COSMOLOGIES in TRANSITION

Science and the Politics of Academia after Yugoslavia

Dr Andrew Hodges

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Cosmologies in Transition:
Science and the Politics of Academia after Yugoslavia
Andrew Hodges

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A note to the reader

This book aims to contribute to existing anthropological literatures on post-socialist 'transition', nationalism and, to a lesser extent, science studies. It is not intended to be a theoretically developed ethnographical monograph – completing a more cohesive and systematic study would have required a considerable amount of extra work. It is experimental in nature, playing with anthropological concepts rather than developing a body of work in relation to other texts in the academic field of science studies. Despite not working on this topic anymore, I have chosen to publish it in this form as I believe it will be of particular interest to publics in the former Yugoslav region and beyond. Were funds available, I would love the book to be translated at some point in the future.

The account offered may also be considered one outcome of five years of activist and anthropological engagements in Belgrade, Serbia, Zagreb, Croatia, and Manchester, UK, between 2007 and 2012. It draws heavily on fieldwork engagements at an astronomical observatory in Serbia, and to a lesser extent, on interviews and experiences in Zagreb. The perspectives taken move across Anglo-American, Croatian and Serbian anthropological traditions, and the writing process reflected an increasing commitment on my part to write politically relevant anthropology. The fieldwork is classically 'Western', based on eighteen months of immersion in the field context, with little knowledge of that context or the language(s) spoken beforehand – I leave it up to the reader to assess the limits of such an approach.

Anti-fascist engagements, autonomist Marxist insights and left academic currents popular in Manchester Social Anthropology have also influenced the writing. These engagements resulted in a redirection away from Anglo-American anthropological studies of science and technology, a literature I found generally uninspiring for this project, towards themes in political and economic anthropology. I found these sub-disciplines offered a theoretical toolkit which resonated more deeply with the highly politicised, post-war, post-socialist context in which I was working.

I really hope you enjoy the book!

Copyright note

Parts of three chapters have already been published, in the journals *Anthropology Matters* 15(1), (2014) - chapter three, *Antropologija* 12(2), (2012) - chapter five, and *Narodna Umjetnost* 50(1), (2013) - chapter six.

Acknowledgements

This book draws on over five years work and couldn't have been completed without the patience and help of numerous friends and family. First and foremost, I would like to thank my supervisor Dr Stef Jansen, for his encouragement and help with this project. Both his deep knowledge of the fieldwork contexts and help with both the practical and academic aspects of this project have significantly shaped both my approach, writing and research direction. Second, with a similar level of support, involvement and solidarity, I wish to thank Dr Čarna Brković, who encouraged me with my writing, from the early days when I was relatively new to anthropology, through what I call my 'cynical phase', before a later breakthrough when my future interests and direction crystallized. Your friendship and integrity means a great deal to me, and I am sure we will remain friends for many years to come. I would also like to take the opportunity to thank both my thesis examiners (Dr Paul Stubbs and Prof. Sharon MacDonald), the two peer reviewers who gave me detailed feedback on earlier versions of this manuscript, and Dr Penny Harvey for her thoughtful comments on this text as PhD thesis. As regards my fieldwork at the observatory and with students and scientists, I would particularly like to thank Vladimir Janković and Milan Ćirković for their interest in my project, enthusiasm and criticism. I have learnt a great deal through our various discussions and meetings. I would also like to thank everyone at the observatory for their time, coffee breaks and conversation. This project, and my current writing, wouldn't have taken the shape it did had it not been for numerous activist engagements,

working with comrades on the free education campaigns and of course at the *Blokada* of the Faculty of Humanities and Social Sciences in Zagreb. Without these interventions I am certain that my view of both academia and the ethnographic problems I have faced would have been quite different. I would also like to thank my research colleagues who encouraged and stimulated my interest in political and economic anthropology, namely Prof Karen Sykes, Prof Chris Gregory and Dr Keir Martin. In Belgrade I would like to thank Dr Miloš Milenković for his support of my project and help with organising valuable seminars at which I presented and discussed my project. In Zagreb, I would like to thank the Institute of Ethnology and Folklore Research, and especially comments from Dr Ines Prica and Dr Orlanda Obad. Finally, I would like to thank all my friends in Serbia and Croatia who helped me over the course of fieldwork, and later, with my decision to settle in Zagreb.

FOREWORD by Paul Stubbs

Although I was the external examiner for the doctoral thesis upon which this book is based, chosen indeed because I was expected to be more favourably inclined to the approach than a disciplined anthropologist might be, I write this foreword in a somewhat different capacity. Before Andrew's oral examination, I had met him only once, for a brief discussion/interview in Zagreb in which his enrolment within what I perceived as a rather deterministic, class-based, and reductionist Marxism, hardly endeared him to me! As a fellow "stranac", albeit with over twenty years of living in Zagreb and writing about the post-Yugoslav space under my belt, I had become a little blasé, meeting yet another (invariably young!) researcher who made knowledge claims on the basis of immersive but rather limited ethnographic "engagement".

I quickly changed my mind about Andrew when I first read the thesis. Here was someone striving in very open, direct, and committed ways towards a critically appreciative activist anthropology, successfully breaking free of the shackles of an Anglo-American anthropological tradition and, even more importantly, consciously and explicitly reflecting on the pitfalls and potentialities of positionality between the centre and the (semi-)periphery. Andrew was, clearly, on one of those rapid learning curves which many more "established" commentators of the so-called "region" never reach and which, more tragically perhaps, a smaller number of "new voices" find too dizzying, disappearing from view like shooting stars that burn out overnight. Andrew's deep and

enthusiastic engagement with his topic was very evident in the oral examination. Even more unexpectedly, given the solitary nature of doctoral endeavours and the fragility of ego of anyone in or near academia, Andrew took our insistence on a significant re-write very seriously, almost joyously, since it allowed him to create a much better work – that which, more or less, you have in front of you in book form today.

After Andrew obtained his doctorate and he began to spend more and more time in Zagreb and, later, moved to the city, I felt privileged to call him a friend and, indeed, to engage in collaborative writing with him, most notably on one of his many fascinating "obsessions", that of the study of football fan groups. Although he suggests that that work, and his focus on language use from a linguistic anthropological perspective, are more directly "political" than his work on scientists, I see some obvious continuities. Most importantly he continues to address the complexities of discursive practices, linguistic hegemonies, and situated recalcitrance and resistance, amongst diverse groups in tumultuous and precarious times, at the conjunctions of war, new nation-state building, authoritarian nationalisms and the near-exhausted trope of "post-socialist transition".

The book is, in fact, a masterful study of a group of public intellectuals, primarily astronomers and astrophysicists, in Serbia and, to a lesser extent, in Croatia, who once upon a time lived in a country, Yugoslavia, which is remembered by most of his respondents, rather fondly if not nostalgically, as "punching above its weight" in world science. Locating these scientists in a fast-changing political and disciplinary order, marked by systematic disinvestment in science combined with anti-intellectualism and desecularisation, as the sociologist Josip Županov (2001) framed it, enrolment in nationalist projects becomes, for some although by no means all, a way of self-preservation, juggling roles, and managing the paradox of seeing science as both "universal" and "national".

Once on the "fast track" within the European, if not world, scientific space, the book charts what it means to be relegated to the "slow lane" or even to be disqualified before reaching the start line, within the "semi-periphery" of globalising neo-liberal capitalism.

I was introduced to the concept of "semi-periphery", borrowed from the Serbian sociologist, Marina Blagojevic, by Andrew's work; if I had got nothing else from reading his work, I would have been eternally grateful, in any case, for this. The concept of "semi-periphery" has proven to be robust and extraordinarily productive, rescued from its origins within a rather essentialist geo-political international political economy tradition and put to work in understanding processes of "contradictory modernization" in perverse conditions, not only descientisation and authoritarian nationalism but, also, deindustralisation and repatriarchalisation. The concept allows Andrew to think through the deep ambivalences felt by the scientists in his study, torn between "imitation" and "rejection" (Blagojević 2006) of an imagined "advanced" West, even as it moves ever further out of reach.

The other, perhaps less obvious, influence on the book was the *blokada*, or series of student protests throughout the post-Yugoslav space but, most particularly, in Belgrade and then in Zagreb in 2008 and 2009 demanding the right to free higher education. Even more important than the actual demands, these protests became a training ground for a new generation of what, elsewhere (Stubbs 2013). I have termed radical 'third wave" activists connecting substantive demands for the decommodification of public services with experiments in 'direct democracy" later coming to full fruition in the plenums in a number of cities across Bosnia and Herzegovina in 2014. Enjoying the comradeship of activists breaking free of a stifling 'NGOization' and 'projectization' of the life-world, Andrew has taken activist anthropology, in this book and in his later work, to a level of what might best be termed

'playful seriousness', moving speedily across different conceptual traditions in order to write meaningfully and concisely on issues of fundamental political import, indeed, sometimes, of life and death.

Andrew's is a human anthropology, moving far beyond the closed heuristics of Latourian-dominated Science and Technology Studies towards an appreciative ethnography which is deeply conjunctural as well as explicitly critical of the lived impact of diverse nationalisms, patriarchal- and class-based power relations. He points both to the complexity and unpredictability of human social relations, on the one hand, and the partially prescribed dynamics of change within the scientific field in particularly dramatic circumstances as one option or another are closed down. Reading, discussing and building on his work, should lead to nothing less than a reconfigured sense of the politics and ethics of science in relation to diverse publics and as an anti-oppressive practice in the semi-peripheral space and beyond.

INTRODUCTION: a cosmic postcard

Introductions to astronomy and astrophysics often begin by asking students to write down their 'cosmic address.' This consists of a regular postal address, which extends out to include a positioning in the universe. For example:

Ivan Aleksić
Belgrade Astronomical Observatory
Belgrade
Serbia
Europe
Earth
Solar System
Milky Way Galaxy
Local Group
Local Supercluster
The Universe

This exercise teaches an individual to locate herself in a specific kind of cosmology – an order of things (Foucault 2001) – which spans a number of scales. The various lines of the postcard refer to different kinds of ontological categories. Some are clearly relatively temporary institutions maintained by humans. The Socialist Federal Republic of Yugoslavia (hereon SFRY), was one such institution which no longer exists. The later lines of the address have a more enduring existence however, encompassing different orders of human knowledge. The act of writing such a postcard weaves together these different kinds of entities – some enduring, some less so – in presenting and naturalising a set of scales and different orders. Astronomy and astrophysics operate on the level of what we may refer to as a universal-scientific order of things.

As such, generating understandings of humanity's humble place in this wider cosmology is an important social role that astronomy and astrophysics play in modern societies. Yet the postcard has also been shaped by other cosmologies, including a *national* order of things (Malkki 1992).

For example, the postcard is written in a standard language – in this case English. English is a language which has been standardised differently, for example, in the United Kingdom (hereon UK) and United States of America (hereon USA). Different standards are often then identified with a particular imagined community (Anderson 2006) such as the 'Americans' or the 'English'. Whilst standardising a language often brings practical benefits, such as enabling communication between large numbers of people over extended geographical distances, it can also reflect problems and cement cultural distinctions and the existence of national collectivities, as happened during the break-up of SFRY[1]. The cosmic postcard thus has a national ordering potentially built not only into the line labelling a state, but into the use of standard language. The postcard itself can be viewed as an artefact of a number of political changes resulting in the production of modern states, such as the development of a postal system infrastructure.

The exercise of writing a 'cosmic postcard' can also be consdered as one of many 'locating practices' which occur on a day to day basis as people negotiate spaces, institutions, networks and knowledges[2]. What is located (an individual self, group or something else) varies as much as how it is located, for example through talk, maps, picking out significant features of the landscape and so forth. The ordering of the 'space' in which locating practices take place may also differ. While maps often make Cartesian assumptions about how space is constituted, there are other approaches,

1 See Hodges et al. (2016) for a linguistic anthropological discussion concerning the debates which took place in Croatia.

2 See Green (2005) and Brković (2012) for discussions of locating practices in the 'Balkan' region.

such as picking out details of the landscape, or understanding oneself in relation to other groups of people which serve different purposes[3].

Many locating practices such as the above examples, which situate people within a specific universal-scientific and national order of things, depend upon a disciplined knowledge about the world transmitted through academic institutions. Yet academics do not have complete control over how they discipline and transmit knowledge about the universe and the natural world; they are also subject to changes taking place in other disciplines, and other domains of life; changing practices, relationships and politics. Foucault posed a philosophical question when he remarked "on what 'table', according to which grid of identities, similitudes, analogies, have we become accustomed to sort out so many different and similar things?" (Foucault 2001, xix). A corresponding anthropological question might be: how did people – in this case scientists working in two cities in former Yugoslavia – experience these changing political and disciplinary orders. How did they participate (or not) in the production of both 'national' and 'universal-scientific' orders of things in light of the changing historical and political contexts they experienced from the nineties up to the fieldwork period of the late 2000s? This central concern will lead me to follow scientists as they simultaneously juggled roles as politicians, scientific researchers, as university academics, as public intellectuals, and as historians of science.

In focusing on understanding the experiences and self-reporting of scientists as they reacted to the changes associated with the wars

3 I do not suggest that a 'Cartesian approach' is incorrect, or seek to relativise the truth claims of various scientific concepts. It is in my opinion too successful to not be an excellent approximate description of the physical world, or an extremely useful fiction. Yet social scientists and physicists alike recognise that it is one way of describing space with particular assumptions attached. In phenomenology and physics, the use of different metrics may be more useful in particular circumstances. See Lynch (1985) for a discussion of how field biologists define space in Cartesian terms through disciplinary practices and the implications of that in terms of the aims of their work.

and post-socialist 'transition', the following questions emerged through the field experience. How did the wars and newly established national hegemonies affect scientists' work? What role did scientists play in establishing or contesting these hegemonies? How did scientists experience technological change during the nineties – the internet; digital imaging – in a context affected by war and scientific isolation? How did innovations in political policy enacted via bodies such as the European Union impact on the post-Yugoslav states whose political elites were (at least nominally) engaged in the accession process? To what extent did socialist political legacies persist and affect scientists' work? How did different generations of scientists cope with and react to social, political and technological change? How did the transmission of scientific information to publics change, if at all, over the post-socialist 'transition' period?

In sketching possible answers to these questions, this book focuses both on scientists' self-reporting of their experiences during the nineties when the Yugoslav wars were taking place and experiences of the situation in Belgrade and Zagreb when I conducted fieldwork in 2008-9. In so doing, it draws on insights from the literature on post-socialist 'transition', political anthropology and – to a lesser extent – science studies respectively.[4] The analysis spans a variety of themes, including a focus on discursive practices, (linguistic) hegemonies established, how everyday 'geopolitics' influences actors' engagement with everyday social realities, how *veze* are established and maintained, and implicated in practices of state-building, the impact of different projects of establishing and measuring 'value', how social hierarchies operate and finally, how public engagements of intellectuals shape and are shaped by socialist legacies and the new neoliberal capitalist reality. Whilst playful in approach, the issues covered are very serious,

4 For introductions to the anthropological literature on post-socialist transition in Eastern Europe, see Burawoy and Verdery (1999) & Hann (2002); for recent anthropological approaches to the study of nationalism, see Malkki (1992), and for an introduction to science studies, see Jasanoff et al. (2002).

including interviews with scientists who played direct political roles in Milošević's and Tuđman's governments. Its primary objective is to give an anthropological account of scientists (rather than, for instance, knowledge practices (Knorr 1999) or scientific networks (Latour 1988)). The focus is on the collective challenges scientists faced working in a context in which the social world around them was being drastically reordered. The study thus retains a focus on the 'human' which has been lost in anthropological studies which understand agency as distributed between humans and non-humans (Latour 2007) or arguments stating that the category of human is obsolete now that we live in world made up of cyborgs (Haraway 1991). Whilst focusing primarily on scientists, I retain an interest in following changing scientific practices, popularised in the science studies literature by numerous authors including Latour and Woolgar (1986), Collins (1992), Traweek (2004) and Stengers (2010), using such a focus as a means to examine the collective situations and challenges scientists working in the former Yugoslav region faced during the nineties and face at present.

This book focuses on science in a location that was once a global big science player, yet which has been severely adversely affected by the recent wars. It therefore contrasts with many of the key studies in the anthropology techno-science tradition from the late 1980s onwards, which primarily focused on scientific practices and knowledge production in what Fischer (2007, 541) described the 'first world' and what I will refer to as the 'centre', with an emphasis on the disciplinary avant-garde in sciences such as biotechnology. An exception is Traweek's (2004) recent work on pedagogical traditions amongst particle physicists in the US and Japan. Her work is closer to the emphasis of this project in moving back to focus on scientists as humans engaged in a specific set of practices in a specific historical context, as well as focusing on researchers as operating on a number of levels; simultaneously juggling roles as academics, as public intellectuals, as scientists, as politicians and as historians of science.

Traweek conducted her most recent research in Japan, considered a rising power in the field of particle physics. As she noted:

> It is extremely important to remember that basic research in experimental science, particularly in so-called "big science" with its stunningly expensive research equipment, can only be conducted in the very richest countries; almost all of them are in Europe and North America. [At the other end of the spectrum, many universities around the world are not able to afford subscriptions to the major research journals, much less easy access to the internet. (Traweek 2004)

Ethnographies mapping 'big science' have considered topics such as reproduction (Franklin and Ragoné 1998), kinship (Strathern 1992), epistemic cultures (Knorr 1999) and the body (E. Martin 2001), analysing how they have been reworked in light of biotechnological and informational advances, bringing with them other kinds of changes such as the creation of new forms of citizenship in other locations (Petryna 2011). As earlier mentioned, I found that much of the new anthropological vocabulary generated in these contexts did not resonate with the mainstream concerns I came across through my experiences in post-socialist Belgrade and Zagreb working with astrophysicists. Scientists committed to working and living in the 'region' (as opposed to moving to work in the 'West') had experienced many of the changes associated with neo-liberalisation and post-socialist reforms, including the context of the Yugoslav wars, as a hindrance to their work. Anthropological studies of science and technological knowledge production are currently moving out of Fischer's 'first world' and STS departments are being founded in many new locations, which suggests that the contribution of this ethnography may become clearer in light of future work currently being undertaken in the discipline.

The Belgrade Observatory

This research is primarily based on eighteen months of fieldwork from 2008 to 2010: one year at an astronomical observatory – the Belgrade Observatory – in Belgrade, Serbia and a further six months in Zagreb, Croatia, conducting follow up interviews with scientists there. Both cities are capital cities and relatively large.

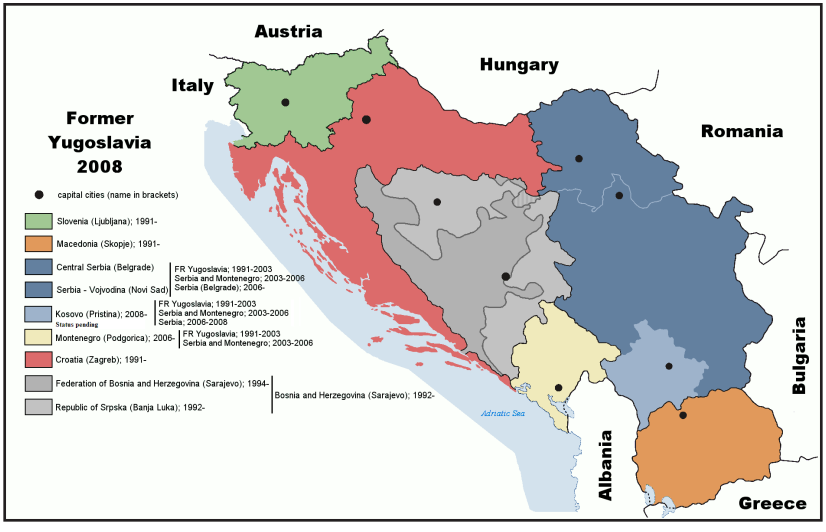

Image one: Map of the former Yugoslav region in 2008[5]

Belgrade has approximately 1.5 million inhabitants, in a state (Serbia) with approximately 7.3 million people and Zagreb has approximately 800,000, in a state (Croatia) with a population of around 4.4 million.[6] Belgrade was also the capital of former Yugoslavia.

5 Available online at https://upload.wikimedia.org/wikipedia/commons/8/89/Former_Yugoslavia_2008.PNG (accessed 29/02/16).

6 See *First Release* (City of Zagreb, City Institute for Urban Planning, Statistics Department). Data from 2006. Available online at http://www.zagreb.hr/UserDocsImages/Vitalna%20statistika%20u%202006..doc (accessed 4/7/2011) For data on Serbia see http://webrzs.stat.gov.rs/axd/Zip/VJN3.pdf (accessed 10/10/11).

The observatory, located in an area of Belgrade called *Zvezdara* (*Zvezda* meaning star) is the only professional institution for astrophysics research in Serbia. There are currently around fifteen researchers working on eight project streams. There are also around twenty PhD students, two librarians, and around ten members of staff working on site maintenance and administration.

It is located in a wooded part of town situated on a hill a short bus ride away from the city centre, which I reached each day by travelling on the number sixty-five bus to the end of line. From the end of the line, I would then walk for a further ten minutes through a park on the edge of Zvezdara wood, before reaching the observatory. The area by the observatory is more wooded. The observatory and its surrounds are enclosed in wire fencing, and I would reach it by walking up a drive of roughly twenty metres. My first impression of the building was its colour, a sallow grey. I would then follow the road along the drive round to the left, coming to a car park and the observatory main entrance, with many pigeonholes for post, and a second entrance which leads directly through to the director's and secretaries' offices, and to the library. The library was the largest room in this building, constituting the main part of the observatory space. It had stairwells leading up to a second mezzanine floor, where there were more books. The library was heated, with radiators next to large glass windows backing out onto the drive. The room served many functions: it was not simply a place where books were read, but was also a central meeting place, where people drank coffee, chatted, shouted, smoked, and had meetings and parties. Occasionally the observatory cat, *Matija*, would jump from shelf to shelf whilst the librarian worked at her computer and responded to staff requests. When working there, sometimes I would leave through a side door, reaching a small kitchen where the cleaner would make coffee each day. Passing through the kitchen, and following a passage round to the left, I would reach the hallway. In the hallway, there were offices on the right hand side, separate male and female toilets on opposite

sides of the entrance area, and a room for making tea and snacks on the immediate left hand side. Additionally, on the right hand side, by the offices, there were two grandfather clocks with digital clocks above them. Finally, there was a series of pot plants and noticeboards directly ahead, beside a staircase. On one of the noticeboards I noticed a poster, taken from an American website of PhD cartoons. It was written in English, and consisted of a flow chart concerning whether you, as a researcher, should be concerned about the world economic crisis, which illustrated that this discourse was present here in 2008. The poster was mostly ironic and made derisive comments about economics graduates, suggesting that researchers here should not be worried about the crisis, and that such material concerns are beneath those of astrophysics.

The Belgrade Observatory has been located at its present site in Zvezdara, around six kilometres from Belgrade city centre, since 1932. It was founded earlier, in 1887, conjointly with the meteorological observatory on the initiative of Milan Nedeljković, who was appointed as the first director of the observatory (Dimitrijević 1998). At the University of Belgrade there is also a Department for Astronomy, offering undergraduate degrees, which also began operating in the 1880s (Milogradov-Turin 2003). The department is small, with between five and ten students in each academic year, taught by twelve members of staff who also undertake research. The department has strong connections with the observatory, for several members of staff participate in research projects at the observatory. Other professors from the observatory also frequently attend seminars in the Department for Astronomy. At the University of Zagreb, there is an astronomy and astrophysics *smjer* (course/pathway) in the Physics Department.[7] There are also several Professors who conduct astrophysics research, some of whom make observations on a telescope located on the island of Hvar. Finally, throughout Croatia and Serbia there are also several

7 The University of Belgrade and the University of Zagreb have around 89,000 and 65,000 students respectively.

institutes which specialise in the popularisation of astronomy. *The People's Observatory* (Belgrade) and *Zvjezdarnica* (Zagreb) are the largest such institutions in the region and anybody can join and visit for a small entrance and membership fee, founded in 1934 and 1902 respectively.[8]

8 For Belgrade see http://adrb.org/index.php?lang=sl (accessed 5/3/12). For Zagreb see http://www.zvjezdarnica.hr/index.php?option=com_content&task=view&id=14&Itemid=29 (accessed 5/3/12). *Zvjezdarnica* was part of a larger organisation of amateur natural scientists from 1885, yet there did not exist a special, separate astronomy section until 1902.

CHAPTER ONE: cosmologies and contexts

One word I frequently came across in discussions with astronomers and astrophysicists was *smer* (*Croatian: smjer*), which means course. It can refer to the 'course' that a planet takes around a star, encapsulating a sense of directional movement. It can also be used metaphorically to refer to the direction of development of a number of actions, or simply refer to the various options that students can take at university (a teaching or research based course, for example).As such, it encapsulates a sense of intentional, or rule driven direction. Just as planets may appear to wander whilst obeying strict gravitational laws in their movements, so the directions of students and researchers, which might appear aimless or random, were influenced by many of the processes and factors which I will describe in this chapter. Before moving to consider the factors influencing such directed movement – the *vectors* involved – in this chapter I first ascribe *coordinates*, locating the ethnography within the wider social, political and historical contexts in which it took place. I first consider the historical background to political and scientific life in the SFRY and during the break-up, from the Second World War up to the present day. I also briefly discuss whether the observatory fitted into these various orderings and changes, and if so, how (assuming it fitted into such orderings could be construed as a case of adapting the material to fit a particular cosmology of mine). I then focus on the changing economic contexts in which I worked, paying particular attention to the discourse of economic crisis I often came across and also the concept of a knowledge economy, heavily promoted in Serbia and Croatia in connection with the EU accession process. I conclude with a discussion of Serbian and Croatian national cosmology, taking inspiration from Malkki's (1995) study of Hutu mythico-history production. I introduce the categories and approaches Serbian and Croatian

nationalists typically used and which featured in many conversations I had in the field – a reference system in which individuals often positioned others. Finally, in this section I situate recent events inside such national cosmology.

Changing frames of reference in science and political life

The coordinates of political life in this region changed a number of times over the course of the twentieth century. One crucial point of reference for both scientists and many other people in the region who have lived through the recent changes was the SFRY, which was formed at the end of January 1946, when the Federal Peoples' Republic of Yugoslavia established six socialist republics (Bosnia & Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia), and two autonomous provinces (Kosovo & Metohija, Vojvodina) following a victory on the part of the communist Partisans. At first the state followed a Soviet socialist model based on central planning. However, during 1948 the SFRY leadership chose to distance the state from the Soviet system after a dispute over the perceived exploitative nature of the bilateral trade agreements that the Soviets were creating with Eastern European states. After a short period pursuing an attempted collectivisation policy (Verdery 1996, 70–73), the SFRY leadership gave up on this strategy at the start of the 1950s. Instead, a decentralisation strategy was pursued, bringing about what the general secretary Tito described as a 'blow to bureaucracy' with the demise of a centralised administrative apparatus. In such a system, the vast majority of workers owned and managed firms collectively through collective decision making on workers' councils. This marked the beginning of the distinctive 'socialist' course that Yugoslavia took, often referred to as 'self-managing socialism' or 'market socialism'.

Despite parting from the Soviet Bloc in 1948 and pursuing a distinctive socialist course, named Yugoslav self-management, the

effects of centralised administrative management and economic planning exerted an influence until 1952 (OECD Report 1976, 13). In the immediate post war period and after, scientific research was funded by both the federal budget, and budgets of the various republics. From 1952 to 1964, the distinctive system of workers' self-management was developed. On this understanding, workers were encouraged to make decisions directly on issues concerning 'communities of interest' in which they were involved. The OECD report suggested that such an approach had an affinity with syndicalism and systems of workers' councils. Following the Soviet suppression of the Prague Spring in 1968, the government stressed the active military participation of all members of the population, based around a military doctrine – *Total National Defence* – which saw between one and three million citizens learning military skills. Basic defensive techniques and skills such as how to look after and use a gun were taught in schools up to the early nineties in many areas,[9] although the units of organisation were highly decentralised and so education and training probably varied significantly from place to place. In contrast to the OECD description of the workers' councils, historians such as Unkovski-Korica (2016) have argued that the self-managing rhetoric during this period was an ideological cover on the part of Tito to maintain links with both East and West, whilst opening up to the world market.

In a third period, from 1965 onwards, a further opening up to the world market was encouraged. This led to an increased emphasis on industrial contract research with practical outcomes, and likely increased research institutes of business firms. This trend continued from 1971, but this later period was also marked by a further devolution of federal government, with increased regional powers handed over to the various republics in 1974. In line with increased marketisation, there was an increased focus on institutes depending on their earnings, which meant adapting research to the demands of industry, theoretically designed to offer some kind

9 Interlocutors who grew up in what is now Slovenia and Croatia described such classes.

of wider social use value. Indeed, the production of technologies became both an important symbol of the modernising claims of the socialist project and a source of income on the world market, with some brands achieving international acclaim, such as the Yugo car.

Key research institutions were focused around academies of science in Belgrade, Zagreb and Ljubljana. The context of US deployment of atomic weaponry in Japan and the associated horrific human tragedy rendered nuclear research of particular significance and, more broadly, meant that scientific research was a priority for many governments on a perceived basis of national security.

According to the OECD report, scientific institutes were typically organised along the following categories:

> i) Independent institutes, which are economically self-supporting but may apply for grants from republican funds. Another main source of income is industrial contract research
> ii) Institutes connected with universities of colleges, which usually are self-managed but have agreements with universities regarding facilities and staff. They may also do contract research for industry and government
> iii) Institutes under the academies of science, which are usually run directly by the academies and financed from republican funds
> iv) Research institutes of business firms, which may be organised as independent institutions working for several firms within the same branch or as part of a firm. They are largely financed from the profits of the firm(s) but may also take contracts from outside. (OECD Report 1976, 182–3)

In many SFRY scientific projects, there was an ideological focus on stressing the socially productive aspects of one's research. Projects which were regarded as 'consuming', offering no tangible benefits

to society and seemingly esoteric projects were more likely to be side-lined. Projects which had no tangible application but which did contribute to the enlightenment goal of an educated, scientifically literate public, a category which included astronomical cosmological projects, were modestly invested in. Finally, projects which might have had a particular value in showcasing Yugoslavia, or which showcased symbols of a 'modern' Yugoslavia internationally, were also promoted. In the post-Second World War period for example, the creation of large modern housing projects in New Belgrade (*Novi Beograd*) and New Zagreb (*Novi Zagreb*) conveyed a powerful message of modernisation, as did the arrival of new telescopes at the observatory.[10] New asteroids discovered by the observatory were frequently named after 'great' Yugoslavs such as Josip Broz Tito, the general secretary, Marshall and president of the SFRY, and Nikola Tesla the inventor, born in 1856 in Austro-Hungary on the territory of what is now Croatia, yet associated with a Yugoslav canon throughout the SFRY period.

The OECD report described the organisation of science as being exceptionally decentralised. This description chimes with my experiences during and after fieldwork, and is also suggested by the spatial organisation of the universities and research institutes within republics and cities. In Belgrade and Zagreb, they are scattered all over the city centre. Bourdieu's (1990) sociological study of academia in France is particularly useful here, as there are very few sociological studies of academia available, and even fewer which focus on Eastern European academies. Bourdieu focused on the various strategies by which faculties reinforced their claims to power and authority, examining in particular detail the moments leading up to the 1968 strikes. Some of the details he identified were specific to the historical context. For example, the French university system is strongly hierarchical and centralised

10 Many of the more powerful telescopes that were housed there were rendered academically obsolete more recently by the information 'revolution' and use of internet to obtain observations from much larger and faraway telescopes (see chapter three).

(ibid., 100). In contrast, whilst the education system in Serbia is relatively centralised in Belgrade, and the system in Croatia, perhaps to a slightly lesser extent, centralised in Zagreb, the autonomous structure of the faculties within the Universities of Belgrade and Zagreb means that they are neither as hierarchical nor as centralised as those in France. However, as in Paris, there exists a central authority-conferring institution – the Serbian Academy of Sciences and Arts (*Srpska akademija nauka i umetnosti* hereon SANU), for which there exists a comparable institution in Zagreb, the Croatian Academy of Sciences and Arts (*Hrvatska akademija znanosti i umjetnosti*, hereon HAZU). These institutes were regarded as socially conservative by many researchers and students with whom I spoke, including scientists who were not their members and those who, towards the end of their careers, were honoured with membership.

More women were involved in science during the SFRY in comparison to Western Europe due to the provision of extensive state welfare systems, combined with an emphasis on employment as key to the legitimacy of socialist governments. Such welfare provision enabled parents to pursue scientific careers, unburdened by childcare costs. In a study of gender inequality in the natural sciences, (Etzkowitz, Kemelgor, and Uzzi (2000, 167-8) observed that, "women scientists gained significantly in numbers in Eastern Bloc countries during the socialist era but have been losing ground since 1990". However, the gender equality promoted by the SFRY leadership did not entirely materialise. In line with my experiences in Belgrade, "even when official ideology prohibited direct discrimination, female scientists typically filled the middle ranks of support researchers working under the direction of a male laboratory chief" (ibid.). In the case of Yugoslavia, where women did rise to high positions in research institutions, the prestige of science decreased, for as Blagojević noted, "as it became less and less prestigious, science opened up to women" (2006, 90).

Descriptions such as Josephson's 'totalitarian science' (1998) in no way described the logic of the organisation of science in the former SFRY, as there was no clear central political control of scientific knowledge production. Indeed the OECD report remarked that "the system is elastic and allows many different forms of organisation and financing" (OECD Report 1976, 182). I find Josephson's bracketing of 'Aryan' and 'Soviet' science as both 'totalitarian' problematic, as it attempts to distance the science of Western liberal democracies from those of other political systems which had little in common with one another. However, in the SFRY, there were a small number of highly ambitious and politically driven projects such as the TESLA accelerator at Vinča, that *did* resonate with Josephson's description of an aesthetic typical of 'totalitarian science' which he described as 'gigantomania' (1998, 15). Perhaps the only serious constraint on scientific research and development in the SFRY was a focus on tangible outputs with a perceived socially useful role, such as medicines, agricultural products, technologies and military products.

One key feature of the everyday practice of science in SFRY self-management was the practice of hoarding key resources, although this took place to a lesser extent than in the Soviet bloc. This took place as certain resources were in relative scarcity. This contrasted with the relatively affluent position of scientists in the USA, where laboratories were swathed with large amounts of funding, especially in the post Second World War period (see Kevles 1995). Such funding led to the development of unnecessarily complex technological solutions to problems, whilst relatively ignoring other important issues such as wealth inequalities, in a military-industry-academic constellation characterised by the epithet 'Big Science' (see Capshew and Rader 1992).

Did the institution where I carried out the bulk of my fieldwork fit into these frames of reference and if so how? Following the Second World War the observatory was placed under the jurisdiction

of Belgrade University and later SANU. The observatory was then granted progressively more research autonomy, whilst it continued to receive funds from the government, gaining the status of an autonomous scientific research institute in 1985 (Dimitrijević 1998). This meant that it had no obligations to industry in the region, although this did not preclude collaboration on projects of industry or military significance. For example, projects such as modelling the motions of clusters of objects in the upper atmosphere were useful in understanding the movement of space debris, or asteroids breaking up in the earth's atmosphere, debris which had obvious significance to the movements of satellites and rockets.

In addition, the observatory and especially public orientated initiatives such as the *People's Observatory* in Belgrade and *Zvjezdarnica* in Zagreb, in which members of the public could participate and stargaze, played an important educational role in offering scientific insights into the universe. This provided an important means by which scientific authority was cemented, particularly through the discipline of cosmology which offers explanations of the history and origins of the universe. As Bourdieu (1990, 64) observed, "... academic knowledge tends to gain social recognition, and thereby also social efficacy, both of which increase as scientific values become more generally recognised"; an observation as true of the socialist and post-socialist states in the Yugoslav region as it was of 1960s academia in France.

The dissolution of Yugoslavia

The political order changed quickly and significantly in the early 1990s, when the SFRY ceased to be a frame of reference for many. These dramatic changes had a massive effect on the life courses and self-understandings of people as political subjects in the region. Following the death of Tito in 1980, the discourse of Yugoslav 'unity' and 'solidarity' was weakened, as nationalist

tensions rose between several of the republics. Several events, including the leaking of a famous memorandum criticising the position of Serbia in the SFRY, written by academics in Serbia who were members of the Serbian Academy for Arts and Sciences (SANU), led to further increases in such tensions. In the absence of a clear way to proceed following the collapse in legitimacy of communism in 1989, and increasing expressions of nationalist sentiments, the prime minister at that time, Ante Marković, attempted to implement a series of free market reforms including a new *Zakon o preduzećima* (Law on enterprises), which encouraged privatisation (Allcock 2000, 96-7). He was informed by the US economist Jeffrey Sachs, one of the leading ideologues of neoliberalism. Decentralisation under self-management had created separate 'markets' or 'trading zones', which Marković associated with increasing calls for national autonomy. He encouraged the formation of a common market, facilitated through privatisation, which would theoretically severe the networks of personal, regional ties between self-managing enterprises, through introducing a lowest common denominator of private competition between firms throughout the whole of Yugoslavia. Growing economic problems and increased inflation reduced the value of the money spent on welfare, a situation experienced by almost all the population of both Serbia and Croatia.

In June 1991, the Slovene Republic seceded and the Croatian Republic made a declaration of independence. A short ten-day war followed between the Yugoslav People's Army (*Jugoslovenska narodna armija* hereon JNA) and the Slovenian Territorial Defence, starting on 27 June 1991. In Croatia, the war was much longer, stretching from 1991 to 1995, with estimates of soldiers killed ranging from approximately seven to fifteen thousand, whilst in Bosnia and Herzegovina the war stretched from 1992-1995 with many more casualties. During this period, the situation for scientists quickly deteriorated; in Belgrade, UN sanctions were placed against scientists in what remained of Yugoslavia - the Federal

Republic of Yugoslavia (in Serbian: Savezna republika Jugoslavija, and hereon FRY) a topic I discuss in chapter two in more depth, where I trace events from the nineties to late 2000s through scientists' self-reporting.

Whilst the observatory continued to receive funding during the nineties, the years of hyperinflation made such funding relatively worthless. It is only more recently that the economic situation at the institute has begun to improve, and the observatory has had recent success in receiving funding for an EU funded 'FP7' project.[11] FP7 funding is project based, and consists of collaboration with research groups from other states in Europe. As such, it cannot provide the years of security which a state salary can offer, for FP7 funding relies on successful bids and the framework and bidding rounds last a maximum of five years. A main source of funding for the observatory continues to be the state budget, which strategically assigns funds to projects in the natural and social sciences. State funding for the observatory was divided up around research themes, which then had project leaders or 'chiefs'. These leaders would then work with a wider group of staff, including PhD students on these topics, and certain groups also wrote bids for FP7 projects.

Many of the researchers with whom I spoke at the observatory were frustrated by the relatively small amount of state funding for science, particularly compared with larger states in Western Europe. FP7 provided a new option to obtain increased funding for project work. Whilst particularly in the context of crisis and/or war, science funding was not a state priority, recent (optimistic) announcements by the Serbian government to increase science funding to 2% of GDP by 2020 illustrate a prioritisation of science by the current government. The low funding compared to Western Europe created an increased focus on theoretical work,

11 FP7 refers to the EU science funding initiative. See http://cordis.europa.eu/fp7/home_en.html (accessed 19/12/14).

or forging collaborations with observatories with access to greater funds. As we shall see in chapter three, the situation scientists found themselves in during the nineties influenced their approach to research, and theoretical topics became increasingly popular. Before discussing such changes and dynamics in more detail however, other features concerning the present day context in the region, notably the economic crisis and national cosmology require discussion in more depth.

Fieldwork conditions: local coordinates and fluctuations in the political-economic order

I commenced fieldwork in autumn 2008, a time which was marked by the sub-prime mortgage crisis in the USA and the expansion of a discourse of a global economic crisis, which as mentioned in the introduction, was present at the observatory. The crisis had large implications for the stability of the EU banking system and, at the time of writing, the future course of political events is uncertain. My interlocutors at the observatory were understandably worried by the economic crisis, but I often heard the comment that Serbia and Croatia had been in crisis for the past twenty years, so people were used to it and knew how to cope.

The economic crisis marked out a delay in, or possible future end to (it is still unclear), the expansion of a post-Fordism variant of capitalism based on a logic of flexible accumulation. Post-Fordism had been expanding in global breadth and depth for nearly forty years leading up to the period when field work commenced. Despite the presence of the discourse of crisis when I conducted fieldwork, the crisis had not at that time significantly impacted on the way the observatory organised its work. This meant that science policy and strategy, including proposed EU directives and funding sources, were still based around a set of models which had been popular for a few decades, on which I will now elaborate

through reference to the ideas of post-Fordist flexible accumulation and a knowledge economy.

Post-Fordist flexible accumulation emerged in the context of a Western capitalist debt crisis in 1971, when United States President Richard Nixon stripped away the international gold standard. This act initiated the regimes of free-floating currencies that continue to this day (Graeber 2014, 53; Gregory 1997, 1). The emergence of Post-Fordism occurred in the context of global capitalism reaching a point of recession and having to adapt to survive. This resulted in an end to the post-World War Two consensus which had seen significantly increasing standards of living and the negotiation of significant labour rights and social welfare policies in Western Europe and, to a lesser extent, in the USA.

The main characteristic of Post-Fordism was an increase in flexibility of labour, of production processes, and of consumption patterns. In the case of labour processes, increased numbers of temporary contracts, labour flows, out-sourcing and in some sectors, such as science and technology, a desire for increased researcher mobility were experienced. Some of the consequences of this flexibility were positive and liberating. Workers were able to choose flexible hours in some cases, and there were genuine benefits which emerged from greater flows of people and ideas. However, there were many negative consequences associated with such changes, as workers became more dispensable and had fewer rights in the workplace, for the increased flows of people in and out of workplaces, coupled in many states with a legal attack on union legislation, meant that the ability of trade unions to safeguard the interests of workers was diminished.

Crucially, the anthropologist Verdery has argued, the shift to an increased dominance of a Post-Fordist model based on flexible accumulation was partly responsible for the collapse of Soviet and Yugoslav socialism (Verdery 1996, 34). Following Verdery,

I use the term socialism to describe the experience of daily life in these states as qualitatively distinct from daily life in capitalist states. Whether or not these states should properly be described as socialist or state capitalist[12], everyday life in these states differed from Western liberal democracies in several ways. The combination of extensive welfare provision, central planning or self-management combined with provision made in the education system for Marxist theory and political censorship of many texts written by dissidents or Western 'bourgeois' establishments all shaped people's experiences. Yet the SFRY was always part of an already globalised system. It had joined the *General Agreement on Tariffs and Change* (GATT) in 1965 and received both military assistance and loans from the West. Economic liberalisation was thus a process that occurred step by step rather than a radical reorganisation occurring in 1991.

Verdery argued that there were two reasons for the collapse of socialism. Firstly, Yugoslavia and Soviet states had taken out loans from Western states. Yet as Verdery remarked

> The intent, as with all the international borrowing of the period, was to pay off the loans by exporting manufactured goods into the world market. By the mid-1970s it was clear, however, that the world market could not absorb sufficient amounts of socialism's products to enable repayment, and at the same time, rising interest rates added staggeringly to the debt service. With the 1979/80 decision of the Western banking establishment not to lend more money to socialist countries, the latter were thrown into complete disarray. (Verdery 1996, 32)

12 The system of global trade agreements, including agreements between Western and Soviet Blocs and non-aligned states such as Yugoslavia has led some academics, and particularly Trotskyists to describe the Soviet bloc states and Yugoslavia as state capitalist.

Second, Verdery argued, the logic of post-Fordist flexible accumulation differed significantly from both Yugoslav self-management and Soviet central planning, which had a logic of disciplined labour much closer to Fordist systems. The shift to flexible accumulation precipitated by the falling rates of profit in the USA required "greatly intensified rates of commercial, technological, and organizational innovation" (Harvey 1989, 147). This was because, 'such flexible production systems have permitted, and to some degree depended upon, acceleration in the pace of product innovation together with the exploration of highly specialised and small scale market niches.' (ibid., 156)

The "acceleration in the pace of product innovation" created in socialist states a "massive rupture produced by its collision with capitalism's speedup" (Verdery 1996, 36). Product innovation was directly dependent on scientific know-how. This meant that applied scientific knowledge played an important role in effecting the recent changes. As Harvey summarised:

> Access to scientific and technical know-how has always been important in the competitive struggle, but here too we can see a renewal of interest and emphasis, because in a world of quick-changing tastes and needs and flexible production systems (as opposed to the relatively stable world of standardised Fordism), access to the latest technique, the latest product, the latest scientific discovery implies the possibility of seizing an important competitive advantage. Knowledge itself becomes a key commodity to be produced and sold to the highest bidder, under conditions that are themselves increasingly organised on a competitive basis. (Harvey 1989, 159)

The idea of the importance and profitability of knowledge thus became central to organisations promoting post-Fordist

regimes of flexible accumulation. Furthermore, this understanding of knowledge defined scientific discovery as key to gaining a competitive economic advantage. These changes had a direct impact on policy and strategy making by states in the EEC (European Economic Community). The EEC, known from 1992 as the European Union (EU) was a grouping of states who signed trade agreements promoting further economic integration and the intended creation of a single market. Following the collapse of socialism at the turn of the nineties, the union hoped to expand with the goal of creating new markets in zones which were formerly part of the Soviet Bloc or Yugoslavia. In several states, Poland being the prime example, vicious shock therapy measures were undertaken, resulting in sharp, extensive privatisation policies and a rollback in state welfare provision. The common market emphasis in EU policy meant that aspiring EU candidate states were forcefully suggested to embrace post-Fordist principles.[13] In Serbia and Croatia, the rollback in state welfare provision created feelings of insecurity for many and Milošević's government was acutely aware of the insecurities surrounding such potential changes. For example, one of the slogans for Milošević's socialist party during the nineties was '*sa nama nema neizvesnosti*' – with us there is no uncertainty. This slogan played directly into the feelings of insecurity about the future and ambivalence of many in Serbia towards many of the proposed changes. The increasing appeal of nationalism, and traditionalist and religious values, was one strategy of coping with such insecurities, as they offer permanence or hope which counterbalanced the insecurity of the present. As Harvey (ibid., 171) summarised:

> As Simmel long ago suggested, it is also at such times of fragmentation and economic insecurity that the desire for stable values leads to a heightened emphasis on the authority of basic institutions – the family, religion, the state.

13 See Dunn (2015) for an excellent ethnographic description of the reorganisation along post-Fordist lines of a juice and baby food producing factory in Poland.

Whilst states, as arbiters of value, had been devalued along with Nixon's floating of the gold standard, they were far from redundant. On the neoliberal model, as promoted during the post-Fordist period, states were required to play an important role in managing competitiveness and the maximisation of profit. Indeed, as Graeber pointed out, you need a state in order to have a market and government policies played an invaluable role in organising and promoting a market, a role for government which Adam Smith attempted to downplay (Graeber 2014, 45)

Furthermore, if science and technology were intended to drive forward innovation, governments were also encouraged to play an important role in educating citizens who would have the necessary scientific skills, or facilitating private educational faculties who would carry out such tasks. In the case of many states in Central Eastern Europe, the historical context entailed a desire to keep many of the welfare benefits and ultimately ontological security, which were taken for granted during the SFRY period. In Serbia and Croatia, the political outcomes of the recent wars were also of paramount importance. In Croatia for example, the ruling elite was much more open to implementing the changes desirable for EU membership than in Serbia. In part due to perceived economic centralisation in Belgrade during the SFRY period, many citizens had negative attitudes towards the Yugoslav past. In Serbia however, there was more nostalgia for the former SFRY and increased scepticism towards the changes.[14] As regards science and technology, such EU reforms placed an importance on the production of an entity called a 'knowledge economy'.

In line with the goal of science as a driving force for 'the economy', EU directives in the early 2000s, shaped by the Lisbon Agenda, argued for increased state investment in science and technology in EU member-states and those hoping to join.[15] In a 'knowledge

14 On a practical note, the consequence of this was that I found it much easier to get statistics and reports on recent changes, and to arrange interviews with officials involved in implementing EU directives in Croatia than in Serbia.

15 See the report *Presidency Conclusions* (Council 2000).

economy', investment in research and development leads to new product innovations, which confer competitive advantages and economic benefits for those who claim ownership. Whilst EU directives promoted this goal, the driving force behind 'knowledge economy' policy was the World Bank, who through their 'knowledge for development' program aim to "help countries identify the challenges and opportunities they face in making the transition to the knowledge-based economy".[16] Indeed, the World Bank provides an index and set of indicators charting each state's progress towards becoming a knowledge-based economy. The 'four pillars' of their approach and requirements are as follows:

> • An economic and institutional regime to provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship;
>
> • An educated and skilled population to create, share, and use knowledge well;
>
> • An efficient innovation system of firms, research centres, universities, consultants and other organisations to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology;
>
> • Information and communication technology to facilitate the effective creation, dissemination, and processing of information.[17]

On such a model, researchers are often described as 'human capital'. Those researchers with a high value of human capital possess

16 See http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/EXTUNIKAM/0,,menuPK:1414738~pagePK:64168427~piPK:64168435~theSitePK:1414721,00.html (accessed 6/3/12).

17 See http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/EXTUNIKAM/0,,contentMDK:20584268~menuPK:1433162~pagePK:64168445~piPK:64168309~theSitePK:1414721,00.html (accessed 6/3/12).

the necessary skills and embodied knowledge to confer maximum economic benefits. As scientific researchers possess large amounts of 'human capital', they constitute an elite group to be nurtured. The term points to a need in Europe for a more skilled workforce and the expansion of white collar professions in a context of increasing mechanisation with outsourcing of lower skilled jobs to other states outside of the EU, a goal which implies a global division of labour whereby EU states, and others who pursue the model 'successfully', occupy an elite position. Indeed, the very emphasis of the 'knowledge economy' on intangible entities also suggests that the model is a means whereby those states who can no longer offer competitive market rates in manufacturing, seek to maintain their dominance through emphasising the importance of gaining intangible skills and qualifications. As Kobal and Radošević commented concerning policy making for Croatia:

> The decision for a knowledge based society demands the development of a national strategy for building and sustaining a knowledge-based economy and society. It is necessary to: create a society of skilled, flexible and creative people; build a dynamic information infrastructure; create appropriate economic incentive and institutional regimes; and create an efficient innovation system. (Kobal and Radošević 2005, 5)

Significantly, despite the vaunted 'demise of the nation-state' in a context of post-Fordist transnational capitalism, policy innovations promoting the production of a 'knowledge economy' are 'national strategies', or rather they are designed to take place at the (nation-)state level. When Kobal and Radošević described the need to create 'a society of skilled, flexible and creative people', it is 'Croatian' society to which they refer.

As the European Commission described, investing in research is crucial, 'to help European companies innovate and stay competitive, to create more and better jobs in Europe, and to keep

improving the European way of life'. [18]With this in mind, a goal of achieving an investment level of 3% of GDP in research and development was set out in the Lisbon Strategy in 2003, with the aim of achieving that level by 2010. To put those figures in context at present Japan invests over 3%, the USA around 2.5%, while the EU average is less than 2%.

Figures for Serbia, Croatia, and other states from Central Eastern Europe are listed below, in the years leading up to the commencement of the fieldwork period:

Year	Croatia	Serbia	Hungary	Romania
2006	0.76	0.47	1.0	0.45
2007	0.81	0.35	0.96	0.53
2008	0.9	n/a	n/a	0.59

Table one: Research and development expenditure as a percentage of GDP[19]

The latest figures for Serbia (2010) show a further tailing off to 0.3%, accompanied with an optimistic announcement that Research and Development will now be prioritised with the goal of reaching 2% within a decade.[20] The Lisbon Agenda clearly failed, in part due to the impact of the financial crisis.

As extensive investment in scientific research programs is a relative luxury, when economic conditions are tough, many state budgets prioritise other activities over investment in science. Ironically however, it was the 1970s debt crises that resulted in the switch to a post-Fordist model which required an increased pace of product innovation that identified scientific and technological improvements as key. This is because, from the perspective of business,

18 See http://ec.europa.eu/invest-in-research/index_en.htm (accessed 3/11/11).

19 Source: http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.Z (accessed 8/11/11).

20 See Tatalović (2011). Figures are not available for Croatia in 2010.

one possible advantage of recessions is a process of 'creative destruction' in which relatively inefficient firms are 'weeded' out, leaving a base of more competitive firms to take a future lead. However, if capital supply flows are impeded for too long, as is the danger with the current economic crisis, many of the more competitive firms may also liquidate, creating a negative spiral. The context of recent military conflict in Serbia and Croatia meant that science was hardly at the top of the list of government priorities, as the EU country profile for Croatia illustrates:

> Since Croatian industry is currently mainly occupied with mere survival and regaining lost markets, scientific research is obviously not its priority. In the Public Sector, R&D institutions, especially universities, are still not prepared to take an active role in economic development and take part in articulating and meeting the needs of industry. Therefore, it seems that cooperation between the scientific community and the private sector, with some exceptions, is mainly decreasing instead of increasing.[21]

The 'knowledge economy' which was hoped to be stimulated in Europe relied on collaborations with and in a thriving private sector. Those advocating investment in scientific education and research included private sector firms and interests, politicians sympathetic to promoting 'the knowledge economy', and to a lesser or greater degree, all scientists. This is because, independent of political views, scientists shared a faith in the importance and value of scientific research. Yet the country report for Croatia described a 'lack of public support of the private sector' (ibid., 7). The private sector was also rather weak in Croatia and Serbia, as the report stated:

> Currently, private sector involvement in the scientific research decision-making process is rather weak in Croatia. The main reasons are of two different kinds:

21 See EU Country Profile: Croatia (n.d., 6–7).

> The first one involves cultural aspects deeply rooted in the country-specific historical heritage, while the second stems from purely economic reasons and the transition process towards a market economy. The cultural aspects rely upon a strong labour division between public R&D and industry R&D due to the domination of the standard research policy driven by the European tradition of academic freedom and curiosity-driven academic research. (ibid., 1)

The 'tradition of academic freedom and curiosity-driven academic research' is a reflection of the fact that historically, during the former SFRY, many institutes had an 'autonomous' status. They received funding from the government, yet were free to set their own research agendas. The intention was that such freedom would lead to the development of scientific innovations. Yet the concept of the 'knowledge economy' argues for a tighter coupling between private industry and scientific research programs, which would result in what many researchers would experience as a loss of autonomy. This has led to ambivalence on the part of many scientists to form alliances with the private sector.

Some scholars based in post-Yugoslav states may comment that the above discussion of Post-Fordism ultimately describes processes that are pertinent to understanding everyday change in economic centres of the global world system; this may also apply to the theoretical vocabulary associated with anthropological studies of techno-science in Western Europe and the USA, which has typically (although not exclusively) analysed cutting edge scientific innovation in 'first world' settings, rarely drawing on Marxist insights, instead taking up ideas developed by theorists such as Latour, the novelty of whose ideas was in turn considered in its time as a counterweight to the dominance of Marxism in French academia. Whilst these changes take place within an interconnected global world system, they may, as I argue in chapters three and five, be experienced in different kinds of ways and

at different speeds as a consequence of uneven development. This foregrounds a particular criticism of Anglo-American anthropological theorising, namely that scholars in the region cannot escape an engagement with literature and understandings of change occurring in economic centres, because they have wide ranging effects on the region. Scholars working in such economic centres, however, can complete projects without a substantive engagement with academic literature produced by people based in institutions in the states where they complete fieldwork. Geertz' fieldwork in Bali, during which he ignored established scholarly traditions in Bali and instead spent his time "hanging out with the natives" as Gupta and Ferguson (1997, 25-7) argued, is one example of this trend. Nevertheless, the details of the economic context outlined here will, as we shall see, particularly in chapter three, cast light on some processes at work beyond the centre. Now however, I turn to consider 'national' cosmology, which is one kind of order I frequently came across in my interactions with scientists.

A map of Serbian and Croatian national cosmology

Besides the SFRY, another important reference frame and socio-political order present concerned what Malkki (1995) referred to as "national cosmology". Understanding national categories and references to them as a cosmology, suggests that they were invoked as a kind of ordered system, assigning coordinates to selves and others through which actions and behaviours could be rendered legible and meaningful. In a similar way to scientists using specific concepts to describe and explain the behaviour of the movements of stars and planets, 'scripted' understandings of human behaviours were subsumed as relating to the specificities of national cosmologies with which individuals were identified.

In order to understand the labels and meanings different people attached to me and others, it is necessary to detail certain aspects

of the political history of the region relevant to understanding the production of what Malkki (1995, 54) has termed "mythico-history". Malkki used the term to denote the production of "a set of moral and cosmological ordering stories: stories which classify the world according to certain principles, thereby simultaneously creating it" (ibid.). The term emerged through her fieldwork conducted with Hutu refugees who had fled the mass killings of 1972 in Burundi, East Africa, some of whom cast the world into these kinds of categories and described themselves as a nation in exile who wished to reclaim their homeland in Burundi from Tutsi rule. In her discussions with Hutu refugees, a key feature of the mythico-historical accounts Malkki often came across was their oppositional construction:

> The mythico-historical world making was an oppositional process; it was constructed in opposition to other versions of what was ostensibly the same world, or the same past. The oppositional process of construction also implied the creation of the collective past in distinction to other pasts, thereby *heroising* the past of the Hutu as "a people" categorically distinct from others. (ibid., 55)

In the case of the post-SFRY region, other kinds of mythico-history had been produced in the past in addition to national mythico-history. During the SFRY period antifascist mythico-histories were produced and promoted by the party leadership in explicit opposition to national histories. Such accounts also organised the world through moral categories. However, during the period when I conducted fieldwork, I found that national mythico-historical accounts had a much greater presence and were used to explain a number of recent occurrences. They were often used in relation to concepts of 'national character' and/or 'national mentality'. National character and/or mentality were understood however, not as static but as historical facts, with references made to the

effects of different historical legacies (Todorova 2009), particularly the Austro-Hungarian and Ottoman empires.

Due to their contemporary importance, I pay detailed attention to Serbian and Croatian national cosmologies in this section. My concern is not with whether such accounts are 'true' or not, but rather with which historical details and accounts are of importance and generate meaning in the lives of people who refer to such histories. Whilst different people with whom I spoke drew upon a bank of themes in different kinds of ways, what surprised me and Malkki (1995, 57), when she conducted her fieldwork, was the coherency of the narratives (see chapter two). In the accounts that follow, I draw on a mixture of academic literature, articles taken from newspapers, political campaigns noted around town and at the universities in Belgrade and Zagreb, and conversations I had with people in the field. I describe basic 'origin' stories and important themes in the mythico-histories, designed to give an overview of important historical actors which provides necessary background for the later chapters. Nevertheless, such accounts depend on making selections from and homogenising a wider mix of stories and narratives. As Malkki (ibid., 56) commented, "the challenge is to find a representational strategy that does not suppress what was the most powerful and striking character of these narratives: the sense of a collective voice". The following accounts are therefore designed as a rough guide, with the help of which readers can orientate themselves within this bank of themes. Since there was a degree of diversity between different nationalists' mythico-historical constructions, there was no consensus or agreement concerning much of what follows. The aim is rather to offer a sense of what topic, issues and symbolic motifs one might encounter in discussions with informants in the field, rather than giving a definitive account of how Serbian and Croatian nationalists construct their frames of references, which they then used to interpret individuals' actions and courses.

Serbian mythico-historical themes

Serbian mythico-history draws on key tropes of victimhood and sacrifice which extend back to a noble defeat in 1389 in Kosovo, where a 'Serbian' army under Prince Lazar fought and lost a battle against Ottoman troops, with both sides suffering heavy casualties. Partly for this reason, and partly because of the number of old Serbian-Orthodox monasteries in the region, Kosovo is viewed as the spiritual home of the Serbian people in the mythico-history. Indeed, in 1989, a famous speech by Milošević in Kosovo was made, which explicitly drew on some of the mythico-historical themes earlier mentioned:

> You should stay here. This is your land. These are your houses. Your meadows and gardens. Your memories. You shouldn't abandon your land just because it's difficult to live, because you are pressured by injustice and degradation. It was never part of the Serbian and Montenegrin character to give up in the face of obstacles, to demobilize when it's time to fight... You should stay here for the sake of your ancestors and your descendants. Otherwise your ancestors would be defiled and descendants disappointed. (op cit. Silber and Little 1996, 38)

The existence of archaeological remains of Orthodox monasteries throughout the region defines an earlier 'Serbian Orthodox' cultural zone which has been diminishing in territory over time. The definition of the 'Serbian people' thus connects with religious institutions and religious belonging and a blood and soil national ideology asserting ancestral 'Serbian' rights to a territory comprising much of Croatia, Bosnia and Herzegovina, Macedonia and Montenegro. This historical territory is referred to as 'Greater Serbia'. According to some advocates of a 'Greater Serbia', these lost historical lands ought to be reclaimed at some point in the future. Various politicians have made reference in the past to 'Greater

Serbia' as an unaccomplished dream.[22] Such statements, frequently made during the early nineties when the wars were taking place, have been taken out of context and used by the media in Croatia to consolidate existing tensions and simultaneously promote an exclusivist national solidarity.

The mythico-history relates a story of diminishing territory due to victimisation and aggression on the part of historical Others, including the Ottomans and the Habsburgs (Austro-Hungary). A running theme is that throughout history 'Serbs' have frequently been invaded by other, larger forces or empires. This theme was sometimes explained using the concept of a national character or mentality. For instance, I was sometimes told that it was not part of the Serbian character to subjugate other 'peoples', unlike for example, the colonial system of the 'English' or 'British' with which I was often associated and in which I was implicated. Such statements resound with Malkki's comment on the moral aspect which mythico-histories often contain; they tell a particular story which champions certain qualities of the national grouping to which they refer, and focus on negative qualities associated with oppositional others.

These themes persisted throughout mythico-historical constructions of the twentieth century. For instance, during the Second World War Belgrade was bombed by both Axis and Allied forces. During this period an independent 'Croatian' state (the NDH; *Nezavisna Država Hrvatska*) was set up. The leadership of this state was known as the *Ustaše*, and this label came to be used by some during the recent wars, metonymically as a pejorative term for any person identified as Croatian. The NDH, under Axis directives, set up a series of horrific concentration camps, the largest named *Jasenovac*, where Roma, Serbs, Jews, communists and other anti-fascists among others were sent to work, and many were killed.

22 http://dnevnik.hr/vijesti/svijet/nikolic-velika-srbija-je-neostvareni-san.html (accessed 14/8/12)

The precise number of deaths and historical revisionism concerning these figures on the part of the Croatian President Franjo Tuđman's government during the nineties is a point of sore contention, and the political use of 'national' statistics during and after the wars has received anthropological attention (see Jansen 2005a).[23] The tragic murders which took place at *Jasenovac* thus occupy an important place in rearticulating Serbian mythico-historic narratives of victimisation, as acted out through reference to the closest, and perhaps most uncomfortably oppositional 'ethnic' other in the mythico-history – Croats.

This theme persisted in mythico-historical constructions of the recent wars. In 1986, as earlier mentioned, a memorandum was 'accidentally' leaked to the press from the *Serbian Academy of Sciences* in which it was argued that Serbia was systematically undervalued and victimised in the SFRY. As the following extract comments:

> In these conditions and under constant accusation of being "oppressors", "unitarists", "centralists" and "police", the Serbian people have not been able to attain a level of equality in Yugoslavia, a country for the creation of which they have made the biggest sacrifices. (Grmek, Gjidara, and Simac 1993, 38) [my translation]

This highlights an important role academic institutions played in vocalising and producing particular discourses – a theme I return to in chapters four and five when considering scientists' academic and media engagements.

Finally, in the Serbian mythico-history, continuity is often drawn between the NDH, legitimated on the basis of a mixture of Nazi and Croatian national ideology during the Second World War and the new Croatian state established in 1991. Whilst the constitution

23 For a discussion of 'national' statistics and their role in representations of the post-Yugoslav wars, see Jansen (2005a)

of the most recent Croatian state does not recognise the NDH as a predecessor, some far right groups in Croatia drew connections and members of the Croatian Home Guard – the armed forces founded during the NDH – received a state pension after independence. The forced movement of Serb identified populations in Operation Flash and Storm, with US support, were also seen as confirming this view, and I found the Croatian military forces were often referred to by Serb veterans and some citizens of Serbia as *Ustaše*. An added complexity here is that the USA was not aligned with the Axis forces during the Second World War, but in drawing a line of continuity between the NDH and the new Croatia, some constructions of the Serbian mythico-history would pass over such details which did not fit into their ordering of the world.

In contrast, 'Serbs' were referred to by some people with whom I spoke as 'antifascist' and tropes such as 'We were the Partisans, *they* were the Ustaše' were used to corroborate this narrative, showing how historical traditions were selectively chosen and other groupings and historical facts, such as Četnik-Ustaše collaboration, were deliberately ignored in the production of the mythico-history. On this view, Yugoslavia was understood as being a multicultural haven and the recent wars were understood as motivated by secessionist nationalism in which Slovenes and Croats turned themselves against Serbs.[24]

Whilst I will discuss the nineties in more depth from the scientists' perspectives in chapter two, several important events contributed to the deepening of the victimhood trope earlier discussed. These included sanctions being placed against the FRY (Serbia and Montenegro) which prevented travel abroad for many, along with a vilification of 'Serbs' in the western media, perhaps most explicitly by the BBC, where some journalists even referred to Serbia as

24 This narrative is most clearly articulated in the recently produced film The Weight of Chains, which one interlocutor at the Observatory suggested I watch. For details see http://www.imdb.com/title/tt1789083/ (accessed 24/10/12).

'Mordor'.[25] Such events highlight the important role of international media in shaping the mythico-history and of making sharp moral judgments themselves. In addition, the ethnic cleansing of certain regions, such as Operation Storm in 1995, which took place in a region of what is presently Croatia (*Krajina*), permitted a mapping in some constructions of the mythico-history, whereby the 'West' was understood as having an agenda of victimhood against the Serbian people. The NATO airstrikes in May 1999 further contributed to this victim narrative, and finally, for some, the secession of Montenegro, which many Serbian nationalists understood as part of 'Serbia'.

Finally, as earlier hinted, I did not come across 'one' mythico-historical narrative alone. For instance, some Serbian nationalists with whom I spoke regarded 'Croats' as an 'artificial' or 'made-up' nation, which they then contrasted with 'real' Serbs. The changes to the linguistic standard in Croatia during the nineties was sometimes used to corroborate this, alongside the pronouncement that 'Serbs' didn't make any changes to the standard and left the language in its 'natural' state. Other Serbian nationalists regarded 'Croats' as a 'real' nation, and accepted the Croatian standard and Croatian nationalist explanation of Croatian mythico-history, but refused to permit that 'Montenegrins', 'Bosnians', or 'Bosniaks' constituted 'real' nations.

Croatian mythico-historical themes

In the Croatian mythico-history, I found that Serbs often featured as an aggressive, more 'primitive', more numerous and therefore more dangerous Other. Croats were imagined as comparatively civilised and European, with Habsburg belonging, Catholicism, including a stress in the church on education, and the earlier standardisation of the language cited as key (see Peti-Stantić 2008).

25 See http://news.bbc.co.uk/2/hi/europe/4788592.stm (accessed 24/10/12).

The Habsburg period had a degree of significance in both the Croatian and Serbian mythico-histories precisely because of this, and Habsburg belonging was frequently associated with petit-bourgeois proclivities. In the Croatian mythico-history, I found that 'Serbia', despite Vojvodina – the Northern region of Serbia, having a history of recent Habsburg rule – was mapped onto Ottoman rule and the phrases 'Serbism' and 'Turkism' would be used almost synonymously by some interlocutors.

In the Croatian mythico-history, the victory of the Partisans after the Second World War, sponsored and armed by UK forces, was seen as a failure for Croats to establish an independent 'nation-state' (albeit not necessarily under the conditions offered by the Ustaše, which few were happy with, for there were mass defections to the Partisans) and the SFRY period was understood as a period in which Serbian 'culture' – understood as inferior, less European and less civilised – dominated public life, whilst the use of Croatian words was prohibited in official documents. The use of Cyrillic in state documents, and the use of a standard which was not 'pure Croatian' in Zagreb was cited as key, and after the break-up of Yugoslavia, a process of linguistic purging (*čišćenje jezika*) took place in Croatia, which consisted of both of a revival of words earlier used, and the invention of new words to replace words deemed international or 'Serbian'. In the Croatian mythico-history, the formation of the SFRY was viewed as an aberration preventing further Europeanization and was almost always mapped onto the Greater Serbia project. The recent war in Croatia was often referred to as the Homeland war (*domovinski rat*) by Croatian nationalists, and was understood as an emancipatory success for the Croatian national idea. It was also understood as an economic victory gaining freedom from Belgrade; Belgrade when capital of the SFRY was sometimes depicted in discussions with people in Zagreb as having been a centralising force draining the economic benefits of hard work done by Croats in order to enrich the living standards of 'lazy southerners' in the less economically developed regions of the

SFRY. These details are of particular importance in understanding aspects of 'discursive hegemonies' encountered during the interviews with scientists in the next chapter.

Conclusions

In short, this chapter has provided a reference frame for those unfamiliar with the broader geopolitical context, of changing institutions in Croatia, Serbia and the former Yugoslavia, and finally with a bank of mythico-historical themes: selections which Serbian and Croatian nationalists frequently employed and which created a moral basis for future social action. The actions of nationalists attempted to determine the future courses of individuals and institutions, both in a metaphorical sense in terms of future options available, and in a literal sense, for the hundreds of thousands of people who had to move, as refugees or in planned forced migrations during the nineties wars, as national cosmology increased in importance.

These actions can also be situated within the broader context of different modernising projects – socialist and capitalist – and the move to post-socialism, here accompanied by war and, in Serbia, sanctions against science. The reference frames discussed also ground our exploration of the situation scientists found themselves in, in terms of theoretical anthropological approaches as well, and I will continue to draw on some of these insights in the chapters which follow.

CHAPTER TWO: narratives of science in 'transition'

This chapter focuses on scientists' reference frames. Whilst in the previous chapter I used the term as an informal metaphor, thinking loosely of reference frames as a concept in astrophysics, in this chapter I more clearly employ it in the social psychological sense (e.g. as Clark (1953) uses it) of referring to the ways in which scientists filtered information in their surroundings to produce specific meanings and make sense of the world – a sense encompassing their use of national cosmology. This might be contrasted with a 'cultural lens' view (drawing on Franz Boas' work) where different 'cultures', such as 'Serbian' and 'Croatian' culture lead scientists to articulate histories of nineties and post-war period differently; reified 'cultures' playing an explanatory role, rather than messy cultural differences providing relevant descriptive material. Rejecting such a culturalist perspective, I view any homogeneity I came across in the accounts as relating to attempts by scientists (and people more generally), to create an ordered social universe (a cosmology). It struck me that certain aspects of narratives describing everyday experiences during the nineties were relatively uncontested. I suggest this is because certain discursive hegemonies were established in relation to the increase in importance of national cosmology (Malkki 1995) and in the new state contexts produced. As Bourdieu remarked, when labelling:

> what is at stake in the symbolic struggle is the monopoly of legitimate nomination, the dominant viewpoint, which, in gaining recognition as the legitimate viewpoint, causes its truth as a specific, situated, dated viewpoint to be misconstrued. (Bourdieu 1986, 26)

Consequently, to comprehend themselves as 'citizens' in a state in a wider, modern world composed of states, people were required to accept the national (state) categories produced in the manner they were during the wars in order to socially function. As such, particular narrative explanations defining aspects of the wars emerged from centres (i.e. Belgrade and Zagreb). The scientists alongside whom I worked were thus compelled to understand the changes in terms of new 'national' categories, in order to be able to even begin a discussion with people in other places. I especially found that students who had been born after the war tended to accept the new national categories much more readily as given, for they had known no different. As Roseberry remarked,

> what hegemony constructs, then, is not a shared ideology but a common material and meaningful framework for living through, talking about, and acting upon social orders characterised by domination. (Roseberry 1994, 361)

The narratives which scientists presented me concerning the trajectory of science over the past twenty years differed substantially, as a result of post-socialist hegemonies established in and through the experiences of war and/or geopolitical isolation, combined with the increase in importance of national categories and the different ways in which scientists and politicians oriented themselves with respect to the socialist past, the capitalist present, and geopolitical meanings attached to Europe and the Balkans. As concerns claims to Europeanness as contrasted with an orientalised Balkan 'other', as Bakić-Hayden commented:

> In the current struggle for representation of self and "other", those Yugoslavs who have not scored high on the hegemonic western scale find their own "others", whom they perceive as even lower. (Bakić-Hayden 1995, 924)

This throws up the question of 'methodological nationalism', particularly as some of the contrasts I have drawn in this chapter have been between 'Belgrade' and 'Zagreb', which may be taken to refer to a contrast between 'Serbia' and 'Croatia'. Methodological nationalism is the view, in social sciences, that "the nation/state/society is the natural social and political form of the modern world" (Wimmer and Schiller 2002). As such, it concerns the analytic deployment of the concept, a deployment overwhelmingly present in policy literature[26], which assumes states to be 'natural' units of political organisation in the modern world, a view which nationalists frequently naturalise through arguing that particular states exist to represent particular 'peoples'. Consequently, as earlier discussed, I have been careful to avoid the analytic deployment of states as natural units in the modern world, and most certainly have not referred to the existence of 'nations' in a biological or cultural sense. However, through existing political institutions, there of course exist certain regularities in the social world that exist as a function of the (hegemonic) acceptance of such units as organising social life. As such, I have employed use of frames such as 'Serbian' or 'Croatian' as an ethnographic reality which I have attempted to render, and which I do not believe we can simply ignore in anthropological writing. To make this distinction clear, I have used the term narrative to describe scientists' accounts, and the use of the concept of hegemony to describe the unspoken (methodologically nationalist) assumptions on which those accounts are based, rather than claiming to describe how the situation 'really' was in Serbia and Croatia.

Consequently, before considering contested features of discourses which emerged in the interviews I conducted with scientists, I first describe relatively 'uncontested' features of everyday experience, before moving to concentrate on dominant cleavages between different groups of researchers making particular claims. I argue

26 See for example (Prpić 2011), which naturalises a 'Croatian' frame for discussion of public understanding of science.

that such differences in opinion relate to political distinctions. I make two arguments. The first is that groupings that interlocutors frequently mentioned relate to their positions concerning the changing political economy of the region. Second, I argue that points of contestation between interlocutors are of particular anthropological interest, because they direct us to important political cleavages between such groupings. Ultimately, these will influence future events as the success of certain political groupings has much wider social consequences. I begin with some short notes on cosmopolitanism and science.

Science and cosmopolitanism

One key feature of many natural sciences, including astrophysics, is the cosmopolitan claims they make. During the SFRY, the modernising claims of Marxism created a Marxist cosmopolitan opening, in this context, less elite (i.e. less associated exclusively with the Party elite) than in the USSR. Many people made extensive use of the privilege of their *crveni pasoši* (red passports) to travel in both Eastern and Western Europe (see Jansen 2009). This situation contrasted sharply with the economic situation in Serbia when I conducted fieldwork, with visa regimes making travel to certain countries, including the UK and USA, expensive and difficult. During fieldwork, whilst cosmopolitan orientations were *aspirations* on the part of some people with whom I worked, especially students and those focusing on higher education, many of the scientists I interviewed were already moving in such cosmopolitan circles.

The phrase *svetski čovek* (worldly person), which had a positive connotation, emphasised this orientation and was one way of expressing the related idea that travelling, combined with a high level of education, had a positive effect in producing a particular kind of person. This was particularly evident in Serbia with the removal of the highly restrictive EU visa regime following the wars

and embargo; for as (Greenberg 2011, 88) observed, "for many citizens in their twenties and older, abolition of visas restored the worldliness and mobility that defined Yugoslav citizenship during the socialist period". It was, she argued, one step closer to 'normality', namely, "a return to a high standard of living, international respect, and a functioning Yugoslav (*now Serbian*) state". (ibid., 89). I found that this aspiration was also expressed with a strong enthusiasm, on the part of many people, and especially students, for learning foreign languages.

Niches such as learning specifically British English (as students were more frequently exposed to American English through mass media) were clear indicators of distinction (Bourdieu 1986). Besides foreign language learning, the natural sciences too were an option for students who wished to travel. The universal enlightenment claims of much scientific knowledge provided both common interests and a global network. Some students related explicitly how, for them, the natural sciences offered opportunities to live abroad, and that a good university degree in a science was their ticket out of the region. For instance, when living in Zagreb I conducted a survey amongst students at the physics faculty, wherein students were asked specifically about future career plans and aspirations. One student made the following comment:

> Several years ago I concluded to myself that I wanted to get out of this country as soon as I could, as soon as my basic living requirements and income were assured. I just wish for the opportunity, because abroad I will have a much bigger chance for work in interesting fields and on interesting projects.

Such cosmopolitan aspirations connected with the natural sciences marked out a degree of continuity with the SFRY, as self-managing socialism was a modernist project and science played a cosmopolitan role in its modernisation. Indeed, during the SFRY there was

a strong social prestige attached to academic ability and knowledge learning and academics were accorded a special status in society. All citizens were encouraged in their education. As Blagojević described in Eastern Europe and the SFRY,

> official ideology and a politics of equality strongly encouraged women to get a good education. Education, besides Communist Party membership, was the most important asset for upward mobility. (Blagojević 2009, 42)

This fact possibly related to the academic orientation and emphasis on universal education of Marxist theory. As the *Report on the Modernisation of Science Policy and Management in South Eastern Europe* noted:

> Scientific institutions, universities and scientists enjoyed certain social privileges based on expectations that science could solve a number of social problems, and that it provided for an easier and more efficient way of reaching certain development goals... such understanding tended to over-evaluate the power of knowledge, particularly in comparison with other activities and productions. (Kobal and Radošević 2005, 48)

Yet whilst the privilege of a good level of university education struck me as continually highly valued, there was much less optimism about scientific progress and funding in the present day. Despite a value frequently placed on education regarding an ability to create particular kinds of subjects – in the best tradition of Rousseau's Emile (1991) – there was a widespread suspicion, or rather resignation, that it was your connections (*veza* - singular; *veze* - plural) that mattered to secure a competitive advantage in the workplace, rather than your ability to perform in exams, as I have discussed in other contexts (Hodges 2017).

For example, in May 2009, I visited a private school in Košutnjak, a wooded area around 6 km south of the centre of Belgrade, on the invitation of a friend who was working there as a chemistry teacher. I drank coffee with several science and maths teachers, who were willing to chat about their experiences there. As we drank coffee, the chemistry teacher showed me the official textbooks he used in classes. He was very fed up. 'Look at this', he remarked, pointing to a diagram of a chemical structure on an open page. 'this is completely wrong'. He showed me several basic errors in the textbook and claimed that the poor quality of textbooks had implications for his teaching. When I asked why the books had so many basic errors, he claimed that the author of the book was a member of Milošević's political party and that the publication of the textbook related to their ability to network rather than their ability to teach science well.

Such politicians, some of whom had profited heavily out of recent privatisation deals, were viewed as crooks, and blame was attributed to them and their actions as individuals for much of the recent military conflict, as in the above example. A strong egalitarian ethic persisted among many, in Belgrade especially, whereby many viewed the acquisition and crass consumption of excessive wealth as morally problematic. This was likely in part a legacy of the socialist heritage. Yet I speculate that it was also historically connected with the fact that people living in the region in centuries previous had not been at the centre of 'empire', and had therefore lived in relatively egalitarian surroundings, in comparison to other regions of Europe which have a history of very hierarchical relations stretching back over several centuries. As such, richer people were more often seen as crooks rather than as successful self-made individuals. Overwhelmingly, this perception was reinforced due to the existence of a class of war-profiteers who were fond of crass and conspicuous consumption practices (Jansen 2005, 154), and who crossed-over significantly with the politician 'crooks' described above. In nineties Serbia, the class of

war profiteers were popularly associated with a particular variety of music combining dance beat and semi-traditional folk melodies, *turbofolk*, which earned politicians and patriots connected with this grouping the label *turbonationalists*.[27] This possibly also explained the continued high value attached to devotion to academic learning, as a means of distancing oneself from the turbonationalists, who were portrayed as uneducated (*neobrazovani*), illiterate (*nepismeni*) and uncultured (*nekulturni*), the term cultured here designating an acquaintance with an collection of high-brow cultural works and behaving in an appropriate, well-mannered way.

These groups of criminals, according to those I spoke with, had extensive links in government circles and were effectively, 'running the show' during the nineties. For example, when the war criminal and politician Karadžić, discussed in the introduction, was captured in June 2008, a series of stickers were placed around Belgrade city centre, embossed with a picture of *Mayor Quimby* and *Police Chief Wiggam*, both famously corrupt characters from the cartoon series *The Simpsons*. Mayor Quimby, who signified key figures from the government, was handing the Police Chief a large amount of money in exchange for information regarding the whereabouts of Karadžić. Yet whilst the turbo-nationalists and organised crime were partly blamed for the failures of state institutions and profiting out of the wars, the old socialist government bureaucracy also received a portion of the blame. Many previously state owned enterprises were sold to 'friends', thus creating serious private monopolies in some areas.[28] In fact, when the SFRY was dissolving, the main aim of the red elite may have been to conserve the advantages, be they cultural, institutional or economic, which they held under the previous system. As Sekulić and Šporer (2002,

27 The film *Rane* gives an impression of the possibilities and lifestyle choices made by some of these profiteers in Belgrade during the nineties.

28 The supermarket Maxi in Belgrade made in 2008, I was told, a profit margin of 35% in comparison with Tesco's 7%. Tesco's figure for 2011, 4.38%, suggests the figure for Tesco may have been accurate. From an anthropological perspective however, it is the importance that was attributed to the statistic given, rather than its accuracy. For Tesco, see http://www.google.co.uk/finance?cid=4116076 (accessed 11/3/12).

85–86) summarised, "the socialist nomenclature "converted" political capital into economic capital by using their connections and control of resources... the reproduction of socialist elites is a main feature of these transitions".

The issue of corrupt privatisation deals was not specific to the former Yugoslav region. It is a well-recognised feature of post-socialist changes throughout several states in Eastern Europe (Sajo 1998). It was perhaps exacerbated by the context of war and the prevalence of a black market finding extra opportunities in the war situation. This led to common characterisations of the politics of post-socialist governments in the region as a 'circus' (*cirkus*) and a widespread feeling of apathy and resignation regarding one's ability to secure a job or a livelihood without mobilising a connection.[29] It also meant that, due to the importance of having connections, and the assignment of positions at institutes to friends and relatives, there were people working in institutes and schools who had little or no reputation in Croatia/Serbia or abroad, and who did little work relating to their discipline, but maintained their positions through managing connections.

Corruption, as many commentators on post-socialist transition have already commented (e.g. Verdery (1996), Hann (2002) & Creed (1998)), was an issue which was exacerbated when those who had privileged access to state resources under socialism (often on the basis of familial or professional links) converted their social capital into hard capital (Sekulic and Šporer 2002). One professor, who worked at the Institute for Physics in Belgrade, stated the issue as follows:

> We are still influenced by a tribal mentality... it's not so much a question of whether your laboratory is advancing enough and producing an outstanding output, it's much more important if your director, the manager

29 The term *bezveze* (one word), besides meaning disconnected, also means 'stupid'.

> of your section, of your institute, of your department has a good political position in the government, and it is this tribal mentality, which is the most I would say, the biggest obstacle for establishing normal relationships between your scientific work generally, intellectual output, your official position and even your social position.

His use of the term 'tribal mentality' is evocative and partly relates to the importance of connections. Such connections assumed central importance as state socialism, however structured, entailed a contract being made between citizen-workers and 'the state', whereby work was 'exchanged' for extensive welfare provision. The state is better understood, as several anthropologists have argued, as a group of persons organised in a particular kind of way (Ferguson and Gupta (2002); Mitchell (2002)), and it continued to support factories and other producers, manufacturers or providers of services whether or not they were run profitably. This commitment is sometimes referred to as 'soft budget constraints'. This meant that 'if enterprises do not have to show a profit, and if performance is judged on output alone, then they had better suck up all the labour and materials they can get' (Creed 1998). This had the effect of empowering local planners, who would often hoard resources and then exchange them on the black market with other local planners. Consequently, party officials and local planners who had such resources played a role as brokers; other people had to establish connections with them in order to gain access to positions, services or goods they desired, creating a hierarchy around certain privileged persons in state institutions. This had the institutional effect of creating networks of people who would do one another favours, often connected to involvement in party activities. In Yugoslavia, due to the market socialist system, which President Josip Broz Tito claimed to be a third way, budget constraints were considerably harder than in many centrally planned economies, but workers were nonetheless kept in employment

over going bust, as high unemployment would undermine the egitimacy of the claims of the socialist government. As Woodward (1995) illustrated, unemployment in the SFRY was understood by political analysts and critics of Yugoslav socialism as high relative to the claims of universal employment made by the political elite.

Sanctions against science

Now we turn to consider narratives of the nineties which I was presented with by scientists in Belgrade. Whilst I do not want to make the inductive argument here that their narratives defined science in 'Serbia', there were likely regularities which concurred with experiences of other scientists as a result of being placed under similar political constraints. The key issue which many scientists in Belgrade repeatedly mentioned to me concerning the nineties was the impact of sanctions placed on SR/FR Yugoslavia. The sanctions came into effect in May 1992 when the UN Security Council passed a resolution calling for the suspension of 'scientific and technical co-operations and cultural exchanges and visits involving persons or groups officially sponsored by or representing the Federal Republic of Yugoslavia (Serbia and Montenegro)'.[30] This was part of a much wider series of measures, including an embargo, which left people living in the state relatively isolated until the year 2000 when they were lifted.[31] Many researchers at the observatory, and many other people with whom I spoke in Belgrade, referred to the embargo period and the nineties more generally as a very difficult time, in which besides isolation, a sharp drop in living standards occurred for many. (Jansen 2001, 9) noted that people alongside whom he conducted fieldwork termed this drop 'the situation' (*situacija*). Researchers at the observatory recounted stories of scarcity: sheets of paper for printing were counted out

30 The UN security resolution is available online at http://www.hm-treasury.gov.uk/fin_sanctions_bosnia.htm, (accessed 6/7/2011).

31 This followed the beginning of the war in BiH, following BiH's declaration of independence in April 1992.

one by one and carefully rationed; gaining access to an internet connection was extremely difficult; researchers were subjected to an official ban on access to international scientific journals. I was told that the situation was highly de-motivating for many, for almost all scientific projects relied on continuous access to data and information about what was occurring in other scientific centres the world over. Only those scientists who were analysing already obtained data sets, or working out theoretical simulations, were able to continue conducting research. Some scientists, conversely, threw themselves completely into their work as a means of escaping from the politics which dominated everyday life, referring to science as a kind of 'refuge'. 'What better place to escape to,' one astrophysics researcher related to me, 'than the stars?'

The isolation and the context of war meant that the quality of education in Serbia decreased seriously, exacerbated by the fact that due to hyperinflation, salaries were virtually meaningless, and many teachers had little motivation to carry on teaching. This decrease in quality of education was frustrating for many researchers, not only because new generations of students had many gaps in their scientific knowledge, but more generally because a poor educational standard was linked by some researchers, as discussed in the introduction, to the growth of populist nationalisms. The political context also had direct implications even for sites of scientific knowledge production. For instance, cities such as Belgrade and Zagreb were flooded with refugees as a consequence of 'nation-state' formation. There were two significant 'waves' of refugee movements to Belgrade, the first in 1991-1992 from Croatia and Bosnia and Herzegovina, and a later one in 1995 due to *Operation Flash* (May 1995) and *Operation Storm* (August 1995) from Croatia. Refugees even came to live on site at the observatory, where there was a significant amount of land and a number of disused buildings.

This impacted on research in quite complicated ways. For exam-

ple, when I first visited the observatory, I was shown around by Prof. Aleksić. Upon leaving the main building, Aleksić took me around the site to show me the big telescopes, although he did not mention at that time that they were not really used any more, perhaps as it was something he took for granted. This is because most research completed today in astrophysics is done by computer, using data sets gathered from a small number of very powerful telescopes located strategically across the globe or in orbit.[32] As we moved between the various buildings housing differently sized telescopes and wandered over towards the radio transmitters, I noticed a lot of dogs roaming the area. Aleksić explained their presence through the following anecdote. As mentioned, during the nineties, cities such as Belgrade and Zagreb were flooded with refugees. At this time there were several buildings in the observatory compound which were unused, according to Aleksić. Many refugees thus came and lived in those spaces during the nineties.

When property was privatised everyone technically had the right to buy the homes they inhabited for a nominal fee, which resulted in many of the refugees on site becoming homeowners. The telescopes were still in use at this time, and so the site required as little light pollution as possible. Yet with the newly occupied houses and extensive street lighting, the situation was far from satisfactory. In order to resolve this problem, the observatory asked for a law to be passed restricting the use of street lighting around the observatory. Consequently, the home owners, worried about security at night, bought dogs to guard the houses resulting in the present day situation. Aleksić's anecdote charted the interplay between a number of important processes going on during the nineties and how they impacted on people's everyday life in this locale in a very specific way. The story is also a little too neat for an anthropologist to hear on a first visit to a potential field site, suggesting that Professors such as Aleksić were keen for me to visit and had an understanding of what may be of interest to anthropologists.

32 One example is the ESO (European Southern Observatory) in the Atacama desert, Chile. See http://www.eso.org/public/ (accessed 19/8/11).

During the period of sanctions, some scientists with whom I spoke emphasised how they managed collaborations and even attended conferences in other states through networks of friends and associates on an individual level. However, they also pointed out that the relative isolation and the domestic political environment made undertaking scientific work very difficult, for as Aleksić commented:

> The full atmosphere of the state of siege which existed during the nineties wasn't conducive to science in general, you cannot really expect science, which after all does require some sort of at least a little bit, or vaguely, ordered society and relations in society, to be successful. It is really, again with a couple of exceptions with some more peaceful or smoother intervals, it was chaos. It's rare to see science having some success in times of chaos.

Besides isolation, some scientists mentioned how Milošević's government exerted pressure on the university and particularly on 'liberal' groupings of intellectuals (such as the *Board for the Defence of Democracy*). In the early 1990s, university staff were all dismissed and then asked to reapply for their positions, signing a contract with the university that pledged loyalty to the government (Grujić 1999). Grujić argued that this was a means by which 'disobedient' members of staff were purged.[33] A similar process to this took place in Zagreb, where President Tuđman sought to 'resolve' combatant elements within state institutions in the mid to late nineties (Stubbs and Zrinščak 2006, 4). This resulted in a purging of staff members who did not have the interests of the Croatian homeland at their heart, and especially people designated as 'communists'. This meant that although there was a substantial continuity in politicians assuming positions in government, there was a certain

33 I could not find statistics concerning the number of staff 'purged'. However, his statement concerning this is of anthropological interest, and I came across similar accounts in Zagreb.

amount of change as well, and I frequently heard comments from students and researchers claiming that the newcomers to government in both Belgrade and Zagreb during the nineties were not well-educated enough. Quite how bad the nineties were in Belgrade was also questioned by a researcher with whom I spoke who had arrived in Belgrade as a refugee from Sarajevo. She felt that the difficult sanctions should be in context when refugees such as her had been forced to flee for their lives when faced with military combat in the towns and villages where they lived. For this reason, the grumbling of *Beograđani* surrounding the nineties irritated her.

In contrast to Belgrade, the newly formed Croatian state, which declared independence in June 1991, and whose independence came into effect in October of the same year, was not placed under international sanctions in this period. As concerns scientists, continued access to journals was relatively unproblematic and physical disruption was relatively minor in Zagreb. The war did have a significant impact however; there was an interruption of work to dash to bomb shelters and the atmosphere of insecurity which often accompanies war situations. Some researchers in Zagreb also mentioned feelings of insecurity and aggression, associated with direction from Milošević's government in Belgrade, members of which dominated the JNA (Yugoslav People's Army). These feelings of persecution were perhaps stronger for many in Croatia and Bosnia and Herzegovina, as wars were fought in these areas from 1991-5 whilst they were not in Serbia, except for later, in Kosovo from 1998-9. Indeed, there was military combat in several other parts of Croatia, such as the regions surrounding Zadar and Dubrovnik (*Operation Coast*, starting Autumn 1991), and so disruption, including to the universities in these cities, is likely to have been much greater than in Zagreb.

Contested experiences

There were two contested features which struck me as important in the narratives I heard when interviewing scientists about their research. The first point of cleavage in the narratives with which scientists presented me was between Belgrade and Zagreb, concerning the extent to which there had been a unified operational scientific network during the SFRY. The second point of cleavage I noted within narratives presented to me by scientists in Belgrade. It concerned the extent to which nationalist and socialist elements of the Milošević government during the nineties had adopted anti-science positionings. These key differences often pointed to political differences between various scientists. Since the political context is particularly complex, it is worth excavating these differences in some depth through the interview and ethnographic material.

Was there a Yugoslav *we*?

The first striking difference was that scientists in Zagreb more frequently played down the amount of collaboration with Belgrade, some arguing that Yugoslavia had in fact been a confederation rather than a federation, and that the idea of a Yugoslavia 'breaking up' ought to be regarded critically. This issue ran as deep as naming the character of the military conflict in the nineties. In Croatia the ruling elite and many citizens defined it as the 'Homeland War', whilst in Belgrade I heard it more often described as a 'civil war'. In Belgrade I also came across much more nostalgia for the SFRY, yet also a greater variety of opinions about the past and the nineties.

Some researchers with whom I spoke in Belgrade had a nostalgic view of the SFRY and of the quality of science conducted in this period. For instance, one day, shortly after arriving, I decided

to visit the Department of Physics at the University of Belgrade, to enquire about whether there were any professors of astrophysics there, and to learn a little bit more about the work that was done. I had been given a contact in the Department of Physics through a professor of chemistry that I knew through an academic colleague, Joksimović, with whom I had worked at the University of Manchester – this illustrates how I rarely met people 'blindly' solely through email contact or a phone call, but instead through established networks of 'someone who knows someone else'. The contact's specialty was in nuclear physics. He was very keen to speak to me and we organised an impromptu interview. Throughout the interview, he often used the phrase *kad smo mi bili jedna država* (*when we were one state*). This emphasised a sense of unity which many scientists in Zagreb argued never existed; some were critical of the idea that there had even been some kind of a network in some sciences in the first place. This professor, Filipović, acknowledged that in the case of his discipline, nuclear physics, 'in the old Yugoslavia activities were divided between three centres; Belgrade, Zagreb and Ljubljana and they tried their hardest to make sure there was no overlap'. Yet there was communication, and whilst there was a division of labour, they were working on larger common projects, which the dissolution of Yugoslavia negatively affected:

> When the break-up began, when it could be seen in the distance (*da se nazire*), it became clear that each of all these statelets (*državice*), which were formed from the big Yugoslavia, would *become* damaged because inside each of these statelets, those things that ought to be covered couldn't be. And the effects of that are felt even today. Belgrade has absolutely no accelerator physics and Zagreb has no reactors.

Following the breakup, the links between centres became difficult to maintain:

> Once the links were very strong. People went from here to work there and from there to work here... and it was really one state. Despite some continuous tensions which existed between the centres but that's all that was... And now after the break up... I think that the situation has got worse for them (Croatia) in relation to how it was when we were the big Yugoslavia but it has got especially bad here. In Serbia nuclear physics has practically stopped existing.

According to Professor Filipović, the situation today is thus quite different to that which existed in Yugoslavia. He used the term 'državice' (literally 'statelets', i.e. little states) to describe the post-Yugoslav states. This term, which had a pejorative connotation, was a term I never came across in Zagreb. The relative size of the new states, or as Filipović termed them 'statelets', and their previous focus on different production areas when part of the SFRY suggests that certain resources in each of the recently formed states may have become difficult to obtain. For some sciences, this means that the critical mass necessary to conduct state-of-the-art research has been lost. According to Filipović, repercussions of this were particularly damaging in sciences such as nuclear physics as the new states could only play a role as *consumers* of new technologies, not as producers. Filipović was not the only Professor in Belgrade to reference a Yugoslav 'we'. I also interviewed the director of the observatory about his experiences during the sanctions and about the situation at present surrounding collaboration with Croatia. During the SFRY period, there had been some collaboration with an observatory on the island of Hvar, so I asked specifically about this:

> No, unfortunately with the Hvar observatory we do not have such links which would improve collaboration anymore. Of course we follow what they are doing, we know some people personally and sometimes meet them here and there around the world

> at international meetings and so on. But collaboration, of the kind that existed before the splitting of the former country does not exist [my emphasis].

Another Professor, Aleksić, used the same phrase in an interview:

> ...Well of course this was the time of the crisis, the political problems which happened with the splitting of the former country, with all kinds of economic problems, due to the sanctions which were imposed on this part of the former country [my emphasis].

Referring to Belgrade, or perhaps a larger geographical location, as 'this part of the former country' evokes different associations to describing it as 'Serbia'. Besides interview references, I also came across maps of the SFRY more frequently in Belgrade. For example, such a map was hanging surreptitiously on the wall behind the main door to the main lecture room in the Astronomy and Astrophysics Department at the University of Belgrade. Also, on a visit to the *People's Observatory*, an observatory which members of the public could visit, one worker got out a map of the former Yugoslavia and spent several minutes explaining to me his version of the historical linguistics of the region and why that meant that the Croatian language does not exist.

In contrast, I cannot recall one occasion when I saw a map of the SFRY in Zagreb. Where there were maps of surrounding countries, maps were titled as referring to the South and/or Western Balkans, with the territories of the newly formed states marked out. Additionally, professors from other physical science disciplines in Zagreb did not emphasise the previous existence of connections, claiming that, apart from being politically supported, the connections between SFRY republics were on a similar level to other international connections. For example, I interviewed Professor Horvat in Zagreb. Horvat had had a role in Croatian President Tuđman's

government as a scientific advisor and at the time of fieldwork worked at the PMF (*Prirodoslovno-Matematički Fakultet* – Faculty of Natural Sciences and Mathematics). Regarding his sub-discipline, solid state physics, he argued that:

> As far as co-operation within Yugoslavia was concerned, it was politically supported. There was a congress or meeting of the Yugoslav societies or whatever it was but it was not really scientifically interesting. There were some natural interest colleges; there were some people in Belgrade and in Ljubljana who were interesting to me, whom I helped of course, natural contacts. But in my view it was not... it was just the same as any, so to say, international collaboration.

In so doing, Horvat denied the existence of a meaningful network in the former Yugoslavia here, and in the interview he chose instead to stress connections with the USA and France. I rarely heard researchers or students in Zagreb refer to the SFRY as 'we', or present the SFRY as a unity in the manner Filipović did, when he spoke of the time when 'we had been one state'. Instead, the SFRY period was often referred to as a time when 'they' (the Serbs) dominated political life, centralised as it was perceived to have been, in Belgrade. With regard to the recent violence, the aims of 'Serbs' in wanting to create a 'Greater Serbia' were referred to more frequently than a common Yugoslav attempt to save a state built on socialist ideals. Greater Serbia referred to a larger geographical area over which, according to a 'blood and soil' ideology relating to the past existence of Serbian Orthodox monasteries over a larger area throughout the region, some Serbian nationalists claimed that such 'territory' ought to be reclaimed – and I did sometimes come across those advocating such a project in Belgrade. For instance, when I started learning Serbian at a language school, one of the teachers said to me, 'you have Great

Britain, so why can't we have Greater Serbia' (*Vi imate Veliku Britaniju, pa žasto onda mi ne možemo da imamo Veliku Srbiju?*). Yet another 'we' is discernible in the narrative that Filipović presented. This first person plural referred to a community of Yugoslav scientists who had a critical mass. This mass of scientists led to them being considered a global 'player' in their field. This contrasted with the situation at present, where due to the relative lack of connections between former SFRY centres, excessive brain drain, the financial costs of war (many people commented on how the recently formed states were bankrupt), and in Serbia, the sanctions against science, natural science research was now in relative decline. This first person plural was a cosmopolitan grouping which was competitively compared to other (ethno)national citizen groupings (Jansen 2009), in this case, national groupings of scientists. In the case of the SFRY, the feeling of 'being special' (Yugoslav exceptionalism) linked into a Yugoslav cosmopolitanism which Spasić described as 'ourness' (*našijenstvo*):

> Yugoslav cosmopolitanism was also imbued and tangled up with what should have been its opposite – a tendency to closedness, a looking after oneself and one's own, a turning one's back on the external world; in one word, *našijenstvo*. Foreigners there, you could say, would only be accepted under certain conditions. Above all, they had to be defined as guests, who we ourselves had invited. Secondly, they had to express their delight of us and everything that is ours; nothing less than superlatives, and under no circumstances was any criticism in question. Additionally, they ought not to ask too many questions and get involved in our work – we were the ones who knew best of all how we ought to work. Perhaps most importantly, we did not want to be forced to learn so much that our cultural assumptions would be upset and our world reorganised. (Spasić 2012, 3–4) [my translation]

This feeling of *našijenstvo* was importantly connected to the non-aligned positioning of the SFRY which enabled scientific collaborations between both former Eastern and Western blocs.[34] The important point underlying the question of whether there was a Yugoslav 'we' is that fundamental categories concerning the nature of the conflict and the changes differed amongst many scientists, and that those differences reflected political narratives which had become hegemonic in Zagreb and Belgrade. These changes entailed a large upheaval for some people, particularly those with a strong commitment the SFRY, and consequently, some people were left feeling incredibly disorientated by such changes.

Was the Milošević government anti-science?

The other contestation I came across points out a crucial difference concerning Belgrade scientists' understandings of the actions of the Milošević government during the nineties. Some researchers argued that some members of Milošević's government during the nineties had pronounced anti-science leanings. I do not have the ethnographic data to examine the same topic in Zagreb, although in my student survey, some students made comments to the effect that the current government had some anti-science stances.[35] Aleksić from the Belgrade Observatory stated in an interview I conducted with him, that some politicians were intrinsically suspicious of science as something that came from 'outside'. He said that one government minister even used the phrase *odao se nauci* (hooked on science), to derogatorily describe the zealousness

34 Importantly, a feeling of 'being special' and in such a unique position is also key to many radical nationalist arguments based around mythic histories and historical destiny.

35 One professor also made the following comment: 'The position of the natural sciences in Croatia is unstable. After the war there was a big problem at the Ruđer Bošković institute because there were some people who thought that such a big scientific institute is of no use for such a small country, that a small country doesn't need science and so on and so forth which of course was the view we were trying to oppose.'

with which scientists attempted to secure resources for conducting research, and to describe their passion for them. The phrase *odao se nauci* is powerful and evocative in its implications. Aleksić described the anti-scientific positionings of the Milošević government in more detail in the interview I conducted with him. He argued that many members of government simply did not want to invest in the natural sciences, or would only put money aside for what he described as 'politically inspired mega-projects', a framing which resonates with Josephson's (Josephson 1998, 138) discussion of gigantomania as a characteristic of science heavily directed by a central government with an ideological focus. As Aleksić commented:

> On the other hand, there were very few, and very useless (projects), there was a couple of big reputation, or big, if you wish, in a local sense... projects which were more or less completely useless like the accelerator[36] at Vinča, this infamous one which was cut off two years ago finally, when it was completely laid to rest. Of course you have this tradition of vampires in these parts so you never know whether it may rise again at some point but let's hope not because that was an extreme waste of money. It was supported during the nineties because it was a project of Milošević's wife, she was very well acquainted with the Tesla accelerator at Vinča. From the very name, they called it Tesla which is in my view awfully arrogant and impertinent to call something which is really useless, which was never working and probably, according to many experts, wasn't capable of working at all since the beginning. There was great discussion about how much money they had wasted on that but overall it was something of the order of more than thirty

36 An accelerator accelerates sub-atomic particles at very high speeds in order that they split into more fundamental particles. As such, knowledge about fundamental buildings blocks of the material universe can be gleaned from an analysis of the particle collisions.

> million euros which is really big for any western country but huge for Serbia.

When discussing these recent events with several professors, I noticed a slippage between the categories of nationalists, *primitivci*, and even communist ideologues who endorsed 'pseudo-scientific' or 'politically inspired megaprojects'. This perhaps demonstrated the lack of ideological (and social) coherence present during the nineties. As Aleksić stated:

> **Aleksić**: There was very little funding of science, there was little support of science by other means and there was very little serious science in the media. On the contrary, there was a great rise of pseudo-science in the form of various astrologists, parapsychologists, self-proclaimed prophets and all these faith healers and similar guys who got a lot of attention in the media, especially television. So in a sense, even the authority of science was undermined in several ways not only by lack of funds but also by in some cases openly endorsing pseudo-science. There was the case of Transcendental Meditation (TM) which was almost a part of the ideology, again of this party which was called the 'JUL', which was the party of Milošević's wife. They almost endorsed TM as a sort of official part of their ideology. They invited this guy Maharishi Mahesh Yoga who is the founder of that sect or doctrine or whatever you wish to call it. They invited him several times and he came and he rented out not one floor, maybe this is an urban legend, not just the whole floor in the Hotel Intercontinental, but he also rented the floor above and the floor below because he claimed that nobody would interfere with his meditation and he was not constrained.
>
> **Andrew**: I bet he did very well for himself from his methods.

> **Aleksić**: The thing is that that was another way, in a sense, of demeaning and decreasing the authority of science and scientific work being done. Of course, a lot of this is unfortunately continuing to this day, although to a lesser degree.

Such 'alternative' practices, according to Aleksić, enjoyed popularity among fractions of the ruling elite, and this had a demeaning effect on the authority of the natural sciences. For Aleksić then, it was quite appropriate that Karadžić had been working in hiding as a new-age healer in Belgrade, for it exposed him once again as a charlatan using rhetoric to achieve his goals.

Other researchers with whom I spoke argued that funding was low, but there was certainly no negative stance taken towards the natural sciences. For example, one professor at the Observatory commented that 'the policy makers weren't from first rate scientific circles, and so didn't appreciate science'. The lack of appreciation which he perceived was probably related to the relatively low level of funding, a situation which, as the statistics in chapter one have shown, continues to this day.

'National' heroes of the enlightenment?

Some of those researchers I interviewed were members or supporters of the government during the nineties. For example, I conducted interviews with one of the Milošević government ministers for science, who I shall name Matić. I asked him specifically about the relationship scientists had with the government:

> Well science was independent, but there are fields of applied science, for example military institutes, which have political implications, but if you look at astronomy and other fundamental science, this has no relation with politics. The only influence of politics

> on such kinds of science concerns, for example, if a particular director chooses to give more or less money to someone who is in the governing party of, but there is no larger influence.

His strategy here is to play down the influence of politics on science, arguing that science was a relatively autonomous field. Where Aleksić described the ruling elite as 'anti-science', Matić did not describe any kind of opposition as overly demanding of scientific resources; he denied any meaningful differences between the groups regarding science, as well as professionalism. In the interview, Matić carefully stressed enlightenment ideals:

> You know the spirit of science is to improve the life of a person... and if you look for example, in order to explain the universal character of science and its achievements, to the benefit of all humanity.

He used these enlightenment ideals to justify his role in the Milošević government. He claimed that he used his role to 'fight for science' after sanctions had been imposed against international collaboration and sharing of documents. In so doing, he played down possible negative political contributions using a language of sacrifice for the enlightenment ideals of science. The contributions of science however, were understood by him as originating along national lines:

> I tried to explain to foreign ambassadors and representatives that if they want to exclude from human civilisation all the achievements of Serbs, to place sanctions on all of this, then they should bear in mind that Nikola Tesla is a Serb and that if they want to exclude the inventions of Nikola Tesla, such as the production and distribution of alternative current, the asynchronic motor and the rotational magnetic field, and these things were to be excluded from civilization

> by sanctions against all Serbs in the universe, industry in all the world would stop, the electric powered city would stop, many forms of transport would come to a halt, and we would return to the nineteenth century.

Clearly, enlightenment ideals do not necessarily conflict with the more particularist focus of national cosmology. Whilst national categories might have been a pragmatic discursive device used to facilitate global communication by some scientists, Matić here makes use of the category of Serb in a deeper sense, arguing for a particular Serbian contribution to modernity, and furthermore, making the grand claim that late modernity might not have happened were it not for the contributions of Nikola Tesla – therein combining Whig history, emphasising the individual genius like qualities of individual scientists, with a nationalist orientation.

When discussing his narrative of fighting for science, Matić argued that he made the same case when the Milošević government placed similar sanctions on *Republika Srpska*, arguing within the government that these sanctions must be lifted. The underlying enlightenment vision itself is reinforced by scientists the world over, as expressed below in the ICSU (*International Council for Science*) statement which Matić chose to read out to me in his defence of his position:

> Non-discrimination, in pursuing its objectives in respects to the rights and responsibilities of scientists, ICSU, as an international non-governmental body shall observe and actively uphold the principle of the universality of science. This principle entails freedom of association, expression, information, communication and movements, in connection with international scientific activities without any discrimination on the basis of such factors as citizenship, religion, creed, political stance, ethnic origin, race/colour, language, age or sex. ICSU shall recognize and respect the inde-

> pendence of the internal science policies of its national members, ICSU shall not permit any of its activities to be disturbed by statements of actions of a political nature.

Matić did not once mention the influence of the Serbian Orthodox Church. Those Professors who claimed the Milošević government was anti-science however, at least in part attributed this rise in anti-science feeling to the growth in importance of religious sentiment and feeling amongst many people. Prof. Aleksić argued that:

> **Aleksić**: These extreme nationalist guys are really sort of, at least in part, religious fanatics who were by default suspicious of science. That also coincided with a rise in what some people call 'turbo-religiosity', which is like a new-fangled and newly found religiosity of our ancestors.
>
> **Andrew**: Like turbo-folk is to folk?
>
> **Aleksić**: That's exactly the phenomenon it's comparable with. So overall the rise of power and influence and visibility of the church, especially the Orthodox Church, this is a big distinction between the Orthodox and Catholic Church, the Orthodox Church didn't place an emphasis on learning and studying and education as the Catholic Church did. So the problem is that with the exception of a couple of peoplenear the top of professors of theology etcetera, mostly their educational structure is very bad.

Despite attacks on the scientific literacy and/or professionalism of certain politicians and the insinuation of anti-science leanings amongst some sectors of the political elite during the nineties, the attribution of 'being scientific' garnered a high authority amongst all researchers with whom I spoke. For example, one interlocutor named Čukić, suggested that the reason for Aleksić's insistence on education and enlightenment championing of the natural

sciences was connected with accusations he had received from other scientists that cosmology and astrobiology, his specialist areas, were not pure science (*čista nauka*) but in fact closer to being 'fairy-tale'. Cosmology is particularly problematic because it asserts itself as scientific, yet deals with claims which also appertain to other kinds of inquiry, such as theology. This is particularly the case for theoretical cosmology, one task of which is to produce computer simulations of the evolution of the universe over time, given different conditions. Disciplines which were based on real observations, rather than theoretical models, laid claim to being more scientific on account of their use of 'real' observations. Spectroscopy is one such example. Other sub-disciplines, which relied completely on theory, and made some claims which were not falsifiable, or open to multiple interpretations (as was the case with certain hypotheses in cosmology), were viewed by some as less 'scientific'. The implication here is that being scientific is a good thing, and that experiment, namely working with real data rather than simulations, is key. This internal disciplinary dispute became particularly fierce because the heads of different research teams, almost all male, had different political views. Čukić argued that the animosity was in part due to Aleksić's upbringing in a predominantly Četnik milieu. Četniks were royalists who wanted to restore a monarchy in Serbia and hence were also nationalists, although obviously in very different ways to many of the ex-communist party members. From an anthropological perspective, the truth value of Čukić's comment is less important than the fact that he had attributed clearly political motives for the animosity between the Professors, as this gives an insight into the kind of practical logics through which motives were attributed to various people. I speculate that the focus on political motives probably relates to the socialist heritage, for Marxist theory and education focused on politicising everyday life in the sense of understanding various contemporary social arrangements as contingent, and changing them as accomplishable through a political project (see Erdei 2009).

After the fifth of October: changing relations between religion, science and the state?

Milošević's rule came to an end on the 5 October 2000, an event which was hailed a 'democratic revolution' (Naumović 2006). The post-Milošević period bore witness to an increased focus on the importance of religion in the political sphere. Vojislav Koštunica, a politician with strong nationalist views replaced Milošević as president of the Federal Republic of Yugoslavia (FRY), and as (Vukomanović 2008) described, over the past ten years, the relations between the government and the Serbian Orthodox Church have grown ever stronger. In fact, the last ten years have been described by some commentators (Djordjević 2005, op cit. Vukomanović 2008) as a period of clericalisation of the state, as relations between the Serbian Orthodox Church and the state reached a level of high mutual agreement and understanding, mediated through the president, Koštunica and enacted in a series of laws regarding non-pluralistic religious education in schools. As Aleksov (2004, 346) described, religious education was hastily introduced throughout Serbia in 2001, in line with other post-Yugoslav states such as Croatia and Bosnia and Herzegovina, where it was introduced in 1991. However, it is not compulsory; students must choose either a civic or religious education option, although in some regions families are discouraged by the church from opting for civic education (ibid., 355). Occasionally the two options are also sometimes played against one another rather than being viewed as compatible (ibid., 354).[37]

Some researchers told me how they wished there was a greater separation of religion and state policy. For example, in May 2009, I spoke with two young Professors from the University of Belgrade, who had organised a one day astrophysics conference for students

37 After Croatia and Bosnia and Herzegovina were declared independent in 1991, religious education was also hastily introduced, yet no alternative civic option was available, and the connections between state and church were particularly strong in Croatia, with extensive popular approval.

from both Belgrade and Novi Sad.[38] We discussed the situation concerning the funding of the natural sciences in Serbia, which was significantly lower than the EU recommendation and other states in the region.[39] One Professor sighed. 'The renaissance', she said, 'never reached Serbia'. This echoed Aleksić's comment that 'Eastern Europe has never sincerely accepted the achievements of the Enlightenment and the pro-medieval powers have always remained powerful'. Again these comments referenced a perceived lack of interest and investment in the natural sciences by the ruling elite and, in connection with this, the power of the church in shaping government decision making. The power of both the church and the mafia led to comparisons with 'feudalism'.[40]

Two other examples were given of Church influence on education policy, one by Aleksić and the other by one of the fore-mentioned conference organisers respectively. Aleksić's example concerned the suspension of the teaching of evolution on the school curriculum for one week in 2004, thanks to the efforts of the minister Ljiljana Čolić, one of the founding members of Koštunica's DSS, to implement creationist teaching. She was cited in the paper *Glas Javnosti* as stating that Darwin's theory of evolution and the Biblical creation story were equally dogmatic and ought to be taught alongside one another. Aleksić argued in an article written on *Peščanik.net*, a website where many intellectuals who opposed the Milošević government wrote during the nineties, that:

38 Novi Sad is a city around 70 kilometres north of Belgrade.

39 Serbia is already 'lagging behind' other states in the region. See Tatalović (2011). For example, Serbia hopes to increase its science budget to 0.5% of GDP in 2011. The EU average investment is around 1.85% whilst the USA invests around 3%. See also statistics in chapter one.

40 A large variety of different systems of governance have been described under the umbrella term feudalism. Some historians, such as Brown (1974) argue against the usage of the term, which was not used during medieval times. The important point is my interlocuters used the term pejoratively to refer to a system seen as outdated and certainly not progressive, from a period of human history in which the church played an important role in many people's everyday lives.

> This bizarre gesture by the minister in which she argued in a short statement that "Darwin's theory is dogmatic and the decision has been made to teach it alongside the view according to which God create humans and the whole world". This was greeted with applause by delighted creationists the world over, appeared on the front page of the notorious "Discovery Institute" and had even been added to books and monographs describing the history of the creationist struggle against the sciences.[41]

This resulted both in a public outcry and a denunciation by the scientific establishment.[42] The conference organiser's example concerned government advice that people stay inside during the total eclipse of the sun which occurred in August 1999, arguing that it was a public health hazard.[43] An astronomy lecturer from the University of Novi Sad recounted the event as follows:

> It's 11 August 1999, a date special for many astronomers, the day of the total solar eclipse. That particular eclipse could be seen from far north parts of Serbia (close to the border with Hungary), while from my hometown of Novi Sad, and from Belgrade, the capital of Serbia, only a partial eclipse could be seen. Usually from 1pm-4pm there's rush hour. The traffic in both cities is jammed, people everywhere on the streets, you can't take 3 steps without bumping into someone passing by. But that day (my dad told me about it, since at that time I was up north doing observations), there was no rush hour, there was no bumping into people. There was no one on the streets! No cars, no passers-by! The streets in both cities, Novi Sad with popula-

41 Online version available, but not listed to protect anonymity. Contact me for a copy of the text.

42 See http://www.ipsnews.net/africa/sendnews.asp?idnews=25466 (accessed 10/10/11).

43 See Pomračenje Svesti http://www.e-novine.com/srbija/srbija-tema/28799-Pomraenje-svesti.html (accessed 10/10/11).

> tion of about 400 000, and Belgrade with population of about 1.5 million were empty! It was really creepy. All because people got scared of all the harm that a solar eclipse can cause! So while in other European cities people got on the streets and eagerly observed the rare spectacle of the solar eclipse, the people of Novi Sad and Belgrade hid in their homes, with windows tightly shut and blinds covering them.[44]

Despite the concerns of some scientists concerning the influence of the Church on the state in Serbia and Croatia, the current governments, which are at least nominally in favour of EU membership, have committed to focus on investing in science over the coming years in an attempt to reduce brain drain and to encourage scientists who have left to return. For instance, after completing fieldwork, the government opened the *Centar za promociju nauke* (Centre for the Promotion of Science) in spring 2010. The centre is housed in an ostentatious building in *Novi Beograd* (New Belgrade) built with funds given by an agreement from the European Investment Bank, with the promise of promoting a 'knowledge economy' in Serbia.[45] This is despite the current context of economic crisis, and so while, as I have shown, many scientists have felt discouraged by the diminishing funding spent on science, the stance of the current government offered them some hope that investment will increase again soon.

As Bourdieu commented on crisis situations in his sociological study of academia in France,

> conflicts of legitimacy which often give rise to radical arguments... it is this temporal structure of the field, as shown in careers, curricula vitae and accumulated honours, which becomes shaken; the uncertainty

44 See http://cosmicdiary.org/blogs/tijana_prodanovic/?p=69 (accessed 11/11/11).

45 See http://www.cpn.rs/o-centru/?lang=lat (accessed 8/3/12).

> about the future which the crisis establishes in objective reality itself means that everyone can believe that the processes of reproduction have been interrupted for the time being, and that all futures are possible for all people. (Bourdieu 1990, 183)

This suggests that probing what Bourdieu referred to as 'the temporal structure of the field' may shed light on key changes which have affected scientists at the observatory, and on the basis of induction, wider inferences may be conjectured. Consequently, in the next two chapters, I explore such conflicts in more detail through looking at scientists' curriculum vitae, career paths, alliances formed and the dynamics of academia in a different context to Bourdieu's study. Before I do so however, I will explore an idiom that scientists in both Belgrade and Zagreb used to describe their relations with other scientists the world over; the idiom of shared belonging in a 'scientific community'.

CHAPTER THREE: the scientific community

A visit to 'Europe'

At the start of February 2009, a note was posted on one of the main observatory noticeboards stating that a trip to visit observatories in Prague and Vienna was being organised. I was excited, as I thought this would be an excellent opportunity to get to know people better. The trip had been planned by a (now) retired professor, who I earlier called Marić. She lives on site at the observatory and her father and son were, or had also been, resident astronomers at the observatory. The process for the trip, organised through a tourist agency, was relatively straightforward. A representative from the agency came with a presentation displaying pictures of the various sites we would visit. At this point visa restrictions were still in place for Serbian citizens who wished to travel in the EU, and so all participants, except me, had to apply for a visa, which cost thirty-five euros. Partly due to the cost of the trip and existing groupings of friends, it was mainly older researchers who went on the trip. For instance, a doctoral student related to me how she could afford one holiday a year and would rather go snowboarding with friends. Besides various researchers, a secretary and the daughter of the director of the observatory attended, which meant that around ten of us went on the trip altogether. We travelled to all destinations by minibus with the tour guide from the agency, who occasionally pointed out sites of interest to us.

We visited a working observatory around forty minutes by car from Prague in the countryside. When we arrived, we were greeted by an attendant who spoke to us in Czech, and we were told that we would be received as tourists rather than as fellow researchers, and that we would have to pay a fee to look round and view

the exhibition. Whilst I could not understand every detail of the conversation as my Serbian was limited at that point, I got a sense that we were all a bit confused and bemused at being asked to pay a fee to look around a setting with which all, except myself, had an occupational affinity. Marić, who had a talent for managing connections, had brought photos with her of an earlier visit she made to this observatory and left the group to visit the librarian and 'catch up', whilst we visited a part of the observatory that had been converted into a museum.

Several buildings at the Belgrade Observatory site were also being converted into a museum exhibition whilst I conducted fieldwork, as much of the equipment on site was now redundant: in recent years, most data were obtained via internet sources which drew on a small number of powerful telescopes. This museum transformation was partly in response to frequent public requests to look around the observatory which astronomers in Belgrade had reported, and which resulted in a museum exhibition opening in 2010 at the Belgrade observatory.

After visiting the exhibition at the Prague Observatory, we viewed some medium sized telescopes, before visiting some much larger telescopes housed in buildings a short walk away from the main site, with instruments taking up more space than a squash court. We then returned to the library to find Prof. Marić, who was still chatting with the librarian. In the library, there was a piano at one end beneath a large oil painting of a 'great man' whom I presumed to be the founder of the observatory. I noticed that the library was equipped with well-known journals such as *Science* and *Nature* to which the Belgrade observatory did not subscribe at the time. Such publications are expensive to subscribe to, and are 'general' scientific publications with papers on all kinds of recent 'notable' research, rather than solely astronomy and astrophysics. Having such journals gave us the impression that the library was well-equipped and that the people there have the chance to gain a wider

knowledge of the natural sciences. I overheard a comment about this is what we should 'expect' of the Belgrade Observatory if the EU accession process continued, and overall we, as a group, were impressed with the observatory and its facilities.

Europe and the 'knowledge economy'

The trip to 'Europe' and the observatory in Prague entailed an engagement with other sites affected by a 'knowledge economy' model and policy, as promoted by the EU. A 'knowledge economy', as popularised by Drucker (1992), places an emphasis on scientific and technological innovations as key to securing a competitive advantage in global markets, with a focus on non-tangible products. Whilst this emphasis on competitive advantage is neither new nor solely characteristic of recent political changes, the increased acceleration and importance attached to scientific innovation does relate, as we shall see, to the international debt crisis of the 1970s, which also led to a neoliberal turn in policy making. I understand neoliberalisation here neither as a system, nor as a culture (Comaroff and Comaroff 2001), but as a series of economic processes with accompanying new modes of governmentality, which, as a political reaction to the debt crisis resulted in, following Wacquant, the "*remaking and redeployment of the state* as the core agency that actively fabricates the subjectivities, social relations and collective representations suited to making the fiction of markets real and consequential" (Wacquant 2012, 68). However, as we shall see, the establishment of new modes of governmentality does not necessarily occur alongside neoliberally informed economic reforms.

As earlier mentioned, the embracement of neoliberal policies created many opportunities for scientists globally, as the increased speed in product innovation required to gain a competitive advantage in global markets led to a focus on increased funding for

many scientific projects as drivers of innovation in a 'knowledge economy'. This idea of the importance and profitability of 'knowledge' became central to organisations promoting post-Fordist regimes of flexible accumulation. In the case of astrophysics, new information and visual technologies led to several disciplinary innovations often captured by the term 'the information revolution'. Specifically, the increase in time-space compression (Harvey 1989, 260–84) required under the conditions of neoliberal transformations had serious implications in terms of collecting and processing data for a discipline which is focused on understanding and creating images of objects and processes located far away in space-time. As we shall see, the importance attributed to information and communication technologies, as well as a stress on technological innovation has completely transformed much of the work that astrophysicists conduct. The large amount of funding that the observatory near Prague received relative to the Belgrade Observatory suggested that steps had been taken there to pursue this particular competitive 'knowledge economy' paradigm. The expectation that we were to pay an entrance fee suggested increased commercialisation. For the scientists in Belgrade with whom I worked, these transformations were taking place against the backdrop of recent scientific isolation due to the aforementioned sanctions placed against science and scientists in Serbia and Montenegro (then the Federal Republic of Yugoslavia - FRY).

Following the 'democratic transition' in October 2000, the privatization of publically owned services increased. Discussions of potential EU candidacy did not occur until 2003 however. In this socio-political and disciplinary context, we might then examine how scientists in their engagements with other researchers (including those at the observatory in Prague as well as with myself) described and interpreted their relationships with others against this backdrop of recent conflict, isolation, political change and later – potential EU accession.

The scientific community

Occasionally on the trip, researchers would define their relations with other researchers the world over in terms of belonging to a 'scientific community'. For example, Prof. Marić took photographs of an earlier visit she had made to the observatory near Prague several years previously, and spent a portion of her time chatting to members of the observatory and showing them the photographs, rather than joining the rest of us in the museum, actions which both cemented an understanding of collective belonging to a wider scientific community, and which may have consolidated a network of personalised connections, which was a commonplace way of engaging with colleagues in the post-Yugoslav states as other anthropologists (Brković 2015b, 2015a; Henig and Makovicky 2016) have discussed and which relates to the socialist legacy.

The idiom of 'the scientific community' frequently emerged in interviews as well. For instance, when discussing the period of sanctions, when a number of technological changes were taking place and academics were beginning to use email, one professor in Belgrade remarked how the isolation meant that 'we lost this initial step in joining the scientific community in that period and this is sad'. In Zagreb as well, one Professor commented:

> People abroad are very friendly. Science communities are like family. This is why I was always happy, especially in astronomy. You don't have a lot of people. In physics (compared to astrophysics), the physics community is a large community, as in biology or whatever. So I would not expect such cosiness and friendship in them. But in astronomy, astrophysics, you see membership in the International Astronomical Union which is a professional organisation, I think it is still less than ten thousand members. Membership is by PhD let's say. So it's less than ten thousand. This is still a small community.

This professor described a feeling of 'being small' which generated a sense of cosiness and familiarity. For him, 'the scientific community' was composed of smaller communities divided by discipline. As such, this feeling of 'being small' was encountered in a disciplinary sense (astrophysics being small compared to physics). I also often came across such references in a 'national' or 'regional' sense, whereby a small 'Croatian' or 'Serbian' national community was often pitted against much larger groupings, such as 'Europe' or the 'West', or a similar regional grouping was mentioned using the collective pronoun 'we', but in an ambiguous, non-national sense. Comparisons were sometimes also drawn with larger national groupings in a cosmological sense; 'Germany' was said to often side with 'Croatia', and the UK to often side with 'Serbia'.[46]

The commitment which scientists expressed through reference to a supranational 'scientific community' was especially interesting because it contrasted with the more individual and dynamic focus of a 'knowledge economy', which emphasised the importance of mobility, innovation and the autonomous actions of individuals maximising their potential as bearers of human capital. The use of the term community by scientists here resonated with the wider sense in which Anderson (2006, 7) used the term, to denote a sense of "deep horizontal comradeship" across non-contiguous areas of space-time. Examples of solidarity amongst members of the scientific community abounded throughout the interviews. For example, shortly after arriving at the observatory, I interviewed the director. The format for my initial interviews with staff was relatively open-ended. I asked for a little information about their career and their work as a starting point, with the hope that

46 This was a precedent set by events which took place during the Second World War; the Communist Partisans received Allied support, whilst the Ustaše set up a Nazi puppet state in areas of what is now Croatia. Of course, the various groupings and their relations to the new national groupings are very complicated, yet often small groups such as Ustaše or Četnici would be taken to metonymically refer, in a pejorative sense to 'Croatian' or 'Serbian' national groupings respectively.

this would encourage a much longer discussion surrounding issues they wanted to share with me. Themes relating to the situation in the nineties were common, because in Serbia this had been a period of both sanctions and relative isolation. In an interview with the director of the observatory, he related to me a long anecdote of how he was supposed to attend an important meeting after sanctions had been placed on the Federal Republic of Yugoslavia (which at that time consisted of what is presently Serbia, Kosovo, and Montenegro). This anecdote is worth reporting in some detail, as it gives a sense of the dynamics present and tensions surrounding a desire to participate in an 'enlightenment' endeavour conceived as both above politics, whilst in a material sense deeply affected by political change, the war and fall in status experienced by many scientists in Serbia and, to a lesser extent, other post-Yugoslav states.

He described how he received a letter from the conference organisers in Munich stating he could not attend to present a shared paper with his colleagues from Italy, because of the sanctions preventing travel. One month later, he received a phone call from another organiser who asked if he was still interested in coming. He then described the process behind the scenes which led to that phone call:

> These colleagues of mine said, "if you do not come we will have a lot of problems, because we have received a threat from the American Astronomical Society that they will cancel the meeting if we do not give you the money to attend". They said, "please just come!" They paid me first class on the plane, which was ridiculous because at that time I had to go overland from Belgrade to Budapest, because flights from Belgrade were prohibited, and then I had to take a plane from Budapest to Munich which is a forty-minute flight. They also paid me all my expenses in Munich. I learned later on what happened. These Italian colleagues of

mine had written to their American friends explaining that the organisers in Germany had told me they could not offer me financial support due to the sanctions. My American colleagues were upset, they were not my personal friends like the Italians, but they knew me and they knew my work and so on. They were people who just don't like politics; you know how the scientific environment is different from the political? One of these colleagues phoned the US Department of Foreign Affairs asking for an explanation, and asked if I would be eligible to participate in the meeting, and whether I could get support from the organisers or at least from the American Astronomical Society. They told him to contact this phone number, and to call tomorrow, so he called the next day, and it turned out that for one week he was calling. The offices got higher and higher, I don't know if this is all true, but this is how he told the story. Eventually he obtained somebody in a very high position in the State Department and he told me it was the person who actually wrote the draft of the text for the Security Council of the United Nations, which was proposed by the United States when the sanctions were declared. These resolutions meant that we had sanctions imposed against our country, and the guy who talked to this colleague of mine on the phone said, "individual scientists are not under sanctions, so your colleague cannot only participate in the meeting, he can also legitimately receive the grant".

Then they called the Germans, and asked, "what are you doing?" The problem was that there was a committee which took care of protecting the rights of individual scientists. For example, the Astronomical Union has a rule that a country cannot organise a meeting under the auspices of the AU again if they aren't able to guarantee that every participant from every corner of the world can get permission to

> participate. This was introduced because of problems with Israeli scientists, but it turned out that it was also necessary for us. In my case the Germans tried to say that their government was the one which actually denied them the money if I were to attend. Then to my knowledge there was a meeting of the executive council, something to do with the American Astronomical Society, and one of my colleagues who I know very well was a member of this executive committee, he put forward the question and there was also the letter written by these other people, in particular this person who made the phone call and so on. The general organisers would have actually tried to cancel the meeting, if I hadn't been allowed to participate and then I received the phone call.
>
> When I met these people, they told me how the initiative was more or less put forward by my colleagues from Italy, and then realised by a number of key individuals. I was more or less the guest performance at the meeting. I had a very nice time and a very good meeting. The presentation was successful and everything was fine. I was very happy that this had happened, as it set a precedent for later meetings and as a member of the academy I continued my collaboration with colleagues in especially Italy but also in other countries without any problems, more or less, and in that period of time I had longer stays in France and Belgium and other countries where I was invited by many colleagues and other people and I was always received with a lot of kindness, hospitality and I have made a lot of good friends all around the world.

His account detailed solidarity between scientists the world over working on a common project, who nonetheless, as earlier noted, are conceived as belonging to national research communities; the Germans, the Italians, the Americans and so forth. This was also

the case for the anthropologist Traweek in her fieldwork with particle physicists. Traweek argued that, for the particle physicists with whom she worked, 'culture [was] not an issue' (Traweek 1992, 78). What she meant by this was that whilst the scientists with whom she worked unhesitatingly understood themselves and others as belonging to a 'nation', the importance of those 'national differences' was minimal and, as far as communicating science was concerned, non-existent. One Professor made this connection explicit in our interview. He described the familiar objects he would find in observatories the world over, and implicated knowledge of a common way of engaging with those objects, as inculcated through disciplinary training:

> My opinion is that science must be completely international and I believe astronomy is a good example of this because every astronomical observatory in the world is my house, and immediately I can find my books, articles, friends, colleagues, and I can start to work immediately.

The point here was that the shared occupational focus would, or should override political concerns. This was also evident in the director's assertion in the long narrative given above: 'you know how the scientific environment is different from the political'. This assertion warrants further investigation, as it contradicts the view that the political in an important sense defines the human condition.[47]

Tensions

When in Prague, several differences we encountered at the observatory in Prague and on the trip more generally were expressly political, and contest the view that science is 'above' the

47 See Candea (2011) for a discussion of this view and a novel account of a space for the 'non-political' in the anthropology of politics.

political. For instance, I, understood and treated as a UK citizen, experienced privileged visa treatment throughout the EU. Also, when we visited the observatory in Prague, it was clear that they had more income to spend on subscriptions to magazines such as *Science* and *Nature*, and despite our best intentions, we were received as paying customers, a fact which bemused many of us. Such differences in resources available to the observatories in Belgrade and Prague problematized any possible horizontality to the comradeship observed among members who nonetheless understood themselves as part of distinct national communities of scientists in a global scientific community.

The 'national community' which scientists also invoked has been analysed by Herzfeld (2014) through his concept of 'cultural intimacy'. Cultural intimacy, on Herzfeld's view, refers to 'an intimate feeling associated with "the recognition of those aspects of a cultural identity that are considered a source of external embarrassment but that nevertheless provide insiders with their assurance of common sociality" (ibid., 3). This was manifest on the trip through numerous practices, such as choosing to take familiar brand juices, coffee and snacks on the trip, the covering of the smoke alarm with a plastic bag and elastic band, so that we could have a cigarette inside rather than being forced to leave the hotel premises, and about which members of our group complained. Some of these differences reflected economic differences, such as the choice to bring supplies of food, rather than to eat out for every meal in an expensive restaurant. Such differences led on occasion either to a disapproval of others lifestyles or a sense of resentment upon seeing how people accustomed to different state contexts had strikingly different expectations and budgets to others.

The scientists with whom I spoke largely regarded themselves as Serbian scientists, in a larger community of astrophysicists and astronomers the world over. Publications such as the *Serbian*

Astronomical Journal[48] and the series of conferences titled *Development of Astronomy among Serbs*[49] are testament to this view. Furthermore, in the case of former Yugoslavia, this perceived cultural belonging was a concern. There were very few Croatian identified scientists working in Belgrade and I suspect even fewer Serbian identified scientists in Zagreb. One professor who I interviewed in Zagreb had a recognisably Macedonian surname and we discussed the implications of his surname for a career in Croatia. He suggested it was very unlikely that he would ever be accepted to join HAZU (the Croatian Academy of Arts and Sciences) because of the ethnicity marked by his surname[50] which suggests that such identifications were an issue for him. Additionally, whilst at the observatory in Belgrade, a professor from Macedonia related to me problems which emerged when a conference was organised with scientists from Greece and the Republic of Macedonia. Greek scientists asked all participants from the Republic of Macedonia to wear name badges with the name for the state which they found acceptable (the *Former Yugoslav Republic of Macedonia*), and in the name of political correctness, they adopted the name *Hellenic Republic of Greece*. A PhD student also recounted to me her experience of a scientific meeting organised in Bosnia and Herzegovina. The meeting took place at a hotel in which the mostly Serb identified conference organisers slept. Many Bosnian Muslim identified attendees chose to sleep in another hotel and walk a mile to the conference hotel each day rather than stay in the same hotel, and the student described the atmosphere at the conference as 'strained'. This suggests that in this European, semi-peripheral context affected by recent war, national categories had to be dealt with by scientists on an everyday basis in a different way to the capital mediated discourse of multiculturalism present in many Anglo-American and Western European contexts.

48 See http://saj.matf.bg.ac.rs/ (accessed 9/1/12).

49 See http://aquila.skyarchive.org/6_DAAS/html/index-e.html (accessed 9/1/12).

50 In Croatian: *Hrvatska Akademija Znanosti i Umjetnost*i.

If the reality was that political differences were ever present in such interactions between scientists, then why did many scientists invoke 'the scientific community' as an ideal? The anthropologist Joseph (2002), in her book challenging the romance commonly attached to the concept of community, suggested that "capitalism, and more generally modernity, depend on and generate the discourse of community to legitimate social hierarchies" (ibid., viii). She argued that this is achieved, in multiculturalist and nationalist discourse, through positing the existence of communities of identity, some of which are marked, whereas other (dominant) 'communities' are unmarked. According to Joseph, invocations of community are a means through which particular inclusions and exclusions are defined, exclusions which are perhaps necessary for scientists both to travel and thus gain direct access to resources in relatively far-off locations. Such exclusions, in turn, enable scientists working on similar themes, to have a continued shared sense of mission. Such reference is thus a discursive means by which such differences manifest between researchers in different states, as we found out on the trip, were brushed aside on the basis of perceived common ground, a ground which could only be maintained through drawing on a roughly equivalent set of practices. Maintaining such a roughly equivalent set of practices necessitates both collaboration and technological 'catch-up', which, as we shall see, was particularly pronounced under the pressure of increased innovation under post-Fordism.

Time-space compression and the effects of 'catch-up'

How can a scientist maintain this sense of participating in the 'state-of-the-art' in her discipline in contexts where they are faced with significant political (e.g. sanctions) and economic (e.g. increasingly expensive equipment) challenges? As Hoskin (1999) surmised in his recent history of astronomy, "the astronomer with a "state-of-the-art" instrument at his disposal has an

advantage over his rivals, not only in the disinterested pursuit of new knowledge, but in the competition for status and salary within the astronomical community" (Hoskin 1999, 307). During periods of relative isolation, such as the war period, and especially under the sanctions placed on Serbia during the nineties, appeals to 'the scientific community' promoted continued interaction with other scientists abroad? Or within Serbia? and filled a gap created by a lack of access to the latest equipment, or feeling of 'lagging behind'. This lagging is produced by the 'epistemological gap' created by difficulties in accessing the latest publications and state-of-the-art techniques. As the physicist Grujić related in an article for the *Europhysics* News in which he detailed the effects of isolation on 'society', meaning Serbia/Yugoslavia,

> the state of isolation destroys the standard structure of the society, first of all, the economic one. Because of the trend to self-sufficiency, sanctions first hit the most sophisticated economic layers, like electronics, or the most "luxurious" products, like high quality, expensive consumer goods. (Grujić 1999, 4)

In the case of astrophysics and astronomy, this feeling of isolation was likely to have been particularly pronounced due to post-Fordist innovations in information technologies, which transformed the discipline in economic centres of the global world system. Capitalism requires, as the geographer Harvey argued, a degree of space-time compression. This refers to, "processes that so revolutionise the objective qualities of space and time that we are forced to alter, sometimes in quite radical ways, how we represent the world to ourselves" (Harvey 1989, 240). Harvey argued that this space-time compression is achieved through the dissipation of technologies such as the telegraph, telephone, television or personal computer. The crisis conditions of the switch to post-Fordism required an acceleration in product innovation to gain a competitive advantage. In turn, this led to a radical acceleration in time-space

compression and associated technological innovations. Over the past four decades in economic centres of the global world system there has been, according to Harvey, "an intense phase of time-space compression that has had a disorienting and disruptive impact upon political-economic practices, the balance of class power, as well as upon cultural and social life" (ibid., 284).

Time-space compressing technologies are also central to understanding developments in astrophysics, a discipline which seeks to represent objects located far away in space-time. These changes had a key impact on astrophysics and astronomical research practices, as telescopes, and the processing of data obtained have informational and time-space compressing technologies at their centre. As Hoskin (1999) noted, the best observations and the clearest skies are available in the Southern Hemisphere, yet telescopes had historically been concentrated in the Northern Hemisphere. Recent changes have meant that, "in the last quarter of a century, the increasing speed and economy of modern air travel and ease of communication have permitted the development of southern sites with facilities at least equal to those in the north" (Hoskin, 1999, 307). Information technologies such as the development of photosensitive charge-coupled devises (CCDs) have meant that modern telescopes capture many more photons which hit the photographic plates, with the result that a "30-inch telescope in 1990 could record more photons than the 200-inch could in 1960" (ibid., 309). Astrophysicists therefore have more sensitive equipment that can make finer observations, permitting the examination of far off galaxies, stars and other astronomical objects in much greater detail.

In addition, telescopes which encompass a much wider region of the electromagnetic spectrum have been developed and researchers now have access to observations from telescopes located above the atmosphere, such as Hubble. The internet and increasingly fast computer processing also led to radical transformations in disciplinary practices, from requiring craft skills and large on-site

telescopes to requiring skills in computer programming and simulation. Scientists at the Belgrade Astronomical Observatory thus spent most of their time working on computers. They either ran theoretical simulations or drew on databases of observations from telescopes located in other parts of the world to make observations, and had been doing so increasingly after the lifting of the sanctions. At the Belgrade Observatory, only a solar telescope was still in use for cutting edge research. These changes, coupled with local interest, were behind the conversion of part of the observatory sites in Prague and Belgrade into museums given that the telescopes were now obsolete, yet expensive to maintain.

This condition of playing technological catch-up constituted an important dimension of what Blagojević (2009) described as the semi-periphery, and which she used to describe a region she referred to as Balkan. In economic terms, this is constituted by a relative lack of funds compared to the 'centre', entailing what she termed 'slow' or 'impeded' modernisation. This condition, a fact of the current historical moment, is according to Blagojević (ibid., 3) characterised by its instability, "because it is open to two different possibilities at the same time: to catch up with the centre, or to be pushed further into the periphery." The increase in pace of innovation required by post-Fordism has been implemented in Serbia and Croatia with varying degrees of success via policy descriptions of a need for a 'knowledge economy'. This increase has generated a sense of continually playing catch-up in the natural sciences. For example, whilst I worked at the observatory, there was no audit culture (Strathern 2000) in place, in the sense of a system of external checking (auditing) of the scientists' activities and established through bureaucratic procedures and sometimes visits by external organisations. Regardless of the lack of external checks, scientists continued to receive funding from the government and work on projects defined in conjunction with discussions taking place at the Ministry of Science and Technology. Only with the arrival of an FP7 project grant after I had left, did the extensive

'checking procedures' and resultant large amount of uploading information to the FP7 website become a feature of some scientists' work. In the face of a lack of shared practices compared with states in Western Europe in this period, and under the conditions of an imposed 'catch-up', the idiom of a horizontal 'scientific community' became particularly pronounced as a means of building bridges and emphasising collaboration with other research groups.

In terms of disciplinary advancement in astrophysics, post-Fordist innovations have had a largely positive effect on advancing knowledge, through the increased accuracy, precision and range of telescopic observation and information management. Furthermore, some of the changes have had a democratising effect – the availability of international data banks of observations from observatories throughout the world via the internet is a prime example, when no subscription charges are levied. One professor related to me how small observatories such as in Belgrade have been able to capitalise by, for example, making observations when the centres, i.e. large observatories, are on leave (for example, on the 25 December). Semi-peripheral positioning thus necessitated, on the part of science policy, careful consideration of the kinds of projects in which it is worth investing time and energy, and questions of with whom one collaborates. It also created, as we have seen, an environment in which scientists are forced to 'take a position' on the centre, with some feeling resentment and cynicism towards 'catch-up', whilst others pressing for closer alliances.[51] Some scientists tempered some of the recent technological innovations with viewpoints stressing how some of these innovations had come at a great human cost, citing the levels of poverty and extensive class differentiation particularly typical of the UK and USA. Some felt that a dependence on following the fashions of the centre, or of striving to be like the centre (conceived in the region as Western Europe/USA) would lead to a permanent state of being 'second

51 See Janković (2004) for a historical account of a semi-peripheral niche in meteorology.

best' and that instead scientists ought to focus more on taking research in different directions. These varied feelings were manifest in the different audiences for their work sought out by different professors as we shall now see.

CHAPTER FOUR: credit and credibility

To succeed as an academic researcher in a Western institution at present, one must typically maintain a research profile and develop a reputation based on one's academic work, alongside – albeit to varying degrees - investing significant energy in local academic hierarchies and demonstrate a willingness to undertake the bureaucratic aspects of university work. Scientists specifically must also (unless working on theoretical topics) access and use what are frequently expensive resources. In post-Yugoslav, post-socialist academic networks, such resources were not available at the state level and a different logic, connected with the socialist legacy, persisted and combined with the Western approach briefly mentioned above. In this context, a focus on local academic hierarchies meant negotiating veze, gaining preferential access to resources and convincing an audience of one's worth in ways quite different from in Western European and Anglo-American contexts. Given the relative scarcity of resources, small research community and high levels of politicisation following the recent wars, I argue in this chapter that scientists had to metaphorically behave as 'scouts', carefully seeking out resources and useful collaborations, albeit typically – although increasingly less so – from a secure 'base'. To make this argument, I focus on scientists' presentational strategies and how their approaches and positioning relate to different value fields. The aim is to build on, whilst provincializing, the ethnographic findings of the early work of Latour and Woolgar (1986), through describing how the dynamics differ in a post-socialist context affected by recent war and political isolation.

Indeed, despite rhetorical references to a supranational scientist community promoting openness and a common feeling of participation in an enlightenment endeavour directed towards all

scientists, in practice we have already seen that the scientists had various political engagements and invested in different kinds of collaborations, with some more directed towards national and/or regional collaborations in post-Yugoslav space, whilst others focused on collaborations with scientists in other, often Western states. Some sought to enhance their public reputation through extensive media engagements, an aspect which will be covered in chapter five. As earlier mentioned, in the post-Yugoslav context, research audiences and groupings are relatively small, and one would therefore likely know the majority of other academic researchers and their interests in their discipline, a fact which makes certain tasks, such as anonymous peer review, difficult. This is compounded for small disciplines such as astrophysics, and social anthropology. In Belgrade there was one department for astronomy and astrophysics[52], whilst in Zagreb it was a possible fourth year postgraduate option taken in at the faculty of physical and mathematical sciences.[53] In exploring the post-socialist dynamics surrounding a scientist's career trajectory in the European semi-periphery, I begin by attempting to answer the question of how, in such a context, a scientist comes to be regarded as credible. Furthermore, how is credibility accrued and managed, through engaging with different networks and speaking to different audiences? In this chapter, I sketch an answer to these questions, which motivate the fifth and sixth chapters as well, in which I later analyse academic hierarchies and the media engagements of scientists in more depth. I begin by drawing a contrast with Latour and Woolgar's work on this topic in a Western European context.

52 http://astro.matf.bg.ac.rs/beta/index.php (accessed 1/2/14).
53 https://www.pmf.unizg.hr/phy/predmet/aia (accessed 1/2/14).

Credit and credibility among 'Western' scientists

There is already a substantial literature theorising relations between scientists, primarily in Western contexts, in this vein. Models underlying the dynamics of scientific activity have been proposed, from pre-capitalist gift exchange[54] to more capitalist models based around the accumulation of intellectual, cultural and social capital (Bourdieu 1990).

For the Belgrade Observatory however, I find Latour and Woolgar's description in *Laboratory Life* (1986) especially useful. Working in the Salk Institute in France during the 1970s, they noted the prevalence amongst researchers of a description of their activity in quasi-economic terms, especially amongst younger scientists. They gave the following examples:

> This instrument can bring me ten papers a year (II, 95).
>
> We had a sort of joint account with him; he got the credit, we got it too; now we cannot draw on it anymore (VI, 12).
>
> Why working on this (substance), we are not the best in this area; we invested a lot in the releasing factor field... we are the best in it, we'd better stay in it. (VII, 183) (ibid., 190)

54 One example of gift exchange I came across is worth mentioning here, although I didn't come across it often. One day I visited the *People's Observatory* in Kalemegdan, a fortress in the centre of Belgrade. This is not used for research but for amateur astronomers amongst the public to stargaze. They produce a magazine called *Vasiona*. Copies of the observatory magazine produced by members of *Zvjezdarnica*, the public observatory in Zagreb and the *People's Observatory* in Belgrade were sent between one another with no fee charged during the crisis period. At that time, due to sanctions, it was difficult to transfer money out of the country, and the conditions of hyperinflation made salaries relatively worthless. Hence, with the aim of maintaining a relationship, the observatories reverted to a process of gift exchange. Again, whilst there was no obligation to keep such a system going, no monies sent or contract drawn up, it was maintained through the expectation that there would be, at some point in the future, reciprocation.

The quasi-economic account which Latour and Woolgar gave is based on an analogy with scientists as investors, as shareholders in an activity which produces what they term credit. By 'credit' they refer to a system of acknowledgement (receiving credit for something), which reproduces itself as scientists build up, through their various engagements, *credibility*, by which they mean a reputation. This credibility is also in some sense a product of, although not directly reducible to, the system of acknowledgements through which they gain credit. On Latour and Woolgar's view, success depends on building a reputation and acquiring prestige, which necessitates initiating what they refer to as a cycle of credibility. As they argued:

> Our scientists had a much more subtle way of accounting success than simply measuring returns in currency. The success of each investment was evaluated in terms of the extent to which it facilitated the rapid conversion of credibility and the scientist's progression through the cycle. For example, a successful investment might mean that people phone him, his abstracts are accepted, others show interest in his work, he is believed more easily and listened to with greater attention, he is offered better positions, his assays work well, data flow more reliably and form a more credible picture. The objective of market activity is to extend and s*peed up the credibility cycle as a whole.* (ibid., 207)

The attempts to initiate, extend and speed up cycles of credibility thus led to a need to build up a reputation recognisable to others working in different locations on the same topic. Yet as Latour and Woolgar illustrated, few scientists directly focused on building up a stock of acknowledgements as an end-in-itself. Instead, the stock was a resource that scientists could and sometimes had to draw on in order to ensure success. Latour and Woolgar's model made no presumption about the motivations of individual scientists. Whilst initiating a credibility cycle was necessary, the projects

through which this was achieved were understood as relatively autonomous; scientists were not consciously dictated to by fashions or the market.

The need to initiate a cycle of credibility in the Salk Institute related to the precariousness of scientists' employment, in the sense that positions at institutes were open to competition if scientists failed to perform to the standard required. In contrast, in Serbia and Croatia over the 2000s, upon finding employment in a scientific institution, the position was often guaranteed for a relatively long period of time. Whilst the minimum contract length was three years, it was unusual for a contract not be renewed. This was an informal rule relating to the SFRY heritage that I also came across when employed as an anthropologist in Croatia. It is based on a workplace solidarity, and collective bargaining with those distributing resources (e.g. government ministries) that everyone, who behaved appropriately and considered 'part of the institute', ought to remain employed. The consequence was that there was less need to initiate a cycle of credibility than in Western European scientific networks, where early career researchers frequently found themselves in a particularly precarious and competitive position. Another specificity of post-Yugoslav scientists' situation was that they had low incomes compared to many scientists in Western Europe and the USA. This means that they were relatively less able to participate in Western conference circuits, or make frequent visits to Western European research institutions in situations where they had to cover their own costs. The relative lack of mobility due to the sanctions placed on science, combined with political constraints (especially in Serbia) concerning movement throughout Europe had a further consequence: when scientists were given an opportunity to travel, some used the opportunity to enjoy a tourist experience alongside or sometimes instead of the conference – the trip to Prague discussed in the previous chapter partly describes this dynamic.

Returning to Latour and Woolgar's study, the need to build up and be able to showcase a reputation required the foregrounding of questions of presentation and image. On a deeper level, it required the existence of a clear 'objective' signalling strategy to signify competence. This is what Bourdieu (1990) referred to as institutional capital, and which was embodied in the *Curriculum Vitae*. As Latour and Woolgar stated:

> A scientist's curriculum vita (CV) represents a balance sheet of all his or her investments to date. A typical CV contains name, age, gender, family information, and four sections, each of which corresponds to a particular meaning of credibility. Under "Education," for example, we may read:
>
> 1962: Bachelor of Science and Agriculture, Vancouver
> 1964: Master of Science, Vancouver, B.C., Canada
> 1968: Ph.D. (Cellular Biology), University of California
>
> This list of qualifications represents what could be called the scientist's *accreditation*. This in itself does not ensure that the individual is a scientist, but it does enable him to be admitted to the game. (Latour and Woolgar 1986, 208)

The simple fact that the scientists' CVs discussed at the beginning of this chapter had much greater variance in form suggests that a different logic was at play. In Latour and Woolgar's example, education and qualifications, typically a PhD, allowed scientists to gain their credentials as 'shareholders' in science. In the analogy with investors, an appropriate CV would equate to having the necessary funds to be a shareholder. Latour and Woolgar described an institute in France in the 1970s, and so the situation may be quite different today. One important difference, throughout Europe, and which formed a topic of debate amongst the scientists with whom I worked, is the increasing transparent use of citation

indices and research profiling, besides the CV. Citation indices form a ranking of journals, and of the number of times an author is cited in other scientists' work. A large number of citations in a high ranking journal will constitute a larger 'return' for that scientist. In a similar way, educational institutions were ranked using indices such as the Shanghai index.[55] In addition to publishing in national level journals in Serbia and Croatia, for many researchers, it was important to have an engagement with the state-of-the-art, in order to keep up and remain members of the supranational 'scientific community' I earlier discussed. Increasingly, and especially in the interval after I finished fieldwork, I found upon returning and speaking further with researchers, that they were engaging in discussions about citation indices to a greater extent, a topic I consider in greater detail in chapter five. This was partly connected with aspirations to obtain lucrative FP7 funding, and the downward spiral which state funding had taken following the beginnings of the economic crisis. The effects of this have further intensified since I completed fieldwork.

One practice which Latour and Woolgar didn't discuss, and which is a relatively recent development in Western Europe, is research profiling. This consists of individual researchers being asked to create a profile comprising details of their academic CV, and also an on-going bank of citations and other details. This is also part of what Strathern (2000) referred to as an audit culture, whereby instead of state or transnational institutions driving an agenda forward, they rather 'steered' institutions through developing criteria for quality review. These practices were not in place at the institute in Belgrade, where scientists continued to receive state funding every year for the work. It is only with the arrival of FP7 funding at the observatory in the two years after completing fieldwork that scientists working on an FP7 project have come to engage with such practices, via the process of uploading details of the project and project progress to the FP7 website. In fact, such practices

55 http://www.shanghairanking.com/ (accessed 19/10/12).

caused some scientists to complain of the 'excessive bureaucracy' associated with the project, and one member of the administrative staff related to me how he resented the high salaries paid out to visiting academics working in the framework of the project – the salary, several times the Serbian average, seemed unjustifiable to him in the context of the high unemployment in Serbia at that time.[56] The auditing processes of research profiling and self-awareness of 'impact' due to citation indices in Western Europe means that the following observation may not obtain to the same extent today:

> Our scientists only rarely assessed the success of their operations in terms of formal credit. For example, they had little idea of the extent to which their work was cited. (Latour and Woolgar 1986, 207)

A possible negative consequence of this recent change is that scientists may have begun to pursue 'fashionable' topics for which they were likely to receive many more citations, leading to a potential devaluing of topics less fashionable. This would have rendered topic choice more dependent on the whims of the market and/or frequent changes of government (as policy priorities and trends change), which typically occur every four to five years in liberal democracies. If this is now a closer approximation, then Bourdieu's (1990) model of scientists competing in a 'field', as individuals attempting to gain stocks of various kinds of capital (institutional, cultural, and so forth) may be at present a better approximation.

Latour and Woolgar's model, and economic metaphors concerning the accruing of credibility have also been critiqued (Hayden 2003; Knorr-Cetina 1982). The anthropologist Cori Hayden argued that

> In a knowledge economy it no longer makes sense (if it ever did – a much debated question [see Haraway

56 In 2008 it was approximately 18.8%. See http://www.indexmundi.com/serbia/unemployment_rate.html (accessed 1/2/12).

> 1997; Knorr-Cetina 1982] to understand science as an exercise in amassing symbolic or reputational credit. Certainly, when university researchers routinely patent their research results; or when entire academic departments in public universities search results; or when entire academic departments in public universities sign funding and benefit-sharing contracts with transnational life sciences firms, science studies' economic metaphors of interest-bearing knowledge reassert themselves, appearing both all too literal and, in the harsh light of the increasing imbrication of the private and public sectors, even a bit pale. (Hayden 2003, 28)

The anthropologist Knorr-Cetina also argued that "the idea of a capitalist market mechanism operating within scientific communities sustains paradoxical assumptions of internalism and orthodox functionalism and endorses a model of man which is at best simplistic" (1982, 114). explain to us in one sentence what this means in scientific practice. Whilst Knorr-Cetina correctly identified that economic definitions of human action are simplistic and inadequate, I assert that such economic models and their advocates must be nevertheless taken seriously. This is because the implementation of such models have an influence on how large numbers of people behave on a daily basis. I have already argued that this is the case as concerns the dependence of astrophysics on changing technologies made possible by conditions such as time-space compression under which scientists have been operating. To avoid the trap of functionalism then, the models of scientific research activity presented here should thus be understood historically, not as descriptions of a body of society, but as partial descriptions of dynamics surrounding particular processes which have occurred at different junctures in the global world system, open to constant revision in light of political changes. As such, they have what the anthropologist Chris Gregory (1997, 5) referred to as a 'planned obsolescence'.

Credit and credibility through curriculum vitae

Latour and Woolgar's innovative focus on scientists' CVs offers an interesting entry point into understanding how value fields operated along post-Yugoslav scientific networks, and so the scientists' CVs are worth considering. The curriculum vitae (CV) of various researchers and some doctoral students working at the Belgrade Astronomical Observatory are available online.[57] On the website there is a section named *Contacts* with the names and contact details of all professors. You can click on the names of individual professors to access either a CV or a personalised webpage. Eighteen out of forty-four researchers listed have an online CV, including the majority of research heads; five out of a total of eight. There is no standardisation of form or content across the CVs and webpages available to view. Almost all are written in English, although there are a small number written in Serbian using Latin script, and one available uses Cyrillic script. The use of Cyrillic Serbian references a very particular audience, which is here conceived as referring to, at its narrowest, a national research community of 'Serbian' scientists, whilst at its broadest the (literate) 'nation', with affinities and possibly some degree of partial comprehension available to scientists in other states which use the Cyrillic script. There was no guarantee for example, that young scientists from Croatia would be able to read Cyrillic script, as it is no longer taught in schools there as it was during the SFRY period.

At their most basic, the CVs consist of a list of qualifications, personal and contact details, a list of research interests, publications and language skills, listed in a variety of formats. interestingly, several start with a small statement about the author's life history, for example

> I was born in a small village named Kamenica located near Užice, since 1990 I have been living in Belgrade.

57 See http://www.aob.rs/old/index.html (accessed 1/2/14).

The quality of English varies from a solid intermediate level, to an extremely high level of competence with the use of a personalised, sophisticated register demonstrating clear evidence of having lived for an extended period in an English speaking environment and of being aware of conventions specific to Anglo-American academia.

Two researchers have colourful web pages which also function as blogs, in which they discuss various interests such as novel writing. One has themed her webpage around her interest in fantasy gaming, with a yellow and black crest with a dragon on it positioned in one corner, and the headline 'the yawning dragon'. Another has a series of webpages written in extremely high quality English with a 'gentlemanly' feel. There is a picture of the author dressed in a suit, and a quote by the British historian Arnold J. Toynbee, whose twelve volume *A Study of History* (1934-61) recounts the 'rise and fall' of several 'civilisations'. There are also links to a wide range of sites detailing interests and projects with which he is involved. He starts with the pronouncement:

> Having some sort of web page since 1994 (long ago by Internet standards), I've recently concluded that all complicated and fancy webpage stuff is truly unnecessary and usually annoying. Therefore, I've decided to keep this page as simple as possible. While I haven't yet reached the laudable simplicity of my colleague, pen-friend, and an outstanding polymath Joe Bloggs, that certainly remains a goal worth striving for!

Such a style makes use of complex vocabulary ('laudable') and upper-class forms of address ('truly unnecessary') that speaks to a particular, Anglo-American professional audience among others. Highly personalised and complex expositions are an invitation to 'get to know' the researcher on a level beyond his or her work, and offer a hint of the traditions with which the author associates her or himself. They clearly reference an audience outside the confines

of 'Serbian' academia and are highly accessible to interested people who come across the pages and who may have an interest in the professor's research foci, despite knowing very little about the institutional capital associated with publishing in particular journals, or with having been educated at various institutions in different states. Such websites contrast sharply with the lists of publications, research interests and collaborations common to other online CVs available to peruse, which serve the more pragmatic goal of allowing the audience (presumably conceived as other scientists, aspiring scientists, possible media contacts, and institutes) to identify areas of common ground, and on the basis of such common ground, perhaps initiate contact.

Clearly, the diversity present in the style and content of the CVs available strongly suggests that the researchers are engaging with different audiences, as the difference between publishing in Serbian in Cyrillic or Latin script and in English make clear. These different audiences were also reflected in disputes over language used in workshops and professional discussion at the observatory. The choice to use English in situations where it was not necessary emphasised an opening up to the world, particularly in my presence, and was seen by some researchers as a cosmopolitan good to be promoted in the workplace (see Erdei 2007). The following extract from an interview with a post-doctoral researcher at the University of Belgrade made this position clear:

> English is the language of science. All of our publications are in English, even the articles which are published in the national (*domaći*) magazine; as you have probably heard, the observatory publications are in English... and so everything is unified.

The use of English was primarily viewed pragmatically. However, in cases where Serbian/Croatian may be used, it was welcomed, as the following comment from an interview with the same post-doctoral researcher made clear:

> If, for example, one of our people (*neki naš čovek*) who lives and works in America comes to collaborate with us then we would speak in Serbian.

For others however, the use of English was tolerated as a necessary condition for conducting research in the natural sciences at that time, and its intrusion when not necessary was unwelcome. To give an example, one of the professors organised a meeting with doctoral students and other people working on the same research team, whereby students would present a particular topic, either relating to their own research, or a key paper in astrophysics taken from the past few years. The meetings were fairly informal and juice and biscuits were usually served. Before I arrived, the meetings were conducted in Serbian. However, upon my inclusion in this group, two of the professors suggested that meetings be conducted in English from then on. They argued that this was a practical move, as students would have to present in English at international conferences, and so it was useful, particularly as there was now an English speaker present who could offer feedback on language and academic presentation skills. Some of the students were annoyed with having to speak in English, as it made it more difficult for them to explain points clearly. Other students felt much more comfortable speaking English than others, either having a gift for languages or having had extensive private tuition, or simply being in the habit of using English as a language for academic discussion. After attending several of these meetings, I arrived late one day just to catch the end. Leaving the observatory, I spoke to one student at the bus stop, as we waited to get the bus back into Belgrade city centre. He was also working for the army and was only at the observatory on a part time basis. His English was not as good as some of the other students present and it irritated him that the seminars were conducted in English, particularly when I wasn't present for the meeting, as I hadn't been that day. He commented, 'why do they insist on us speaking English in the seminars? We are all Serbs'.

With good connections, being *employed* as a scientist required very little effort or work. One researcher whispered to me that some of the older professors were not very computer literate and so they were - in his opinion – of spurious professional competence, stealing results from doctoral students to add to their credit. This comment demonstrated the importance of producing authored papers and generating results as necessary for retaining some kind of credibility. Other individuals had practical advantages over others: for instance, one family lived on site and had worked at the observatory for three generations. Their home was directly attached to the main observatory building, and part of it having been converted into an art studio for one of the sons. This family had a clear material advantage which also included site access, and the mother, who was nearing retirement age, had a particular skill for maintaining connections. The adjoining of the house with the observatory irritated some of the other scientists, particularly younger ones, and they complained that there would be more room for offices if they moved out.

Scientists as 'scouts'

I suggest that the specific juncture appropriate to understanding the context in which I conducted ethnographic research at the observatory and interviews in Belgrade and Zagreb involves an engagement with the SFRY legacy. Despite policy attempts to create a knowledge economy, more enthusiastically in Zagreb than in Belgrade, whilst conducting fieldwork such a model was not pervasive in its effects. In contrast to the context in which Latour and Woolgar conducted fieldwork, in the SFRY, employment was theoretically guaranteed. In actual fact, in the SFRY this was not the case; socialist unemployment existed above levels desired by both the government and their left wing critics. However, upon securing employment, positions were more stable and longer lasting as in other socialist states. As such, there would have been

no need for scientists to initiate a cycle of credibility in order to subsist, particularly if they managed connections particularly well. I spoke briefly about these issues in an interview with a man, who I will call Geoff, from the UK who was working in the Serbian Ministry of Education, Science and Technological Development.[58] Geoff[59] was a retired scientist from the UK, who now lived in Belgrade. One of the more Western oriented observatory professors suggested I contact him as he worked at the Ministry of Science and was involved in promoting strategies designed to help scientists in Serbia with applications for FP7 project funding, a large scale European initiative focused on collaboration with other academic institutions throughout Europe. I went to speak with him one morning at the ministry. It was clear that he had difficulties there and he complained to me about the lack of communication and problems he had had in obtaining basic documents, such as the Serbian Strategy for Science, from other workers there, some of whom – perhaps correctly - viewed him with suspicion. Geoff had completed his studies and a large part of his career in the UK, and was broadly committed to promoting this tradition and completing the necessary bureaucracy to obtain lucrative EU funding, which he said few scientists in Serbia were applying for. As he related to me:

> Serbian scientists are generally not taking part in FP7. If you look at the proportion of scientists that are active in FP7 it would be only of the order of five to eight per cent of Serbian scientists so it's a very small proportion. The number of scientists who are gradually increasing to take part is again very small, I would say maybe only stimulating another ten or twenty scientists per year, if that. There is a core of scientists who are working very hard to write project proposals and trying to get money but they are a very small proportion of all of Serbia's scientists.

58 http://www.mpn.gov.rs/ (Ministarstvo prosvete, nauke i tehnološkog razvoja).

59 I use his first name as he was a retired scientist, rather than a professor employed by the observatory.

Geoff's tone throughout my meeting with him was one of frustration with the situation in Serbia and a perceived inaction on the part of scientists there. He made the following comment in this vein, in which he referenced the 'Eastern' socialist legacy and its continued impact today:

> You have to be competitive in the west otherwise you don't get money. In the east you have a job, usually a job for life, as a scientist. You may not have much money coming in to do science but it comes in regularly every two or three years, you get projects and therefore you don't need to struggle to improve yourself. Therefore in general, scientists in Eastern Europe are not as competitive by tradition as scientists from Western Europe. The advantage (with the Eastern philosophy) is you don't have to struggle so much; your level of stress may not be as high. I suppose a lot of it is because scientists here may regard science as something of a hobby, doing research. It's a hobby in as much as it's only one of many activities that they carry out.

Geoff's comments highlight these differences between having a secure based and relative paucity of resources which one must fight for, and having to constantly build and maintain a competitive research profile, through which one obtains access to the best resources (whilst in Serbia, I found there was no relationship between research quality and the amount of national-level resources one had at one's disposal – a source of frustration for many, who commented on how the scientists at the top of the political hierarchy are not 'first-class' scientists.

The combination of a relatively secure position and relative scarcity of resources led to a dynamic of hoarding, although the relatively liberal logic of self-managing socialism meant that this was much less the case in the SFRY than in Soviet states. When conducting

an interview with the head of a Belgrade based research institute, one important difference with the situation today was highlighted, when he stated that:

> They used to consider science as part of the consumer sector, not as a productive sector, and they're actually right in part because unless you achieve some level of scientific research whereby the factories could take on your research results, particularly applied research done and then construct something and then produce something and sell it on the market or implement it in the other sectors of the economy, then they're right to consider that your research is mainly of an academic nature and that's the problem with insufficiently developed countries because fundamental research is not a factor in the general development of a country.

This account describes a need to illustrate to central government that an investment would produce some kind of direct positive results for society, when academic research frequently leads to indirect or delayed benefits. A slippage is present between something being good for 'the economy' and for society. The existence of a political centre exerting influences with a moral emphasis on producing socially useful technologies and research meant that, as Verdery stated, there was a convergence between, 'the inextricable connections between social definitions of what is valuable... and the politics through which these judgments, evaluations, and discriminations are produced' (1995, 19). There was a need to directly persuade others of the relevance of particular research projects, from one's (relatively) fixed position in an institute and the state bureaucracy. Yet one's ability to persuade, often depended on one's *veze*; in other words, one's ability to convince members of the party bureaucracy that a particular project or resource was worth investing in. When positions at institutes were typically for life, there was little need to demonstrate effectiveness in doing one's job on a day to day basis provided that official targets were

reached. These targets were set by key figures in central government, or in the case of autonomous institutes, such as the observatory, developed internally at the institutes themselves. Some researchers, as we have seen, were closer to the party political centre, and thus able to exercise greater power over the setting of a research agenda.

Rather than describing scientists as investors, I suggest that the metaphor of a 'scout' is more appropriate to the SFRY, and more widely, former socialist states in Central Eastern Europe. Such a metaphor has continued relevance in such contexts where new models, such as the 'knowledge economy', have so far failed to arrive in a significant sense. In describing scientists as scouts, I am suggesting that they actively and innovatively pursued the relevant resources, connections, skills, techniques and collaborations they needed to realise their ambitions. A scout implies a search, which suggests that many of the items they were looking for were in short supply. It also suggests coming back to a relatively fixed position of safety, provided by the roles in research institutes and the relative lack of urgency in not having to 'work to live'. Finally, like Latour and Woolgar's model, it makes no assumption about individual motivation; scientists may be ultimately motivated by a strong desire to solve a particular problem, improve the conditions for many in society, or to simply enjoy the job security offered to them. The relative lack of movement and competition between institutions meant that scientists seeking resources to further the needs of their projects had to confront political hierarchies in their home institutes, rather than to try to build up a successful CV and initiate a cycle of credibility. Hence, 'scouting' attributes much less importance to the CV and signalling factors necessary to initiate cycles of credibility, whilst Latour and Woolgar's model perhaps downplays the importance of veze in Western European scientific environments.

Upsetting the balance

The metaphor of a 'scout' involves having a relation, positive or negative, with a political centre which distributes resources. Yet the fact that scouts also had to seek out resources through other alliances via 'hoarding' practices suggests that, for fear of surveillance and possible future inability to obtain resources, one had to be shrewd regarding the alliances one formed, and with whom one shared information. As intimated, I argue that 'scouting' had a legacy during the post-socialist period up to the present day, although to an uneven extent depending on the particular successes various institutes had in engaging with new policy directives and EU funding initiatives. One possible reason for continuity in some settings was the lack of change in some political circles, for as Sekulić & Šporer (2002, 86) described, "the socialist nomenclature converted political capital into economic capital by using their connections and control of resources". In other words, whilst the political system 'democratised', those in key positions rarely changed and many in the networks of those who had benefitted from the socialist party system continued to benefit during the nineties, with some socialists ideologically embracing nationalist ideology.

When in Zagreb, I conducted an interview with an astrophysicist who had worked for several years in the USA, and who described a number of these frustrations to me, when relating how he came across several obstacles in Croatia when attempting to create a new astrophysics teaching program in the coastal city of Split:

> The main idea was to create the most prestigious astrophysics program in this part of Europe. Now, I know it was quite naïve, but after I returned I faced unbelievable problems at the local university and at the faculty of natural sciences; but I had proved the concept was possible. The first generation enrolled

last autumn and we had a long list of experts from all around the world coming to Split to teach these students for peanuts. The amount of money spent on that was the equivalent of my gross salary, one year's salary, which is basically nothing. With that amount of money for one year we had definitely the most prestigious program in this part of Europe. But it was not sustainable simply because there was no local support at all. For example, when I returned I talked with the city mayor, I talked with the head of the županija (*province*); I talked with the minister for science and with people at the ministry. I talked with everybody and they were always saying, 'Oh yes this is a great idea, this is very good' but when the deadline was approaching and I needed some accurate measures taking, there was nothing. Then I realised at this point that people are not interested in change. This is the key problem for the Bologna Process too; people do not really want to change; when I say people I mean professors. It is quite nice actually; if you look at the salaries you have about one thousand Euros or more per month as a wage after taxes. There is no pressure from above to publish more, to change the way you teach, nothing. Let's imagine that you teach one course for say, three or four years in a row, but you do it like that without any effort - you can come to the class without any preparation! Then you realise that eighty or ninety per cent of people are like that, literally. The only hope is the new generation, people in their thirties; not all of them, but I notice a lot of tension between people in their thirties and this older generation. So now I will not be able to enrol new students simply because I was not able to secure the money. Some of the reasons for the lack of local support are specific to the University of Split, but the situation is more or less the same everywhere else. Very early on I realised that people really do not like me to mess things up. If you

think in that way, whereby you have your well defined style of working and so on, if someone becomes more successful, if some teaching program becomes more successful, this creates new standards. Suddenly you speak out if you are not following that plan. Very early on I realised that I am poking into the core problem of these universities; it is the way they teach, the way they organise their programs, their departments, everything. So I came with a big project, I got one hundred thousand Euros from the Croatian Science foundation for my research project. I got students and managed to get students from Zagreb to come to Split. The way I organised the whole thing was different. When the results started to come in I realised that a lot of people felt very uncomfortable about that. I didn't have any kind of backup from people who would be able to remove these obstacles from in front of me. Basically you need something, I don't know, you need accommodation for a professor to stay and you hit a wall, yet you suddenly realise that someone else booked the whole year for their professors who didn't come, or for some program. Simply, as you move on you start poking into someone else's business, stepping on someone else's toes. Then the main problem; there are people who will have a successful research project, will have a successful teaching project and you mess up the balance of power. I noticed that very much. Actually now, two years after I had some results, I noticed more than ever that some people are afraid of me; some people are annoyed with what I'm doing. Simply, they don't like people who mess up the balance of power. It's quite depressing; we are talking about people who will go on to lead this country. They really do not behave as an intellectual should. So when I talked with other people who had returned from abroad, when I talked with successful scientists here, the message I received was that you have to recognise your niche. You have

> to recognise how far you can go. Sometimes this is just one lab, perhaps after ten years you climb up through the hierarchy and you can expand your niche. This money for my teachers was given to the university by the Minster of Science and Education, money for international collaboration. Step by step, they basically took the money, giving only a little chunk to the natural sciences. I got zero. Then, when you start poking around, asking 'Where is my money?' you find out that someone else took it and they don't want you to ask these questions.

This 'delicate balance' suggests that some 'scouts' were more interested in creating comfortable lives for themselves in the state bureaucracy, rather than being focused on particular scientific problems or issues, and that such 'scouts' were often attracted to climbing administrative hierarchies in the university structure which gave them access to the distribution of incoming funds and resources. This explains how, for the above scientist, schooled in the USA, his return to academic life in Croatia was hampered by such manoeuvring and the siphoning off of cash designed to be spent on his project into other projects such as, for example, the creation of ostentatious new university buildings. The socialist legacy created a need for people to find such a fixed space in the bureaucracy from which they can 'scout'; an idea captured by the above scientist in his comment, 'you have to find your niche'. This phrase is particularly telling, as it highlights the need to find one's 'safe space' from which one is accepted and able to pursue the connections one wishes, without upsetting the balance, resulting in a string of possible bureaucratic and interpersonal problems with those unhappy with your being there. Therefore, one's ability to manage connections and control of resources, including intellectual property, thus affected the security of one's position. As the above example demonstrates, this created particular problems for scientists who had left the region for Western Europe or the USA and who, following career success and developing a deep familiarity

with academic research practices in those locations, experienced a string of problems upon their return, where they were perceived as a threat to some. I myself, also experienced problems of a similar nature when attempting to seek employment as an anthropologist in Zagreb, some of which I discuss in the postscript.

Another problem that persists today attributable to the socialist legacy and the scouting dynamic is a fear of collaborating for fear of ideas being stolen. This was particularly relevant in the natural sciences, as particular results were dependent on material resources needed to conduct experiments. In the human sciences, a more common practice was senior staff (sometime falsely, or having completed much less work on a text) claiming co-authorship as a means of boosting their number of citations. Geoff also described how he had many difficulties gaining information whilst working in the Ministry of Science and spoke of general communications problems surrounding his relationship with other politicians there in his experiences with scientists from Serbia in applying for FP7 projects. He made the following remark upon being questioned about this reluctance to collaborate:

> I think this is partly out of fear that someone is going to steal their ideas. This is in some cases a genuine fear, and it is a realistic fear because science is so difficult to carry out here because resources are extremely small. I suppose to fund research here they would be getting only about ten per cent of the money that would be funding the same number of people at the University of Manchester for example and therefore it makes it very difficult to achieve good quality research, even when they know how to do it, and to achieve it quickly. So what might take you six months to do will take a PhD student here four or five years to do just because they don't have access to the resources. What will happen is, occasionally a researcher from another institution may see what is

> being done by a research group somewhere else in Serbia and because they have better research funding they take up the idea and they progress it to a conclusion while the original research group is still struggling to get money. Therefore, a lot of research scientists are very reluctant to discuss their research with any other scientist; even the scientist sitting in the office next door. So there is a major problem of communication and this is not just a problem in science but in general. If you have information, then you have access to power and knowledge and if you share that information then you are diluting your power.

As earlier mentioned, one key difference between the natural and human sciences which necessitates a greater need for scientists to scout is the increased dependence on resources, laboratory equipment and so forth, which as Geoff stated, could be hard to procure.

Regarding communications problems, I can also recount numerous examples of suspicion directed both at myself, and at others. For instance, I received frequent jokes that I was a spy, whilst at the observatory, one researcher invited me up for coffee, and chatted to me in hushed voices for over two hours about how he believes a small number of other professors to be crooks, who have stolen results and data from multiple doctoral students, taking the credit for other people's work themselves. Such actions would therefore have created an atmosphere of suspicion, which necessitated a need for any 'scout' to conduct their scouting from a secure place, i.e. from a base of connections which they could trust.

Conclusions

The different strategies and resources invested in presentational skills, styles of collaboration and engagement with different

audiences, including through the media, articulated the ways in which scientists produced themselves as credible to particular audiences, both internationally and in the post-Yugoslav space. This need for recognition shaped numerous aspects of their self-presentation, ranging from how they organised their curriculum vitae and personal website, to the language ideologies and linguistic habitus which they lived. At the time of writing, scientists were increasingly compelled to learn the presentation techniques, bureaucratic skills and modes of self-governance required by the 'knowledge economy' in order to keep up with scientists in other parts of Europe. As we have seen, younger students who had little experiences of the Yugoslav bureaucracy found this easier, whilst some of the older scientists who advocated these ideas and international collaborations sought an explicit engagement with it, and more keenly enrolled in FP7 applications and so forth. Nevertheless, the number of scientists participating in FP7 initiatives was small, and scientists had different views concerning the politics surrounding those changes, therefore choosing to engage, in their work, with different imagined audiences.

CHAPTER FIVE: hierarchy and academia

A year before starting fieldwork, I visited a different scientific institute in Belgrade when looking for a possible fieldsite. I was accompanied by Joksimović, an academic from Serbia who worked in the UK and knew the elderly director of the institute who was highly regarded in Belgrade. Joksimović, with whom I had collaborated in Manchester, was enthusiastic about my possible project focused on scientific institutions in Serbia, and at that point was himself planning to return to live and work in Serbia. He suggested I print off a number of academic business cards to hand to other researchers I came into contact with in Belgrade, mentioning that collaborations were typically founded on the basis of face-to-face interactions, and that some scientists did not regularly reply to emails from people with whom they had not already established a face-to-face relationship. Indeed, all first meetings I had with scientists in Serbia, Croatia and Bosnia and Herzegovina were organized through colleagues: namely 'someone who knows someone else' (Brković 2015b), a consequence of the system based on personalised connections.

This institute was located on the banks of the river Danube. I met Joksimović outside the main building and we entered together, informing the porter we had a meeting with the director. Joksimović, whose connections within Belgrade academia and reputation on the basis of published work and tenure in the UK were key, organised the meeting. The meeting was in the director's office. The tone was very formal and conducted in English, as at that point I could only speak a little Serbian. As a courtesy, I said a few sentences in Serbian. The director was interested in the project and was keen for me to visit, as he said there were not many visitors from abroad, by which he referred to visits from scientists

established in trans-national, reputable scientific networks. He emphasised the importance of 'intellectual' exchange with researchers from other places, reminiscent of the importance of the trope 'scientific community' as discussed in chapter three. He stressed that this was particularly important as many scientists in Serbia had been relatively isolated from scientists in other countries, due to the economic and travel sanctions placed against Serbia during the nineties. Following this, he commented that we would have to go and discuss the fine details with the management team, so we organised a meeting with them. It was unclear to me the relationship the management team had with this elderly scientist – while in the UK managers are often separate (i.e. in this case non-scientists) and have control over a lot of researchers' freedoms in university environments (i.e. concerning job duties, responsibilities, and time), my experiences in Serbia and Croatia are that most institutes are run by the scientific team, who meet on a regular basis and have control over employment and the future direction of the institute.

The management team were keen for me to visit, but brought up the issue of 'bench fees'. Bench fees referred to a one off fee paid to them to cover the costs of my being there. Joksimović asked them what the costs would entail exactly. They mentioned water, electricity (should I bring a laptop), and a space to work in. Then they pointed to the beautiful view of the Danube out of the window and said that such a beautiful view doesn't come for free! At that time, it wasn't clear to me the underlying motivation behind their comments, it simply struck me that they were creating obstacles and/or were not aware of the relative precarious position doctoral students were in. Later, on the basis of more extended experiences in Croatian and Serbian academia, I saw two possible explanations. Were the institute controlled by scientists, the scientists involved in the management team would likely have been from a rival 'faction' with different interests to the elderly scientist I had met, and so were deliberately placing obstacles to my visit

in my path. Alternatively, if the management team were separated off from the scientists, this was likely an attempt to try and 'profit' off a (presumed) rich Westerner and/or link to expectations of what a commercialised - read capitalist – environment should look like. Upon leaving the institute, Joksimović was fuming regarding their comments. His interpretation was the latter: that they had assumed that someone from the West will have lots of money and they wanted a cut. It also cemented common associations, often founded in reality, of academia in Serbia as being a corrupt elite, with academics earning relatively large salaries compared to the average wage and receiving extra money from European projects which often consisted of large amounts in this context, relative to average wages which were considerably less than in Western Europe.

This encounter was one among many examples of first meetings I frequently had with scientists in the former Yugoslavia. In the first half of this chapter, I pay special attention to such meetings as I contend that how I related to and was treated by scientists in these encounters reveals much about the dynamics present, as well as the assumptions and expectations they had of me and of each other. In the second half of the chapter, I examine the hierarchies and exclusion mechanisms present at different stages in an academic career. I consider the emergence of national and international citation indices as a method of ranking the academic capital of scientists, focusing on the specificities of doing science in what Blagojević (2009) termed the 'semi-periphery'.

The broader aim of this chapter is to analyse how hierarchies and capital in academia become established (through citation practices) and how existing hierarchies are negotiated (through first meetings).

Thinking through first meetings

Unlike a classic village ethnography, where there is often only one arrival and then a prolonged period of getting to know a relatively limited number of people, when undertaking ethnography in an urban environment, there are often many more first meetings. The expectations each party has of the other also offers a route into understanding how different social actors conceive of and attempt to attach importance to actions and institutions. I deliberately use the term first meetings, as opposed to 'arrival story/ies' here. Ethnographic descriptions of arrival stories have often notoriously romanticised or exoticised the fieldwork experience through the use of specific tropes, such as Malinowski's castaway. As such, arrival stories received particular attention in the *Writing Culture* (Clifford 1992) debates where it was claimed they often function as a trope which reinforces the ethnographer's legitimacy, emphasising that (s)he *really* was there. They often had a heroic and gendered element which emphasised typically male ethnographers' persevering qualities.

Nevertheless, the context of an arrival and the beginnings of an interaction with people in the field are particularly interesting as they reveal what is at stake in such encounters, and implicitly, in the same way as a first date, what assumptions each side makes of the other, and on the basis of those impressions, what expectations emerge regarding the potential for future meetings. Of course, first meetings often marked the beginning of a longer exchange I had with academics, in which after initial negotiation, we found some issues or topics on which we had some common ground. They also created lasting impressions which often set the terms for future interaction. Nevertheless, whilst they were packed with meaning, such meetings were relatively superficial. Over the course of my time in Serbia, multiple first meetings were arranged with different scientists, all strangers to me, in order to conduct interviews or to try to gain access to an institute. In such meetings I typically

presented my research topic, arranged a short interview or simply had a coffee and an informal chat with students, researchers or non-academic staff. In several of those meetings, as we shall see, a certain hierarchy surrounding academic institutions located in other states and principally in Western Europe and the USA, which conferred academic capital became evident.

My second 'first meeting' with a scientist from a Belgrade based institute took place shortly after the meeting described above when I met Aleksić, an acquaintance of Joksimović. We met in Belgrade city centre. In contrast to the previous meeting, the tone was casual and he was both open and very friendly, which I read as relating to a positive stance taken towards (and time spent) in American Academia, where in my experience, a logic of enforced informality was often present. He was wearing an Oxford University sweatshirt with the logo and words emblazoned clearly, having studied there in addition to the USA. Interestingly, when I interviewed another physicist in Zagreb, he also wore an Oxford University sweatshirt to the meeting. Both these scientists spoke very positively of their experiences in Western scientific institutions. Aleksić suggested we go for lunch in a restaurant, where he told me a little about the work completed at the observatory. We arranged that I visit the observatory to speak with the director, and so we caught a bus there. Upon arriving, Aleksić and I met the director in his office. This meeting was much more formal than the first meeting with Aleksić alone. I was asked if I wanted coffee and replied that I did. An assistant, whose job it was to keep the main building clean and to serve coffee then retired to make the coffee. I sat on a chair at one end of the office about five metres from the director, who sat behind a desk. The director was clearly a busy man, as occasionally the phone would ring, and he would answer the calls. Aleksić had proposed to him a kind of exchange, whereby a role was created for me at the observatory, whereby I could help students with philosophical questions they might come across in their research and experimental design. We spoke in the

meeting for around twenty minutes, and they agreed to write a letter of support confirming my visit.

When I arrived in Zagreb to conduct research, I also needed to find a point of contact in the physics department. My PhD supervisor had given me a contact detail of a professor there, who I had visited in the department on a short trip to Zagreb in November 2009 – on this occasion we had met in his office and had a relatively informal discussion about my project, and how it might link to his work in the philosophy of physics. When I moved to Zagreb on September 20, I had at that point another 'way in' to the department, as I knew some physics students due to their involvement in left-wing political organising. What was interesting was that they took me to the same professor's office – I found two separate routes (one 'from above', one 'from below') to the same person. The students also suggested I speak with another professor. While I spent time with the students in the department one day, they found that second professor and said that a researcher from Cambridge University wanted to speak with them. I found this comment embarrassing as it was untrue – I had studied there as an undergraduate and the students knew this as they had asked me – this stretching of the truth was an example of 'impression management' (Goffman 1959) designed to secure access to such a meeting. The two students who told that lie suggested I should play up my previous institutional belonging there as professors would be more willing to talk to me if I mentioned it. Nevertheless, I explained to the Professor that I was presently completing a PhD at the University of Manchester. On the students' view, at first sight, my project would be valued (or not) depending firstly on whether the project had an institutional affiliation or not, and secondly on what that institutional affiliation was, i.e. where it was situated in a hierarchy of academic institutions.

I also found that in several first meetings, some scientists had preconceptions of me. Upon describing my project, I found that some

people made a series of implicit assumptions, that I in some sense represented and would have a positive stance towards the EU, or that I was an 'ambassador' for the interests and position of the UK government. For example, in Belgrade I was sometimes, as earlier mentioned, considered responsible for the actions of NATO in 1999, and challenged on this issue. I was regularly asked my opinion regarding the prime minister at that time, Tony Blair. Occasionally in first meetings, both with scientists and with people in the street with whom I did not even mention my project and focus on science, people would joke that I had come to spy for the UK government. Such encounters evidenced a perception of surveillance on the part of international governments and institutions, in addition to the suspicion I discussed in the previous chapter. The anthropologist Greenberg (2010) also observed such perceptions of surveillance in her fieldwork with NGO activists in Niš and Novi Sad, two large towns in Serbia, as did I in my fieldwork with football fans in Zagreb (Hodges 2016). In Greenberg's case, she describes how at meetings, where the recent political history including the NATO bombings of Serbia in 1999 were discussed, she was often portrayed as a representative of the USA and the larger world outside Serbia. As concerns Greenberg's research, the dominant conclusion her interlocutors drew was that they were powerless to change the political situation and that non-participation was the decision reached:

> ...nonparticipation or self-exclusion from politics and political agency is a way people in Serbia can manage and displace what they perceive as a judging western eye... Our struggle, forged together, reinforced my position as a judging westerner to whom Mira [an informant] was appealing, even as she attempted to position us as equals in relationship to political powerlessness. (Greenberg 2010, 44)

In the case of certain encounters which I had at first meetings, this idea of a judging Western eye was certainly present; it was sometimes challenged, whilst with other scientists, my status as representative of the 'West' was welcomed and even promoted at the observatory on the basis of an 'openness'.

Generational differences and 'manners'

Generational differences were also of great importance in shaping everyday interactions between researchers in scientific institutions. I often found that older male researchers had a different understanding of my role to younger researchers. The younger generation of researchers would typically listen more carefully to my questions. Some, especially at the doctoral/early career level, would ask me why I wanted to interview them, as they did not feel that they had anything interesting to contribute, due to their perceived relative lack of experience. Older researchers viewed me more frequently as an historian working on the recent history of science in Serbia. They would more frequently launch into a monologue in which they recited a story or series of events they thought should be documented. I also found that some older Professors talked about topics outside of their area of expertise. For instance, one professor, Jokić, offered his opinions on the situation in Serbia from what he described as an 'anthropological and sociological viewpoint' in which he mentioned the negative consequences of the dominance of 'dinaric types' from mountainous areas on the political situation. His implicit perception of the interview, I later realised, was that I record 'his story' and opinions and convey them to a wider audience, while from an anthropological perspective, I was interested in what I could learn from the interview process and concepts and viewpoints which he articulated, linking them to other circulating discourses. Authorship was therefore privileged in his interpretation of the interview and he asked that I send him the interview transcript (the interview had been conducted

in English), so that he could 'correct' it. He did this on the basis of memory alone, for he did not have the interview recording with him when he made his edits. He implicitly asserted authorship not over the spoken speech, but over a particular story he wished to tell, undercutting the authority of my transcription.

I experienced a higher level of mild avoidance behaviour in first meetings with older members of staff who were relatively well established in their field, more strongly with male identified researchers than with female. There was a definite generational gap between researchers up to around the age of thirty, typically completing doctoral studies like myself; 'early career' researchers aged from around thirty to late forties, and established researchers towards the end of their careers who typically received honours and national awards (such as from the Serbian Academy of Sciences and Arts - SANU) and who devoted time to other pursuits such as the history and philosophy of science. In this manner, a hierarchy of knowledge was produced, which Traweek (1992, 79) also referenced in her study of particle physicists. On this view, for physicists, physics was understood to be "of more intrinsic interest for great minds than the fields they chose to leave, such as chemistry, engineering and history", and a greater amount of intellect and reasoning capacity was needed to succeed in physics compared with other sciences and the humanities. In addition to these hierarchies of knowledge and academic disciplines, characteristics of academic knowledge production, including peer review, can also be viewed as relating to the political-economic hierarchies of capitalism too. Drawing on the work of Elias (1978) and Radcliffe-Brown (1940), the anthropologist David Graeber (1997) contrasted joking relations with relations of avoidance. Joking relations refer to relations of extreme informality, whilst avoidance relations are marked by such extreme respect and formality that one party is enjoined never to speak to or even to gaze upon the other under any circumstance. Graeber argued that such relations mark out a continuum. At one extreme, in avoidance, there is

always a burden; one party is indebted to behave in a 'proper' manner towards the other, whilst the (superior) other has greater licence to define the terms of the interaction. This was the case, for example, in many of my first meetings with scientists. Their phones often rang and they took calls throughout the meeting. Had my mobile phone rang however, I would have felt embarrassed about wasting their time. Graeber argued that

> In joking – the body is more material, made of substances... in avoidance, the physical body itself is negated, the person is translated into some higher or more abstract level. The body in avoidance is constructed out of property. (ibid., 20)

The bodies of people in joking relations are much more continuous both which each other and with the external world. As Graeber described

> Joking partners `tease' or `abuse' one another; they toss insults, even missiles. At the same time, one hears again and again of joking partners privileged to make off with each other's possessions, and this sort of license is considered of a piece with all the others. There is a sort of symbolic equivalence at play: an equivalence, one might say, between the taking of goods and the giving of bads. (ibid., 19)

In avoidance however, there is a stricter boundary drawn between the two bodies and much stricter rules on how to behave. For Graeber, this is because the body in avoidance is constructed out of property. Property, as anthropologists are aware, is not a set of objects which people own, but more correctly describes a series of social relationships between people, which consist of "a bundle of rights and privileges with regard to some object, held by a person or group of persons to the exclusion of all others" (ibid., 23). Graeber sought to understand where this disparity came from.

If we take the material, joking, world as our starting point and think about how joking relationships (the mutual taking of goods and giving of bads) may become hierarchical, i.e. where goods are taken and bads are given one-sidedly, then we see one way in which hierarchies arise:

> In a joking world, there are only bodies, and the only possible difference between them is that some are bigger and stronger than others; they can take more goods and give more bads. And the implications of that for a view of the contemporary social order, and particularly for the moral standing of the high and mighty of the world, need hardly be mentioned. (ibid., 30)

The growth of capitalist work patterns and regimes of private property were also accompanied by an increase in patterns of mild avoidance behaviour often referred to as 'manners'. The existence of avoidance relations stretch back much further over the historical and ethnographic record, yet what was peculiar about capitalism was the growth of such mild avoidance relations over a much wider domain, the importance of which was often stressed by aspirational social climbers and the wealthy, land owning classes. If the body is understood as constructed as property in avoidance, the increasing importance of manners can be explicitly linked to the growth of a private property regime, whereby the number of property owners rapidly increased, and such manners served as a means by which various groupings of people, with differing allegiances and amounts of property, could relate to one another, leading to social stratification of those groupings with common ground. This link was clearly visible in the cognates surrounding the word in Croatian for the economy (*gospodarstvo*). The term *gospodarstvo* is derived from the term *gospodar*, an old term which means owner of property, and has the same origin as the term *gospodin*, which means gentleman. This change is interesting in light of recent work by Shapin (1994, 1996) on the historical origins of the natural sciences

which emerged in early modern sixteenth and seventeenth century Europe as a perspective distinct from earlier 'natural philosophy' (see Dear 2008, 16). Of great importance for the development of the natural sciences was a shift from a scholastic orientation, wherein the authority of certain old texts was unquestioned, to an empirical orientation. Recent work in the history of science has described other key factors accounting for the emergence of modes of inquiry which are now commonly described as natural sciences. Shapin (1995) argued that alongside the shift from a primarily scholastic to an empirical tradition, questions of trust and legitimate testimony came to assume central importance with the growth in importance of peer review (i.e. groups of well-respected gentlemanly scientists) in determining what sources of information and which experimental results were considered reliable. This increase in importance grew in the mid-seventeenth century with the founding of the Royal Society in London in 1660. The Royal Society was founded on an ideal, which resonates with earlier discussion of the 'scientific community', of 'gentlemen' coming together to discuss natural philosophy, and agreeing to put political differences to one side. Whilst not constituting the basis of truth alone, the question of who to trust, or rather who was a credible spokesperson for reality, became paramount. The result of this shift in focus to the privileging of direct experience and testimony in developing arguments about the analysis of nature meant that natural philosophers were faced with the task of which travellers' testimonies to trust. This was also a consequence of the change in scale whereby reports, often from travellers, were now received of environments and 'objects of fancy' from different parts of the world rather than just one's immediate surroundings. Shapin argued that "direct testimony was to be preferred to hearsay testimony; multiple testimonies to single; knowledgeable sources to vulgar..." (ibid., 249). Yet standards of vulgarity often depended on conduct and whether it accorded with gentlemanly standards. In fact, gentlemanly conduct, honour and respect came to play a large role in determining whether your account was believable

or not. Combined with Graeber's interpretation that the body in avoidance is property, this suggests that those individuals with large private estates, and corresponding gentlemanly comportment, were viewed as more reliable sources of knowledge. This suggests that the peer review system is historically grounded in the history of capitalism and the spread of manners, or codes of civility, amongst the property owning classes. Questions of gentlemanly conduct and manners also featured in many of my interactions between scientists. As earlier mentioned, older scientists typically acted more 'set-apart' from the world and expected greater formality. As such, who counted as a 'credible spokesman' for scientific and experimental observations historically depended on norms of 'gentlemanly' conduct and mild avoidance relations associated therewith, while political-economic power played a large role in determines how universities were globally ranked, the topic to which we shall now turn.

Global Rankings of Institutions and 'National' Groupings

(*On a local Belgrade radio show, being interviewed by Aleksić about my project*)

***Aleksić**: Last question... so who do you support, United or City?*

***Me**: Leicester City, but if I had to choose, I'd pick City.*

Two months after beginning fieldwork in Serbia I was invited onto a radio show to be interviewed by Aleksić, the format being an 'intellectual duel', in which I was quizzed about my project and science, and asked what I thought about the dominance of 'postmodernism' in Western cultural and social studies, with Aleksić mentioning the 'science wars' (Jardine and Frasca-Spada 1997) which took place during the 1990s. Aleksić attacked a 'straw man' version of certain poststructural currents, such as the focus on signifiers and discourse, and the use of obscurantist writing styles. The interview, in which I was presented as an academic with

a specific (prestigious) academic affiliation and therefore worthy of participating in the dual, ended on a lighter note, indexing popular cultural stereotypes associated with Mancunian belonging.

Outside of the radio show format, in the first meetings earlier described, some kind of academic institutional belonging was key to me gaining access to potential field sites, which were sites of knowledge production also connected with universities. Such qualifications and attachments to particular institutions had a certain amount of academic capital (Bourdieu 1990) attached to them, from the perspective of those committed to working in that particular circuit. The extent to which people with whom I spoke were interested, and asked me questions about academic topics depended often, but not always on having a commitment to academic circuits, for instance through having been university educated or working at an academic institution. For instance, for the cleaner at the institute who I regularly socialised with, any kind of institutional connection was not at all interesting – whether I was a sociable person or not was more important.

Among the scientists, academic institutional 'brands' enjoyed a popularity in Belgrade and Zagreb. Some academic brands were understood as elite and recognised amongst academics. Aleksić's Oxford University sweater was testament to this. These institutions were ranked according to the relative prestige of institutions, some of which were recognised 'global' brands. A hierarchy associated with (ethno) national-citizen groupings also played a role; for instance, French universities were valued in general more highly than Albanian universities. Such a ranking of national communities of scientists was also pointed out by Traweek in her ethnographic work with particle physicists:

> The particle physicists unhesitatingly rank national research communities. For example, American experimental particle physicists consider that the best

> work is done by Americans, then Germans, English, French and Soviets (in that order), with the Japanese and Italians about equal. The Japanese are dedicated to moving KEK and their national reputation in experimental work to the first rank. The Americans do not even seem to be aware of this ambition. No American physicist I asked has any clear idea about how such an ambition could be realised. They seem to assume that such a change in relative rank has never been known, forgetting the relatively recent rise of the American and Soviet communities vis-a-vis Europe. (Traweek 1992, 110)

Despite the invocation of ideals of a common global scientific community, rankings took place of 'communities' of researchers defined on a 'national' level. In the case of my arrival in Zagreb, I was urged by the students to emphasise my past belonging to a prestigious academic brand in order to make my work easier for me. Just as Jansen (2009, 827–8) stressed how the understanding of the world in terms of ranked collectivities was a process reinforced outside of the former Yugoslav region by EU committees, so the academic ranking of institutions was reinforced by outside institutions such as European 'cultural' institutions. These included the British Council, Institute Cervantes, Goethe Institute and so forth, who often had the vaunted aims of promoting a 'nation's' culture and language. These institutions had a significant presence in Belgrade and Zagreb.[60] There were also a small number of stipends available for bright students to study at academic institutions abroad, often organised through connections to philanthropic bodies such as George Soros' 'Open Society' foundation. Periods at institutions abroad were also promoted by the Serbian and Croatian governments and other fund giving bodies for students scoring the highest marks in examinations. As a person

60 For example, the British Council describes itself as "a cultural relations body, connecting the UK to the world and the world to the UK." See http://www.britishcouncil.org/new/about-us/ (accessed 10/10/11).

from 'outside' (Serbian - *napolju*, Croatian - *vani*, meaning abroad), I found that being taken seriously as a researcher by other researchers in Serbia and Croatia relied on having a claim of belonging to a particular higher education establishment which was valued in this hierarchy. The importance of international collaborations were frequently mentioned in interviews, as the following quote from an interview with one of the professors at the observatory made clear:

> **Andrew**: Have you ever studied abroad at all?
>
> **Matić**: No, I wanted to finish here, but even so, after defending my PhD thesis I went to France for three months. I have been involved in several, wide-ranging international collaborations, in particular with France, meaning that I speak French fluently. I have collaborated with researchers in France for more than thirty years and have published about seventy papers in the leading astronomical and physics journals. I have also collaborated with researchers in England at the British Council.[61] I was involved in projects at University College, London over two to three years and have spent around six years in London. I have also collaborated with researchers in Greece, Russia, Tunisia, Poland – although this collaboration came to a standstill during the sanctions. I have also collaborated with researchers in Bulgaria. I also had a PhD student there and was invited to be a supervisor as I speak Bulgarian fluently.

The 'national' ranking issue also emerged with reference to the new national hegemonies produced by the recent conflict. In Zagreb I often came across the idea that the conflict had brought 'Croatia' closer to Europe, with previous Austro-Hungarian

61 This comment struck me as strange as I understood the British Council as being primarily an institution used to teach and promote English language and 'British Culture'.

Empire belonging stressed, whilst in Serbia I more frequently came across a narrative that 'Serbia' was the 'victim' at the hands of the international community in the recent conflict. The argument was that 'Serbia' unfairly suffers from an image problem, whereby Western audiences view the state as a violent place in which a dangerous nationalism is located.[62] Such a distancing strategy often relied on a distinction between a 'good', voluntarist, inclusive, liberal, universalist civic nationalism and a 'bad' ascriptive, exclusive, illiberal, particularist ethnic nationalism (Shulman 2002). These binaries were often invoked as an orientalising strategy (Said 2003) used to distinguish 'Western' nationalisms, whose key exemplars include the USA and France, from dangerous ethnic nationalisms, whose key exemplars include Germany and the states of Central Eastern Europe.[63]

International media reporting during the recent wars was key to producing this myth according to many people with whom I spoke in Serbia, for particular (ethno)-national citizen groupings had been painted as 'good' and others, especially 'Serbs' as 'bad'. To give one example, a researcher described how some students from Western European countries were due to visit Belgrade in a scientific exchange, and how one student had been scared when she had found out she was to live in "wild and dangerous Serbia" for several months.

Some of the Professors who I interviewed talked about this image problem explicitly, as for some it was a perceived problem facing scientists attending conferences. For instance, this issue arose in the following interview with Prof. Jokić from the Institute for Physics in Belgrade. During the interview, Jokić actually rephrased my question to tackle the issue of the 'image' of Serbia, when I

62 This was particularly prominent in the tourist industry (Armenski, Zakić, and Dragin 2009).

63 This distinction between civic and ethnic, as Brubaker (1999) argued, is ambiguous and overburdened analytically, key characteristics of various types of nationalisms being shown by different states at different times.

had in fact asked him to reply to the question of how the relatively small size of the Serbian state impacts on the kinds of scientific projects pursued:

> **Jokić**: I think I understood your question, but you probably meant the political position of Serbia, which is still influenced by the former reign of Milošević, has some influence on the image the West has of Serbia and whether this influences in some way relationships concerning scientific exchange and so on. I don't think it has a very big influence concerning academic relationships. Serbia, I think, has a rather good reputation in the West as far as our science, our general cultural atmosphere and our cultural level is concerned. I think that even the latest political events including the aggression against Serbia, and I will speak freely of the aggression against Serbia in 1999 (the NATO bombings). It was irrational, that somehow some people from the West, and I am not only referring to academic people, intellectuals, even politicians, have some misgivings about Serbia... think that somehow, there is something wrong with Serbia and Serbian people. I don't think there is a fundamental problem as far as the influence of our political position concerned, and that position is still very bad, you can see that it is very bad - the best indicator is the Kosovo issue; but as far as science and cultural exchanges go, I think we can be satisfied more or less with the general position of Serbia.

The condition of isolation during the nineties was central to reinforcing this sentiment as the following excerpt from an interview with a Professor, (Prof. Sandić) from the observatory made clear:

> **Andrew**: That's it basically, so if there's anything else you want to add or anything that you think might be useful or of interest?

> **Sandić**: Let me try to remember now. Essentially it was a really tough period for science, really it was. The main problem was this sort of isolation. Because really, you can ask people from the observatory here, I think they were also... I can only speak in my name but I think that the international astronomical community prohibited Serbian scientists from participating so they were writing petitions at that time asking for this to be removed. Some people also had problems publishing. Yet I didn't have any problems. This is interesting. When we sent something we got a response.

Intellectual property and citation indices

On another occasion, while at the observatory, Prof. Sandić suggested a paper to me, and subsequently a book which argued that the dominant ideas in astrophysics today were not necessarily the closest explanations to 'the truth'. The book argued that they were rather systems of ideas which the institutions with the most resources had invested in and so conservatively were loath to discard them. This suggested that some accepted facts in the discipline were accepted due to the hefty investment in that particular approach. This is a position that Latour and Woolgar (1986) also claimed about neuroendocrinology in their ethnographic study of a laboratory. On this view, as hierarchies of institutions and the relative resources they had at their disposal changed over time, so new perspectives and approaches would emerge as dominant.

Over the 'transition' period intellectual property legislation changed and the academic use of citation indices increased. These developments have been key to understanding and measuring rankings in new kinds of ways. There was some pressure in Belgrade and Zagreb to publish in a small number of highly respected international journals with high rankings, such as *Astronomy and Astrophysics, Astronomische Nachrichte* and so forth, but scientists

could survive by publishing solely in regional journals and negotiating local academic hierarchies. There was also a national citation index system for journals on the basis of which institutions, such as the observatory, were assessed. The director of the observatory, for example, mentioned that the observatory has always been ranked as one of the top five scientific research institutions in Serbia, sometimes the top in the ranking, and so they had little to worry about regarding receiving state funding. The national citation index is called *SCIndeks* and was piloted in 1995 in the Social Sciences first. Šipka described the motivation for it as follows:

> Sharing the unfortunate destiny of society as a whole, Serbian science suffered a visible decline during the previous two decades. Now, at the end of an era of extreme political instability, Serbia is lagging behind other countries in the region compared to which it once had a similar R&D output. This situation encouraged authorities in the new democratic government to set up an ambitious strategy of fast catch-up. The strategy is aimed at raising the quality and fertility of research. The core problem is a long-lasting low motivation of academics, resulting in huge brain drain and low performance (Šipka, 2001). This can hardly be solved without introducing robust, non-arbitrary evaluation, including impact indicators. In applying this, ISI [International] citation indexes are known to be of only partial usefulness, due to their inability to discriminate among entities belonging to low-performance and/or isolated academic communities. Strong contributing factors to the low Serbian performance in R&D were found to be a low level of international cooperation and low visibility of locally published journals (LPJs), underrepresented in international databases. (Šipka 2005, 710)

This article - writing in a normative vein of 'transitology' which views the endpoint as being a democratic, transparent form of

capitalist market society - forcefully suggests a national citation index as a solution to the problems science in Serbia faces. These problems include low productivity and quality of research output. The choice to use citation indices was indicative of the increasing imposition of a globalising neoliberal value field, which anthropologists have extensively critiqued, as they have also critiqued the normative approach to discussions of post-socialist 'transition'. As long as the governments in former Yugoslavia continue to promote EU accession, more forceful acceptance of this value field is to be expected. For example, in Slovenia, I regularly heard how researchers no longer received a full salary, but had to make up a certain percentage of their salary through successful application to projects at the national level. Furthermore, my experiences in Croatia suggest that state initiatives such as project applications for funds and resources constitute an attempt to introduce a level of 'neoliberal' competition, in fact they are marked in a highly subjective manner based on the connections, personal alliances and ideological tastes (with nationalism hegemonic) of those who apply to mark the applications – individuals who have already negotiated themselves to high level ranks in the local academic hierarchy, which is possible with few or little international publications.

Citation indices and the move towards projects have been criticised, particularly in the human sciences, in which some methods used are not easily measurable. Indeed, scientists were increasingly encouraged to play a role as 'experts' in their respective disciplines, and as we shall see in chapter six, this process was required as part of a wider trend in promoting 'public understanding of science'. The particular geopolitical positioning of the region in terms of the 'semi-periphery' (Blagojević 2009) is useful in illuminating positions in and concerning such value fields. As she commented:

> the semi-periphery is positioned between the centre and the periphery and it contains the characteristics

> of both, therefore it is a large scale social hybrid. It is essentially shaped by the effort to *catch up with the core*, on the one hand, and to *resist the integration into the core*, so as not to lose its cultural characteristics, on the other hand. ...the semi-periphery is in its essence transitional, in a process of transition from one set of structures to another set of structures, and therefore it is unstable, and often has characteristics of a void, chaos, or structurelessness. The instability of the semi-periphery comes from the fact that it is open to two different sets of possibilities at the same time: those coming from the centre, and those coming from the periphery. (Blagojević 2009, 33–4)

There is a tension here between attempting to catch up and investing in the value field promoted by the core. On the one hand, the distinct political form of the centre, which up until around 2015 made liberal democratic claims, later superseded by authoritarian nationalist and economic protectionist claims, offered researchers who chose to invest in scientific collaborations with 'core' states some distance from the recent wars, whilst the recent developments have surprised post-Yugoslav academics – in my experience – less than their Anglo-American colleagues. This relates to a deeper awareness that many scientists in the post-Yugoslav states have of the fickleness of geopolitical dominance. Through living in a 'borderland' between East and West, they have been directly affected by such changes repeatedly over the past century. Involvement in the 'core' also offers them international recognition through involvement in well-funded research projects. Some scientists also had an ambivalence towards the kinds of political collectivities the core currently promotes, which lead to attempts to form other alliances or to gain a critical mass for research through collaborations with other collectivities, some of which better understand the context in which scientists in the region work, where distinct scholarly traditions are established (see Prica and Antoljak, 2001).

The tensions between focusing on the core and immersing oneself in post-Yugoslav academic networks is likely exacerbated given the previously relatively large size of the former SFRY and the discourse of Yugoslav exceptionalism, alongside the politicisation and rhetoric of struggle associated with the socialist legacy, leading to some scientists attempting to hold on to their autonomy. This is a tension which Hayden came across in her ethnographic work with ethno-botanists in Mexico, a context which may be similarly described as 'semi-peripheral'. Hayden commented how

> In their efforts to secure intellectual property rights and/or related forms of protection for "traditional knowledge", indigenous activists, engaged ethnoscientists and legal scholars, and nongovernmental organisations have thus attempted to pry open the exclusive hold that Northern, corporate entities have had on intellectual property rights. (Hayden 2003, 37)

Amongst astrophysicists, I came across the communalist ideal (Merton 1973) that research and data should be available to all scientists, as discussed in chapter three. The Serbian Strategy for Science also reiterated this ideal:

> The knowledge and results of scientific research do not carry a national stamp, they are already, by law, available to all of humankind, i.e. they belong to the world scientific fund. However, those who contribute belong to national scientific traditions and their results are most frequently accomplished in the frame of national programs, even when one considers cases of international scientific research collaboration.[64]

This however, was an ideal. Many databases and observations were available to view for free online (including many publications

64 My translation. For a copy of the document, contact me on ajhodges22@gmail.com.

made available prior to peer review), whilst others commanded subscription fees. The European Southern Observatory, located in Chile, is one example of this, requiring annual membership fees on the part of aspiring states on a scale of millions of euros, dependent on the population of the state.[65] For some researchers, forging collaborations with scientists in other states was thus important, because whilst working collaboratively, they could gain access to such expensive data.

Career paths

Following the career paths of scientists offers a route into understanding how hierarchies emerge between scientists. In the following, I draw on my experiences in working alongside scientists and students in Belgrade, although several of the conclusions are likely true, via induction, for other universities in Serbia, and some in Croatia as well. A scientist's career begins with good school and university exam results. Besides exams, competitions in subjects such as astronomy are also organised between schools on a national level in both Serbia and Croatia, and participation in such competitions is a route by which excellent students are identified.[66] Besides this, there is a centre called Petnica where bright school students are taken away from mainstream education to attend seminars and work on scientific projects, including astronomy. Students from schools over Serbia apply to attend Petnica, and attendees are chosen from the applicants. Some professors from the observatory also regularly visit and lecture at Petnica. Whilst studying at university, bright science students have the opportunity to conduct work placements abroad. Ability to find placements

65 Fifteen member states made a total contribution of approximately 131 million euros last year.See http://www.eso.org/public/about-eso.html (accessed 16/2/12).

66 For Croatia, see http://astronomija.azoo.hr/ (accessed 1/3/12) Students from Serbia, and more recently Croatia, are also entered regularly into an international astronomy competition named the International Astronomy Olympiad. See http://www.issp.ac.ru/iao/ (accessed 1/3/12).

and funding depends on students' results in university exams. Marks are graded from 6-10, with ten being the highest. Courses now carry ECTS points, thanks to the Bologna process reforms, which means that the qualifications are rendered 'equivalent' with similar courses at other institutions throughout Europe.

Such a system should function as a meritocracy. However, as the sociologist Doolan (2009) illustrated with respect to the University of Zagreb, several discriminations take place. Doolan conducted a sociological study into factors affecting students' completion of studies and factors affecting educational opportunities. Inherited cultural capital shapes students' paths; for students whose parents were university-educated, the decision to attend university often formed a 'natural' part of growing up for them and it was not an active choice to attend university, as it was for many first generation students. Oral exams are also conducted at the universities during which discriminations may occur, as discussed by Doolan (2009) in relation to Croatian higher education. Furthermore, results sheets cite the place of birth, and the student index (a card in which information about courses and exam results are written) gives information about the school of origin. The name given in some cases has an obviously 'Croatian', 'Serbian' or 'Bosnian' association, which coupled with information gathered from accent may lead on some occasions to further discrimination. For example, I had a friend in Belgrade who regularly received jokes from friends that she was using 'Croatian' phrases, and that this was sometimes picked up at the university in her essay writing. This was also the case, and probably more salient in Zagreb, with respect to Serbian phrases.

Following success at university level in Belgrade or Zagreb, students may apply for Masters or PhD level qualifications. If they choose to do so at the university, then they will be assigned a supervisor. Using the observatory in Belgrade as an example, supervisors were associated with particular research teams, based around

project areas such as astrobiology, astrophysics, spectroscopy and cosmology. Students would regularly attend meetings at the observatory and some had desks there, whilst others were based in the university department. The heads of the research teams at the Observatory were all male, and as a PhD student related to me, they often had arguments between one another. The head of the department at the university was female. I found, through discussions with friends in both natural and social sciences, that a lot was expected of PhD students generally, partly as it was difficult to get a scholarship and hence it was a significant achievement. In meetings and at parties, when administrative staff members were not present, I noticed that it was almost always female PhD students who would help with practical tasks such as making coffee. For example, at one meeting, after a (male) Professor spilt a cup of juice, without any words spoken, the only female present, a PhD student, got up and went to the kitchen area where she picked up a cloth and mopped up the spill. On another occasion, the telephone in the library rang out in the meeting. The same female student stood up and moved over to answer it, before another male student got up and picked up the receiver, actions which relate to the dominance of a strong patriarchy.

To varying degrees, PhD students were treated in a hierarchical fashion and expected to organise, for example, multiple courses for undergraduate and masters students. This meant that for some, teaching obligations impinged on the time they had intended to use for research, and as such, often took longer than hoped to complete their PhD studies. Upon completion of a PhD, the defence (*obrana/odbrana*) would be public, with friends and family, as well as academic colleagues and professors attending, and the student asked to present their key findings and answer questions from the public, followed by a celebration with party snacks and drinks.

Sometimes the extra obligations demanded of PhD students severely reduced the amount of time they could dedicate to their

studies, thus having an adverse effect on the quality of their work. This meant that choices about whether to remain in Belgrade/Zagreb or whether to look to complete postgraduate studies abroad (typically in 'core' states) were significant. On this topic, Blagojević (2009, 94) described the various 'paths' open to researchers, and noted their particular impact on women. She determined four paths, which equally apply to male researchers, which we may term 'brain drain', 'scientific nomadism', 'the transmitter' and the 'home academic'. The first referred to gaining a position in what she described as the 'core', which typically for students from Belgrade and Zagreb referred to academic positions in Western Europe and/or the USA. Scientific nomadism described mobile researchers who move from post to post. She argued, "if she [the scientist] chooses to become endlessly mobile she will need to give up family life, stable relationships and support networks. Instead she would need to develop professional networks, possibly to connect to 'influential people' and become close to them" (ibid.). Finally, two other options include the role of 'transmitter', where a scientist typically works in the 'core' and regularly visits the semi-periphery, holding seminars and transmitting state-of-the-art knowledge. The final option involves staying in the home institution, where she will have fewer opportunities and reduced access to state-of-the-art material, but will perhaps be better integrated.

Whilst working at the observatory and visiting the Faculty for Physics in Zagreb, I came across several scientists who lived or worked in the 'core' countries, including from France or the USA, who returned to Belgrade to organise seminars, special classes, and who also made arrangements for some students to visit institutions in the 'core', who would qualify as 'transmitters'. For example, one day a visiting professor based in France came to the observatory and university department, where he gave a presentation. He had grown up in France, with parents from Serbia. As such, he had spent summer holidays growing up in Serbia and had a reasonable command of the language, giving his presentation

in a combination of Serbian and French. Many scientists, particularly older researchers, in Belgrade had a strong command of French as it had been the lingua franca for scientific research, and the observatory journal was published in French in the first half of the twentieth century. Such travelling scholars were received as guests with a great deal of hospitality, and any attempt to speak Serbian was warmly welcomed. One professor named Vuković had the aim of fostering collaboration, as the following interview excerpt illustrates:

> **Vuković**: My idea in Serbia was to try and develop contacts with people isolated because of the war, because of everything that's happened. My idea was to help, to build... to start building small connections, followed by bigger connections and then maybe a small group, and then in a few years they would develop and would maybe even enter the European Union economically and politically, but scientifically they would be more involved in Europe. So that's the idea, I mean we already collaborate with other countries, and so with the small amount of time that I can spend on this collaboration, this can help us, this can help them. First, we need some people to work on the data, to work on the science because we are very behind with our experiments...
>
> **Andrew**: What would that collaboration mean in practical terms? Would it mean something new, would any other astronomers be coming over [to France]?
>
> **Vuković**: I would first come for lectures, and maybe for some conferences. Practically speaking, my plan is to develop the topic of solar wave physics from France, the idea is that the students would gain some knowledge there, they would then come back here and train students themselves. Practically the idea is that after some time they would create and work on

solar wind physics here, aiming to become autonomous. Hopefully then they will be able to get funds, but this is much more an opportunity; they could also participate in building experiments for space projects. To participate in space projects, we need to build some hardware and we have begun to do this. They do that because they had closer collaboration with the Russian space project in the past, who are also building some hardware. The Russians now have better collaboration with the Polish than here in Serbia. There was more collaboration in nuclear physics, devices, experiments and hardware in nuclear physics than in astrophysics or space. So hopefully the idea is to make themautonomous and be able to work in the same field and encourage them to be more open than they are now.

Andrew: Are there some topics or themes which are easier, that are restricted for Serbian people to work on because they don't have access to the level of funding that you have in France?

Vuković: Yes, it's the same with the Russians, it's very expensive to set up an experiment. It's expensive to build a big telescope, but it is even more expensive to set up a small experiment on a rocket. You can build a small telescope and observatory with one or two, maybe three million euros, but some experiments and solar telescopes that you build on the space station can cost up to twenty million euros. So space business is very expensive. To launch one kilogram into space you need one million Euros so it's very expensive. For that they would need really big money, but what you do notice with these countries is that they are very well developed in terms of theoretical knowledge. And theory is easy as you do not need big devices that are expensive, you just need some pieces of paper,

> you need your brain and you need a pen and you can work on the theoretical questions. But nowadays you also need computers to do simulations. With a modern computer you can do simulations with a laptop, so this is not very expensive; doing theory in any country is not expensive. It's why you also have to have plenty of theoretical physicists in these countries, because it's not very expensive doing theory. When you want to do experiments it is more difficult. This is why they have developed the science more into the field of theoretical work, theoretical spectroscopy, and so on.

In the case of Vuković, the fact that he was born in France and grew up in the French educational system meant that he had embodied cultural capital (such as high level French language skills and knowledge of how to comport himself, as well as CV and grant writing skills) which academics who grew up in Serbia/Croatia and then subsequently moved to France did not have. As such, coupled with his knowledge of Serbian, he was in an excellent position to function as a 'transmitter'.

Growing up in the region and choosing to stay in the home institution meant, to a greater or lesser degree, accepting the institutional hierarchies present in the Serbian and Croatian university system. Martin's (1998) sociological study of academia is useful here. Martin conducted an ethnographic study of hierarchy in academia, drawing on his knowledge of processes taking place in the UK, Australia and the USA. His analysis is useful, because there are certain regularities which exist by virtue of the claims academics, and especially as we have seen scientists make, to be part of a wider (global) academic 'community'. He argued that:

> There are two separate but interconnected ways to rise in the academic hierarchy. One is based on the local political system and the other on the wider research community. The local political system consists of the

> formal academic posts and the myriad of committees through which institutional decisions are made. The way to get ahead through this system is to be a proper politician or bureaucrat in the local institution and to build up support from others in the system... The local political system is built on service (putting in time) and on cementing alliances. Power in the political system centres around control over resources, in particular allocation of money to departments and to individuals, and hence control over the working lives of other academics. Modern academia might not be much different from some other bureaucracies except that there is a competing system through which people may rise to power: the research system. An academic who publishes in respectable journals and who becomes known to leaders in the discipline through conferences and visits can thereby gain access to power. This power is power based on credit for academic contributions rather than based on control over money and resources. (Martin 1998, 28–9)

One's ability to bypass the local political system through publication in international journals was rendered more difficult for two reasons. First, the choice to stay and work in local institutions led to peer pressure to focus on publications in national level journals and publications: to firmly focus on advancing local research traditions. Second, access to international journals was expensive and so it was more difficult to acquire articles than for scientists and researchers living in core states, although this has changed in recent years with increasing moves to open access and the emergence of pirate sites which some researchers used to access articles. However, many researchers in Serbia and Croatia managed connections with people based at Western universities who would volunteer their university account details, so that locally based scientists could access articles via their accounts. For instance, I received requests regularly by students asking if I could procure

an article for them. My access to journals made me a potentially useful connection, as did my English language and academic writing skills, which resulted in me receiving a large number of formal and informal requests for proof reading and copy-editing – on one or two occasions with senior professors or students even asking me to proofread whole articles for free.

Some scientists discounted the international journals, as earlier mentioned, using dependency theory arguments. Other scientists were more or less critical of them, dividing their energies to various degrees between a focus on national level journals and a commitment to regional traditions, with occasional publication in the international journals, which conferred them a certain degree of credit and legitimacy particular amongst the general public. To give one example, I was added onto a number of mailing lists for science and social science researchers and I noticed that on some lists, special announcements were made when scientists published in highly ranked, international journals – considered an important honour. When based in Manchester however, such publications were considered relatively routine and necessary if one were to 'survive' in academia.

Where dependency theory arguments were used to criticise international journals, the entity under attack was often conceived nationally. To give one example of such a dependency theory argument, in Zagreb I arranged to meet with one of Tuđman's scientific advisors during the nineties, Prof. Horvat. We met in his office in the physics faculty. He mentioned that he had been active in many of the reform processes surrounding higher education and was especially critical of changes such as the Bologna process, describing the process as *gimnazifikacija* (high-school-isation). As earlier mentioned, the Bologna process refers to a standardisation of higher education systems across Europe in order to enable degrees at different European universities as roughly equivalent. By attempting to standardise systems of knowledge acquisition

and qualifications gained over Europe, students would be rendered more mobile in an attempt to institute a 'knowledge economy'. He argued that the best students would typically seek out the best resources, facilities and the strongest research traditions, thus moving to European 'centres'. This would leave small countries such as Serbia and Croatia in a worse off state. He also used the term 'levelling off' to describe this process:

> **Horvat**: ...Whereas here they just have viewed the Bologna Process as a kind of levelling off of the system.
>
> **Andrew**: What do you mean by `levelling off' exactly?
>
> **Horvat**: Establishing equivalencies.
>
> **Andrew**: Yes, standardisation.
>
> **Horvat**: Standardisation and equivalences. So just, so to say, normal for an empire. This is administratively enforced equivalency.

Here he drew an analogy between the EU and 'empire'. Implicit in his tone and in the use of the term 'enforced equivalency' was the assumption that the effects of empire do not offer uniform advantages to all under its rule, and that a new form of dependency relation would emerge that would not benefit semi-peripheral EU states such as Croatia.

Conclusions

This chapter has focused on how academic hierarchies were performed and/or consolidated in particular encounters with researchers, and especially during first meetings. It has also discussed such hierarchies in relation to changing value fields, including intellectual property and the use of citation indices, and

political-economic hierarchies. Researchers' strategies have also been discussed, namely how the engage with local, regional and international academic institutions and hierarchies and the specific challenges researchers face at different points in their career. Problems associated with building a scientific career in the European semi-periphery have also been discussed.

CHAPTER SIX: media engagements

INTRODUCTION: public engagements

One cold January morning, a television crew arrived at the observatory. They had come to film a short documentary about the observatory, as the International Year of Astronomy[67] had just begun. When they arrived, a female presenter and two or three cameramen visited the library before exploring the building and moving outside. A handful of us ventured out with the crew in the snow, including a professor who often presented school students with a history of the observatory when class visits from nearby schools took place. He first talked in some detail about the importance of the International Year of Astronomy which had just commenced. Hurrying away from the snow outside, we then moved inside the vast cylindrical buildings which house the older telescopes to view and film them. The air was cold and moist; damp was visible on some of the walls and the buildings were in clear need of renovation. The television crew filmed inside the buildings of two large telescopes – each housed in a separate building on the observatory site – before chatting with the professors. We then moved back to the warm library which was chosen as the venue for a more detailed discussion in front of the camera. Professor Marić, an earlier mentioned elderly female scientist who lives on site with her family, gave a presentation for the camera, in which she spoke in a scripted way about the individual qualities and achievements of the various 'founding fathers' of the observatory. It was clear that she had talked about this topic on many earlier occasions. I was also asked to give a short presentation about my research, explaining in a few sentences why I was here. We then relaxed and had a coffee with the team before they left. The main output of the

67 At http://www.astronomy2009.org/ (accessed 16/10/2012).

visit was a short piece for national television in Serbia, informing the public about the International Year of Astronomy and showcasing the history of the observatory.

School visits to the observatory also occurred on a fairly regular basis. As I sat in the library once, where I typically worked, a professor, teachers and a crowd of children descended, as they were being shown around the observatory site. The same professor who showed the television crew the telescopes told the pupils about the founders of and history of the observatory, asking them questions to test their knowledge. Whilst such school visits sometimes took place, the observatory ran no open days to my knowledge at that time and was generally (officially) closed to the public, although in principle there was nothing to stop people from walking up and entering the observatory building.[68] Following the completion of my fieldwork however, a museum has been opened on site, as was the case at the Prague observatory, we visited, where it functioned as one way of retaining interest in and looking after the old telescope buildings there.

Another important way in which the scientists at the Observatory engaged with the public, with a similar focus on user interaction through visitors participating in experiments was at the science festival, *Festival nauke*. This festival is a relatively new initiative, having first taken place in Belgrade in December 2007. The festival is supported by a wide range of scientific institutions including the observatory. Additionally, a quick glance at the *Festival nauke* website under the section *prijatelji* (friends) includes a long list of corporate sponsors, a fact which was also visible in the displays of various stands I encountered at the festival. A quick search on the internet also revealed similar events taking place in Zagreb (*Festival znanosti*) and in other locations all over Europe.

68 However, open days did take place at the amateur observatory mentioned in the introduction – *Narodna opservatorija* (People's Observatory) – located in Kalemegdan fortress in the centre of Belgrade by the river. Information available at: http://adrb.org/index.php?lang=sl&page=observatory (accessed 3/1/2013).

I attended the second festival which took place in December 2008, on the invitation of Professor Aleksić. It was held in an exhibition space in Tito's former palace in Dedinje, a short bus ride from city centre Belgrade. I met Professor Aleksić outside and we walked past some large statues from the socialist era, which he discounted as "monuments to a dead religion". We then walked towards the building located on a hill. The festival was a bright buzz from outside, caught amongst large queues of people and lots of brightly coloured logos and adverts, with copies of a local newspaper called *24 sata* being distributed alongside helium balloons. The crowd struck me as smartly dressed, and there were fewer children present than I expected in the queues. From the hill where the entrance lay, the shimmering haze of the city was visible to all. As we walked inside, we passed security guards on one side. All around I saw volunteers wearing white laboratory coats. The first association I made when I entered was with physics as we passed a papier maché display of an Einstein-like figure. A volunteer was handing out special editions of *Time* magazine, all in Serbian, dedicated to the festival, on the left-hand side as we entered. Opposite lay an advertising stand offering free snacks alongside another display about the importance of recycling. Ahead lay stairs which led up to the various exhibits. Inside the exhibit space, there were several rooms, each composed of a space with boards on which information was written about various topics of interest. Almost all the text was in Serbian, and used the Latin script. Some boards consisted of images, for example of technological gadgetry. In front of several of the boards, which were themed around particular disciplines (for example, there was an astronomy section) there were "hands on" tasks with which the attendees could engage. Overseeing these tasks were volunteers, primarily people who work at institutes which collaborate with the festival, or simply people who have a strong interest in science. These volunteers talked to visitors and guided them, where necessary, through the interactive tasks. Several of the exhibits related to themes of particular local importance. For instance, there was an exhibit surrounding Tito's

role in NASA and the USA, and there was a genetic map of Europe, where the migration routes of different "ethnic" groups over time were mapped out. Many of the university faculties, such as agriculture, also had sections. Some areas, however, were not connected with a university faculty or institutions. One display which struck me as particularly strange consisted simply of loud house music being played with equations flashing in different colours on the wall. Towards the end of my visit to the festival, I found the astronomy space, which was concealed in a chamber with stars projected on the ceilings and walls, information available about them. In the astronomy section I recognised a colleague, Marina, who I knew through a friend from university who suggested I go for a coffee with her upon my mentioning that I was focused on astronomy and astrophysics. Marina guided me through the exhibit and we chatted a little about the festival, before I found Professor Aleksić again and left to have a coffee with him, where he quizzed me about the UK science fiction series Dr Who, before returning home.

Enrolling publics

The television format did not involve active public engagement, unlike several other engagements mentioned above, such as the move to object centered displays in the museum and the user interaction characteristic of *Festival nauke*. The television show and school visits principally concerned transmitting both ideas and information about the history of the observatory and a regional tradition in astronomy and astrophysics to a wider audience principally in Serbia. In so doing, they provided a "public" with information about a universal-scientific order of things on the basis of knowledge gleaned through global networks of knowledge as well as the observatory's own research activities. At the same time, they helped to constitute an audience as a 'public' in a particular kind of way. Whilst I do not always consider the phrase 'the public' an

example of "flagging the homeland daily" in the sense of a national grouping (Billig 1995: 93), it very often does take the boundaries of 'the people' (*narod*) understood in the political sense as the body politic over which a particular state rules. In an important sense then, the concept of 'the public' is a reflection of the organising principles which attempt to maintain a modernist, political status quo. Besides the role of enlisting publics, several other interesting questions emerged. Why was I asked to give an interview? From where did *Festival nauke* receive funding and how were the natural sciences promoted differently there? What was the political context to the anti-communist comments Aleksić made and repeated on several occasions in my presence? As regards the interview, I contend that my academic capital and my familiarity with Serbian marked me out as of special interest. Indeed, the significant media presence of many scientists in Belgrade relates to a particular role assigned to intellectuals as "humanist figures" who, due to their extensive education and disciplining, have a social authority through which they speak about topics of wider "public" interest. The Belgrade based anthropologist Miloš Milenković described a post-socialist process associated with a decrease in authority of such figures in strong words:

> An even more baneful trend has been initiated in the name of democratic consolidation – the removal of humanist intellectuals from the public eye, replaced by political analysts and economic experts. (Milenković 2009, 39)

Despite the decrease in authority which Milenković reported, I contend that such a role still existed when I was conducting fieldwork and suggest that it relates to the socialist legacy with its enlightenment claims and emphasis placed on education and learning. Besides my academic capital, I was likely asked to present my project on television as it was relatively unusual at that time for an 'outsider' to conduct an anthropological study amongst an elite

group in Belgrade, to have learnt the language and so forth in a context in which there was still considerable international isolation due to the recent sanctions. Whilst the television interviews and school visits were done on the basis of good will and promoting the observatory, events such as *Festival nauke* clearly received a large amount of external funding, which begs the question, from where did it receive these funds and how were the natural sciences promoted differently there? At the festival there were very few background/historical details concerning the observatory offered in the displays, which were more hands on and practical and used very bright colours. Volunteers were on hand to play an expert role. In contrast, the television show was much more heavily focused on showcasing the observatory and spreading details concerning its history and contribution. This was also the case for the school visits, although there was also a strong element of enlisting a new generation and satisfying public interest on these visits. These differences related to regional and international policy making trends – for instance the International Year of Astronomy was coordinated on an international level by UNESCO and the International Astronomical Union (IAU).[69] *Festival nauke* was the most heavily influenced by these policy 'innovations'. To give one example, the science fair encouraged active user participation, echoing recent trends in Western Europe concerning desired relationships between scientists and science advocates and the public. As Davies observed, there has been a move away from what is termed a deficit model prominent in the UK and Western Europe to a "participation model" (Bell, Davies, and Mellor 2008, 15-37). The deficit model, at its height from the mid-eighties till the end of the nineties, argued that the public were deficient in their knowledge of science and thus needed to be educated. The participation model, following the UK House of Lords' (2000) recommendations[70] focused on getting the public more actively interested and involved in scientific policy and debate. This was connected with

69 At http://www.astronomy2009.org/general/ (accessed 6/1/2013).

70 At http://www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3808.htm (accessed 12/3/2012).

the need to justify large amounts of state spending in science, in a context where transparency has come to be promoted as desirable as a result of what Strathern (2000) refers to as audit cultures. On the transparency model, tacit public approval is necessary to make expenditure accountable, and so positive images of science and public participation have been heavily promoted. The policy drives for public participation and the liberal cosmopolitan imagery associated with *Festival nauke* were not visible in the other public engagements described, however. I never once throughout my fieldwork heard the phrases "measuring impact" or "need for public participation" mentioned in relation to media engagements – only once did I hear the term "impact" mentioned with reference to an increased emphasis on the ranking of journals. It was rather in 2010 that a centre – the *Centre for the Promotion of Science* – was opened in Belgrade with an explicit focus on popularising science amongst the public.[71] To my knowledge, at that point there were no technologies in place for measuring and promoting media impact and popular writing about science. Some professors had topics that were intrinsically more media-friendly – such as one professor's cosmological work investigating conditions of planets that might be suitable for extra-terrestrial life. Lectures on such topics were therefore fairly regularly organised, both at institutes in the city centre, such as the Serbian Academy of Sciences, and at planetariums such as that in the old fortress, now a park, named *Kalemegdan*. The view that public participation drives tended to promote was one of scientists playing a public role as being an expert who describes the background to the particular topics they work on. Differences in opinion are often brushed under the carpet, only discussed when scientists meet for panel discussions with other individuals, such as politicians and environmental activists, who have other concerns. As Edkins commented,

> [...] in Anglo-American culture at least the intellectual is often synonymous with the "expert": someone who

71 At http://www.cpn.rs/o-centru/?lang=en (accessed 6/1/2013)

> has technical expertise and whose expert knowledge can be called upon to replace a political decision. Often if "experts" can be said to agree, political debate is closed down or even pre-empted. (Edkins 2005, 65)

This 'expert' role resonated more closely with the format of the science fair, where exhibits were divided into sections on the basis of discipline, and students and researchers were on hand to answer specialist questions and discuss concepts being exhibited in the displays and experiments. On this view, scientists are understood as isolated individuals having opinions only about their subject matter. This was not the case with the scientists alongside whom I worked, however. Nevertheless, despite the model promoted at *Festival nauke*, the economic context in post-socialist Serbia differed from the context in Western Europe where such policy "innovations" were designed. The dominant 'public' discourse I came across was that public expenditure on scientific research was not and should not be a priority. Investment in science was sometimes depicted as a 'luxury' or even as a decadent waste of money imposed on Serbia by the West, primarily to the benefit of the 'West', according to more extreme commentators utilising 'dependency theory' arguments.[72] Indeed, in comparison to states in other regions of Europe, funding was small as a percentage of GDP and this created some resentment amongst scientists.[73] However, from the scientists' perspective, I found that they wanted to make such investment an increased priority. Many scientists would often draw comparisons with the resources available in other states, particularly in Western Europe and the USA and on the basis of that, lobby the government to increase investment

72 For a discussion of the connections between anti-science rhetoric and disappointment with modernity, see Perović (2000)

73 The latest figures for Serbia (2010) show a tailing off of science expenditure as a percentage of GDP to 0.3%, accompanied with an optimistic announcement that Research and Development (R & D) will now be prioritised with the goal of reaching 2% within a decade. To put those figures in context at present Japan invests over 3%, the USA around 2.5%, while the EU average is less than 2%. At http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.Z (accessed 8/11/2011).

in the natural sciences. From the perspective of many social scientists however, I often found that they felt the natural sciences were already incredibly privileged compared to the funding they received and that the natural sciences were often supported for ideological reasons. This was particularly acute as some of the astrophysicists with whom I worked associated the social sciences with Marxism and the SFRY and were keen to dismiss or ridicule them as not worth investing in.

Whig histories

Towards the end of the fieldwork period in Belgrade I interviewed Professor Marić, who had spoken in front of the television crew. During the interview she gave a potted history of the observatory similar to the one she gave for television, completely ignoring the questions I asked about the observatory's situation today and during the nineties. The account she gave included finely grained details of the various personalities at the observatory and their achievements. For example, she mentioned, regarding the building of the observatory building:

> (Prof. Vojislav Mišković) had an exceptionally agreeable personality, he was a great enthusiast and lover of astronomy, an exceptionally, how can I put it, conscientious and meticulous person, meaning that he was the kind of person who could oversee the project until its completion. I think he was also the right person for the job after Prof. Nedeljković took a more backseat role.

I came across this kind of account, emphasising the individual details and often greatness of particular male scientists frequently over the course of my fieldwork, including at the Nikola Tesla Museum in Belgrade which I first visited in Spring 2008. Nikola

Tesla, a well-known inventor, was born in Smiljan near Gospić, in Austro-Hungary, to a family whose father was a Serbian Orthodox priest. Tesla moved to the USA to pursue a scientific career and patented a number of devices, including an induction motor, having a long and successful career On this first occasion, a large part of the museum was being renovated and so there was relatively little which was available to see. There were displays of several of his inventions, many in miniature form. There was also a large Tesla coil which was used to generate electricity. The coil was shown at various points throughout the day, and visitors with pacemakers were asked to leave the room. Of those remaining, several were offered to hold a neon strip light, and when the conductor was turned on, the lights would illuminate the room. On my first visit a video was also shown. The screening began with flashes of thunder and lightning occurring in nature, which conjured up a sense of the sublime. A biographical account of Tesla's life, beginning with his birth and focusing on his extraordinary abilities as a child was then given, emphasising his special and other-worldly abilities. In the back of the museum, Tesla's ashes were located in a shiny metal ball, in the centre of a special area set aside for the display. On later visits to the museum, this video was no longer shown, having been replaced with a less emotive, narrowly biographical account, and a clear movement in the organisation of the museum towards more object-centred displays with some degree of user interaction.

Such biographical historical accounts of great individuals and their accomplishments are often referred to as 'Whig histories'. Such histories were typically written by scientists at the end of their careers, seeking to glorify their achievements and inspire a new generation of scientists, who may one day be immortalised like them. Those working behind the scenes, very often women or assistants from other social classes, very often received little or no credit.[74] They typically have several characteristics.

74 Recent 'social' histories of science have done much to correct this view. For interesting work focusing specifically on gender, see Fara (2011).

First, they often stereotype key scientific figures as 'geniuses', set-apart from ordinary humanity. For writers of Whig histories, science progresses over time, and that progress is located in the foundational characteristics of a small number of key individuals, often based on personality characteristics such as ingenuity, adaptability and so forth (Jardine 2003). Whig history writing invokes a hierarchy between certain individuals who are somewhat removed from the real world and everyday people. I found the term *veliki čovek* (great man/person) was often used to describe such an extraordinary person distinct from ordinary people in Belgrade and Zagreb. The term was always used in a positive sense to refer to someone who has achieved much more than others, or who has done something good, for her/his 'people' or for humanity in general. As the historian of science Fara (2002) argued, the related concept of genius was a romantic invention. She argued that Sir Isaac Newton was not regarded as a 'genius' at the time in which he wrote for his accomplishments. Even after the category of genius emerged, poets such as Alexander Pope garnered much more respect and were more highly valued at that time. One of the most important insights from relatively recent work in Anglo-American history of science has been the emphasis on scientists as human beings, engaged in a collective endeavour, in complete contrast with Whig history accounts.

Like Traweek (1992, 74–105) in her dealings with particle physicists, I came across numerous 'Whig-history' references in my engagements with scientists and especially in their public self-presentation. This was probably a consequence of the lack of a separate, professionalised history of science department at the universities, meaning that scientists typically engaged in philosophical discussions or wrote histories of the sciences themselves. Besides the above material, the observatory practice of naming asteroids was also inflected with a Whig history element. The observatory had located many previously unknown asteroids (of particular importance were those on a potential collision

course with earth!). Many of the asteroids they 'discovered' were also named after famous scientists or other cultural or political figures from the region. Examples included Milanković, Tito, Tesla, Mišković, which all reference famous political or intellectual figures from the region. This practice reveals a tension which Daston (1991) discussed in her analysis of the *Republic of Letters*, between the founding of national scientific academies as part of a program of attempted nation-building and the showcasing of prestige, and the cosmopolitan ideals of many scientists involved in the *Republic of Letters*. Whilst some scientists, as we have seen in chapter three, advocated 'nation-building', others were critical or ambivalent.

Whig histories typically exaggerated academic hierarchies and individual achievements. Such an approach had both a historical grounding in and strong resonance with the *Volk* romanticism associated with figures such as Herder. Throughout the nineteenth century, Belgrade and Zagreb were well connected to intellectual circles generating ideas in this tradition. I found that such material often formed the basis for competitive comparisons. In Zagreb I visited the Tesla museum one day with a physics student, to whom I mentioned I had lived in Belgrade. The physics student commented on how he had been disappointed by the museum in Belgrade, and he had expected it to be better than the one in Zagreb given the relative size of the cities and Tesla's Serbian Orthodox upbringing. In Zagreb, there is a theatrical style display. Groups of school students would come and sit opposite the display area, which was cordoned off, and observe various experiments and the Tesla coil in action. The Tesla coil display in Belgrade, whilst impressive, was not on the same scale. Whilst it not surprising that such competitive comparisons took place, particularly in a context seeking to consolidate newly formed national hegemonies, comparison making sometimes led to disputes, which impacted on the academic life of scientists.

Disputes sometimes occurred between advocates of different 'national' groupings. For instance, one day whilst working in the observatory library, a Professor, Prof. Vanska came in to do some photocopying. She invited me for a coffee in her office on the first floor. One of the first things she mentioned to me was that she was from Macedonia and was currently working on a paper about a scandal whereby another scientist at the observatory had made in her opinion fraudulent historical claims about a 'Serbian' scientist, Milanković. Milanković was credited with devising modifications which resulted in modifications to the Julian calendar in 1923, in addition to his predictions of a coming 'mini ice-age' as discussed in chapter four. She referred to this scientist as a crook, and sought to redress the injustice in this historical account, by illustrating how another scientist from what is now Macedonia, Trpković, had in fact played a key role in devising the calendar, yet had received little credit.

Rather than simply stating that such Whig histories are a conservative format, anthropologically we can ask: what social effects do they have, or what ideological 'work' are they doing? One possible answer is that they are enrolling and defining a particular kind of public and a particular kind of interested citizen, who situates herself within a disciplinary and/or national history on the basis of seeing her or himself as part of an intellectual lineage, 'standing on the shoulders of giants', to whom (s)he experiences a debt and affinity. Whig histories are key to generating such a feeling, as they describe particular individuals such as Tesla as if they stand on another level 'above' ordinary people, a spatialisation which is also ascribed to the state or nation and which in a sense makes the debt one feels to them so large as to be impossible to pay back.

The importance of debt and indebtedness and its connection with Whig historical narratives was clear when I quizzed students in Belgrade and Zagreb about Nikola Tesla, presenting them with two written statements I found on an internet forum on the B92

website and asking them to write their thoughts on the statements.[75] The statements were as follows:

> (i)Tesla was a Serb from Croatia, with a temporary stay in America
>
> (ii)Tesla was above all an American scientist, the fact that he was born in Gospić doesn't have any connection with his life. [my translation]

I asked students to write on a piece of paper (conducted individually, in silence) whether they agreed with the above statements or not, and to state reasons. They were then asked whether it was important to them whether Tesla was a Serb/Croatian/American or not and why. Many students claimed that national belonging wasn't important, but only one student in Zagreb explicitly rejected the culturalist framing of the question[76], in stating:

> No, it (nationality) isn't a foundational characteristic of people, generally, their nationality. To me Tesla is neither a Croat nor a Serb nor an American, but a good physicist and a good man.

There were several interesting patterns to the responses. The first, most prevalent argument, was that it was not Tesla's origins that mattered, but rather what he achieved. On this view, in concordance with one stress of Whig history analyses, achievement was attributed in terms of the individual (often moral) qualities of the scientist. Several of these students also stressed that this related to the cosmopolitan quality of the natural sciences and their common value for all of humanity. For example:

75 A friend suggested I remove the source origin from the survey, as B92 is itself a politically controversial choice of website with a liberal, pro-EU bias, which might generate preconceptions about me and the survey, particularly as people would guess I came from Western Europe.

76 Which I hadn't yet problematised at this stage in my research, and so had not thought to devise a question format that did not 'presume' a culturalist framing.

> No. His contribution to humankind is important (Zagreb)
>
> No. Where he was from isn't important, what matters is what he achieved in life (Belgrade).

Of those who felt that nationality was unimportant, several conceded that he had some kind of belonging, and some stated that was important in some other way.

> No, his contribution to science for me has no kind of link with his belonging to some collection of people. Einstein and Bohr were Germans, Fermi was an Italian, but what they achieved together was something big. (Zagreb)
>
> It isn't important. In science, I hope, there are no barriers between peoples. Also I would like to add intuitively that I am sure that Tesla's origin and heart are in Serbia. (Belgrade)

To a differing degree (from unimportant to very important), parts of his earlier life experience were assumed to have had some kind of influence on him, determining his achievements. These marked a divergence from the 'individual' achievement argument in suggesting that some kind of context, cultural, historical or both, played an important role in shaping his career path and subjectivity. Two commonly referred to debts concerned debts to the 'nation' and 'state'. Of those students who argued that nationality was important, origins and roots were often referred to as shaping significantly the course of one's life. Upon being asked about the importance of Tesla's national belonging, one student made the following comment:

> Yes it is important. It is the same as if we were to state that Queen Elizabeth wasn't English but French

> (although she had a German origin like all those from the Royal Family). This is because every nation and podneblje[77] has its own character, such as accents for example. If he [Tesla] had gone somewhere different, in some different circumstances today we would be using candles instead of light bulbs. (Belgrade)

Such arguments referenced historical specificities of Tesla's biography which resonated with belonging to a 'nation' and his later achievements. The parts of his history drawn out varied in Zagreb and Belgrade in accordance with the production of different national histories, although many students acknowledged, or even mentioned a famous statement Tesla is remarked to have made: '*ponosim se srpskim rodom i hrvatskom domovinom*' (I am proud of my Serbian birth and Croatian homeland). Tesla's Austro-Hungarian education and living in a location in Croatia were stressed more heavily in Zagreb, whilst the fact that his father was a Serbian Orthodox priest was stressed more heavily in Belgrade. By focusing on different aspects of Tesla's life history, some students made the argument that Tesla owed something of what he achieved to particular traditions, and that those traditions were all the more valued as Tesla who had achieved so much, was connected with them. Such arguments were particularly strong as they referenced a long history and debt to one's ancestors. As such, designations of Tesla as 'American' were not highly regarded. One student stated the following: "*I believe that the relationship of the USA towards Tesla (I am thinking here of his life in poverty) is proof enough of how much Tesla is an 'American'*", mobilising this idea of debt, and in this case citizenship; that for his work, the American government owed Tesla a decent wage. Such views in the survey also, crucially, formed motives for choosing to stay rather than to seek a scientific career abroad:

> Yes. Because I feel a belonging here and want to contribute to the development of Croatia.

77 This term is difficult to translate. It literally means 'beneath the sky', and can be taken to refer to 'region' in the above context.

> Yes. Croatia is beautiful to me, no matter what state it is in.
>
> I want to stay in Croatia because I want the sciences in Croatia to develop on a bigger level.
>
> Yes, I would like to stay in Croatia. Although the conditions are not necessarily the best, I think it isn't the right solution that everyone goes abroad to work because if we all did that then nothing would improve here.

Debts were also made with reference to an 'investment' a state had made in students, in terms of education, resources and so forth. This is precisely how citizenship is inculcated through reference to 'giving something back' on the basis of that investment. The following quote from an interview I conducted with a senior Professor, Jokić, from the Institute of Physics, made this clear:

> The problem was that we used to work in a Socialist country where you got a small salary, but you had benefits. For instance, after some years you got a flat practically free of charge, but you were bound to this flat, you were bound to this institution, you were bound to this country, and you were bound to this regime. So it was not a free market. [my emphasis]

What the scientist does not point out is that in a 'free market', there is a similar binding; markets require states, states require citizenship, and citizenship is based on some kind of loyal commitment. Especially in Zagreb, I found that the concept of 'having a state' associated with a 'culture' formed a benchmark of legitimacy, legitimating that 'culture' and national traditions on a 'global level'. This was partly the case due to the state and nation building processes underway there as the following quote made clear:

> Yes. I think that for a state which is young like ours, and of the size that ours is, it is important to emphasise the achievements of our people (*domaći ljudi*). (Zagreb)

To give one further example, many young scientists were offered grants from the government in order to study abroad, with the condition that after a given number of years they would return to work in Serbia. Whilst the conditions of such grants would have been extremely difficult to enforce, there was a sense that many students would feel an obligation to return on the basis of the opportunities they had been offered. Both citizenship and nationalisms rely on much a much more defined bind between two entities, typically understood as a debt relation between an individual and the state, or between and individual and one's (nationally defined) ancestors respectively.[78] Sometimes these debts to the 'state' or 'nation' were even monetarily calculated; the sharper the contours of this feeling of owing or 'debt', often the more unpleasant the consequences. Demanding precision regarding such debt involves the on-going production and digging up of a history, with the practice of setting some kind of historical 'balance sheet'. In a context of recent state formation organised around a national logic, such practices were necessary to naturalise the historically produced national categories through generating an understanding of 'who' owes what to whom, and thus who is indebted and why, a process which when positive apportioned credit to key individuals and a tradition and when negative, apportioned blame, thereby often generating a history with a particular moral character, typical for what the anthropologist Lisa Malkki (1995) terms 'national cosmology'.

More politicised engagements

It became clear to me that several of the researchers discussed topics that went far beyond their disciplinary expertise, sometimes

78 See chapter three Primordial Debts in Graeber (2014)

engaging in polemics with other scientists. For example, shortly after arriving in Belgrade, Professor Aleksić also invited me to participate with him on a radio show which he regularly hosts, as mentioned in the previous chapter. The show describes his work and other astronomy related themes to the general public. We arranged to meet in front of a statue of Nikola Tesla, located in city centre Belgrade in front of the Electro-Technical Faculty. Aleksić suggested to me that I might like to write about the statue of Tesla as part of my project, joking that an exact replica had been measured and built in Zagreb in 2006 in a process of 'nation-building'.[79] A statue had indeed been moved to a central location in Zagreb at this time, but it had been built much earlier by a sculptor, Meštrović and located until that point outside of city centre Zagreb at the Ruđer-Bošković Institute. I then walked with Aleksić towards Vračar, an upmarket area of Belgrade, where some of the former Communist elite used to live. The studio, located there, was small and inconspicuous. We arrived a little earlier, and had a coffee with the owners who were very relaxed. I was nevertheless quite nervous as I sat and waited for the show to begin, having had little experience of speaking live to a public at that point. The discussion we had on air was very informal and was focused partly around my project and partly around an issue in science and technology studies known as the science wars. Professor Aleksić used the opportunity, to have a discussion about the science wars, in which he made clear his anti-postmodernist viewpoint.[80] Throughout the discussion, I felt as if I was being encouraged to engage in a friendly polemic, and that some of the central concerns of Anglo-American humanities were being simplified and ridiculed from a liberal humanist position. In any case, the tone of the radio show was pleasant, and I felt as if I had been treated as an academic guest from Western Europe who was treated as a colleague and worthy of a 'gentlemanly' academic duel (*dvoboj*). The show ended with a light-hearted comment I was often

79 See http://www.index.hr/vijesti/clanak/tesla-napokon-dobio-spomenik-u-zagrebu/321498.aspx (accessed 15/3/12)

80 For an overview of the science wars see Jardine and Frasca-Spada (1997).

asked several times each day both in Belgrade and Zagreb given I identified as from Manchester – 'so do you support (Manchester) United or City?' Besides such public duelling on the radio and television between scientists and academics, polemical forms often emerged in online discussions, such as blog debates. Shortly before arriving in Belgrade, an academic colleague of mine directed me to a blog which one professor from the observatory had on the media website B92. This professor, and a number of others, had regular blogs on this media site and others such as Peščanik,[81] which crucial outlets for the Milošević opposition during the nineties. One particular blog discussion of interest concerned the arrest in late July 2008 of a famous fugitive politician, Radovan Karadžić, who was charged with genocide at the International Tribunal for Crimes in the Former Yugoslavia.[82] To many people's surprise, he had been living for several years in Belgrade, the capital of the former Yugoslavia and present day Serbia. Furthermore, he had been making a living for himself in hiding as an alternative medicine practitioner under the alias *Dr Dragan Dabić*. He claimed to use a technique harnessing the power of what he termed 'human quantum energy' – a suspicious claim to anyone with a basic training in the natural sciences: 'We are energetic beings', the Serbian-language site begins. 'Numerous energetic processes in us, on which all the functions of our body are dependent, are caused by the energy of the higher source (cosmic energy, prana, mana, organic energy, quantum energy, the Holy Spirit). They flow in us and around us and they are our highest good and the source of health and our wellbeing' (Walker and Hecimović 2017). It was this set of events that provoked the following polemical blog response:

> Not denying the ancient local saying that "there is a grain of truth in every pit of lies", and that quasi-scientists sometimes do come across serious yet previously

81 At http://www.b92.rs/ and http://pescanik.net/ (accessed 31/10/11).

82 Radovan Karadžić, president of the Bosnian Serb SDS (Srpska Demokratska Stranka), whose party's troops were responsible for the facilitation of ethnic cleansing in Bosnia.

> incomprehensible "boundary phenomena", it seems absolutely clear that one ought not dare to give up the fight against these anti-enlightenment and anti-rationalist phenomena which prey on the ill and trouble naïve and inadequately educated people. Furthermore, education is absolutely our biggest problem. The most likely doctored statistics published at the end of last year in the very servile service of [prime minister] Vojislav Koštunica demonstrated that the situation is alarming with more than 15% of citizens illiterate and more than 40% not having finished primary school. It isn't surprising that Dr Dabić has his hands full with work. [my translation]

Karadžić's imprecise use of the term 'quantum' is likely to have enflamed the professor's response, in his denunciation of people whom he described as quasi-scientists. Furthermore, Dr Dabić used the prefix 'Dr', which implied he had an academic qualification and a claim to both status and expert knowledge.[83] His use of the prefix doctor took on a particular salience as academic qualifications commanded a significant amount of respect, and scientific literacy in the post-Yugoslav states was low at the time of fieldwork, and is still so today, according to some other scientists with whom I spoke. On their view, politicians were at least partly culpable for this lack and for the growth in popularity of what they termed 'pseudoscientific' goods, knowledge and remedies. Consequently, some scientists, including the above, had little empathy with many politicians and particularly those with strong religious views and connections to church institutions. Karadžić's role as both a politician with strong religious views and a life in hiding as a peddler of New Age cures thus expressed the problem of the existence of fraudulent political and religious elites, at least partly in power due to the lack of education, including scientific illiteracy. The blog and the radio show served other purposes although they typical-

83 Karadžić was a graduate student of psychiatry. However, his alias certainly did not have a qualification in "human quantum energy".

ly helped to construct an audience and public as well, as earlier mentioned. The radio show consisted of a more in-depth discussion concerning issues in the sociology and philosophy of science, but rather than being concerned with the simple transmission of knowledge, it took on a duel-like component in places designed to challenge the listeners, albeit in a fairly controlled manner. The choice of topic spoke to academic issues in Anglo-American culture rather than, for example, regional academic traditions; it was therefore an academic topic choice that neither engaged with questions of the social production of knowledge nor the local context. This, I suggest, related to the political positioning and US-based training of the astrophysicist with whom I featured on the radio show – other professors at the observatory quizzed me for example about the ethical implications of the project and contested the interest of my receiving UK state funding for such a project. What was even more interesting about the blog was that besides having a polemic streak, it concerned a topic completely out of the orbit of astronomy and astrophysics – although it was still concerned with processes that influenced scientists' work, such as education. This suggested that scientific commentators had a certain amount of licence to discuss political and cultural topics about which they had likely had no formal academic training, yet as we have seen, strong opinions. Despite the earlier mentioned grumbling on the part of many scientists that the natural sciences were undervalued and chronically underfunded in Serbia and Croatia, in my experience, science commanded a large amount of intellectual authority amongst educated lay-citizens when compared to the humanities, in a trend indicative of cultural hierarchies between disciplines in the Anglo-American academic world. The involvement of several professors in political programs and institutions, including members of Milošević's cabinet and the intellectual opposition, meant that public outlets such as blogs and news columns drew extensive criticism and counter-polemics, particularly during the crisis period when there was so much at stake. I found that debates over general social themes amongst intellectual elites - which for the

purposes of this analysis referred to employed academics - were commonplace. This resonated with Dragović-Soso's observations in her study of intellectual elites and political opposition in Serbia. She noted that:

> Throughout the nineteenth and early twentieth centuries, the absence of a large educated class in Serbia ensured that political authorities often recruited intellectuals for a variety of duties, sometimes as state bureaucrats and administrators, sometimes as the ideological vanguard (or at least as the providers of an authoritative endorsement) of state policy. Along with this tradition of reliance on and cooperation with the state, there was another tradition: that of intellectuals acting as critics of the political powers and their actions. The first half of the twentieth century in particular saw the rise of a fledgling class of – perhaps not "free-floating" – but certainly independent minded intellectuals as a separate voice on the public scene. (Dragović-Soso 2002, 170)[84]

Professor Aleksić's comments, and the invitation to public debate surrounding complex academic topics on the radio show can thus be seen as part of a long-standing tradition in the region concerning the actions of intellectuals, and during the nineties, of the existence of opposition to Milošević's government. As Dević commented:

> The fact that many younger social scientists, philosophers and writers participated in the antiwar protest movements in 1991–1992 illuminates the differences in the cultural, professional and political ethos between the established and the 'free-floating' intellectuals. The generational explanation of differences between attitudes toward the post-communist future

84 See also Dragović-Soso (2002, 186)

> of Yugoslavia can shed some light on the diversity of cultures that existed in the now deceased Yugoslavia. Some of them produced the rival and ruthless political elites; the producers of parochial academic knowledge and literature were their closest neighbours. The all-Yugoslav communication space, inhabited by a growing army of highly educated, semi-employed and freelance intellectuals who benefited from the egalitarianism of the Yugoslav economic and political system but did not have a stake in defending its elites, developed alongside. (Dević 1998, 402)

Bearing these points in mind, let us now take a step back and consider these engagements from a more theoretical position.

Producing cognizant publics

One of the key aims of engagements such as the blog is the formation, not simply of publics, but of what Verdery has referred to as cognizant publics (Verdery 1991, 144). In her research analysing the politics of the national idea under socialism in Romania, Verdery offered an analysis of intellectual elites and their relationships with one another, the Party and publics in the vein of Bourdieu's *Distinction* (1986), which she argues isn't appropriate to (purported) socialist contexts, where the concepts of cultural *capital* and symbolic *markets* are not appropriate (Verdery 1991, 5). She argues that the central issue rather concerns promoting and defending particular regimes of value, which govern access to cultural authority and power, and which take place in a politicised context influenced by the privilege of those close to the communist party. She argues that:

> To make a successful claim to status as a bearer of cultural authority requires that this authority be acknowledged by others (Bourdieu 1986: 730–731),

> who recognize both that it is of value and that they themselves have less of it. Therefore, part of forming and reproducing elite groups is the formation of a unified field, which includes persons of "low" culture who will recognize the superior claims of those possessing "high" culture. (ibid., 143)

She then argues that such elites maintain their status through engaging with a public that "is sufficiently literate both to value this dimension and to acknowledge its own deficiency thereon". She names such publics 'cognizant publics'

> A major means of forming a cognizant public is the "civilizing" mission some elites launch with their inner "primitives", whom they seek to illuminate with learning that will dispel the mists of darkness. Civilizing missions have been brought to colonial peoples by agents of imperial powers – the rhetoric of English imperialism is a fine example – and also by would-be national elites, civilizing the "backward" peasants of their own territories [...] some people appropriated Marxist terms of a different sort. They claimed, for example, to uphold "rationalism", a quality of the enlightened thought of which Marxism is the apogee, and to oppose "irrationalism and mysticism", cardinal sins in the official Marxist analysis of fascism and rightist currents in earlier times. (ibid., 144)

Whilst the SFRY self-management system differed significantly from the Soviet model implemented in Romania, the existence of a party elite and a highly politicised public sphere resulted in certain similarities, and the description above suggests that when I conducted fieldwork, this sphere remained highly politicised. This would further suggest that certain figures such as Professor Aleksić wielded a degree of politicised cultural authority and public voice on wider social topics and furthermore, that whilst the Com-

munist Party as an ideological body was now defunct, many of those who held positions of power in it continued to wield power over access to resources; there was no "free market" in scientific ideas. The frequent political comments I came across in other contexts, such as Professor Aleksić's description of the statues outside Tito's palace as 'monuments to a dead religion' and the time the secretary at the People's Observatory took to discuss the political engagements of various professors is also testament to this. In a politicised public domain in which resources were relatively scarce, polemics such as the blog helped scientists to identify political allies, and to reinforce boundaries with identified enemies, activities crucial in the competitive struggle for resources. When I was conducting fieldwork such resources depended largely on government funds, and therefore on party affiliation and membership; a situation which has now somewhat changed due to the increased availability of FP7 project funds. The relatively small amounts of government expenditure on science suggest that the politicking which Verdery described, and in the framework of which we can interpret interventions such as the blog, has continued relevance and importance.

Conclusions

In this chapter I have discussed several media engagements in which scientists from the observatory engaged, detailing their different purposes and intentions. When conducting fieldwork, in 2008–2009, I did not come across a sense of directed forward movement characteristic of capitalist and/or socialist modernity. I suggest, on the basis of the arguments made here, that this is due to the mixing of various political models and organising principles. The media engagements of scientists could not be easily positioned inside the frameworks posed by analysts of socialist or capitalist societies and that such feelings of a lack of progress were further exacerbated by the nascent context of the

growing European financial crisis. Whilst the consequences of this lack of political consensus were not all positive, they perhaps helped to create a feeling of increased possibilities – certainly in political activist circles – of different future directions in which social processes might unfold, which made polemics and encounters between advocates of different possible directions all the more passionate. Several parallels emerge with arguments made concerning research in earlier chapters. In summary, echoing observations in chapter three, at the time when I conducted research scientists had reached a critical juncture in which the effects of the collapse of the 'socialist' system had been experienced directly, but in which organisational techniques, characteristic of post-Fordist variants of capitalism and used widely in Western Europe were not commonplace in the scientific workplace. Whilst scientists, in terms of increased funding and innovation speed, have globally benefitted from the neoliberal 'acceleration' in economic centres of the global world system, this situation created a *hindrance* for scientists committed to working and living in the region. This hindrance was experienced as a form of reperipheralisation and created a diversity of reactions towards post-socialist changes, the lack of closure concerning the course (*smer/smjer*) to be taken (felt to a greater extent in Belgrade than in Zagreb), thus resulting in a sense of apathy and the mixing of old and new political models, as we have seen in this chapter. Let us therefore now draw together some of the threads and themes linking up the courses of individuals and institutions in the region over the past twenty years and recapitulate what has been observed so far.

CONCLUSIONS: future courses?

This book has examined the experiences and engagements of scientists - primarily astrophysicists in Belgrade, Serbia – and to a lesser extent for comparative purposes in Zagreb, Croatia, on a number of different levels. It has focused both on their experiences today and self-reporting on the situation during the nineties. It has examined how their practices and experiences reflect, relate to, shape and have been shaped by not only post-Yugoslav discursive hegemonies (chapter two), but also disciplinary changes (chapter three), local academic hierarchies and conventions (chapters four and five), the socialist legacy and attempted neoliberal 'transition' (chapters two, three, four, five and six), and national cosmology (chapters two and six). As with the cosmic postcard, I understand these various levels as qualitatively different clusters of actions and practices. However, unlike the postcard, there is no easy way of ordering them or of rating their relative importance or sphere of influence, except for referring to an increasing dominance of a neoliberal value field shaping scientists' actions and practices. An appropriate metaphor would perhaps be a solar system in which different planets disrupt and interact with the courses of other depending on their mass and the inverse square of the distance between each other, subtly or not so subtly influencing their changing courses.

I have shown through the ethnographic material that the wars and new national hegemonies established affected scientists' work unevenly over the former Yugoslav region, leading to specific regional experiences of disciplinary and political change. In Belgrade the sanctions had a profound, negative effect on the everyday activities of scientists, whilst on the other hand, the scientists there were not directly affected by the fear of military

combat taking place on the territory in which they lived. Experiences of refugees working at the observatory also diverged from Belgrade 'locals' grumblings regarding the sanctions. For scientists based in Zagreb, their situation was not so severely affected *directly* by the outbreak of war - particularly as, unlike Dubrovnik, Zadar and other cities on the Croatian coast, Zagreb was not a site of military combat. I have also shown that the national hegemonies discussed were not established in Belgrade to the same extent as in Zagreb. A key consequence of the establishment of these new national hegemonies is that, in some disciplines, due to decreased or completely disrupted communication between scientists in the different republics, the number of scientists and equipment available in some disciplines dropped below the critical mass required for those disciplines to compete globally. I therefore came across, particularly in Belgrade, a nostalgia associated with what Spasić (2012) refers to as *našijenstvo*; a yearning for the time when scientists working in and from the region were a global player in the sciences. In addition, despite formal political sanctions placed on scientists, I have shown that scientists' ability to manage 'connections' - often eliding distinctions between formal institutional contacts and a more informal domain of personalised friendship - also had a large impact, which I discussed through the tropes of a supranational 'scientific community' and of scientists as 'scouts' in chapters three and four.

The phrase 'scientific community' – a trope which the scientists alongside whom I worked regularly used - also speaks to the question posed of how scientists experienced the technological changes which took place during the nineties – the internet; digital imaging – in a context affected by war and scientific isolation. Whilst I argued that it was often used to emphasise commonality and being 'thrown' into a common situation, further ethnographic work could be done to explore the multiple ways in which the term was mobilised. Particularly for scientists in the Federal Republic of Yugoslavia (later Serbia and Montenegro) I have argued,

the term was used in a compensatory fashion to act against a feeling of 'lagging behind' in a wider global context in which technological changes and the so-called 'information revolution' were swiftly occurring. As just mentioned, given the backdrop in which the SFRY had been a relatively large 'player' in many scientific disciplines; this is one reason why the anthropologist Simić (2009, 7) referred to the nineties in Belgrade as 'the fall', as this 'lagging behind' was not specific to the astrophysics but occurred in many other domains of life (and academic disciplines) as well. This feeling of lagging behind led to particular regional experiences of political policy, such as the 'knowledge economy' models promoted by bodies such as the European Union. I suggest that the late arrival and frequently experienced apathy towards such models and the EU as a political project amongst some of the scientists with whom I spoke can be understood, not in terms of a culturalist specificity of the Balkan region, but in terms of the consequences of isolation and what Smith (2010) refers to as 'uneven development'.

Clearly, socialist political legacies persisted and affected scientists' work in a variety of ways, ranging from conceptions of the relationship between scientists and 'publics' (chapter six), through to the management of political connections (chapters two, three, four and five) as a means of gaining differential access to resources and public media. The low state funding of science during the 'transition' period and the relatively low success (when I was conducting fieldwork) of scientists in gaining access to FP7 funding and other international sources contributed to the persistence of a hoarding, 'scouting' dynamic as discussed in chapter four. In addition, as discussed in chapter six, the significant media presence of many scientists in Belgrade and Zagreb is of particular interest, as it relates to a particular role assigned to intellectuals as 'humanist figures' who, due to their extensive education and disciplining, have a social authority through which they speak about topics of wider public interest. It is partly due to such engagements - which

I suggest relate to the socialist legacy, with its enlightenment claims and emphasis placed on education and learning - that I have chosen to take a humanist focus. Let me conclude by exploring what this means in more depth, why I considered this focus to be appropriate and what the implications may be for further anthropological studies of sciences conducted in this vein.

For the purposes of this study, taking a humanist focus entailed various approaches to the fieldwork experience and ethnographic material generated. First and foremost, it entailed a focus on *scientists* as human agents, rather than following a particular set of scientific practices and expanding the meaning of 'agents' to perhaps include 'non-human agents'. In focusing on scientists, their practices, engagements and understandings of the work they do in all corners of their professional lives were examined. A disadvantage of such an approach is that some of the fine-grain ethnographic details of disciplinary practice common to many ethnographic and sociological studies of the natural sciences – Latour & Woolgar's (1986) *Laboratory Life* being the prime example - were lost. An advantage of such an approach is that the practices of the scientists studied – as a loosely defined collective of human agents – were interpreted holistically with reference to the wider political and economic context -a post-war, post-socialist context in the global 'semi-periphery', to paraphrase Blagojević (2009). Such an analysis, which paid attention to 'everyday geopolitics' (Jansen 2009), therefore allowed me to make explicit the connections between the social and political changes associated with the war and the actions of scientists outside of their strictly disciplinary engagements. Given the context of nationalist violence, I strongly felt that making and discussing these political connections was important, and that they couldn't be ignored. However, in contexts where the majority of scientists play a role as depoliticised experts - such as in many laboratories in Western Europe and the USA, such connections may be harder to make, or may draw one even further from the strictly ethnographic context and experiences of

those scientists. The approach I have taken may therefore not be as appropriate as it would draw the anthropologist into the realm of political or historical analysis too far removed from the experiential worlds of scientists of which ethnographers aim to describe and understand. I therefore suggest that the approach I have taken is particularly suited to anthropological studies of the natural sciences taking place in post-socialist contexts dealing with elite groups of scientists. This study has not paid detailed attention to gender as a subject of ethnographic analysis. An anthropological study which analyses women in science ethnographically - to complement the excellent sociological work completed by Blagojević (1991) - would be a welcome addition to literature on the region.

Taking a humanist perspective – specifically a radical humanist perspective – also allowed me to examine the recent changes through the lens of capitalist restructuring, key to understanding both disciplinary change in astrophysics and the collapse of 'socialism'. I claimed that the specific context surrounding the collapse of 'socialism' in former Yugoslavia and attempted neoliberal 'transition' reduced the ability of scientists committed to working in the region to take advantage of opportunities provided for scientists more generally the world over, which neoliberalisation offered. This may be understood as an example of uneven development; where sociological changes and 'time-space' compression (Harvey 1989) occur at different speeds. Indeed, the differential experience of time-space compression and social change across post-Yugoslav space accentuated processes of differentiation which were consolidated during the 'late-socialist' period, exacerbated by the constitutional changes which took place in 1974.

This condition of playing technological catch-up created by 'uneven development' constituted an important dimension of what Blagojević (2006) described as the semi-periphery. Whilst the collapse of the SFRY can be understood as relating to the effects

of neoliberal policy makers, I have shown that the organisational techniques characteristic of neoliberalism were not in general use. 'Audit cultures' (Strathern 2000) – one of the cornerstones of neoliberal governmentality consisting of bureaucratic procedures of accountability put in place in institutions across the world and legitimised by the goal of ensuring the 'efficient' allocation of resources – were not performed when I conducted fieldwork at the observatory. Scientists continued to receive funding from the government and work on projects defined in conjunction with discussions taking place at the Ministry of Science and Technology. Only with the arrival of an FP7 grant after I had left did the extensive 'checking procedures' and resultant large amount of uploading information to the FP7 website become a feature of some scientists' work. I understand, on the basis of continued contact with the observatory and other scientific institutions in the region, that scientists in Serbia are having more success in gaining such grants compared to when I completed fieldwork and so further anthropological research analysing the reactions of scientists to the demands (bureaucratic, collaborative and so forth) of such projects may be of interest for future ethnographic studies in the region.

On a broader note, taking a radical humanist stance asserted a fundamental distinction between the natural and human sciences which Latourian and post-humanist approaches either do not make, or view as 'contingent'. On this view, the human sciences differ from the natural sciences in that they engage with a different kind of entity – human beings, which it is asserted therefore warrants a different method; an approach which begins with *history*. Such an approach shares a respect for the enlightenment ideals of science with the vast majority of scientists with whom I spoke, yet rejects scientism as applied to the human sciences. My choice in taking such an approach – the humanist dimensions of which I have expressed a preference for with reference to understanding the socialist legacy and the anti-humanist dimensions of the nationalist violence - has therefore intended to add something

new to the science studies literature, which has been preoccupied with other concerns, such as debates over the social (or not) construction of scientific knowledge (Bloor 1991, Latour & Woolgar 1986), and critiques of human agency (Latour 1988). I suggest that these concerns relate to boundary and value disputes between scientists and social researchers in Anglo-American academia. From the perspective of the semi-periphery, as Buchowski (2012) has recently argued, such boundary disputes and the arguments which accompany them are less interesting; anthropologists from the 'West' are nevertheless understood as extremely privileged rather than at the margins in terms of the resources they have available, when compared to anthropologists based in and working in Central Eastern Europe. However, in the same vein as Capshew and Ryder's (1992) 'big science', by no means do the extra resources always translate into more interesting studies; one negative consequence is the marginalisation in Anglo-American academia of other anthropological traditions and the interesting and important work completed by authors based in and writing about the region for example. This marginalisation is most clear when expressed through the use of problematic first person plurals, such as Latour's (2012) famous phrase "we have never been modern", which may construe a particular historic subject for a more universal one. Indeed, as I have shown, the conditions of relative prestige and abundance of resources which scientists in Western Europe enjoy do not appropriately describe the social positioning of science in other contexts, such as post-socialist Serbia and Croatia.

The broader, implicit argument made is that - far from being an 'ivory tower' - the public authority and serious questions with which academia, and academics in post-Yugoslav states such as Serbia and Croatia have dealt, were intimately connected with the redefining and reshaping of the various orders of the world and social realities inside of which people lived. The different public engagements of the scientists and the ways in which they produced value and came to be seen as credible by specific publics directly

relates to the political changes which accompanied post-socialist 'transition' and war.

The ways in which those orders were reshaped took place in a complex fashion, affected by events occurring in other parts of the global world system, ranging from the globalisation of telescope use, continued 'big science' tendencies and the time-space compression made manifest in the 'information revolution'. Whilst individual scientists had clear agendas and political strategies, they had little control over a number of these changes, the increased cost and complexity of instruments required in the context of repe-ripheralisation and the consequent switch to increased theoretical topics specifically defining scientists' experiences as different to those of politicians or academics in the human sciences. A sense of powerlessness in the face of these changes in the global organisation of science compounded by the sanctions against science in Belgrade, motivating the discourse of 'the scientific community' as discussed in chapter three. The strong personalisation of relations due to the relatively small size of the research groups likely also played a role.

The actions and political engagements of academics, including several of the scientists with whom I worked, did wield some degree of control over the development of events however, evidenced in the accounts they gave and the different kinds of obstacles they encountered. The courses that scientists' lives and the lives of those around them took as the wars and 'transition' played out could not have been predicted in the way that the movement of stars across the sky, or of planets round the sun can be predicted. Nevertheless, the disruptive effects of different clusters of events and influences meant that a clearly defined, ordered pathway through the chaos surrounding the wars and post-socialist 'transition' could be neither forged nor foreseen through the perceived relative chaos of the nineties. As an economic crisis continues to deeply affect South-Eastern Europe, things are no clearer now.

POSTSCRIPT: auto-ethnographic reflections on two different academes

The above account was written between 2009 and 2013 and up until that time, I had only ever been a guest at academic institutions based in the Balkans on a Western (state funded UK) grant. From late 2013-2017 I have been 'part of the system'. In 2013-14 I was employed by the Faculty of Philosophy in Novi Sad, Serbia as an English for Academic Purposes teacher. In this position, I received the same salary as a postdoctoral researcher or *docent*, but was considered much lower down in regional academic hierarchies – the fact that language instructors receive the same salary as postdoctoral researchers was a source of resentment for some. However, this position had few contact hours and therefore lots of time to write articles, which was my employer's intention. The second position was at the Institute of Ethnology and Folklore Research, Zagreb for three years. This position was less involved in the institutional politics of the institute in the first two years, as I was on an EU funded project. However, the fact that it was funded 'from outside' did not mean I received a larger salary (as I did when on the UK funded PhD) than postdoctoral researchers at the institute, although I did receive a larger budget than some for conferences.

I learnt a great deal about the internal dynamics of academia and how hierarchies operated and worked through these experiences, a study of which would complement the broader focus of this book, which has more of an outsider's description of how the hierarchies operate, alongside the focus on the broader situation and questions concerning positionality. It would be unethical to discuss these experiences ethnographically, but these 'insider' experiences drew

my attention towards the negative 'internal' characteristics and often strained personal relations present. I also learnt what it means to depend on a state which operates in an often personalised, unpredictable and unreliable manner (e.g. with wages arriving late, strange bureaucratic requests, roundabout ways of gaining permission, or of being rejected for grants etc.). One broader observation worth mentioning is that, whilst disputes (a common feature of academic life the world over, although surely to varying degrees?) were common features of everyday work in both locations, my experience to date in a Croatian research institute suggests they were more overtly caught up in political differences and formations than in the English department in Serbia – which may reflect the difficult position ethnology has been in with respect to the recent wars and the ideologisation of national ethnology as an approach taken by some at the research institutes and university.

My initial decision to move away from UK anthropology was motivated by a disillusionment with its commercialisation and what Chris Gregory has described as the impingement of market rhetoric and values, which culminated in activities such as celebrity 'masterclasses' being organised from time to time with academics. I was also dismayed to discover that some anthropologists didn't have a decent (beyond basic conversational) level of the languages with which they were working, and I disliked tendencies such as the privileging of abstract theoretical conversations over more concrete and/or politically/socially relevant engagements in the field contexts. Some anthropologists rarely revisited the field sites after completing the main body of fieldwork, whilst spending over a decade writing about them. Studies of Polynesia occupied an elite position in comparison, for example, to studies of Europe, and people who worked on other geographical areas often then went on to do 'anthropology at home' in the UK, without a substantial engagement with the regional ethnographic literature, but simply with the latest theoretical innovations (e.g. 'the ontological turn'). There were many exceptions to these tendencies in my

department, from whom I could have learnt more, with hindsight, and I had the most respect for those who were highly regarded in the region they studied and who regularly published/had engagements there. Due to this disillusionment, I chose to spend little time in Manchester after completing field work. I also made this decision as I thought that if I were to become a 'good' anthropologist on my own internal criteria, eighteen months was nowhere near long enough to gain a good enough grasp of the language and socio-political situation (I believed four to five years of immersion were appropriate for a region such as the Balkans, coming from an Anglo-American background, and that the UK doctoral grant system rushed candidates to finish the entire project within 3-4 years). I therefore focused on making connections in Croatian and Serbian academia, and this was one reason why I wanted an academic based in the region to examine the thesis, although I was also conscious the doctoral thesis was not as developed as it should be, given I had spent a lot of time involved in activism, including the *blokada*. Due to this disillusionment, towards the end of the PhD I lost interest in Anglo-American mainstream social anthropology, although I enjoyed the writing process, and the fieldwork experience as a vehicle for language learning and political activism.

Working between Anglo-American academia and Serbian/Croatian academia also created difficulties due to the different demands and expectations. In trying to juggle between the two – completing the requirements to enter into the Croatian/Serbian system whilst attempting to do the minimum requires to stay competitive in Anglo-American academia in case I ever decided to return, I had to make difficult choices about what to publish and where, and likely ended up doing more work than had I decided to solely pursue one path.

Post-Yugoslav academia requires one to produce a large number of articles early on in one's career, before one can get an official

accreditation at the national level, called an academic title (*zvanje*), which gives you a status in Croatian/Serbian academia, demonstrating a commitment to the system and permitting one to gain longer-term employment and supervise students. However, once an academic title and long-term employment has been secured, text production for some dropped off heavily and my experience was that certain more senior academics had a sense of entitlement, treating themselves as more important than other people around them, and demanding that junior staff complete numerous favours for them to secure advantages and sometimes resources, in line with the system of personalised connections discussed in the book. The *zvanje* system does not exist in the UK, although it does in other European countries, and some form of certification is, I believe, particularly relevant in 'semi-peripheral' locations so as to valorise regional academic knowledge production rather than a (primarily Anglo-American at present) imposition from above and afar. In contrast, it was common for PhD students in the UK not to have published anything when they finished their PhD, with perhaps one article completed by a minority and more than one by a small minority. This requirement to publish several articles in regional journals early in one's career therefore has a definite impact on the quality of those early texts, written and published when one is still undergoing a process of maturing as a writer.

Publishing in almost all regional journals does not 'count' in Western exercises which assess researcher output through journals ranked in specific international indexes, the majority of regional ones being unranked, or low ranked. Serbian and Croatian journals also face further difficulties, including making peer review anonymous and in finding expertise for each topic – given the small size of the community, the likelihood is greater that people will be asked to review topics further from their own specialism, which has an obvious effect on the quality of output. In comparison, Western publishing demands more labour intensive articles which are typically more polished and include more extensive

basic description of the context, alongside with more theoretical innovation, as opposed to advancing discussions or debates more 'embedded' in the post-Yugoslav region. Furthermore, the often strained and angry (likely because of the small research community and recent wars) personalised relations between different individuals impacts on the publishing process, which – more so than in Anglo American academia – in my experience more frequently included more polemical statements either of praise or disdain. In contrast, peer review in Western journals often failed to comprehend the wider relevance of the topics outside of the post-Yugoslav context, with a greater focus on theoretical innovation. A benefit to the post-Yugoslav publishing process is that less polished, but rawer and often therefore more interesting articles can be published in the region, whereas the Anglo-American peer-review system has a tendency to guarantee a decent basic quality of text, but arguably favours mediocrity, often moving towards middle ground consensuses and favouring circles of friends who share a 'perspective' and quote one another frequently. Attitudes by scholars based in Serbia and Croatia towards publishing in Western journals varied a great deal, as I have already discussed as regards astrophysics in the main body of the text. They ranged from celebrating people who published in a Western journal as having 'made it' and treating them as mini-celebrities highly ranked in institutions, to attitudes of general disdain towards traditions and approaches from outside, particularly in social sciences, in light of the mass of 'ethnographers' which descended on the region during the 1990s in trying to, often superficially, explain and understand the war – which I believe Stubbs' comment on having a blasé attitude towards young researchers making knowledge claims on the basis of ethnographic 'immersion' relates to. To finish, at the time of writing (2017), conservative tendencies are being consolidated in Croatian academia, with researchers now being required to publish regularly in Croatian to gain an academic title, and publishing in 'international journals' not being necessary to enter the system. Whether these developments will be further consolidated remains

to be seen, but such tendencies – which make the system more hostile to both foreigners and Croatian diaspora who have built up a career in the West with few personal connections in Croatian academia – are rather worrying.

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Cosmologies in Transition:
Science and the Politics of Academia after Yugoslavia

By Dr Andrew Hodges

How did scientists who worked in the former Yugoslavia experience the nineties and their aftermath? How did contexts of war, sanctions and economic isolation impact on their work? What role did they themselves play in the remaking of political and scientific orders, over a period marked by post-socialist transition, 'nationalist' war and the information revolution? Drawing on several years of ethnographic research and engagements, this book follows scientists – mostly astrophysicists from Belgrade (Serbia) and Zagreb (Croatia) - as they simultaneously juggled roles as politicians, scientific researchers, university academics, public intellectuals, and as historians of science. It brings political anthropology into dialogue with science studies, describing how many neoliberalising processes were experienced as a hindrance for many scientists based in the former Yugoslav region, and arguing for a renewed focus on the 'human' in anthropological studies of science. It also includes extensive interview material conducted with scientists, including scientists who served in the Milošević and Tuđman governments.

Andrew Hodges is a social and linguistic anthropologist currently working as a postdoctoral researcher at the Institute of Ethnology and Folklore Research in Zagreb, Croatia. He has just completed a project on Croatian minority (language) activism in Serbia and is currently writing an ethnography looking at organised football fans as a social movement in Zagreb.