The everyday geopolitics of science in post-Yugoslav space: from war and ‘transition’ to economic crisis

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A note on pseudonyms, language and reference to the recent wars

I use pseudonyms throughout the thesis to refer to people alongside whom I worked. I use real names only when having been instructed to do so.

I sometimes use the imprecise term 'the conflict' or simply 'the wars' throughout the thesis. In using this term, I refer to the wars that took place during the nineties surrounding the secession of several constituent federal zones from the Socialist Federal Republic of Yugoslavia (SFRY), and the formation of several new states in the region, namely Croatia, Bosnia, Macedonia, Montenegro, Serbia and Slovenia. Some sources also refer to Kosovo as an independent state, although this is contested.

I have chosen to use relatively imprecise terms such as 'the conflict' or ‘the wars’ as definitions of the character of the recent wars carry strong political connotations. Reference to a 'civil war', common in Belgrade for example, suggests that there was a unity present in the federation which others deny ever existed. In Croatia, for example, the conflict is often referred to as the 'homeland war'.

The written languages are phonetic, which means that each letter of the alphabet represents a separate sound. Basic rules for pronunciation are as follows. The letter $c$ is pronounced as “ts” or “tz”. The letter $j$ is always pronounced as a $y$ (Jugoslavija is “Yugoslavia” or “Yugoslaviya”).

The most common diacritical marks are:
- $ć$ is pronounced ‘ch’ like the ‘ch’ in choose
- $č$ is pronounced ‘tch’ like the ‘ch’ in chop (more forceful than ć)
- $š$ is pronounced ‘sh’ like the ‘sh’ in shell
- $ž$ is pronounced ‘zh’ like the ‘g’ in the French word ‘fromage’
- $đ$ is pronounced ‘dj’ like the ‘j’ in jam

I use anglicised forms for place names as these are in common usage (Belgrade instead of Beograd, Yugoslavia instead of Jugoslavija). For persons and relatively unknown places I use the original spelling, including the use of diacritics. I use standard Serbian for discussions of terms I came across in Belgrade and standard Croatian for terms I came across in Zagreb, citing both if they differ (for example ‘brain drain’ odliv/odljev mozgova) when making comments which refer to both locations.
Abstract
My research concerns how the changing geopolitical positioning of the post-Yugoslav states has impacted on the lives and prospects of students and researchers in the natural sciences. The main focus is on scientists’ experiences and self-reporting, both of the situation at present and during the nineties, when scientific operations and scientists’ lives were disrupted by war and in the case of Belgrade, Serbia, UN sanctions against science. My fieldwork is centred on participant ethnography based at an institute in Belgrade, Serbia (the Belgrade Astronomical Observatory). However, throughout the thesis I trace and make connections between numerous other institutes and networks, as well as drawing on interview material and ethnography completed with students in Belgrade and Zagreb, Croatia. I analyse in particular on the impact of the recent wars, attempted ‘democratic transition’ and the current European economic crisis. My main argument is that whilst neoliberalisation and social changes over the past forty years have created opportunities for scientists globally, these opportunities were not evenly distributed. For scientists committed to living and working in the former Yugoslav region, these changes were often, but not always experienced as a hindrance; particularly as seen through the lens of reperipheralisation, which strongly relates to the context of war and recent scientific isolation. In the introduction and first chapter of the thesis, I detail the background in light of which ethnographic insights in the later chapters make sense. I then examine how scientists’ 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 (chapter four), the socialist legacy and attempted neoliberal ‘transition’ (chapters two, three, four and five), academic traditions (chapter six) and national cosmology (chapters two and six). The thesis also attempts to make an original contribution to anthropological studies of science, in particular engaging with Latour and Woolgar’s (1986) work on credibility (chapter three), literature on science and its publics (chapter five) and the historiography of science (chapter six). The thesis also draws heavily on anthropological theory from other traditions in the discipline, including Marxist anthropology and theories of hegemony (chapter two), Bourdieu’s (1984) work on education (chapters two and four), Verdery’s (1995) analysis of cultural politics under socialism (chapters three and five) and exchange theory, including Graeber’s (2011) work on debts and indebtedness (chapter six). One key theoretical claim advanced through the ethnographic material is that an anthropological study working with scientists in what Blagojević (2010) terms the ‘semiperiphery’, and where a series of violent wars had recently took place, warrants a human focus, namely on the scientists and how
they collectively dealt with and coped with disruption to their work and the reorganisation of their social worlds.
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This thesis is the result of over five years work and couldn’t have been completed without the patience and help of numerous friends and family. This was especially the case with the ups and downs of both the fieldwork experience and writing up. First and foremost, I have to thank my supervisor Dr Stef Jansen, for his encouragement and help with both the project and with language learning. Without his large personal investment, encyclopaedic knowledge of the region and constant support and encouragement, I would not have been able to finish the project as hoped. I also want to thank Dr Marina Simić, Dr Čarna Brković and Marija Krstić immensely. Words cannot express how much I value your help from the very start with my language learning, with helping me find my feet in Belgrade, and with putting up with my questions and comments, especially in the early days when I was new to anthropology. On that note, I couldn’t have made it through fieldwork without the friends who helped me out on so many occasions, especially during those ‘difficult’ moments. There are too many names here to include, but for all the personal help and moral support, I have to thank in particular Sonja Ivanisević in Belgrade and Matija Parać in Zagreb. Fieldwork aside, the project couldn’t have been completed without the help I received in transcribing interviews, and so I would like to thank Niven and Jordan Ganner for their help with transcribing.

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This project 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 the Blokada in Zagreb. Without these interventions I am certain that my view of both academia and the ethnographic problems I have faced would have taken a different form. I have learned just as much out of the classroom through these engagements as in any postgraduate seminar. Again, whilst there are far too many names to mention, special
thanks for Andy Cunningham for giving me a political education much more directly engaged with problems real people are facing on a day to day basis than I ever gained through social anthropology alone.

I would also like to thank the various audiences of researchers and students who have listened to and made useful suggestions and insights into the project. In Manchester I would particularly like to thank Prof Karen Sykes, Prof Chris Gregory and Dr Keir Martin. The seminar series on the anthropology of value, as well as the postgraduate showcase and round table discussions on the value question provided no end of inspiration and particularly helped me rethink my approach after returning from fieldwork and developing a growing frustration with aspects of the Anglo-American tradition that I was unable, at that point, to articulate. I understand the translation of those gut feelings, gained through experience in fieldwork and the institutional contexts of academia, into some kind of deeper criticism as key to social anthropology. I would also like to thank Prof Penny Harvey for her insightful comments and suggestions on various drafts. In Belgrade I have 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 Institut za Etnologiju i Folkloristiku for helping acquaint me with anthropological traditions in the region. My time spent there, and particularly Dr Ines Prica’s and Orlanda Obad’s comments, which taught me things about my project of which I hadn’t at that point been conscious.

I would also like to thank Dr Amy Blakeway for our important discussions regarding the relative merits and foci of anthropology and history as disciplines, and for her help with making my thesis intelligible to an academic audience with no anthropological training and little knowledge of the post-Yugoslav states. I would also like to thank Dr Patricia Fara, for believing in me from my undergraduate days, and for constant encouragement and motivation to keep writing and studying. Finally I could not have completed the project without the support of my family, and especially my mother, her interest and encouragement.
Declaration: No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Introduction

(i) 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, or himself, 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. Yugoslavia, for example, 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 language – in this case English. A language is a form of speech which has been standardised. English is a language which has been standardised differently, for example, in the United Kingdom (hereon UK) and United States of America (hereon USA). This standardisation is often then identified with a particular imagined community (Anderson 2006[1983]) such as the ‘Americans’ or the
‘English’. Besides the production of difference, sometimes ‘nationally’ conceived, processes of standardisation are often undertaken with practical aims in mind, such as enabling communication between large numbers of people over extended geographical distances in a way that simply would not have been possible in the Middle Ages, outside of a relatively small group of educated elites using languages such as Latin. Whilst standardising a language has many benefits, it can create problems, as happened during the break-up of Yugoslavia where an earlier unified standard; ‘Serbo-Croatian’ came to be split and identified with two national communities - ‘Serbs’ and ‘Croats’. The cosmic postcard thus has a national ordering potentially built not only into the line labelling a state, but into the standardised form it assumes. The postcard itself can be viewed as an artefact of a number of political changes resulting in the production of modern states, and which often banally flags the existence of a national community (see Billig 1995).

The exercise of writing a ‘cosmic postcard’ can also be considered as one of many ‘locating practices’ which occur on a day to day basis as people negotiate spaces, institutions, networks and knowledges.¹ 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, such as picking out details of the landscape, or understanding oneself in relation to other groups of people which serve different purposes.²

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

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¹ See Green (2005) and Brković (2012) for fascinating discussions of locating practices in the ‘Balkan’ region.

² I do not want to suggest that a ‘Cartesian approach’ is wrong or untrue. It is in my opinion too successful to not be an excellent approximate description of the physical world. 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. See Heidegger (1978[1927], 128) for a phenomenological approach to the interpretation of space, through the concepts of Dasein (being-there) and Heimat.
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, p. xxi). The corresponding anthropological question in which I am interested is that of how people - in my case scientists working in two cities in former Yugoslavia - experienced these changing political and disciplinary orders. A further important question concerns how they participated (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 today. This central concern will lead me to follow scientists as they simultaneously juggled roles as politicians (chapter two), scientific researchers (chapters two and three), as university academics (chapter four), as public intellectuals (chapter five), and as historians of science (chapter six).3

In focusing on understanding the experiences and self-reporting of scientists as they reacted to the changes associated with the wars and post-socialist ‘transition’, a series of more specific research questions emerged through the field experience. How did the wars and new national hegemonies established 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? How did national cosmology come to feature in histories of science produced by scientists?4

In providing answers to these questions, this thesis will focus 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, this study aims to contribute to existing anthropological literatures on post-Socialist ‘transition’, nationalism and science studies4. In contrast to being an

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3 Denoted chapters designate the main role with which each chapter is concerned; in practice elements of each category present themselves in each chapter.

4 For introductions to anthropological literature on post-socialist transition in Eastern Europe, see Burawoy and Verdery (1999); Hann (2002), for recent anthropological approaches to the study
anthropological study of *science* in the first instance, which may focus on knowledge practices (e.g. Knorr-Cetina 1999) or how scientific networks produce knowledge (e.g. Latour 1988), the primary objective of this study is to give an anthropological account of *scientists* and the challenges they 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, 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), is retained and is used to examine the collective situations and challenges scientists working in the former Yugoslav region faced during the nineties and face at present.

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of nationalism, see Malkki (1992) and for an introduction to science studies, see Jasanoff et al. (2002).
(ii) Fieldwork: introduction

I completed eighteen months of fieldwork in total, spending one year in Belgrade, Serbia, beginning in September 2008 and a further six months in Zagreb, Croatia. Both cities are capital cities and relatively large, and are shown in image one below:

![Image one: Map of the former Yugoslav region](http://bar.wikipedia.org/wiki/Datei:Former_Yugoslavia_Map.png)

Belgrade has approximately 1.5 million inhabitants, in a state with approximately 7.3 million people and Zagreb has approximately 800,000, in a state with a population of around 4.4 million. Belgrade was also the capital of former Yugoslavia. I initially had contacts and friends in Belgrade, and so, due to its relative size and importance in terms of scientific research activity, I sought out an institute at which I could conduct fieldwork there. I became particularly focused on astronomy and astrophysics, as I met professors who were keen for me to work with them. Additionally, both the discipline and the observatory, which is located in a wood on the edge of town, had a romantic appeal to me which, for example, industrial applications of physics or solid state physics research did.

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5 I wanted to find a map without borders clearly marked out, as they have changed much in recent years and are still politically contested in the case of Kosovo. This map marks out the Kosovo boundary, and doesn't display the regions in 'block' colours – a strategy I understand as 'imprinting' the shapes of the new, nationally defined regions on the viewer. Available online at [http://bar.wikipedia.org/wiki/Datei:Former_Yugoslavia_Map.png](http://bar.wikipedia.org/wiki/Datei:Former_Yugoslavia_Map.png) [accessed on 12/10/12].

not. I had also completed an undergraduate degree level training in mathematics, which made the contents of astrophysical research relatively accessible to me. I regularly attended the Belgrade Astronomical Observatory in Zvezdara over the course of a year, during which I found out about the various astrophysics projects and institutes in the region.

My time in Zagreb was spent quite differently, partly as there was no comparable institute there, although there were several Professors working on astronomy and astrophysics related themes. This meant that I did not consider the period in Zagreb ‘fieldwork’ in the classical anthropological sense of following the everyday activities and practices of a particular grouping of people. I used my time there to conduct interviews with scientists and students, following up suggestions I had been given in Belgrade (such as visiting certain projects, for example, an ‘amateur’ observatory in Istria) and consolidating my language skills through also learning Croatian. Some of my stay was, however, spent with physics students (who were also far left political activists) and I kept field notes throughout my time there. It was also important in allowing me to further contextualise what I had experienced in Belgrade, for my experiences in Zagreb directed me to key points of cleavage in opinion which challenged certain assumptions that I had ‘taken for granted’ about science in the former Yugoslav region both during the Socialist Federal Republic of Yugoslavia (hereon SFRY) and today, after having spent a year at the observatory in Belgrade. The material in the chapters that follow is hence focused heavily on Belgrade, sometimes using insights gleaned from interviews and encounters in Zagreb to offer a comparative dimension and to challenge certain views which emerged from the (former Yugoslav) centre. The observatory in Zvezdara 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.

Image two: The Belgrade Astronomical Observatory

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7 Picture available online at [http://www.aob.bg.ac.rs/old/Main/history.html](http://www.aob.bg.ac.rs/old/Main/history.html) [accessed on 3/11/11].
A scientific tour

The Belgrade Astronomical Observatory lies in a wooded part of town situated on a hill a short bus ride away from the city centre. One must take bus 65 to the end of line to reach it. From the end of the line, the observatory is approximately a ten minute walk away along a road through a park. The park is on the right hand side of the road, containing a children’s play area and a green on which adults often play bowls. On the left hand side of the road there are several houses, including what appears to be a small Roma settlement, and a restaurant, with the word restaurant typed clearly in Cyrillic. The area by the observatory is more wooded. The observatory and its surrounds are enclosed in wire fencing. It is reached by walking up a drive of roughly twenty metres. The first impression one gets of the building is of grey. Taking the road along the drive round to the left, one comes to a car park and entrance to the observatory, a 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 is the largest room in this building, which comprises the main part of the observatory space. It has stairwells leading up to a second mezzanine floor, where there are more books. The library is heated, with radiators next to large glass windows backing out onto the drive. The library serves many functions: it is not simply a place where books are read. It is a central meeting place, where people drink coffee, chat, shout, smoke, where meetings and parties take place. Occasionally the observatory cat, Matija, will jump from shelf to shelf whilst the librarian works at his/her computer and answers staff requests. One can leave the library through a side door, through which one reaches a small kitchen where coffee is made. Passing through the kitchen, and following a passage round to the left, one reaches the hallway. Alternatively, one can take a right or left turn into the secretaries’ office or down to the cellar respectively. In the hallway, there are 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 are two grandfather clocks with digital clocks above them. Finally, there is a series of pot plants and noticeboards directly ahead, beside a staircase. On one of the noticeboards is a poster, taken from an American website of PhD cartoons. It is in English, and is a flow chart concerning whether you, as a researcher, should be concerned about the world economic crisis. This is interesting as it shows that this discourse is present here. The poster is mostly ironic and makes 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 Astronomical Observatory, which I shall refer to as ‘the observatory’ in this thesis, 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 specific 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.8 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 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. They were founded in 1934 and 1902 respectively.9 I also conducted interviews with researchers at these institutes, and travelled to Ljubljana and Sarajevo to conduct interviews with researchers there.

(iii) Methodology

As a route into discussing the methods I used, I will discuss a number of problems I encountered when I arrived and during the first few months conducting fieldwork, as these shaped how I spent much of my time. Upon arrival, I found it very easy to arrange meetings, including with high ranking officials such as government ministers, who almost all spoke high quality English. I found that many people were very willing to speak to me about their experiences of the nineties and problems they faced today, a fact which made arranging interviews relatively easy. I also found that some people were also very interested in what I had to say, which had a dangerous flipside in instances when statements I made

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

9 For Belgrade see http://adrb.org/index.php?lang=sl [accessed on 5/3/12]. For Zagreb see http://www.zvjezdarnica.hr/index.php?option=com_content&task=view&id=14&Itemid=29 [accessed on 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.
were viewed as carrying an authority, due to my association with Western European academia, a topic I discuss in more depth in chapter four. It was also relatively easy for me to find a field site and to make arrangements to spend time there, and I was even proposed a role at the observatory, offering advice to students on philosophical issues they may come across in their research. In practice, this involved attending and asking questions at *Journal Club* meetings – a biweekly meeting organised by one of the research heads and his team of researchers, in which students or professors discussed significant papers in astrophysics and astronomy over the past ten years or so. Students were asked either to present their own research or a significant recent finding in the discipline, in so doing improving presentation skills useful for conferences and other presentations. Whilst attending these meetings I organised a seminar looking at some issues in Anglo-American philosophy of science which may be relevant and/or of interest to practising scientists, such as the problem of under-determination (Lipton 2004, p.5) and debates concerning scientific realism and social construction (Hacking 2000). However, I got to know the researchers better through attending *Journal Club* meetings on a regular basis rather than through any deep discussion of philosophical issues that emerged in students’ research, although the seminar I held was well-attended.

My largest problem and the first I will mention concerned access and arose shortly after commencing fieldwork. I was unable to spend a large amount of time with scientists, due to their busy and unpredictable schedules as research professionals. This is a challenge which sometimes presents itself when ‘studying up’ (Nader 1972). At the start, the semi-structured interviews I conducted took up a portion of time, yet I was able to socialise with them relatively little outside of the interview context. Regarding the bureaucracy associated with the running of the observatory, I also felt that I couldn't 'pry' too much. The sensitivity of the context meant that I didn't have the confidence to ask lots of questions about how every detail worked. I think that a request to sit in on sessions dealing with the bureaucracy of the observatory would have been viewed as suspicious and 'meddling'. Whilst I was accepted as an academic guest, many of the scientists with whom I worked were in positions of great authority; some had publishing contracts with and an academic history of studying at world famous universities such as Oxford University and Harvard, meaning that some had strong opinions and views which carried a great deal of weight. As Forsythe commented regarding studying up in anthropological studies of techno-science:

> Much concern has been devoted to the privilege accorded the anthropological voice and the difficulty of letting informants’ voices be heard. Anthropologists who critique powerful people tend to encounter the opposite problem. Our informants have voices, and generally
have no difficulty being heard. This is of course especially true of scientists and doctors. (Forsythe 1999, 8)

As it wasn’t always possible to spend large amounts of time with such researchers, I focused on linguistic and ‘cultural’ immersion, learning a great deal through discussions with colleagues and science students, and attending anthropology seminars at the University of Belgrade. These activities were in addition to my time spent at the observatory each day working in the library and/or socialising with students and non-academic members of staff. I was often given intelligent suggestions by various people from the observatory as to what might be worth investigating, and meetings were suggested or arranged with people from other institutes, such as the Ministry for Science and the Institute for Physics; I therefore spent a lot of time following up such leads. Contacts were suggested not simply in Belgrade, but over the whole former SFRY region, from Istria on the Croatian coast to Sarajevo, Bosnia. Although the institutes in these locations worked on very different topics, with little overlap, certainly before the conflict and to a lesser extent today, researchers were in touch with one another. I spent most of my time with students from a variety of disciplines rather than with professional scientists conducting research. This was much easier, due to my age (mid-twenties) at the time of fieldwork, which very much categorised me as a young man (mladić). Had I grown up in the region, I would likely have still been studying at this age for an undergraduate or master’s qualification. My friends were a mixture of people from the university, far left political activists, academic colleagues who were studying anthropology or natural sciences there, as well as academic colleagues who were from the region and are currently, or have now finished studying with me at the University of Manchester.

The second problem concerned my lack of knowledge at the start of the project when conducting interviews. This lacuna, in what was a highly complex and sensitive context due to the recent wars and rich historical and academic traditions, meant that I felt unable and unwilling to discuss the interviews with others – as colleagues frequently requested what people had told me - and I was unsure that I was even asking the right kinds of questions. For this reason, I kept the interviews as open ended as possible. I had several questions I could ask if the conversation stopped, but I encouraged the interviews to begin with the interviewee (scientist or student) telling me about their academic history, career history and research interests, with the hope that anecdotes and burning issues would emerge in the dialogue. Two broader questions I often later asked if appropriate were, ‘what was the situation like working in the nineties?’ and ‘what are the difficulties/positive aspects surrounding work today?’ If pressed for conversation, I would ask questions such as ‘do you think the situation has
improved or gotten worse since the nineties? and then prompt for reasons. The only question that I started to ask in later interviews on the basis of earlier interviews was: ‘what did you think of the relationship between science and the government during the nineties – were they supportive or not of science and scientists?’ Overall however, I would ask very specific questions concerning earlier answers given in the interview. I would often repeat back the last sentence in a questioning tone, prompting the interviewee for more information. This allowed me to demonstrate when interviews were conducted in Croatian or Serbian that I was following the conversation, even if due to language difficulties at the start of the project, I had not understood everything said. This leads me on to my third problem, concerning my lack of Serbian and Croatian language skills at the start of the project.

I gave scientists the free choice to speak English, Croatian or Serbian when conducting the interviews and they almost always spoke in Serbian and Croatian at the field sites, only speaking English if an informant insisted on it. In the interviews, many chose to speak English, although several chose to speak in Serbian or Croatian. All interviews were transcribed, and I translated the interviews conducted in Serbian/Croatian after they had been transcribed by colleagues (see acknowledgements). Whilst almost all researchers spoke high quality English, I would have felt uncomfortable had I spoken English with them, as I view mastery of the language as a necessary (but not sufficient) condition to the success of an ethnographic project. Furthermore I would have felt my project to have been an insult had I not been able to present my work in Serbian. My reasoning was that the researchers at the observatory had to present their work in English, were they to attend conferences or study in other parts of Europe. Initially I overcame this problem by focusing on themes such as practices, for which language mastery was not as necessary. I later developed a very strong command of the language. In focusing on language acquisition, as earlier mentioned, I spent most of my time with students speaking only Serbian/Croatian, which enabled me to learn a whole host of basic and wide-ranging but crucial details which anthropologists who grew up in the region would have already known; for instance, to whom the various labels such as Četnik, Ustaše, Partizan pertain; why students would keep insisting that ‘nema perspektive’ (there’s no prospects) here; as well as the main symbols associated with various groups and popular brands such as Cedevita; cleavages in opinion on figures such as Milošević, Đinđić, Šešelj and so forth. I was then able to bring this wealth of broader knowledge of the context to bear on my analyses of the interview material and my relatively limited dealings with scientists through an understanding both of these specific, contextual details and the everyday geopolitics. Such wider contextual knowledge, I discuss some of these issues in the section on national cosmology in chapter one.
which I still deemed inadequate at the end of eighteen months fieldwork, could be built on with further immersion and be of use in further anthropological fieldwork or other engagements in the region.

This connects with my fourth problem or rather concern, which I developed over the course of the project. I feel that one or two years is an inadequate amount of time in which to develop a familiarity with such intricacies. I quickly realised that the project was ambitious in its aims and scope, due to the difficulties of the language, difficulties of learning how to understand and ‘read’ astrophysics, the complexities of the history associated with the region, and the sensitivity of the context owing to the recent wars. Besides my lack of knowledge upon arrival, I also had further doubts and fears about expressing political views. This was particularly the case as it struck me that my field site and everyday life in Belgrade and to a lesser extent in Zagreb, was highly ‘politically’ or 'ideologised'. By politicised, I mean that people talked a great deal about politics and possible future directions on a day to day basis frequently, even if there was a large amount of apathy towards formal political processes and structures (see Greenberg 2010). I understood this as related to the conditions of crisis, sanctions and recent bombings and elaborate these themes in more depth in chapter two through the lens of Bourdieu’s (1990) study of education and crisis conditions. I also suggest that this state of affairs was magnified by the legacy of the SFRY’s non-aligned positioning, which had the consequence that many of the political traditions in the region, such as the Partisans, Ustaše, Četniks and so forth (all of which I later discuss in the section on national cosmology), were 'local', leading to highly personalised encounters between advocates of different positions due to the relatively small populations and academic community in the former Yugoslav region. The political, in this context, was very often also personal. This marks a contrast to other states in Central Eastern Europe, where communist ideology, whatever individual actors' opinions of it as a project, was more easily understood as something imposed from above and afar by the 'Russians'. This relative personalisation of academic relations and politics entailed that, when I was not being treated as a guest, I was often being identified with or placed into particular traditions. For example, some Serbian nationalist colleagues challenged me on the grounds that I represented the actions of the UK state government, and that I was a representative of the 'UK' people, where opinions were understood as relatively homogenised within the UK and aligned with decisions made by central government. The result of all these changes led me to feel even more insecure about having an academic opinion; my strategy at this point was to 'shut up and write'. I attempted to
overcome this problem by completing a substantial period of ‘writing up’ in the region, in so doing continually improving my language skills and knowledge of the wider context.

A fifth problem I came across was that whilst working alongside scientists, I found it was often not easy to explain what anthropology entailed. It was much more acceptable for me to be described as a 'historian' or 'philosopher' as these categories were more familiar. A sociological or anthropological study may have been seen as 'muckraking' (Latour and Woolgar 1986, p.21). I was unsure at the start whether some of the people with whom I worked understood my role. For example, before I returned to commence the main fieldwork period, the observatory wrote a formal letter accepting my wish to work there, framing the study as an inquiry into the recent history of science in Serbia. Additionally, I noticed that many, but by no means all astronomers and astrophysicists, by the nature of their training, were unaccustomed to thinking about social context when discussing the humanities. For example, one researcher jokingly described the ‘monkey typewriter theorem’. This is the thesis that if left for a long period of time, a monkey would eventually type out Shakespeare’s sonnets. The implication is that there are only a finite number of meaningful combinations of words, and that as such, poetry and the arts more generally goes around in cycles and is hence relatively uninteresting. Such an account pays no attention to the influence of the specific contexts within which actions such as writing plays take place. There is no understanding of how particular actions and acts often have intended consequences and are written often with particular audiences in mind. Some scientists also described the social sciences, and my work, using terms familiar from the natural sciences. I was asked what my hypotheses were, how I would test them, and what conclusions I had drawn. At the start of the project, given my distance from and lack of connection with the region, some researchers and students argued that I would be able to offer an objective, or at least the most disinterested view possible regarding the relative merits and problems regarding the natural sciences, and even views on society more generally in Serbia as compared to Croatia. In making this 'objective' assessment, it was two discrete, bounded units - 'Serbia' and 'Croatia' which were to be compared. In addition, one research team questioned me specifically about the potential political implications of such a project, and whether what I wrote might be damaging to some people in any way. I found this discussion refreshing, although it added to my sense of fear and nervousness surrounding writing.

Finally, in an attempt to gain more data from students which I could approach ethnographically, I conducted a qualitative survey (see appendix) amongst astrophysics students in Belgrade and physics students in Zagreb (there was no separate astrophysics
course there). The survey was qualitative with open ended questions and was designed to survey student attitudes towards Nikola Tesla, and also towards their current situation and future hopes and career prospects. The surveys were conducted by students in the university building in a classroom under my supervision. I was introduced as a guest researcher from the University of Manchester and the students then completed the forms without discussion. In Belgrade I required the spoken permission of the head of the astrophysics department whilst in Zagreb I required written, signed permission. Unfortunately I didn’t have much time to discuss the survey and the results with students afterwards. The intention was for the survey to generate new qualitative insights and/or threads to follow up later ethnographically. Certainly no substantive conclusions can be drawn from the student responses. I rather included it as a ‘methodological triangulation’ technique (Denzin 2006[1978]) to complement insights gained through the interviews and participant observation, based on the premise that if particular themes emerged repeatedly through the use of all three methods, such themes must be worthy of more detailed investigation. The survey information is only used very peripherally in chapter six, in a similar way to the use of interview quotes in chapter two, although less frequently for I had fewer contextual details surrounding the student replies than I had concerning the information generated through the interviews. I thus use the material cautiously to highlight particular feelings or opinions I came across, which are perhaps articulated better in the students’ own words than through ethnographic description.

All of these different elements and engagements gave my fieldwork experience a scattered dynamic, for I had lots of meetings in different locations and often short but important encounters with professionals. The strength of having an association with the observatory in Belgrade, and going there on several days on a weekly basis, was that it allowed me to anchor my study in a concrete location for ethnographic observation and in a network of scientists who had a wealth of opinions and frequently suggested contacts from other natural scientific disciplines. Hence, I do not consider my fieldwork ‘multi-sited’ in the sense that Marcus (1995) used the term to describe ‘multiple sites of observations and participation that cross-cut dichotomies such as the ‘local’ and the ‘global’, the ‘lifeworld’ and the ‘system’’. Rather, I retain a commitment to the anthropological practice of following the everyday rhythms and practices of people in a particular locale. It is precisely this focus on practice rather than representation, which differentiates anthropology from cultural studies. I argue in chapter three that such anthropology is well placed to grasp understandings of how communal subjectivities are produced and experienced.
(iv) Researcher self-positioning

I am a male, queer identified researcher who has grown up in a middle class, predominantly white suburban background in the UK (a state which makes liberal democratic claims), who was single when commencing fieldwork. I have a history of institutional academic involvement, with an undergraduate background in mathematics and the history and philosophy of science. This background led to my having an interest in more abstruse theoretical problems as (sometimes) opposed to issues which various groups of people might be facing; consequently I had difficulties learning to ‘think anthropologically’ at the start of the project. I also have a history of leftist political activist involvement in Manchester, which has an infamously large left wing activist scene, often working on campaigns with queer activists, revolutionary socialists, anarchists and social democrats.

When conducting fieldwork, I was freed from the subtleties of the UK class system, an experience I found to be liberating, given that I strongly felt that distinctions between various social groups were not as exaggerated in Serbia and Croatia as in the UK, in part due to the former socialist context. In the paragraphs that follow, I discuss the implications of my positioning, for as May (1999, 2.18) argued:

To be reflexive in the final twist entails an assault upon studies of the social world through seeking to expose the partiality of accounts in terms of their restriction not only to time and place, but also the biography of authors.

Such a discussion will thus help to better highlight the limitations of this study and contextualise its relations of production, so as not to appear to be, as Haraway (1988) described, a “view from nowhere”. Some of the afore-mentioned actions and identifications directly influenced the development and foci of the project. As concerns the scientists with whom I worked, the main factor influencing access was that I was educated and had some kind of institutional academic affiliation; the other details were relatively irrelevant for the purposes of conducting interviews.

I chose not to mention my queer identification and political involvement at the field site. I made this decision because of both the sensitivity of the political context after the recent wars and the existence of a large amount of casual homophobia. For instance, if I had been vocal about this issue, I may have received regular verbal abuse would have been easily cast by more nationalist colleagues into the role of being a 'symbol' or representative of values and/or lifestyles associated with the 'decadent' West. To give one example, shortly after completing fieldwork, I participated in a Pride March in Belgrade. After this event, where
my face was visible on television for I had been in the crowd, the cleaner/coffee lady at the observatory refused to speak to me, suggesting that my fears had been valid.

As the fieldwork progressed, I was on close enough terms to talk about such issues with some members of staff at the observatory, but not so much with the scientists with whom I had relatively little contact. Such issues also created occasional problems in my personal life on several occasions. For example, whilst leaving the premises of a queer cultural and political festival in Belgrade, I had an altercation with members of Obraz, a far right nationalist group using direct action techniques, which resulted in a friend's arm being broken. I was also forced to move house on one occasion for the same reason. Whilst physical incidents were rare, the presence of radical right wing groups who 'policed' such events led to an atmosphere of distrust and fear, especially in activist circles, as well as amongst many non-straight identified people.

Outside of the observatory, throughout the fieldwork period I was involved in a variety of activist initiatives, which I viewed as of great importance. They were also central to me gaining a better understanding of the wider historical-political context. I was however, aware of the danger that my activist engagements could prove to be a distraction taking me too far away from the observatory, and so I had to be careful at times not to get too involved. I participated in protests surrounding debates about higher education reform in Belgrade, whereby increasing numbers of students were asked to self-fund their higher education.\footnote{Baćević (2010) for the context and background.} I also participated in the student Blokada (blockade) at the Filozofski Fakultet in Zagreb.\footnote{The blockade had a website \url{http://www.slobodnifilozofski.com/} with details of the action and changes the government were planning to make to higher education [accessed on 4/7/11].} The blockade entailed a form of direct action whereby a group of students stopped all classes taking place for two weeks.\footnote{It began on 23/11/9. See Kapović (2010).} The aim of the blockade was free higher education for all, as increasing numbers of students were being asked to make increasingly large contributions as the government attempted to introduce a neoliberal model of higher education funding in Croatia. It received widespread press coverage in the national media and was immaculately organised, with students setting up workshops on all kinds of topics including practical workshops on how to talk to the media. It was also successful in leading to a delay in the implementation of these reforms, and made the issue visible to a wider public, who overall, had some misgivings about the methods the students used, but were highly sympathetic to the aims of the blockade. I worked as a redar (monitor) and gave a lecture on higher education in the UK today. The protests and blockade were directly
connected with a series of EU university reforms, known collectively at the Bologna Process, which were designed to create an EU wide standardised higher education system. The ultimate goal of this process was to enable the production of a ‘knowledge economy’, a goal in which, as we shall see, scientists have a distinct and important role. The activist engagement, thus, related back to my research focus through dimensions of the economic context I discuss in chapter one and chapter three.

My involvement in these activities undoubtedly shaped my approach towards the project and the details I have chosen to focus on. As Strathern (1987) described, with respect to feminist activist engagements, there is an 'awkward' relation between anthropology and activism, which require quite different skills. A combination of the two is likely to result in either an overly laid back approach to activism, as various assumptions on which activism is based are questioned and problematized, and/or poor quality anthropology, as observations and descriptions are made with a particular end point in mind which may leave other voices unheard or misinterpreted as they are placed within a particular political schema. My personal solution was to oscillate between periods of heavy activist involvement when an important issue arose, and to otherwise concentrate heavily on the project focus. Whilst I am wary of activist approaches which insist on a particular focus through an assertion of the moral high ground (for example Schepver-Hughes 1995), in contrast to anthropologists who view activist engagements as detrimental to the discipline (e.g. D’Andrade 1995), I strongly feel that interesting theoretical dynamics can be generated at the interface of anthropology and activism, and believe that this thesis has been enriched through such engagements.

(v) Mapping the thesis

Referring back to the specific research questions earlier posed, I will now map out the rest of the thesis. Chapter one begins with a literature review, situating the thesis within the anthropology of science literature, before outlining key information and details of the historical and political contexts in Serbia and Croatia at present. It focuses on the changing organisation of science and political life in the region and the economic contexts (economic crisis; promotion of a ‘knowledge economy’) in which my research took place. It also engages with key motifs I often came across in discussions with informants which frequently emerged in Serbian and Croatian nationalists’ constructions of the world. This background is necessary to answer the first question posed, concerning how the wars and new national hegemonies established affect scientists’ work. This question is then pursued
in chapter two, drawing on the context provided in the previous chapter, through a discussion of scientists’ narratives of the nineties. I focus on how the newly established national hegemonies affected scientists’ work, and the roles some scientists played in establishing or contesting these hegemonies - the second research question.

Chapter three moves to focus on changing scientific practices in astrophysics. The past thirty years have seen an explosion in media and informational technologies, ranging from the development of the internet to digital imaging techniques which have transformed the discipline. Drawing on the changes specific to the post-Yugoslav context discussed in earlier chapters, I then ask the third research question: how did scientists experience technological change during the nineties – the internet; digital imaging – in a context affected by war and scientific isolation? In keeping with the focus on scientists and their experiences, a particular trope I often came across – that of the ‘scientific community’ - is interpreted against the backdrop of these changes. The chapter finally explores aspects of the socialist legacy and post-socialist transition, drawing on Latour and Woolgar’s (1986) discussions of credit and credibility and Verdery’s (1995) discussion of cultural politics under socialism, thereby addressing the fourth and fifth research questions: 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?

Chapter four moves to focus on scientists as academics. It analyses generational differences, gentlemanly precedents and the career paths of students at present in the region, looking at the challenges aspiring scientists face and the hierarchies they have to encounter to achieve their goals. This focus complements the ethnographic description at the start of chapter two concerning the status and role of formal education in Serbia and Croatia, allowing me to tackle questions concerning the production of political and academic hierarchies and the sixth research question of how different generations of scientists cope with and react to social, political and technological change.

In chapter five, I move to consider the media engagements of certain scientists, looking at the importance such work had for the construction of what Verdery (ibid., p.142) has referred to as ‘cognizant publics’, in addition drawing on science studies literature concerning science and the public. This provides a bridge between the focus on academic hierarchy in chapter four, and the wider-spread political activities, of mobilising public opinion and so forth, which media engagements allow.
In so doing, I tackle the seventh research question, of to what extent and how the transmission of scientific information to publics change over the post-socialist ‘transition’ period.

**Chapter six** draws the themes of the previous chapters together by returning to the final research question concerning how Serbian and Croatian national cosmology came to feature in histories of science produced by scientists. The role of being a historian of science as well as a practicing scientist links up insights gained in the previous chapters, concerning academic political hierarchies, disciplinary change and the public roles of intellectuals. The chapter cross-examines such national cosmology through analysing representations of ‘great scientists’ and also the inventor Nikola Tesla. I also look at how students become implicated in national cosmology through imagining relationships with others, and with ‘great individuals’ in terms of debt and indebtedness, a process which plays an important role in reproducing scientists as a social group, through generating a sense of mission and direction.
Chapter one: cosmologies and contexts

(i) Introduction
One word I came across in discussions with astronomers and astrophysicists was smjer (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 smjer, 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 now describe in this chapter. Before moving to consider the factors influencing such directed movement – one could say the vectors involved – I first ascribe, in section two, coordinates, locating the thesis amongst other anthropological studies of science and technology. In section three I move on to consider the historical background to political and scientific life in the SFRY and during the break-up, up to the present day. I also briefly discuss whether the observatory fitted into these various orderings and changes, and if so, how. In section four, I offer an account of 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'. In section five I move to consider national cosmology in more depth, through introducing the categories and approach nationalists typically used and which featured in many conversations I had in the field - coordinates individuals applied to others. I have sought to do this in an ethnographic way, through placing a discussion of recent events inside a wider narrative of Croatian and Serbian national cosmologies, taking my inspiration from Malkki’s (1995) study of Hutu mythico-history production. Finally, in section six, I give an overview of mid-range concepts which emerge in the thesis, linking them both to each other and the topics discussed in some of the earlier sections of this chapter.
(ii) Anthropological studies of science and technology

Many sciences, and especially the physical sciences, are frequently portrayed as being in some sense universal and objective, with research conducted on a supranational scale. For example, the anthropologist Traweek, in her ethnographic study of particle physicists in the USA and Japan, described how researchers sought to create ‘a world outside human space and time’; what she referred to as a ‘culture of no culture’ (1992:162). Indeed, the recent work of many anthropologists, sociologists and historians of science has attempted to displace, or at the very least question, such presumed universality. Up until the mid-twentieth century, scientific authority was so great that in Western Europe and the USA scientific concepts were ‘black-boxed’ and sociological study was limited to analysing features of the institutions in which scientific activities took place. An example of this is the Merton’s analysis of a commitment by scientists to ideals such as communalism, universalism, disinterestedness and organised scepticism, which theoretically enables progress in the sciences (Merton 1973[1942]). However, the presumed universality and objective detachedness of science from the social contexts in which it is produced have been challenged over the past forty years in the science studies and anthropology of science literature from a variety of different perspectives, some of which I draw on throughout the thesis. Two key bodies of literature include a ‘classical’ science studies tradition in which I was first trained, which includes SSK (the Sociology of Scientific Knowledge), SCOT (the Social Construction of Technology) and ANT (Actor-Network Theory).14 The second tradition, with which this study engages less, is that of techno-science anthropologies primarily conducted in Western Europe and the USA, which includes key authors such as Haraway (1989); Traweek (1992) and Martin (2001).

The ‘classical’ tradition in science studies emerged with the publishing of Bloor’s (1991[1976]) ‘strong program’ in the sociology of science. In Knowledge and Social Imagery, Bloor suggested the prospect of a ‘strong’ sociology of scientific knowledge based on the assumption that social relations were often the driving force behind theoretical innovation in the sciences. The key insight, which opened him up to charges of epistemological relativism, was the postulate that the program ‘would be symmetrical in its style of explanation. The same type of cause would explain, say, true and false beliefs (ibid., p.7)’.

14 Key authors in this tradition include Bloor (1991[1976]) and Kusch (2004) - SSK; Pinch and Bijker (1984) - SCOT; Latour and Woolgar (1986) - ANT. An overview to the field can be found in Jasanoff et al. (2002).
Bloor’s program was radical because it broke what the anthropologist Emily Martin referred to as the ’citadel’ view of the natural sciences:

The natural sciences of the present day are heir to processes that have left most of us thinking they are set apart from the rest of history and society, something like a citadel in Webster’s definition: ”a fortress that commands a city, both for control and defense.” (Martin 1998, p.26)

The strong programme argues that different modes of organising social institutions and different social interests often play an important role in advancing scientific knowledge. As Shapin surmised in his strong program influenced study of the development of phrenology in nineteenth century Edinburgh, ’my purpose, in brief, is to explain the controversy by integrating the various intellectual positions taken up by the actors with their social position, interests and values’ (Shapin 1975, p.222). Whilst Shapin’s study concerned a field (phrenology) which has now been discarded by the scientific mainstream, the strong program could equally be applied to nuclear physics or other fields currently regarded as scientifically valid; the key insight is that the successes and failures of both scientific theories currently held to be true and those that have been discarded can be explained causally with reference to prevailing social interests As Shapin (1998, p.10) commented, ’there is as much society inside the scientist’s laboratory, and internal to the development of scientific knowledge, as there is outside’. My project working with astrophysicists was designed with the concerns of SSK and the strong program firmly in mind, as I had been previously trained in this field. As the anthropologist Fischer argued:

There is a second, more STS difference between the anthropologists and SSK style ethnographies, which also has to do with how the two sets of actors seem to have come to science studies. Physics continued to provide the key exemplary field for SSK as the “hard science” to show that it was cultural and socially constructed; the focus remained on a problematic of “fact making” inherited from an epistemology-centered philosophy of science. (Fischer 2007, 564)

Indeed, the ’hard science’ status of astrophysics influenced my choice of field site; it was deliberately chosen as a ‘test case’ for the strong program. However, the central concerns of the SSK tradition owe more to academic epistemological concerns in Anglo-American philosophy of science rather than the concerns of the people with whom I worked in the field context and so my project moved away from this SSK tradition as I moved through the fieldwork period.

The literature surrounding the strong program soon gave way to new insights which focused, in a more anthropological vein, on following the everyday practices of scientists in
minute detail. In this field, Latour and Woolgar’s *Laboratory Life*, first published in 1979, is particularly relevant. Their study of scientific practices revealed that much of the work scientists appear to do on a day to day basis is more akin to that of a bureaucrat and/or craftsperson. Furthermore, they abandoned the epistemological commitments of the strong program to the category of social in favour of a scientific symmetry principle which argued that all kinds of entities, humans and non-humans alike, could be approached in the same fashion. These theses were further developed by Latour (1993) in his Actor-Netowrk Theory (ANT). As ANT has made such an important contribution to the science studies literature, it is worth discussing its merits and pitfalls. I take the exposition of ANT in *We have never been modern* (1993) as exemplary, although Latour’s perspective and interests have shifted somewhat since then.\(^{15}\)

Latour’s argument centred on the existence, for many, of a ‘modern condition’ in which a dichotomy between humans and non-humans was asserted, as well as a dichotomy between nature, the province of scientists, and culture, the social world which we inhabit. Latour did not understand these distinctions to be ‘total’, but rather as conventions produced as the results of a ‘modern settlement’. From the perspective of this ‘modern settlement’, distinctions were made between various domains (and academic subject areas) inside which many scientists, economists, lawyers and so forth worked. Latour argued that many scientists were guilty of naturalism, with no understanding of their work as socially produced. Bloor’s strong program, in focusing symmetrically on producing social explanations of scientific theories understood as true or false was thus an important corrective, but it did not take the symmetry principle far enough according to Latour, for it still worked inside this ‘modern settlement’. On Latour’s view, the conventions of this modern settlement had resulted in a purification of categories such as human, natural, social and so forth. Latour then argued that, rather than accepting this ‘purification’, we should follow hybrids, or ‘actants’. As he stated the issue:

> Here lies the entire modern paradox. If we consider hybrids, we are dealing only with mixtures of nature and culture; if we consider the work of purification, we confront a total separation between nature and culture. It is the relation between these two tasks that I am seeking to understand. (ibid., p.30)

Through following the proliferation and movement of hybrids across domains, contemporary disciplinary distinctions may be disrupted and a new kind of analysis emerges in which we can trace networks which shift between discussions of “the most

\(^{15}\) For later opinion and discussion, see Latour (2007) and Law & Hassard (1999).
esoteric sciences and the most sordid politics, the most distant sky and some factory in the Lyon suburbs, dangers on a global scale and the impending local elections or the next board meeting” (ibid., p.1). In so doing, he argued a case for the strengths of anthropology:

I proposed anthropology as a model for describing our world, since anthropology alone seemed capable of linking up the strange trajectory of quasi-objects as a whole. I quickly recognised, however, that this model was not readily usable, since it did not apply to science and technology...If we understand modernity in terms of the official Constitution that has to make a total distinction between humans and nonhumans on the one hand and between purification and mediation on the other, then no anthropology of the modern world is possible. (ibid., p.91)

Such questions have provided the basis for much recent anthropology and sociological inquiry, culminating in several fascinating studies of scientific practice (see Latour 1988, Lynch 1985, Collins 1992). This development in the SSK tradition is particularly suited to anthropology, although it is not without its critics. I found the focus on scientific practice particularly useful and pursue it in chapter three although at a more general level. In the case of a study taking place in the SFRY where recent wars, nation and state-building were taking place, I felt I had to engage with details of the historical-political context which Latourians typically ignore. As the anthropologist Emily Martin described:

One feature of the Latourian approach, a feature that relates directly to what is not anthropological about it, is that even if Latour's description of the scientist as accumulator is accurate in all its details, the description is never placed in a larger historical or cultural context. The network-building, ally-enrolling scientist is poised in a timeless, universal arena. Much like the cells or particles that scientists are trying to describe in the laboratory, from Latour's perspective, scientists always seem to behave in the same way. Also, like those cells or particles, scientists are stripped down to, reduced to, simple forms— in this case, the competitive, aggressive, accumulating individual. (Martin 1998, p.27)

Anthropological departures into the world of techno-science, such as Martin’s work, differ from the SSK tradition in that they particularly developed in a milieu influenced by feminist scholarship. As Fischer commented:

...the gendered differentiation from the almost exclusively male and rhetorically combative SSK and SCOT tradition is not incidental, but a visible effect of anthropology’s conversation in the 1980s with feminist studies, cultural studies, postcolonial studies, and media studies, and with its call to turn the jeweler’s eye of ethnography on the key
technoscientific institutions of the First World, and to re-integrate political economy with cultural analysis. (Fischer 2007, p. 541)

Such writers included, ‘...a wider range of actors, institutional accountabilities, political economy and media focus, class-linked cultural analysis, and other interests’ (ibid., p. 563). Other studies in this tradition, such as Rabinow’s (1997) work Making PCR and Petryna's (2011) work on biological citizenry in the Ukraine after Chernobyl have had a more narrative, human focus, tackling ethical and political questions more directly, in Petryna’s case through understanding how post-socialist changes and the severe nuclear accident in Chernobyl led to the reimagining of citizenry and access to state provided welfare benefits through the socially defined category of being a Chernobyl ‘sufferer’. Their work moves away from the more esoteric epistemological concerns of the Edinburgh School and Latour. Traweek’s (2004) more recent work has focused on pedagogical traditions for particle physicists in different states, including Japan and the USA, with an emphasis on how communities of researchers are reproduced and how they change. Such 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, which is 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. (ibid., p. 3)

This study 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, p. 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. Such texts analysed how concepts such as reproduction (Franklin and Ragoné 1998), kinship (Strathern 1992), epistemic cultures (Knorr-Cetina 1999) and the body (Martin 2001) were
being reworked in light of biotechnological and informational advances, bringing with them other kinds of changes such as the creation of new forms of citizenship (see also Petryna 2011). 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, where far from being a scientific ‘centre’, 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 neoliberalisation 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 study may become clearer in light of future work currently being undertaken in the discipline. In terms of local anthropological traditions in Serbia too, studies of science and biotechnology are currently being taken up as a new topic, bringing this study into conversation with work such as that discussed in the recent biotechnology/science studies themed edition of the Belgrade based anthropological journal Antropologija (2012, second edition). As I discuss in chapter three, concepts such as uneven development are of particular use in understanding the changes from the perspective of scientists working in the former Yugoslav states. Consequently, throughout this study I also draw on anthropological theory from other corners of the discipline, which I will move on to discuss after explaining some further important details of the context in which I worked.

(iii) The changing organisation of science and political life

As earlier mentioned, classic texts in the science studies literature, such as Bloor’s (1991[1976]) ‘strong program’ and later Pinch and Bijker’s (1984) work on the social construction of technology posit a close correspondence (in Bloor’s case a causal connection) between modes of social organisation and the content of scientific theories and technologies. Whilst such claims are somewhat extreme, the relationship between the organisation of scientific institutions, political life, and the work that scientists accomplish certainly warrants some consideration and will prove to be of particular importance in later chapters when considering changing scientific practices. As such, in this section I describe some important reference points concerning how political life has been organised in the region since the Second World War, discussing how scientific institutions and organisations were implicated in and/or affected by such changes.
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, pp.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, all workers owned and managed firms collectively through collective decision making on workers councils. This marked the beginning of the distinctive ‘socialist’ path Yugoslavia took, often referred to as ‘self-managing socialism’ or ‘market socialism’.

Despite parting from the Soviet Bloc in 1948 and pursuing a distinctive brand of socialism, named Yugoslav self-management, the effects of centralised administrative management and economic planning exerted an influence until 1952 (OECD Report 1976, p.13). In the immediate post war period and after, scientific research was funded by both the federal and republican budgets:16 From 1952-1964 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. However, the approach to governing was not an attempt to create some kind of anarchy; there was still a state structure, bureaucracy, and a central committee in each of the republics. Furthermore, 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

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16 The SFRY, as mentioned, was divided into republics. Certain amounts of money were funnelled to cover expenses at the federal (highest) level, whilst others were funnelled to deal with expenditures at the level of the various republics.
many areas\textsuperscript{17}, 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, academics, notably Marxists such as Unkovski-Korica (2011, p.130), 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 marketization, 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 of wider social use value. Indeed, the production of technologies were 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:

\begin{center}
\includegraphics[width=0.5\textwidth]{Yugo_Car_Ad_1987.jpg}
\end{center}

Image three: Yugo car advert in the UK media\textsuperscript{18}

\textsuperscript{17}Informants who grew up in what is now Slovenia and Croatia described such classes.

\textsuperscript{18}Available online at http://3.bp.blogspot.com/_L8BTRurV0uk/SRdS2rNaII/AAAAAAAAAJNQ/U0OcfxXfCWk/s400/Yugo+Car+Ad+1987.jpg [accessed on 14/12/11].
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, p.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 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.¹⁹ New asteroids discovered by the observatory were frequently named after ‘great’ Yugoslavs such as Josip Broz Tito, the general secretary, Marshall and president, and Nikola Tesla the inventor, born in Austro-

¹⁹Many 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).
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, an observation which is reflected in 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 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 (ibid., p.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 mean they are neither as hierarchical nor as centralised. However, as in Paris, there exists a central authority-conferring institution - the Serbian Academy of Sciences and Arts (hereon SANU)²⁰, for which there exists a comparable institution in Zagreb, the Croatian Academy of Sciences and Arts (hereon HAZU).²¹ These institutes were regarded as socially conservative by many researchers and students with whom I spoke, including scientists who were not 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 et al. (2000, pp.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

²⁰The abbreviation SANU comes from the Serbian title Srpjska Akademija Nauka i Umetnosti.
²¹The abbreviation HAZU comes from the Croatian title Hrvatska Akademija Znanosti i Umjetnosti.
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” (1991, p.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, p.182). I find Josephson’s analysis problematic in arguing a case for similarities between ‘Aryan’ and ‘Soviet’ science, a manoeuvre which attempted 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, p.15). Perhaps the only serious constraint on 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.22

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 & Rader 1992).

Did the institution where I carried out the bulk of my fieldwork fit into this context 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.

22I certainly wouldn’t describe military industries as socially useful. Nevertheless, the Yugoslav government chose to stress investment in military goods, perhaps due to the positioning of the SFRY between the Soviet and Western blocs.
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 Zvjezarnica 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, p.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.

(ii) The ‘break-up’ of Yugoslavia

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 (Alcock 1995, p.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 sever 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 (hereon JNA\textsuperscript{23}) and the Slovenian Territorial Defence, starting on 27\textsuperscript{th} June 1991. In Croatia, the war was much longer, stretching from 1991-1995, 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 the Federal Republic of Yugoslavia\textsuperscript{24} (hereon FRY), a topic I discuss in chapter two in more depth, where I trace the history up to the present day through scientists’ self-reporting on events.

Whilst the observatory continued to receive funding during the nineties, during the years of hyperinflation, such funding was 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.\textsuperscript{25} 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. The observatory’s topics for the period from 2006-10 are listed below:

- Influence of collisional processes on astrophysical plasma spectra
- Astrophysical spectroscopy of extragalactic objects
- Stellar and Solar Physics
- Dynamics of Celestial Bodies, Systems and Populations
- Inverse Problems in Astrophysics: Interferometry and Spectrophotometry of stars
- Gaseous and stellar components of galaxies: interaction and evolution
- Chemistry of Galactic and extragalactic molecular clouds
- History and epistemology of the natural sciences

\textsuperscript{23}This is an abbreviation of Jugoslovenska Narodna Armija

\textsuperscript{24}This consisted of the remainder of the SFRY – what is presently Serbia and Montenegro.

\textsuperscript{25}FP7 refers to the EU science funding initiative. See \url{http://cordis.europa.eu/fp7/home_en.html} [accessed on 19/12/11 at 13:08].
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. 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, 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.

(iv) Economic contexts and crisis

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, and there is a worrying possibility of large scale future social unrest. Researchers and friends were understandably worried by the economic crisis, some more so than others. For instance, 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’.

46
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 2011, p.53), (Gregory 2007, p.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 a 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, p.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 capitalist²⁶, 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 it must be emphasised that 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

²⁶The 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.
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, p.32).

Secondly, 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 1991, p.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., p.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, p.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 1991, p.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. 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., p.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.

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 2011, p.45).

27See Dunn (2004) for an excellent ethnographic description of the reorganisation along post-Fordist lines of a juice and baby food producing factory in Poland.
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. 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. In a ‘knowledge 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.” 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;

28 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.
29 See the report Presidency Conclusions (Lisbon European Council 2000).
• 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.\textsuperscript{31}

On such a model, researchers are often described as ‘human capital’. Those researchers with a high value of human capital possess 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, p.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 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. 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:

<table>
<thead>
<tr>
<th>Year</th>
<th>Croatia</th>
<th>Serbia</th>
<th>Hungary</th>
<th>Romania</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0.76</td>
<td>0.47</td>
<td>1.0</td>
<td>0.45</td>
</tr>
<tr>
<td>2007</td>
<td>0.81</td>
<td>0.35</td>
<td>0.96</td>
<td>0.53</td>
</tr>
<tr>
<td>2008</td>
<td>0.9</td>
<td>n/a</td>
<td>n/a</td>
<td>0.59</td>
</tr>
</tbody>
</table>

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

The latest figures for Serbia (2010) show a further tailing off 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. 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, 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:

34See Tatalović (2011). Figures are not available for Croatia in 2010.
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. 35

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., p.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: 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., p.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 in particular apply to the theoretical vocabulary associated with anthropological studies of techno-science in Western Europe and the USA, as discussed earlier. 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, p.25–7) argued, is a prime 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 and so are worth engaging with as well as with other traditions, such as understanding ‘national’ cosmology, which I will now turn to consider.

(v) A map of Serbian and Croatian national cosmology

Besides the SFRY, another important point of reference and source of identifications concerned the national categories of ‘Serb’ and ‘Croat’ which many informants used in my conversations with them. 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., p.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, p.57) in 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., p.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 anthropologists can orientate themselves within this bank of themes. 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 the world, for there was a degree of diversity between different nationalists’ mythico-historical constructions.

(i) 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. 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 Blut und Boden 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’. I found that far right Serbian nationalist groups would regularly travel to Zagreb and graffiti comments in Cyrillic (an alphabet associated with Serbian – the Latin alphabet is now used officially in Croatia) to the effect that much of Croatia was ‘really’ part of 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, such as the current President of Serbia, Nikolić, have made reference in the past to ‘Greater Serbia’ as an unaccomplished dream. Such statements, many 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 promote national feeling.

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 wasn't 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

36 http://dnevnik.hr/vijesti/svijet/nikolic-velika-srbija-je-neostvareni-san.html [accessed on 14/8/12]
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; 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 Antifascists among others were sent to work, and many were killed. 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). 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 et al 1993, p.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. The following year, a famous speech by Milošević in Kosovo was made, which explicitly drew on some of the mythico-historical themes earlier mentioned:

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37For a discussion of 'national' statistics and their role in representations of the post-Yugoslav wars, see Jansen (2005a).
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. Little and Silber 1996, p.38)

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 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 Storm and Flash, 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 many 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. This narrative is most clearly articulated in the recently produced film *The Weight of Chains*.38

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 'Mordor'. 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 and Montenegrin citizens 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 it ‘natural’. 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’ or ‘Bosnians’ constituted ‘real’ nations.

(ii) 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). The Habsburg period had particular 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

39 See http://news.bbc.co.uk/2/hi/europe/4788592.stm [accessed on 24/10/12].
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 an 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.

(vi) Mid-range concepts

Besides national cosmology and the economic and organisational contexts in light of which the ethnographic material makes sense, I also draw on a bank of mid-range concepts throughout the thesis, the most important of which are discursive hegemonies; the semiperiphery/reperipheralisation; value fields and imagined debts. These concepts may be considered as running themes linking the problems posed in each chapter. In this section I therefore introduce them, discuss them in some detail and relate them to the other information provided so far before we move to consider ethnographic material in chapter two.

In the earlier discussion concerning national cosmology I discussed how despite coming across different nationalist narratives and interpretations I was astounded by the frequency with which certain motifs and themes continually reappeared. I discuss the patterning of such repetition in chapter two, as analysed through the interviews and ethnographic observation. In order to understand such patterning, I find the concept of 'discursive hegemonies' particularly useful. By discursive hegemony, I refer to the particular assumptions people make and implicitly rely on in order to be able to have a conversation with others. Whilst debate and argument stress difference, in order for such debate to make
sense, there has to be a certain amount of agreement concerning the 'foundations' on which disagreement can then emerge.

This is a theme Verdery discussed in her study of national ideology under socialism in Romania:

I would argue that like Gramsci's hegemony, legitimacy is always in process and is linked with ideology and ideological struggle. Particularly important in both processes is **debate**, which constructs hegemonies or legitimating ideologies by obscuring the premises upon which the debate occurs. To the extent that debate thereby promotes unspoken agreement—howsoever circumscribed—on certain fundamental premises, then one can speak of this as a "legitimating outcome" or "legitimating moment."...The basis for understanding legitimating moments and the larger ideological processes they participate in is thus to look at language as a realm of disagreement that is, simultaneously, a realm of agreement—on premises such as the existence of "the nation," for instance. (Verdery, 1995, p.11)

In chapter two, I show how those assumptions upon which different interlocuters agree are influenced by the historico-political context in which they are produced. In the case of Zagreb and Belgrade, where wars, state and nation-building have taken place, some of the fundamental assumptions – such as accepting of the new national categories and rejection (or not) of the older Yugoslav categories have diverged, as we shall see, thanks to the production and embellishment of national difference through discursive hegemonies established.

A second key concept underlying the study, and which is discussed in more detail in chapter three, is the concept of the semiperiphery (Blagojević 2009) and related ‘reperipheralisation’ – the process of becoming more peripheral – due to the recent wars. The concept of semiperiphery is popular in a Marxist tradition which includes Wallerstein's (1974) global systems theory. Wallerstein popularised the use of the terms ‘centre’ and ‘periphery’ as incorporated in a global world system. My use of the concept of semiperiphery therefore marks a point of contrast with many STS studies, particularly those inspired by postcolonial theory. In his review of anthropological studies of science, Fischer comments that the centre-periphery relations define an ‘older paradigm of study’:

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40 For an introduction see Chakrabarty (2007); Guha (1999).
Although STS studies are gradually beginning in many places—at the Institute of Technology at Bandung, the National Tsing-Hua and National Min-Yang Universities in Taiwan, Tsing-Hua in Beijing, the National University of Singapore, Sharif University and the Institute of Philosophy in Tehran, the Universidad Nacional de Colombia, and at various places in India—these programs often have to struggle against older paradigms of study that emphasize catching up, or center–periphery relations. (Fischer 2007, 575)

Despite this, I found the concepts of reperipheralisation and the semiperiphery (Blagojević 2009) extremely useful in depicting ways in which what Jansen (2009) terms ‘everyday geopolitics’ made themselves manifest. Jansen uses the term ‘everyday geopolitics’ to describe the ways in which wider economic and political processes such as visa restrictions and exchange rates impinge on and shape aspects of our everyday routines and experiences. To give one example, the wars and economic uncertainty which followed resulted in a significant drop in living standards for many in Serbia and perhaps to a lesser extent Croatia. This particular change in the geopolitical positioning both of the region in a global hierarchy of value, and of the various newly founded states in relation to one another is captured by the process of ‘reperipheralisation’. In some scientific disciplines, as we shall see, a critical mass of researchers was lost and scientists could not complete ‘big science’ projects which relied on expensive state-of-the-art equipment as they could earlier.

The idea of the ‘semiperiphery’ also implies the existence, certainly in the sciences, of a centre with which scientists had to manage some kind of relation, be it one of ambivalence or alliance forming. I found, as I discuss in chapter three, that different scientists conceptualised their relationship with the centre in different kinds of ways. One crucial way in which this relationship was conceptualised was through making value judgments; of having an opinion on different academic traditions for example.

I refer to ‘value field’ then, to describe the historical political context in which such alliances and judgments were made by scientists, of how they interpreted their actions and what they do as valuable, with particular audiences (see chapters three and five) in mind. Such a definition of field resonates strongly with Bourdieu’s (1986) use of the term, encompassing subconsciously articulated opinions ‘takes’ on the world. Particular new value fields were thus produced by the nationally defined states which emerged following the wars, whilst a value field associated with the ‘centre’ also featured in scientists’ evaluations of their own work and others. In Serbia I found this ‘centre’ was often homogenised as the ‘West’ or as ‘Europe’.
The final concept which is discussed in more detail in chapter six concerns strategies through which people came to view themselves as individuals in part of a wider schema shaped by both value fields and the new discursive hegemonies; processes by which people came to understand themselves as ‘Serbian’ or ‘Croatian’ citizens. I look in particular at citizenship and nationalism as particular kinds of metaphorical debt which individuals ‘owe’ to an imagined greater ‘collectivity’. This is a debt that cannot be repaid, for it is so great, and so individuals feel a deep sense of indebtedness which is experienced as belonging to a state or national tradition, and which motivates action. I also consider ways of operating outside of such feelings associated with a debt to an imagined collectivity which can never be paid.

A common thread linking these four mid-range concepts is the production of value. On the basis of what (e.g. discursive hegemonies, semiperipheral positioning) did scientists’ interpret their actions and assign value to the actions of others? How were such judgements influenced by sub- and supra-state processes which resulted in the creation of particular value fields and on occasion generated a sense of debt/indebtedness? The production of value was both shaped by and reflected through changing disciplinary practices and political changes; we thus need to find a way of locating the ‘coordinates’ in terms of which the scientists’ present courses (smerov/smerovi) made sense. An appropriate start to this journey is by looking at how scientists are moulded – through education. Hence we shall now begin by looking at value judgments which refer to education and universities, later returning to consider their impact in more depth in chapter four.
Chapter two: narratives of science in ‘transition’

(i) Introduction: ‘worldly people’
Shortly after arriving in Belgrade I arranged to meet with a friend, Jana, and her brother, Marko. Jana had been living abroad and had returned on a short visit to see her family. She suggested that I meet up with her brother Marko, who was also living in Belgrade. At that point, Marko was working part time in a menjačnica (exchange office) in New Belgrade, for a boss Jana deemed dubious.\(^{41}\) Jana was worried that Marko was getting involved with a crowd working on the boundaries of the law, and thought he ought to concentrate more on university where he was studying for an economics based qualification. He was a keen Grobar - a supporter of the Belgrade football club Partizan Belgrade - and was showing me photos from a football match where some friends had lit flares in the stand during the game. Much to my embarrassment, she used me as an example of the benefits that working hard at university could bring, emphasising how I had had the opportunity to travel, learn new languages and so forth. She used the phrase svetski čovek, which literally translates as '(wo)man\(^ {42}\) of the world', to describe me. I found the situation uncomfortable as I was being portrayed as an aspirational figure or role model. Higher education had opened up opportunities for me, and I was acutely aware of the privilege that that entailed. Yet there were many other paths, 'legitimate' or otherwise, that different people might wish to take and I felt an insistence on the value of university level education was quite narrow and definitely not suited to everyone.

(ii) Education and cosmopolitanism
It was clear from Jana’s example, and numerous other conversations I had during fieldwork, that many people in both Belgrade and Zagreb placed a value on education and being highly educated, and that this value was often connected with a cosmopolitan orientation. This orientation denotes a claim “imagined through a cultural or aesthetic disposition toward difference – a sense of tolerance, flexibility and openness toward otherness that characterizes an ethics of social relations in an interconnected world” (Molz 2006, p.2).\(^ {43}\) This definition and orientation has been used specifically to describe categories of persons produced by recent neoliberal globalising processes and is predicated on a liberal humanist position. In contrast, officials in some Soviet Bloc states such as East

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\(^{41}\) There were many menjačnice in Belgrade at the time of writing. Many people would store cash in euros and then convert it back to Serbian dinars when necessary. This was partly due to fears regarding the stability of the dinar, and the inflation rate.

\(^{42}\) The word Čovek is not sociologically gendered.

\(^{43}\) This difference may be conceived in a variety of both nationalistic and/or anti-nationalistic ways.
Germany (Thacker 2003) and Romania (Verdery 1995, p.143) used the term *kosmopol* pejoratively to refer to people who had studied or worked in a variety of different locations in the East and West and feared that such people might have internalised bourgeois habits towards consumption. In East Germany for example, party members with presumed cosmopolitan status were purged on certain historical occasions, such as after the uprising of June 1953. However, the non-aligned positioning of Yugoslavia created, from the perspective of Yugoslav elites, a Marxist cosmopolitan opening. Still, it must be emphasised that whether described as Marxist or liberal, “the views of cosmopolitan elites express privilege; they are not neutral apprehensions of the whole” (Calhoun 2003, p.523), and indeed in socialist Yugoslavia there was a well-documented elite who made extensive use of the privilege of their *crveni pasoš* (red passports) to travel in both Eastern and Western Europe (see Jansen 2009). During my 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. Additionally, there were many students who struck me as highly intelligent, but who did not have such aspirations.

The phrase *svetski čovek*, which was always a compliment, 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, p.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., p.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. It was very common, certainly amongst the student population, to speak at least one but often two *svetski jezici* (world languages) at a highly competent conversational level. The phrase *svetski jezici*, referred to 'well-known' languages which were in some sense economically useful, but often students were drawn to choose a particular language on the basis of an affinity rather than a strict economic calculation – for example, some friends were learning Icelandic or Gaelic besides language choices commonly viewed as more economically useful.44 Yet some resisted the idea that

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44I was unable to find statistics on language learning in Serbia, despite an extensive search. There are however, extensive statistics for other states of Central Eastern Europe which have recently
language learning, particularly of English due to its world dominance, was important or relevant and were disparaging of such aspirations and critical of EU membership. For example radical nationalist groupings were opposed to this cosmopolitanism. They would sometimes graffiti over signs in the city centre advertising foreign language classes, or graffiti out parts of signs written in English. Clearly, following Calhoun (2003), the cosmopolitan orientation had a strong dimension of class production to it in post-socialist Serbia.

In fact, Belgrade was home to one of the largest numbers of private language centres in Europe, leading to large differences amongst students at university level concerning language ability. 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 thus 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 (2010, p.42) 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’.

joined the EU. An EU report in 2008 on language learning in secondary education illustrated that between 2000 and 2008 the average number of languages studied increased (in Belgium, Germany, Italy, Latvia, Lithuania, Hungary, Romania, Slovenia and Macedonia). Whilst I am hesitant to induct on the basis of these statistics, several of the states above were part of the SFRY or close by. I would strongly suggest on the basis of anecdotal observations that language learning is booming in Serbia, both at the state university and in the private sector. See http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-10-049/EN/KS-SF-10-049-EN.PDF for more information [accessed on 10/10/11 at 13.35].
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, p.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* (Rousseau 1991[1762]) - there was a widespread suspicion, or rather resignation, that it was your connections (hereon *veza* - singular; *veze* - plural) that mattered to secure a competitive advantage in the workplace, rather than your ability to perform in exams.

For example, in May 2009, I visited a private school in Košutnjak, a wooded area around 6km south of the centre of Belgrade, on the invitation of a friend who was working there as a 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 her/his success in being published was due to her ability to network rather than her/his 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. I suggest that this was partly 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 2005b, p. 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. 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 (nepismeni) and uncultured (nekulturni), the term cultured here designating an acquaintance with a collection of high-brow cultural works and behaving in an appropriate, well-mannered way. Of course, there were many crooks which did not fit such stereotypes, but a popular association was made.

These groups of criminals had extensive links in government circles and were effectively, it was argued, ‘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 blamed on the one hand for the failures of state institutions and profiting out of the wars, the old socialist government bureaucracy also received a portion of blame. Many previously state owned enterprises were sold to ‘friends’, thus creating serious private monopolies in some areas. 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 & Sporer (2002, pp. 85–6) summarised, “the socialist nomenclature ‘converted’ political capital into economic capital

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

46 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 on 11/3/12].
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 (see Sajo 1998), but 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 *cirkus* (*circus*) and a widespread feeling of apathy and resignation regarding one's ability to secure a job or a livelihood without having a connection (*bez veze*).47 It also meant that, due to the importance of having *veze*, and the assignment of positions at institutes to friends and relatives, there were often a number of people working in institutes and schools who were incompetent at their jobs, but much better at managing *veze*.

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 (Sekulić & Sporer 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 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 *veze*. Such *veze* 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 social contract between citizens and 'the state’ meant that this entity referred to as ‘the state’, in fact better understood, I argue, as a group of persons organised in a particular kind of way, 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

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47 The term *bezveze* (one word), besides meaning disconnected, also means 'stupid'.
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 *rezerve* 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 legitimacy of the claims of the socialist government, and 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.

(iii) Sanctions against science
Now we turn to consider narratives of the nineties which I was presented with by scientists in Belgrade. Whilst I don’t 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 many scientists in Belgrade repeatedly mentioned to me concerning the nineties was the impact of sanctions placed on 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)'. 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. 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, p.9) noted that people alongside whom he conducted fieldwork termed this drop 'the situation' (*situacija*). Researchers at the observatory recounted stories of scarcity; sheets

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

49 This followed the beginning of the war in Bosnia, following Bosnia's declaration of independence in April 1992.
of paper for printing were counted out one by one and carefully rationed, gaining access to an internet connection was extremely difficult, and researchers were subjected to an official ban on access to international scientific journals. I was told that the situation was highly demotivating 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 1991-2 from Croatia and Bosnia, 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 example, 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 didn't 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. 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

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50 One example is the ESO (European Southern Observatory) in the Atacama desert, Chile. See http://www.eso.org/public/ [accessed on 19/8/11].
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. As Stjepanović (2011, p.2) noted, the “privatisation of public owned housing began in the nineties in Serbia, through the introduction of the 1992 Law on Housing (Zakon o stanovanju), which led to privatisation of approximately 95 per cent of public-owned housing stock in Belgrade by the year 1993”.

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.

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 'liberal' groupings of intellectuals (such as the Board for the Defence of Democracy). According to Grujić (1999), shortly before the time he wrote, 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. He argued that this was
a means by which 'disobedient' members of staff were purged.\footnote{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.} 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 & Zrinščak 2006, p.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 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 Beogradani 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.
(iv) Discursive hegemonies

The narratives of the aspects of everyday experience mentioned above were relatively uncontested throughout the fieldwork period. As broadly accepted, I will now develop the argument that certain aspects of these narratives were examples of discursive hegemonies established. As Bourdieu (1986, p.26) 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’. 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 start a discussion with people in other places. I especially found that students who had been born after the conflict tended to accept the new national categories much more readily as given, for they had known no different. As Roseberry (1994, p.361) 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'. In my experience, only a small number of people alongside whom I worked contested these national hegemonies and these people were typically the more politically literate. For instance, I had a friend in Zagreb whose grandfather had been involved in union organising. His grandfather, more unusually for Zagreb than for Belgrade, viewed the recent political changes as negative and would continue to describe himself as ‘Yugoslav’. My friend said people would laugh at him and ask him how he can possibly describe himself as Yugoslav, if no such state exists. This suggested, implicitly, that ‘having a state’ accorded a political grouping a certain amount of legitimacy. When confronted with such questions, he would ask who the Roma (gypsies) were then, for they were a grouping without a state of their ‘own’. However, I found that responses such as this were in my experience extremely rare and as such, understanding aspects of dominant narratives with which particular groupings presented me provided a route into analysing the production of such hegemonies.

Consequently, in the following argument I concentrate on dominant cleavages between different groups of researchers making particular claims. I argue that such differences in opinion relate to political distinctions. I make two arguments. The first is that groupings that informants frequently mentioned reflect positionings concerning the changing political
economy of the region rather than defining particular cultures of individuals with different values. Indeed, whilst such values cannot and should not be 'historicised away', I suggest their production can and should be understood historically in anthropological analysis. **Second**, I argue that points of contestation between informants 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. 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.

**(v) 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 (*Jugonostalgija*), 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. The contact was named Prof. Filipović and his specialty was 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 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 too, 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 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, in essence derogatory, 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 around 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 Prof. Horvat in Zagreb. Horvat had had a role in 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 such as Horvat, 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.
Yet even if we discard nostalgia for the former SFRY ideals, another 'we' was discernible in the narrative that Filipović presented. This was a community of Yugoslav scientists who had a critical mass and who were a global 'player' in their field, yet who nowadays, due to the lack of connections between 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, p.826), 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, pp.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. 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.

(vi)Was the Milošević government anti-science?

The other contestation I came across does not concern a hegemony established on a ‘national’ (state) scale. Instead it points out a crucial difference between groupings of 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, a government seeking to claim legitimacy on a mixture of nationalist and socialist views, had pronounced anti-science positionings. I do not have the ethnographic

52 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.
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. According to Prof. Aleksić amongst others, some politicians were intrinsically suspicious of science as something that came from 'outside'. One government minister even used the phrase *odao se nauči* (hooked on science), to derogatorily describe the zealously with which scientists attempted to secure resources for conducting research, and to describe their passion for them. The phrase *odao se nauči* is powerful and evocative in its implications. Yet Aleksić went much further in describing the anti-scientific positionings of the Milošević government in an interview. 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 (1998, p.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 at Vinča, this infamous one which was cut off two years ago finally, 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 this 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 million euros which is really big for any western country but huge for Serbia.

When discussing recent events with these Professors, a slippage between the categories of nationalists, *primitivi*, and even communist ideologues who endorsed ‘pseudo-scientific’ or ‘politically inspired megaprojects’ was present. 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

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53 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.”

54 An accelerator accelerates sub-atomic particles at very high speeds in order that they split into more fundamental particles. As such, knowledge about fundamental building blocks of the material universe can be gleaned from an analysis of the particle collisions.
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, there is a lot of this process 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. Advocates of socialist and nationalist views during the post-socialist period had common ground in a distrust of foreign influence ('outside'), an anti-imperialist thrust and a politics based on kinds of solidarity rather than stressing individuality. The former communist party member and public anti-nationalist intellectual Perović (2000) argued that, in the face of the loss of legitimacy of socialism, which was ultimately a modernising project, many of the more ideologically inclined members of the communist party had a crisis of faith and so turned to nationalist positions stressing the importance of local traditions in what she termed a “flight from modernity”. The speed-up associated with Post-Fordist capitalism and the role of technology in facilitating that speed-up may also have led to a wariness surrounding certain new technologies. Technologies such as the internet, for example, allow the spread of knowledge in a decentralised manner, which could challenge governments’ authority to provide an unchallenged account of many events. Researchers recounted for example, the difficulties of gaining access to an internet connection during the early nineties, one suggesting that there was only one link available, via Greece. As one Professor close to Aleksić commented in an interview:

Serbia was not part of the internet so we couldn't communicate. There was only one, you can check this somewhere, I don't know where, there was only one route from Greece, some sort of semi-illegal connection between Greece and Belgrade. We couldn't even send emails. Only this channel was open.

Whilst sending emails in the late nineties was a common practice for academics all over Europe and the USA, it was not so established in the early nineties, suggesting he may have been overstressing the severity of the situation. Other researchers with whom I spoke argued that funding was low, but there was certainly no negative stance taken towards the
natural sciences. One Professor, Prof. Jokić, 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. 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, Matic. 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.

He also 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. The contributions of science however, were understood 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 asynchronous 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.

He 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 Matic 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 independence 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.

Despite his emphasis on these ideals, Prof. Matić didn't make the same slippages between the categories of nationalists, ‘primitives’ (primitivi) and communist ideologues that Aleksić made. Prof. Matić also invoked a language of 'resistance' and 'struggle' that resonated with terms often used by Marxists. For example, when discussing the effects of the sanctions on collaborations with scientists in Bulgaria and Romania, he commented:

Matić: I think our Romanian friends were afraid of political consequences. We organized four Serbia-Romania Astronomical Meetings, and the fifth should have been organised by our Romanian colleagues but it was never organised.

Andrew: What do you mean when you say they were afraid of the political consequences?

Matić: Simply because they wanted to enter into Europe, into NATO (North Atlantic Treaty Organisation). But for example we had Bulgarian colleagues, who were not afraid of this, the colleagues who organised these were under very intense political pressure to stop but they resisted.

Andrew: But…and so, are there still collaborations with Bulgaria?

Matić: Excellent.

Andrew: And they've not been affected by Bulgaria’s wanting to be a part of the European Union?

Matić: No. No, because astronomers resisted to the pressure. In Romania, there was also pressure, but they were afraid of this.

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 people maybe near the top of Professors of theology etcetera, mostly their educational structure is very bad.

Despite attacks on the scientific literacy of certain politicians and the insinuation of anti-science positionings 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 informant, Ćukić, 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 Professors, 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).

(vii) After the fifth of October

To conclude this chapter, I will now mention certain changes which have taken place in Belgrade and Zagreb over the past decade, relating them to narratives of the current situation with which researchers presented me. Milošević's rule came to an end on the fifth 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, cited in Vukomanović (2008, pp.15–18) 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 Koštunica and enacted in a series of laws regarding non-pluralistic religious education in schools. As Aleksov (2004, p.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., p.355). Occasionally the two options are also sometimes played against one another rather than being viewed as compatible (ibid., p.354).

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 from both Belgrade and Novi Sad. 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. 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’.

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.

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55 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.

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

57 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.

58 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.
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 Pešanik.net, a website where many intellectuals who opposed the Milošević government wrote during the nineties, that:

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.  

This resulted both in a public outcry and a denunciation by the scientific establishment.  

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. An astronomy lecturer from the University of Novi Sad recounted the event as follows:

It's August 11th 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 population 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.  

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 a flashy building in Novi Beograd (New Belgrade) built with funds given by an agreement from the

59Online version available, but not listed to protect anonymity. Contact me for a copy of the text.
European Investment Bank, with the promise of promoting a ‘knowledge economy’ in Serbia.

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.

(viii) Conclusions

Throughout this chapter, I have discussed the narratives scientists presented me with charting the trajectory of the natural sciences over the past twenty years, focusing on ‘national’ post-Yugoslav hegemonies established. In all discussion and debate there needs to be some kind of unspoken agreement regarding the terms in which the debate is understood. Certain unspoken assumptions must be black-boxed in order to get work done by all except perhaps activists working on political projects which seek to challenge them. This black-boxing reflects those particular hegemonies in place. Indeed, the differences in opinion regarding the existence of a Yugoslav ‘we’ reflected a post-socialist hegemony achieved in part by the democratic changes. This hegemony also intensified a process of production of hierarchical new ‘national’ political units, based around relative claims to Europeanness contrasted with an Orientalised Balkan ‘other’. As Bakić-Hayden (1995, p.924) described, ‘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.’

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 Glick Schiller 2002, p.302). As such, it concerns the analytic deployment of the concept, a deployment overwhelmingly present in policy literature, 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

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63 See http://www.epn.rs/o-centru/?lang=lat [accessed on 8/3/12].
64 See, for example Prpić (2011), which naturalises a 'Croatian' frame for discussion of public understanding of science.
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’.

In the final section of the chapter, probing narratives of an ‘anti-science’ discourse supposedly present in the Milošević government, discussion moved away from established intra-state hegemonies towards the political attempts of certain groupings to establish a potential new hegemony based on what they presented to me as a ‘definitive account’ of the situation. These differences in opinion reflected different concepts of value mobilised and changing amongst different groupings of researchers. This led to vitriolic encounters on occasion, and of course, the forming of alliances with other like-minded researchers. This was particularly pertinent in the crisis situation; for crisis situations often lead to increased politicisation, where taken for granted assumptions rendering a previous social reality are opened up. 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 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, p.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 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

(i) Introduction: the trip
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, Prof. Marić, who lived, and continues to live onsite at the observatory. 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 entailed a cost of 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 PhD 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. The tour guide was an anglophile and attempted to start a conversation with me about the Royal Family at several points throughout the trip, a feat which tried my ethnographic patience, and she had an admiration for Prague and Vienna as important cities in the Austro-Hungarian Empire.

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. Part of the observatory had been converted into a museum, a process which has now also occurred in Belgrade, as much of the equipment on site is now redundant; most data at present is obtained via internet sources which draw on a small number of powerful telescopes. According to Prof. Marić, there had been queries from members of the public in Belgrade who were keen to look round and a museum was also planned to open (and opened in May.
at the observatory in Belgrade. Prof. Marić, who had a talent for managing reži, 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’.

First we visited the exhibition and 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. The library was equipped with well-known journals such as Science and Nature to which the Belgrade observatory does not subscribe. These 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 being what we should ‘expect’ of the Belgrade Observatory if the EU accession process continued; overall people were impressed with the observatory and its facilities.

In Vienna, some Professors had a notional plan to visit the observatory, but time constraints meant that it wasn’t possible, as we had other tourist activities booked for the one full day for which we were there. A small number of people were keen to visit this observatory despite the lack of time, and they were jokingly referred to as geeks (štäberi). Upon arriving at the hotel, I noticed that Milan, the secretary, a friendly and highly eccentric person, felt visibly uncomfortable. The hotel we stayed in was large and had a corporate feel and lack of personality. On the door in the room where we stayed a ‘price list’ had been written. Milan made a point out of the fact that the official price for the room was 359 euros per night. This was evidence that Vienna, for him, was definitely ‘Western Europe’ rather than Prague, which was not. ‘Jebena Zapadna Europa’ (fucking Western Europe) he murmured under his breath.

At this point we found a plastic bag and an elastic band to cover the smoke alarm. Jelena, the director’s daughter, got out her portable kettle and made Nes (Nescafe instant coffee)

69I had hoped to investigate this process ethnographically, but was unable as the date for the opening of the museum was repeatedly pushed back, in the end taking place in May 2010 around nine months after I had left Belgrade. See http://www.b92.net/zivot/nauka.php?yyyy=2010&mm=03&dd=29&nav_id=421013 [accessed on 11/3/12] for more details.
and we all relaxed and smoked a cigarette. Many of the people on the trip brought snacks, sandwiches, juice and coffee with them, which we often ate in the hotel rooms, although we bought food from supermarkets in Prague and Vienna as well. Following the cigarette break, Milan and Jelena went to get some food from a supermarket. When they returned, Milan was visibly upset. Apparently, his debit card had not been accepted in the supermarket and he was unable to pay. This was an uncomfortable experience as there was a large queue of people behind him. This seemed to be the excuse he wanted to detest Vienna, and by proxy Western Europe, for this was his first visit to what he designated Western Europe. His disgruntled feelings were later further exacerbated all the more by our tour guide’s snobby delight in being in Vienna, which she described as the centre of a ‘great civilisation’. As she gave us a tour of the city in our bus, with a focus on showing us all the five star hotels and the most ‘exclusive places’ peppered with references to the sexual exploits of the Viennese Bourgeoisie, the secretary ripped up a paper handkerchief and stuffed it in his ears to block out the sound, saying that he didn’t want to hear this rubbish as it was like a španska serija (Spanish soap opera). Shortly after, we left the minibus and embarked on a walking tour through the centre. We passed some horses and the guide mentioned to me how they were the same breed as Princess Margaret’s horses had been[^66], a cue for me and several of the others to depart, enjoying some time alone before we piled back into the minibus towards Belgrade.

(ii) 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 tradition, in a particular form promoted by the EU. This form, 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 (Dunn 2004), nor as a 'culture' (Comaroff 2001), but as a series of economic processes with accompanying new modes of governmentality (Foucault 2004), which, as a political reaction to the debt crisis resulted in, following Wacquant (2012), the 'remaking and redeployment of the state as the core agency that actively fabricates the subjectivities, social relations and collective representations suited to

[^66]: Princess Margaret died in 2002. See [http://news.bbc.co.uk/1/hi/uk/1810760.stm](http://news.bbc.co.uk/1/hi/uk/1810760.stm) [accessed on 11/3/12].
making the fiction of markets real and consequential'' (Wacquant 2012, p.68). However, as we shall see, the establishment of new modes of governmentality does not necessarily occur alongside neoliberal economic reforms.

The 1970s crisis resulted in a political shift towards flexible accumulation, a mode of accumulation which Harvey argued was

characterized by the emergence of entirely new sectors of production, new ways of providing financial services, new markets, and, above all, greatly intensified rates of commercial, technological, and organizational innovation. It has entrained rapid shifts in the patterning of uneven development, both between sectors and between geographical regions, giving rise, for example, to a vast surge in so-called 'service-sector' employment as well as to entirely new industrial ensembles in hitherto underdeveloped regions (Harvey 1991, p.147).

Key to understanding the emphasis on knowledge production and scientific innovation is the fact that flexible accumulation required ‘greatly intensified rates of commercial, technological, and organizational innovation’ (ibid., p.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., p.156). These changes had a direct impact on policy and strategy making by states in the EEC (European Economic Community) - later known as the EU after 1992 - following the collapse of the Soviet Union at the turn of the nineties. As earlier mentioned, following the collapse of socialism, the EEC hoped to expand with the goal of creating new markets in zones which were formerly part of the Soviet Bloc or SFRY. The common market emphasis in EU policy meant that aspiring EU candidate states were forcefully induced to embrace post-Fordist principles, although the desire for expansion was influenced by the stability of political and economic conditions in the various post-Socialist regions.

How and when did neoliberal reforms reach Serbia and what impact did they have on scientists? As earlier discussed, in 1989 the prime minister 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, p.96–97). He was informed by the US economist Jeffrey Sachs, one of the leading ideologues of neoliberalism. However, the reforms were barely enacted and whilst Milošević’s government paid lip-service to
privatisation processes during the nineties, the embargo situation was hardly conducive to foreign investment and the crisis and war fought in other regions of former Yugoslavia meant that structural adjustment reforms were hardly at the top of the government’s list of priorities. By the turn of the millennium, when Milošević’s government rule ended and ‘democratic transition’ took place in October 2000, less than ten per cent of public capital had been privatised (Begović et al 2000, p.8), and of those firms that were privatised, private monopolies were often established as members of the former Communist party sold off state enterprises to their friends. The privatisation of state enterprises took place in a series of rounds, its success also being determined by the ability of the firms to attract investors. This means that the process occurred in a drip-fed form, especially so in Serbia where the impact of war and sanctions meant that conditions were deemed too unstable by many firms for investment, particularly during the nineties and first few years of the new millennium. Whilst the privatisation process had been completed for many more firms by the time I conducted fieldwork, as concerns the scientists with whom I worked, the institute was state funded and private investment was only significantly visible in the sponsorship of the science fair (Festival nauke), possibilities for applying for certain kinds of funding and projects promoted abroad encouraged by the private sector, and the promotion of the activities of centres for schoolchildren to work on scientific projects (Petnica).  

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 1991, p.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 obvious increased amount of funding that the observatory

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near Prague received suggested, given the aforementioned details of the historical context, that steps had been taken there to pursue this particular competitive ‘knowledge economy’ paradigm and 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’, as earlier mentioned, privatization of public capital increased although Serbia was not announced as a potential candidate for EU accession until later, in 2003. As concerns apparent opportunities available to scientists through EU membership, visible on the trip to the observatory near Prague, there was also a distaste experienced by some at that time, due to a sense of nadziranje (monitoring); manifested through what Greenberg (2010) referred to as a ‘judging Western gaze’. I, an academic having grown up in a Western European (UK) tradition, was sometimes understood, especially upon arrival, as representing that judging gaze, and on occasion even UK foreign policy, for some scientists at the observatory. Differences such as the preferential visa treatment I received on the trip also set me apart from the scientists.68 This leads us to the question of 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 the backdrop of recent conflict, isolation and political change.

(iii) 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. This did not only occur on the trip – the idiom of ‘the scientific community’ frequently emerged in interviews as well. The ideal also had a historical precedent throughout Europe in discussions of a cosmopolitan Republic of Letters, consisting of frequent written exchanges between intellectuals in different cities. The ideal was at its peak, as the historian of science

68 See Jansen (2009) for a discussion of visa regimes.
Daston (1991, p.368) described, from 1660 to 1789. 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’ sense, whereby a small ‘Croatian’ or ‘Serbian’ national community was often pitted against much larger groupings, such as ‘Europe’ or the ‘West’. Comparisons were sometimes also drawn with larger national groupings with specific agendas; ‘Germany’ was said to often side with ‘Croatia’, and the UK to often side with ‘Serbia’.69

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[1983], p.7) used the term, to denote a sense of ‘deep horizontal comradeship’ across non-contiguous areas of space-time. Such a term contrasts sharply with the ‘traditional’ definition as an emergent social dynamic characteristic of small scale, face-to-face environments in terms of which Tönnies (2011[1887]) and Durkheim (1984[1893]) understood the concept. Examples of solidarity amongst members of the scientific community abounded throughout the interviews. For example, shortly after

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69This 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.
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 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, as we know, in Serbia this had been a period of both sanctions and relative isolation. The director 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 and Montenegro. 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. 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 and updating me every day. 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, p.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, Prof. Matić made this connection explicit in my interview with him. 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 intention was that the shared occupational focus would override political concerns, as was 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 I consider as anthropological common sense, that where there are people, there are politics.70 As such, it is worth probing the concept of ‘community’ in more depth, with a focus on understanding how it was mobilised by scientists and for what ends.

70See Candea (2011) for a discussion of this view and a novel account of a space for the 'non-political' in the anthropology of politics.
Several anthropologists have grappled with the concept of community as it underlies, in an important sense, much of the work that they do. Cohen, writing in the Anglo-American tradition, argued that ‘community is a symbolic rather than structural construct’ (Cohen 1985, p.98) and that what defines it is shared meanings. Culture for him is ‘the community as experienced by its members’ (ibid.) which led him to consider questions of ‘identity’ and what it meant to be ‘in’ or ‘out’ of a particular group, citing feelings of belonging to a community as key. Other analysts, such as Lave and Wenger, have focused on re-describing aspects of the social world in terms of ‘communities’, in their case ‘communities of practice’ (Wenger 1998), seeing ‘community’ where it was not seen previously. Whilst their work is interesting, it does not help with the anthropological problem of understanding why the term ‘community’ was mobilised by scientists. Other anthropologists such as Turner (1995) have focused more closely on how ‘community’ emerges through shared experiences. Turner described those liminal moments in which experiences of communion occur, with specific reference to his field experiences studying religious rituals in Northern Rhodesia. He noted that ‘among themselves, neophytes tend to develop an intense comradeship and egalitarianism. Secular distinctions of rank and status disappear or are homogenised’ (ibid., p.95). Such moments, for Turner, can explain the glue which binds people together in a shared situation with ritual aspects. Such an approach is distinct from the more everyday forms of solidarity which Durkheim (1984[1893]) described as ‘mechanical’ and ‘organic’ and as emerging from a more generalised social condition, of face-to-face rural living as compared with city dwelling. Yet, as Letkemann (2002, p.258) argued in a critique particularly relevant to an analysis of the conditions under which the term community is mobilised:

It is inherently problematic to assert a situational absence of socio-structural (in the sense of hierarchical or status) distinctions. Such analyses connect communitas to social contexts in which "the roles and statuses connected with class and gender in the larger society are not operative" (Kemp 1999, p.81) or a "lack of social hierarchy" (Bettis 1996, 116) or context that exists "outside the structure of roles, statuses and positions" (McLaren 1999, 259). Such claims of situational egalitarianism inevitably require qualification.

Whilst Turner’s approach may be key to understanding the attraction felt between people in the face of a common situation in a particular instance, the maintenance of ‘community ties’, particularly over long distances and at a supra-state level, requires something above and beyond communitas, something more quotidian. For Cohen, such belonging is a mental and symbolic construct. Joseph (2002), in her ethnographic study of invocations of community amongst people involved in the running of a gay/lesbian theatre, Rhinoceros, in San Francisco offered a different perspective. Her case study is revealing as, like ‘scientific community’, it concerns invocations of ‘community’ amongst a grouping who had
previously never met, yet who it was supposed had some kind of affinity. Her analysis however, takes case on a sub-state level in a state making liberal, multiculturalist claims and so differences pertaining to these aspects of the context in which she worked will be pointed out. Joseph argued that feelings of communal subjectivity are constituted in and through bodily practices, sidestepping questions of ‘identity’ and ‘group belonging’ on which Cohen’s understanding relied, and which I have earlier argued are highly problematic concepts in the post-Yugoslav context. As Joseph commented:

While identity is often named as the bond among community members, it is a false name in that communal participants are not identical and many of those to whom an identity is attributed do not participate in communal activities. I argue that communal subjectivity is constituted not by identity but rather through practices of production and consumption. (Joseph 2002, p. viii)

Reference to ‘community’ by informants in Joseph’s study served a political purpose, she argued, of maintaining particular inclusions and exclusions, a theme Green (1997) also explored in her study of lesbian feminists’ contestations of identity in London. On Joseph’s view, and implicit in Green’s understanding of how the term ‘community’ was mobilised, ‘community’ is a dangerous word. This is because it defines particular inclusions and exclusions, a conclusion which resonates with my criticism of communitarian theories of knowledge in SSK, as reliant on a recent Anglo-American tradition of stressing culture and identity. Whilst practices are key for Joseph, feelings of belonging may be reflected on a more cognitive level through feelings of being involved in particular traditions.

As Kertzer (1988, p. 76) phrased it, ‘solidarity is produced by people acting together, not by people thinking together’. Consequently, as regards national community, Joseph’s focus on practices would urge us to consider the role of the state. For reference to ‘the scientific community’, this would be bound up with disciplinary training, which in turn creates certain tensions.

(iv) Tensions
The view of the ‘scientific community’ as above or outside of political processes is evidently false, as the following examples make clear. First, we encountered several differences at the observatory in Prague and on the trip more generally, which were expressly 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

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71 This view of the centrality of practice has much in common with Heidegger's view in *Being and Time* (Heidegger 1978 [1927]), yet rejects the idealism and implicitly nationalist views with which he is often associated.
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 (2005) 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., p.3). This was manifest on the trip through numerous practices, such as choosing to take ‘home’ or 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, as EU directives demanded, and about which members of our group complained. References such as the *španske serije*, which commanded a large popularity in Belgrade, also pointed out aspects of this intimacy. 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 and as such, could also lead to political conflict, upon realisation that different ‘national’ groupings had different expectations 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*\(^2\) and the series of conferences titled *Development of Astronomy among Serbs*\(^3\) are testament to this view. Furthermore, in the case of former Yugoslavia, this perceived cultural belonging was a concern unlike in Traweek’s study. There were very few ‘Croatian’ scientists working in Belgrade and very few ‘Serbian’ scientists in Zagreb. For instance, one Professor who I interviewed in Zagreb had a recognisably Macedonian surname. He related how he 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\(^4\). Additionally, whilst at the observatory in Belgrade, a female 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

\(^2\)See [http://saj.matf.bg.ac.rs/](http://saj.matf.bg.ac.rs/) [accessed on 9/1/12].  
\(^3\)See [http://aquila.skyarchive.org/6_DAAS/html/index-e.html](http://aquila.skyarchive.org/6_DAAS/html/index-e.html) [accessed on 9/1/12].  
\(^4\)In Croatian: *Hrvatska Akademija Znanosti i Umjetnosti*.  

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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. Finally a PhD student recounted to me how a scientific meeting had been organised in Bosnia and Herzegovina. The meeting took place at a hotel in which the conference organisers, who identified as Serbs slept. Attendees who identified as Bosnian Muslims 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’. If the reality was that political differences could not be removed from interactions between scientists, then why did many scientists invoke ‘the scientific community’ as an ideal?

Joseph’s research suggested that ‘capitalism, and more generally modernity, depend on and generate the discourse of community to legitimate social hierarchies’ (ibid., p.viii) and 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. Rhetoric of community is a means through which particular inclusions and exclusions are defined, which are necessary for scientists both to travel and thus direct access to resources in relatively far-off locations, which will enable scientists, as we shall see, 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 a commonality, which can only be maintained through drawing on a roughly equivalent set of practices. This 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’**

Maintaining communal subjectivity, from the perspective of scientists, as a legitimate member of ‘the scientific community’ requires maintaining links with state-of-the-art techniques. As Hoskin and Gingerich surmised in their 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 and Gingerich 1999, p.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 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’ (Grujic 1999, p.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 1991, p.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., p.284).

Time-space compressing technologies are also central to understanding disciplinary 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 and Gingerich 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 and Gingerich 1999, p.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., p.309). 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.

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 site in Prague into a museum, for the telescopes were now obsolete, as many were in Belgrade, yet at the same time expensive to maintain.

Image four: Radio telescopes on site at the observatory

The condition of playing technological catch-up constituted an important dimension of what Blagojević (2010) described as the semiperiphery, 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’

75 I am not suggesting here a technological determinist argument, that practices were/are determined by new technologies. They were however, shaped in an important way by the new technologies, and equally new forms of organisation that were developed surrounding them, and to have continued input into disciplinary discussion meant that astrophysicists had to, more or less, keep up with the state-of-the-art.

76 Image available online at http://www.aob.rs/old/index.html [accessed on 19/3/12].
modernisation. This condition, a fact of the current historical moment, is according to Blagojević (ibid., p.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’ in place, to use Strathern’s (2000) phrase. 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’, I argue that the use of the phrase ‘the 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. Prof. Aleksić 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 25th 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.77 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

77See Jankovic (2004) for a historical account of a semi-peripheral niche in meteorology.
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 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.

**(vi) Credit and credibility**

The different positions of researchers towards this semi-peripheral positioning were related to their career stage, the requirements of the sub-disciplines in which they were engaged, and their political views. One researcher whispered to me that some of the older Professors were not very computer literate and so they were, in his opinion, phoney, stealing results from PhD students to add to their credit. Some researchers had extensive media engagements, either in addition to, or in some circumstances, instead of, strong collaborations with other scientists, including from ‘outside’ (abroad). In contrast to rhetoric of ‘the scientific community’ as a supranational community which concerned openness and welcoming directed towards all scientists, and a willingness to visit them, in practice have already seen that different scientists had different political engagements, and invested their time in different kinds of collaborations. Some scientists engaged in lengthy collaborations with scientists in other states and were keen to emulate state-of-the-art practices from the ‘West’. Others were more cautious towards new fashions in research and/or were more focused on gaining a reputation in the relatively small worlds of national/regional research communities and/or the public through extensive media engagements. This was particularly pronounced in Serbia, where the ‘West’ or ‘centre’ was associated with sanctions and the NATO airstrikes, a context which intensified opposition on the part of some scientists to innovations of policies associated with the ‘West’, thus drawing out the political cleavages we saw in chapter two more intensely.

This leads us on to consider questions of what it meant for a scientist to be regarded as credible, which draws us towards questions of how credit and credibility are accrued. There is already a substantial literature theorising relations between scientists in this vein. Models underlying the dynamics of scientific activity have been proposed, from pre-capitalist gift exchange (Hagstrom 1975) to more capitalist models based around the accumulation of intellectual, cultural and social capital (Bourdieu 1990).

Latour and Woolgar’s description in *Laboratory Life* (1986) is especially interesting for the purposes of a focus on credit and credibility. 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., p.190).

The quasi-economic account which Latour and Woolgar gave is based on an analogy with scientists as investors, as would-be shareholders in an activity which produces what they term credit. By credit they refer to a system of acknowledgement (getting credit for something), which reproduces itself as scientists build up, through their various engagements, credibility, in the sense of 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 a cycle of credibility. As Latour and Woolgar 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 speed up the credibility cycle as a whole. (ibid., p.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. This need to initiate a cycle of credibility 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 - a precedent set in the SFRY. The consequence was that there was less need to initiate a cycle of credibility. 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. This contrasted with (expected) relative stability in Serbia and Croatia with employment guaranteed and relatively less mobility offering other dynamics. In 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, p.208).

On their view, the entry point for scientists into the world of accumulating credit was symbolised by the CV. In the CV, 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 the desire for 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. In addition to publishing in ‘local’ 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

78 [http://www.shanghairanking.com/](http://www.shanghairanking.com/) [accessed on 19/10/12].
greater detail in chapter four. 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.

A 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 caused some scientists to complain of the ‘excessive bureaucracy’ associated with the project, and one member of administrative staff 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.79 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, p.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

79 In 2008 it was approximately 18.8%. See [http://www.indexmundi.com/serbia/unemployment_rate.html](http://www.indexmundi.com/serbia/unemployment_rate.html) [accessed on 1/2/12].
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). Hayden argued that

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

Furthermore, Knorr-Cetina 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, p.114). Whilst I think Knorr-Cetina correctly identified that economic definitions of humans are simplistic and inadequate, it is important to also emphasise that economic models and their advocates must be taken seriously. This is because the ideas advocates of such models promote have an influence on how large numbers of people behave on a daily basis. We have seen this in relation to the dependence of astrophysics on changing technologies made possible by the conditions under which scientists have been operating. Hence it makes sense to take economic models and conditions seriously. 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, and which are open to constant revision in light of political changes. As such, they have what Gregory (2007, p.5) referred to as a ‘planned obsolescence’.

(vii) Scientists as ‘scouts’

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 legacy of the SFRY. Despite policy attempts to create a knowledge economy, perhaps 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, as earlier mentioned via reference to Woodward (1995), 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 particularly well. I spoke briefly about these issues in an interview with a man named Geoff Wilkinson, with whom Prof. Aleksić had put me in touch. Geoff was a retired scientist from the UK, who now lived in Belgrade. Prof. Aleksić 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, which 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 complained about the lack of communication and the difficulty he had had obtaining basic documents, such as the Serbian Strategy for Science, off other politicians there. 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 at that time few scientists in Serbia were applying for. Geoff’s tone throughout my meeting with him was one of frustration. 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.

A different metaphor is thus necessary to examine the dynamics of employed life for such scientists, rather than the ‘scientist as investor’ metaphor which Latour and Woolgar employed. One key similarity spanning the former socialist states, and marking out of a difference with Western Europe was the existence of a centre of power which exclusively exerted a direct and sometimes restrictive political influence on actors. This contrasts with the often relatively indirect and more chaotic effects of economic influences common in Western Europe, in addition to central government. Two other important similarities spanning socialist states included a relative stability of positions in scientific institutions
(and workplaces more generally), and a relative scarcity of resources. This 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. 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, p.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 depending on one’s везе; in other words, one’s ability to convince members of the party bureaucracy that a particular project or resource was worth investing in. For example, I questioned Prof. Jokić regarding the government’s stance towards promoting science during the nineties. He made the following comment:

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 has a clear focus on a need to illustrate to central government that an investment would produce some kind of positive results for society although, yet it seems that here a slippage had already occurred between something being good for ‘the economy’ and for society. For scientists working in contexts with a strong state socialist legacy, such as Belgrade over the past twenty years, there was no sense of urgency or a drive to initiate a cycle of credit. When positions at institutes were typically for life, there was little need to demonstrate effectiveness in doing ones job 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 power over the setting of a research agenda.

Rather than describing scientists as investors then, 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 failed to arrive in a significant sense. In describing scientists as scouts, I am suggesting that they actively and innovatively pursued
the relevant resources, \(\text{veze}\), 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 find a cosy position of prestige in the state bureaucracy. 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 \(\text{veze}\) in Western European scientific environments.

Before we move on, it must be noted that the above description offers an understanding based on the conceptualisation of ‘the system’ as a self-contained body, which, as Knorr-Cetina rightly pointed out, has the potential to fall into a functionalist trap. The ability to accumulate \(\text{veze}\) was more important if one focused one’s career on an ‘internal’ public, and due to Western markets being relatively flooded with resources, it may have been relatively difficult, without extensive collaboration, to initiate cycles of credibility outside without emigrating. However, accumulating \(\text{veze}\) in the first instance may have been important if one wished to gain the necessary resources to emigrate. In the post-socialist climate, this situation has changed substantially, with different scientists clearly pursuing different strategies, some promoting openly closer links and political affinities with ‘the West’, whilst others remaining sceptical towards such alliances. Comprehending the changes, as we shall see, depends on scientists’ understandings of the audiences with whom they chose to engage.

(viii) 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 & Sporer (2002, p.86) described, 'the socialist nomenclature converted political capital into economic capital by using their connections and control of resources'. One's ability to manage vezé and control of resources, including intellectual property, thus affected and continues to affect the security of one’s position. The following experience of a researcher attempting to set up an astrophysics program in Split after having spent several years studying and researching in the USA makes this clear:

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 županiya (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 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 Minister 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, ‘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 cosy positions 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. As such, the socialist legacy created a need for people to find such a fixed space in the bureaucracy from which they can ‘scout’; as the above scientist termed it, ‘you have to find your niche’. 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 to the natural sciences, as particular results were dependent on material resources needed to conduct experiments, which I suggest was less the case in human sciences which relied less on such specialist equipment. 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, 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.

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 mentioned could be hard to procure. Regarding communications problems, I can also recount numerous examples of suspicion. For instance, when I suggested undertaking historical work in the Nikola Tesla Museum, an academic colleague, Joksimović, said to me that I would have difficulty gaining access without vezé as people may think I was attempting to steal some of Tesla’s ideas. Also, 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 PhD students to take the credit for themselves. Such suspicions also created a distrust or lack of will to engage with new forms of bureaucracy, such as FP7, understood by some as imposed from abroad. As Geoff 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.

His comment that there was a core of scientists who were committed to FP7 collaboration is interesting, for it suggests some scientists more than others were interested in engaging with the dynamics of closer EU collaborations than others. With this in mind, we will now return to Latour and Woolgar’s analysis of credibility. Different career strategies and political positioning thus implied, I contend, different audiences for one’s work, a claim I will now examine through considering strategies of CV presentation.

(ix) Curriculum Vitae

The CVs of various researchers and some doctoral students working at the Belgrade Astronomical Observatory are available online. See [http://www.aob.rs/old/index.html](http://www.aob.rs/old/index.html) [accessed on 1/2/12].
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 openly references a very particular audience, which is here conceived as referring to, at its most narrow, a national research community of ‘Serbian’ scientists, whilst at its most broad the (literate) ‘nation’. 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, basic personal and contact details, a list of research interests, publications and language skills. There is no standardised ordering to this information, and interestingly, several start with a small statement about a life history, for example

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

The quality of English varies from a high intermediate level, to an extremely high level of competence with personalised stylistic features which show clear evidence of having lived for an extended period in an English speaking environment.

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 Professor has a series of webpages written in extremely high quality English with a ‘gentlemanly’ feel. There is a picture of the Professor 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 a 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 her work, and offer a hint of the traditions
with which the author associates herself. They clearly reference an audience outside the confines of ‘Serbian’ academia and are highly accessible to interested and intelligent 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 a more pragmatic goal of allowing the audience (presumably conceived as other scientists, aspiring scientists, possible media contacts, and institutes looking to award paid positions to ‘excellent’ researchers) to identify areas of common ground, and on the basis of such common ground, perhaps initiate contact.

The different audiences which different members of staff had in mind 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 (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 viewed pragmatically, but where Serbian/Croatian may be used, then 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 will 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. For example every two weeks Aleksić organised a meeting with PhD 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 (to my knowledge) 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 an English speaker present, for them to present in English. From my perspective, I was more than happy for the meeting to take place in Serbian, as it was useful for me to improve my language skills, and these were crucial to completing fieldwork. I also didn't want others to feel inconvenienced by my presence, as preparing a complex presentation in a foreign language is considerably more difficult than preparing one in a language known from childhood. Some of the students were a little annoyed by having to speak English, as it made it more difficult for them to explain points clearly. Other students felt much more comfortable speaking English than others, perhaps 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 chatted 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, as I hadn't been that day. He commented, “why do they insist on us speaking English in the seminars? We are all Serbs”. The use of English, besides being at that point pragmatic for academic conferences, had a political dimension to its use, and that dimension related to particular audiences which certain researchers had for their work more than others.

(x)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. The meaning of that credibility depended on the audiences that they were trying to impress, and this expressed itself explicitly in the different political orientations of scientists, to collaboration, the use of English and so forth. However, to an extent at the time of writing, and increasingly so scientists were being 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 the ‘knowledge economy’ sought an explicit engagement with it, and more keenly enrolled in FP7 applications and so forth.
I have also argued that rhetoric of belonging to ‘the scientific community’ is a powerful tool which scientists invoked to signal a desire to keep up with state-of-the-art practices in a context of relative isolation and, in the case of Serbia, sanctions during the war period. I have explicitly related those changes in practices to the context of Post-Fordist technological and organisational innovations and argued that, despite the need, or rather coercion to ‘keep up’, different scientists had different views concerning the politics surrounding those changes and consequently chose to engage, in their work, with different imagined audiences. This suggests the importance of focusing on what I shall term different ‘value fields’. By ‘value field’, I mean a field in which particular scientists, by virtue of their practical activities and engagements, conceive of their actions and what they do as valuable, with a particular audience in mind. This is similar to Graeber’s comment, taken from a theoretical discussion of various theories of value and their histories in anthropology; “if for the actor, “society” is simply the audience one would like to impress, for the analyst, it is all those actions that have gone into making it possible for that actor to make that impression that have thus, in effect, produced the value realized in this way” (Graeber 2002, p.78). This is not necessarily a dramaturgical understanding of social relations in the vein of Goffman (2002[1959]). For Goffman, human actions are in a significant sense produced by, or are a dramatic effect of one’s audience. On the above view however, from the actor’s perspectives, in my case scientists, actions occur with audience(s), or what I would refer to as particular value field(s) in mind. However, from an analytical perspective, we would want to understand how key institutions, policy and the actions of influential elites organise the social world in such a manner that makes certain kinds of audiences (such as ‘nationally’ defined audiences) possible. This warrants a focus on the particular people who make particular kinds of value fields possible. Thus, throughout the remainder of the thesis I shall explore how groups of people, working in different institutions, ranging from the Ministry for Science and Technological Development to the World Bank, exerted an influence in shaping value fields upon which different scientists had to take a position. One ethnographic route into such an analysis is to look at particular hierarchies I came across in my dealings with scientists and so it is to this topic that we now turn.
Chapter four: hierarchy and academia

(i) Introduction: three relationships
In this chapter, I examine ethnographically three kinds of relationships I encountered in my dealings with scientists in Belgrade. In so doing I offer, inducting on the basis of my experiences, a route into a discussion of how various hierarchies operate in academia. On the basis of further induction, I suggest that several of the conclusions apply more widely to the Serbian state context and some to the Croatian as well, on the basis of an SFRY heritage, which I assume exists.82

The first relationship concerns how I related to and was treated by scientists; in particular I focus on the expectations they had of me, and assumptions they made about me. In the first section of this chapter I focus on such dynamics present in ‘first meetings’ I had with scientists to better understand implied hierarchies present. In so doing, I hope to get a grasp on how I and the people with whom I worked placed themselves, and just as frequently were placed by others comments and practices, into a broader set of historical processes. The second kind of relationship concerns those between various scientists in academia, and especially at the observatory. I examine these relations through an analysis of the various stages in a scientific career at present, beginning with university and then considering strategies which scientists used to advance their careers at institutions. 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 (2010) termed the ‘semiperiphery’. Finally, the third kind of relationship I analyse is that between academics and a wider audience which may be termed ‘the public’.83

In this chapter, I focus on this relationship as manifest in a public duel between two scientists, which flagged up the issues of credibility and audience as discussed in the previous chapter. In the final two chapters, I take this third relationship much further in considering both attempts to fashion new kinds of ‘publics’ and audiences for science, and also the impact of historical precedents in the region in shaping modes of representation of science and scientists.

82 This may be a controversial assumption for some – see the section on discursive hegemonies in chapter one.
83 I examine the concept of ‘the public’ in chapter five.
(ii) 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. First meetings are particularly interesting because they 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, yet although packed with meaning, such meetings were relatively superficial. In my fieldwork, 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 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.

The first of such introductory meetings I had took place several months before fieldwork ‘officially’ commenced, when I visited Belgrade to organise a location for my project. I visited the first institute with a colleague, Joksimović, an academic from Serbia who knew the director, who was an elderly gentleman and highly regarded. I knew Joksimović from the University of Manchester, for he had supervised a dissertation I had written there, and was enthusiastic about a possible project being completed which focused on scientific institutions in Serbia. Joksimović had suggested I print off a number of academic business cards to hand to other researchers I came into contact with in Belgrade. He remarked that collaborations were typically founded on the basis of face-to-face interactions, rather than at a distance. Indeed, all 'first meetings' I had with people at institutes were organized through colleagues, in other words, 'someone who knows someone else'. Not once did I arrange a meeting beforehand with a person unknown to me by email.

The first institute I visited was located on the banks of the river Danube. I met Joksimović outside the main building and we entered together, telling the porter we had a meeting with the director. 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. He was interested in the project and was keen for me to be
there, as there were not many visitors from abroad and he placed a value on the importance of an 'intellectual' exchange with researchers from other places. He stressed that this was particularly the case 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. He said we would have to go and discuss the fine details with the management team, so we organised a meeting with them. They were also keen for me to visit, but brought up the issue of ‘bench fees’. Bench fees referred to a one off fee paid to the management 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! Throughout the meeting with management, and particularly after that comment, I felt uncomfortable. Upon leaving the institute, Joksimović was fuming regarding their comments. Typical, he said, they assume that someone from the West will have lots of money and they want a cut. At that point, I thought about other possible institutes at which I might be able to work.

My first contact with the observatory took place shortly after the meeting described above when I first met Prof. Aleksić, an acquaintance of Joksimović. We met in Belgrade city centre. The tone was casual and he was both open and very friendly. He was wearing an Oxford University Sweatshirt with the logo and words emblazoned clearly, for he had studied there. Interestingly, when I interviewed another physicist in Zagreb, he also wore an Oxford University Sweatshirt to the meeting, and had similar ‘pro-West’ political leanings to Aleksić. 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 a kind of exchange, whereby a role was created for me at the observatory. The intention was that I could help students with philosophical questions they might come across in their research and experimental design. This was deemed appropriate as part of my academic background had been in the Anglo-American philosophical tradition, the approach of which has a broad affinity with approaches often taken in the hard natural sciences, with an emphasis on concise clear
writing, a perceived objectivism and breaking down of complicated ideas into logical elements. 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, 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 visited in the department on a short trip to Zagreb in November 2009. When I moved to Zagreb in September 2010, I had at that point another 'way in' to the department, as I knew some physics students due to their involvement in far left political organising. What was interesting was that through chatting to them, 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 the Professor and said that a researcher from Cambridge University wanted to speak with them. I found that comment embarrassing, as I was no longer a student there. My two student friends told me I should mention it, as Professors would be more willing to talk to me if I mention having studied at Cambridge University. On the students’ view, at first sight, my project would be valued (or not) depending firstly on whether it had an institutional affiliation or not, and secondly on what that institutional affiliation was.

(iii)Global rankings of institutions and ‘national’ groupings
In all of the above accounts, 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. Clearly levels of 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. Impressions of me were also drawn from a wider bank of associations with Manchester, as I self-presented as from the city, for it was the nearest large town to where I grew up. For example, I was asked on an almost daily basis whether I support Manchester United or Manchester City. Manchester was also recognised as having an historical association with the industrial revolution. For example, one evening whilst drinking in a bar in Zagreb with a close friend, a man sitting nearby interrupted our conversation upon hearing my accent and started asking us questions. He was feeling depressed at the time and said it cheered him up a little to hear an Anglo-Saxon person speaking Croatian. He was a veteran from
the war for the Croatian homeland (as it is officially referred to)\textsuperscript{84}, and upon hearing that I was from Manchester, made the comment that that was where ‘the evil’ had begun. I asked him what he meant by that and he replied with the comment ‘the industrial revolution’.

The extent to which people with whom I spoke were interested, and quizzed me on 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 – points of common ground and whether I was a sociable person were more important. It struck me that these particular associations with place, traditions, and particular 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 Trawee (1992, p.110) 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.

Thus we see that despite ideals invoked 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, pp.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

\textsuperscript{84} In Croatian: \textit{domovinski rat}.  

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and language. These institutions had a significant presence in Belgrade, and Zagreb. 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 from ‘outside’ (Serbian - napoj, Croatian - vani, meaning abroad), I found that being taken seriously as a researcher by other researchers relied on having a claim of belonging to a particular higher education establishment which was valued in this hierarchy. When discussing study abroad, the names of such institutions were frequently mentioned in interviews, as the following quote from an interview with Prof. Matić 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. I was involved in projects at University College 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 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. Such a distancing strategy often relied on a distinction between 'good', voluntarist, inclusive, liberal, universalist civic nationalism and a 'bad' ascriptive, exclusive, illiberal, particularist ethnic nationalism (Shulman 2002), manipulated as an orientalising strategy (Said 2003) to distinguish 'Western' nationalisms, whose key exemplars include the USA and France, from

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85 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/](http://www.britishcouncil.org/new/about-us/) [accessed on 10/10/11 at 19:27].

86 This was particularly prominent in the tourist industry (Armenski, Zakić, and Dragin 2009).
dangerous ethnic nationalisms, whose key exemplars include Germany and the states of Central Eastern Europe.\footnote{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.}

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 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.

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. Occasionally in first meetings, both with scientists and with people in the street with whom I didn’t 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, an idea which was also present in other contexts. For example, members of a football fan club in Zagreb with a reputation for being unruly (often referred to as ‘hooligans’ (huligani)) had cleverly spray-painted across a wall, ‘kako vi gledate na nas, tako Europa gleda na vas’ (Europe looks at you in the same way as you look at us). This entailed the view that ‘the Balkans’ was seen as a ‘disordered’ region to be ‘resolved’ by EU policy making, in the same way that huligani were viewed as a ‘disordered’ segment of ‘Croatian’ or ‘Serbian’ society to be resolved. The anthropologist Greenberg (2010) also encountered the theme of surveillance in her fieldwork with NGO activists in Niš and Novi Sad, two large towns in Serbia. Greenberg recounted the reactions of students she experienced in great detail, when she attended an English language class on the invitation of a friend in Niš who had spent some time living in Australia. This friend also often portrayed Greenberg at the meeting as a representative of the USA and the larger world outside Serbia. The conversation turned to the extremely sensitive topic of the 1999 NATO bombings, which had killed a number of civilians in Niš when a bomb landed in the centre of the central open-air market there. One student, Dušan, who had been making negative comments about the USA all evening, burst out with the statement that he had been happy when the World Trade Centre attacks took place, because the USA had ‘got what it deserved’ (ibid., p.42). This led to the teacher attempting to silence Dušan. Greenberg then insisted that he be allowed to voice his anger, at which point another student, Mira, forcefully interjected and argued that Dušan had no right to his anger. She felt this as she believed that people had to accept that it was those who made decisions in politics who were responsible (absolving her and others not engaged in politics of agency), and that everyday people were powerless for it was politicians who were really in control. Consequently she had constructed a moral universe characterised by nonparticipation in political decision making. As Greenberg summed up:
As this example shows, 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 was appealing, even as she attempted to position us as equals in relationship to political powerlessness. (ibid., p.44).

In the case of certain encounters 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’.

(iv) Intellectual property and citation indices
How were such rankings measured in the academic world? Over the ‘transition’ period changing intellectual property legislation and the increasing academic use of ‘citation indices’ have been key to understanding and measuring rankings in new kinds of ways. In the case of Serbia and Croatia, both states signed contracts with World Intellectual Property Organisation (WIPO), and as members of the General Agreement on Tariffs and Trade (GATT), had an established intellectual property system more akin to Western European states than was the case for former Soviet states, making their circumstances unique. Intellectual property is technically available for all astrophysicists to view. Indeed, amongst astrophysicists, I came across the communalist ideal (Merton 1973) that research and data should be available to all scientists.88 Geoff, who as earlier mentioned, worked at the Ministry of Science and Technological Development, supplied me with a copy of the Serbian Strategy for Science, which as earlier mentioned, he had had trouble procuring. The strategy stated:

The knowledge and results of scientific research don't 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.89

This however, was an ideal. Many databases and observations were available to view for free online, whilst others commanded subscription fees. The European Southern Observatory 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.90 For some researchers, forging collaborations with scientists in other states was thus

88 See chapter three.
89 My translation. For a copy of the document, contact me on ajhodges22@gmail.com.
90 Fifteen member states made a total contribution of approximately 131 million euros last year. See http://www.eso.org/public/about-eso.html [accessed on 16/2/12].
important, because whilst working collaboratively, they could gain access to such expensive data.

There was pressure to publish in a small number of highly respected international journals, such as *Astronomy and Astrophysics, Astronomische Nachrichten* and so forth, yet there was a national citation index system as well 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 before moving online in 2001. 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, p.710).

The above account references several problems earlier discussed, and forcefully suggests a national citation index as a solution, for it will be able to make discriminations that matter at that level, which international citation indices do not make. Whilst designed to take place at a ‘national’ level however, the choice to use citation indices was indicative of the increasing imposition of a global, neoliberal value field. As long as the governments continue to promote EU accession, more forceful acceptance of this value field is to be expected, a fact which has drawn criticism, particularly in the human sciences, some methods of which are not easily measurable. For instance, the anthropologist Milenković noted in his sharp critique of the introduction of citation indices in the humanities in Serbia, ‘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, p.39)[my translation]. Indeed, scientists were increasingly encouraged to play a role as ‘experts’ in their respective
disciplines, and as we shall see in chapter five, this process was required as part of a wider trend in promoting ‘public understanding of science’.

The particular geopolitical positioning of the region as what Blagojević (2010) termed the ‘semiperiphery’ is useful in illuminating positionings in and concerning such value fields. As she commented:

…the semiperiphery 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 semiperiphery 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 semiperiphery 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, pp.33–4).

There is a tension between attempting to catch up and investing in the value field produced by the core. On the one hand, the distinct political form of the centre, currently liberal democracy, offers a distance from the recent wars. On the other hand, recognition of the fickleness of geopolitical dominance, or an ambivalence towards the kinds of political collectivities the core currently promotes, lead to attempts to form other alliances or 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, for ‘core’ states such as the USA or the UK work in quite different scholarly traditions. This tension is perhaps exacerbated given the relative large size of the former SFRY and the discourse of Yugoslav exceptionalism, leading to 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 ‘semiperipheral’. 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, p.37).

Such efforts also relate to a feeling that some of the most elite global institutions in fields such as astrophysics maintain the dominance of their central paradigms through their economic power. For example, whilst at the observatory, Prof. Sandić suggested a paper to me, and subsequently a book (Corredoira and Perelman 2008), which argued that the dominant ideas in astrophysics today were not necessarily the closest explanations to 'the truth'. Instead, they were 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 (i.e. intellectual property) 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, a fascinating proposal for further sociological investigation.

(v) 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.\textsuperscript{91} Besides this, there exists in Serbia the Petnica Science Centre, 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, although there is relatively little formal recognition of this in terms of career advancement, which is more focused on the quality and quantity of research produced, as measured through specific indicators, such as publishing in ‘respected’ journals, as earlier discussed.

Whilst studying at university, bright science students have the opportunity to conduct work placements abroad. Ability to find placements and funding depends on students’ results in university exams. Marks are graded from 0-10, 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.

\textsuperscript{91}For Croatia, see http://astronomija.azoo.hr/ [accessed on 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 on 1/3/12].
Such a system should function as a meritocracy. However, as the sociologist Doolan (2009) illustrated with respect to the University of Zagreb, where she conducted a sociological study into factors affecting students’ completion of studies and factors affecting educational opportunities, several discriminations take place. 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 wasn’t an active choice to attend university, as it was for many first generation students. Oral exams also often take place during which discriminations may occur. The following quote from Doolan’s research makes this clear:

Mladen: When you have an oral exam, the teacher opens the index and then looks at which school you came from, where you’re from, sometimes they even comment on what a bad school it is. And of course, they look at how many exams you have passed so far.

K: So, what are your experiences with teachers seeing your index?

Mladen: I feel cut short. Because, some people have passed more exams, for some it says fifteenth grammar school and everyone knows that’s MIOC, so he’s the perfect student whereas I’m not as good because I went to the eleventh grammar school. Some teachers are prejudiced, but it should be the same because we are learning the same content. This secondary school thing is a problem, but then again I chose it myself.

Rebeka: I have a friend in my year group who finished a secondary nursing school and for her physics exam, I think it was the course director, she went to her office hours and she told her ‘you should be lucky you even passed the entrance exam’. I don’t think that’s fair (Doolan, 2009, p.97).

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. 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 spilled 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.

To varying degrees, PhD students were treated in a hierarchical fashion and expected to organise, for example, multiple courses for 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) 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, before a celebration with party snacks and drinks takes place.

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 (2010, p.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 semiperiphery, 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, but who would return 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, I spoke with Vuković who had grown up in France, but who had parents from Serbia. As such, he had spent summer holidays growing up in Serbia and had a reasonable command of the language, meaning that he gave a presentation using 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. Vuković’s aim was to foster collaboration, as the following interview excerpt illustrates:

Vuković: With Serbia, really my idea was to try to 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 a small connection, a bigger connection then maybe a small group, and then in a few years they would develop and they would maybe even enter the European Union economically and politically, but scientifically they would be more involved in Europe. So that’s the idea, but I’m not saying I will bring them the things, 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, to help the people we need some people to work on the data, to work on the science because we are very out of time with our experiments...

Andrew: So what would that collaboration mean in practical terms? Would it mean new, would any other astronomers be coming over [to France]?

Vuković: I would come just maybe like that for lectures, maybe for some conferences. My plan practically would be to develop the topic of solar wave physics from France, the idea would be that the students would get some knowledge, they will come back here then they will train students themselves, and practically the idea is that after some time they would themselves here create and work on solar wind physics and they would try 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, to build some hardware, already we are beginning. They do that because they have, they had in the past, the closer collaboration with the Russian space project, who are also building some hardware. So the Russians were, they have this better collaboration with the Polish than here in Serbia. There was not, there was more collaboration in nuclear physics, devices, experiments and hardware in nuclear physics than in astrophysics or space. So maybe, hopefully the idea is to make them autonomous and be able to work in the same field and to try 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, if you look it’s the same with the Russians, it’s very expensive to build an experiment. It’s expensive to build a big telescope, but it is even more expensive to build 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. If you launch one kilogram into space it is one million Euros so it’s very expensive. For that they would need really big money, but what you can 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 Russia, 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 native 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, pp.28–9).

However, one’s ability to bypass the local political system as much as possible through publication in international journals was restricted since many journals charged hefty subscription fees. Hence, universities in small states such as Serbia and Croatia could not afford to subscribe to as many journals, and thus the same quantity of state-of-the-art research, as larger states. I received requests regularly by students asking if I could procure an article for them, my access to journals theoretically making me a potentially useful veza which I and they could draw on in a process of mutual gift exchange.

(vi)Generational differences

I also found that generational differences were important in shaping my interactions with researchers, and between researchers. Older scientists, typically men, with highly respected positions and a large number of papers to their name treated me differently in such first meetings or interviews. I often found that older male researchers often had a different understanding of my role to younger researchers. I found that younger generation of researchers would listen more carefully to my questions and some, especially at the doctoral/early career level, would ask me why I wanted to interview them, as they didn't 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. I also found that some older Professors also talked about topics outside of their area of expertise. For instance, one professor, Jokić claimed to offer opinions on the situation in Serbia from what he described as an 'anthropological and sociological viewpoint'. He also chose to 'correct' the transcript of the interview I had written of the interview recording. He did this on the basis of memory alone, for he did not have the interview recording with him when he made his edits. This suggested that he had a particular story he wanted me to write down on paper in the interview, rather than wanting me to have an accurate transcription of what was said on that day.

A higher level of avoidance behaviour was also often experienced in meetings with older members of staff who were relatively well established in their field. There was a definite generational gap between researchers up to around the age of thirty, typically completing doctoral studies like myself; ‘established’ researchers aged from around thirty to fifty five, and researchers towards the end of their careers who typically received honours and
national awards (such as from SANU) and who devoted time to other pursuits such as the history and philosophy of science. This increased level of avoidance rendered these older Professors more 'set apart' from the physical (bodily) world, and also 'set apart' in the sense of distinguished. The classic example, in physics, of a well-known media figure emphasising 'set-apartness' from the physical, bodily world, would be the cosmologist Stephen Hawking. Hawking suffers from a condition (muscular dystrophy) which renders him unable to move. He thus conforms precisely to the stereotype of intelligent scientists; as set apart from people and from the world. This is precisely the reason why bodily associations with him, such as his publicised trip to the strip club Stringfellows, and his affair with his nurse, generated so much media attention. His set-apartness contrasted sharply with the bodily functions and urges which the controversies referred to. In this manner, a hierarchy of knowledge was produced, which Traweek (1992, p.79) 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.

**(vii) Gentlemanly precedents**

Why were many older researchers more ‘set apart’ in their interaction with me? In the final section of this chapter, I wish to draw together several strands through looking at historical precedents of ‘gentlemanly’ behaviour in the natural sciences, drawing on the arguments of Shapin (1995) and Graeber (1997), by arguing that this is a particular mechanism through which a hierarchy was manifest. Drawing on the work of Elias (2000[1939]) and Radcliffe-Brown (1940), Graeber 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 more licence to define the terms of the interaction. This was the case, for example, in many of my first meetings with Professors. 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 (1997, p.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., p.19) [my emphasis].

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., p.23). Graeber sought to understand where this disparity came from. If we take the material, joking, world as our starting point (imagine a playground for example) 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, as would be the case if one child started to bully another, 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., p.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 (1998, 1995) 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 2001,
p.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 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.,
p.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. Norms of such conduct were also expected by certain members of the public. For example, in February 2010, a debate between two physicists in Croatia, Vinković and Paar, was televised and received coverage in the mainstream press. The tone was extremely bitter, and was part of a longer running dispute between the two individuals on an internet forum. Paar is an older and well-respected and established physicist, born in 1942. He has appeared on a number of television shows about physics and a colleague of mine described his public persona as a friendly ‘grandfather’ figure. Vinković is a much younger physicist, who recently returned to Croatia after having studied in the USA at the University of Kentucky and at Princeton. He thus had significant academic capital in academic circuits due to his study in the USA, yet as we shall see, this was not crucial for all viewers of the duel. The debate concerned whether parts of the world will enter a mini ice-age over the next one hundred years or not, hinging on the impact of global warming and how this might affect climate changes that are to be expected as a consequence of Milanković cycles. Milanković cycles are orbital periods spanning many thousands of years that mark out variations in the amount of solar radiation received by the earth, due to changes in three main factors: orbit eccentricity (the shape of the orbit around the sun), changes in the angle that the Earth's axis makes with the plane of Earth's orbit, and finally precession – the change in the direction of the Earth's axis of rotation. They are named as such after their discoverer, Milutin Milanković. Milanković, like the famous inventor Nikola Tesla, is renowned as an intellectual figure from the region. He was born in a village called Dalj, which is now part of Croatia, yet which at that time was part of Austro-Hungary. His life and work are often covered currently by the media in Serbia and Croatia at present, partly as issues concerning climate change have been particularly topical over the past few years. An online article summarised the debate as follows:

Pseudoscientists don't know what they are saying and their theses result from being convinced by truths which have no connection with science. However, according to Dejan Vinković, a young Professor of physics from the Zagreb PMF (Physics and Mathematics

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93In this example I have not used pseudonyms, as the debate is available to view online.
Faculty), Paar goes a step further. He is a liar and a swindler who intentionally deceives the public with scientific untruths... This was a dispute between a young scientist who chases truth with zeal as his only imperative at any cost, and an older, more experienced enlightener who is conscious that each popularisation he wrote was useful in pulling out, but also in vulgarising facts.  

Note how scientific authority is asserted as a standard against which pseudoscientists are judged, in an echo of Prof. Aleksić's discussion of Dr Dabić. The discussion became very vitriolic and aggressive, particularly on the part of Vinković, who claimed that Paar was a liar. We see this 'double barrel' of polemical statement and moralising in his denouncing of Paar:

- Take this pen (lifts pen). I pick it up and it drops to the ground. Paar would make the prediction and then try to convince us that it would actually take off and fly (19th minute).
- You are paid by tax payers to tell the truth, you have a social responsibility to do so, if you want to lie, find a private firm, and do your work there, and let them pay for you out of their pocket. (35th minute) [my translation].

Paar behaved much more calmly. He argued that Vinković's argument was not accessible to a much wider public and that any popularisation of science entailed a vulgarisation of the facts. Vinković replied that he was making a fundamental and basic error in his argument and that the issue was not a complicated one. Paar commented:

- How much of what Vinković has just said, do you think the average citizen of Croatia will understand? (20th minute).
- One thing I learnt when I was working abroad is that, in scientific debates, when someone doesn't have a better argument, then they start with insults... (42nd minute) [my translation].

Paar was certainly a skilled rhetorician and closer to the gentlemanly ideal associated historically with natural science conversations, whilst Vinković pursued a polemical tone. Paar's proponents continually stressed his good 'manners' and conduct in contrast with Vinković, who was not engaging with the codes of honour expected of a public duel. Rather than attacking his arguments, Paar and his proponents thus attacked Vinković's gentlemanly credentials. By appearing 'polite' and 'cultural', Paar could play on an important opposition in the region between 'primitives' (primitivci) and civilised urban elites to further his case and his authority. His 'supporters' made the following online comments:

- Paar is on form and a gentleman above all
- Oh dear God, this Vinković, what an impolite, rude, arrogant little girl
- He (Paar) seemed like the only person deserving of attention [my emphasis]

94 Translated from the online version (Vijesti 2010).
95 Translated from online video debate (Vinković-Paar 2010).
Paar thus upheld liberal ideals of gentlemanly conduct, which as the second quote suggests, had a gendered component. Vinković’s argument was rather a plea to 'reason', coupled with more polemic and less restrained comments, making reference to a different tradition more typically associated with other views in politics. For example, Marxist groupings are often noted for their use of polemic and extensive criticism, an issue which Bourdieu discusses in his choice not to pursue a polemical style in the preface to *Distinction* (Bourdieu 1986, p.xii) and his discussion of the Bourgeois tradition of having a personal 'opinion' on many possible political topics rather than, for example, having 'convictions'(ibid., p.414). 97 Gal & Kligman (2000, p.40) made this connection explicitly in stating; 'in the liberal and Bourgeois tradition, by contrast, public dialogue ideally entails restrained, reasoned discussion, assuming a fundamental deliberative process that, by its rational form, legitimates decisions'. Other anthropologists such as Rabinow (1997, p.15) have also highlighted this continued importance, in his case in his study of the production of PCR (Polymerase Chain Reaction), in commenting that ‘there is no doubt that evaluations of character, and their consequences for trust and mistrust, figure centrally in science; they certainly shaped the early days of PCR’.

(viii)Conclusions

In this chapter, drawing on the discussion of value fields relevant to understand the strategies scientists pursued, I have examined particular hierarchies I came across during fieldwork. As such, whilst the conclusions may appear a little pedestrian, my intention in this particular chapter has rather been to use my ethnographic experiences as a tool to flag up what I experienced as particular inequalities, rather than to pursue an ethnographic argument for its own sake. I have also suggested the use of induction to make inferences from the specific levels on which ethnographic encounters operate, to more generalised arguments, yet to understand those generalisations as provisional and with a potentially short 'shelf life'. I found that my informants made inductive moves all the time, both in their scientific work, and with reference to the social world, often using the first person plural ‘we’ to signify ‘Serbs’, ‘Croats’ or other collectivities and making assumptions about these collectivities on the basis of limited experience. Some anthropologists such as Latour and Woolgar have been critical of the use of induction, particularly as employed in the

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97: Extracts from the first ten comments beneath the video, (Vinković-Paar 2010)
98: This has absolutely nothing to do with the political convictions of Vinković and Paar, such as 'translation' from science to political thought is not normally possible, for there is rarely a highly defined ordering to many people’s political beliefs (except maybe amongst some politicians). There are, of course, tendencies however.
production of state-of-the-art scientific facts. As they commented regarding the experimental activity of a hormone, somatostatin in a test of its composition (an assay):

One can believe that somatostatin has this effect and even claim by induction that the statement holds true absolutely, but this amounts to a belief and a claim, rather than to a proof. Proof of the statement necessitates the extension of the network in which the radioimmunoassay is valid, to make part of the hospital ward into a laboratory annex in order to set up the same assay. It is impossible to prove that a given statement is verified outside the laboratory since the very existence of the statement depends on the context of the laboratory. We are not arguing that somatostatin does not exist, nor that it does not work, but that it cannot jump out of the very network of social practice which makes possible its existence (Latour and Woolgar 1986, pp.182–3).

Latour and Woolgar’s suspicion of induction is connected with the assumptions they bring to the field, including the view, following Garfinkel’s (1994[1967]) ethnomethodology, that the world around us is disordered and it is rather actions which pattern and make the world ordered, and arranged in such a manner that it may be comprehended by scientists, through their extension of laboratory practices over wider domains. From radical humanist perspectives however, nature is often understood as existing independent of human perception of it, and as patterned in a manner which humans can uncover, and so induction in the natural sciences is often left unproblematised in the manner which Latour and Woolgar problematize it in their work. In the human sciences, induction may be employed if the inferences made are understood as provisional and historically transient. The use of induction in this chapter thus is an attempt to generate a series of provisional generalisations which may be useful for scientists and social researchers working on the region. As such, it does not focus on the finely tuned and often referenced ‘specificities’ of particular events which are sometimes used as anthropological tropes to problematize previous interpretations of situations taken as definitive.

In the first section, I argued for the importance of ‘first meetings’, particularly when conducting urban anthropology. I have deliberately used the term first meeting, as opposed to 'arrival story'. 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, for they emphasised that (s)he really was there. They often had a heroic and gendered element which emphasised typically male ethnographers’ persevering qualities. Yet critiques of arrival stories certainly do not imply that a focus on such first meetings is out of the question. In fact, information gleaned from
such arrival stories could provide a wealth of literature around which to use the comparative method.

In the final section I also highlighted, through the work of Graeber and Shapin, how the empiricism and importance of testimony key to scientific knowledge production evidences a deep relation with liberal political economy, although as Jankovic (2004, p.67) observed, scientists in the SFRY claimed that scientific autonomy fitted in with the ethos of self-management as well. In a deep way, the historical path of the natural sciences was and continues to be grounded in ideals of gentlemanly conduct besides the cosmopolitan enlightenment ideals reminiscent of the ‘Republic of Letters’ as discussed in the previous chapter. I have suggested that references to such gentlemanly ideals references a particular hierarchy with a historical grounding in private property owning classes, and that therefore attempts to back up argument with reference to such norms of conduct and respectability, call on explicit references to such hierarchy. In the next two chapters, I now consider the issue of scientists’ engagements with the public in more depth, in an attempt to understand how processes currently underway in the region were co-producing new kinds of researchers and their audiences.
Chapter five: media engagements

(i) Introduction
Besides working on research and teaching engagements, many of the scientists with whom I worked were actively engaged in the local and national media, where they not only discussed and debated popular-scientific topics but also voiced their opinions on social, political and cultural events. In this chapter I survey the various kinds of engagements I came across, discussing the different intentions and what was at stake in the different engagements. I divide them broadly into two groups. At one extreme, I explore engagements whose primary objectives include engaging with and enlisting a ‘public’ and a new generation of scientists. At the other extreme, I explore engagements which took the form of polemical discussions concerning complex social and political issues. I see these as connected as much with power struggles within existing intellectual elites as in trying to enlist a public. Between these two extremes, I consider a ‘friendly’ intellectual duel (in addition to that discussed in the previous chapter) on a radio show. I conclude by bringing the different strands together through Verdery's (1995, p.144) concept of ‘cognizant publics’.

(ii) Transmitting knowledge

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 had just begun. When they arrived, a female presenter and two or three cameramen visited the library before exploring the building and venturing 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. The professor talked a little bit about the importance of the International Year of Astronomy which had just commenced at that point. We then moved inside the vast cylindrical buildings to view and film the older telescopes. The air was cold and moist; damp was visible on some of the walls, yet it was also slightly magical to be in a cold building with steep white walls whilst it was cold and snowing outside. The 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 library. At this point, Professor Marić, who as earlier mentioned lives on site, came and gave a presentation for the camera. Finally, I was asked to talk in brief about my research, which took me by

98 http://www.astronomy2009.org/ [accessed on 16/10/12]
surprise as I had only recently arrived and so didn't feel as if I had much to contribute. The team were warm and friendly and we had a coffee afterwards before they set on their way.

Certain professors had clearly ready-prepared speeches, which some repeated when I conducted interviews. For example, Professor Marić gave a potted historical account of the observatory, unprompted, when I interviewed her and repeated similar accounts in front of the camera.99 The main output of the 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. The television format did not involve active public engagement, unlike several other events which I attended – school visits, open days and a science festival (Festival nauke), which I will now discuss in turn.

School visits to the observatory occurred on a fairly regular basis. One professor would show the children and teachers round the observatory, talk about the history of the observatory, the founders and then ask the students questions to test their knowledge. Despite regularly receiving phone calls from interested members of the public who wished to visit, 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. However, open days did take place at the amateur observatory mentioned in the introduction - the People's Observatory (Narodna opservatorija) - located in Kalemegdan fortress in the centre of Belgrade by the river.

I first had a detailed look around the People's Observatory on a surprisingly sunny day in February. Kalemegdan fortress, a fossilised relic from the days of Ottoman rule and now a pleasant picnicking spot, was awash with families, teenagers fooling around on the cobbled stone walls and young couples simply content with one another, basking beneath the winter sun. I made my way to the observatory, nestled in the top right hand corner of the fortress, overlooking the river, with the smoky mirage of Novi Beograd shimmering in the distance. As I entered the turret I saw a man behind a glass window to my left, with a book full of tickets in his hand. Just outside the door lay a sign with information on how much it costs to enter and when the observatory was open for viewings. At first he tried to charge me. I reached for my pocket and pulled out my grey, crumpled membership card. I mentioned that I had come to pick up a copy of Vasiona, the quarterly magazine. He glanced over my membership card, a grumpy demeanour about him, and suggested that I need to renew it. Having signed up only in November, I questioned this for a little while,

99 I discuss this in more depth in the next chapter.
before the issue was resolved. He suggested I visit the secretary to enquire about the magazine and so I made my way across from the entrance and his glass walled cabin, up the winding stairs. Photographs of stars and planets jewelled the walls. The blackness of space, the colours of stars and other objects and the Cyrillic lettering were the main impressions which fastened in my memory. I saw the secretary's office to my right and knocked the door. Trying the handle, it became clear that there was nobody there and so I continued up. A large handful of people had gathered on the roof, looking through the day viewing equipment at other parts of Belgrade. The main telescope was in the very centre of the turret and was locked up, presumably as it is delicate, and is only opened at night when the skies are clear. The secretary, a serious fellow, was relaxing with the young children and adults who were drifting around from point to point, glimpsing the far off reaches of Belgrade. He then walked down to his office - I followed and waved at him, and as I did so, he remembered my face. We walked into his office and I sat down. Downstairs, the man in the glass cabin shouted something about my needing to pay an extra fee. All information about members is stored in a large paper book, of which both the secretary and the gentleman in the glass cabin have a copy. The secretary opened the book, on his desk, disordered with papers strewn all higgledy-piggledy. A young lady with a child entered and began to converse with the secretary. I, sank into my chair until I was introduced. After the usual pleasantries, and having finished speaking with the secretary, she left. A few moments later, the secretary pulled out a copy of the magazine Vasiona, after which I had enquired, and then asked me whether astronomy was a hobby of mine or not. We then chatted for a little while about astronomy and he described in detail the public political engagements of some of the professors at the observatory and the arguments they had been involved in between one another in the national press, a topic I return to later in this chapter.

The school visits and People's Observatory contrasted somewhat with the final active public engagement I will discuss in this category - 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 inflected in 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. I attended the second festival which took place in December 2008, on the invitation of Prof. 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 Aleksić outside and we walked past some large statues from the socialist era, which he described 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 among large queues of people and lots of brightly coloured logos and adverts, with copies of a local newspaper 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 available for all to enjoy. As we walked inside, we passed security guards on one side. All around I saw volunteers wearing white labcoats. The first association I made as I entered was with physics as we passed a papier maché display of an Einstein-like figure; in fact Einstein’s wife, Mileva Marić, was from the region. 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 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. From what I gathered through chatting with them, these were 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 was 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. As I walked around, I found it hard to approach some of the exhibits due to the swathes of visitors all around me, and so I contented myself with focusing on reading about the various subject areas in an attempt to improve my Serbian. Towards the end of my visit to the festival, I found the astronomy space, which was concealed 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 Prof. Aleksić again and left to have a coffee before returning home.

Some of these activities were part of broader schemes collaborating with other scientific institutes and were more concerned with science and the promotion of science rather than with astrophysics and the observatory. The science fair in particular attempted to enlist and interest a new generation in the natural sciences, through emphasising science as a hands-on, practical and fun activity, using techniques common to science fairs already established in other places all over Europe. In using the Latin script overwhelmingly, a cosmopolitan effect associating the style of the fair with the West was enhanced. Additionally, there was very little background/historical details concerning the observatory offered in the displays, which were more hands on and practical and used very bright colours. Finally, the science fair encouraged active user participation, echoing recent trends in Western Europe concerning desired relationships between scientists and science advocates and the public. Indeed, as Davies, (cited in Mellor 2008, pp.15–37) observed, there has been a move away from what is termed a ‘deficit model’ prominent in UK and Western Europe to a ‘participation model’. 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\textsuperscript{100} (2000) recommendations, focused on getting the public more actively interested and involved in scientific policy and debate and is connected with the need to justify large amounts of state spending in science, in a context where ‘transparency’ has come to be promoted as desirable. 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. Whilst these issues are far from the situation and status of science in Belgrade during the nineties and early years of the new millennium, they have influenced the agenda of internationally organised events such as the science fair which are promoted in the former Yugoslav region.

In contrast, the television show was much more heavily focused on showcasing the observatory and spreading details concerning what 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. The television show and

\textsuperscript{100}See http://www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3808.htm [accessed on 12/3/12].
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. This leads to open up the question of what a ‘public’ may refer to. As Gregory and Miller pointed out in their discussion of post-Fordist science governance and public engagement, the phrase ‘the Public’ has not been examined closer in the literature, and is often thought of ‘as a black box – and an empty black box at that’ (Gregory and Miller 1998, p.6). Thorpe & Gregory (2010, p.278) also made the comment that:

Public engagement does not tap into a pre-existing public, but rather is itself a process whereby publics are constituted and constructed (Pestre 2008, p.104). Engagement policies are attempts to produce a particular kind of post-Fordist public and public engagement is a post-Fordist mode of governance of science and technology (Bodmer and London 1985).

Whilst such policy making is based around a shift away from a focus on national community, more characteristic of state capitalism, it does not imply the negation of national community, for as I discussed earlier, markets require states. This is a point which is sometimes conflated in the literature. For instance, Ang wrote of public service broadcasting institutions:

The relationship of the public service institution to its audience remains essentially characterized, not by economic profit-seeking, but by a pervasive sense of cultural responsibility and social accountability, which is emphatically opposed to the easy-going commercial dictum of ‘giving the audience what it wants’. As a result, a different positioning of audience is at stake here. Not the audience-as-market, but the audience-as-public is the central object of concern within public service institutions (McQuail 1987, 219–220). The audience-as-public consists not of consumers, but of citizens who must be reformed, educated, informed as well as entertained—in short, ‘served’—presumably to enable them to better perform their democratic rights and duties (Ang 1991, p.23).

Whilst creating consumer-subjects is a subset of the wider set of tasks which state institutions enable, understanding oneself as a citizen of a particular state (as a member of ‘the Public’) is necessary in order to produce a market and thus to promote commercial interests, a connection which Ang does not identify. In fact, this link has been passed over by several analysts who, taking a cue from postmodernist trends in the human sciences (Billig 1995, p.128), have argued that states were being rendered redundant in a postmodern, ‘post-national’ age. Billig and anthropologists of the state such as Trouillot (2001) argued that such claims were overstated. 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, p.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. The policy drives for public participation which events such as the science fair were associated were not visible in the other public engagements described however. Echoing the comments in chapter three concerning the lack of an audit culture, 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, as mentioned in chapter four. To my knowledge, at that point there were no technologies in place for measuring and promoting media impact. Some professors had topics that were more media-friendly (such as one professor’s cosmological work investigating conditions of planets that might be suitable for extra-terrestrial life101), and indeed lectures were fairly regularly organised, both at institutes in the city centre, such as the Serbian Academy of Sciences, and at planetariums such as that in Kalemegdan. Let us now turn to consider more ‘academic’ engagements.

(iii) Intellectual duelling

Shortly after arriving in Belgrade, Aleksić invited me to participate with him on a radio show which he regularly hosts, on which he relates his work and other astronomy related themes to the general public. The radio studio was in Vračar, an upmarket area of Belgrade, where some of the former Communist elite used to live. The studio was small and inconspicuous. We arrived a little earlier, and had a coffee with the owners who came across as hippies. I was a little nervous as I sat and waited 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. Aleksić used the opportunity to have a discussion about the science wars, in which he wished to make clear his anti-postmodernist

101I have not used the pseudonym here as it would reveal his identity.
viewpoint, with which I broadly agreed. 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 asked several times each day both in Belgrade and Zagreb given I identified as from Manchester – so do you support (Manchester) United or City? After the show had ended we spoke to the owners, who mentioned that an anthropology student worked for them. They asked if I would be interested in presenting a show with her. Finally, the third kind of media engagement was aimed at a more specialist audience and was written in a blog format, where some professors would discuss a range of themes covering political, social, philosophical and cultural issues as well as specialist astrophysical and astronomical themes. I will now discuss one such example, once again concerning Aleksić, in more depth.

(iv) Polemics and academic power struggles
Shortly before arriving in Belgrade, a close academic colleague and friend of mine directed me to a blog which one professor 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, which were crucial outlets for the Milošević opposition. My colleague directed me to this blog as it was particularly polemical and outspoken, and at the time very topical.

The blog 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. To many people’s surprise, he had been living for several years in Belgrade, the capital of former Yugoslavia and present day Serbia. Furthermore, he had been making a living for himself in hiding as an alternative medicine practitioner under the

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102 For an overview of the science wars see Jardine & Frasca-Spada (1997).
103 A colleague from Manchester was so used to this question, he would introduce himself as 'I'm from Manchester, and I don't like football'.
104 See http://www.b92.rs/ and http://pescanik.net/ [accessed on 31/10/11].
105 Radovan-Karadzic, president of the Bosnian Serb SDS (Srpska Demokratska Stranka), whose party’s troops were responsible for the facilitation of ethnic cleansing in Bosnia.
alias Dr Dragan Dabić. However, he was no herbalist or homeopath. 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" (The Guardian 2008).

It was this set of events that provoked the following polemical blog response on the part of one professor from the institute, the Belgrade Astronomical Observatory:

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 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].

Physicists such as the professor above and Sokal were particularly critical of the ‘poetic’ or imprecise use of terms typically employed by scientists, and viewed the appropriation of such concepts as bordering on charlatanism. The term ‘quantum’ which Karadžić employed, masquerading as Dr Dabić, has a specific and specialist meaning for those trained in physics, and is rarely used outside the discipline. Karadžić’s imprecise use of this term 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. His use of the prefix ‘doctor’ took on a particular salience as academic qualifications commanded an immense 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...

106 This text is available online, but I have not given the reference to protect anonymity. Please contact me by email [ajhodges22@gmail.com] for a copy of the text.

107 Karadžić was a graduate student of psychiatry. However his alias certainly did not have a qualification in ‘human quantum energy’.
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 the Church. 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 in the 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 typically helped to construct an audience and public as well. The radio show concerned 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. I was interpreted as an opponent worthy of discussion for a radio show spot and as discussed in the previous chapter, gentlemanly ideals pervaded throughout the discussion.

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. Science had a large amount of intellectual authority in the region, in a trend indicative of cultural hierarchies between disciplines in the Anglo-American academic world, and reflected in relative amounts of funding for the sciences compared to the humanities, although in comparison to states in other regions of Europe, as we have seen, science funding was small as a percentage of GDP and this created some resentment amongst scientists. Negative views towards social sciences also predominated amongst scientists with strong anti-communist views, as social sciences, which included teaching Marxist theory, was more highly valued in the SFRY.

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 much to play for. I found that debates

108 In Serbia, the Church refers to the Serbian Orthodox Church, whilst for Croatia, the Catholic Church.
over general social themes amongst ‘intellectual elites’, which for the purposes of this analysis refers 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 co-operation with the state, there was, another tradition: that of intellectuals acting as the 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, p.170)

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 (1998, p.402) 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 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 free-lance 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.

On this view, one of the key aims of engagements such as the blog is the formation, not simply of publics, but of what Verdery (1995, p.142) has referred to as ‘cognizant publics’.

(v) Producing ‘cognizant publics’

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109 See also Soso (2002, p.186)
In her research analysing the politics of the national idea under socialism in Romania, Verdery (1995) offers an analysis of intellectual elites and their relationships with one another, the Party and publics in the vein of Bourdieu’s *Distinction*, which she argues isn’t appropriate to socialist contexts (ibid., p.5). She argues that some members of intellectual elites, which would include scientists, seek a degree of cultural authority and therefore power:

To make a successful claim to status as a bearer of cultural authority requires that this authority be acknowledged by others (Bourdieu 1985: 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., p.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., p.144)

This description clearly resonates strongly with Aleksić’s blog discussion. In contrast to the discussion of post-Fordist publics more pertinent to the kind of engagement events such as the science fair promote, Verdery’s description details processes at work in socialist Romania. This suggests that an understanding of the socialist legacy is key to understanding some aspects of the public engagements of scientists in post-socialist contexts such as the present day post-SFRY states.

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 meant that similarities existed, and the description above suggests that when I
conducted fieldwork, this sphere remained highly politicised and certain figures such as Aleksić wielded a degree of politicised cultural authority and public voice on wider social topics. The frequent political comments I came across in other contexts, such as 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. This contrasts to a role of scientists as depoliticised ‘experts’ who talk only about their field of expertise and who continually have to justify their contribution to society in terms of the measurable impact of their expertise, which relies on metrics. As Edkins (2005, p.65) commented, ‘in Anglo-American culture at least the intellectual is often synonymous with the ‘expert’: someone who 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’.

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. To contrast, 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.

**(vi)Conclusions**

In this chapter I have discussed several media engagements in which scientists from the observatory engaged, detailing their different purposes and intentions. 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. What I did not come across was a sense of ‘directed forward movement’ (‘progress’) characteristic of capitalist and socialist modernity. This sense of apathy and helplessness was once again strengthened by the context of the growing European financial crisis, which faded into the background as another episode of ‘permanent crisis’.
Chapter six: romantic ‘heritage’

(i) Introduction
Verdery’s notion of ‘cognizant’ publics relies on both the exercising of cultural authority on the part of an intellectual elite and members of the public who recognise their lack of knowledge and/or expertise in comparison to those intellectuals who have power in the public sphere. In turn, this relies on the production and maintenance of a ‘sphere’ with which people identify as being members of the public. Another key dimension to the media engagements which relates to this, which I touched upon in the previous chapter, concerns the identification of and association with a tradition, in this case a ‘local’ scientific tradition. In this chapter, I focus in more detail on how people may come to view themselves as part of such a tradition; how that tradition may be bounded and how ‘Others’ who are not part of the tradition come to be identified. I look at these issues through the lens of ‘national cosmology’. In the first half of the chapter, I pay attention to ‘Whig histories’ of great individuals and achievements in my dealings with scientists at the observatory. In the second half of the chapter, I analyse how students conceptualised their relations to such great individuals, drawing on a survey I conducted amongst students, ethnographic observations and Graeber’s (2011) work on debt and indebtedness. This discussion will lead us to consider a practice, well documented in the Museum Studies literature with reference to debates over the ‘repatriation’ of cultural artefacts (see Meighan (1992), Gulliford (1992)) which I will refer to as ‘cultural accounting’. By cultural accounting, I refer to the practice of drawing up a historical ‘balance sheet’ between two or more collectivities. On this balance sheet, there lies a claim that one group has harmed, or dominated the other group(s) at some point in history, and therein lies an attempt to ‘put right previous wrongs’ through acts such as ‘repatriating’ cultural artefacts, awarding monetary compensation or making a public apology. To give one more general example, there was the recent acceptance that a case for ‘Croatia’ to charge ‘Serbia’ with the crime of genocide lay within the jurisdiction of the International Court of Justice (ICJ), with the aim of seeking monetary compensation.¹¹⁰ I conclude the chapter by looking at different ways in which scientists related to one another and to other imagined traditions and collectivities.

(ii) Practicing national cosmology

One rainy November day I made arrangements with Prof. Aleksić to be a guest on his radio show, which discussed popular science themes to a Belgrade radio audience. We arranged to meet outside the *Elektrotehnički Fakultet* (Electro-technical Faculty) in downtown Belgrade. We met by a statue of Nikola Tesla, a well-known inventor, 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. 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’.\(^\text{111}\) 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. The choice to recently move the statue however is an interesting one, and drew some comment when it was moved, for some passers-by deemed it ‘too big’ for the location in which it was placed. The President of Croatia at that time, Stjepan Mesić, responded with the comment that whilst they may have been right, Tesla was indeed a big (great) man (*velik čovjek*), and so the size of the statue in its surround sends out an apt message.

![Image five: The ‘big’ statue of Nikola Tesla, Zagreb\(^\text{112}\)](image)

\(^{111}\) See [http://www.index.hr/vijesti/clanak/tesla-napokon-dobio-spomenik-u-zagrebu/321498.aspx](http://www.index.hr/vijesti/clanak/tesla-napokon-dobio-spomenik-u-zagrebu/321498.aspx) [accessed on 15/3/12]

\(^{112}\) The image is my own.
When discussing such practices relating to Croatian nation-building and especially the linguistic reforms, I sometimes came across a derisory or joke-like tone amongst people with whom I spoke in Belgrade. Such jokes were often made on the presupposition that the Croatian nation was artificial, and ‘made-up’ during the nineties. When this was contrasted with the idea that the Serbian nation was ‘really’ real – and examples such as the lack of a linguistic reform in the FRY during the nineties cited as ‘evidence’, it opened up a space for a Greater Serbian national cosmology, at its strongest when such observations were taken as evidence that ‘Croats’, ‘Bosnians’ or ‘Montenegrins’ were ‘really’ in fact Serbs. Indeed, during the nineties, a number of practices associated with state and nation building occurred with vigour, including statue building, flag making, street sign renaming (for Budapest, see Bodnar 2009), banknote production and museum reorganisation. These were all designed to legitimate the new political order through marking out a new specific national ‘heritage’ (see Gillis 1996, Lowenthal 1994). As we have seen, in part due to the presumed need on the part of political elites to build a new state in Croatia, this process occurred more enthusiastically than in Belgrade, where older established hegemonies and frames were not displaced to the same extent (see chapter two).

Statues helped to produce national cosmology in a particular way, often focusing on the achievement of individual ‘heroes’, and controlling symbolic meanings associated with public space. Indeed, statues operate through leaving preconscious impressions on individuals, as people do not normally stand under and consciously focus on them every day while waiting for friends. When arranging to meet friends in both cities, it was common to meet kod kipa - at the statue or kod konja - at the horse (statue), located in front of main train station in Zagreb and in the main squares in both Belgrade and Zagreb. Smaller parks too, in these cities, were places where students and teenagers would often drink, socialise, or cuddle up with their partners on park benches. The smaller parks were also replete with statues, almost always depicting male individuals, often in a heroic or intellectual pose. Many provided examples of what Billig (1995) termed ‘banal nationalism’, through subtly, or not so subtly reinforcing an historical narrative, whilst others reinforced other cosmologies with a moral dimension, such as antifascist histories.

As Macdonald (2008, p.2) described with respect to the production of memorials in Europe, such practices were often taken up by minorities, cities and other localities. Whilst I was conducting fieldwork, I came across a number of examples whereby groups of people, many who were by no means members of any 'elite', actively chose to mobilise such a practice, petitioning or raising funds to erect statues. For example, at the Petnica Science Centre, some students told me they were ashamed to read in the newspapers that
one village in Serbia planned to erect a statue of Slobodan Milošević. The village advocates of the statue claimed that things were much better even in those days compared to now for them, because employment was much higher.\textsuperscript{113} Whilst working with antifascist and socialist groupings in Belgrade and Zagreb, there were often discussions over writing magazine articles about particular historical figures which may be considered as symbols for, or in some cases martyrs of, antifascist struggle. Examples included activists who had been attacked and/or murdered by far right nationalist or paramilitary groupings. However, taking the concerns of informants seriously does not necessarily mean accepting the same practical language and approach that they use; this would be a form of populism if applied to politics. MacDonald agreed, in noting, ‘my approach here is to explore ‘difficult heritage’ as a historical and ethnographic phenomenon – and as a particular kind of ‘assemblage’ – rather than to establish it as an analytical category’ (ibid., p.4). I have argued that the violence of nation-building processes as manifest in the post-Yugoslav context urges us to rethink the analytical use of such terms, certainly in the post-Yugoslav context, whilst continuing to take them seriously as concepts which actors use (see Handler 1985).

The focus of statues on ‘great individuals’ is interesting, for a similar process was also taking place at the observatory where new ‘Whig’ histories were being written and, as we shall see, disputed. The term Whig history refers to biographies of great individuals and their accomplishments. They typically have several characteristics. First, they often stereotype key scientific figures as ‘geniuses’, set-apart from ordinary humanity. A religious quality is often attached to such figures. Newton, Darwin and Einstein are commonly considered icons in this vein at present, certainly in Western Europe and the USA. 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, like the practice of erecting statues, a hierarchy between certain individuals who are somewhat removed from the real world and everyday people. I found the term \textit{veliki čovjek} (great wo(man)) was often used to describe such an extraordinary person distinct from ordinary people in Belgrade and Zagreb, as we saw with reference to the Tesla statue. 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. Whilst the term literally means 'great man', it by no means has a pejorative sense, which it may have in English.

\textsuperscript{113}See \url{http://www.blic.rs/Vesti/Politika/200139/Hoce-da-grade-spomenik-Milosevicu} [accessed on 25/8/11 at 15:20].
As the historian Fara (2003) 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 (Lawrence and Shapin 1998), engaged in a collective endeavour, in complete contrast with Whig history accounts. In much the same way as a statue of an individual attempts to immortalise them in stone, Whig 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.114

Like Traweek (1992, pp.74–105) in her dealings with particle physicists, I came across numerous ‘Whig-history’ references in my engagements with scientists. 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. For example, at the end of my stay in Belgrade I interviewed Prof. Marić. She both works and lives at the observatory, for part of the observatory is her family home and several generations of her family have worked there. We sat in her cluttered kitchen and drank coffee, before I started recording the interview. The account she gave was off topic – she completely ignored the questions I asked about the situation concerning the observatory today and during the nineties. Instead she outlined a history of the observatory which I suspected she had given many times before in interviews with the Belgrade media. 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.

114Recent 'social' histories of science have done much to correct this view. For interesting work focusing specifically on gender, see Fara (2011).
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, yet a need to placate one’s funders was present.

The Nikola Tesla Museum (Muzej Nikole Tesle) in Belgrade also focused on a Whig account of Tesla’s life, and particularly so the first time I visited in Spring 2008. 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. 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 and less narrowly biographical account, and a clear movement towards more object-centred displays.

Whig histories and the practice of erecting statues of individual heroes typically exaggerated academic hierarchies and individual achievements. Such an approach had both a historical grounding in and strong resonance with the Volksromanticism associated with figures such as Herder. Throughout the nineteenth century, Belgrade and Zagreb were well connected to intellectual circles generating ideas in this tradition. Attempts to catalogue and standardise the languages spoken in the region were undertaken by figures such as Ljudevit
Gaj (Croatia) and Vuk Karadžić\textsuperscript{115} (Serbia). They were well connected and known to, among others, the Brothers Grimm. The category of genius, embedded in a national canon, resonated strongly with Volks Romantic thought as

The romanticist placed the highest value on the individual, his freedom, and his self-development and self-realization. Yet, he placed an equally high value on the group, which he considered as a living organism whose laws of organization placed the constituent individuals in a relation of mutual dependence (Lougee 1959, p.638).

The 'living organism' in this tradition referred to above typically referred to the Volks, of which individuals were creative components, and towards which they had a duty. As Lougee continued,

Romanticists emphasized the culturally and historically creative role of the simple people of the folk. The folk were idealized, spiritualized. The folk-spirit, Volksgeist, is the medium out of which great events and great works are precipitated (ibid., p.636).

The Volks, here, has an ethnic quality which expressed itself in ideas concerning biological or genetic connections between groups of people, bloodlines, race and a connection with place (Blut und Boden). As described earlier, the discourse of Volks has persisted in Germany by being redrawn along linguistic instead of presumed ethnic lines. The concept of Sprachkultur (in English, literally 'language-culture'), as Davies (2008, p.437) noted, is in common use both by laypersons and sociolinguists in Germany.\textsuperscript{116} This term focuses on the connection between language use and a cultural totality. Davies argued:

In general, when the meaning of the term is discussed, there is a tendency to interpret 'culture' in the anthropological sense as the totality of practices and knowledge associated with language, rather than in the artistic or aesthetic sense (ibid.)

The discourse of Sprachkultur also resonates closely with the work completed in the nineteenth century by language reformers such as Vuk Karadžić and Ljudevit Gaj, who developed and argued over different linguistic standards (see Peti-Stantić 2008) and who now have near mythic status in Serbia and Croatia respectively. This Volks Romantic tradition is also present in anthropology and ethnology in the region, some of which is devoted to documenting 'folk' traditions. The salience of this tradition in the region has been typically explained through concepts of cultural contact and intellectual descent (see

\textsuperscript{115}Indeed, one central meeting place in Belgrade is kod Vukovog (spomenika) – at the Vuk statue. 
\textsuperscript{116}Davies (ibid., p.439) stated, 'The importance of the concept of 'Sprachkultur' in Germany is illustrated by the fact that in 1999 a handbook listing over a hundred institutions which promote 'Sprachkultur' was published.'
Karnooh 1985, cited in Naumović 1998). Naumović took serious issue with this 'descent' hypothesis, arguing that it overestimated the importance of intellectual traditions, rather than looking at why specific, historically situated actors take particular ideas up. Furthermore, he argued, rather than the descent being a causal historical agent, it was a historical fact itself in need of explanation. Naumović suggested that the particular position which Balkan ethnologists found themselves in, in relation to other ethnological traditions, and as a consequence of their geopolitical positioning, resulted in a particularly affinity amongst ethnologists for what he termed ideologised discourses, which encompassed Marxist and Volk romantic approaches. This was due to the existential position of many ethnologists working on the region, and intellectuals more generally, which was characterised by what he referred to as the double-insider syndrome. According to Naumović, this entailed belonging to the group under study, advocating the interests of the group under study, and feeling that the group under study was in some way victimised or disadvantaged.¹¹⁷ He argued that this double-insider syndrome, which ultimately related to the geopolitical positioning of the region within Europe, within a context of nation and state production, meant that ideologised discourses "could satisfy in the most efficient way the historically determined social needs of Balkan intellectuals, as well of those of considerable parts of the populations" (ibid., p.13). This positioning, and associated feeling of being 'disadvantaged' or 'victimised' in the context of a perceived belonging to a family of 'nations' in, or on the edges of Europe is, on Naumović's 'objective humanist' view¹¹⁸ key to understanding the appeal of Marxist and Volk Romantic ideas amongst many academics and wider audiences in the region and hence the high attention paid to both Whig histories and the prevalence of statues. It also reflects the current 'semi-peripheral' positioning, in which comparisons were drawn with other European cities and perhaps such a model of nation-building therefore promoted. This positioning, which can be understood in terms of reperipheralisation as discussed in earlier chapters, is also expressed in the phrase 'imamo i mi konja za utrku', which I occasionally heard in competitive discussions regarding what particular towns or cities had to offer. The phrases literally translates as 'we have a horse in the race too', with the phrasing 'imamo i mi', suggesting an unexpectedness surrounding that assertion. The first person plural 'mi' always indexed a collectivity, typically a city sized or national grouping.

¹¹⁷To avoid making a culturalist assumption, we could replace 'belongs to group under study' with 'does not have an existential distance from the context under study'. On this reading, ethnologists who are not from the region could come to experience this 'double-insider' syndrome if they committed themselves professionally as academics as well as ethnographers to the region. His argument holds just as well with this rephrasing.

¹¹⁸See Golubović (2007) for a critique of Naumović's 'objective humanist' stance.
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. Such disputes were sometimes between advocates of different ‘national’ groupings yet also, as we shall see, between academics working in different traditions, some of whom were critical of *Volk* Romantic and Whig approaches. For example, 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 a certain other Professor 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 Professor 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. I had come across other instances of such disputes over credit in academia. Besides disputes over the correct ‘Whig history’ to be written, some academics were highly critical of the idealisation inherent in such Whig history writing. One colleague, Joksimović, was acutely aware of this God-like perception of Tesla in the region, and as such had sought to introduce histories of Tesla's life and work which emphasised his more everyday human attributes, following a trend in Anglo-American history of science. Joksimović controversially arranged an interview at the *Serbian Academy of Arts and Sciences* (SANU) with an historian from the USA who claimed that Tesla was homosexual. This was controversial firstly as the nitty gritty details of Tesla's personal life were little focused on in accounts given in museums. Secondly, queer rights issues were a tense subject. Two queer pride marches had been organised in Belgrade, in 2001 and 2010. The first ended in bloody scenes of violence, whilst the second, in which I participated, resulted in a showdown between over six...
thousand clericofascists and police wherein some government buildings were set on fire and the main shopping street smashed and looted.\textsuperscript{119} The argument that Tesla may have been homosexual was provocative for it shattered a hetero-normative and patriarchal masculinity, which was key to understanding the post-socialist course taken during the crisis period. This is because

The rise of masculinist nationalism provided a powerful linkage between an emerging post-socialist citizenship and male identification and privilege. While gendered forms of citizen belonging were also a feature of socialism, this new nationalism was grounded in a normative, masculine basis for citizenship. This and other cases demonstrate that normative gender categories can be resources that people mobilize to produce a sense of continuity and agency in times of drastic social, political and economic change… I argue the period after 5 October was a similar moment in which rapid social and economic transformation made the categories of everyday life and identification uncertain. In addition, this period saw the official rise of a new political ideology—liberal democracy—that directly threatened the link between male pride and Serbian national identification (Greenberg 2006, pp.322–3).

As such, the EU and associated political hierarchies, which also heavily promoted queer rights issues in the region, were often portrayed as more effeminately ‘gentlemanly’ and homosexual (see also Mikus 2011). Arguing that a figure of central importance for Serbian nationalists, Nikola Tesla, may have been homosexual was thus an obvious political move, in the same breath attempting to diminish the ‘set apart’, or ‘sacred’ status attached by some to him. Different academics thus had different agendas and perspectives on the writing of Whig histories, and tried to influence the future course (\textit{smer/smjer}) of events in particular ways.

(iii) \textbf{The student survey}

One reason why such disputes over Whig histories took place was that they were published in the public domain and new audiences and potential students were interested in and affected by them. Whilst I gained many glimpses into students’ positionings through ethnographic observation, I complemented such work with a survey, as mentioned in the methodology section of the introduction. The survey was split into two sections. The first was designed to gain a further glimpse of students’ positionings concerning historical figures such as Nikola Tesla, whilst the second was designed to test student responses to questions concerning their university level education and hopes for the future (see appendix one for complete list of survey questions and the methodology section of the introduction for further details concerning how the survey was carried out). The survey was

\textsuperscript{119}See for example \url{http://news.nationalpost.com/2010/10/10/photos-violence-breaks-out-at-serbian-gay-pride-march/} [accessed on 19/3/12].
conducted with students in both Belgrade (Department of Astronomy, N=14) and Zagreb (Department of Physics, N=65).\footnote{The astronomy department is small compared to Physics, yet I couldn't gain access to the Physics department in Belgrade.}

Students were asked specifically about Nikola Tesla and national belonging. The survey was based initially around some famous quotes regarding Tesla. I found the quotes on an internet forum on the B92 website. 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. The two statements concerned claims over Tesla's connections with various traditions:

(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 \textit{[my translation]}

Students were asked whether they agreed with the above statements or not, and were asked to state reasons. They were then asked whether it was important to them whether Tesla was a Serb/Croatian/American or not and why. The survey was printed in Serbian and Croatian for Belgrade and Zagreb respectively, and students were asked to respond in those languages.\footnote{All translations are my own.} Many students claimed that national belonging wasn't important, but only one student in Zagreb explicitly rejected the culturalist framing of the question\footnote{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.}, 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.

The various student responses are in no way conclusive. It is also difficult to gauge what preconceptions students had of me, for I had presented the survey, and how that might influence their responses to questions, particularly, as discussed in chapter four, some researchers and students were concerned with the ‘image’ of Serbia presented to the ‘outside’ world. There were however, several patterns to the responses which are interesting in themselves.
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 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:

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 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’, so I will now examine these in turn.

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\textsuperscript{123} 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

\textsuperscript{123}This term is difficult to translate. It literally means 'beneath the sky', and can be taken to refer to 'region' in the above context.
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 argued '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. It wasn’t clear to me whether this was a sarcastic comment on the way the USA is organised given the extensive poverty there, or a comment that he can’t be considered 'American' because he didn't receive decent compensation for his work. 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.

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 are bound to this flat, you are bound to this institution, you are bound to
the country, you are bound to this regime. So it is not a free market. Unless we got this position to be able to freely move abroad, and foreigners from abroad come here, not necessarily with the same frequency, but with some reasonable amount and they come here, stay here, say five or fifteen years, they settle down here, they establish their laboratory, their school of research if you want, but this is a two ways, you know; collaboration to this contact, then you get say my country, my research, my science, being integrated to say European Community and when this is achieved it is worthy of international collaboration

[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. The point is rather that socialist governments typically invoked a sense of their investment being ‘fair’ and relatively equal to all. Especially in Zagreb, I found that the concept of ‘having a state’ associated with a ‘culture’ formed a benchmark of legitimacy, legitimating that ‘culture’ 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 bright 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. 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 practice which may also be interpreted in terms of ‘culpability’. This is no coincidence, for

124See chapter three Primordial Debts in Graeber (2011).
In all Indo-European languages, words for “debt” are synonymous with those for “sin” or “guilt”, illustrating the links between religion, payment and the mediation of the sacred and profane realms by “money.” For example, there is a connection between money (German Geld), indemnity or sacrifice (Old English Geild), tax (Gothic Gild) and, of course, guilt (Grierson 1977, pp. 22–3).

This was particularly the case prior to the outbreak of war, where certain historical examples of tragedies were seized on by nationalists, who sought to reaffirm the importance of particular crimes committed by groupings such as Ustaše or Četnici, which were aligned with ‘Croatian’ or ‘Serbian’ national categories respectively. Such claims change the importance many people attach to such categories. Post-war compensation claims, in terms of financial compensation for ‘genocide’ is one example of this as are the various demands made by Hague war tribunals and so forth. In the case of the natural sciences, for nationalists this involved inserting precise claims about the nationality of ‘great figures’ into a historical narrative, the importance of which would define the sense of indebtedness people today feel and which would subsequently order their self-understandings as members of a particular ‘nation’, to which they feel an immense debt, and therefore perhaps feel a connection to, and affinity with. 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 (see Ferguson 2002) and which in a sense makes the debt one feels to them so large as to be impossible to pay back.

Relations of indebtedness were also imagined between states. For example, I often heard reference to the current crop of politicians as izdajnici, selling themselves to the EU and foreign interests. Such accounts often resonated with dependency theory explanations. Dependency theorists argue that relatively smaller or ‘poorer’ states provide markets and cheap labour for developed states. Developed states exert their dominance by making other such states dependent on them, in a variety of ways, from systems of conditional loans, to creating demand for new technologies, systems of governance, by draining away upwardly mobile workers, and so forth. The workers will then primarily contribute to the economy of the larger state, to the further detriment of the smaller state. When the well-being of wealthy states is threatened by the growth of such smaller states, they respond with economic sanctions and/or military force in order to maintain their dominance. This view had an obvious salience in Serbia, where a Western military alliance (NATO) had recently imposed military force and economic sanctions. Dependency theory has an obvious affinity with Marxist theorising in its emphasis on exploitation, and an affinity with supporting the

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125 The literature often uses the term nation instead of state.
126 For a summary see Cueva et al. (1976)
‘smaller/downtrodden’ against the ‘large/imperial’, yet it understands states as being
containers in which action (and exploitation) occur. It is precisely this combination of
nationalism and socialism which Kuper (1999) argued against, and which Williams (1957)
and McGuigan (1992) are sympathetic critics, advocating what they term a ‘left wing
democratic populism’. One friend went as far as to suggest the theory be named ‘the theory
of small nations’. Dependency theory arguments embody the kinds of ‘debt’ relations I
came across frequently in the survey, and in interviews and conversations with researchers
and students.

For instance 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 advantages to all under its rule. Students too, exasperated with the current situation,
made similar remarks. Whilst taking a break from playing basketball with some students in
a park by a student hall, avjetno naselje, where I was staying in Zagreb in the summer 2010, I
heard a group of students on the bench next to us complaining about the situation in
Croatia. The gist of the conversation was that the country was in a mess, and it was only going to get worse, if many of the people who did well at university continued to seek employment abroad. Such intellectual movement was not viewed in a positive light, as the assumption was made that such movement would be of economic and social use to the country to which the students moved, whilst Croatia would be left with a class of relatively ‘second-rate’ scientists.

Besides dependency theory arguments, another theme which emerged in the interviews and survey responses was a desire to stay to help 'improve the standard', with the implication that the success of popular nationalist campaigns would only further increase if the upwardly mobile left the region to seek employment, creating a vicious circle. This is more nuanced, because it demands a connection with the region, which may be mediated through a sense of obligation engendered by indebtedness, or the sense of belonging may be much less rigidly defined as in the following responses:

I would like to (stay). But that doesn't mean that I won't go abroad for postgraduate, postdoctoral or expert development. I consider that for a good quality of life, a particular social situation is required, i.e. family nearby, friends, a way of life. That is why I don't want to go abroad, to for example America, because the mentality and the priorities are different. (Zagreb)

I wish to. I don't wish to be separated from my friends, parents, birth place, and to leave for a state with bigger criminals. (Zagreb)

(iv) Gift exchanges

Finally, in contrast to the ‘binds’ required by nationalism and citizenship, and those proposed as existing between states amongst advocates of dependency theory, some exchanges were governed by a gift exchange logic. For instance, a friend from Croatia was debating whether to move from the village where he lived to try and find work in Zagreb or to look for work abroad. He conceded that although he wasn't in any way patriotic, he felt as if he would like to stay here, invoking the concept of having been ‘built’ (građen) by his surroundings. In this case, there was no implication of ‘debt’, i.e. a feeling of having to pay ones dues, as expressed for example through military service; he felt rather an affinity, perhaps built on familiarity, which encouraged him to stay. Such invocations are closer to a form of gift exchange, as there is no obligation (sacrifice required) to repay a debt, yet reciprocation builds relationships between the collectivities in question. As discussed in several places throughout the thesis, the system of veze, an informal system, often functioned on gift exchange principles. For example, whilst working at the observatory I
was sometimes asked to do favours for people, and indeed for friends. In my case, this most often involved checking the quality of English in academic articles written in English, or CVs or job applications. Very occasionally, and in more formalised contexts, I would be offered some money for doing such work, but much more frequently it functioned on the basis of a gift exchange where there would be an unspoken assumption that I may ask for a reciprocal favour at some point, such as asking for help with presentations in Serbian.

Crucially, gift exchange also formed a means by which some of the consequences of the formalisation of new national and state collectivities could be bypassed, just as the system of veze was an attempt to bypass the formal structures of socialism. For instance, upon visiting and speaking with volunteers at the People’s Observatory in Kalemegdan, a fortress in the centre of Belgrade, they recounted how they attempted to situate themselves ‘above’ the political happenings. 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. It also contrasted sharply with the nationalist agendas of those who wished to erect new memorials or produce particular Whig histories based around a sense of national indebtedness.

**(v) Conclusions**

In this chapter I have attempted to highlight how certain practices have been invoked with the aim, implicitly or explicitly, of generating a sense of indebtedness towards the ‘nation’ or ‘state’. I have shown how this is revealed to be problematic, for the practice of ‘cultural accounting’, undertaken by nationalists with relish, is bound up in conceptualisations of debts between imagined collectivities, and between individuals and larger collectivities. On some occasions, such debts have been monetarily calculated, a practice mediated by institutions such as the ICJ which deal with compensation claims, and which is problematic for it helps to reproduce self-understandings of belonging to a national collectivity, as mediated through claims for compensation. The feeling of indebtedness which practices such as Whig history writing attempted to invoke are key to understanding how national belonging operates. They also form a strategy through which political and intellectual elites
in the region may attempt to counteract the strategies employed at events such as the Festival nanke. Given the strength of emotion that nationalism and citizenship can generate and have generated, I suggest that anthropologists ignore such strategies at their peril. On a more optimistic note, I concluded with a discussion of how other kinds of exchange, such as gift exchange, do not attempt to reproduce such problematic collectivities and offer a way around dealing with certain issues the architects of such collectivities created.

The argument in this chapter has proceeded at a more general level than in the previous ones. We have moved away from the observatory in our orbit, in so doing gaining a limited understanding of the wider impact; a ‘view from somewhere else’. We have discussed in more detail how students and other academics outside of the observatory have interpreted some of the actions and activities in which researchers at the observatory have been engaged on a day-to-day basis. As we have moved further away, some of the finer ethnographic detail has been lost, but other patterns and ways of understanding and interpreting what we have seen on our journey have been brought more sharply into view. It is thus an appropriate moment to draw together some of the threads and themes linking up the courses (smerovi/smjerovi) of individuals and institutions in the region over the past twenty years and recapitulate what has been observed so far.
Conclusion

This thesis has examined the experiences and engagements of scientists, principally astrophysicists, in Belgrade, Serbia and for comparative purposes, 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 (chapter four), the socialist legacy and attempted neoliberal ‘transition’ (chapters two, three, four and five), academic traditions (chapter six) and national cosmology (chapters two and six). As with the cosmic postcard, I have listed these various levels which I understand 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. The actions and practices relating to each ‘cluster’ rather disrupt and interact with those relating to the other clusters in an often unpredictable manner, disrupting the courses (smerovi/smjerovi) of others.

Returning to the research questions posed in the introduction, let me summarise the main claims and findings of the thesis. 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. 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 nasijenstvo, 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 through the ethnographic material that scientists’ ability to manage ‘connections’ veze - 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 chapter three.

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 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, p.37) 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 and Harvey (2010) refer to as ‘uneven development’.

The thesis has also shown that socialist political legacies persisted and affected scientists’ work in a variety of ways, ranging from conceptions of the relationship between scientists and ‘publics’ (chapter five), through to the management of political veze (chapters two, three and four) as a means to gain 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 three. In addition, as discussed in chapter five, 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. The Belgrade based anthropologist Milenković described the post-socialist process associated with the decrease in authority of such figures in strong words:

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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, p. 39)

Despite a decrease in authority, I have shown that such a role still existed when I was conducting fieldwork. 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 ‘agents’, perhaps including ‘non-human agents’ for example. 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. My view is that, given the context of nationalist violence, making and discussing these political connections was important. I felt it was particularly important given that I am writing first and foremost to academic audiences living and working in the region, where the ideals surrounding the ‘humanist’ intellectual are in my experience still relatively strong. 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 (as discussed in chapter five), 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 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 capture a sense. 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. In other contexts, such as those with which the majority of the recent feminist inspired anthropological studies of techno-science deal, another approach may be appropriate. Nevertheless, a key weakness of this study is that, aside from a limited engagement with the work of Sharon Traweek, the study has not taken on board many of the insights from recent feminist scholarship in anthropology. This is partly connected with my background training in the SSK and science studies tradition, as well as with the humanist focus on scientists as a collective and their engagements. Whilst I discussed a problematic hierarchy concerning gentlemanly conduct which highlighted issues of gender inequality (chapter four), this study has not explored in great depth the particular role of women in science and how they were differentially affected by the wars and nationalist violence. An anthropological study which analyses women in science ethnographically (to complement the excellent sociological work completed by Blagojevic (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 what Smith and Harvey (2010) refer to as ‘uneven development’; where sociological changes and ‘time-space’ compression 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

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127 Some examples of authors include Martin (2001); Haraway (1989); Traweek (1992); Strathern (1992); Franklin and Ragoné (1998).
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.

Finally, 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; notably debates over the social (or not) construction of scientific knowledge (Bloor 1991[1976], Latour & Woolgar 1986), and critiques of human agency (Latour 1998). 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 semiperiphery, 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 (1995) famous phrase “we have never been modern”. Such plurals sometimes mistake particular historic subjects for a universal one and 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.

Consequently throughout the course of writing the thesis I developed an interest in and focus on social collectivities characterised by group labels which (ab)use the first person plural ‘we’. These groupings included a Serbian, Croatian or Yugoslav political community (chapter two), a ‘scientific community’ (chapter three), a wider academic community (chapter four), a ‘cognizant public’ (chapter five), and a ‘nation’ (chapters two, three and six). The severity of the wars and isolation during the nineties throws up the question of what work, political or otherwise, such collectivities are doing and what roles intellectual and political elites play in constituting, preserving and redefining such collectivities. Through analysing the discourse of scientists, in particular through the interviews as in chapter two, I have offered some possible answers to the question I posed of how the wars and new national hegemonies established affect scientists’ work, and of the roles scientists played in establishing or contesting these hegemonies. Perhaps the most important question of all concerning the production and maintenance of such collectivities, is the question of how lines of accountability and responsibility trace out connections between human subjects and the range of collectivities and polities in and through which people define and live out their lives – a focus which directly relates to the described humanist, political anthropological approach I have taken.

In this vein, one topic of particular interest and wider relevance for sociological studies of post-Yugoslav space concerns the relationship between the political and social crisis and wars, intellectual elites and wider publics who gain an understanding of academic knowledge and then act on the basis of that knowledge. Indeed there does exist a literature on this topic, such as the excellent work completed by Dragović-Soso (2002) and Dević (1998). Anthropological contributions which focus particularly on the relationship between particular discussions amongst intellectual elites and the ‘ordinary’ people who are affected by their debates and decision making, pace Verdery’s (1995) on socialist Romania, are less researched however. Indeed, state and nation production and the maintenance of those frames by the media, inscribed and maintained ‘publics’, as discussed in chapter five and
implied in chapter two. This process has created particular inclusions and exclusions which have been for some a source of solidarity, yet have resulted in reduced life chances and hope for others.

To conclude, I have tentatively argued, especially in chapters one, two, five and six, that far from being an ‘ivory tower’, the public authority and serious questions with which academia, and academics in post-Yugoslav 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. In chapter five I illustrated how the transmission of scientific information to publics was infused with other kinds of public engagements, some of which had an explicitly political dimension. Scientists could thus wield a certain amount of public authority in contrast with a role, for instance, of being a depoliticised ‘expert’ on a narrow scientific topic. Whilst important, 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. Individual academics rarely had complete control over those changes and the courses (smerovi/smjerovi) their lives and the lives of others took as the wars and ‘transition’ were 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 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 and therefore such academics are responsible in a definite sense, even if 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.
Appendix one: survey questions

Qualitative survey (sample copy)

Gender:

Year of birth:

Year at university:

Program at university:

First part

(1) What, in your opinion, is "science"?

(2) Are the natural sciences important for Croatia/Serbia? Argue your case.

(3) Write down three of the most famous Croatian/Serbian scientists and the field(s) in which they work/worked.

(4) Read these sentences:

"Tesla was a Serb from Croatia, who had a 'temporary' stay in the USA"

"Tesla was above all an American scientist, the fact that he was born in Gospić doesn't have any link at all with his life"
(a) Do you agree with these statements? State reasons for your response.

(b) Does it matter to you whether or not Tesla was a Serb/Croat/American? Why (not)?

Second part

(1) Why did you choose to study (astro)physics?

(2) Did anyone influence your decision to study (astro)physics?

(3) What are you interested in, as far as (astro)physics is concerned? What don't you like?

(4) What are, in your opinion, the advantages and disadvantages of the (astro)physics program?

(5) What will you do when you finish this program at university?

(6) When you become a qualified (astro)physicist, what kinds of opportunities for work do you think you will have, in Croatia/Serbia and abroad? Have you thought about this?

(7) Do you want to stay in Croatia/Serbia after you finish university? Explain your reply.
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