dmitriy joined the PhD program at M. University in 2001, where he became the first Russian-speaking student. Similar to Leonid, his decision to migrate was influenced by the contact with Yevgeniy, whom he met through the Tempus project in 2000, when he was a first-year PhD student. Choosing to go to M. (rather than to other universities he had received offers from) stemmed from his personal acquaintance with Yevgeniy and an interest in his new research project. Speaking with other junior RCS at M. University, we find similar scenarios: connections to Anatoliy and Yevgeniy enabled the migration of Alexei (now a lecturer at M. University), Sergei, (a research associate), Semen, Igor, and Mixail (now working in industry), as well as for Ilya and Vasiliy (who started their PhDs in 2014).

Senior RCS who moved to the UK in the 2000s initiated connections with young Russian graduates as they actively looked for PhD students and researchers. In contrast to the first wave of RCS émigrés who relied on their own resources with limited support from non-diasporic connections, younger scholars had a ready-made migration path that was well-structured, clearly organized, and financially affordable: "It was easy for me […] I was invited, and I did not have to do anything, and I just took the path of the least effort" (Alexei). Things looked quite different from the senior RCS's point of view, having to work hard to negotiate financial and institutional constraints to attract Russian students. According to Anatoliy:

> *It is difficult as here the system does not like foreigners. […] Therefore we take one by one sometimes, someone who is a very good guy, who is recommended. […] In the department we have opportunity to save money from our grants, because it is necessary to pay for tuition […]. Now I have Ilya […], it is because I have been working on this piece by piece for two years and I also needed the department to partially reduce the fees […] It's very complicated, I had to say:*

> *"do you remember, I had two huge grants and it was so good for the department, could you partially reduce tuition for this man, and I will pay him scholarship from my grant."*

What were the reasons that motivated senior scholars like Anatoliy to navigate these difficultires in order to attract students from so far away? As Yevgeniy pointed out, securing funding for research projects is only the first step. Next, one needs to find people:

> *I had grants and needed to find people, not only research associates, but PhD students. As I was in a computer science department, but was mostly working on electronics, it was difficult to attract computer guys. As a result, I searched through all my acquaintances, through friends from Italy, Spain, with whom I wrote articles, but nothing came out of it.*

Seeking Russian students was partly an answer to a shortage of researchers with the right profile for the job, one that straddled the line between software and hardware. Another reason articulated by Anatoliy was his confidence in the high qualification of Russian students, as well as some feeling of commonality and understanding, which made communication easier and effective:

> *They are the best, the elite of young people, and I see, they are the same as me. In my time, when I was entering [the university], we had a group of young guys, we read the journal "Quantum" and loved physics and maths. These guys are the same, I just see it. When I take PhD students, I understand young Russian guys better, as we have something common. It is very important for my sense with PhD student to totally understand him, not even to trust, but understand all his actions, all his reactions and so there is no resentment [...] and for me it is difficult with Englishmen.*

In addition, Russian-speaking students were praised for their deep interest and immersion in research, what manifested itself in persistent work on certain problems, readiness to stay overtime and be in contact on weekends. Combined with inventive turn of mind, ability to think independently and offer innovative solutions, also much valued by senior RCS, it made Russian-speaking students their preferred and

long-term collaborators.

In a few cases, Russian students proactively sought to build ties with Russian professors in the UK. Ilya, for instance, was looking for opportunities to pursue a PhD in the UK and managed to meet Anatoliy through a fellow Russian student who was already completing a PhD there. Similarly, Vasiliy contacted several professors in the UK during his last year at the Moscow Physical Technical Institute, and Yevgeniy was one of the scholars he got in touch with. As a result, after some correspondence, personal meetings, and a formal test, Vasiliy was offered a position in the project and PhD studentship. The presence of a Russian-speaking community of fellow researchers had an effect on Vasiliy's decision to go to M. University: "I also liked the milieu, and namely the faculty, which consists for the most part of Russian-speaking scientists, because it does not only facilitate communication, but it is also a mentality, what is very important, the same as yours, therefore it is easier to establish a dialogue."

Furthermore, Dmitriy and Leonid, the first two Russian PhD students at M., became involved in recruiting new candidates for the PhD program. Similarly to the practice of hiring by personal references typical for Russian Jews working in corporate IT sector in US (West on Boston, this volume), they used their personal contacts and recommended their friends, acquaintances, and fellow students whose skills and qualities they prized. They also regularly monitored the results of the programming Olympiads in their home country, pointing out students with prominent abilities to their professors. Nontrivial decision-making and ability to find a unique solution to the problem, trained in such algorithmic contests, proved to be highly valuable skills for academia, aimed at producing new ideas advancing computer science as a discipline, in contrast to the industry, focused on stability, quality and maintenance of the product (Fedorova on Yandex, this volume). [57] Still, Dmitriy and Leonid organized and checked testing assignments to ensure candidates possess necessary level of qualification. Junior RCS migrants thus became not only involved in diasporic cooperation with senior scholars but developed relations among themselves, mobilizing their own connections and building a professional network of diasporic

57 This ability to think non-trivially and independently was often referred to as a specific trait of Russian-speaking students recruited for PhD programme in the UK and was perceived as a necessary element of background necessary for the research work. For instance, comparing students from China and Middle East to Russian-speaking students, Dmitriy complained that "their mentality is different, there is a feeling, that they can't think independently, they contantly need professor as God to tell them what to do [...] They don't have the dukh researcherstva (English – spirit of research) – to try this and that, to compare". "They don't have the wit, self-learning, independence". Similar views were expressed by Leonid, Antoliy and Yevgeniy.

ties aimed at recruiting more junior RCS. [58] Collaboration and interaction with other RCS effectively frames the early phase of their professionalization and integration into the British academic community as well as dominates the subsequent years of mature scientific activity. The junior RCS work mostly with colleagues from the same university and, as a result, their networks remain quite narrow, thus maintaining their dependence on senior diasporic colleagues.

The development of Leonid's professional connections illustrates this. From the publication of his first article in 2003 until 2015, the majority of his papers have been published with Russian-speaking scholars (31 out of 41, or 76%). His main collaborator is Anatoliy, his supervisor, who is a co-author in virtually all of Leonid's publications (30 out of 31 or 97%). In the first years after migrating to the UK (2004–2009), he also cooperated with non-diasporic scientists but within projects headed by Anatoliy, and did not continue the collaboration after the projects ended. Only later was Leonid able to establish independent ties with researchers from the UK and Europe, but it resulted only in a few papers. From the beginning of his studies in the UK, Leonid also started to collaborate with a Russian-speaking group from Finland on a topic that became central to Leonid's interests. He published almost one third of his papers with them (27%) and has maintained this collaboration to the present. But, again, his advisor was guiding this interaction, determining the direction of the work and distributing the research tasks. Though Leonid assumed a more active role, eventually becoming the scientific leader, Anatoliy remained the organizational and financial leader, structuring the workload and securing the funding. Therefore, despite Leonid's participation in the network of diasporic and some non-diasporic scientific ties, his involvement continued to be structured mostly by his supervisor. Even after years of research experience and a number of diasporic professional relations with junior RCS, he did not attempt to organize a research project on his own or develop cooperation independent from his supervisor.

Dmitriy's story resembles Leonid's. Since his first publication in 2003, he has been collaborating predominantly with Russian-speaking scholars within his university. More than half of his articles are co-authored exclusively with diasporic colleagues (14 out of 27 or 52%) and the rest with both Russian and non-Russian scientists.

58 It should be noted that similar to pioneer RCS migrants, junior RCS experienced diasporic professional connections as more informal and personal, often involving communication outside of the university office, including common leisure and family activities (visits, hiking, bicycle rides, etc.) as well as support during the initial period after migration.

When he was co-authoring outside of diasporic networks, it was through the non-diasporic connections of Yevgeniy, his former supervisor. In one such case, Dmitriy collaborated with non-diasporic colleagues from the University of Manchester, but these ties ceased with the end of the project in 2009. Yevgeniy remained his main co-author (25 articles out of 27, or 93%), as well as the main influence on his academic career. For instance, it was Yevgeniy's opinion that led Dmitriy to decide to leave the university for a start-up company and, when the company collapsed a few years later, it was again Yevgeniy who invited Dmitriy back to the university as a research associate.

This way, compared to senior RCS, Leonid and Dmitriy demonstrated much less interest in organizing their own projects and pushing forward their own research agenda. As described for Russian IT specialists in other regions (West on Boston, this volume; Fedorova on Israel, this volume), they preferred engagement with technical content of work, often deliberately distancing themselves from managerial activities. Probably, collaboration with well-established diasporic colleagues enabled followers to achieve sufficient stability already on the position of a research associate and discouraged advancement of their involvement in research management and organization.

However, reliance on diasporic connections may bring about other outcomes. For instance, Alexei was able to establish himself as an independent scientist, though being also deeply involved in diasporic and intramural collaboration. From 2007 to 2015 he published 35 papers, almost all co-authored with other RCS (31 out of 35 or 89%), with more than half written exclusively with Russian-speaking scholars (19 out of 35 or 54%). But while building his scientific career through diasporic connections, he also strived to achieve more independence. A permanent lecturer position in 2012, granted only three years after his PhD defence, enabled him to apply for grants on his own, winning some of them. He also started to establish his own non-diasporic scientific contacts as well as ties with companies like Microsoft. Additionally, Alexei began attracting his own PhD students, once again activating contacts with scholars and institutions in Russia.

In sum, immersion in diasporic scientific connections may ensure a smooth entry into the scientific activities of the particular department and research group, learning from experienced scholars, publishing articles soon after arrival, and providing

financial support and cultural comfort in the initial years after migration. On the other hand, support may turn into long-term dependence on diasporic connections, especially on senior RCS, thus undermining the breadth and quality of collaborative networks among junior RCS and lowering their chances for establishing their own career and research programs. Still, those negative outcomes hinge on how effectively a young scientist manages to reduce the role of diasporic connections over time, but there does not seem to be any doubt that such connections can play a positive—indeed crucial—role in enabling young researchers to migrate and start their careers in the UK.

The second mechanism of migration can be thus summarized: 1) diasporic connections were deeply involved in the migration of junior RCS to the UK in 2000s, and in their integration into British academia; 2) migration itself was marked by a reliance on diasporic contacts with senior RCS, who came to the UK in the 1990s as pioneer migrants, establishing "bridgeheads"—institutional, organizational, and financial opportunities for the migration of the next generation; 3) the growth of the RCS community in the UK in the 2000s was accompanied by the development of substantial diasporic professional networks (primarily, but not exclusively in the UK), in which junior researchers acted as facilitators for the recruitment of new Russian-speaking PhD students, thus leading to further migration from Russia and CIS countries; 4) the extensive collaboration with Russian-speaking scholars and intensive reliance on diasporic ties continued after migration, but was associated with different outcomes: either the continuing dependence on senior RCS and lack of independent scientific connections, or the use of diasporic ties as a starting point for establishing one's own non-diasporic professional network.

Conclusion

An analysis of the migration trajectories and early career strategies of some RCS community members in a British university has identified two distinct and previously unstudied mechanisms of academic migration. The first is characterized by a virtually exclusive reliance on nondiasporic professional ties, while the second is essentially dependent on diasporic connections, being fully dependent on the previous generation of RCS "pioneer migrants." Another original finding relates to the formation and development modalities of diasporic networks among academics. Building on earlier studies of professional migrant associations (Meyer and Wattiaux 2006; Meyer 2007; Saxenian 1999; Saxenian 2007), I have shown the special and pervasive significance of ties based on common origins, ethnicity, and nationality

for scholars who become highly skilled migrants. Such ties frame their cross-border movement, their training, their professionalization in the scientific community, and their early careers, though with different effects depending on which of the two migration mechanisms is in play. In particular, this chapter has shown that diasporic ties function simultaneously as networks of scientific collaboration and as migrant networks. As such, not only do they generate substantial scientific outcomes but they also create structural opportunities for successive waves of scientific migration from the home country—a brain drain that facilitates further draining. Diasporic or ethnicity-based networks are thus found to be of consequence not only for low-skilled migrants but also for highly skilled and scientific migration. However, migration through diasporic networks should be differentiated from chain migration as they are comprised of organizational and professional contacts and represent mostly new ties which were established only after movement abroad. In addition, diasporic connections in this case are different from interpersonal contacts in chain migration as they are constructed deliberately and characterized by high selectivity.

What drives formation and extension of diaspora networks between RCS and holds them together? Pragmatic considerations seems to be the most important factor for both pioneers and their followers, though they are deeply influenced by host country academic environment, its inner rules and requirements. By attracting Russian-speaking students to PhD and research associate positions, senior RCS ensure a constant supply of qualified staff for their large-scale research projects, thus securing their high status in a British university. Likewise, diasporic collaboration enables junior RCS to start and advance an academic career in the UK, a prospect many find appealing..

The migration of RCS to the UK in general fits the pattern of transnational movement of IT specialists in the industry, where diaspora knowledge network building is largely determined by migration policies and visa regulations as well as market fluctuations and needs of multinational corporations (universities in case of RCS). But this pattern extends beyond the IT industry: Russian-speaking scholars also work together in other disciplines, such as biology and math, resulting in a brain drain effect for the home country (Allahverdjan and Agamova 2012; Artiushina 2014; Bronnikova 2010). Similarities and differences in migration and diaspora knowledge network formation no doubt reflect both structural characteristics of each field as well as science and research policies of the host countries.