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Methodology of scientific research for humanities scholars.

Brief summary

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Introduction

The university asked me to give a series of lectures on research methodology for master's students studying international relations and regional studies. It turned out that there are many textbooks on this subject, but they are unusable because the authors describe the philosophy of science rather than research methodology, and these are two very different things! The methodology of science focuses on obtaining objective knowledge (independent of the state of the scientist's mind). The philosophy of science focuses on the process of cognition (epistemology). How does the human brain perceive the environment, how does it divide it into elements, systematise it, determine its truth or falsehood, determine its knowability, etc. Philosophers believe that they are helping science in self-knowledge, although this is a misconception. Instead of methodology as a science about method, i.e., about the clear way of a scientist's professional activity, students receive methodology as a science about cognition, in which everything is unstable, contradictory, and vague, since no professional psychologist or neurobiologist, let alone a philosopher, will tell you exactly what the brain is and how it functions. Attempts to study the rules of formal logic do not add clarity either, because it does not work in normal science. Therefore, I decided to write my own summary of the discipline "Methodology of Scientific Research," in which the main methods of creating new scientific knowledge would be presented first. After studying this discipline, future specialists should have a clear understanding of how to create scientific knowledge from fact to theory and how to apply the knowledge gained in practice to prepare their final qualification work (dissertation). No philosophical "water" or abstract reflections. Only a clear sequence of actions for a researcher to obtain truly new scientific knowledge.

The syllabus has been tested over five years and has received enthusiastic feedback from students. Therefore, I offer it to the widest possible circle of teachers and students for study and practical use in preparing dissertations and conducting specific research.

The course is intended for students of the humanities. All examples are given either on the basis of the humanities or with the use of examples from the natural and technical sciences in cases where this is necessary for the creation of humanistic knowledge.

The material is deliberately presented in the form of a brief summary. I only mention the essential research methods and give examples that I myself have used in my research. I very much hope that this discipline will be taught not by philosophers, but by specialists in the relevant fields of knowledge who can give real examples of the use of methods and techniques, with real examples of instruments, scientific

equipment and statistical data. The practical classes are structured precisely according to this principle.

I do not provide test questions, as they must also correspond to the specifics of the field of science being studied. Therefore, these notes are only a basis for collaboration with specialists in specific sciences. I would be delighted to receive constructive additions and new suggestions. The original source of the notes is available on the website alexskopin.org; all other sources are secondary, and I am not responsible for their quality. In the event of borrowing materials from the notes without reference to the original source, I will apply full copyright protection.

For the sake of clarity, I will begin with an analysis of the definition of "methodology," and then we will consider all the basic methods of modern science (especially the humanities) necessary for obtaining 17 types of new scientific knowledge. Proposals about the types of scientific knowledge and their strict sequence in Russian science are being considered for the first time and may raise questions even among advanced researchers, but if we do not do this, then instead of science we will get scientosophy (a vague combination of philosophy and science), naukomifia (a combination of science and mythology) and other quasi-scientific types of information.

Lecture 1. Definition of methodology, methods and techniques. Algorithm for creating new scientific knowledge.

Internet sources contain many definitions of the term "methodology." Artificial intelligence (Alice), Wikipedia, and Ruviki all define methodology as "the study of methods, means, and strategies for researching a subject." The Great Russian Encyclopaedia refers to methodology as a branch of philosophy and, in a narrow sense, defines methodology as "a set of procedures, techniques and methods of science, combined into a single constructive programme and serving as means for comprehending a particular object of scientific knowledge", and in a broad sense as "a set of methods used in a particular field of activity to achieve certain goals." The Oxford Dictionary defines methodology as "the scientific study of the methods and rules used in a particular field of knowledge." V.I. Dal's Encyclopaedic Dictionary defines methodology as "the science of methods... and ways of acquiring knowledge."

The main mistake in all of these definitions is repetition. Translated from Greek, "method" means a way of doing something. Therefore, when "method" is mentioned together with "means," "procedures," "techniques," "rules," and even "strategies," it is as if one were writing: Methodology is the study of methods, methods, and methods of researching a subject.

So, the main term in defining methodology is the term "method". A method is a way of doing things. But it is not the way a child or a novice or an uneducated person does things. **A method** is the way **a professional** does things. What distinguishes the actions of a professional? Correct goal setting, correct sequence of actions, accuracy, confidence in movements and thoughts, speed of action, clear understanding of the beginning, middle and end of each action, effective use of resources and tools, achievement of set goals. Therefore, when we talk not just about a way of acting, but about a professional's way of acting, that is a method. That is why **I define** the term "**method**" **more precisely as "a professional's standardised way of acting"**. **The scientific method** is a **professional scientist's** way of acting! At what point can a researcher be said to be a professional scientist? I think from the moment they defend their doctoral thesis, because at the level of a candidate of sciences, a scientist has mastered the method of their specific science and methodologies from collecting facts to substantiating the concept of the phenomenon under study.

Each branch of science develops only through the formation of its own scientific method. Mathematics forms the mathematical method. Geography forms the geographical method, history forms the historical method, sociology forms the sociological method, economics forms the economic method, and so on. Each scientific method has its own way of presenting the knowledge it has acquired. In mathematics, these are algebraic records and geometric diagrams. In geography, these are maps and texts with images of nature and people; in history, these are chronological descriptions; in sociology, these are texts, tables, and graphs; in economics, these are models, graphs, and expert analytics, etc. Sciences often use each other's methods. Historians use geographical maps. Geographers use historical chronologies and mathematical methods. Mathematicians try to rethink history using their methods. Sociologists use statistical methods and regional descriptions. Economists use mathematics of all kinds, sociology and political science. Therefore, future specialists study not only the methods of their own science, but also the necessary methods of related sciences. In a brief summary, I cannot describe all the classical methods of modern science. For this, there are introductory disciplines (Fundamentals of Economics, Fundamentals of Sociology, Modern Geography, etc.). Let us focus on what is absolutely the same for all sciences. This is **the**

algorithm for creating new scientific knowledge. Ideally, it consists of seventeen sequential techniques, in which there may be individual rearrangements depending on the group of sciences (humanities, natural sciences, technical sciences, etc.). In reality, this algorithm is applied in a variety of ways. This includes inventing a theory and then looking for facts to confirm it (in the ideal algorithm, the facts are obtained first, and then a theory is created based on them).

Methods are part of the scientific method. The main purpose of each method is to obtain new scientific knowledge that is as objective (independent of emotions and mental states) and rational (calculable) as possible. There are methods of primary observation and measurement. There are methods for creating databases. There are methods for calculating trends, making forecasts, developing scientific projects, writing articles and monographs, etc. Let us define **methods as sequential parts of a method designed to solve specific research tasks.**

The average person sees the result of applying the geographical method of cognition – a map – but has no idea how maps are created. They do not understand that first, a volume of information must be accumulated using methods for creating facts and series of observations. Then, based on the methodology of transforming the spherical surface of the Earth into a graphic plane of a map, a cartographic projection must be selected to display the facts. Next, points and lines representing the main landmarks (cities, rivers, railways, parallels and meridians, etc.) must be plotted on the diagram according to geographical coordinates. Next, it is necessary to develop symbols for the objects that will be marked on the map, etc. Each of these operations requires the creation and application of a clear methodology. But all this remains in the scientific "kitchen" where the map is prepared.

Similarly, ordinary people listen to the weather forecast every day, but they have no idea how professionals calculate this forecast using meteorology and why they need supercomputers.

Already in secondary school, students acquire the most basic knowledge of scientific research methods (through measurement, observation and calculation), but higher education is primarily responsible for understanding the method and the ability to apply it. The goal of higher education is to turn students into professionals who, in the course of their studies, have mastered the methods of a specific science (physics, geography, history, etc.), consisting of a variety of techniques (taught within the framework of individual disciplines). Unlike a holistic method, which is used from the beginning to the end of a study (from setting a goal to obtaining a result), a technique is a way of solving a specific problem. For example, a dentist must be proficient in the techniques of: a) tooth extraction; b) dental treatment; c) caries

prevention; d) implant placement; e) installing veneers; f) pain relief and many other techniques that will enable the implementation of a holistic dental treatment method. Based on the number of disciplines taught (an average of 8 professional disciplines per year) in higher education, a specialist must master 40 techniques that are part of their profession's methodology over five years of study.

Speaking in general terms about science as a whole, the main techniques that make up the algorithm of the scientific method are the following 17 techniques.

These are **1) the method of selecting a research topic (problem, object, goals and objectives of the research); 2) the method of creating and analysing individual facts; 3) the method of creating a group of sequential, similar facts from time series observations; 4) the method of spatially combining series of observations in the form of maps; 5) the method of calculating and analysing trends based on series of observations; 6) methodology for spatio-temporal forecasting based on trends; 7) methodology for substantiating causal hypotheses based on a comparison of two or more trends; 8) methodology for substantiating concepts based on two or more hypotheses; 9) methodology for creating a theory as a picture of the world based on two or more concepts of one's science; 10) methodology for generalised scientific forecasting (retrospection) based on concepts and theories; 11) methodology for setting up and conducting scientific experiments; 12) methodology for scientific programming and design based on a wide variety of achievements in one's own science and related fields of knowledge; 13) methodology for scientific expertise on public or intra-scientific requests; 14) methodology for transferring scientific knowledge and skills into the education system to support and disseminate the scientific method; 15) methodology for disseminating scientific knowledge in the professional community (in the form of articles, monographs, reports); 16) methods of disseminating scientific knowledge in society (in the form of popular science); 17) methods of writing qualifying scientific works (coursework, dissertations, doctoral research).**

After reading this paragraph, you may think, "But I don't know any of this!" That's right, because Russian universities teach competencies rather than methodologies. And what a competency is remains unclear, since it is simultaneously knowledge, skills, leadership qualities, communication skills, emotional intelligence, and other qualities that "blur" the essence of methodical (from the word method) and methodological (from the word methodology) training of students. In this course, we will correct this mistake and finally understand what the scientific method and

scientific techniques are, since even the Higher Attestation Commission and the Ministry of Science and Higher Education do not fully understand this.

The goal of each of the above techniques is to create only one of 17 types of scientific knowledge. These are

- 1) **Justification of a new research topic (problem, object, goals and objectives);**
- 2) **creation of new scientific facts;**
- 3) **creation of new series of observations from scientific facts;**
- 4) **creation of new maps combining series of observations in an area (creation of an area structure of facts);**
- 5) **calculation of trends based on the temporal dynamics of facts;**
- 6) **calculation of new trend forecasts;**
- 7) **justification of a new hypothesis by comparing at least two trends;**
- 8) **justification of a new concept based on a comparison of at least two hypotheses and four trends;**
- 9) **substantiation of a new theory by comparing at least two concepts;**
- 10) **creation of new conceptual and theoretical forecasts;**
- 11) **conducting new scientific experiments;**
- 12) **development of new scientific programmes and projects for solving applied problems;**
- 13) **conducting scientific expertise;**
- 14) **creating new textbooks and teaching materials for higher education;**
- 15) **creating scientific articles, monographs and scientific reports;**
- 16) **creating popular science books, participating in television and radio programmes;**
- 17) **preparing qualifying scientific and educational works.**

We will examine each of these types of scientific knowledge in detail in the following lectures. For now, let us return once again to the term methodology (literally, the science of method).

Let us ask ourselves a question. Is there anything in science other than methods and techniques? And let us answer, of course there is! First, there is scientific knowledge produced using methods and techniques. Second, there is the history of scientific discoveries and the entire dynamics of the development of science, from its separation from natural philosophy to the latest developments. Thirdly, it is the financing and organisation of scientific research, as well as the relationship between science and society, the relationship between individual scientists (including both good and bad relationships), between individual scientific schools, and much more. The term "science studies" is used for the comprehensive study of science. Therefore, **the methodology of scientific research can be considered a part of science studies that examines only the methods and techniques of scientific research.**

Philosophers like to talk about methodology as a kind of "superstructure" above science, a form of understanding scientific activity. In this case, we should

use the term "philosophy of science," within which philosophers can do whatever they want with their reflections on science. To be fair, it should be said that in the 1960s and 1970s, at the intersection of the methodology of science and the philosophy of science, truly significant works appeared by T. Kuhn (paradigmatic model of science) and K. Popper (The Logic of Scientific Discovery). P. Feyerabend (Against Method, Science in a Free Society), I. Lakatos (competitive struggle of research programmes) and other researchers, but a detailed study of these works only makes sense within the framework of the philosophy of science.

In addition to the methods of specific (classical) sciences – geography, history, physics, chemistry and others – methods of general scientific research began to develop in the 20th century. In general scientific research (the study of the complex consequences of nuclear tests, the formation of international relations systems, the environmental consequences of economic growth, and many others), the methods and techniques of specific sciences must be combined in a certain way. This is a rather complex task, since sciences, in the course of their development, begin to "break away" from each other in terms of equipment, computing capabilities, and other components of scientific research and scientific knowledge. Some sciences find themselves at the forefront, while others are on the periphery of scientific research. But in complex research, they must be combined in many components. This has led to the emergence of general scientific methods and professional communities that have begun to develop such integration and complementarity. Today, we can talk about three established general scientific methods. These are 1) the organisational and informational method, which includes tectology, cybernetics and the informational approach; 2) the systems approach and systems analysis; 3) non-equilibrium thermodynamics and catastrophe theory. The author is developing a fourth general scientific method – the theory of existence, the main provisions of which will be published in the second half of 2026. Postgraduate and doctoral students must be familiar with general scientific methods. We will examine these methods in the work **Methodology of Systemic (General Scientific) Research**.

Let us summarise and give a correct definition of methodology.

The methodology of science is a part of science studies that generalises knowledge about the methods and techniques of scientific research used by the professional scientific community for their further improvement and the creation of professional scientific education.

Now that we know exactly what the methodology of scientific research is, we will begin studying the algorithm of the scientific method by studying the methodology

of substantiating (selecting) the topic of scientific research (the problem, object, goals, and objectives of the research).

Practical exercise 1: 1. Find definitions of "methodology," "method," "technique," "science," and "science studies" on the internet. Analyse the pros and cons of these definitions from the perspective of Lecture 1. Try to come up with your own definitions.

Lecture 2. Methodology for selecting a new research topic.

The topic of scientific research is the main choice that a student must make at the beginning of their scientific career. If the topic is chosen correctly (it is interesting, relevant, supported by a basic level of information, promising in terms of possible continuation of research, promising in terms of financial support or increased social status), then each year of study it can be deepened and expanded, moving on to new levels of scientific knowledge. If the topic is unsuccessful (unpromising), then each new coursework will start from scratch, preventing the student from achieving the necessary level of depth by the time they write their final qualification paper.

The method for choosing a new topic includes three consecutive steps: 1) determining one's scientific interest (defining the field of scientific research); 2) choosing a scientific supervisor (an expert in the field of research); and 3) choosing a research topic with the help of a scientific supervisor.

The definition of one's scientific interest takes place in high school, when the future student chooses a university, faculty and field of study.

In their first year, they take courses that introduce them to the fundamentals of their future profession. As a rule, the fundamentals are presented from the general to the specific, which allows students to see the entire field of research (the Earth's surface for geographers, society for sociologists, economics for economists, etc.), as well as the division of the entire field into major parts (physical and social geography; macro- and microsociology; macro- and microeconomics, etc.). At the same time, students get to know their teachers, see their intellect and character traits, and understand who teaches best and who they would like to communicate with as a

research supervisor. Therefore, they can begin their academic work as early as their first year, in the form of preparing essays on topics related to the disciplines they are studying, preparing academic reports for seminars, and participating in student academic conferences and debates.

In the second year, students are required to choose a topic for their first course paper. The choice of topic is limited by the department and the lecturers who are assigned this workload. Therefore, students have virtually no opportunity to write a course paper on a topic that interests them. They are forced to rely completely on their academic supervisor not only in choosing the title of the course paper, but also in choosing the subject of research, setting the goals and objectives of the research, and structuring the paper. From my point of view, the first course paper is extremely important for the realisation of the student's scientific interest, so the university needs to make this opportunity as flexible as possible for the student and, of course, it should be a course paper in the field of the student's immediate professional interests. As for the novelty in the choice of research topic, it should be encouraged in every way. Students should understand the four possibilities of science in creating new research topics, which are 1) expanding the existing research object (i.e., including something in the research object that has not been studied before); 2) raising the level of research (facts became trends or hypotheses); 3) using the techniques and methods of other sciences to obtain interdisciplinary knowledge; 4) creating fundamentally new areas of research (and new branches of science).

Starting in the third year, the opportunity to get closer to the area of interest increases due to a better understanding of the capabilities of the department, the capabilities of teachers, the establishment of better contacts, and familiarity with the latest innovations in the field of science. The third-year course allows for greater freedom in formulating a topic, which can take into account not only personal interests, but also the interests of parents and relatives, the interests of a social group (family clan, people), the interests of the state, etc. The ideal research topic corresponds to four motives at once: scientific curiosity, moral duty (to the family, people, state), the opportunity to earn money, and the opportunity to improve one's status (professional, social, group, etc.).

For second-year coursework, it is important to demonstrate the ability to analyse existing facts and the ability to create facts using instruments, measurements, artefact searches, statistics and surveys. In the next lecture, we will talk about this skill in more detail.

For third-year coursework, it is important to demonstrate mastery of the methodology of analysing observation series and creating area maps showing the distribution of the phenomenon under study in a given area.

Coursework and final qualification projects in the senior years (4th to 6th) are significantly limited in terms of the ability to choose topics independently due to formal requirements for the availability of teachers with the appropriate specialisation and workload. The art of working with students in choosing a topic consists in finding a compromise between the capabilities of the teacher and the personal interests of the student. The mandatory components of the topic include relevance and a solvable research problem (along with the object, goals, and objectives). In addition to analysing facts, making observations and creating maps, it is important for senior students to demonstrate their ability to identify trends (4th year), make trend forecasts (5th year) and justify scientific hypotheses based on a comparison of two or more trends (6th year). If necessary, scientific experiments at the level of research laboratories and computer models can also be used.

The choice of topic for a candidate's dissertation is no longer determined by the place of study, but by the place of work, since a candidate's dissertation must include an applied part of the research, which is related to the performance of work tasks and the solution of current research problems. From the point of view of achieving a certain, higher level of scientific knowledge, compared to final qualification works, a candidate's dissertation must analyse at least two hypotheses (four trends) to substantiate the author's concept of the process under study and its verification (in the theoretical and analytical parts of the dissertation). The applied part must contain proposals (a project) for solving a topical social, economic, political or other socially significant problem.

The choice of a doctoral dissertation topic, on the one hand, does not depend on the scientific supervisor (but depends on scientific consultants), and on the other hand, is even more determined by the subject of research at the doctoral student's workplace and the requirements of the dissertation council where the doctoral dissertation will be defended. Therefore, there is no such thing as a completely free choice of a doctoral dissertation topic. In terms of the level of scientific knowledge that should be present in a doctoral dissertation, it should be at the level of conceptual and theoretical predictions (or retrospections) based on a solid theoretical foundation (at least two concepts in the given field of science). From the point of view of the level of applied results, a doctoral dissertation should show ways to solve (a programme for solving) serious social and state problems.

To sum up: the choice of research topic is partly based on the existing scientific interest of the student or doctoral candidate, but to a greater extent it is determined by the capabilities of the scientific supervisors. Therefore, the development of any scientific community is determined, first and foremost, by leading scientists who are ready to mentor young researchers. The teacher-student relationship plays a decisive role both in the development of young scientists and in the formation of scientific schools, without which it is impossible to create a broad and deeply studied field of scientific research. Therefore, three steps — choosing an interesting and promising area of research, getting help from an outstanding scientific supervisor, and clearly formulating scientific goals and objectives — will allow you to professionally determine the topic of your research.

Practical exercise: discuss possible topics for your qualification work with the teacher of this discipline. Listen to their reaction to the proposed topics. Ask for help in setting goals and objectives. How does the teacher assess the relevance and prospects of your topic? What will they say about the prospects for working on this topic in the future?

Lecture 3. Methods for creating and analysing new facts.

Science begins with **facts**. This is as irrefutable as the fact that religion begins with sacred scripture and sacred tradition, mythology begins with fiction, philosophy begins with reflection, journalism begins with events, etc.

A fact is the result of a single measurement of a phenomenon or object using a calibrated instrument. If a scientist does not have a calibrated instrument with a measurement scale (thermometer, ruler, microscope, etc.), then the fact cannot be obtained and scientific research cannot begin. The availability of scientific instruments is one of **the main differences** between scientists and ordinary people. Some philosophers of science accept observation as the beginning of scientific research. This is because ancient Greek natural philosophers used observations for subsequent reflection. However, this idea is unacceptable for modern science. Until a phenomenon is measured, it cannot be included in scientific research. **Without measuring instruments, there is no modern science!** In a sense, every person is

now equipped with a "scientific instrument." It is a smartphone that can count steps, measure blood pressure and temperature, record videos of observed phenomena with the time, place of observation, environment, etc. However, the use of a smartphone is quasi-science, or rather journalism, since the accuracy of measurements is questionable, and possible manipulation of images makes the information obtained more a source of fantasy than scientific knowledge.

What distinguishes scientific knowledge from other forms of information?

If you ask an ordinary person about their body temperature, they may say "normal temperature" or "high temperature". This is not a fact. It is a subjective observation (feeling) of that person. The fact is the result of measuring a person's body temperature with a thermometer that has a temperature scale. If you press the thermometer against the body in a certain way and hold it for a certain amount of time (where to press and how long to hold is determined by the measurement method), you will see a clearly defined temperature reading on the thermometer scale (36.6 degrees Celsius or other), and this will be **a scientific fact**. School-age children already know how to manipulate a thermometer so that it shows a higher temperature, which exempts them from school classes. Therefore, **the requirements for accurate and extremely objective measurement of phenomena are the cornerstone of true scientific research.**

Science measures everything – the size of the universe, solar radiation, the height of mountains, the number of trees in a forest, the length of a road, a person's height and weight, the size of a diamond, the force of an impact, etc. **Measuring phenomena and recording the results of these measurements as facts is the basic methodology of any scientific research, which fundamentally distinguishes science from philosophy, religion, journalism, and any other sphere of intellectual activity.** The most "scientific" sphere of intellectual activity in this sense is criminology, on whose objectivity people's fates depend.

If a political scientist discusses the abstract advantages of democracy over totalitarianism, this is not science, but political philosophy. If a political scientist says that the economy of democratic South Korea grew by 1.8% in 2025 and unemployment was 4%, and the economy of totalitarian North Korea grew by 3.7% in 2025, with unemployment at less than 3%, this is political economy.

In each specific branch of science, the methodology for producing facts is implemented in its own way, depending on the instruments and conditions of measurement. Meteorologists use thermometers, barometers, hygrometers and other instruments. Astronomers use optical, radio, X-ray and other telescopes. Economists use stock market prices based on transactions, macroeconomic statistics, etc.

Sociologists use representative surveys, political scientists use surveys of voters on the popularity of politicians and parties, etc. Instruments are constantly being improved and allow humans to measure things that they could not see, hear, feel, etc. Microscopes have opened up a previously invisible microcosm to humans. Telescopes have made it possible to see the universe.

A number of instruments from the field of science have found their way into the everyday life of modern man. Every day we use thermometers, devices in cars, and appliances in the kitchen and household. The widespread use of observation and measuring devices in our daily lives shows that the method of obtaining facts has become not only scientific, but has also entered the lives of modern people in a simplified form. For example, it took 400 years for the thermometer for measuring air temperature to become part of every home (the first calibrated thermometer was invented back in 1620, but the widespread use of this device in everyday life only began in the 20th century).

Even now, not all sciences use precisely calibrated instruments. For example, the humanities use such "instruments" as public opinion polls (sociology), voter counts (political science), stock market and retail prices (economic science), population censuses (demography), church attendance (religious studies), etc. Nevertheless, the first and most important difference between science and other types of information (myths, fiction, religion, philosophy, etc.) is precisely the presence of facts (measurements) as the basic feature of scientific research.

Thus, the methodology for obtaining facts involves an observer who takes measurements using a calibrated instrument and records or otherwise captures the fact in a specific way (e.g., by making a text or tabular record, taking a photo or drawing a picture).

Along with facts, there are also fakes in science. A fake is a falsification of a fact in order to obtain "plausible" information, which in fact not only distorts reality, but can also lead to completely false conclusions. There are known cases of fakes being created in archaeology and palaeontology, physics and chemistry, sociology and political science. Fakes are especially common in ideologised societies (communism, liberalism) to prove the truth and effectiveness of the chosen path of development. To combat fakes in science, there is a method of checking and double-checking facts. As already mentioned, such methods are especially important in criminalistics, which often encounters specially fabricated evidence pointing to the guilt of an innocent person. In this case, fakes not only divert attention away from the criminal, but also lead to the punishment of a completely innocent person.

The presence of fakes and the falsification of facts for certain interests requires scientists not only to understand how facts are created, but also to be able to analyse facts in order to recognise fakes and substitutions. This ability to analyse facts comes with time, when a certain knowledge base and analytical skills are formed.

Practical exercise 3. What instruments are used in your field of science? What units of measurement are used in these instruments? Measure a phenomenon or object using these instruments. What dimensional scales (from and to) are used in these instruments? Find examples of outstanding (unique) facts in your field of science. Find examples of fakes in your field of science. Select a group of facts and analyse them for accuracy and lack of manipulation. Independently create a group of facts (or find a reliable source of facts) for research in the field of your dissertation topic.

Lecture 4. Formation of series of measurements (observations) and area maps.

If measurements are taken with a certain regularity (several times a day, a week, a year, etc.), a series of measurements can be obtained. **A series of measurements is a group of facts obtained using the same measurement technique (at the same time, in the same place, with the same instrument, by similarly trained observers).** For example, there is a weather station on Vorobyovy Gory in Moscow where air temperature measurements have been taken since 1808, i.e. even before Napoleon's campaign in Russia. In 1954, it became a meteorological observatory with more modern equipment and a complex of instruments for weather observation. Therefore, meteorologists in Moscow have the longest series of comprehensive observations of temperature, humidity, wind direction, pressure and other parameters than any other weather station in Russia (although the first systematic weather observations began in St. Petersburg in 1722). Thanks to the long series of observations (which is usually presented in the form of a chronological table), meteorologists can talk not only about the daily weather, but also about the type of climate in a given area, because temperature and humidity indicators repeat themselves in the same seasons of the year. The observation series also show extreme temperatures that occur only once in the entire history of observations.

In the humanities, observation series are quite specific. For example, history uses historical chronicles in which socially significant facts (wars, battles, changes in power, crop failures, famines, riots, natural phenomena, etc.) are recorded in chronological order, which makes it possible to establish a certain periodicity of events and identify those that are most significant for the existence of a given society. In the science that studies international relations, the facts of the conclusion of international treaties that create the rules of international life are of great importance. Therefore, the history of international relations is not so much a description of wars as a description of the dates of conclusion and the essence of international treaties that establish new international relations.

The sequence of facts is extremely important for historians, political scientists, international relations specialists and representatives of other branches of science, as it allows them to clearly identify "violators" of the international order, against whom the international community must apply measures of "collective" deterrence. In order to attack Poland, Hitler's Germany staged a provocation on 31 August 1939, allegedly involving an attack by "Silesian insurgents" on a radio station in the German city of Gleiwitz (i.e., it created a fake with the time and place of the incident). And on 1 September 1939, Hitler announced the start of military operations against Poland.

If observation series (e.g., air temperature) are created based on data collected at different points in space, but using the same methods, the same instruments, and similarly trained observers, then we can confidently compare such observation series not only in time, but also in space. A resident of Russia can immediately see the air temperature in Moscow, St. Petersburg, Sochi, Novosibirsk, and any other city in Russia where there are weather stations included in the national weather system on television.

It is also quite possible to include fakes in the observation series and maps. However, the repeatability of the series and the duration of the observation periods make it possible to identify extremely high and extremely low values, the exceeding of which by new measurements always deserves special attention and re-checking. If the maximum air temperatures in Moscow have not exceeded 34 degrees Celsius in 120 years of observations, then a temperature of 35 or 36 degrees will already raise doubts. If the maximum human body temperature is 41 degrees (at this temperature, irreversible protein decomposition begins in the body), then talk of 42 or 43 degrees can already be questioned.

The stability and verifiability of measurement series led to the creation of blockchain technology (storage and transmission of data in the form of a chain of blocks), which

makes it impossible to change data retroactively. When transferring money from one address to another, communication nodes check whether the sender has enough money and whether the transfer complies with the rules of the blockchain. Then a block (an immutable record) is created, linked to all previous records. The appearance of the block makes the transaction valid and includes it in the permanent history of the blockchain. Everyone is familiar with cryptocurrency blockchains such as Bitcoin and Ethereum, but there are also private (for a limited circle of users) and hybrid blockchains.

Thus, observation series and spatial distribution patterns (relief maps showing terrain elevation, temperature distribution maps, and many others) are the most important result of applying the methodology of compiling observation series and spatial patterns. These methodologies are constantly being improved, including the use of space-based observation and measurement tools. The use of measurement series and spatial patterns is particularly effective for analysing complex phenomena. In economics, macroeconomists mainly use measurement series, while regional economists mainly use area patterns, so a combined analysis of macroeconomic indicators taking into account regional specifics makes economic analysis much more accurate and useful for the government and the President.

Practical exercise. Find a series of measurements and a spatial diagram for several series of measurements in your field of science. Consider the methodology for creating such a series and such a diagram. How expensive will the information obtained using this methodology be? Can you independently create a series of measurements and a spatial diagram for combining series of measurements with colleagues from other universities? What measurement series and spatial schemes can be used in your dissertation?

Lecture 5. Methodology for calculating and analysing trends. Methodology for trend forecasts.

A series of measurements can be shown not only in the form of a chronological table, in which each date corresponds to a fact, but also in the form of a graph. If we use the simplest graph, with the horizontal axis showing time and the vertical axis

showing the value of the measured facts, we will be able to calculate and analyse trends. A trend is the predominant direction of change in indicators (facts) over a certain period of time.

Search online for "gold price trends in 2025". Look at the graph showing changes in gold prices. In January 2025, the price of a troy ounce (31 grams) in US dollars was \$2,600. In April, it exceeded \$3,100. In May, it exceeded \$3,400, and in December, it was \$4,500. Thus, the price of gold rose by 73% over the year. In terms of price movement, we see an upward trend, with the price rising almost continuously throughout the year. In January 2026, buyers drove the price up to 5,600 (29 January), and investors who bought gold in January 2025 considered that they had earned 115% over the year and that this was enough. On 30 January, a massive sell-off of gold began, which lost 12% of its price in one day and fell to \$4,700 per ounce. However, the "smart" banks that sold gold on that day were left with an excellent profit. They gave 15% to their depositors and kept 100% for themselves.

The events of 30 January dramatically changed the direction of the gold price. If before 30 January it was rising, then it suddenly turned downwards (became declining). If the price of gold had remained unchanged for some time, this direction would be called sideways (neutral). Thus, at each point of the trend at the time of analysis, there are three possible further directions: upward, downward, and neutral. In Fig. 1, the three forecast directions are shown by arrows.

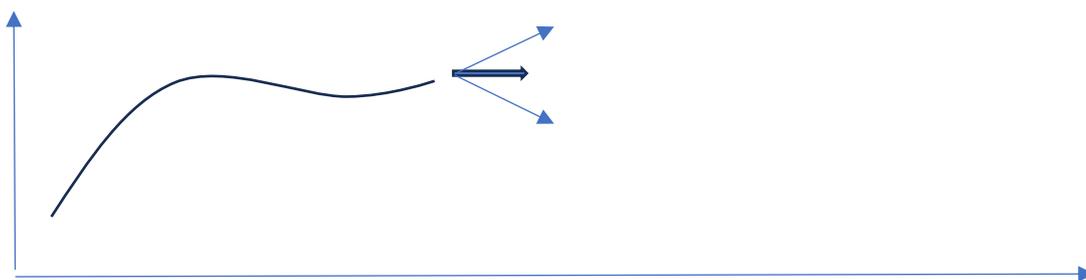


Fig. 1. Trend forecasting (three options: further increase, transition to sideways movement, or decrease).

This provides a good opportunity for trend forecasting. In such a forecast, the indicators will either increase, decrease, or remain unchanged in the future. This means that a person who makes a trend forecast has at least a 33% chance of making the right decision. All "trend" forecasters can be divided into "fast" (entering an

upward trend at the beginning of the rise), "thinking" (entering an upward trend in the middle of the acceleration) and "conservative waiters" (those who enter an upward trend at its peak and lose a lot of money at the first downturn).

Trends can be built on three types of indicators: maximum indicators, minimum indicators, and average indicators.

If we analyse an upward trend and see that it is moving from maximum indicators to average indicators, then the probability of a transition to minimum indicators increases. If the trend moves from minimum indicators to average indicators, then the probability of a further increase grows. Stock market analysts use technical analysis methods (moving averages, momentum indicators) and statistical methods (.). However, trend forecasts must be supplemented with an analysis of fundamental factors that link several trends together through cause-and-effect relationships. For example, it has been observed that demand for gold increases in pre-crisis and crisis periods of economic growth. Therefore, the trend forecasting method must be supplemented by a method of proposing and testing various hypotheses about the relationship between the analysed trends and fundamental factors (gold, oil, wars, elections, debt crises, etc.).

The method of temporary trend forecasting can be supplemented by the method of spatial forecasting, when trend changes are predicted not only in time but also in space. Space can be very loyal to a trend change (widespread growth in gold prices), very conservative to a trend (unchanged price), or negative to a trend (price decline). This is due to the fact that space is differentiated and each country or region has its own characteristics in responding to external changes. The peculiarity of the professional training of regional specialists is precisely that these specialists must have a thorough understanding of spatial differences and adjust global trends to take into account the different responses of regions.

Practical exercise: Draw a graph of changes in facts over time in your field of knowledge. What was the trend in these facts in 2025? What forecast can be made based on this trend regarding changes in indicators beyond 2025? What series of observations and trends can be used in your dissertation? What trend forecast can be made based on current trends? How do different countries respond to the same global trend? Why do fashion trends spread at different speeds in Europe and Russia?

Lecture 6. Methods for proposing new scientific hypotheses

A scientific hypothesis is a comparison of two trends to establish formal or substantive cause-and-effect relationships.

Formally, any trends can coincide in direction and duration. For example, an increase in air temperature in May and a rise in the price of tutoring services for schoolchildren preparing for their final exams. The demand for tutoring in May formally coincides with the trend of rising air temperatures, but it is unlikely that these two trends can be meaningfully linked and a correlation established. The statement "the rise in air temperature in May causes an increase in the price of tutoring services" would be perceived as a lack of basic school knowledge, and the statement "the rise in the price of tutoring services in May causes an increase in air temperature" would be perceived as a reason to see a psychiatrist. Nevertheless, a famous expression has emerged in science and journalism: "British scientists have proven that...", which refers precisely to formally coinciding trends. For example, British scientists have proven that "within 24 hours of eating bread, a criminal is 90% likely to commit a violent crime" or "that people who have celebrated many birthdays live longer." Some of the more serious hypotheses put forward by British scientists include "low cancer rates among children who eat ketchup at McDonald's" and "a steady decline in demand for football socks among people over 95 years of age." The most interesting discovery by European and British scientists in recent years is the establishment of a link between democratic values and natural gas pollution. It turned out that American democratic natural gas is much cleaner than Russian natural gas, which led Europe to conclude that it was necessary to completely abandon the purchase of cheap but undemocratic Russian gas at €200 per 1,000 cubic metres in favour of American democratic gas at €500 per 1,000 cubic metres. As we can see, the formal coincidence of trends often leads to the creation of false hypotheses that make scientists look ridiculous.

At the same time, establishing meaningful cause-and-effect relationships can be very useful in understanding the world and various events.

For example, to explain the rise in gold prices in 2025, hypotheses linking gold prices to the following factors are used: - 1) a reduction in the US Federal Reserve's interest rate and a decline in the dollar exchange rate; 2) increased geopolitical tensions in the Middle East and Latin America, which reduces the of investing in the real sector of the economy and encourages investment in gold; 3) increased demand

for gold from central banks due to increased currency volatility; 4) increased demand for gold from individuals diversifying their assets, etc. Each of these hypotheses is confirmed by figures, and we can speak of the cumulative (combined) impact of all these factors on the rise in the price of gold.

Even more hypotheses have been put forward to explain global climate change, in particular the trend towards global warming. Climatologists attribute global warming to only one factor: human economic activity, especially the emission of greenhouse gases into the atmosphere and the increase in the greenhouse effect. However, palaeoclimatology shows that there were significant fluctuations in air temperature on Earth even before the appearance of humans. Even now, temperature observations show that there are three types of regions on the Earth's surface. In the first type of region, the air temperature is indeed constantly rising (the Arctic and Antarctic). In the second type, temperatures are clearly decreasing (the North Atlantic in the Gulf Stream zone). In the third type, temperature "swings" are becoming more frequent, with air temperatures becoming either extremely warm or extremely cold. The Moscow region and a significant part of Russia belong to the third type.

An analysis of air temperature measurements in Moscow shows the following. Every year, meteorologists record temperature records both in the direction of greater warming and in the direction of greater cooling. In other words, temperature readings are increasingly exceeding the limits of the existing 120-year series of observations, which allows us to make a reasonable conclusion that the modern climate system in the Moscow region is becoming increasingly unstable and will produce new temperature records, of which there will be several dozen in 2025 alone. This is only possible in one case – when two opposing factors simultaneously affect the climate. The first factor, of course, is human activity. The second factor may be cosmic causes (e.g., a global decline in solar activity, etc.). If two factors act simultaneously, the number of hot days increases in summer and the number of extremely cold days increases in winter. There may also be local cooling in summer and local warming in winter.

If scientists identify several simultaneously acting factors, it is time to move from hypotheses to concepts (comparing at least four indicators, i.e. at least two hypotheses). For this purpose, there is a methodology for creating concepts, which we will consider in the next lecture.

Practical exercise: 1. Name the most relevant hypotheses in your field of science. Which two sets of measurements could be used to formulate these hypotheses? How

can a hypothesis be confirmed or refuted? Which existing hypotheses can be used in your dissertation?

Lecture 7. Methodology for substantiating scientific concepts.

When several hypotheses are discussed in science, it becomes possible to combine them to substantiate concepts that cover an even greater number of facts, series of observations, spatial patterns, trends, and hypotheses.

One of the most discussed concepts in modern economic science is the concept of economic growth. Why do some countries and regions have long periods of economic growth, others have intermittent periods, and still others are constantly in decline?

Two hypotheses are most often used to answer this question: the demographic hypothesis of T. Malthus, who compares two trends — population growth and food production growth — and the investment hypothesis of K. Marx, who compares capital growth and industrial production growth.

According to Malthus' hypothesis (not theory or concept), economic growth occurs on new lands, the cultivation of which leads to an increase in agricultural production, creating a surplus of food and provoking population growth. The new population cultivates new land, produces even more food, and so on. But when the land runs out and the population continues to grow, there is a reduction in food production and a decline in production, as well as socio-economic unrest and riots. Malthus' hypothesis explains the situation in agrarian countries well, but is completely unsuitable for explaining economic growth in industrial countries. Karl Marx's hypothesis is more appropriate for industrial countries, according to which the main factor of economic growth is the use of capital as production equipment (machines, tools, etc.). The more capital is used by workers, the more goods are produced, including new capital, and the greater the economic growth. Karl Marx's additional assumption is that if capital belongs to workers, it will be used more efficiently than if it belonged to capitalist entrepreneurs. Therefore, production will grow at an even faster rate.

The hypotheses of Malthus and Marx complement each other well. If a country begins to experience agricultural overpopulation, then the peasants must be resettled in cities and turned into workers who, with the help of capital, will begin to produce

industrial goods. V. Lenin combined the hypotheses of Malthus and Marx as they applied to Russia and created the concept of the revolutionary transition of the agrarian Russian Empire to the industrial Soviet Union, which was implemented in the 20th century.

An alternative concept of economic growth was used in the United States. It was based on hypotheses of economic growth based on the use of intensive growth factors – entrepreneurial talent, labour organisation, competition, innovation and institutions (the ideas of A. Smith, D. Ricardo, J. Schumpeter and T. Veblen). Entrepreneurial talent is a person's ability to organise the production of socially useful goods. The more entrepreneurs there are in a country, the greater the opportunities for economic growth. The organisation of labour is the division of labour between workers, leading to specialisation and a sharp increase in labour productivity (manufacturing, Fordism and Toyotism). Supporting a high level of competition also contributes to economic growth, as production activities are carried out by those who are able to achieve the best price-quality ratio for their products. Innovation is always necessary to win the competitive struggle, and public and private institutions (rules of conduct) can either stimulate economic growth or suppress it. Thus, in economic science, two concepts oppose each other: the Malthusian-Marxist (planned) and the liberal (market) concepts. The consistent application of the Malthusian-Marxist concept created a socialist bloc of countries with a rapid transition from an agrarian to an industrial society, while the liberal concept created a bloc of capitalist countries with a transition from an industrial to a post-industrial society. Contemporary economic science in Russia, as well as in China, is attempting to combine these two concepts to create an economic theory of mixed growth.

Practical exercise: Find concepts in your field of science. What hypotheses underlie these concepts? Is there competition between concepts in your field of science? Which concept could form the basis of your dissertation?

Lecture 8. Methods for formulating scientific theories

The fundamental difference between a concept and a theory lies in the number of testable hypotheses (two hypotheses for a concept, four hypotheses and eight trends for a theory) and the reaction of the scientific community. If two concepts

complement each other, a theory can be created based on them. A theory differs from concepts not only in the number of tested hypotheses, but also in the creation of a terminological dictionary. The main thing in a theory is clear definitions of terms, since a picture of the world or a picture of part of the world requires a clear description, and without a clear meaning of terms, this would be impossible. S. Huntington was unable to give a clear definition of the term "civilisation," so his book *The Clash of Civilisations* can only claim the status of a concept, but not that of a theory.

When it comes to combining concepts into a theory, we can return to the example of economic growth concepts. It would seem that the concept of a planned economy is completely incompatible with the concept of a market economy. Is it possible to combine them to create a mixed theory of economic growth and, within the framework of such a theory, justify the elimination of the shortcomings of both the plan (poverty for all) and the market (wealth for the select few)?

The Chinese experience shows that, of all the world's economies, it is the Chinese economy that demonstrates the best example of rapid economic growth, combining the mechanisms of both a planned and a market economy.

China's first reform in the late 1970s consisted of a transition to family planning, i.e., Malthus's hypothesis was borrowed to limit population growth in order to create a surplus of food production. At the same time, institutional reform in agriculture (family contracting) was borrowed from liberal hypotheses, which dramatically increased the entrepreneurial abilities of peasants and labour productivity in agriculture. Thus, two reforms from different concepts of economic growth (one from a planned economy, the other from a market economy) led to such changes in China's agricultural sector that the country not only fed its 1.4 billion people, but also exported agricultural products, and many Chinese villages began to prosper.

The same dual reform was carried out in the industrial sector. The need to attract capital to high-tech industry was borrowed from Marx's hypothesis. In total, China carried out five industrialisation reforms, including the import of equipment from the USSR in the 1950s, but the most successful were the two reforms of the 1980s and 1990s, during which, firstly, special economic zones were created to attract Western investment (similar to the Singapore and Hong Kong models of development), and, secondly, a model of competitive management of state-owned enterprises was applied in mainland China, which made it possible to maintain the planned production of goods necessary for the state economy and, at the same time, saturate the market with consumer and investment goods for the agricultural sector and urban residents.

As a result of the reforms, China began to use the advantages of both a planned and a market economy, which allows it to maintain high economic growth rates (3-5%)

per year and increase the welfare of the population. China has become the world's leading country in terms of GDP (calculated at purchasing power parity).

Russia initially pursued reforms based solely on a liberal concept of economic growth, which led to a huge decline in industry (up to 52%) and agriculture (up to 47%). In the 2000s, production began to recover thanks to foreign investment. However, in the 2020s, restrictions on international trade and foreign investment forced Russia to return to planned economic development using state resources (especially in the defence industry and agriculture), and economic growth began to accelerate.

Thus, the theory of a mixed economy is becoming the leading economic theory in both China and Russia. In the near future, it may spread to other SCO and BRICS countries.

A good theory provides an adequate description of the world in the relevant field of scientific knowledge. This allows science to move out of laboratories and offices into political activity and reform society in the direction of progress. Conceptual and theoretical forecasts, which are much more reliable than trend forecasts, play a decisive role in such reforms.

Practical exercise: What is the main theory in your field of science at the moment? What concepts and hypotheses is it based on? What are the disadvantages and advantages of this theory? Are there any competing theories? Can this theory be used in your dissertation?

Lecture 9. Methodology of conceptual and theoretical forecasting

A huge advantage of forecasting using concepts and theories (compared to forecasting based on trends) is that it is based on the entire body of accumulated scientific knowledge (in the form of facts, series of observations, maps, trends, trend forecasts, and hypotheses). Of course, analysing such a vast array of knowledge requires time, participation in scientific discussions, and life experience. That is why scientists return to the ability to make conceptual-trend (CT) forecasts at the age of 50-70.

As a sociologist and political scientist, V.V. Zhirinovsky made exceptionally accurate predictions in the field of Russian foreign policy. Back in 2010, he predicted the reunification of Crimea with Russia, two months before the start of the special military operation, he predicted its implementation, in 2017, he predicted the reunification of Eastern Ukraine with Russia, accurately characterised Europe's role in inciting Ukraine to armed conflict with Russia, and made many other predictions, including not only political but also social and economic life in Russia. The basis for such predictions was, of course, not political intuition (as stated on the LDPR website), but rather a vast knowledge of geopolitics and incredible insight, such as the ability to see what is "hidden" from the average person.

Two Western concepts, published in 1993 and 1995, occupy a central place in modern geopolitics. One concept was developed by Z. Brzezinski and published in his book *The Grand Chessboard*. The second concept was substantiated by S. Huntington in his book *The Clash of Civilisations*. These books gained worldwide fame in the second half of the 1990s and were undoubtedly known to V.V. Zhirinovsky.

Zbigniew Brzezinski's concept is based on the hypothesis of American leadership in the world and in Eurasia in the 21st century and the hypothesis of the gradual decline of Russia's role. The book explicitly identifies Central Asia and the Caucasus as priority targets of American policy in Eurasia, where the US must demonstrate its global leadership and establish control over the region's energy resources. If one is familiar with this concept, then many of the individual political decisions taken by the US in relation to individual states in Central Asia and the Caucasus appear not as a random set of measures, but as a targeted policy with a clearly defined strategy. As part of this strategy, provoking conflict between Russia and Ukraine is aimed at stopping direct access to hydrocarbon raw materials from Russia and Central Asia to Europe and creating US-controlled transport corridors for the export of resources from Central Asia and the Caucasus to Europe (the Trump corridor). Zbigniew Brzezinski made several fundamental errors in his practical conclusions and predictions based on his concept. He exaggerated Russia's weakness (which is typical of all Poles) and underestimated the power of China, which he assigned the role of a regional power. As a result, Russia and China united within the SCO and created a serious centre of resistance to American plans in Eurasia, thanks in part to the predictions of V. Zhirinovsky and the activities of the LDPR.

S. Huntington's concept is more realistic than Z. Brzezinski's. It is based on two hypotheses. The first hypothesis states the strengthening of the role of two civilisations in the modern world – Chinese and Islamic (according to demographic

and economic growth trends). The second hypothesis is based on an analysis of the trend of demographic decline in Western countries and the trend of a growing mental divide in the West (competition between socialism, liberalism, nationalism, racism, environmentalism and many other ideologies, leading to the division of society into ideological groups). This leads S. Huntington to the reasonable conclusion that the West is weakening and that there will be a decisive clash between Chinese and Islamic civilisations and Western civilisation in the 21st century. Although Huntington calls for the unification of the West and the preparation of the United States for a clash with these civilisations, his prediction of possible American success in a third world war (which will begin in Southeast Asia) seems unconvincing. This happens to scholars who replace the logic of their own concept with the emotionality of an American citizen who must speak from a patriotic standpoint. For the same reason, S. Huntington, like Z. Brzezinski, believed in the decline of Russia and Orthodox civilisation and called on the US not to waste resources on competing and fighting with Russia, but to focus on limiting Islamic and Chinese influence.

Despite the fact that both Brzezinski's and Huntington's concepts became the basis for geopolitical forecasting and planning for US presidential administrations, they do not rise to the level of theory, as they make a serious miscalculation in identifying the most important threats to white America, which are not foreign policy but domestic policy issues. These include: 1) the uncompromising domestic political struggle between Democrats and Republicans; 2) the fading possibility of the white minority retaining power in the country (Trump may be the last white US president); 3) underestimation of the growing influence of the Indian diaspora in the US, which has brought its representatives to the vice-presidency (K. Harris) and the mayoralty of New York (Z. Mamdani), and is constantly increasing its demographic, economic and political weight in the country. Based on these threats, it can be predicted that the 21st century will be the century of the decline of the United States, and with it, the entire Western civilisation, which may be accelerated by military conflicts between the West and China, Russia, Islamic, Latin American, African and a number of Asian countries.

I have developed a universal theory of international relations, which can be found on the website alexskopin.org, and which provides much more accurate forecasting capabilities, as it takes into account trends in 10 areas of international relations. According to this theory, the Chinese, Indian, Russian, Brazilian, Indonesian, and South African super-ethnic groups will increase their influence in the world, along with groups of Arab, Turkic, Spanish-speaking, and Iranian-speaking peoples. The

centre of world civilisation will finally shift to East and South Asia, which will produce most of the world's GDP and most of its technological innovations.

The peoples of Western civilisation are gradually deteriorating demographically and psychologically (the Epstein case perfectly demonstrates the psychological degradation of the political elites of the West) and will gradually disappear in the 21st century, as is already happening with the peoples of the Baltic states.

Practical exercise: Find an example of a conceptual-theoretical (based on 4 or 8 trends) forecast in your field of science. How reliable does such a forecast look? Has it been confirmed in real life? What mistakes might it contain? Can this forecast be used in your dissertation?

Lecture 10. Methods for designing and conducting scientific experiments.

In the second half of the 20th century, scientific forecasting began to dramatically expand the horizons of management decisions. What types of weapons should be developed? What resources should be developed? Which scientific projects should be supported and which should be closed? To answer the many questions that arose, science proposed conducting scientific experiments that modelled situations on a micro scale (at the level of scientific laboratories), allowing objective facts to be obtained for making more informed management decisions on a macro scale.

In the 21st century, the need for scientific experimentation has grown exponentially. Today, scientific inventions are revolutionising technology, economics, social and political life, and leading to situations that call into question the very existence of humanity (new infections, robots with artificial intelligence, climatic and tectonic weapons, etc.). There is an existential need to obtain preliminary data on humanity's reactions to these threats.

One does not need to be a super-scientist to predict the extreme danger to humanity posed by nuclear, biological, chemical, and other types of weapons of mass destruction. However, work on improving these types of weapons continues, and

with testing banned, the only way to continue the work is to conduct classified experiments.

For science, especially military science, there are no forbidden topics of research. They concern changes in the human genome, the development of new types of energy, the creation of military robots, the creation of new types of weapons based on new physical principles, etc. Nowadays, there are no fantastic ideas that do not immediately become the subject of scientific experiments. Therefore, scientific experimental methods are becoming increasingly in demand, even in the social sciences.

One of the founders of Soviet physics, Academician P. Kapitsa, explained these methods in his well-known book, *Experiment, Theory, Practice*. They involve initially conducting experiments on a micro scale (in laboratory conditions), then, once sufficient data has been obtained, the experiment is conducted on a medium scale (in research and development and experimental design facilities), and then the experiment is transferred to an industrial scale (to real production enterprises). At each stage of the experiments, refinements and improvements are made to the technology and the products being created, allowing resources to be saved and serious losses in real production and during the product operation stage to be avoided.

In political science, experiments are associated with the preparation and implementation of revolutions, each of which simulates a rapid change of power and the establishment of quasi-democratic (but in reality, Nazi, tribal, racist, and other totalitarian regimes). The very process of preparing and carrying out a colour revolution is an experiment in influencing mass consciousness, distorting values and imposing certain new models of behaviour on people of different generations, but primarily on the generation of aggressive youth, which acts as an instrument of mass unrest and change of power. The methods of conducting colour revolutions are described in many monographs and articles.

Virtual experiments have come to play a special role in modern science. Modern computers allow hundreds of thousands of calculations to be performed, making it possible to model the process of change in the smallest details. Whereas previously the effect of a new molecule on the effectiveness of a drug had to be tested in hundreds of experiments, computer programs now allow this to be done thousands of times faster and without huge costs. The same applies to the modelling of new types of weapons. Modern children already model the development of civilisations, battles, city construction and other large-scale processes in computer games. Therefore, scientific experimentation techniques are progressing rapidly and

increasingly using virtual capabilities to achieve fast and effective results. In the humanities, virtual experiments particularly clearly demonstrate the consequences of management decisions. Therefore, mastery of scientific experimentation techniques is becoming an essential component of the scientific method.

Practical exercise: Find examples of scientific experiments in your field of science. Consider one of the experiments step by step. What role did existing theories, concepts, hypotheses, and trends play in the justification and conduct of this experiment? What new facts and conclusions were obtained during the experiment?

Lecture 11. Methods of scientific programming and design

Thanks to the constant accumulation of a huge amount of relatively objective knowledge in the form of facts, trends, hypotheses, concepts, theories, and predictions, scientists know more than representatives of any other profession. They use their knowledge to warn society and managers about dangerous consequences. However, managers say to scientists, "If you know so much, then tell us what to do." In this case, the stage of scientific programming and scientific design begins, during which programmes and projects for specific actions are developed.

A programme is to a project as a method is to a methodology. A programme must be comprehensive in nature, clearly defining goals and objectives, the amount of financial resources required, the time frame for implementation, and the necessary results. A project is an integral part of a programme and is aimed at achieving one of the objectives set out in the programme. The project has a more detailed rationale than the programme and may set out daily action plans and control results (weekly and monthly). The duration of the programme is several years. Projects are usually planned for one year.

I have participated in two major programmes. In Kazakhstan in the 1980s, a programme was developed to solve the problem of the Aral Sea (summarised in my book *Ecological and Economic Problems of the Aral-Balkhash Region and Ways to Solve Them*, 1991). According to this programme, four main projects needed to be implemented in the Aral Sea basin: 1) to separate the Small Aral Sea from the Aral

Sea basin with a dam (the project was successfully implemented); 2) reduce rice production in Kazakhstan as the most moisture-loving crop and reduce water withdrawal from the Syr Darya River (the project is still being implemented with some success); 3) establish quotas for water withdrawal from the Amu Darya and Syr Darya rivers for each state in the Central Asian basin and monitor compliance with these quotas (the project has been implemented, but conflicts have arisen); 4) actively introduce water-saving technologies in the region's agricultural and urban sectors (the project is being actively implemented). It can be argued that the programme is quite successful, as the water area of the Small Aral Sea has been fully preserved, where fishermen are once again engaged in fishing, the sea level has risen by almost half a metre since 2023, and water-saving technologies are being actively introduced in the sea basin, which allows for an increase in agricultural production even in conditions of reduced water consumption. As the developer of the programme, I consider it to be the most successful scientific achievement of my life.

The second major programme was developed in Russia in the 2000s and provided for the modernisation of school education. In this programme, I was involved in a project to modernise school education in rural areas. The project proposed: 1) a complete transition to distance learning in remote areas; 2) optimisation of the network of rural schools in regions with good roads (such as in the Samara region) and the organisation of 'school' buses; 3) the creation of mobile science laboratories that could travel from school to school to demonstrate experiments in physics, chemistry and biology; 4) the creation of specialised agricultural classes to retain students in rural areas; 5) the creation of incentives for rural teachers to live in rural areas and pursue professional development, and others. Unfortunately, of the measures listed, only the "brutal" reduction of under-enrolled rural schools (more than 20,000 rural schools have been closed since 2000) was carried out, which was not at all envisaged by our project and is an initiative of the municipal authorities, which financed the maintenance of schools from municipal budgets. The Zemsky Teacher programme is currently working to create incentives for teachers to relocate, but the conditions of this programme (payment of 1 million roubles for 5 years of work) are such that the number of participants has not yet exceeded 400. As the main developer of the rural school programme, I consider it to be completely distorted and unsuccessful in its implementation at all levels of government – federal, regional and local.

Based on the results of this programme, it can be said that if a project is social and does not give the state an advantage in terms of power (defence projects), wealth (energy and foreign trade projects) or strengthening of power, it is very difficult to predict its successful and sufficient funding, and therefore its implementation. The

"cheap and cheerful" approach prevails in the minds of bureaucrats who are tasked with implementing social programmes and projects. Therefore, for science, participation in social projects is also not very prestigious or promising. Nevertheless, without scientists, social planning is doomed to complete failure and showmanship.

To sum up: programme development is the creation and justification of a sequence of actions (projects) that will lead to the desired result. Scientists develop projects in detail (goals, objectives, activities, project budget, expected results) and monitor their implementation in order to make the necessary adjustments. In Russia, social projects related to the SVO are actively supported, but, of course, social development programmes and projects need to be expanded to cover a wider range of areas.

The most successful organisation in the world that develops highly sought-after projects at the national and global levels is RAND Corporation in the United States. In the practical session, you can look at one of this organisation's projects.

Practical exercise: Find RAND Corporation reports in open sources and analyse such a report according to the following scheme: 1) project goals and objectives; 2) problem being solved; 3) proposed actions (subprojects); 4) expected results and project budgets; 5) degree of project implementation to date. If social development projects at the federal and regional levels in Russia are available, you can also consider one of these projects for comparison.

Lecture 12. Methodology of scientific expertise on public or intra-scientific requests.

Scientific expertise is a reasoned opinion of a highly professional scientist on a socially significant or intra-scientific topic, expressed in the media or in special expert notes.

The methodology for preparing special expert notes includes obtaining a clear request for an assessment (the goals and objectives of the assessment, questions for analysis and preparation of a response, the sequence of responses, the form of the

final expert opinion, the amount of funding), organising an expert group, and preparing an expert opinion. If a quick and reasoned response is required, an expert council is held in the form of a remote discussion.

For example, a comet with an unusual trajectory, unusual colour and unpredictable behaviour arrives in the Solar System from the universe. Some American scientists say that only an alien spacecraft could behave in this way. The Russian government tasks Russian astronomers with conducting a scientific review of the American researchers' conclusions and either confirming or refuting them. The task is sent to the Russian Academy of Sciences (RAS). The president of the RAS sends a request to the relevant scientific institutes and receives a response signed by the directors of these institutes, stating that the comet is unusual, not because it is an alien spacecraft, but because it is flying from far away and has acquired some new properties. However, in order to avoid getting into trouble, the directors add that it would be a good idea to conduct additional scientific research, and if the government allocates additional funds, the scientists will be able to give a more definitive answer. Having received such a response, the government may allocate additional funds, because if it does not, the scientists will say, "We asked for a little money for additional research, but we were not given it. That is why we were unable to warn about the alien threat in time. Thus, expertise turns into a process of additional funding for scientific research, which allows scientists to remind bureaucrats of their importance and either reassure them or, on the contrary, alarm them.

Business structures, various expert bodies, and the media most often seek expert assessments. The latter are the most unceremonious and want to receive any expert assessments free of charge and as quickly as possible. As a result, expert assessments are often provided not by the most qualified professionals, but by those who can afford to spend a couple of hours working in a television studio for free.

Each expert assessment requires additional preparation. This is due to the rapid "aging" of information, new legal acts, new events in the country and in the world, etc. The peculiarity of presenting expert assessments on television is also linked to the unpredictability of the presenter, who may interrupt the expert at the most important moment to recall a childhood memory, the Epstein files, an alien invasion, or other "important" events. Since 1987, I have given about 600 interviews on radio, television, and for newspapers, and I understand perfectly well that it is quite difficult to give well-founded expert assessments quickly, especially since there is a high probability of their distortion during preparation for publication or broadcast (except for live broadcasts). Just one publication on the problems of the Far East, in which the correspondent distorted the meaning of my statements, made me an enemy

of all the inhabitants and administrators of the Far East, and my well-founded reversal of the whole of Russia towards the Far East (the textbook "Economic Geography of Russia" and other publications and speeches since 2005) went unnoticed by everyone.

In addition to socially significant expertise, scientists often "expertise" themselves. For example, many scientific journals and publishers send articles for review by at least two experts in the field of research, and if at least one of the reviews is negative, such an article or monograph is unlikely to be published. As a result, innovators in science who put forward fundamentally new ideas find themselves at a disadvantage (without publications), while scientists who write "familiar" and "understandable" works find themselves published. All scientific reports also undergo expert evaluation. This "red tape" begins in universities, when reviews of bachelor's and master's theses are required. Those who have received such reviews know how it is done.

Nowadays, special programmes such as "Antiplagiat" and artificial intelligence are used for mass expert evaluation. However, they cannot yet replace the expert evaluation of a truly good specialist. A good expert assessment shows the real pros and cons of the research. It shows the researcher themselves the main areas for improvement, which can be extremely useful for scientific knowledge, for the methods of obtaining it, and for social progress.

Practical exercise: Find examples of scientific expertise in your field of science. What scientific status do the scientists who perform such expertise have (candidates, doctors of science, academicians, Nobel laureates)? In which television and radio programmes and newspaper publications has this expertise been discussed? What management decisions could it lead to? Have you received feedback on your research? Was it really useful?

Lecture 13. Methods of transferring scientific knowledge and scientific skills to the higher education system to support and disseminate the scientific method

First of all, let us state that without science there is no higher education, and without higher education there is no science! Science must bring the latest knowledge, as well as methods and techniques (scientific skills), to higher education. Higher education must convey this knowledge and these skills to each student in the most accessible way, ensuring understanding and application. Therefore, mutual understanding and interaction between science and higher education is a crucial issue for the survival and development of these fields of activity. This crucial issue is decided by teachers, as intermediaries between science and higher education, who must have special professional training and extremely rare teaching talent.

Many people think that teaching does not require special training. All you need to do is read a few pages of a textbook and retell it to students as they take notes. We admit that this does happen. However, true teaching involves a variety of skills (teaching methods). Firstly, the information must be made relevant at the time of retelling, even if it concerns the life of dinosaurs (actualisation methodology). Secondly, complex scientific knowledge must be simplified for the level of the relevant course (simplification methodology for each course from 1st to 6th). Thirdly, the flow of information must be clearly segmented, with the main, secondary and tertiary topics highlighted, to which different memorisation requirements apply (multiple repetition, two or three repetitions, single mention). This is the responsibility of the knowledge differentiation method. Fourthly, it is necessary to take into account the previous preparation of students (what knowledge they should already have) and constantly link new knowledge with existing knowledge (the methodology of linking knowledge). Fifthly, it is necessary to take into account the racial, national, linguistic, gender, age and other characteristics of students in order to create a high level of mutual understanding and communication (method of mutual understanding). Thus, a mediocre teacher simply retells the textbook. A talented teacher implements a variety of methods for transferring scientific knowledge and skills, creating creative, critically thinking students who will promote scientific research at the highest level in the future.

I would like to highlight the role of acquiring scientific skills in higher education.

If the learning process is based solely on memorising existing scientific knowledge, students risk becoming "experts" but not "skilled practitioners" because they will not master either methods or techniques. If they have never seen a scientific instrument, never taken measurements themselves, never created measurement series, never created spatial diagrams, never plotted trends, never made trend forecasts, never put forward hypotheses, etc., they will not be able to create new scientific knowledge, but will only be able to repeat the knowledge they once memorised. Thus, higher

education can "produce" experts, but not create new scientists! Therefore, university teachers must personally engage in scientific research in order to be able to pass on not only scientific knowledge, but also scientific skills. University graduates must conduct real research for 5-6 years, testing methods and techniques to identify their shortcomings. After defending their doctoral thesis, young researchers are considered to have made a significant contribution to both the improvement of methodologies and the production of knowledge. With this background, they can join a university as a lecturer and pass on the skills they have acquired through their research.

Teaching is very different from research. Not every scientist is capable of teaching. Some scientists do not understand that they need to interact with their audience (observe, respond in a timely manner, monitor the speed of information transfer, explain complex knowledge or methodologies repeatedly), interact with students' parents (directly or indirectly), motivate those who are lagging behind and encourage those who are ahead, and do many things that are not part of science. Teaching skills can theoretically be acquired from teaching methods, but if a person does not have a talent for teaching, it becomes torture for students. For example, schools have introduced the Unified State Examination for teachers. However, the score a teacher receives only shows their level of knowledge; it does not show their teaching talent, i.e. their ability to transfer knowledge and skills. As a result, a person who is knowledgeable but unable to teach can create a completely wrong impression of the subject and cause rejection among pupils and students. Often, someone with average knowledge but good teaching skills is much more useful than someone with extensive knowledge but poor teaching skills. Therefore, when transferring scientific knowledge and methods to universities, it is extremely important to look for talented teachers, not just scientists who have achieved certain scientific results.

It turns out that without immersion in real science, a person cannot become a scientist, and when transitioning to teaching, they must master completely new methods of transferring knowledge and skills to the younger generation.

Among the great scientists who possessed teaching talent, K.E. Tsiolkovsky, A. Einstein, P. Kapitsa, L. Landau and many others are well known, and there were real legends about their teaching, as they spoke so simply and clearly about the most complex phenomena of nature and society. Conveying knowledge and skills in a way that is understandable without losing sight of the main point is the most important method of transferring scientific knowledge and skills to higher education!

The formation of scientific schools is direct evidence of the successful transfer of knowledge and skills. At first, they consist of one professor and students. Then these

students become postgraduates and doctoral students. Then they become professors, who have their own students, and so on. In addition to teaching talent, the founder of a scientific school must also have organisational talent. Only a few scientists possess this talent, which makes it all the more important for the transfer of knowledge and the creation of scientific schools.

When it comes to the specific teaching methods for a particular academic discipline, it begins with an analysis of the existing curriculum for that discipline, the existing textbooks and teaching aids for that discipline, the distribution of the knowledge to be studied across lecture hours, and the distribution of the skills to be studied across seminar and practical class hours. The teacher distributes the volume of knowledge and skills to be transferred by hours and ensures that the entire volume transferred is successfully assimilated by students. To this end, surveys and tests are conducted, and notes and essays are checked. If the teacher sees shortcomings in existing textbooks and teaching aids, they can write their own teaching aid and use it in their classes.

This lecture notes were written because there was no textbook on the subject of "Research Methodology" that provided clear definitions and a clear algorithm for obtaining scientific knowledge from the very beginning. Later on, the confusion in definitions usually intensifies, making the content of the textbook less and less understandable. As a result, students do not gain knowledge about methods and techniques, but rather a philosophical reflection on scientific research, which is of little use for concrete scientific research.

Practical exercise: Open a textbook on the basics of your science. Are the basic definitions given? Is the knowledge (facts, trends, hypotheses, concepts) relevant? Is there any mention of skills (methods of obtaining facts, series of observations, area diagrams, trends, trend forecasts, hypotheses, concepts, theories)? What types of scientific knowledge (facts, trends, etc.) make up the main content of the first chapter and what makes up the main content of the last chapter (is there a transition from simple to complex, from facts to theory)? Are there examples of the practical application of knowledge in your field of science in forecasting, programming, designing, and solving pressing social problems?

Lecture 14. Methods of disseminating scientific knowledge in the professional community (in the form of articles, monographs, conference reports)

The result of scientific research is a scientific report on the research conducted, which is submitted to the customer (the scientific foundation that awarded the grant, ministries and departments, regional and city authorities, business structures, public organisations, political parties, etc.). The content of the scientific report may be closed (not subject to free distribution), semi-closed (with the possibility of partial open publication), or open for publication.

In the first case, the research results are only available to the customer, and the contractor (individual scientist or research team) does not have the right to freely publish the research results. In the second case, the customer gives permission for partial publication of the results obtained. In the third case, no permission for publication is required, and the researcher is free to choose a scientific conference to present the research results in the form of a report, a specialised scientific journal to publish an article, or a publishing house to publish a scientific monograph.

Participation in a scientific conference usually requires the payment of an organisational fee, including the publication of the abstract of the report (from 3 to 5 thousand roubles in 2025). Travel to a conference within Russia requires additional transport and accommodation costs. Not every university or institute is willing to pay for scientific trips. Trips abroad are only available to leading specialists and institute management. The main advantage of participating in conferences is that you can discuss the results obtained in a direct discussion, establish direct contacts with other scientists, and establish contacts with potential customers for future research.

Publishing in a scientific journal also requires a certain amount of time (correspondence with the editorial board, waiting for the editorial board's decision on publication) and sometimes financial costs (from 2,000 to 20,000 roubles). The main problem is that the publication must comply with the "policy" of the journal's editorial board, i.e. a certain scientific theory and, sometimes, the political preferences of the editorial board. It is necessary to use more cautious wording than in a conference report, not to offend or argue with great scientists, to support each idea with a quote from the classics, and to follow other requirements (at least 10-12 references to sources, mention of the most cited authors and monographs, brief conclusions, etc.). The right to publish is transferred to the editorial board, and further publication of the materials in other journals or monographs becomes

impossible. The introduction of requirements for the number of publications per year by the administrations of institutes and universities creates serious problems for researchers and teachers if such requirements are not backed up by appropriate funding. Scientists have to pay for their publishing activities out of their own pockets, which can amount to 50 to 100% of their monthly salary per year.

The situation is even more complicated when it comes to preparing and publishing scientific monographs. In terms of volume, a scientific monograph is equivalent to 10-15 articles, which means that it is necessary to accumulate material for publication, format it as a single whole, pay 200,000 for publication, engage in distribution and, sometimes, sales, store the published print run of the book, and resolve other issues. While it is sufficient to obtain results at the level of new scientific facts and trends to publish an article, a monograph must contain at least hypotheses and concepts. In the life of every scientist, the publication of a monograph is a serious summary of research for their entire scientific career. My analysis of monograph publications in the field of international relations showed that scientists published their most significant monographs at the age of 68. Not every specialist lives to see this age, and only one professor in a thousand can publish a work that will gain worldwide fame. However, even the publication of a world-famous work does not make a scientist rich, although it can make them immortal (Plato's *The Republic*, Confucius' *Discourses and Judgements*, Sun Tzu's *The Art of War*, Niccolò Machiavelli's *The Prince*, Samuel Huntington's *The Clash of Civilisations*, etc.).

If a scientist is skilled at disseminating the knowledge they have acquired (obtaining grants for publishing research results, scientific reports and trips to conferences) and knows how to interest the authorities, the scientific community, teachers and students, their scientific career will be quite successful. If a scientist is withdrawn and preoccupied with financial problems, if he is not well known, his scientific career may come to an end and he will have to find another profession.

Practical exercise: Find examples of scientific reports, scientific articles and monographs by a scientist you know. Compare them in terms of the types of scientific knowledge, the techniques and methods used. Can these sources be used as a model to emulate? Would you like to participate in the research conducted by this scientist? What knowledge and skills would you like to acquire first?

Lecture 15. Methods of disseminating scientific knowledge in society (in the form of popular science)

Unlike the dissemination of scientific knowledge within the professional community, the transfer of scientific knowledge directly to society requires its significant simplification, a clear understanding of the target audience's ability to comprehend the knowledge being transferred, good communication skills, quick reactions, and other abilities on the part of the scientist.

The dissemination of scientific knowledge can take the form of publishing popular science books, articles, and brochures; participating in television and radio programmes; blogging; responding to and commenting on popular internet resources, news feeds, etc.

The publication of popular science books and brochures may even be paid for by the publisher if the print run is expected to be in the tens of thousands (the print run for a scientific monograph is only about 200 copies).

Participation in radio programmes brings limited fame, but the format of the programme is such that it is difficult to discuss the most important issues, let alone the necessary solutions. Important issues are always complex, and the format of a radio programme requires extreme simplification and emotionality in order for the audience to respond to the programme with heightened interest. The necessary solutions will inevitably affect the interests of the authorities and powerful groups in society, so radio stations either introduce self-censorship during broadcasts or provide programmes in advance for pre-editing. Nevertheless, the opportunity to communicate research results to a large audience should certainly be used, especially if these results destroy public mythology and can improve people's lives.

Television programmes are the most effective way to disseminate knowledge. The practice that existed in the USSR of selecting professional presenters, choosing scientific experts, showing the necessary video clips, preparing television studios and the work of cameramen made television programmes about science a real popular science show, in which it was possible to consider not only the results of scientific research themselves, but also criticism of these results from a wide variety of positions (from criticism by other scientists to criticism by the pseudo-scientific and completely non-scientific community, which intensifies the degree of criticism and requires impressive arguments to defend one's position). The main disadvantage

of television programmes is the lack of payment for the participation of experts, despite the significant loss of time (from 3 to 6 hours, including travel time to the television studio). Since the host controls the television programme, its success largely depends on their knowledge, involvement in the topic, and the editorial team's tasks. Therefore, hosts who have come to television from science can achieve the most positive effect in disseminating scientific knowledge and increasing public interest in scientific research.

Modern means of Internet communication (social networks, messengers, services for short videos or texts, news feeds, author websites, etc.) offer enormous opportunities for disseminating research results and organising distributed research for individual researchers. The younger generation is mastering these new methods faster than radio or television programmes, not to mention books and brochures. This poses significant problems for established scientists who are not proficient in using new Internet opportunities to convey their knowledge. In addition, there is a huge problem with people's use of long-term memory, as information becomes so fragmented that it is no longer stored in long-term memory, and the consumer of information finds themselves swimming not in a rural pond, but in the ocean, where every new metre swum leads to completely new impressions and events.

The problem of disseminating scientific knowledge in society is becoming one of the fundamental problems of modern society, and the scientific community must urgently come up with the latest and most effective methods of disseminating knowledge. Hollywood has long embraced disaster films, which use real scientific predictions and discoveries to model the behaviour of society in extreme situations (global cooling, the revival of dinosaurs, the explosion of the Yellowstone supervolcano, a catastrophic earthquake in California, and others).

Practical exercise: Find examples of popular science books and brochures in your field of scientific knowledge. What radio and television programmes disseminate knowledge in your field of science? Which experts are involved in the preparation of these programmes? Find examples of scientific information transmitted via the Internet (social networks, messengers, news feeds, author websites, websites of scientific institutes, websites of universities). What is the purpose of student scientific conferences? Can they be considered a means of disseminating popular science information?

Lecture 16. Methods for writing academic papers (coursework, dissertations, thesis research).

Now we have come to the practical application of this discipline. Its most important outcome is mastering the methodology of writing a qualification paper (final qualification paper and master's thesis with a possible transition to a candidate's dissertation).

The standard for a master's thesis is based on state educational standards and internal regulations of higher education institutions.

Common to all standards are formal requirements for volume (80 to 120 pages with illustrations); structure (title page, table of contents, introduction, main part consisting of 3-4 chapters, conclusion, list of references and appendices); formatting (font, spacing, page numbering, etc.).

The methodological recommendations of universities additionally include rules for choosing a topic (from choosing topics proposed by the graduating department to independent choice of a topic by the master's student together with the scientific supervisor); rules for organising work on the thesis (determining the structure of the work, monitoring the writing of individual chapters by time period, consulting on specific issues, monitoring the preparation of publications based on research results, monitoring preparation for defence), rules for preparing an abstract.

We are interested in whether there are requirements for the content of master's research and the level of scientific knowledge that should clearly define the level of qualification work – from coursework and final bachelor's qualification work to a master's thesis.

To answer this question, let us consider one of the university standards.

For example, the methodological guidelines of Kuban State University on the preparation and formatting of final qualification papers and coursework (2024) refer to general requirements for the content, structure and volume of research papers, as well as basic recommendations for writing and requirements for formatting papers for the fields of History and Teacher Education. Coursework is defined as "logically complete and presented in text form in-depth studies of individual topics in relevant academic disciplines" (p. 5). It turns out that if the topic of the academic discipline "History" is "The Formation of the Moscow State in the 15th-16th Centuries," then

a second-year student must already provide a logically complete in-depth study of this topic? This is clearly impossible! Thus, the definition of course papers in these methodological guidelines is obviously overstated in terms of requirements. For final qualification papers (bachelor's and master's degrees), the definition is given that these are student papers "whose main purpose and content is scientific research on topical issues of a theoretical and practical nature in the field of study" (p. 5). This definition is not specific and can be applied equally to both bachelor's and master's theses!

For clarification, let us examine how the Higher Attestation Commission (HAC) defines the requirements for candidate dissertations in terms of content: a candidate dissertation must be a scientific work in which the problem is not simply researched but solved using specific applied tools. The tools developed must have characteristics such as practical significance, innovation and relevance. Therefore, the thesis must contain three sections: theoretical, analytical and practical. The theoretical section examines the experience of predecessors and provides an overview of sources. The analytical section studies the current state of the object and subject using specially selected methods. The practical section describes the development that allows the identified problems to be solved. In addition, in applied candidate dissertations, it is important to demonstrate the results of testing and provide information on implementation with a description of the features of the implementation.

As we can see, not only is a term paper on "The Formation of the Muscovite State in the 15th-16th Centuries" impossible, but so is a candidate's dissertation on this topic, since it is unclear what to write about in the analytical and, especially, practical chapters of such a study. Who should provide the report on implementation? Ivan the Third?

The complete uncertainty in the requirements for the content of qualification works can be resolved very simply – if we distribute the mastery of methods for obtaining scientific knowledge according to qualification levels.

In a second-year course paper, students must demonstrate their mastery of the methodology of independently creating scientific facts (using measuring instruments, statistical data analysis, price analysis, archaeological excavations, study of museum exhibits, field work, etc.). The coursework should take the form of a scientific student article and, in 10 pages, describe the methodology for conducting measurements or other creation of scientific facts and analyse the facts created in terms of their scientific and social usefulness and comparability with existing facts in the field of research.

The coursework of a third-year student should contain at least two series of measurements obtained by the student (in the form of tables) and an area diagram combining these series of measurements (for example, two routes for determining heights and a relief map, or two routes for determining market prices and a map of price distribution across the territory, etc.). The volume of such a coursework should not exceed 20 pages, of which approximately 10 pages are devoted to the description of the creation of observation series and 10 to the creation of an area diagram. For a historian, these may be series of archaeological excavations, archival documents, museum exhibits. For a geographer, these could be measurements using thermometers, barometers and other instruments, subsequently combined into area diagrams. For an economist, these could be the temporary dynamics of prices for certain types of goods and the area distribution of prices in local markets (urban, municipal).

In a fourth-year course paper (30 pages), it is necessary to add an analysis of trends over certain periods of time (10 pages) to the facts obtained (10 pages), series of observations, and area diagrams (10 pages). In a historian's coursework, this could be, for example, an analysis of changes in population size, the size of the armed forces, the area of territory under control in the relevant centuries, etc. In a geographer's coursework, this could be trends in temperature and other indicators over recent years. In an economist's coursework, this could be an analysis of price trends over the last two to three years. When preparing a 4th-year course paper, it is possible to conduct laboratory scientific experiments and virtual modelling of the processes being studied. Course papers of this level must be entered into a unified database of course papers for possible use in forming topics, solving research problems, and determining the basic level of scientific research in certain fields of science.

In the coursework (thesis) of a 5th-year student (40 pages), trend forecasts (for December-May of the last year of study) must be added to the trend analysis so that the forecast can be verified by the time the thesis is defended.

In the final qualification work (dissertation) of 6th-year students (50 pages), it is necessary to add the formulation and verification of a hypothesis about the causal relationship between two phenomena. For a historian, this could be a hypothesis about the relationship between population growth and the number of military campaigns; for a geographer, a hypothesis about the relationship between climate fluctuations and volcanic eruptions; for an economist, a hypothesis about the relationship between food price dynamics and the dynamics of transport costs for

food transportation, etc. It is necessary for students to be able to compare both formal and substantive coincidences of trends.

Thus, upon completion of higher education, students should be able to create new facts, new series of measurements, new area diagrams, calculate new trends, make trend forecasts that can be verified in December-May of the final year of study, and put forward hypotheses based on the formal and substantive coincidence of two trends.

When preparing a candidate's dissertation, the ability to compare two hypotheses (four trends) should be added to the above skills. The first chapter should consider the first hypothesis, based on two trends. The second chapter should consider the second hypothesis. The third chapter should put forward a concept that combines both hypotheses. Thus, the candidate of science must achieve a level of formal and substantive comparison of two hypotheses and the ability to justify their own concept of the process. In the fourth chapter, based on the proposed concept, proposals should be made to solve a specific economic, social, political, or other humanitarian problem (in the form of a project). Candidate dissertations also require a real or virtual scientific experiment to assess the effectiveness of the proposed solutions. The number of scientific publications prior to defence should not exceed three scientific articles in VAK journals and one brochure on the research topic.

Doctoral dissertations must include a conceptually sound theory and programme for solving a complex social problem. The results of the doctoral dissertation must be published in advance in a monograph.

Using the proposed scheme of qualification levels, we set clear criteria for each qualification level and encourage students and postgraduates to master the methods necessary to confirm each qualification level (from facts to theory). Only in this way can we develop professionalism among humanities scholars and science as a vital field of activity.

Practical exercise: with the help of your teacher, determine the topic of your final thesis, develop a structure, identify sources of factual material, and select or formulate two hypotheses based on a series of observations.

Conclusion.

The methodology of scientific research studies the methods and techniques of modern science as ways of producing new scientific knowledge and disseminating it professionally in the scientific community, in higher education and in society as a whole.

Today, there are 17 basic methods of knowledge production (methodologies) that form a unified algorithm for scientific research (scientific method) and 17 basic types of scientific knowledge.

These are: 1. Methodology for creating a new topic for scientific research; 2) methodology for creating new scientific facts; 3) methodology for creating new series of measurements from scientific facts; 4) methodology for creating new maps combining series of measurements in an area (creating an area structure of facts); 5) a method for calculating trends based on the temporal dynamics of facts; 6) a method for calculating new trend forecasts; 7) a method for substantiating a new hypothesis by comparing at least two trends from different measurement series; 8) a method for substantiating a new concept based on a comparison of at least two hypotheses and four trends; 9) methodology for substantiating a new theory by comparing at least two concepts; 10) methodology for creating new conceptual and theoretical forecasts; 11) methodology for conducting new scientific experiments; 12) methodology for developing new scientific programmes and projects for solving applied problems; 13) methodology for conducting scientific expertise; 14) methods for creating new textbooks and teaching materials for higher education; 15) methods for creating scientific articles, monographs and scientific reports; 16) methods for creating popular science books and participating in television and radio programmes; 17) methods for preparing qualifying scientific and educational works.

Mastery of these methods determines the scientific level of the researcher. A second-year student can create facts under the guidance of a teacher. A third-year student should be able to create series of measurements and area diagrams for combining series of measurements. A fourth-year student can create and analyse trend graphs. Fifth-year students should be able to make trend forecasts for two or more series of measurements. Sixth-year students should be able to formulate hypotheses about the formal statistical and substantive causal relationship between two or more trends.

Starting in their second year, students should conduct scientific experiments and virtual modelling of the processes being studied. Starting in their third year, they should master the techniques of preparing scientific reports and articles.

The main requirement for the level of scientific knowledge in candidate dissertations is the development of a project to solve a real problem (at the local, city, or regional level) based on a conceptual and theoretical forecast that includes several (6-8) trend forecasts and the conduct of a scientific experiment at the experimental design level. The candidate must be able to prepare scientific articles and scientific reports.

The main requirement for a doctoral dissertation should be the candidate's ability to compare concepts, put forward theories for solving problems at the macro-regional, federal and international levels, develop a programme for solving problems, prepare a monograph for publication, and conduct industrial-level experiments.

Using the proposed scheme of qualification levels, we set clear criteria for each qualification level and encourage students and postgraduates to master the methods necessary to confirm each qualification level (from facts to theory). Only in this way can we develop professionalism among scientists and science as a vital field of activity.