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Our mission is to promote psychology both as a fundamental and applied science within and outside Russia. We provide a platform for development of new research topics and agenda for psychological science, integrating Russian and international achievements in the field, and opening a space for psychological discussions of current issues that concern individuals and society as a whole.

Principal themes of the journal include:

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Vol. 16. No 1
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CONTENTS

Psychology. Journal of the Higher School of Economics.
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Special Theme of the Issue. Theoretical and Applied Issues of Research into Human Environments

Guest editors — S. Nartova-Bochaver, M. Kyttä

EDITORIAL

Environment surrounds people throughout their life span; environment is infinite in space and eternal in time. However, today's abusive relations towards nature have become a serious threat to its very existence. It is vital that people approach the situation mindfully and carefully, since environment is a great force to be tampered with.

Environmental approach is inevitably implicitly present in all psychological research in the form of stimuli or conditions of mental processes, as well as like ecological validity of the study. In the current international special theme of our journal we have collected papers devoted to environmental psychology as a subject of explicit study.

Recently, environmental psychology has been developing dramatically in different directions. There are many reasons for this dynamics: Medicine uses health potential of environments; developmental, organizational and clinical psychologies require establishment of recreational environments; urbanism strives to design humane buildings and cities, etc. All these requests are satisfied by environmental psychology. And, in order to preserve a resource function of the environment, it is necessary to educate ecological thinking.

In broad sense, environmental psychology is not only a field of science; it is rather a paradigm of thinking and doing science. In narrow sense, environmental psychology is the study of transactions between individuals and their physical settings (Gifford, Steg, and Reser, 2011). In these transactions, individuals change their environments, and, in turn, are influenced by environments. Environmental psychology as a science includes theory, research, and practice aimed at making the built environment friendlier, improving relations with natural environments and extending ecological thinking.

Careful use of living environments and their preservation is a task that unites all mankind, regardless of the place of residence and culture. Therefore, it is not

surprising that most of the works presented in our issue are made in collaboration by scientists from different countries: Estonia, Netherlands, Poland, Russia, Ukraine, and USA. The main purpose of the issue is to establish a scientific dialogue between the directions of research from different cultures for their mutual enrichment.

The papers collected in this issue complement each other by representing different areas of environmental psychology.

The work by M. Heidmets, V. Durmanov, and K. Liik "Apartments and Offices: How to Make Both Planners and Users Happy?" deals with a problem of user's dissatisfaction with the built environments, both home and work. The article by I.V. Kryazh "The positive effect of nature connectedness on psychological wellbeing: the significance of trust as a mediator" confirms connectedness with nature as a predictor of psychological well-being. The theoretical paper by L.V. Smolova "Types of Thinking and Their Value for Ecological Education" clearly shows that each type of thinking may be a resource for the education of environmental attitudes. The article by S.I. Reznichenko, S.K. Nartova-Bochaver, and E.I. Braginets "How the Home Matches the Person: The "Relevance of The Home Environment Questionnaire" continues the theme of built environments, presenting a new version of the instrument measuring the extent to which the home reflects and satisfies inhabitants' needs. In the paper by S. Clayton, B.D. Irkhin, and S.K. Nartova-Bochaver "Environmental Identity in Russia: Validation and Relationship to Concern for People and Plants" there is a concept of environmental identity validated on a Russian sample. Finally, the article by T.C. Andringa and N. Angyal "The Nature of Wisdom: People's connection to nature reflects a deep understanding of life" presents an original approach to understanding human-nature relation, based on enactive cognition theory and concept of wisdom.

Human — environment relations is an escalating topic due to the numerous environmental issues across the globe. It becomes more and more obvious that resolving this urgent sore is our primary duty not just as psychologists, but as sapient beings. We believe that the urgency of new environmental studies could make a substantial difference and have significant impact on the future of human environment. We hope that the first experience of such special theme will further stimulate new environmental research.

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APARTMENTS AND OFFICES: HOW TO SATISFY BOTH PLANNERS AND USERS?

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Abstract

Two cases of user-environment mismatch and tensions as well as ways and modes of the users' adjustments to strictly pre-defined physical environments are presented and discussed in the article. The first case is historical — it analyses consequences of a mass housing program in the former Soviet Union where tens of millions of families coming from very different cultural and social backgrounds had to adjust their everyday life to extremely standardized physical settings. Using the results of the study carried out during 1978–1985 in several Soviet cities, the main areas of tensions and sources of discomfort reported by residents, are described and discussed. The second case focuses on a recent trend in workplace design called activity-based offices representing work environment where employees don't have their own (fixed, personalized) workplaces but are supposed to move from one zone to another, depending on the task or activity they are involved in. A study of activity based offices carried out in Estonia in 2018, indicates that employee's participation in the planning and designing of their work environment may help them better adjust to a novel and unusual workplace layout. The message from the both cases is that a better communication between planners and end-users as well as collaboration between them may help to reduce misunderstandings and the user's dissatisfaction with the physical environment where people have to live and work.

Keywords: mass housing, office environment, place attachment, user's satisfaction, planners-users collaboration.

Introduction

People and their physical surroundings are two different, but deeply interrelated realities: people's needs, behavioural habits, social relation patterns, on the one hand, and principles of planning and design, architectural traditions and technological innovations, on the other. Those two realities converge in our apartments and houses, in streets and workplaces, in public areas and images of our cities, sometimes creating satisfaction and happiness (both for the planners and the users!), but often also controversies and conflicts. When psychologists describe people-physical environment relations, they usually take the position of users and talk about meaningful places and place attachments, personalization and home-like emotions. When the same issues are addressed by planners and architects, their viewpoints and vocabulary are quite different; they are troubled by the functional

layout, external attractiveness and cost-effectiveness of buildings and not so much by the users' attitudes and satisfaction concerning their everyday environment.

Although the idea of a "user's impact and participation" in environmental design is an old and widespread dream, in practice things usually happen vice versa. According to Fischer, in spite of the pressure to have a "user's perspective", in the majority of cases *"... design professionals are regarded as the experts and end-users are the objects of their study during the design phase and the passive recipients of their work once it is finished"* (Fischer, 2003, p. 89). In the majority of cases, users are forced to adapt their behavioral patterns and schemes of interpersonal relations to the 'professionally' pre-defined physical environments, be it a high-rise apartment, a quadrilateral classroom or a park area with fixed sitting and talking places. Does such "technological determinism" have its cost? Is "anything goes" when designing physical surroundings a socially appropriate approach, are there some "human-defined" limits besides simple ergonomic and hygienic characteristics for rooms and spaces? Are users (inhabitants, city dwellers, travellers, office workers, etc.) able to adjust themselves to any kind of physical context, where a mismatch of the social and the physical leads to conflicts, alienation or simply the abandonment of places or territories? And vice versa, are the users ready to participate, do they have enough competence to do this?

In this article we are going to discuss two examples that represent the user-environment mismatch and tensions as well as ways and modes of the users' adjustments to strictly pre-defined environments. The first example is historical — it analyses a large-scale "social experiment" carried out in the former Soviet Union, whereby tens of millions of families coming from very different cultural and social backgrounds had to adjust their everyday life to extremely standardized physical settings. This is a case of the so-called Soviet high-rise residential areas erected during the 1970s and 1980s almost in every big city of the former Soviet Union. The second one is new, representing the recent trend in workplace design called activity-based offices. This stands as a novel way in designing office environments, a model where office employees don't have their own (fixed, personalized) workplaces but are supposed to move from one zone to another depending on the task or activity they are involved in.

In both cases the users (residents, office employees) are faced with a physical environment that happens to be quite different from what they had previously. In both cases, the users' needs and preferences were not adequately addressed, the layout of the physical environment has emerged from economical calculations, technological considerations and political preferences. How do the users adapt to the pre-defined rooms and places? Are there some lessons for planners emerging from those two different (considerations of time and scale!) but still similar (thoughts about ways of creating environments!) cases?

Both cases will be introduced by a brief background overview followed by empirical data representing the results of our studies on both cases. The conclusive part of the article discusses the possibilities of bringing user-centred (psychological) and planner-centred (architectural) approaches closer together while creating our everyday surroundings.

Case 1. Millions Moving to the Tiny Boxes

Background. After the Second World War, the housing situation in the Soviet Union was extremely difficult. More than a thousand cities had been destroyed as well as about 70,000 villages burnt down or made uninhabitable. Almost one third of the housing stock was ruined, especially in the western part of the country, and more than 25 million people lost their homes (Mikhailov, 1967). The rapid migration to cities and the post-war baby boom challenged the Soviet government to take radical steps for meeting the huge housing market need. The solution was to start building highly standardized high-rise apartment blocks in all larger cities of the USSR. In a short period of time (1958–1975) more than 600 house construction plants were erected all over the country that started to produce 'apartments-clones', i.e. living spaces with almost identical geometrical parameters. The number of rooms and dimensions of the apartments in those buildings were tightly controlled by the state construction law 'SNIP' that represented a set of mandatory requirements to be fulfilled when placing and designing building structures (СНиП). A special SNIP was issued in 1963, which became the basis for the design of a **first generation of the mass dwelling units** until 1971.

As of 1965 about 1.5 million apartments with quite similar geometric parameters were built in the USSR yearly, which differed from one- to five-room-apartments with the overall floor area of 28-80 sq. m. According to that SNIP, kitchens were supposed to take up 5–8 sq. m. maximum, a toilet room was limited to 1.1–1.3 sq. m. and a bathroom floor was 3–4 sq. m. The rest of the rooms (so-called living rooms) were limited to 8–18 sq. m. each (Ovsyannikov, 1982). The majority of built apartments had 1–2 living rooms. The technology of pre-fabricated constructions was economically advantageous and enabled to produce 5–9 story blocks usually consisting from 10 up to several hundred apartments. The same model for blocks and apartments was used in cities as well as in villages.

Although the new apartments were small and highly standardized for the whole country, it meant a huge step ahead in comparison with the previous situation where millions of families had to share apartments (using one room per family in multi-room historical apartments) or resided in village houses without water supply and sanitation. As a result, the number of persons on the waiting list to move to those apartment blocks (which were distributed for free!) started to snowball.

The permitted size of apartments in the **second generation of mass housing** construction from 1971 to 1991 was increased by 4–7 square meters. The production of the house-building factories achieved its peak in 1975 when the number of apartments built during one year reached 1.78 million (Ibid.). Afterwards the numbers gradually decreased so that in 1990 only one million new apartments were built (Federal'naya sluzhba gosudarstvennoi statistiki, 2006).

The architectural theories at that time had a popular hypothesis that the change in the direction of building activities in a social community in some part of premises depends on modifications in the spatial image of the inhabitants' lives. Then it seemed that an answer to the question of how to improve the geometry of a particular part of the environment should be sought in the study of a modus of the adaptation

of local population to it. An analysis of the unique lifestyle of domestic household implemented in a standard apartment could be the basis for design of better housing units. Taking into account the huge cultural diversity of the Soviet population, it was quite natural to test how families from the Caucasus and Central Asia, from Siberia as well as from large cities like Moscow and Saint Petersburg would adapt their multiple life form to this unified model of residential environments. Each socio-territorial community envisages a certain representation of geometric parameters and material properties that should be present in a physical environment in order to be called home. The geometric parameters of apartments in cities and detached homes in villages happened to be the same ones for all! Almost no alternatives existed in choosing one's place of residence.

Departure points in planning apartment block areas and the room structure of apartments in the Soviet Union predominantly included economic and technological criteria. To build more and in a shortest possible time! The needs and expectations of users were considered from the viewpoint of the *common sense* of planners who were trying to locate the main elements of domestic life (cooking, washing, sleeping, etc.) into tiny interior spaces prescribed by a SNIP.

Theoretical explanations concerning the design of high-rise blocks with small apartments rely on the experience of state-subsidized housing constructed in Western Europe after the First World War, as well as on the experience of New York City apartment houses where the challenge to have rooms of minimal dimensions was particularly important. Since the XIX century when Hans Auer (1883) noticed that «space is the soul of the buildings», the search for a spatial image of new constructions as better physical conditions for the more productive activities of society became the main direction in theoretical studies by the pioneers of modern architecture and anthropology. Migration to cities and demographic changes stimulated architects to continuously improve the concept of a single family apartment as a central idea of housing buildings during the entire XX century. However, most of the results of investigations of homes conducted during the last century by hygienists, psychologists, sociologists, and economists (due to their different understandings of the concept of space as a place, area, and zone), turned out to be inaccessible to engineers and architects, when the geometric parameters of "the soul of the buildings" were determined by fixed values as width, height, and area. The reaction of the population to adapting to the living premises has become a main subject for interdisciplinary investigations by soviet architectural scientists only after applying the recommendation of the United Nations concerning the concept of «a living quarter» understood as a rather detached and relatively independent part of the material structure of buildings using by people for living (UN, 1968).

Empirical study. There have been cases in other countries on which the Soviet high-rise ideology and practice rely, but the amount of construction and the degree of standardization of erected dwelling units have been unique in the whole world so inevitably creates debates and criticism concerning such practices. As critical voices become louder and louder about life in the new high-rise areas, the main institute (*The Central Research Institute of Experimental and Typical Dwelling*

Design established in 1963) responsible for the planning of residential buildings in the whole country initiated and conducted a study. The basic investigation of standard housing construction was carried out during 1978–1985 with the aim of analysing the real usage of apartment spaces by residents and to find out the areas of main tensions and sources of discomfort. Formalized interviews were conducted with the representatives of almost 5,000 households who inhabited apartment blocks in different parts of the former USSR (Heidmets, 1984; Kruusvall, 1980; Kartashova, 1985). Cities from various climate and cultural regions were included — from Ivano-Frankovsk in West Ukraine to Novosibirsk in Siberia and Vladivostok on the shore of the Sea of Japan. Tallinn was selected to represent the northern part of the country and Tashkent – for representing the southern part. This was the largest and definitely the most representative study of the housing situation in the Soviet Union. All authors of this article participated in a study team lead by prof. Kira Kartashova representing *The Central Research Institute of Experimental and Typical Dwelling Design*, and prof. Mati Heidmets from Tallinn University. Regional studies and analysis have been performed by prof. Vladimir Durmanov, PhD Viktor Ovsyannikov, PhD Yuri Kruusvall and others.

Results of the study outlined at least two big areas of mismatch and tensions between the residents' needs and their everyday physical surroundings they should use to embed their life.

The first — not enough space! Very small apartments created a physical environment in which practically each household experienced limitations or couldn't possibly implement desired household activities. The dissatisfaction with the size and location of rooms in an apartments was the main disadvantage mentioned by majority of respondents (Khachatryants, 1979). The lifestyle and daily needs of families turned out to be far from more sophisticated and space-demanding that the planners imagined. For instance, storage facilities: as there were no special storage rooms, most household items were stored in living rooms; some families tried to store household equipment, bicycles or prams, for instance, in cellars or in the stairwells. Inside an apartment corridors, toilet rooms and the kitchen were also used for storing various inappropriate items.

Balconies became storage places, too, followed by the pressure of the lack of living area, people closed the open balconies. The widespread installation of windows on balconies (although unauthorised) was an option to get some additional space to use. The monotonous identical look of standard buildings was transformed into a colourful mixture of balcony windows, doors, railings, often also with accompanying air-condition units. Regardless of the new aesthetic features in those buildings, technical problems emerged such as the collapse of structures, heating loss, and the deterioration of hygiene standards in apartments.

According to regulations, upon moving to new high-rise blocks families consisting of three people were entitled to have a one-bedroom apartment, families of four could have a two-bedroom apartment, etc. About half of the families in those blocks in Russia were and are still living in apartments where the number of persons in the household exceeds the number of rooms (Federal'naya sluzhba gosudarstvennoi statistiki, 2002). As a comparison, in Russia, Latvia, Belarus the housing stock contains

63%, 62%, and 57%, housing units that have less than three living rooms, while in the contemporary housing stock in France, the Netherlands and Germany the corresponding shares are 18.3%, 9.3%, and 8.2% (Federal'naya sluzhba gosudarstvennoi statistiki, 2011).

Second — stressing functionality! The actual usage of rooms in small apartments happened to be quite different from the initial ideas of planners and architects. Our respondents considered the kitchen as the most uncomfortable part of the premises. Most kitchens in standard apartments were designed without considering the use of home appliances; at the same time, refrigerators and washing machines were usually installed in the kitchen, but a third of tenants also used narrow corridors. Some residents mainly used balconies, but also living rooms (16.1%), bathrooms (19.4%) or kitchens (8.2%) for drying their clothes.

Due to the small size of a kitchen, many families were forced to put a dining table to eat at in living rooms (that were also small). At the same time, the kitchen was often used for other activities when it was not used for cooking or eating. It became the main place in which one could retire, talk with a neighbour or friends, and in a situation where living rooms became «personal zones», you could «play or do homework with your mom in the kitchen". However, the main drawback of having the kitchen as a separate room was the access to it: through the aisles, passage ways or corridors. As soon as it became possible to convert or remodel an apartment, many families tried to remove the partition separating the kitchen from the living room or pierce an opening in the wall. This reconstruction often added additional space to living quarters.

Similar attempts were observed regarding sanitary units, projecting and recessed balconies. The desire to increase the living space of an apartment by any means or to change the spatial organization of it was prevalent everywhere in the mid-1980s. Due to the small size of the rooms, many processes, like eating, washing or drying clothes, were moved to the corridors. For example, according to our respondents, washing clothes and installing a washing machine were moved to the kitchen (27–70% of the cases) or to the hallway (9–30% of the cases).

Having usually 1–2 bedrooms in the apartment complicated the meeting of privacy expectations. Almost half of the families living in new apartments in the city of Lviv reported that their children slept in the parents' bedroom. Very often possibilities for isolated sleep for grown-up children or sick and elderly members of the family were lacking. Families with children of the same gender had better conditions for comfortable sleep. Still, only a quarter of families could accommodate children of different gender in separate rooms (Durmanov, 1992).

Our studies concerning the second generation of mass housing construction presented a 'big picture' of the situation in the Soviet Union. To answer the questions about geometric parameters of housing units one of the authors of this article fulfilled a pilot study to create a spatial model of future apartments taking into account the residents' opinions (Ibid.). More than one hundred households living in mass housing participated jointly with the architects in developing the spatial model of a new apartment allowing them to have 50% more space than the one in which they were currently living.

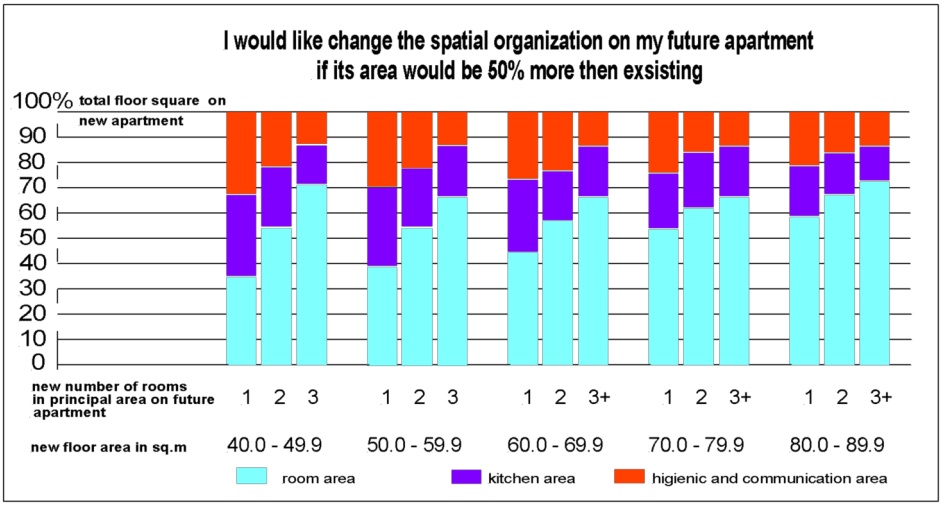
The results are presented in Figure 1. First of all, the additional space is expected for utility rooms (kitchens, storerooms, bathrooms, corridors, etc.) and then for principal rooms (bedrooms, living rooms, dining rooms). The dream apartments varied from having several small isolated bedrooms while the other households wanted to place a bed, sofas and a dinner table in one large room. It means that there is no direct relation between the desired number of rooms in an apartment and its floor area. Soviet households required that apartments of the nearest geometrical dimensions or shape of the living premises would have different numbers of rooms, which meant the future use of apartments with small and large rooms of diverse functional purposes.

Preferences were also dependent on the family composition, especially in case of bigger apartments. Having an apartment (up to 90 sq. m) with one large living room was the most preferable for young married couples, but not so for an adult mother with kids who dreamed of having several isolated bedrooms plus a living room (see Fig. 1 on the right). Health, status, income, the professional, religious and ethnic background also influenced the number of rooms needed as well as preferences concerning the placement of equipment in the apartment (sinks, bathtubs, cookers, refrigerators, TV etc). The study confirms the position that when the economic situation allows having a bigger apartment (more than 25 sq. m per person), the diversity of requirements is rapidly increasing.

Conclusions. The results of our study indicated that the highly standardized and unified spatial organization of the Soviet high-rise apartment blocks enabled a considerable improvement of the overall housing situation in the country, at the same time creating quite widespread dissatisfaction with planning of the apartments and with their spatial arrangements. The majority of families studied

Figure 1

Desired Organization of Premises in the Future Apartment



dreamed of changing the layout of rooms in their apartments; the most stressful areas are the kitchen, storage rooms, and sanitary units. The feeling that our contemporary lifestyle doesn't fit those very boxes was common both in the North and South, in small towns and big cities.

Still, it did not lead to strong public protests against high-rise areas (called micro-districts) or to sharp political criticism. One should keep in mind that in the former USSR apartments were distributed for free. Most families who were entitled to receive an apartment from the state waited in a queue for many years, often decades. The alternative called cooperative housing was available for very few people. In 1976–1980 only 8% of apartments were purchased or borrowed using the residents' funds (Federal'naya sluzhba gosudarstvennoi statistiki, 2006). On one hand, to get a 'present' from the state was a great event in a family's life, on the other hand, this very present created a lot of problems in its actual use. Also, an adaptation to the standard housing environment caused alternative construction activities of population that resulted in a general spontaneous and unregulated transformation, hence there was a loss in quality of the state's living environment.

This dissatisfaction pressurised to find solutions. Many residents rented state apartments in multi-story buildings preferring to build a single-family or summer cottage at their own expense. To meet this trend, urban citizens were allowed to build alternative small cottages on the cooperatives' garden plots (600 sq. m.) located near cities. Before the collapse of the USSR about 17 million families (from all 49.6 million urban families in 1989) had a garden plot or a "dacha" behind the municipal borders of cities (Durmanov, 1992). The broad sweep of the "dacha construction" significantly reduced the exploitation burden on urban dwellings. Part of the population began to use their city apartments as a way to generate additional income through renting them out or as temporary dwellings — summertime was spent at the dacha, wintertime – in a city apartment. Often the country cottage was used as a «real house», some sort of «family hearth». Perhaps this is the reason why the issues of planning the apartment organization was publicly not very worrisome, especially for wealthy sections of society who often saw a city dwelling as an additional investment. Architects, in turn, did not experience enough pressure from the customers to change something in the established practice. Still, in the late 1980s discussions rose concerning the need to change the whole system from mass standard construction to more individualized models, taking into account the history and needs of the local socio-territorial communities. But as the late 1980s were economically and politically difficult times for the Soviet Union, the ideas of individualized construction became topical again only in the late 1990s in the context of democratic changes and the transition to the market economy.

Currently the new generation of planners and architects designing housing on the former USSR territory are more focused on individualization issues. According to Konstantin Kiyanenko, a modern architect should be like «a gardener» who uses knowledge from all areas of modern science to create better fruits (Kiyanenko, 2015). It is important that the "garden" about which he or she takes care would deliver to the market not only externally attractive but also functionally useful and affordable products.

Removing geometric constraints from the private construction sector law allows an increase in the diversity of housing units (at least for some part of population) and takes into account more diverse needs of families. However, in spite the improved appearance of high-rise residential buildings in large cities, there is still not enough diversity in the spatial organization of apartments (Federal'naya sluzhba gosudarstvennoi statistiki, 2005). In this context it is very important to discard the dictatorship of house-building companies that used to be the main and most influential actors in housing policy. They often block attempts to move towards more individualized and diverse methods of design and production. Surprisingly, after the collapse of the system of centralized economy, the structure of public housing construction in Russia has not sufficiently changed. Most of the old and now privatized huge plants are still using technology from the last century and continuing to produce the same standardized clones. As the demand for housing is still very high, such an environment does not encourage the industry to change their ways of thinking and acting.

Case 2. Testing Activity-Based Offices

Background. In environmental psychology there is a long tradition of studying individuals' and groups' emotional bonding to different locations conceptualized as place attachment (PA) (Altman & Low, 1992; Lewicka, 2011). According to Gustafson, PA is a site-related cognition (thought, knowledge, belief), affection (emotion, feeling), and practice (action, behaviour) (Gustafson, 2006, p. 19). Attached 'sites' may include rather different physical locations — home, neighbourhood, home-town, home-country, but also a workplace or a favourite corner in a park; Barcus and Brunn list among them: «*... a house, a room, a «hollow» or town, or a landscape, such as the sea, mountains, or prairies*» (Barcus & Brunn, 2010).

Emotionally bonded places do not randomly occur. Most of them represent the elements of physical environment that are directly or indirectly involved in a person's everyday life, carry a meaning and a value for him/her. Historically, one's home and its immediate surroundings – the neighbourhood – are most strongly attached places sometimes referred to as *«natural conditions of human existence»* (Buttimer, 1980). With the growth of individual resources and the increase in mobility the patterns of attached localities are also changing often taking concentric forms: «*... smaller places are incorporated within larger ones. Home apartments are parts of buildings that are parts of neighborhoods that are parts of cities that are parts of the country regions, countries, continents, etc."* (Lewicka, 2011).

Why is PA as a "psychological bonding process" important for planners, designers, and architects? As numerous studies indicate, PA is not simply a temporary emotion or a positive recognition of a familiar place. An attached place carries a meaning for a person or a group, it is valued and often perceived as a part of one's identity. Studies in the field of PA outline several correlates, as well as fields of PA impact. The perception of a place as an *"extension of the Self"* (Abel, 2015) often means readiness to contribute to the well-being of this location and its development. When residents feel attached to their neighbourhood they take care of it,

they are ready to participate in joint community efforts (Dekker, 2007, p. 372); a place identity is considered to be a strong predictor of pro-environmental attitudes and behaviour (Ramkissoon, David, Smith, & Weiler, 2013).

PA is also correlated with the sense of safety and security; places are often perceived as less dangerous by those who are attached to them (Billig, 2006). A number of studies describe links between migration and place attachment — a positive place attachment reduces the likelihood of migration (Barcus & Brunn, 2010). Also, a stronger attachment is often associated with greater well-being (Scannelli & Gifford, 2017). According to Lewicka, place-attached people compared to non-attached ones had a higher sense of coherence, were more satisfied with their overall life, and had a stronger bonding social capital and neighbourhood ties (Lewicka, 2011).

Hundreds of studies describe PA as a positively charged relationship between an actor and his/her physical environment. This reflects a mode of thinking and a way of life where the immediate physical environment is perceived by an actor as a part or an extension of his/her Self followed by respective attitudes and behaviours towards this "environmental Self". From the planners' and architects' perspective it means that the well-being of our physical surroundings, our homes and streets, schools and offices depends a lot on the users' attachments to those places. Garbage-filled, derelict and broken neighbourhoods usually indicate a low PA level among the residents, jointly built and maintained playgrounds near an apartment block tell an opposite story. Therefore, an attachment both with the immediate environment as well as with wider areas should be promoted and supported where possible also by means of design and architecture.

PA is often expressed by the personalization of places, by giving a personal imprint to a place, by displaying an actor's engagement in it. People use a big variety of signs and symbols that indicate their connections to certain locations, from placing family photos on their work desks to fighting for an "appropriate image" of their neighbourhoods and cities. Personalization represents a real or imaginable boundary building starting from the home's entrance door up to the national homeland marking attached and emotionally close areas. Identification with a place is often experienced as a sense of being 'at home' and this sense may extend far from one's house limits, including a home-town or home-land with their unique structure and visual layout. Hopkins and Dixon are discussing: «*... when the opponents argue that such buildings ("mosques in the West») would compromise the character of the local environment, they usually speak of more than architectural aesthetics. So too, those behind the developments are rarely simply seeking to establish gathering places for prayer*" (Hopkins & Dixon, 2006, p. 178).

Personalization tells about an individual or group identity to others indicating social ranks and life histories (Cuba & Hummon, 1993). It tells about defensibility, communicates ownership and marks territories, helps to distinguish borders and increases security (Omar, Endut, & Saruwono, 2012). Personalization creates a mental limit between one's own and another's, the «violation of the borders» of such a place is often perceived as an attack on the privacy and the integrity of a person.

Personalized sites that are usually also emotionally attached, express the ways how a person has «built» himself/herself into the physical world. Attachment and

personalization indicate which part of the surroundings has been considered by an actor to be close, and which remains outside of their psychological boundaries. It is *«... an interpretation of self that uses the environmental meaning to symbolize or situate identity"* (Cuba & Hummon, 1993, p. 112). In our history and traditions both place attachment and personalization represent two sides of a coin. It represents the person-environment bonding whereby places are stuck to persons or groups who will in turn get a feeling of security, well-being and confidence.

Activity-Based Offices — Work Environment without Personalization

One may ask: are the people-environment bonding models described by the constructs of PA and personalization universal? What happens if physical surroundings are organized in a way that doesn't allow any personalization of, and attachment to, the very places where there are long and strong traditions to do this? Many office employees have been faced with such a situation in recent years when their employers started to implement the concept and practices of activity-based offices (ABO). This is an office without any personal workplace (desk) or personally fixed rooms.

ABO is an office environment consisting of activity-based zones and places instead of person-attached ones — meeting areas, rooms for quiet work, recreation areas, coffee corners, etc. And unlike in traditional offices, employees have no fixed workplaces — desks, workrooms, private shelves (Wohlers & Hertel, 2017). It is expected that a person who leaves their workplace for more than a couple of hours will also clean their place of work in order to allow one of their colleagues to use the same place. Employees are free to choose a zone according to their preferences and scheduled activities. The only "personal" place in the office is a personal box in a storage room for storing one's own documents and private belongings (de Been, Beijer, & den Hollander, 2015). No attached desks, no personalization, everything is used by everyone. When you need to have a meeting, please move to the meetings area; if quiet work is needed you may hop over to the silent room passing a coffee corner on your way. All this is sharply different from the traditional understanding and interpretation of workplaces in the offices where the rule is that each and every person has a personal (and personalized) workplace. In ABO, all this is gone replaced by activity zones and functional areas.

The concept of an activity-based office emerged about twenty years ago in Sweden (Brunneberg, 2000). The idea was to save space and resources having in mind that some employees constantly travel, which enables planning of a workspace not for all employees, but for about 70–80% of them. Besides saving the resources the ABO ideology hopes to promote collaboration between employees, to have better information exchange between people and departments, as well as to increase the autonomy and freedom of employees in terms of working time and space use (Bodin-Danielsson & Bodin, 2009). As ABOs usually have a new and modern design, they are also meant to improve the image of an organization to indicate it is innovative and attractive.

ABOs are quite different from traditional offices in which each employee has a definite workplace and personalized location for keeping his/her personal and work equipment. The old way of expressing one's identity, status or position through physical markers is not possible anymore. Moving from the traditional office to ABO means that employees have to change their habits and behaviour, adapt to the new and quite different physical layout. Employees of ABO are facing similar challenges as described in Case 1 — they need to adapt to a new physical arrangement. They have to adapt to the work context in a situation where one of their deeply rooted desires – to have one's own place at work, to personalize it, to feel attached to this very place – is not possible anymore.

Empirical study 2018

Pros and cons of ABOs began to be debated also in Estonia after certain large organizations started to use this type of office layout a few years ago. In 2017 four Estonian governmental offices (ministries) were moved to a new modern building. One ministry started to use the working space organized according to the ABO principles (we shall call it Ministry A), others (Ministries B) preferred to have a combined system – personalized workplaces plus open office facilities (activity based zones). As Ministries A and B are located in the same building and use similar facilities the main difference between them stands – do employees have or have not personal workroom, the rest of the workspace was quite similar for all employees. A study was carried out in spring 2018 to analyze the way employees evaluate the new work environment in both cases and how they compare it with the old (traditional) office. Internet-based survey was used as a research method. 106 respondents represented the Ministry A (employees moving to the ABO-type office), and 191 respondents represented the ministries using a combined (COMBI) workspace (Ministries B). All respondents had used a very traditional work environment in their previous locations and moved to the new location one year prior to the study. The research questions also included:

1) how important is having a personal (and personalized) workroom and a personal work desk for the employees? Taking into account that in Ministry A the "clean desk" policy had been implemented, which was not the case in Ministries B.

2) how satisfied are the employees with their privacy during the workday? Taking into account that in Ministry A there are no personalized rooms, which is not the case in Ministries B.

3) are there differences in workplace attachment in the comparison of employees in Ministry A and Ministries B?

4) how do employees from the Ministries A and B compare the new work environment with their previous (traditional) one?

Results

1. Importance of personalization. According to the Mann-Whiney test, employees in the COMBI office consider a personal workroom more important

(Mdn = 6) than those in the ABO office (Mdn = 4), $U = 5392.5$, $p < .001$. Also a personal work desk is more important to COMBI people (Mdn=7) in comparison with the the ABO employees (Mdn = 5), $U = 4787.0$, $p < .001$. Figures 2 and 3 demonstrate summarized results — answers indicating the importance of having a personal and fixed workroom are summarized (very important + important + moderately important) as well as answers indicating it being not important (not important at all + not important). Employees working in the ABO regime consider personalized places considerably less important than the employees who are currently using the COMBI system.

2. Privacy in the workplace. According to the Mann-Whitney test, employees who are using COMBI offices are less satisfied with their privacy in the workplace (Mdn = 3) than those working in the ABO office (Mdn = 4), $U = 71543.0$, $p < .001$. Figure 4 demonstrates how satisfied both ABO and COMBI employees are with

Figure 2

Importance of Having a Personalized Work Room in the Office

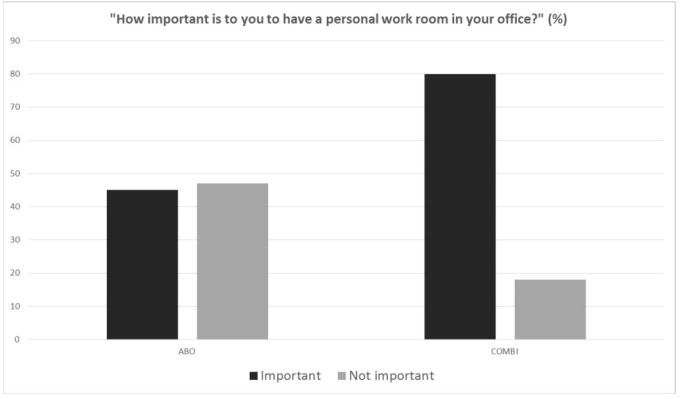
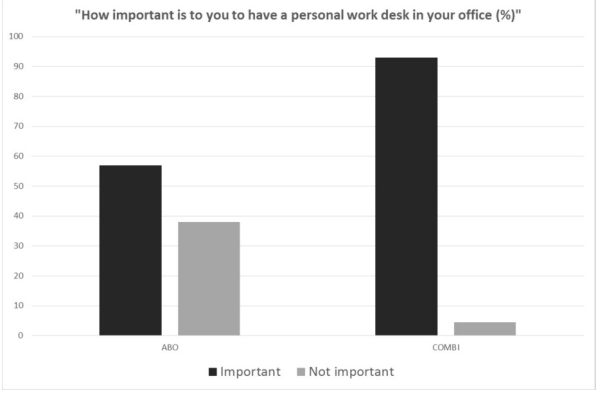


Figure 3

Importance of Having a Personal Work Desk in the Office



the privacy conditions in their current workplace. The answers indicating satisfaction (satisfied + satisfied + moderately satisfied) are summarized as well as answers indicating no satisfaction (not satisfied at all + not satisfied). The data indicated considerably higher satisfaction with the privacy conditions of ABO employees compared to the ones using the COMBI system.

3. Workplace attachment. To measure workplace attachment, the place attachment inventory developed by Williams and Vaske (2003) was included in the study. A 7-items Likert scale was used to assess statements that describe emotional bonding with a current workplace (meant as the whole space used by the Ministry). Inventory's reliability measure (Cronbach's alpha) equals .82 in this study. T-test indicates that workplace attachment in Ministry A was higher M = 3.60 (SD = 1.33) compared to the attachment of employees from the Ministries B, M = 3.18 (SD = 1.32), $t(292) = 2.63$, $p < .05$.

4. Evaluation of changes. Figure 5 presents the overall evaluation of respondents concerning changes in their work environment. They were asked, "*What is*

Figure 4

Satisfaction with Privacy at the Workplace (%)

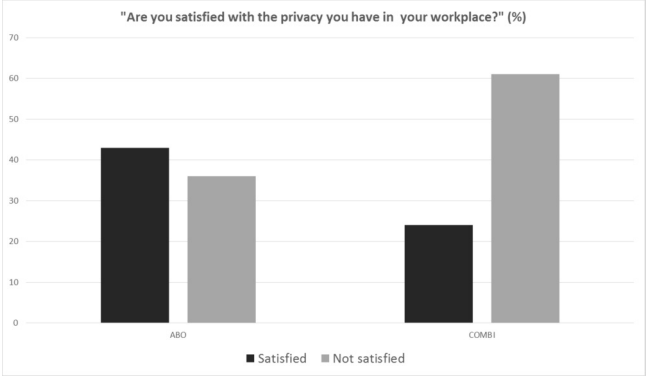
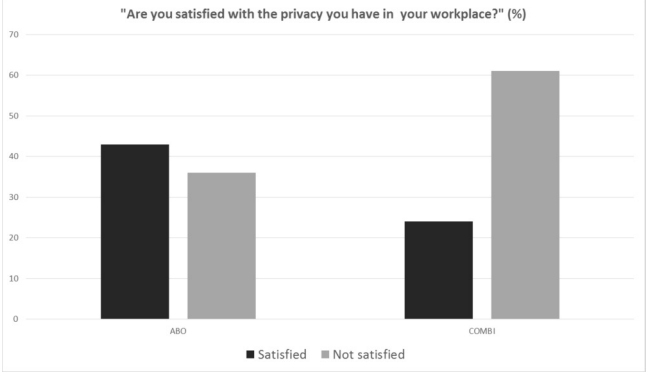


Figure 5

The Overall Evaluation of the New Office (%)



your overall evaluation of the new office, do you like it or dislike it?". In the table positive evaluations were summarized (like very much + like + probably like) as well as the answers indicating disliking the new office (strongly dislike + dislike + probably dislike). Once more, the ABO people happened to be more positive than the COMBI people.

Conclusions. At first sight the presented results seem to be paradoxical. Employees in the ABO system like the new conditions more than the users of the COMBI system; they have fewer concerns about privacy compared to COMBI people and about half of them don't consider having a personal workroom and desk important. Although Ministry A passed considerably deeper changes than Ministries B, a significant part of people from Ministry A seem to be more adjusted to the new working conditions. Does it mean that the widely and thoroughly studied ideas about the importance and value of personalization and place attachment do not find their expression in the case of ABOs?

Our hypothesis explaining those differences relies on how the change happened and specifically on the way it was prepared. In Ministry A, a special preparatory program that lasted several years was implemented. During this program a special study was performed in order to clarify the needs of departments and teams, several design alternatives were discussed with the employees as well as brainstorm sessions with the employees were held to define strengths and possible bottlenecks of the new work environment. Also visits to the other ABO offices were organized in Estonia as well as abroad, and rules of behaviour in different zones and areas were collaboratively discussed and composed.

In the case of Ministries B, the employees were simply informed about the future changes without any special preparatory program. Our explanation (actually a hypothesis) is – as people from Ministry A were better prepared and in fact participated in the planning and designing process, it was easier for them to accept the changes and adjust themselves to the new conditions. There was less uncertainty and fewer surprises for them.

Discussion

The cautious message from both cases is — it is important to pay attention and take into account the users' needs, habits and preferences on changing their physical habitat, while trying to improve the person-environment match and coherence that are represented by the users' satisfaction and emotional attachments to places, also by the readiness to contribute to the place's well-being. In spite of limitations of the both studies — one was performed more than a quarter of century ago, the other had a small and quite specific sample — they give us hints about the possible value of user's participation and indicate some unused resources in planning.

Of course, it is easier say than to do. The meaning of "taking into account" varies considerably. Kamaci lists eight ways of the users' participation from informing and consulting, to partnerships and citizens' control over the whole process (Kamaci, 2014, p. 8). Active and direct 'participation' by millions moving to their new boxes described in Case 1 was hardly imaginable, and yet... The collected data

in our study was also clearly underused, despite outlining several ways of improving the situation. The importance of the research component in planning and design should be once more stressed. Beside the users' direct participation, the indirect way through polls and surveys has a clearly underused value. It includes carrying out pre-design research describing the community or people who are future users of the planned buildings, rooms or public areas. It may also include the study of assessments and evaluations by those who are already using some types of physical layouts. In both cases presented the possibilities of research and collected data have been underestimated and underused.

Stressing users' participation inevitably raises the question about the role and position of planners in society — why not trust the people who have knowledge and experience in the field? Recent debates indicate that skills of communication with end-users and the wider public in order to explain them proposed ideas and solution, ask their opinions and advice are slowly becoming part of planners' professionalism, part of expected competences. Debates about the value and role of the users' voice and participation are growing not only in the field of spatial planning. A trend labelled *co-design* (Sanders & Stappers, 2008) represents broader, not just architect-user relationships. It is used for introducing technological innovations (software vs user), educational innovations (university vs school) and elsewhere. The palette of forms of cooperation is varied, *"... everything which encourages cooperation and facilitates creativity — ...pens, paper, Post-Its and craft supplies are all used ... also co-design workshops often involve the use of games, brainstorming, roleplaying and creative exercises"* (Design Kit, 2018). The aim is to build bridges between worlds that still exist separately — the world of planners and the world of users.

Stressing participation and fair public communication is a part of a bigger game. It indicates changes in the whole culture of decision-making in society. Currently this culture is slowly but inevitably entering the eastern part of Europe as well. According to Damurski, this is a *"...vibrant theme in the former "Eastern Block" where the system transition in the 1990s brought dynamic spatial, social and economic changes in urban areas, creating a new, unique context for local policy formulation. This situation gives an unprecedented opportunity to study public communication patterns 'in statu nascendi' (being currently created), to show the tensions between the existing formal and emerging semi-formal and informal planning phenomena, to depict the challenges of introducing communicative ideas to the planning practice, still in many ways embedded in the traditional administration-centred political culture"* (Damurski, 2015, p. 1574). We have to acknowledge that the future image and functionality of our cities, apartments and offices will primarily depend on this very culture.

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Квартиры и офисы: или как удовлетворить дизайнеров и потребителей

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Резюме

В статье рассматриваются два примера пребывания людей в некомфортных помещениях зданий, что порождает среди их обитателей неудовлетворённость, вынуждая изменить характер жизнедеятельности, проявляющийся в трансформации назначения или геометрических параметров комнат. Первый случай представляет малоизвестные результаты обширных исследований массового городского жилища, которые проводились перед политическими переменами в СССР в 1978-1985 годах. Известно, что в послевоенный период в стране была создана уникальная жилая среда с особым способом распределения квартир, которая заставила десятки миллионов семей, принадлежащих к разным социальным сообществам, приспособить свою повседневную деятельность к одинаковому образу жизни. Исследование выявило основные недостатки таких жилищ и

главные источники дискомфорта в них, а также обнаружило некоторые негативные социальные последствия вызванные намерениями домохозяйств приспособится к неудобным физическим параметрам зданий. Второй случай фокусируется на оценке современной дизайнерской идеи, направленной на создание офисного помещения, в котором сотрудники не имеют собственных (фиксированных, персонализированных) рабочих зон, но могут свободно перемещаться и занимать другие рабочие места, исходя из постоянно меняющегося характера производственной активности персонала. Анализ существующих офисов, основанный на изучении работы административных учреждений, проведённый в Эстонии в 2018 году, указывает на то, что участие сотрудников в планировании и проектировании их рабочей обстановки может помочь им лучше адаптироваться к новой и необычной форме использования рабочего места. Главным содержанием послания авторов статьи специалистам, занятых улучшением качества искусственного окружения, сформированным в результате анализа этих примеров, является предложение по созданию соответствующих социальных условий в среде локальных сообществ, которые были бы способны обеспечить более тесное сотрудничество между конкретными производителями и потребителями. Возможно, активный обмен опытом и знаниями в среде экспертов приведёт к повышению взаимного понимания, столь необходимого современной практике проектирования зданий, которая продолжает пока оставаться для значительной части населения одним из источников растущей неудовлетворенности сложившимся городским образом жизни.

Ключевые слова: массовое жилище, офисная среда, привязанность к месту, удовлетворенность пользователей, сотрудничество с разработчиками.

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THE POSITIVE EFFECT OF NATURE CONNECTEDNESS ON PSYCHOLOGICAL WELLBEING: THE SIGNIFICANCE OF TRUST AS A MEDIATOR

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Abstract

Although the positive effect of nature connectedness (NC) on eudaimonic and hedonistic well-being is confirmed by numerous studies, the question of intrapersonal processes that determine such an impact remains open. Wilson's biophilia hypothesis points to the evolutionary background of NC, as this can be considered pre-trust as an evolutionarily formed trust to the ecological world, to life in its diverse manifestations (Petzold, 2012). It is suggested that pre-trust sets a vector of positive comprehension on what happens while NC actualizes pre-trust, thereby launching a 'system of psychological wellbeing maintenance'. The hypothesis that trust is a mediator between NC and psychological well-being was tested in two studies. Multiple regression and mediation analysis, and structural equation modeling (SEM) were applied. Study 1 (the sample comprised 232 Ukrainian university students) confirmed the model of the NC influence on positive functioning (Ryff's Psychological well-being scale and Hardness test were applied) with trust as a mediator. Study 2 (the sample comprised 276 Ukrainian and Belarusian university students) showed that a latent variable manifested by trust and a sense of coherence index mediated the relationship between NC and subjective well-being. It is shown that trust in oneself is included in support of positive functioning, while subjective wellbeing is supported by experiencing the meaningfulness of life events. Limitations of the studies and their implications for conservation psychology are discussed.

Keywords: nature connectedness, trust, pre-trust, psychological wellbeing, subjective wellbeing, positive functioning, biophilia.

Introduction

The issue of human well-being maintenance becomes particularly relevant in connection with global environmental change. Such change determined by the destructive impact of human activity on the ecosphere, leads to a noticeable deterioration of the living environment posing a threat to human health and wellbeing. Along with the negative consequences of environmental change, positive psychological effects of people's communion with nature are discussed more often. A growing number of studies confirms the positive role of staying in the natural environment

for a person's psychological wellbeing (Hartig, Mang, & Evans, 1991; Wells & Evans, 2003; Hinds & Sparks, 2009; De Young, 2010; Martens, Gutscher, & Bauer, 2011; Bratman, Hamilton, & Daily, 2012; Ratcliffe, Gatersleben, & Sowden, 2013). Various types of psychotherapy based on the interaction of humans with components of nature also evidence that psychological connection with nature is of great importance in maintaining mental health and wellbeing (Esposito, McCune, Griffin, & Maholmes, 2011; McCardle, McCline, Griffin, Esposito, & Freund, 2011; Nimer & Lundahl, 2007; Summers & Vivian, 2018).

Stress recovery theory (Ulrich et al., 1991) and attention restoration theory (ART) (Kaplan & Kaplan, 2003, 2009) explain the recovery effect of nature exposure by the features of natural settings. These theories complement one another explaining how the perception of 'natural scenes' can reduce both physiological stress and mental fatigue (Berto, 2014; von Lindern, Lymeus, & Hartig, 2017). Such an approach focuses attention on objective features of the perceived environment that have an evolutionarily formed and genetically fixed significance. Another approach refers to biophilia which is «the urge to affiliate with other forms of life» (Wilson, 1984, p. 416). It is a subjective experience of connection with other living beings that is important for human wellbeing according to the biophilia hypothesis. Under such understanding, nature can be a resource of wellbeing provided that a person experiences a sense of unity with it realizing «genetically based, human need and propensity to affiliate with life and lifelike processes» (Kahn, 1999, p. 2). As emotional closeness to nature can also increase sensitivity to environmental change and encourage the maintenance of environmental sustainability, it opens ways to promoting the conservation behavior relying on positive experiences and supporting the person's positive functioning (Capaldi, Dopko, & Zelenski, 2014; Carter, 2011; Kasser, 2009; Gosling & Williams, 2010). However, the biophilia hypothesis does not specify which psychological mechanisms exactly provide the 'conversion' of emotional affiliation to psychological wellbeing. This article puts forward and tests a hypothesis that nature connectedness contributes to psychological wellbeing through maintaining and strengthening trust.

Nature Connectedness as a Predictor of Psychological Wellbeing

The phenomenon of psychological connection to nature is conceptualized in a number of psychological constructs and measures including emotional affinity towards nature (Kals, Schumacher, & Montada, 1999), nature connectedness (Mayer & Frantz, 2004), connectivity with nature (Dutcher, Finley, Luloff, & Buttolph, 2007), environmental identity (Clayton, 2003), inclusion of nature in self (Schultz, 2002), nature relatedness (Nisbet, Zelinski, & Murphy, 2009), implicit associations with nature (Schultz, Shriver, Tabanico, & Khazian, 2004), and dispositional empathy with nature (Tam, 2013b). Although some of these concepts distinguish only separate aspects of the human-nature relationship (for example, emotional attachment, cognitive representations, identification processes), while some of them point to a multidimensionality of subjective connection to nature, on the whole they can be reviewed as manifestations of a general nature connectedness

(Tam, 2013a; Capaldi et al., 2014). Studies confirm that nature exposure, as well as engaging with natural beauty, leads to nature connection, which in turn leads to psychological wellbeing (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; Capaldi et al., 2017).

Over the past decades a considerable dataset has been accumulated on features of the association of nature connectedness with psychological wellbeing regarded in hedonistic and eudaimonic traditions (Tam, 2013a; Zelenski & Nisbet, 2014; Nisbet, Zelenski, & Murphy, 2011; Martyn & Brymer, 2016; Kamitsis & Francis, 2013). The associations varied significantly — from −.1 for Negative affect (Nisbet et al., 2011) to .42 for Positive affect (Zelenski & Nisbet, 2014). Capaldi et al. (2014) conducted a meta-analysis that included 21 studies of the connection between the indexes of nature connectedness and hedonic wellbeing, which revealed a low connection between nature connectedness and subjective wellbeing in general (r = .19). Zelenski & Nisbet (2014) also found low correlations between nature connection and eudaimonic wellbeing using Ryff's Scales of Psychological Well-Being that had been developed on the basis of existential and humanistic psychology`s provisions on positive functioning. Significant relations were obtained only for autonomy, purpose in life, and the highest of .30 to .36 for personal growth.

Not too high and inconsistent correlations of nature connectedness with psychological wellbeing give grounds for assuming the presence of mediating links. Empirical evidence has been obtained that such mediators can be spirituality (Kamitsis & Francis, 2013), meaning in life (Howell, Passmore, & Buro, 2013), and regulation of health behavior (Kryazh, 2016). The Kamitsis & Francis study (2013) found that spirituality measured by the Hood Mysticism Scale and characterized by a sense of unity can act as a mediator between both nature exposure and nature connectedness, and psychological health. Still, the results indicate only partial mediation. Howell et al. (2013) confirmed that the association between nature connectedness and well-being is mediated by the meaning in life. In a study by Kryazh (2016) it was shown that the regulation of health behavior mediates the relationship between nature connectedness and subjective wellbeing. With all the differences, the revealed mediators are united by the experience of a harmonious connection: with the world, life, their physical self.

Toward the Question of a Mediator between Nature Connectedness and Psychological Wellbeing: Why Trust?

References to the role of trust as an important condition for positive development and wellbeing were mentioned by Erikson (1963) who viewed the feeling of trust as a basis of the sense of identity that later signals to the individual that they are good. Also for Rogers (1961), a "fully functioning person" who is open to experience is trusting in their own organism. Rogers's work became a theoretical foundation for such core dimensions of psychological wellbeing in Ryff's model as self-acceptance and autonomy (Ryff, 2014). Studies by Ojala (2005, 2012) indicate the role of trust as an existential experience supporting the subjective well-being of adolescents with a high level of ecological concern. Ojala (2017) underlines that "hope based in trust is to give young people the strength to act in the face of uncertainty and

hardship" (p. 5). Developing this provision it can be assumed that trust is the basis for the 'Courage to Be', to maintain a positive functioning in the face of global environmental change. Importance of trust in the natural resources management is also accentuated by Stern & Coleman (2015).

On the other hand, the experience of connectedness with nature as a realization of the «need to affiliate with life» implies openness and a special kind of trust of the natural world and of oneself as its component. Such an experience is defined by Petzold (2012) as pre-trust (Urvertrauen) — a transpersonal trust that determines the expectation of a harmonious connection with parents and other living beings, with the biosphere, the universe or God. That is the evolutionarily formed primitive basic trust, deep trust, which precedes the Erikson's basic trust. Pre-trust is an unconscious condition for any vital activity, assuming trust in the ecological environment — air, water, food, new objects, potentially important for life. Pre-trust is "the consequence of a deep, ancient and growing affinity with the biosphere environment experienced by many generations. The supra-individual [uberindividuelle] and even superhuman meaning of pre-trust becomes evident in animal therapy examples, where such contact renews pre-trust, which has been disabled in contacts with people" (Petzold, 2012, s. 18). Pre-trust provides extraindividual connectivity, coherence with life, thereby creating conditions for healthy development, moreover, according to Petzold, pre-trust is at the center of self-regulation and coherence regulation. In this context, trust is interwoven with the sense of coherence (SOC) in the theory of Antonovsky (1987). Jeserich (2012) underlines that one of the values of 'confidence' (Antonovsky used this word when defining the SOC) is 'trust'. M. Eriksson (2017) defines sense of coherence as "a personal way of thinking, being and acting, with an inner trust".

The fact that trust can act as a mediator, through which psychological wellbeing is influenced, is confirmed by studies in organizational psychology examining the credibility to leaders (Kellowaya, Turner, Barling, & Loughlin, 2012). Also in the studies of Kryazh & Grankina-Sazonova (2018) and Kryazh & Levenetz (2018) it is shown that trust mediates the connection between emotional intelligence and both forms of wellbeing – eudaimonic and hedonic.

Study 1

The relation between subjective connectedness with nature and psychological well-being, in the eudaimonic interpretation, as well as hardiness determined by personal attitudes (Maddi, 2013), were investigated in the present study. The hypothesis was tested that these relations are mediated by trust. It was also assumed that psychological well-being and hardiness can be regarded as manifestations of positive functioning, the condition of which is trust.

Method

Participants. The research was conducted in Kharkiv, Ukraine. 232 respondents took part in the study, among them 212 students (aged from 17 to 25, M = 20.2

years; 75% female) and 20 practicing psychologists (aged from 29 to 40, M = 36 years; 75% female). 162 students (aged from 17 to 25, M = 20 years; 71.6% female) study at V. N. Karazin Kharkiv National University (KhNU) and this sample of students was drawn from schools of psychology (98 people), history (33 people), physics and energetic (31 people). 50 students are from National University of Pharmacy (aged from 19 to 23, M = 21 years; 84% female). The data was collected by N. Grankina-Sazonova in a larger study on predictors of positive functioning that she conducted under my guidance.

Materials

Subjective connectedness with nature was examined using two scales: a short Nature Relatedness scale of 4 items (NR4) and Inclusion of Nature in Self (INS) (Schultz, 2002). NR4 is a Russian modification of the short Nature Relatedness scale (Nisbet et al., 2009; Nisbet & Zelenski, 2013); it includes items reflecting the emotional connection with nature: "I always think about how my actions affect the environment"; "My connection to nature and the environment is a part of my spirituality"; "My relationship to nature is an important part of who I am"; "I feel very connected to all living things and the earth" (α = .77). Schultz's (2002) single-item measure INS consists of 7 overlapping circles labelled 'self' and 'nature'. Depending on how strongly the circles cross each other on the picture chosen by a respondent, their connectedness with nature is estimated from 1 (nature and self barely osculate) to 7 (full overlap of nature and self). While the NR4 scale allows estimating the connection with nature as an emotional experience, INS indicates the cognitive evaluation of one's affinity with nature derived from reflexive ideas about 'human-nature' connections.

Positive functioning in this study was assessed through indexes of psychological wellbeing and hardiness. A Russian adaptation of the 84-item Ryff Scales of Psychological Well-Being (Ryff, 1989) by Shevelenkova & Fesenko (2005) was used to study psychological wellbeing. In addition to the general indicator of psychological wellbeing (PW, α = .94), the scale has 6 dimensions: Positive Relations with Others (α = .8), Autonomy (α = .78), Environmental Mastery (α = .75), Personal Growth α = .80), Purpose in Life (α = .83), Self-acceptance (α = .85). Hardiness was measured by a Russian short version of the hardiness test proposed by Osin & Rasskazova (2013). The instrument consists of 24 items that measure the general index of hardiness (α = .89) and three hardy attitudes: Commitment (HCm, α = .73), Control (HCt, α = .73), and Challenge (HCh, α = .89).

Trust was assessed in two ways. The first was a 15-item Kupreichenko`s (2008) Method of examining trust/distrust to the world, to other people and to oneself. This tool allows the estimation of the general indicator of trust (GT, α = .68) and three different trust types – trust to the world (TW, α = .40), to other people (TOP, α = .62), and to oneself (TOS, α = .58). the second assessment used Skripkina`s (2000) Reflexive questionnaire of level of self-trust where respondents were suggested to assess the level of self-trust (ST) in 11 different life areas (in professional activity, in the ability to build relationships: in the family, with children,

with parents, with superiors, etc.) on a 6-point scale (α = .78). Since self-trust is measured by both methods, it should be noted that TOS is revealed as trust in one's skills to adequately and objectively what is happening. At the same time, ST rather means trust in oneself as in a person capable to interact effectively with other people.

Results

Since practicing psychologists who were older than students comprised 14% of the sample, a comparative analysis was carried out for all indicators between this group and the students of the Psychology school. The Mann-Whitney U test indicated no significant differences between these groups, and further analysis was conducted for the entire sample including practicing psychologists. Analysis of the data distribution showed that only 6 of the 16 variables corresponded to the normal distribution: GT, PW, positive relations with others, autonomy, environmental mastery, and self-acceptance. That determined the choice of nonparametric methods.

A gender-stratified comparative analysis revealed differences for three indexes: general trust, trust to other people, and control. Females demonstrated a higher GT ($p < .05$) due to a more conspicuous trust to other people ($p < .01$), while males had a stronger hardy Control attitude ($p < .05$).

The results of the correlation analysis are presented in Table 1. The table includes those indicators of trust and positive functioning with which at least one of the indicators of subjective nature connectedness correlates at the level $p < .1$.H

Both indicators of nature connectedness are closely related (ρ = .61) to each other and have statistically significant correlations with indicators of trust. The links of nature relatedness with indicators of trust are most expressed, first of all, in the trust in oneself as a social actor (ST, ρ = .27) and, to a lesser extent, in the trust in own objectivity (TOS, ρ = .18) and GT (ρ = .16). INS has a statistically significant correlation at $p < .01$ with ST (ρ = .18), and there is a tendency at p .1 to correlate with TW and GT (ρ = .11, p = .09). TOS doesn't have any significant relations with NR indexes even at the marginally significant level.

Of the two indicators nature connectedness, only NR has though not high but statistically significant correlations with indicators of hardiness and psychological well-being. In addition to the connection with the general hardiness index (ρ = .15), NR is significantly correlated with the hardy attitude Challenge (ρ = .18). We can also speak about the marginally significant correlations of nature relatedness with two hardy attitudes — Commitment (ρ = .11, p = .1) and Control (ρ = .12, p = .06). INS does not have significant correlations with the hardiness indicators, but we can speak about the marginal correlation coefficient between this indicator and the challenge (ρ = .11, p = .09). NR also correlates with PW (ρ = .16), Personal Growth (ρ = .16) and Self-acceptance (ρ = .15). INS is only connected with Personal Growth only at a marginal level of significance (ρ = .11; p = .09).

Hardiness and psychological wellbeing indicators are closely linked showing correlation coefficients ranging from .29 (Control — Personal Growth) to .76 (Hardiness — Environmental Mastery). The correlation between the general indicators of hardiness and psychological well-being is .74. All indicators of trust have

statistically significant relations with indicators of positive functioning, primarily with general indicators of psychological well-being and hardiness.

To test the hypothesis that indicators such as GT, TOS and ST can mediate the connection between NR and the indicators of positive functioning (Hardness, Challenge, Psychological Wellbeing, Personal Growth, and Self-acceptance), a regression analysis was used (Baron & Kenny, 1986). Table 2 shows beta coefficients estimated for two types of regression equations: the regression of a positive functioning indicator on NR and the regression of a positive functioning indicator

Table 1

Intercorrelations of Variables (Spearmen's ρ) — Study 1 (n = 232)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. GT	1														
2. TW	.72	1													
3. TOS	.65	.29	1												
4. ST	.42	.23	.48	1											
5. H	.53	.35	.41	.60	1										
6. HCm	.48	.33	.37	.59	.92	1									
7. HCt	.46	.29	.42	.49	.89	.70	1								
8. HCh	.49	.34	.33	.51	.88	.70	.74	1							
9. PWB	.52	.38	.47	.56	.74	.71	.64	.64	1						
10. AU	.22	.14*	.36	.29	.47	.38	.47	.44	.63	1					
11. EM	.46	.32	.42	.53	.76	.72	.67	.63	.81	.45	1				
12. PG	.38	.32	.34	.32	.35	.32	.29	.35	.69	.39	.41	1			
13. PL	.44	.35	.34	.49	.56	.55	.47	.47	.81	.34	.63	.62	1		
14. SA	.47	.33	.46	.52	.67	.62	.57	.60	.84	.50	.50	.68	.43	1	
15. NR4	.16*	*.10*	.18**	.27	.15*	.11†	.12†	.18**	.16*	.12†	.13†	.16*	.13†	.15*	1
16. INS	.11†	.11†	*.08*	.18**	*.08*	*.08*	*.02*	.11†	*.07*	*.04*	*.05*	.11†	*.10*	*.04*	.61

$p < .001$, except for † $p < .10$, * $p < .05$, ** $p < .01$ (two-tailed), statistically insignificant correlations are in italics.

Note. 1. GT — general trust, 2. TW — trust to world, 3. TOS — trust to oneself as subscale, 4. STG — self-trust as a general indicator after Skripkina's questionnaire, 5. H — hardiness, 6. HCm — hardiness as commitment, 7. HCt — hardiness as control, 8. HCh — hardiness as challenge, 9. PWB — psychological wellbeing (C. Riff's model), 10. AU — autonomy, 11. EM — environmental mastery, 12. PG — personal growth, 13. PL — purpose in life, 14. SA — self-acceptance, 15. NR4 — short nature relatedness scale, 16. INS — inclusion of nature in self scale.

Table 2

Regression Equations Using Nature Relatedness and Trust Indicators to Predict Indicators of Hardiness and Psychological Wellbeing

Dependent variable	Predictor NR4	R^2 adj	Predictors		R^2 adj	Predictors		R^2 adj	Predictors		R^2 adj
			GT	NR4		TOS	NR4		ST	NR4	
			Beta			Beta			Beta		
H	.13*	.013*	.52**	.06	.28**	.40**	.07	.17**	.61**	−.02	.36**
HCh	.16*	.021*	.47**	.09	.24**	.32**	.11	.12**	.50**	.03	.26**
PWB	.14*	.014*	.53**	.06	.29**	.48**	.06	.25**	.59**	−.02	.35**
PR	.14*	.015*	.39**	.09	.17**	.37**	.08	.15**	.34**	.05	.13**
SA	.15*	.018*	.45**	.09	.22**	.46**	.08	.23**	.52**	.02	.28**

* $p < .05$; ** $p < .001$.

Note. H – hardiness, HCh — hardiness as challenge, PWB — psychological wellbeing (C. Riff's model), PG — personal growth, SA — self-acceptance, NR4 — short nature relatedness scale, INS — inclusion of nature in self scale; GT — general trust, TOS — trust to oneself as subscale, ST — self-trust as a general indicator after Skripkina`s questionnaire.

on NR and one of the trust indicator. (For all three of the above mentioned indicators of trust, it was confirmed that they significantly regress on NR, although the RI coefficients were small, within .015 to .06.)

In all cases, the involvement of a trust attitude in the regression equation led to a decrease in the NR beta coefficients that was especially noticeable for ST. NR beta coefficients while controlling for ST are closed to zero, and even change the sign to negative with such dependent variables as PW and hardiness. The weakening effect of TOS and GT is less expressed but reduces NR beta coefficients to statistically insignificant levels.

Although INS does not have statistically significant connections to positive functioning indicators, Sobel's test showed that adding of ST to the regression model causes a significant change in beta coefficients when hardiness and PW are considered as dependent variables. In both cases this is combined with a change in the sign of INS to negative.

Given that the effect provided by GT and TOS varies very little, a number of more complex regression models have been further analyzed. Indicators of positive functioning were considered as dependent variables, and NR, ST, and one of two variables — GT or TOS — were regarded as regressors (Table 3). Comparison of the two sets of regression models supports GT as a stronger predictor than TOS. Models with general trust better explain the variability of the dependent variables (higher RI), and GT has higher beta coefficients. Therefore, ST and GT were included as manifest variables for trust as a latent variable into structural models that describe the specificity of the association between nature connectedness and positive functioning.

Table 3

Predictive Role of Nature Relatedness and Trust Types for Positive Functioning

Predictors	Dependent variable									
	H		HCh		PWB		PG		SA	
NR4 (Beta)	−.03	−.03	.02	.03**	−.02	−.03	.05	.040	.01	.01
ST (Beta)	.47**	.53**	.36**	.44**	.44**	.46**	.21*	.21*	.40**	.39**
GT (Beta)	.33**		.32**		.34**		.30**		.29**	
TOS (Beta)		.16*		.12		.27**		.27**		.28**
F	62.4	47.3	39.0	27.5	60.2	51.7	19.2	17.3	39.8	38.9
R^2	.45**	.38**	.34**	.27**	.44**	.41**	.20**	.19**	.34**	.34**

* $p < .01$; ** $p < .001$.

Note. 1) H — hardiness, HCh — hardiness as challenge, PWB — psychological wellbeing (C. Riff's model), PG — personal growth, SA — self-acceptance, NR4 — short nature relatedness scale, ST — self-trust as a general indicator after Skripkina's questionnaire, GT — general trust, TOS — trust to oneself as subscale. 2) Empty cells mean that the corresponding variable has not been included into the model.

Structural models have been developed that describe the correspondences between nature connectedness, trust, and indicators of psychological wellbeing or/and hardiness. Structural models were estimated using the SEPATH module of Statistica 7; the method of Asymptotically Distributed Free (Gramian) estimation (ADFG), which is one of the appropriate methods for non-normal data, was used (Steiger, 1995: Schumacker & Lomax, 2010). Each model includes three latent variables, the first two of which are present in all models: nature connectedness defined by two manifest variables NR and INS, and trust manifested by GT and ST. Model 1 describes the trust-mediated influence of nature connectedness on PW manifested by Personal Growth and Self-acceptance (Figure 1). According to fit indexes, this model corresponds to empirical data: $\chi^2(7) = 11.1$; $p = .13$; GFI = .985; AGFI = .955; RMSEA = .05.

Model 2, which includes Hardiness manifested by Control and Challenge (Figure 2), was also confirmed: $\chi^2(7) = 10$; $p = .17$; GFI = .987; AGFI = .96; RMSEA = .046.

Models 3 and 4 contain a latent variable referred to as positive functioning. Model 3, in which this latent variable is defined through Challenge, Personal Growth, and Self-acceptance (Figure 3), had satisfactory fit indexes: $\chi^2(12) = 7.3$; $p = .14$; GFI = .981; AGFI = .955; RMSEA = .044.

Model 4 (Figure 4), in which the positive functioning is manifested by two general indicators — hardiness and PW, had in general a little higher fit indexes: $\chi^2(7) = 10.5$; $p = .16$ GFI = .986; CFI = .957; RMSEA = .047. Also the Akaike information criterion indicates that Model 4 (.166) is preferable to Model 3 (.213).

Figure 1

Structural Model 1 of the Mediated Influence of Nature Connectedness on Psychological Wellbeing

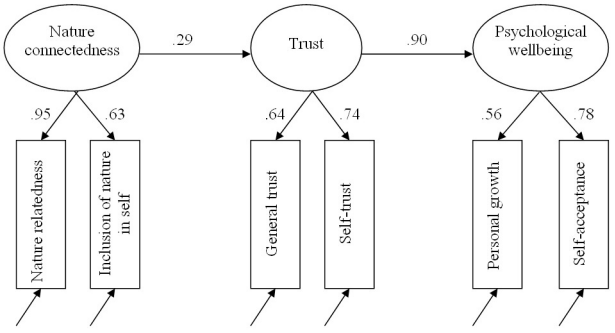


Figure 2

Structural Model 2 of The Mediated Influence of Nature Connectedness on Hardiness

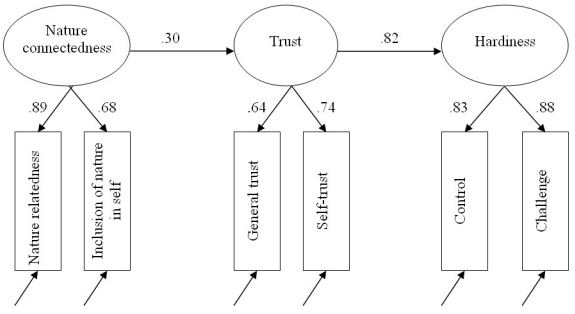


Figure 3

Structural Model 3 of the Mediated Influence of Nature Connectedness on Positive Functioning Manifested by Three Variables

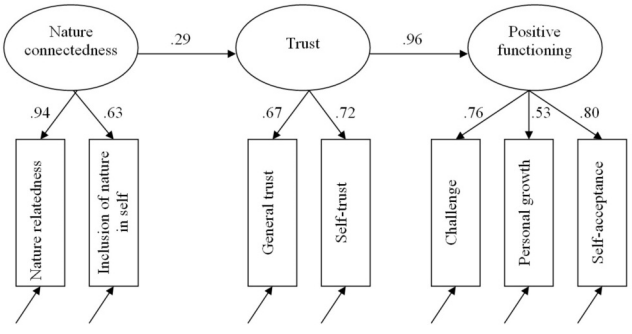
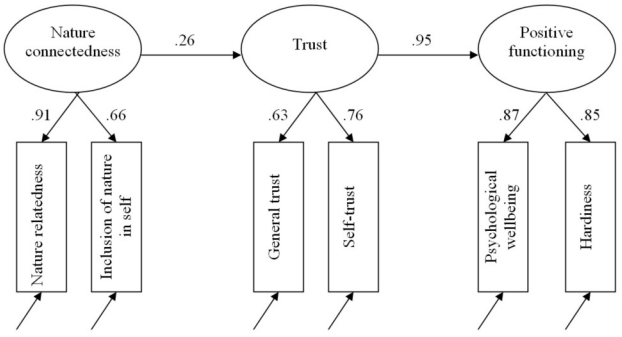


Figure 4

Structural Model 4 of the Mediated Influence of Nature Connection on Positive Functioning Manifested by Two Variables



Discussion

Study 1 did not reveal gender differences in nature connectedness that is at odds with the tendency (confirmed by many studies) for more expressed environmental attitudes in females (Zelezny, Chua, & Aldrich, 2000; Raudsepp, 2001; Heleski et al., 2004; Kryazh, 2012; etc.), but it agrees with the data of a series of studies on the connectedness with nature (Bruni & Schultz, 2010; Capaldi et al., 2014; Mayer & Frantz, 2004).

The correlation of the two indicators of nature connectedness in this study (.61) is close to the results obtained by Zelenski & Nisbet (2014) on the Canadian student samples (.66). Correlations involving INS were weaker than the correlations for NR, and it is consistent with the study of Tam (2013). That is, the emotional component of the connection with nature is more important than the cognitive one for the personal wellbeing and hardiness. However, the correlations of INS and NR with the scales of psychological wellbeing are inferior to that given by Zelenski & Nisbet (2014) (in the range of .11 to .36). Along with it (as in the mentioned study), in our case, from Ryff's subscales PG is closely related to nature connectedness. Besides, according to our data, the connection with nature is important for Self-acceptance and Challenge as the hardy attitude.

The primary goal of this study was to determine whether the influence of nature connectedness on PW and hardiness is mediated by trust. The results of regression analysis and structural equation modeling suggest that trust really acts as a mediator between subjective connection with nature and PW, as well as hardiness. In such a nature connectedness context psychological wellbeing and hardiness can be qualified as indicators of a more general tendency of a person to positive functioning. At the same time an important role precisely belongs to trust in oneself as to a subject of social interaction who can find mutual understanding and build relationships with others. In other words, the experience of one's own connection with nature will promote positive functioning as long as it maintains trust as a fundamental attitude towards life and oneself.

However, when speaking about the positive role of nature connectedness, it should be noted that according to the results of Study 1, its impact on development and the readiness to cope with challenge should be assessed as weak. At the same time, positive functioning is realized through self-acceptance and openness to change, which allows considering these changes as opportunities for personal development. As for trust, although it is closely related to the indicators of positive functioning, it stands as a separate psychological formation, by which the emotional connection with the natural environment is converted into positive functioning.

Study 2

The assumption that trust and sense of coherence may be mediators between nature connectedness and subjective wellbeing was examined in this study. Alongside this, it is assumed that trust as an affective attitude, and sense of coherence can be considered in one bundle as forms of manifestation of undifferentiated deep trust.

Method

The study was conducted in Ukraine and Belarus. The study involved 276 students (17–25 years M = 20.5 years, 64.5% female). Of the 183 Ukrainian students (17–25 years, M = 20.7 years, 62.8% female) 73 were undergraduates of the School of Psychology KhNU, 110 (18–24 years M = 20 years, 44.6% female) specializing in various fields of knowledge in different Ukrainian universities. Of the 93 Belarusian students (18–24 years, M = 20 years, 67.7% female), 50 people specialized in psychology at the Belarusian State University (18–23 years, M = 20 years, 72% female); 43 people studied at the Faculty of Health-Oriented Physical Training and Tourism at the Belarusian State University of Physical Culture (18–24 years old M = 20.1 years, 62.8% female)[1]. Study 2 was a part of a larger study on environmental attitudes as predictors of subjective wellbeing.

Subjective connectedness with nature was studied using the same two techniques applied in Study 1: NR4 (α = .78) and INS.

Subjective wellbeing (SW) was assessed using two scales: Perrudet-Badoux, Mendelsohn, Chiche Scale of Subjective Wellbeing (SSW) adapted by M.V. Sokolova (1996) (17 items, α = .84) and Diener's Satisfaction with Life scale (SWL) adapted by Leontiev & Osin (2008) (5 items, α = .84). SSW was used to identify the emotional component of SW while SWL measured the cognitive component of SW.

Trust was investigated through 15-item Kupreichenko`s (2008) Method of examining trust/distrust with the general trust indicator (GT, α = .63) and subscales of trust to oneself (TOS, α = .65), to other people (TOP, α = .46), and to the world (TW, α = .43).

[1] The author is grateful to Head of the Department of Psychology Prof. Igor A. Furmanov (BSU) and Dean of the Faculty HPT and to Natalia M. Masharskaya (BSUPC) for their help in organizing the study.

Sense of coherence (SOC) was studied using M.N. Dymshits's English translation of the Orientation to Life Questionnaire. Taking into account the research of E.N. Osin (2007), the variant of scale was used including 27 items (α = .84), of which 9 items measure comprehensibility (α = .67), 10 items – manageability (α = .66), and 8 items – meaningfulness (α = .69).

Results

A comparative analysis was carried out on all indicators for groups of Ukrainian and Belarusian students. Since Tests of Normality showed a violation of the normal distribution for all variables except SSW, SWL, GT, and SOC, the Mann-Whitney U test was applied. Significant differences were revealed for SOC (p <.05) and meaningfulness (p = .000), both indicators are higher for the Ukrainian students. Gender differences revealed that female subjects have higher GT than male (p < .05) due to more expressed TOP (p < .001) and TW (p < .05).

Table 4 includes those indicators, SW, trust and coherence, with which at least one of the indicators of subjective nature connectedness correlates at the level p < .1. NR is significantly linked with cognitive (SWL, ρ = .14) and emotional (SSW, ρ = −. 13) components of subjective wellbeing, with GT, and is connected at a marginal level of significance with TW (ρ = .11, p = .07) and TOS (ρ = .11, p = .06), but the strongest connection is found with meaningfulness (ρ = .20). INS is also most closely related to meaningfulness (ρ = .21) and has significant correlations with SWL (ρ = .13) and GT (ρ = .12) and a marginally significant correlation with TW (ρ = .10, p =. 09). TOP, as in Study 1, does not correlate with indicators of nature connectedness, and of all SOC indicators, only meaningfulness is linked with NC-4.

Table 4

Intercorrelations of Variables (Spearmen's ρ) — Study 2 (n = 276)

	SSW	**SWL**	**Mf**	**GT**	**TW**	**TOS**	**NR4**	**INS**
Scale of subjective wellbeing – SSW	1							
Satisfaction with life – SWL	−.51	1						
Meaningfulness – Mf	−.52	.45	1					
General trust – GT	−.43	.31	.45	1				
Trust to world – TW	−.32	.14*	.44	.68	1			
Trust to oneself as subscale – TOS	−.34	.30	.23	.64	.16	1		
Short nature relatedness scale – NR4	−.13*	.14*	.20	.14*	.11†	.11†	1	
Inclusion of nature in self scale – INS	*−.06*	.13*	.21	.12*	.10†	*.04*	.59	1.

p < .001, except for † p < .10, * p < .05, ** p < .01 (two-tailed), statistically insignificant correlations are in italics.

To check whether meaningfulness and trust indicators mediate connection between subjective nature connectedness and wellbeing indicators, a number of regression equations have been estimated. The results presented in Table 5 indicate meaningfulness as a strong mediator, which in fact completely explains the connection between NR and SSW. The value of GT as a mediator is less expressed, and TW and TOS perform as low mediators for NR only in relation to the emotional component of wellbeing (SSW).

The low influence of INS on SWL (β = .12, R^2_{adj} = .01) is reduced to nothing (Beta = .03) when controlling the meaningfulness (R^2_{adj} = .22) and insignificantly diminishes (Beta = .09) when controlling GT (R^2_{adj} = .11). Although INS does not have a statistically significant influence on SSW (Beta = −. 08), the inclusion of meaningfulness in the regression equation yields a significant change of the Beta-coefficient INS with a reversal of the sign to negative (Beta = .03).

The evaluation of more complex regression equations involving more than two predictors showed that, along with meaningfulness as a strong predictor, GT or TW in conjunction with TOS also mediate the relationship between subjective connectedness with nature and wellbeing (Table 6).

Structural models with a mediator between two latent variables of nature connectedness and subjective wellbeing were checked. The manifest variable GT (fit indexes of the model: $\chi^2(4) = 2{,}7$; p = .61; GFI = .996; AGFI = .984; RMSEA = .000), the latent variable manifested by TW and TOS ($\chi^2(8) = 18.2$; p = .02; GFI = .976; AGFI = .932; RMSEA = .068), the manifest variable Mf ($\chi^2(4) = 1.2$; p = .87; GFI = .998; AGFI = .992; RMSEA = .000) were sequentially considered as mediators. Alternative models of direct influence of nature connectedness on subjective wellbeing were also tested, where variables that manifested wellbeing were added to variables that served as mediators in the models described above. Lower fit indexes were obtained by models with GT ($\chi^2(4) = 3.6$, p = .47; GFI = .994; AGFI = .979; RMSEA = .000) and Mf ($\chi^2(4) = 5.4$; p = .25; GFI = .991; AGFI = .966; RMSEA = .036); and higher indexes belonged to models with TW and TOS ($\chi^2(8) = 9.7$; p = .28; GFI = .997; AGFI = .966; RMSEA = .03).

According to the assumption that personal trust and a sense of connectedness are based on pre-trust, a structural model with a mediator — the latent variable manifested GT and Mf (Figure 5) was tested. This model received high fit indexes: $\chi^2(7) = 5.4$; p = .61; GFI = .992; AGFI = .976; RMSEA = .000.

Discussion

Study 2 also showed the absence of gender differences in attitudes towards nature. No differences were also found in indicators of connectedness with nature between Ukrainian and Belarusian students. This can be estimated as an expected result taking into account the proximity of these two Slavic cultures. The lower meaningfulness in the group of Belarusian students, which determines a lower sense of coherence as a whole, is in some way consistent with Satzuk's (2014) data on the low SOC levels among Belarusian students that were explained by the author as lack of choice and inconsistency of demands in the existing educational system.

Table 5

Regression Equations Using Nature Relatedness, Trust and Meaningfulness Indicators to Predict Subjective Wellbeing Indicators

Dependent variable	Predictor NR4	R^2_{adj}	Predictors		R^2_{adj}	Predictors		R^2_{adj}	Predictors		R^2_{adj}	Predictors		R^2_{adj}
			Mf	NR4		GT	NR4		TW	NR4		TOS	NR4	
			Beta			Beta			Beta			Beta		
SSW	−.12*	.011*	−.54**	−.003	.28**	−.47**	−.05	.22**	−.34**	−.08	.12**	−.33**	−.08	.12**
SWL	.14*	.015*	.47**	.03	.22**	.32**	.09	.11**	.15*	.12*	.04***	.27**	.11	.09**

* $p < .05$; ** $p < .001$, *** $p < .01$.

Note. SSW — scale of subjective wellbeing, SWL — satisfaction with life, NR4 — short nature relatedness scale, Mf — meaningfulness, GT — general trust, TW — trust to world, TOS — trust to oneself.

Table 6

Predictive Role of Nature Connectedness, Meaningfulness and Trust for Subjective Wellbeing

Predictors	Dependent variable											
	SSW						SWL					
NR4 (Beta)	.01	.01			−.02	−.01	.03	.03			.02	.01
INS (Beta)			.04	.03	.05	.04			.03	.03	.02	.02
Mf (Beta)	−.40**	−.43**	−.41**	−.43**	−.41**	−.43**	.41**	.46**	.41**	.46**	.40**	.46**
GT (Beta)	−.28**		−.29**		−.29**		.14*		.14*		.14*	
TW (Beta)		−.12*		-.12*		−.13*		−.08		-.08		−.08
TOS (Beta)		−.21**		-.21**		−.21**		.18**		.18**		.18**
F	48.5	35.2	50.1	36.2	37.4	28.9	28.8	23.8	29.0	23.9	21.7	19.0
R^2	.34**	.33**	.35**	.34**	.35**	.34**	.23**	.25**	.24**	.25**	.23**	.25**

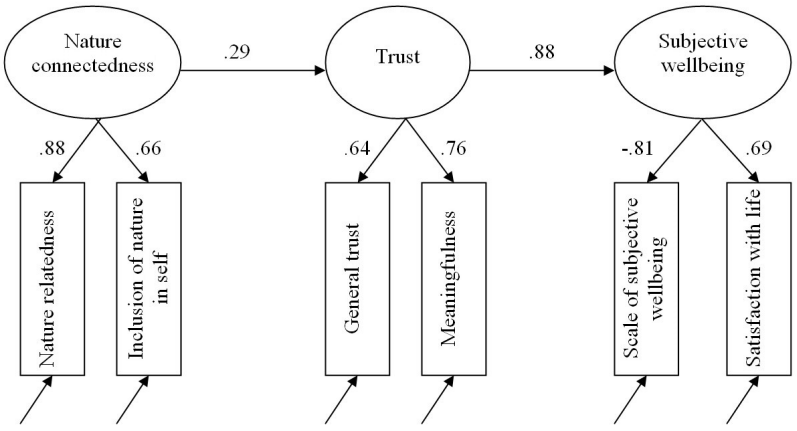
* $p < .05$; ** $p \leqslant .001$

Note. 1) SSW — scale of subjective wellbeing, SWL — satisfaction with life, NR4 — short nature relatedness scale, INS — inclusion of nature in self scale, Mf — meaningfulness, GT — general trust, TW — trust to world, TOS — trust to oneself as subscale.

2) Empty cells mean that the corresponding variable has not been included into the model.

Figure 5

Structural Model 5 of the Mediated Influence of Nature Connectedness on Subjective Wellbeing



As in Study 1, the correlation of INS with SW is generally slightly lower than that of NR and lower than those given by Zelenski & Nisbet (2014). With regard to the nature connectedness correlations with the SW indicators, there is a tendency to a slightly closer connection with SWL (but lower than Mayer & Frantz (2004) obtained by Connectedness to nature scale: $r = .20$).

Of all SOC scale measures, only Mf is associated with subjective closeness to nature, explaining, along with trust attitudes, its positive effect on subjective well-being. This can be explained by the fact that, firstly, meaningfulness indicates rather the emotional experience of the coherence of an event than the rational judgment (Osin, 2007); secondly, the explicit social subtext is absent in statements of this subscale. In other words, the meaningfulness of its content can be considered as a form of manifesting deep trust in life. The unity of meaningfulness with trust is also confirmed by the structural model associating this variable with general trust in the framework of one latent construct.

The hypothesis of trust as a mediator between nature connectedness and subjective well-being was confirmed. It was confirmed that general trust can be considered as an independent mediator explaining a beneficial role of nature connectedness for subjective well-being. At the same time, there are grounds to assert that deep trust/pre-trust as trust in the ecological environment at its various manifestations is used in the 'mechanism' of such influence. In this ecological context, trust in oneself as an actor and trust in social environment, being derived from the pre-trust, draws nearer to subjective well-being, which is indirectly influenced by the nature connectedness.

General Discussion

In sum, subjective closeness with nature is significantly associated with wellbeing in both — eudaimonic and hedonic — aspects, and trust is an important mediator

that determines the benefits of connectedness with nature for wellbeing. Through trust the influence of nature connectedness on wellbeing viewed through indicators of positive functioning also on subjective wellbeing manifested in the form of emotional comfort/discomfort and satisfaction with life, is interpreted. However, a comparison of the results of both studies indicates the significance of different facets of trust for different manifestations of wellbeing. Trust in oneself plays a decisive role in order to maintain dispositions that provide positive functioning. Experiencing one's connection with a large natural world enables the support of self-acceptance and the willingness to transform life experiences into new opportunities for personal growth, provided that this experience fuels self-confidence. Nature here rather acts as a strong partner, whose unofficial support adds self-confidence and helps to move forward. To maintain subjective wellbeing, it is more important to experience its original connection with the ancient world of nature and to accept the intrinsic value of life that increases the trust in life as a whole as meaningful and self-valuable.

In both cases, the natural world appears as a source of a vital resource not just in materialized meaning, but also in a broad psychological, spiritual sense. The experience of its ecosystem identity actualizes the genetically built willingness to rely on the ecological world in its coherence and follow natural processes. In practical terms, reliance on trusting relationships with the natural environment opens new directions for promoting such pro-ecological changes in lifestyle that will contribute to psychological wellbeing.

It should be underlined that, both for wellbeing of a fully functioning person and for subjective wellbeing, the role of subjective connectedness to nature is not big. At the same time, as noted earlier by Mayer & Frantz (2004), nature connectedness is not inferior in importance to such psychological wellbeing factors (that are often considered) as marital status, education, and income. And although, according to the results of both studies, the associations of nature connectedness with psychological wellbeing are somewhat inferior to those described for North American and European samples, they nevertheless confirm the importance of psychological connection with the natural world for human wellbeing.

It also should be noted that in both studies there were no gender differences in the nature of connection, as well as differences between Ukrainian and Belarusian students.

Special mention should be made of the limitations that these studies have. In each study different sets of techniques were used to research trust, and only one aspect of wellbeing, eudaimonic or hedonic, was considered. Although this had specific theoretical grounds, questions about the role of self-trust for subjective wellbeing and the importance of sense of coherence for eudaimonic wellbeing remain unclear. Besides, the low reliability indexes of Kupreichenko's questionnaire improve the measurement error, which could lead to an underestimation of the relationship between Trust to the world and Trust to other people with nature connectedness. It should also be noted that the study involved representatives of one social group, university students.

Therefore, in order to assert that the described mechanism of the influence of nature connectedness on psychological wellbeing is universal, it is necessary to obtain confirmation on samples of other age and social groups.

Conclusion

Although the positive effect of connectedness with nature for eudaimonic and hedonistic wellbeing is confirmed by numerous studies, the question of intrapersonal processes that determine such an impact remains open. The Petzold's concept of pre-trust can serve as a theoretical basis for understanding psychological formations through which the transition occurs from nature connectedness to experiencing happiness, to satisfaction with life, to one's implementation as a fully functioning person. Pre-trust as an evolutionarily formed trust to the ecological environment, to life in its diverse manifestations, sets a vector of positive comprehension of what is happening, the openness to new experience and the readiness to realize one's life potential. Nature connectedness as an experience of unity with nature actualizes pre-trust, thereby launching a 'system of psychological wellbeing maintenance'.

This interpretation is supported by the results of two studies that confirmed that trust mediates the relationship between nature connectedness and both subjective wellbeing and eudemonistic wellbeing considered in the context of positive functioning. At the same time, trust in oneself is included in support of positive functioning, while subjective wellbeing is supported by experiencing the meaningfulness of life events.

Acknowledgements

The author is grateful to Head of the Department of Psychology Prof. Igor A. Furmanov (BSU) and Dean of the Faculty HPT and to Natalia M. Masharskaya (BSUPC) for their help in organizing the study.

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Позитивные эффекты связанности с природой для психологического благополучия: значение доверия как медиатора

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Резюме

Хотя позитивные эффекты связанности с природой (СП) для психологического благополучия, рассматриваемого в эвдемонистическом и гедонистическом ракурсах, подтверждены многочисленными исследованиями, вопрос о внутриличностных процессах, объясняющих такое влияние, остается открытым. Гипотеза биофилии Уилсона указывает на эволюционную основу СП, в качестве которой может быть рассмотрено пра-доверие как эволюционно сформированное доверие к экологическому миру, к жизни в ее различных проявлениях (Petzold, 2012). Предполагается, что пра-доверие задает вектор позитивного осмысления происходящего, в то время как СП актуализирует доверие, создавая тем самым «систему поддержания психологического благополучия». Гипотеза, что доверие выступает медиатором между СП и психологическим благополучием, проверяется в двух исследованиях с применением множественного регрессионного анализа и моделирования структурными уравнениями (SEM). В исследовании 1 (выборку составили 232 украинских студента) подтверждается модель влияния СП на позитивное функционирование (операционализированное через Шкалу психологического благополучия Ryff и Тест жизнестойкости) с доверием как медиатором. Исследование 2 (выборка включала 276 украинских и белорусских студентов) показало, что латентная переменная, манифестированная показателями доверия и чувства связанности, опосредует отношения между СП и субъективным благополучием. Показано, что доверие к себе включается в поддержку позитивного функционирования, в то время как субъективное благополучие

поддерживается переживанием осмысленности происходящего. Обсуждаются ограничения исследований, а также значение полученных результатов для психологии экосохранения.

Ключевые слова: связанность с природой, доверие, пра-доверие, психологическое благополучие, субъективное благополучие, позитивное функционирование, биофилия.

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TYPES OF THINKING AND THEIR VALUE FOR ECOLOGICAL EDUCATION

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Abstract

In this article types of thinking — mythological, totemic, formal, logical, associative, figurative, and abstract — are theoretically analysed regarding their possible contributions to ecological attitudes. The value and uniqueness of each type of thinking as a way of knowing the world is emphasized. The continuity, complication, and evolutionary character of the types of thinking (that are in a certain hierarchical relationship) are described. The potential for all types of thinking to be presented in each person is specified. It is noted that each phenomenon (a situation, an event, or a subject) can be considered from the angle of different types of thinking: it will only enrich the perspective and complement the knowledge of it. The possible contribution of each type of thinking to ecological education is described. It is emphasized that the types of thinking are conscious or unconscious tools, the application of which is possible and necessary in order to clarify reference points and triggers that form the basis of ecological behavior, as well as to help to a person of any age to learn to think integrally and systematically. Understanding the types of thinking will assist people in their search for their personal sense of sympathetic behavior to the environment.

Keywords: types of thinking, system thinking, ecological thinking, ecological attitudes, ecological education, sustainable development, the Club of Rome.

Introduction

In November, 2017 there was an event of (without exaggeration), universal scale: The Club of Rome published a report in time for the semicentennial anniversary on the subject of «Come On! Capitalism, short-sightedness, population and destruction of the planet» (von Weizsaecker & Wijkman, 2018).

The idea of 'The New Enlightenment' became a key point of the report: the need to reject materialism and reductionism, to make a transition to a holistic outlook, and a fundamental transformation of thinking resulting in a radical paradigm shift of our civilization's development.

Regarding the purpose of education in general, the Club envisions populations developing «literacy concerning the future», namely, a focus on sustainable development, the coherence of systems, and the cultivation of thinking that is integrated and beyond the analytical.

Ecological thinking as a combination of ecological understanding and environmental awareness (Balgopal & Wallace, 2009). Ecological thinking involves understanding concepts in ecology, including biotic factors, abiotic factors, and biotic interaction. It is complemented by understanding the impact of human activity on ecosystems (Norizan, Hashimah, Nooraida, Mahamad, & Mardiana, 2018; Woolpert, 2004).

Mitchel Resnick suggests a very unusual metaphor: to think ecologically is to think like a tree, specifically a walking tree. He explains that the walking tree follows a "tree strategy: 1) Test Randomly (send out roots in all directions); 2) Evaluate (determine which roots find the best soil); 3) Elect (choose which direction to move, based on the information from the roots)" (Resnick, 2003). In other words, ecological thinking is connected to the ability to think on a substantial scale, consciously, and attentively.

That makes this category close to system thinking (Gharajedaghi, 2011; O'Connor & McDermott, 2012; Smolova, 2019). System thinking is a framework based on the belief that component parts of a system can be understood best in the context of the relationship with each other and between systems, rather than in isolation. The only way to fully understand why a problem or an element occurs and persists is to understand the part in relation to the whole (Capra, 1996).

Ecological thinking can be improved by ecological education, one of the goals of which is the education of a thinking person who has their own opinion and is capable of independently comprehending various phenomena, as well as making decisions, consciously and responsibly.

Ecological education is a continuous process of training, self-education, accumulation of experience, and personality development with the aim of forming valuable targets and standards of behavior, and obtaining specialist knowledge for the protection and management of the surrounding environment. It is realized in ecologically competent actions (Blenkinsop, Piersol, & Sitka-Sage, 2018; Campigotto & Barrett, 2017; Gifford & Sussman, 2012; Hintz & Lackey, 2017; Stevenson, Brody, Dillon, & Wals, 2014). It is obvious that the ecological component cannot be considered separately from economic, social, political, religious, migration, and other processes and systems.

The purpose of this article is to describe the types of thinking and to show how they contribute to the increase in ecological thinking.

Types of Thinking

In psychology thinking is understood as a mental process of reflecting reality, the highest level of human knowledge and a person's creative activity (Meshcheryakov & Zinchenko). Undoubtedly, thinking has close ties with, and directly depends on, such mental functions as perception, memory, imagination, and speech. It cannot be considered separately from the diversity of a person. Factors such as culture, religion, and the social rules of conduct in a given community exert an impact on thought; also internal experience, behavior stereotypes, outlook, and beliefs, etc. do. Looking at the development of the person in

anthropogenesis, it can be said that thinking was formed together with the formation of mankind, constantly changing and improving it.

The works of many Soviet, Russian (Leontiev, 2008; Pogodin, 2013), and foreign researchers are devoted to the subject of thought (Baum, 2013; Pinker, 2008; Zook & Allen, 2016).

The result of thinking — ideally — is the birth of a person's own thought. However, it does not always occur: not unfrequently the product of mental activity represents a conscious or unconscious retelling of other people's thoughts, or a formalistic study of some phenomenon. In each case, the principle of the birth of a thought will be a different.

To study the types of thinking, we have analysed scientific literature on philosophy, anthropology, psychology and the system approach. The basis of the analysis was formed by the following research methods.

Dialectical materialism adapts the Hegelian dialectic for traditional materialism that examines subjects of the world in relation to each other within a dynamic, evolutionary environment. Dialectical materialism accepts the evolution of the natural world and the emergence of new qualities of being at new stages of evolution.

System approach – the world is a set of elements interacting among themselves and forming a certain integrity, and mentality is an integrity comprised of elements that are closely connected among themselves and can't exist separately, out of this communication.

Determinism approach – a philosophical theory of all events, including moral choices, being determined completely by previously existing causes and processes happening in the world.

So, on the basis of a synthesis of anthropology, philosophy, system theory, and psychology, it is possible to delineate several types of thinking representing specific ways of knowing.

Mythological thinking

A myth (from Ancient Greek: speech, word; story, legend) is a narration passing on people's ideas about the world, a person's place within it, and about the origin of all that exists, gods, and heroes. The prevalence of mythological consciousness belongs mainly to an archaic (primitive) era (Campbell, 1972; Lévi-Strauss, 1999).

Characteristics of mythological thinking are (Lapitov, 2009):

- no separation of people from their surrounding nature, attribution of human characteristics and properties to natural objects;
- lack of a division between natural and supernatural;
- symbolic thinking;
- a belief in magic;
- no division between the subject and the object, material and ideal, spatial and temporary, etc.;
- a poor development of abstract concepts and strong elementary/sensory understanding.

In discussing mythological thinking as one of the types of thinking of the modern person, we will remove the words «archaic» and «primitive»: myth is not something that was left behind centuries ago and is no longer present in modern people. Each person uses their own myth as the beginning of their outlook and the basis for their picture of the world.

Mythological thinking initially is characteristic in children. More than likely this is the first thing a child meets: they have myths of the family, nature, and the surrounding world. In the creation of this myth a large role is played by fairy tales, stories told by adults that pass on their views of the world. Children love fairy tales and believe that Father Christmas and other magical beings exist not in their imaginations, but in real life. «The real reality» and the «fantastic unreal reality» are bound in a single whole.

Even serious and highly intellectual people have myths; beliefs in science, power, mathematics, figures, statistics etc. can be myths too.

However, here it is worth emphasizing an essential distinction: if a person does not understand something, for them it is a myth; if they have the ability to deeply comprehend a certain phenomenon, they use a higher type of thinking. For example, for some people nanotechnologies are a myth in which it is pleasant to believe. However, for scientists professionally engaged in this field nanotechnologies are real knowledge.

The strength of a myth is that its irrationality always gives an impetus for development. In life, it is not possible to explain everything using the mind, and a myth is the recognition that something is not understood.

The weakness of a myth (for an adult) is that a person quite often holds onto a myth without wishing to move further to independent deep judgment, the verification of this myth, and the formation of their own position. A myth prevailing over an adult brings them to the level of a child incapable of directing their life and of thinking independently.

Thus, mythological thinking is a process of handling information and establishing connections between objects or phenomena of the surrounding world. The connectedness of a person with their natural and social environment, and lack of differences between reality and visibility, is characteristic.

*The ecological context***.** When speaking about children, it is very important for them to have created their own myth about the environment – not a frightening one, but one that provokes interest, responsibility, and personal relationships with the planet, nature, the realm of animals, plants, and minerals. While these relations are still fantastic and not formalized, they will be the cornerstone of the transformation of the myth into something more concrete and conscious.

Each adult also has a rather large number of ecological myths: about the ecological condition of a region, country, or the planet. People give birth to them as a result of selective perception, and also on the basis of stories offered by mass media, which often operates with rumors, gossip, and unverified or inexact messages.

Awareness of one's own myths about the ecological situation of a country or the planet, as well as the reasons for their appearance, becomes the first step for work on thought in ecological education.

Totemic Thinking

The term «totem» was used for the first time by the English traveler J. Long in 1791, having borrowed it from the North American Ojibwa tribe, in whose language totem means “name” or “sign”, the clan’s symbol, and also the name of the animal that is the subject of the tribe’s special cult.

Initially, totemic thinking (with the totem meaning ”the protector”) was based on the idea of a person belonging to a certain tribe (Frazer, 2015). The history of a person’s origin, based on mythological thinking — a belief in the existence of the primogenitor, his wisdom, force, power, and final authority — was of great importance. In the history of mankind there was a gradual transition from the context of the primogenitor to that of the Protector.

For children totems are undoubtedly parents and significant people. Their decision is usually not criticized, and if exposed to criticism in certain cases, it is carried out all the same.

For adults totemic thinking is connected with the presence of an authority in their life. This authority can be a personal acquaintance or not, but most importantly a significant person. Their life story, qualities, and characteristics are, for any of several reasons, separated from a great number of others. A person builds their own life by taking this example into account: what will my mother think of me? What would my boss say about this?

Totemic thinking is the substitution of one’s own thoughts and behavior with the thoughts, views and decisions of a totem, where the person steadily corresponds to the opinion of a «senior» and tries to imitate him or her.

At certain stages (especially during childhood) totems genuinely develop a person. The person builds themselves (and their general way of life) according to the chosen values. While these values are not yet appropriated, realized, or comprehended, the process to which a person wants to correspond is already started.

However, at a mature age, the comparison of one’s own life with the life of even the most worthy person can slow down personal development, and even lead to a dead end. The presence of totems in adults limits their opportunities, as well as making them rigid, and not viable enough.

*The ecological context***.** Returning to the ecological subject, it is necessary to emphasize the importance of understanding totems that a person is guided by when making decisions, and installations regulating their behavior.

Why turn off the light when leaving the room? Why not walk on lawns? Why is it necessary to dispose of batteries in special processing points? Why make nesting boxes and plant trees in spring?

For children the priority is the behavior of parents: «I do so because mother always does». For adults the imitation of an idol (a political leader, singer, relative, etc.) can be a cornerstone of ecological behavior.

Once again, we will emphasize that even in case of a friendly relationship with the environment the problem consists of repeating actions without sufficient judgment from oneself.

Formal Thinking

Formal thinking is a sequence of intellectual actions by rules and templates fixed in advance.

The name contains the idea that thinking occurs in a form or forms. (The form (from Latin «appearance») is understood as a relative positioning of borders (contours) of a subject or object, and also as a relative positioning of points of the line.)

Formal thinking is focused directly on the form of actions carried out, without paying attention to their substantial context, logical analysis, and judgment. Interrelations between objects are described without emphasis on their validity or falsehood (for example: «Life is a difficult thing», «Who finds it easy now?»).

Historically, formal thinking is connected with the development of social groups with clearly developed traditions. Independent thinking was not required from members of the societies' majority groups; it was not even absolutely essential for them to think, feel, or respond to any event. The most essential priority was the observance of the social order.

Having acquired the adopted rules, a person becomes successful in communication and a worthy member of society. There were often enough of these rules to have a social life, and to lead a socially approved life.

The strength of formal thinking is that a person does not need to spend resources (strength or time) on a detailed exploration of a certain action.

The weakness is that it is thought on a template or scheme set by somebody else. The person does not penetrate into the content of processes, but remains on the surface. As we see, in the first three types of thinking the process of knowing happens due to following the socially set rules and norms. Own thought, in this case, has not been born yet; it is rudimentary.

*The ecological context***.** Quite often, people follow rules and norms only because the majority does so in this community. It can be inhabitants of closed communities, small towns and villages whose ecological behavior occurs on a habit: «we do as our fathers and grandfathers did». Sometimes they have no modern ecological technologies; sometimes, if they do, they don't want or don't know how to use them. However, the residents of big cities may also not want to analyze behavior in general and ecological behavior in particular.

This is due to an unwillingness to be separate from a group, as they have the opportunity «to be the same as everyone», without thinking of reasons for the behavior. Thoughtless repetition of what is done by other members of society is characteristic of formal thinking, and is shown on all levels including ecological. Thus, for example, in some communities, disposing rubbish directly onto the street is the norm; people don't think of what will happen afterwards.

Undoubtedly, if this behaviour is ecologically preserving, such a formalistic approach can be satisfactory. It is great when there are worthy examples to imitate, not just in the form of totems, but as standard norms. However, there is no guarantee that, if moved to another community, a person will behave in an environmentally friendly way there too. The key is his/her lack of freedom, and dependence on opinions of other people around.

Logical Thinking

Historically, Western cultures give priority to logical thinking, which has had the longest history of development. Aristotle analysed the main forms of a thought (concepts, judgments) and also methods of cognitive activity. From the 17th century logical thinking becomes dominant in European sciences and philosophy. This is connected to the empirical stage of development of the European natural sciences, representing the Galilean-Newtonian picture of the world.

Logical thinking is the type of thinking that essentially operates using concepts, judgments, and conclusions according to the laws of logic. It is the thought process whereby a person uses logical concepts and designs, inherent to which are substantiality and judiciousness, and the purpose of which is to arrive at a valid conclusion from the available prerequisites.

Logical thinking is expressed in rationality and analyticity, that is, with the affirmation of the importance of mental activity. At some level, logical thinking is accompanied by rational thinking and the assumption that the cognitive process dominates while the sensual sphere is secondary.

The essence of analytical thinking is the application of logic in decision-making and analysis of information based on a person's ability to split the general whole into its components.

For an analytical task to be solved, the information is first split into separate components that are then comprehensively analyzed; several possible decisions are outlined; the strengths and weaknesses of each option are considered; and as a result the most optimal is chosen. It is noteworthy that missing information can be deduced by means of logical conclusions.

We will mark out some characteristic features of logical thinking:

• *Substantiality* (the need for justification, rejection of unfoundedness, and declarativity).

• *Certainty* (accuracy and unambiguity of thought, as well as lack of confusion in concepts).

• *Sequentiality* (structural communications and relations are consistently presented in time).

• *Dichotomy* (from Greek, meaning «division in two») (the division of a class into logical subclasses, given that the concept to be divided breaks into two mutually exclusive concepts (day/night; man/woman, etc.)).

• *Consistency* (the impossibility of the phenomena having contradictory values; the ban on any contradictions in life and, therefore, in cognition).

• *Estimation* (well/badly, correctly/incorrectly, etc., an investigation of the laws of non-contradiction as two opposing judgments cannot be true at the same time in the same context, with exclusion of a third judgement (from two contradicting judgments, one is true, another is false, and the third isn't given)).

• An opportunity to reveal relationships of *cause and effect* (the cause is always before the effect, preceding it).

• *Priority of mental functions* (the sensual sphere, while the most dynamic, is given a secondary value in the informative process in general as well as in the course of the birth of own thought).

• A distinct *prevalence of analytical procedures* of research in comparison with synthesis methods.

So, using logical thinking, a person tries to receive the maximum quantity of valid and evidence-based conclusions. It is notable that, when perceiving an object, the person takes a certain position and does not change it throughout the whole process.

The purpose of logical thinking is the birth of *own thought,* which is the ability to synthesize information and knowledge and express it externally. Undoubtedly, the high-level ability of creating thought (as a unique unrepeatable event) is not one possessed by many people. People usually recount thoughts of others.

The ecological context. Thus, the person judiciously and rationally approaches any phenomenon, including those connected to nature. They are capable of creating own thought, explaining a given decision, evaluating their's or another's act, and revealing relationships of cause and effect.

Why is throwing rubbish directly onto the ground not permitted? Why is it necessary to collect waste paper? The answer often assumes the distinct logical answer of: «because the cultural person doesn't behave in that way», or, «because unnecessary paper can be recycled to print books». As we see, it is not a totemic, but a much higher outlook. The person explains their choice of behavior: «I behave so because ...», adding arguments of why they act in this way and not differently.

Many consider that the logical type of thinking is the most effective and high. But it is impossible to deny that similar bonds existing generally at the rational level work locally and are tied to a concrete existential continuum. They do not always involve communications at another level. In this type of thinking, there is not enough of an integrated vision of the connectedness of ecological processes in other systems. There is an understanding of the behavior, but there is not enough intelligence and awareness at a deeper level. Logical thinking has one main restriction: it is incapable of comprehending the life of systems.

Associative Thinking

Association (from Latin "connection", "interrelation") is a communication between elements, objects or phenomena. The basis for association is a short-term conditional generation of mental communications that are responsible for the subject's similarity and analogy.

The use of associations and metaphors in daily life is natural and organic; very often people do it unconsciously. However, *to have* associations and *to think* using associations are different realities. For some people associations can appear from time to time, while others use them as their main way of knowing the world.

Associative thinking is a way of understanding the world and connections within it, through the use of associations as communications between separate representations and images when one of them involves the emergence of another. Associative thinking includes logical analysis, but arrives at a higher level.

Associative thinking emphasizes the restriction of a dichotomizing approach, and the recognition of the meaning of the simultaneous existence of phenomena with contradictory values. It also recognizes the priceless and equal contribution of sensory and rational perception. The priority is given to synthesis as the connection of various elements of an object to a whole system.

The phenomenon of interest is woven into a web of communications that are organised not simply in a certain sequence between the «key» elements (as they are in chains of logical thinking) but between all the elements of a system. Associative thinking assumes a synthesis of associations as the discovery of complete contents of a phenomenon, irreducible to separate communications between parts and elements comprising it.

The result of associative thinking is the concept of a phenomenon as a nonlinear hierarchical synthesis of communications between elements of a system. The concept of the phenomenon defines its role in a given whole, introduces the relationships between the part and the whole, and makes the phenomenon necessary as a part of this whole.

The concept discovered using associative thinking helps a person to answer such questions as: "Why has this happened in my life? What is the point of this situation?" This is an engagement of intelligence and thinking on a new, deeper, level of development.

Associative thinking represents an entrance to systemic thinking, from which even more complicated types will follow: figurative and abstract.

The ecological context. Why do we have bicycle riding? Why do we have to bring our own mugs to the workplace rather than to use disposable cups? What is the purpose of separating rubbish?

When revealing the meanings of any phenomenon including those connected to the environment, the person goes beyond exclusively ecological themes. They are capable of seeing connections between various systems, social, economic, political, and others.

It is obvious that everything a person interacts with is a system. Systems possess the characteristics of openness, nonlinearity, instability, multidimensionality, and diversity, and do not follow the laws of formal logic.

Revealing a meaning, the person acts in some particular way not because it is good or bad, but because he/she finds an important reason for such an action. This helps build up a personal relationship with a given (including ecological or natural) phenomenon, and makes a person's behavior even more specialized.

Figurative thinking

Undoubtedly, images are used in all of the previous types of thinking. However, while most people have images, only some are able to think using images.

"Image" is used to describe the mental image formed in a person's consciousness of an object that is perceived by them and exists in the environment. Research on images in psychology is connected to perception, the result of which is the creation

of a complete perceptual image of an object, but not its separate properties, and this information gives the person a sensation.

Perception always aims to create a complete perceptual image. However, the extent to which this is achieved depends on the person's abilities to synthesize feelings of various modalities. Information arrives from many sensory organs at the same time, creating sound, olfactory, flavoring, visual, kinesthetic, artistic, and other images. The person's task is to synthesize a uniform and whole image, without ignoring anything.

Figurative thinking is thinking in the form of images; through their creation, formation, transfer, operation, and modification by means of thought processes. It does not impart knowledge about the separate and isolated aspects (properties) of reality, but forms a complete mental picture of a separate part of reality. We will emphasize that the discussion is not just about the creation of associations between phenomena, and the ability to see quantitative and high-quality connections between them, but about their association in whole images and thinking with them. This type of thinking was the leading form in A. Einstein, N. Tesla, W.A. Mozart, etc. (Dilts, 2001).

It is remarkable that the greater the associations that arise to reveal different sides of an object, the deeper the image will be. However, associative thinking stops at revealing the features of connections, and identifying the meaning and value of these connections. Figurative thinking, on the other hand, is directed towards opening and deciphering that which stands behind these connections, having synthesized them as a whole, created an image, and entered its essence: what is it?

The essence is a quintessence, and the most precise answer to the question of who is who and what is what. The task of figurative thinking is the recognition of a complete image as being composed of systems, on the basis of identifying their essence.

Thus, figurative thinking is a process of cognitive activity directed towards the reflection of images' essential properties (their parts, processes, and phenomena) and the creation of whole entities of their structural interrelation.

Figurative thinking represents a hierarchically higher type of thinking containing within it a totally different principle of knowing the world. To *understand* the phenomenon (an event or subject), a person resorts to formal thinking; to *analyze it*, to logical; to *comprehend it*, to associative; but if they want to *realize it*, they must think of it in the form of an indivisible image.

The ecological context. To look at an environmental problem in the context of figurative thinking means not to simply see connections linking it to other phenomena and systems, but to see the essence of what is happening.

What, in reality, occurs when a person participates in the activities of public organizations, such as looking after animals in shelters? What need do they satisfy? What value acts as the cornerstone?

When a person thinks about the essence of a phenomenon, they see beyond the surface of some, including ecological, phenomena. For this purpose, there must be sufficient information in the person's database; however, this is not enough by itself. The person synthesizes form and content, and compares it with other observations. The ability to distinguish and separate what is major from what is secondary.

The ecological context passes into the background, and to the first there are moral and ethical values.

Why do I do it? It's good. That is how I express love. My conscience tells me to act like that. It's honesty.

Such a person cares for the environment, participates in ecological actions not because they have to or have some obligations. Not because others also do it, or it can be explained logically or even it makes sense. He just cannot act differently.

The person with figurative thinking is distinguished by the scale and depth of perception.

Abstract Thinking

In classical psychological literature abstract and logical thinking is often combined. Undoubtedly, they can be connected in the course of the performance of a task. However, abstract thinking, from our point of view, can and must be marked out as separate as it represents a qualitatively different and much higher means of knowing.

Abstraction comes from Latin «derivation»; it is the form of knowledge based on a mental separation of essential properties and connections of a subject from its other, particular properties and communications.

In dialectical logic, the *abstract* (a person in general, a handle, wood, etc.) is opposite to the *concrete* (my computer, this food, our house, etc.).

An abstract understanding is a mental design (presented in the form of numbers, notes, symbols, signs, images, metaphors, or objects that don't have a concrete form) capable of representing certain objects or phenomena of the real world, but at the same time separate from their concrete embodiments.

Thinking using abstractions begins during childhood, when a child says that clouds are similar to sheep or when they learn to manipulate a mobile phone or a computer. It develops in the course of education, especially when studying disciplines such as mathematics, physics, chemistry, biology, etc., where it is necessary to actively switch between abstract and concrete thinking.

It is shown particularly strongly in those professionals whose specialty is connected with thinking using abstract symbolical categories. In practicing psychologists this ability can be developed at a high level; a discussion of the client's concrete concern quite often demands recourse to a different level of discussion using abstract concepts (love, good, honor, etc.), with a subsequent return to the level of concrete practical actions.

To solve a concrete task, a person applying abstract thinking leaves «concrete reality»; addresses abstract concepts (symbols, images, notes, numbers, metaphors, etc.); solves a problem at the level of abstraction; then comes back to the concrete level, and applies it in what is called «matter».

However, it is clear that people carry out abstract tasks totally differently. This occurs most often at the level of execution: a person receives a task of executing a certain manipulation of symbols (to solve a mathematical, physical, or other problem). If they possess the minimum logical data, they will be able to perform it.

A totally different situation occurs in the case where a person independently gives rise to an idea and embodies it at the concrete material level. The *idea* is an abstraction, a plan, or a mental prototype marking out the essential qualities of any action, subject, or phenomenon. The idea includes a conscious awareness of the aim and the practical transformation of the world.

However, for this purpose, a person has to think of a way, an action, and a will to embody the idea (as an abstract concept) on the concrete level – the level of physical matter. In this case the person becomes a pioneer and comparable to the Creator: they themselves create reality.

The complexity and scale of ideas will undoubtedly differ, someone realizes the idea of designing of a suit, another composes music, another devises medicine against cancer, and another invents new energy saving technologies.

In this way, thinking using abstractions consists of the conversion of attentional focus from the concrete to the abstract and vice versa for the purpose of performing a certain task. Abstract thinking is a way of knowing the world, the essence of which is the independent generation of an idea as an abstract mental prototype of an action (the symbolic level), and its realization at the level of a specific objective, for the purpose of a high-quality transformation of physical matter.

As we can see, it is also a systemic type of thinking, but on a much higher hierarchical level: in it, there is the ability to think on two levels of reality at the same time,- the abstract and the concrete, holding an image of both of them and their synthesis in general at the same time.

The ecological context. How to restore the ecosystem of a poisoned river? How to reduce harmful emissions in the atmosphere? How to create the device for waste-free technologies?

The person creating new ecological ideas and realizing them can become an example of abstract thinking in this context.

This is the professional who deeply knows the sphere of activity. This is the experimenter: he/she sets tasks and finds solutions of realization of the ideas of an ecological subject. He/she is capable to think of many systems at the same time: social, economic, ecosystems, and others, holding an image of all of them and their synthesis in general.

Such people, as we said, without exaggeration, are creators. Their creativity, freedom, ease of thinking, and perception scale usually inspires others. Such people become role models and it brings them to a deeper level of responsibility. They become responsible not only for realization of their professional ideas, but also for their actions, their style of life, and ecological behavior in everyday life.

Discussion

Having considered the types of thinking, we will sum up some results:

1. *Each type of thinking is valuable in its own way and represents a unique way of knowing the world*. Mythological thinking is consciously or unconsciously connected with the myth of life; totemic thinking is associated with reference points that the person has at various stages of their life; formal thinking is related to a focus on

the external aspect of a given phenomenon. In logical thinking there is a birth of own thought; in associative thinking there is a creation of meaning; in figurative thinking there is an entry into the whole of a phenomenon and the identification of an essence; in abstract thinking there is an emergence of ideas and their realization in matter.

2. We will emphasize that *there is a difference between having a given type of thinking and living by it*. All people think, but not everyone can create their own thoughts. Associations are born in all people, but not everyone can see a meaning as a synthesis of connections from them. People are full of images, however, they are rarely capable of putting together the whole of a phenomenon and revealing its essence. Many are able of abstraction and moving from the particular to the general and vice versa, but very few have the talent to give rise to an idea and to embody it in matter and in life.

3. *Each person potentially has all types of thinking*. However, some are leading at a given moment in time, and these define a person's possibilities.

4. *The types of thinking have certain hierarchical relations between them*. Development of the subsequent form requires the formation of the previous. So, for example, to reveal essences, it is necessary to learn to show meanings and to give rise to thoughts. If it is difficult for a person to create a thought of their own as a synthesis of knowledge and information, they will not fully manage to capture the connections of the phenomenon of interest and will find it extremely difficult to comprehend meanings, let alone essences.

5. *Continuity, complication, and the evolutionary character of types of thinking*. When a person begins to be engaged in a new area, their thinking develops through all stages from mythological to abstract gradually becoming complicated and improved.

So, for example, a child encountering the subject of nature for the first time will perceive the ongoing processes locally. It will be difficult for them to combine the processes into an integrated picture. They will perceive a complete picture only as a myth; a fairy tale, in the creation of which adults will participate. Subsequently, it is possible to assume that the child will copy the behavior and views of significant persons, not fully understanding why they make one action or another (“mother collects waste paper, so I do too”; “grandfather plants trees in the spring, so I do too”).

After a while there is a reorientation to the community, when a child or a teenager wants to be like everybody else and carry out the norms and rules adopted by him/her (“my school gives batteries for recycling, so I do too”; “at work putting garbage in separate baskets is expected”). The person does all this, but does so formally and to be a part of the community.

In a case where knowledge has sufficiently accumulated, the person has the ability to build relationships of cause and effect as well as draw conclusions. They can then synthesize information obtained from their own experience of outside world and express it as their own thought. Actions stop being formal, the person has their own opinion more often, and they make decisions independently and responsibly about any, including ecological, situations.

With the expansion of a person's outlook and also the emergence of one's own professional practice, there can be associative thinking when a mass of associations

arises from a given phenomenon (including one connected with nature). Then, it is easier for a person to answer questions about the causes of a given phenomenon or the meanings of their own actions.

When a professional (in any area) works confidently in theoretical and practical fields, they can have figurative thinking, an insight into the essence of a studied phenomenon that is not learned but instead comes from the depths of personal experience. The ecological context will be deeply interwoven into connections of various quality, level, and order.

The improvement of a professional skill is connected with the development of abstract thinking, spontaneous emergence of ideas, and an easy and natural transition from the abstract to the concrete and vice versa.

6. *Heterogeneity of types of thinking.* As we can see, the first four types of thinking — mythological, totemic, formal, logical — form a basis for the emergence of systemic thinking that can be also differentiated based on the degree of complexity.

We will emphasize once again an important observation: when a person begins to think systemically about any (including ecological) subject, there is a deletion of the borders separating ecological, economic and social areas; they become connected. And even if the attentional focus remains on the environment, solving practical tasks is impossible without understanding processes happening in the neighboring systems.

Therefore, ecological education (ecological consciousness, education, etc.), from our point of view, assumes only an initial entrance to an environmental problem, which will change through profound consideration, and the view of it will be transformed.

7. *Each phenomenon (a situation, an event, or a subject) can be considered from the angle of different types of thinking. This will only enrich a perspective, and will add knowledge of it.*

It is noteworthy that the answer to the same question will be totally different from the perspectives of different types of thinking.

For example: Why do I switch off the water when I brush my teeth?

Mythological: They say that resources are limited in our country. There was a TV program on this subject.. I think it is right to do so if reserves of fresh water are small.

Totemic: Recently I watched an interview with my favorite BB, and she switches off the water. I consider that BB is an outstanding actress and a defender of animal rights; she helps homeless dogs; she can't be mistaken. I will switch off the water too. Another option is: "why do I switch off the water? Mother has also taught me to do so, and she won't advise anything bad... "

Formal: In our community everybody switches off the water, because we all care for the resources of our planet.

Logical: Switching the water off when brushing teeth is correct. The more often I do it, the smaller the water bill to be paid. Another option is: "I read a lot about the ecological footprint, therefore I consciously reduce the load on the environment."

Associative: In the museum of water, it was told that water arrives from water treatment facilities that work using renewable and non-renewable resources.

When I switch off the water, I specifically reduce the workload of these treatment facilities... The point of this action is that I help to preserve resources.

Figurative: The essence of this action consists in respecting the Planet as a single organism.

Abstract: I do it as I personally work for water-purifying facilities (or I am the author of energy-saving programs).

As we can see, the scale and depth of answers to this apparently simple question can vary rather significantly.

Conclusions

In the Club of Rome's report for 2017 the verdict given was that «The old World is doomed. The new World is inevitable» (von Weizsaecker & Wijkman, 2018). In order to implement the ideas of «new Education», it is necessary to form thinking as the ability to perceive, organize, coordinate and reunite separate fragments, and to reach an original understanding of fundamental reality. And this means that until a person does not reconstruct thought, changes relating to environmental problems will not happen.

In this article we have described types of thinking and their contribution to the ecological thinking. Central, however, is the question of ways of educating thinking on such a level.

The initial stage can consist in the identification of specific features of thinking in various social and psychological groups of the population — preschool children, school students, city people, villagers, intellectuals, people without education, etc. — and the use of these features with the goal of protecting the environment.

This is an attempt to carry on the conversation about environmental problems in language that will be, most of all, clear to this group of the population. Forms of conducting a conversation (ecological excursions, popular lectures, performances of public figures in media, etc.) have to be carried out taking into account features of the type of thinking of the groups for which they are intended. Formation of types of thinking will contribute to the development of ecological thinking.

The problem of the development of thinking can and must become a priority in ecological education.

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Виды мышления и их вклад в экологическое образование

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Резюме

В статье раскрываются виды мышления с позиций синтеза антропологии, философии и психологии: мифологическое, тотемное, формальное, логическое, ассоциативное, образное, абстрактное. Подчеркивается ценность и уникальность каждого вида мышления как способа познания мира. Описывается преемственность, усложнение, эволюционность видов мышления, которые находятся между собой в определенных иерархических отношениях. Указывается, что все виды мышления присутствуют у каждого человека в потенциале. Констатируется, что каждое явление (ситуацию, событие, предмет) можно рассмотреть ракурсом разных видов мышления: это только обогатит взгляд и дополнит знания о нем. Описывается возможный вклад каждого вида мышления в экологическое образование и изменение экологических установок. Подчеркивается, что виды мышления являются сознательным или не осознанным инструментом, которые возможно и необходимо применять с целью прояснения тех ориентиров и пусковых механизмов, которые лежат в основании экологического поведения, а также помощи человеку любого возраста научиться мыслить интегрально, системно, осмысленно. Осознавание видов мышления поможет людям в поиске их личных смыслов дружественного поведения к окружающей среде и изменении экологических установок.

Ключевые слова: виды мышления, системное мышление, экологические установки, глобальное мышление, экологическое мышление, экологическое образование, устойчивое развитие, Римский Клуб.

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HOW THE HOME MATCHES THE PERSON: THE RELEVANCE OF THE HOME ENVIRONMENT QUESTIONNAIRE

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Abstract

In a questionnaire study with N = 1730 participants aged from 11 to 72 years (M = 20.4, Me = 19, SD = 6.96), 60% female, we developed the Relevance of the Home Environment Questionnaire (RHEQ) aimed at measuring parameters of the home environment as the inhabitants' eco-social resource. Results from exploratory and confirmatory factor analyses showed that the seven-factor structure of the questionnaire was uniquely formulated. The scales were titled as follows: Privacy, Potential, Self-presentation, Ergonomics, Home detachment, Plasticity, and Historicity. Consistency coefficients (Cronbach's alpha) of scales ranged from .91 to .94. Age trends in four out of seven scales were found. Potential scores were higher in women, while Home detachment — in men. Content validity was investigated by comparison of home relevance scores in students living in their own homes or dormitories. Convergent validity was explored by measuring correlations of the scales with the Functionality of the Home Environment Questionnaire and the Home Attachment Scale. All psychometric properties are satisfactory. Data was discussed with regard to possible applications in research, expertise, and psychotherapy.

Keywords: home environment, person-environment fit, validation, relevance, affordance, functionality, home attachment.

Introduction

Seeking ecological and healthy ways to stimulate one's well-being and growth is one of the most important trends in today's psychology (Moser, 2009; Horelli & Prezza, 2004). Ironically, the home as the very basic "οικος" has not attracted until now much research focus. Home is the primary, basic and relatively constant space in human life that meets a person's basic needs, stimulates development and also carries a psychotherapeutic function. Even when a person has no home, the home's image itself appears to be the source of a person's support (Bochaver, 2015; Dovey, 1985; Case, 1996; Nartova-Bochaver, Bochaver, Dmitrieva, & Reznichenko, 2016;

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Nartova-Bochaver, Reznichenko, Braginetc, & Podlipnjak, 2015). At the same time, research on relationships between home and its inhabitants has been hampered by the lack of a valid measure. Methodological tools in environmental psychology primarily allow us to estimate only the physical attributes of a dwelling (location, footage, furnishings) but rarely take into account the individual needs of each inhabitant (Boumeester, 2011; Bradley, Caldwell, & Elardo, 1979; Heft, 1979, 1985; Jansen, Coolen, & Goetgeluk, 2011). Furthermore, usually there are either interviews or projective techniques that are used as research methods, therefore the results may not be unambiguous and often need additional verification (Skifter Andersen, 2011), except some initial inventories developed for children's home environments decades ago (e.g., Bradley et al., 1979; Heft, 1979, 1985). There exist only few for assessing the psychological resources of environment for adult individuals, and there are no such tools in Russia at all. This is due to the multidimensionality of the concept of home and, therefore, different points of the analysis of relationships between home and its inhabitants.

Researchers and theorists have presented a variety of definitions for the concept of home. P. Somerville (1992) argued that home has at least six dimensions of meaning identified by the 'key signifiers' of shelter, hearth, heart, privacy, roots and abode. After G. Hayward (1975), home can be considered as a physical structure, a territory, a locus in space, self and self-identity, a social and cultural unit. A. Rapoport (1995) referred to three semiotic units of living environment: 1) home as a building with its spatial characteristics, architecture and design; 2) home as a dwelling (functional space) where a person performs various daily activities; 3) home as a place with intrapersonal meanings (meanings). In similar way, H. Coolen and J. Meesters (2012) suggest sharing the concepts of house, dwelling and home. 'House' is commonly used in housing research and describes the physical objective structures we live in. A dwelling is defined as a system of settings that affords different functions and activities (eating, relaxing, entertaining, etc.). While the concept of home connotes with positive feelings and affective bonds based on the temporal (e.g. home as the place where one was born) and social (e.g. home as a "family nest") individual experience and meanings we attach to the living space.

We understand home as integrity of physical, social, and existential properties of a specific place satisfying inhabitants' needs (for security, comfort, identity, etc.). In the normative case, home is present through the course of the life of a person, is biographically connected with his/her history and therefore reflects individuality, expresses identity and stimulates personal authenticity. Following the Lens model of Brunswik (1956), Gibson's theory of affordances (1986), Person-Environment Fit theory (Edwards, Caplan, & Harrison, 1998; Kahana, Lovegreen, Kahana, & Kahana, 2003), the concept of environmental friendliness (Chemero, 2003; Coolen, 2011; Coolen & Hoekstra, 2001; Greeno, 1994; Horelli, 2007; Horelli & Prezza, 2004; Kyttä, 2004) and the subject-environmental approach (Nartova-Bochaver, 2008), we believe that the interaction between a person and their home occurs on several levels.

The *non-psychological level* defines a place as a house, but not as a home. This level is set by the quality of housing, – for example, its location, type, size or number of inhabitants sharing the same living space.

The *objective level* is set by the physical qualities of home as a living environment represented in the degree of functionality of the home environment — various functions and activities that home performs for its inhabitants (i.e. meeting the needs for privacy, development, health management, communication with family members, etc.). Initially the functions of home environment can't be maladaptive (Gosling, Ko, Mannarelli, & Morris, 2002). The more functions a home can perform, the higher number of people it can potentially fit, but the presence of a large number of different functions does not necessarily make it an "ideal home", because some functions are unconscious due to their irrelevance for a particular person (for example, a playground near the house won't be a significant attribute of the home environment for families without children).

The *intermediate level*, or the relevance of home environment, is a degree to which the inhabitant's needs and environmental characteristics match. This level includes a system of affordances — dispositional properties of environments and functionally meaningful 'relations between abilities to perceive and act and features of the environment' (Chemero, 2009, p. 150). The process of perceiving affordances is not the same for all people sharing the same space as others' bodily features and values differ from ours. According to the theory of environmental friendliness the more affordances the environment includes, the friendlier it is to its inhabitant (Chemero, 2003; Coolen, 2011; Куттд, 2004). As H. Coolen (2011) wrote, "Individuals selectively engage particular objects in their surroundings; individuals typically make choices from among the range of potential features in a setting to support some activity. However, individuals do not have unconstrained choice. <...> So there is self-selection of affordances but often within constraints" (p. 5).

Finally, the deepest level of psychological analysis shows the people-home relationship is subjective. The *subjective level* reflects a system of personal experiences and meanings, positive feelings and attitudes towards a home that are integrated into a sense of home attachment de ned as a complex of positive experiences and feelings toward home as a personally relevant place in functional, emotional and symbolic meanings. We assume that home attachment is a kind of place attachment and has a similar structure, manifestations and development mechanisms (Jorgensen & Stedman, 2006; Lewicka, 2011; Reznichenko, 2014; Scannell & Gifford, 2017). Home attachment positively affects the psychological health, well-being and authenticity (Manzo, 2003; Reznichenko, 2016).

We previously developed a set of tools that only allowed the study of two levels of person-home interaction: The Functionality of the Home Environment Questionnaire (FHEQ) was designed to assess the objective level and measure various functions presented in the home environment so that an objective level is possible in relation to the home (Nartova-Bochaver, Dmitrieva, Reznichenko, Kuznecova, & Braginec, 2015); the second one, Home Attachment Scale (HAS), allows the exploration of the subjective level of analysis and measures the person-to-home emotional bonds (Reznichenko, Nartova-Bochaver, & Kuznecova, 2016). In this article, our aim was to describe a technique that allows measuring how much the inhabitants feel their home suits them, reflects their individuality and meets their

basic needs; a subjectively perceived preference of what we call a relevant home. In other words, we would investigate the "compatibility" between people and their home that represents the intermediate level (subject-environmental) of person-home relationship.

As Heft (2012) rightly noted, to proceed in making an assessment of the psychological resources, several steps are required: "(1) particular possibilities need to be proposed for what may serve as an eco-psychological resource (e.g., a particular type of affordance); (2) a means of assessing the availability of these resources in some local needs to be developed; and crucially, (3) linkages between availability of these resources and positive outcomes must be established" (Ibid., p. 26). And we can say, in the current study, these steps towards development of the multi-factorial questionnaire have been taken into consideration.

Participants and Procedure

Sample. In total, 1730 respondents aged from 11 to 72 (M_{age} = 20.4; Me_{age} = 19.0, SD_{age} = 6.96, 62,2 % female) participated in our surveys. Most respondents were recruited from Moscow universities. Adult respondents were recruited mainly from students' families using the technique that became known as "snow ball". Participation in the survey was absolutely voluntary, students were granted an academic credit as compensation. The program of the survey was approved by the Ethical Committee of the National Research University Higher School of Economics. The survey was realized using the "patchwork" design: not all respondents participated in all studies but most of them did. Sample 1 (preliminary study, development of the item pool) included 186 participants, Muscovites, (M_{age} = 23.9, SD_{age} = 4.9, 55.9 % female). Sample 2 (exploratory analysis, reducing the number of questionnaire items) consisted of 431 participants from Moscow and other regions, students from different faculties (M_{age} = 20.5, SD_{age} = 10.1, 72.2% female). Sample 3 (factor analysis, internal consistency) comprised of 1051 participants from Moscow and other regions, students from different faculties (M_{age} = 20.5, SD_{age} = 10.1, 72.2% female). Sample 4 (external validity: age trend and gender differences) included 332 respondents (M_{age} = 26.8; SD_{age}=13.2; 54.8% female) divided into four age groups (82 adolescents 12–17; 76 young adults aged 18–24; 87 adults aged 25–45, and 87 late adults aged 46–72. Sample 5 (content validity) included 434 respondents. 227 of them were Muscovites living with their parents mostly, all single (M_{age} = 22.1, SD_{age} = 0.92; 71.6% female). Other 207 came to Moscow from different regions of Russia and lived in dormitories where they had to share their rooms with 2–3 other students (M_{age} = 21.7, SD_{age} = 0.65; 78.7% female). Sample 6 (construct validity) consisted of 719 individuals aged from 18 to 40 (M_{age} = 21.92, SD_{age} = 6.90; 71.2% female), who were students and graduates from Moscow universities.

We used web-based data collection. The respondents were required to fill out questionnaires incorporating a forced-choice question format. There was no time limit to complete the questionnaires.

Measures. The Functionality of the Home Environment Questionnaire (FHEQ) and The Home Attachment Scale (HAS) were used to measure the convergent validity of the new instrument.

FHEQ was aimed to assess the functions provided by the home to its dwellers (Nartova-Bochaver et al., 2015). The questionnaire consists of 55 statements and four subscales (*Pragmatism*, *Development*, *Stability*, and *Protection*). Examples of FHEQ items are as follows: "My home ... 1) demonstrates the dwellers' wealth, 2) is accessible (geographically and financially), 3) is spacious 4) gives an opportunity to care for myself, etc. In the current study, Cronbach's alphas were from 0.82 to 0.93 for all subscales.

The Home Attachment Scale (HAS) indicates the level of a person's positive emotional connectedness to his/her home (Reznichenko et al., 2016). It includes 14 statements and only one scale. Examples of the items are as follows: "I identify myself strongly with my home", "My home says a lot about who I am", "I am willing to put my heart and soul into my home". In this study, alpha was 0.89.

Results

Development of the Item Pool

To collect a prior pool of statements, firstly we analyzed the sources in the fields of social, environmental, recreational psychology and social anthropology to identify the person's needs satisfied by their home (Boumeester, 2011; Coolen, 2011; Depres, 1991; Ingold, 2002). Then, during the empirical research, the list of constructs identified theoretically was enlarged (Sample 1). Participants (Sample 1) were invited to take part in a ladder interview on the topic of the desired image of a home. Also, respondents were asked to evaluate interiors of rooms and dwellings using the minimum context method by Kelly and to name the meaningful home qualities (Kelly, 1991). Finally, we used a number of creative tasks such as incomplete sentence test and essay exercises.

As a result, this study has identified 54 characteristics of home environment that meet multilevel needs of inhabitants (for rest, for safety, for family interaction, for home space changeability, for ergonomics and aesthetics, for self-presentation and self-development, etc.). Two statements were formulated for each construct (total 108 statements); the questionnaire items' wording had to reflect the personal opinion of the respondent on the possibilities of his own home. The ratio of inverse and direct statement formulations were 1:7. The degree of agreement/disagreement with the statements was evaluated on a five-point Likert scale. To ensure the respondents understood the instruction and to correct controversial statements, a focused interview was conducted. The primary version of the questionnaire was offered to the group of respondents (Sample 1) for feedback on the content, structure and clarity of the statement wordings for convenience of filling out the questionnaire.

Next, we conducted an Exploratory Factor Analysis (EFA) to determine the preliminary structure of the questionnaire and narrow down to the number of variables

(Sample 2). The method of Principal Components Analysis (PCA) with Varimax rotation was used to calculate factors. The criterion of Kaiser's eigenvalues ($k > 1$) showed only one optimal model consisting of seven factors. Since sometimes this criterion shows an inadequately large number of factors, an additional Scree-plot test was performed that confirmed the seven-factor structure. The EFA allowed us to reduce all the items with low factor loadings and to reduce the questionnaire length from 108 statements to 35 items (5 items per scale).

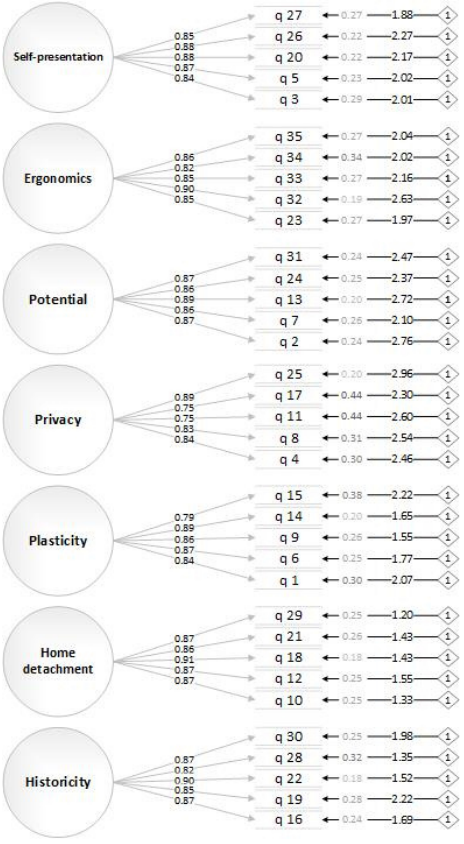
Dimensional Structure of the RHEQ

The reduced version of the questionnaire was reanalyzed with EFA using the Varimax rotation of factors. As previously the seven-factor solution was revealed (the questionnaire structure with factor loadings is presented in Figure 1). We used the final statement list in our further work on this questionnaire (Appendix A).

The performance of the model was evaluated (Sample 3) by examining the ensemble of "goodness-of-fit" statistics, such as the Root Mean Squared Error of

Figure 1

Factor Loadings of the Seven-Factor Solution of RHEQ



Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), the Comparative Fit Index (CFI) and Tucker Lewis Index (TLI). According to conventional agreements, all the indices except chi-squared test indicate a good fit of model (CFI > 0.9, TLI > 0.9, SRMR < 0.5) (Hooper, Coughlan, & Mullen, 2008). The insufficient level of chi-squared significance can be explained by a large sample (> 200), so the Chi-Square statistic nearly always rejects the model in this case (Bentler & Bonnet, 1980). Table 1 shows the results of confirmatory factor analysis.

The titles of the scales were as follows. (1) *Self-presentation* is associated with the inhabitants' possibility to personalize their own space and to signify the individual and social characteristics of the dwellers through the home environment. (2) *Ergonomics* describes home environment convenience and aesthetics. (3) *Potential* includes constructs associated with home support and stability. (4) *Privacy* is associated with the capability to control and predict a home environment context. (5) *Home Detachment* is concerned with reasons of home estrangement, loss of home attachment and sense of belonging. This scale includes statements related to discomfort, inconvenience, low functionality of a living space, and lack of desire to come back home. We have not reversed this scale (i.e. haven't measured 'home detachment' in a positive direction) to prevent confusion with the concept of Home Attachment. (6) *Plasticity* determines the capability of the home environment to be dynamic in accordance with the changing resident's needs. (7) *Historicity* reflects the links of a home with the personal, family, and general past.

The average score is calculated for each subscale. Evaluation of the overall level of home environment relevance is performed by summing up the average values of seven scales, except for the *Home Detachment scale*, the rate of which is subtracted from the total.

Descriptive Statistics and Internal Consistency

Table 2 shows the descriptive statistics and unexpectedly high coefficients of internal consistency (taking into account the small number of items in each scale) ranging from .91 to .94. Thus, we have obtained initial norms; all Cronbach's alpha values are satisfactory confirming the test to be highly reliable.

The most considerable variability is revealed in *Historicity* and *Self-presentation* scores, this potentially indicates that the intensity of these needs depends more on latent variables, for example, the respondent's gender or age. *Privacy* scale has the lowest variability of scores — probably this need is the most universal and significant for the whole population.

Table 1

Goodness-of-Fit Statistics of the Seven-Factor Model of RHEQ (N = 1051)

Model	χ^2 (p-value)	df	RMSEA	SRMR	CFI	TLI
Seven factors	4248.2 (0.00)	539	.06	.03	.94	.94

Table 2

Descriptive Statistics of the RHEQ Scales (N=1051)

Scales	M	SD	Me	Min	Max	SE	Cronbach's alpha
Self-presentation	3.36	0.90	3.40	1	5	0.02	.94
Ergonomics	3.45	0.85	3.40	1	5	0.02	.93
Potential	3.80	0.86	4.00	1	5	0.02	.92
Privacy	3.92	0.73	4.00	1	5	0.02	.91
Home detachment	2.35	0.85	2.20	1	5	0.02	.94
Plasticity	3.09	0.88	3.20	1	5	0.02	.94
Historicity	3.07	1.10	3.00	1	5	0.03	.94

External Validity

External validity of the questionnaire was evaluated via ANOVA and post hoc analysis of the variances in different ages and gender populations (Sample 4).

Age trends. Although there were not significant differences between age groups ($F_{3; 329} = 0.632$; $p = .590$) regarding general index of RHEQ, they were found in four of the seven scales in the questionnaire, namely: *Potential* ($F_{3; 329} = 5.955$; $p = .001$), *Ergonomics* ($F_{3; 329} = 4.792$; $p = .003$), *Plasticity* ($F_{3; 329} = 9.423$; $p = .000$), and *Historicity* ($F_{3; 329} = 5.637$; $p = .001$) (Figure 2). The Games-Howell post hoc test allowed obtaining the following results. In late adulthood *Potential* of the home scale index is significantly higher than in adults ($p \leqslant .050$), young adults ($p \leqslant .002$), and especially in adolescents ($p \leqslant .000$). *Ergonomics* indices are significantly higher in adolescents than in young adults ($p \leqslant .047$) and in adults ($p \leqslant .002$). *Plasticity* is equally less significant in adolescents and young adults, than in adults ($p = 0.001$ and $p = .006$, respectively) and in late adults ($p = .000$ and $p = .002$, respectively): flexible home is more important in adulthood than in youth. Finally, adolescents and young people had higher scores ($p = .004$ in both groups) on the *Historicity* scale than the adults.

Gender differences. Analysis of gender differences showed that *Home Detachment* ($F_{1; 331} = 5.804$; $p \leqslant .017$) is higher in the male group, while *Potential* scores ($F_{1; 331} = 4.114$; $p \leqslant .023$) are higher in women.

Content Validity

In order to test whether RHEQ adequately reflects real significance (relevance) of the home affordances for its inhabitant, we compared the data of students who lived in parental homes or their own apartments, and those who resided in dormitories.

Comparing RHEQ indices of students with different living conditions (using ANOVA), we found that those who lived in their own homes have a higher overall RHEQ rate ($F_{1; 433} = 85.681$; p .000) than others as well as rates of all the 'positive' scales: *Privacy* ($F_{1; 433} = 34.641$; $p \leqslant .000$), *Self-presentation* ($F_{1; 433} = 27.451$; $p \leqslant .000$),

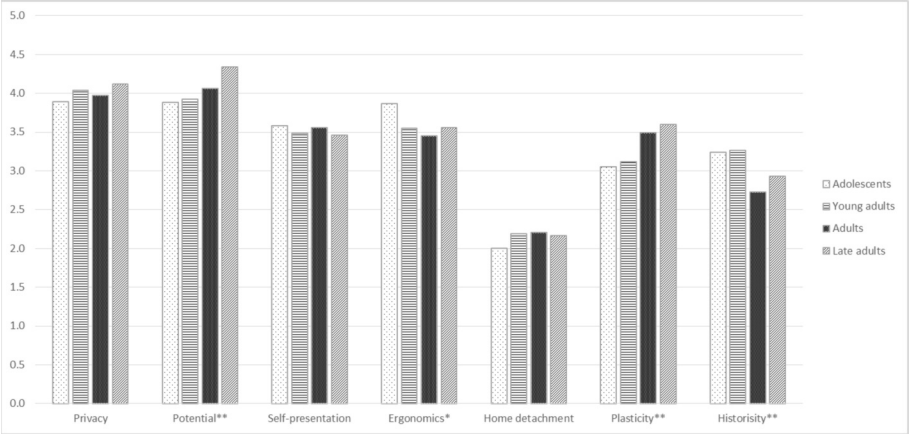
Ergonomics ($F_{1; 433}$ = 38.378; $p \leqslant .000$), *Plasticity* ($F_{1;433}$ = 34.752; $p \leqslant .000$); high intergroup differences were especially observed in *Potential* ($F_{1; 433}$ = 74.440; $p \leqslant .000$) and *Historicity* ($F_{1; 433}$ = 64.943; $p \leqslant .000$) scores. At the same time, *Home Detachment* indices are lower in this group of respondents ($F_{1; 433}$ = 6.272; $p \leqslant .013$). This data is presented in Figure 3.

Construct Validity

The construct validity of the questionnaire was evaluated by examining its correlation to the closest in terms of content empirical constructs – Functionality of

Figure 2

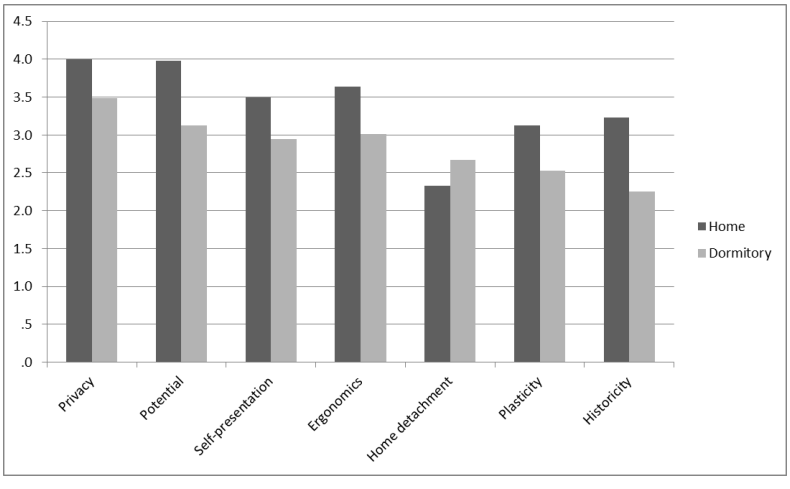
Age Differences in Mean Scores of the RHEQ scales (N = 332)



* $p \leqslant 0.01$, ** $p \leqslant 0.001$.

Figure 3

The Differences of Mean Scores ($p \leqslant 0.001$) of the RHEQ Scales in Students Living in Their Own Flats, and Dormitories (N = 434)



the Home Environment (is measured by the FHEQ) and Home Attachment (HAS) were used. As shown in Table 3, all the scales of RHEQ, except the Home Detachment scale, have a significant positive relationship ($p \leqslant .000$) with the scales of the FHEQ and Home Attachment scale, while Home Detachment has significant negative relations ($p \leqslant .000$). The strongest correlations are found between *Potential, Ergonomics, Self-presentation* and the FHEQ and Home Attachment scales. A weak negative correlation was received only between the *Home Detachment* and *Protection* scales.

Discussion

Based on the Theories of Affordances (Gibson, 1986) and Person-Environment Fit (Coolen & Hoekstra, 2001; Horelli, 2007; Куттд, 2004) as well as on multidisciplinary works devoted to wholesome impacts of the home environment on individuals' well-being (Casakin & Bernard (2012; Heft, 2012; Ingold, 2002) the Relevance of the Home Environment Questionnaire was developed. The aim of this instrument is to measure the extent to which the affordability of home is able to meet the various needs of the dwellers (relevant to dwellers).

While creating the initial statements pool, we assumed the understanding of the home both as the archetypal phenomenon and as a private living space at the same time. That is why in the very beginning we selected from multidisciplinary sources those well-known functions that home had in different times and cultures. Then, through a series of empirical studies, this list was enlarged by functions, which are performed in homes of modern Russians in their everyday lives. Since there is a high diversity in living conditions in Russia, and traditional Russian families are

Table 3

Correlations between the Relevance of the Home Environment Questionnaire (RHEQ) Scales, the Functionality of the Home Environment Questionnaire (FHEQ) scales, and the Home Attachment scale (HAS) (N = 719)

RHEQ Scales	FHEQ Scales					
	FHE	Pragmatism	Development	Stability	Protection	HAS
RHE	.78*	.76*	.72*	.71*	.60*	.64*
Privacy	.69*	.71*	.60*	.67*	.49*	.59*
Potential	.58*	.58*	.51*	.55*	.40*	.67*
Self-presentation	.63*	.54*	.54*	.54*	.63*	.55*
Ergonomics	.68*	.64*	.60*	.64*	.54*	.53*
Home detachment	−.38*	−.44*	−.30*	−.38*	−.24*	−.31*
Plasticity	.55*	.54*	.50*	.49*	.44*	.46*
Historicity	.46*	.37*	.58*	.35*	.32*	.42*

* $p \leqslant 0.01$.

multigenerational, these constructs reflect the experiences associated with living in different dwellings such as separate rural houses, buildings with a few apartments or apartment blocks. This has contributed to the representation of the test statements and the expansion of the target audience within its users (e.g. researchers, practitioners).

Due to exploratory and confirmatory factor analyses seven scales were identified: *Privacy, Potential, Self-presentation, Ergonomics, Home Detachment, Plasticity,* and *Historicity scales*. The new tool seems to have good psychometric properties: Cronbach's alphas are ranged between .91 and .94. Investigation into age trends showed that the RHEQ scores environment features formed specific patterns (profiles) in every one of the investigated ages. Thus, the *Potential* and *Plasticity scales* have highest meanings in late adults, in full accordance with life styles of elderly people who usually spend a lot of time at home and get support and stability from their homes mainly, but not from jobs. Similar trends are shown in M. Lawton and L. Nahemow's (1973) ecological model of aging (Competence-Press Model theory) that conceptualizes the individual as having a set of competences, and the environment as a 'press' or having the characteristic of making demands upon the individual. As the levels of competence gradually decrease with age (due to age health problems, tendency to social and physical inactivity, decreased functioning of the nervous system, etc.), adaptation to living conditions requires a flexible, adaptable, and stable living environment.

At the same time, *Historicity* scores are higher in adolescents and youth because as the proportion of life experience just in their current houses is higher in these age groups, than it is for the older group. Finally, *Ergonomics* of the home environment is more relevant for teenagers than for older people. This may be due to the fact that the home for a teenager is not only a place of relaxation and recovery, but also a place for doing homework and networking with classmates that requires comfortable user-friendly conditions (Jonkmann, Thoemmes, Lüdtke, & Trautwein, 2014). The *Privacy, Self-presentation* and *Home Detachment* (in terms of opposing positive connotations – the overall satisfaction with the living environment) scales have no differences that are age dependent, probably emphasizing the universal nature of these needs.

We have also found gender differences: *Home Detachment* scores are higher in men while *Potential* scores are higher in women. Whereas women are mostly the ones who engage in housekeeping and more often than men work from home, they need affordable, stable and supportive living environments at home to facilitate different home activities. At the same time, men do not cope with domestic problems as easily as women do (Graham & Graham, 1989).

Calculation of the RHEQ scores in the samples of respondents living in different conditions (homes and dormitories) showed that all meanings were higher in students living in homes, and the *Home Detachment* score was significantly lower, thus giving good evidence for construct validity of the new tool. This is the expected result, because students who live in their own or their parents' homes are less limited in residential facilities and are not constrained by the rules and requirements of communal housing as experienced by dormitory residents.

The correlation between the RHEQ and other environmental tools (FHEQ and HAS) was significant and positive, whereas the *Home Detachment scale* formed significant negative links with them. This confirms a good convergent validity of the new questionnaire: numbers of home functions as well as attachment to homes are in mutual relationship to the extent to which a home matches its inhabitants. Naturally, people who are attached to their homes personalize them more strongly and, in turn, this makes their homes more congruent to them.

To sum up, all these results uniquely demonstrate the good psychometric properties of the new instrument.

Conclusions and Limitations

The aim of the study was to develop the Relevance of the Home Environment Questionnaire as a tool to assess the person-home fit. It was stimulated by a broad list of applied tasks as follows: seeking empirical proof to the apartment-therapy, expertise of living spaces, the exploration of restorative and potential functions in various building environments, design of dwellers-friendly flats, homes, dormitories, hostels, hospitals, etc. The new RHEQ tool appears to be very helpful in solving these problems.

Before discussing further implications, we want to point out some limitations of the current study. Firstly, most tests of the RHEQ validity were realized in a students' sample. Secondly, our work did not deal with data on objectively verifiable characteristics of home (density, availability of personal space, length of residence, etc.), which makes the RHEQ content validity slightly less convincing. In future research we plan to observe the objective home characteristics more carefully.

At the same time, the development of RHEQ allows further testing of the theoretical positions, in addition to examining the questions that emerge from this article. For example: How does home as a physical space determine family climate? How does home influence the work-family balance in the inhabitants' life styles? Least but not last, how can friendly homes contribute to the "higher" personality traits and virtues of their inhabitants?

There are multiple new areas of home environment study in both applied psychology and environmental psychology research. We hope that the development of RHEQ will aid these research endeavors and support social and therapeutic applications.

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Appendix A

The Final Tested Items of the Relevance of the Home Environment Questionnaire

№	Scale	Statement
1	Pl	My home changes along with me.
2	Pot	I "feel at home" in my home.
3	SP	My house can 'tell'a guest about my achievements and hobbies.
4	Pr	There is time and space at my home to be alone with myself.
5	SP	My home is a manifestation of my personality.
6	Pl	If desired, my house can easily be rearranged and remade.
7	Pot	I feel like a host at my home.
8	Pr	When moving about the house I do not disturb other inhabitants.
9	Pl	If desired, it is easy to move the furniture and swap rooms.
10	HD	In a bad mood or after a bad day I try for as long as possible not to go home.
11	Pr	Nobody uses my hygiene products without permission.
12	HD	There are many distractions at home and it is difficult for me to plan my next day.
13	Pot	At home I always rest well and recover quite fast.
14	Pl	I can make any changes in my home.
15	Pl	I prefer to design the interior of my home by myself instead of inviting experts.
16	His	The walls of my own house remind me of many events of the past.
17	Pr	My home is a place where I can do nothing.
18	HD	It's hard for me to find inspiration and muster strength at home.
19	His	There are many things in my home that remind me of my family.
20	SP	I like it that my home is not the same as everyone else's.

№	Scale	Statement
21	HD	I rarely do things that I like at home (sports, music, dance, crafts and so on).
22	His	My home is a place that reminds me of my childhood.
23	E	I like that there is a place for each of my activities in my home.
24	Pot	Everything changes, but my home is still my home.
25	Pr	At home I can choose what I want to do at a particular moment.
26	SP	There are many things to see at my home.
27	SP	It is important for me that in my house there is always something to surprise guests.
28	His	I've lived in my house since childhood.
29	HD	My home seems to be too empty for me.
30	His	At my home I have experienced many important events.
31	Pot	My home gives me a feeling of consistency.
32	E	It's comfortable to live, do the housekeeping and relax in my house.
33	E	At home I have no things that are poorly made.
34	E	My home is always clean and tidy.
35	E	I like a lot of things, furniture and decor in my house.

Note. Pot — *Potential*, SP — *Self-presentation*, Pr — *Privacy*; HD — *Home Detachment*; E — *Ergonomics*, Pl — *Plasticity*, His — *Historicity*.

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Насколько дом подходит индивидуальности обитателя: опросник «Релевантность домашней среды»

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Резюме

Статья посвящена описанию валидизации нового опросника Релевантности домашней среды, измеряющему разнообразные параметры дома как экосоциального источника психологического благополучия человека. В исследовании участвовали 1730 респондентов в возрасте от 11 до 72 лет ($M_{возр.}$ = 20.4, $Me_{возр.}$ = 19, $SD_{возр.}$ = 6.96; 60 % женского пола). Результаты факторного анализа подтвердили наличие семифакторной структуры опросника, состоящей из шкал: Приватность, Ресурсность, Самопрезентация, Эргономичность, Отчужденность от домашней среды, Пластичность и Историчность. Опросник показал высокие коэффициенты надежности (альфа Кронбаха), варьирующие в диапазоне от .91 до .94. Репрезентативность опросника исследовалась путем анализа возрастных и гендерных трендов. На основе анализа данных респондентов была обнаружена возрастная специфика выраженности 4 из 7 шкал. Показатели по шкале Ресурсность оказались значимо выше в женской группе, в то время как показатели Отчужденности от дома — в мужской. Содержательная валидность опросника оценивалась посредством пошкального сопоставления данных респондентов студенческого возраста, проживающих в своих собственных домах, и студентов, проживающих в общежитии. Описаны результаты оценки конвергентной валидности, основанные на результатах корреляционного анализа шкал Релевантности домашней среды со шкалами опросников Функциональность домашней среды и Привязанность к дому. Опросник имеет удовлетворительные психометрические свойства и может быть использован в области психологии домашней среды и психотерапии как инструмент экспертизы жизненной среды человека.

Ключевые слова: домашняя среда, субъект-средовое соответствие, оценка валидности, релевантность, допущения, функциональность, привязанность к дому.

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ENVIRONMENTAL IDENTITY IN RUSSIA: VALIDATION AND RELATIONSHIP TO THE CONCERN FOR PEOPLE AND PLANTS

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Abstract

Environmental identity is a self-concept that incorporates and is defined by a relationship with nature. In the current paper the concept is investigated in three empirical studies using the Environmental Identity (EID) scale. Study 1 (n = 222) was devoted to validating the Russian version of the EID scale. Along with the EID scale, we measured environmental attitudes with the New Environmental Paradigm and Global Awareness of Consequences scales. In line with the original version, the Russian version has a one-factor structure and a good internal consistency (α = .88), and is positively connected with environmental concern, global awareness of consequences, egoistic, altruistic and biospheric values. Study 2 (n = 94) investigated the connection between EID and attitudes toward the plant world using the People and Plants questionnaire. EID predicted all variables describing people's attitudes towards plants: Joy, Aesthetics, Experience of Interaction with Plants, Closeness to Nature, and Ecology. Finally, Study 3 (n = 200) examined the connection between EID and empathy with nature and people. The Dispositional Empathy with Nature and Interpersonal Reactivity Index scales were used. It was revealed that EID was positively connected and contributed to both types of empathy, more strongly impacting empathy with nature. It is concluded that the Russian version of the EID scale is a valid and reliable instrument, and the EID concept seems to relate to a more general ability to connect with things external to oneself. Hence, it has the potential to be helpful in forming psychotherapeutic programs and in designing restorative environments.

Keywords: environmental identity, empathy, nature, plants.

Introduction

An individual's relationship with nature, and sense of personal connection to nature, is important to study, because it may both underlie concern about environmental issues and relate to a more general moral expansiveness. The present paper has two main goals: to validate the idea of environmental identity in a new cultural context, namely Russia; and to explore the relationship between environmental

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identity and attitudes toward other people as well as to plants. Previous studies have shown a high predictive role of environmental identity in relation to environmental attitudes and people's positive functioning (Capaldi et al., 2017; Clayton, 2003; Freed, 2015, Kahn & Peter, 2003). This shows that environmental identity has value in understanding people's response to both environmental protection and personal adaptation. However, another question concerns the relationship between environmental identity and attitude toward the natural and social world (other people). In other words, does a sense of belonging to the natural world necessarily mean recognition and respect for the rest of the world — e.g., plants and other people?

According to the theory of moral expansiveness (Crimston, Bain, Hornsey, & Bastian, 2016)), the extent to which people respect others and care for them depends in part on the distinctions individuals make between entities deemed worthy or unworthy of moral consideration, or people's moral boundaries. Thus, they can include or exclude other living beings from their moral responsibility, leading either to empathy with these entities or to neglecting them. Environmental identity, however, does not necessarily imply closeness to other living organisms or people. It may well happen that people with a high environmental identity, recognizing the importance of their own natural rootedness, nevertheless do not sympathize with other people or living beings at the same time. Thus, after having substantiated and validated the concept of environmental identity in Russian culture, we put forward the following research question: how is environmental identity related to the connection with people and other natural objects (in our study – plants)?

What is Environmental Identity?

In prehistoric times, people were completely immersed in nature; interaction with nature was crucial for basic survival. As our species evolved, and the societies we built became increasingly complex and diversified, social interactions became more important and sophisticated than human-nature relations. It became easy to draw a line between Humanity and Nature. However, natural roots remain the foundation of modern humans. E. O. Wilson (1984), among others, has argued in his biophilia hypothesis that the predisposition to form an emotional connection to the natural environment is inherited, because such a connection would have been adaptive in the context within which humans were evolving their defining characteristics.

A stable perception of connection to the natural environment is the basis of an environmental identity. Environmental identity reflects an understanding of "identity" as a relatively stable way of thinking about the self, grounded in personal experiences and mediated by socially-constructed interpretations of those experiences. The construct of environmental identity, in particular, was developed to describe a self-concept that incorporates and is defined by a relationship with nature (Clayton, 2003). People with a high in environmental identity think of themselves as connected to, and interdependent with, the natural world. This feeling of kinship seems at least in some cases to motivate environmental protection and prompt environmental activism (Matsuba et al., 2012).

People have multiple identities — that is, multiple ways of defining themselves, whose importance varies from person to person and whose salience varies according to the social context. Everyone has the potential for an environmental identity, just as everyone has the potential for a gender or racial identity, but the strength of that identity will depend on one's history of meaningful experiences associated with it. Early experiences with nature, particularly in the company of significant others, seem to be important in the development of a natural identity (Matsuba & Pratt, 2013; Chawla, 1999, 2007; Prĭvot, Clayton, & Mathevet, 2018). Matsuba et al. (2012) also argue that an environmental identity is at least somewhat dependent on one's developmental stage, as a certain level of maturity and generativity may be required to commit to an identity and be concerned about one's impact on the world. Although their analysis found no age effects on environmentalism, they did find that generativity and identity maturity were both correlated with environmental identity as well as with environmentalism. Green, Kalvaitis, and Worster (2016) have described a developmental model of environmental identity development that incorporates the interaction between developmental stage and experiences with nature.

The natural environment has the potential to form an important part of identity for three reasons. First, it is a source of emotionally resonant and meaningful experiences for many people. This may be attributed in part to the multisensory nature of environmental experiences, which makes them memorable. Second, it is a context that appears to foster self-reflection. Indeed, many people describe a natural environment as a place where they would want to go to think about their important goals and values (Korpela, Hartig, Kaiser, & Fuhrer, 2001). Finally, it has the potential to satisfy some basic human needs. According to Self-Determination Theory (Ryan & Deci, 2003), identities are adopted in the service of needs such as autonomy, esteem, and belonging. Environmental identities may help to satisfy each of these needs (Clayton, 2003), but perhaps particularly the need for connection and belonging. Many people describe their nature experiences as making them feel "connected to everything else" and "a part of the whole interdependent system".

The possibility of an environmental identity is important to examine because identities affect people's responses to events and issues. Topics that are self-relevant attract more attention and elicit a stronger emotional response. People are also motivated to validate and defend their identities, so that – all things being equal — they will be more likely to behave in a way that demonstrates their connection to the environment and that allows them to feel positive about the environment. Thus, a strong environmental identity should encourage a more pro-environmental behavior.

Measurement of Environmental Identity

Clayton (2003) developed the Environmental Identity (EID) scale, a 24-item questionnaire, which was later modified into a shorter, 11-item version (Clayton, 2012). This scale has strong internal reliability and test-retest reliability. The principal components analysis has typically found only a single dominant factor,

though occasionally a more complex structure emerges; for example, Fritsche and Häfner (2012) found two factors among German students, one interpreted as reflecting contact with nature and one as reflecting self-definition; Olivos and Aragonйs (2011) identified four factors, including self-definition, environmental enjoyment, environmental appreciation, and environmentalism. In known-groups comparisons, Clayton (2003) found significant differences between environmental studies students and a comparison group of students in the U.S.; Matsuba et al. (2012) found that environmentalists scored significantly higher on EID than did a comparison group in Canada; while Scopelliti et al. (2018), in a cross-national study, found that European leaders who were distinguished by their actions for biodiversity scored higher on environmental identity than did similarly-situated individuals who were not known for such actions.

As expected, EID scores are strongly correlated with environmental concern, values, behavior, and behavioral intention (Clayton, 2003; Matsuba et al., 2012; Olivos & Aragonйs, 2011; Scopelliti et al., 2018; Tam, 2013b; Watson, Hegtvedt, Johnson, Parris, & Subramanyam, 2017). Of particular note for the present paper, Kiesling and Manning (2010) found that EID was positively correlated with several scales related to gardening, including pro-environmental gardening behavior, engagement with natural processes, and an overall sense of gardening identity. Fritsche and Häfner (2012), testing the hypothesis that mortality salience would reduce environmental concern, found that this effect only held true for participants low in EID. Mortality salience that refers to the extent to which people are thinking about the possibility of their own death, increases the need for self-affirmation as a symbolic defense and can reduce concern for things that are not self-relevant. Fritsche and Ндfner argued that people high in EID are able to achieve self-affirmation through expression of environmental concern.

Several other measures designed to assess a person's relationship to nature have been developed in the past few decades (e.g., Nature Relatedness, Connectedness to Nature, Inclusion of Nature in the Self). These all tend to have positive intercorrelations, though some studies show that the reliability of EID is slightly higher than some of the other scales (Brügger, Kaiser, & Roczen, 2011; Olivos & Aragonés, 2011; Tam, 2013).

Cultural Differences

The meaning and strength of an environmental identity may vary across cultures. It is difficult to interpret the difference between scores from different countries unless studies have been specifically set up to compare those countries, due (if for no other reason) to demographic differences among samples. The EID scale has been successfully used in (at least) Canada, China, France, Germany, Hungary, Spain, Switzerland, and Turkey, with good internal reliabilities and meaningful predictive validity. Nevertheless, the cultural context is likely to vary in the way it provides a foundation for environmental identity. For example, Turkey has a national culture that seems to stress care for the natural environment, and a sense of national identity was found to correlate with environmental identity among Turkish respondents (Clayton & Kılınç, 2013).

Capaldi et al. (2017) suggest that the Russian context for a relationship with nature is characterized by two themes: one, a dominionistic view that natural resources should be exploited for human wellbeing; and the other, a more relational view of the earth as our universal mother. However, they found relatively similar relationships between a sense of connection with nature (measured with the Connectedness with Nature Scale), on the one hand, and wellbeing, on the other, in Russia as compared to Canada and Japan. There was no evidence that the levels of connection to nature, or the role of connection to nature in predicting wellbeing, were significantly different across the three countries.

Relation to Other Constructs

A sense of environmental identity is fundamentally a recognition of one's own interdependence with a larger collective. It is a personal identity that also has implications for social connections; it should thus be related to other, perhaps non-environmental, perspectives and attitudes that emphasize connections and the larger group. Consistent with this, Clayton found that it was positively associated with a collectivist worldview (2003), and negatively associated with social dominance orientation, which is a perspective that the world is hierarchically organized (2008). A global identity — that is, a tendency to identify with, and feel connected to, people around the globe — is also negatively associated with social dominance orientation, and positively associated with pro-environmental behavior (Reese, 2016). It may be that the ability to transcend one's personal limits and perceive one's status as part of a system is the important aspect of EID. (It is noteworthy, though, that the Global Identity measure includes things that seem to tap into environmental identity, such as "I feel connected with the whole earth.")

Brügger et al. (2011) also relate EID to a measure they call "Disposition to Connect with Nature", which includes items assessing the attention paid to plants and other elements of the natural world. Despite the fact that the EID scale contains no such items, the underlying trait that it measures is likely to promote attention to nature. Other research has found Connectedness to Nature – a measure that is similar to the EID measure — to be strongly correlated with the Engagement with Natural Beauty scale that measures the degree to which people perceive beauty in nature and respond emotionally (Zhang, Howell, & Iyer, 2014).

In sum, environmental identity is an important concept, because it relates to environmentally sustainable behavior, affects our well-being, and influences decision-making. It is also important to examine the cultural differences in environmental identity that could help to illuminate the way in which culture affects and constructs the individual relationship with nature. The present research aimed to investigate the construct of environmental identity in Russia and particularly how it relates to a more expansive sphere of moral concern. We conducted a series of empirical studies: the first was primarily intended to validate the EID scale in Russia; the second explored its relationship to a People and Plants scale; and the third examined its relationship with interpersonal empathy.

Study 1

In order to assess environmental identity in Russian culture, Clayton's (2003) EID scale was chosen for preliminary adaptation to the Russian context (see Appendix A). EID is a well-known scale that showed high levels of reliability in previous research. Due to Clayton's (2003) arguments on the factor structure of the scale it was hypothesized 1) that the Russian version of the EID scale will retain the same one-factor structure as the initial one. The original, longer version of the scale was used to enable comparison to the earlier factor analysis.

In order to check the convergent validity of the translated scale, Dunlap's New Environmental Paradigm (Dunlap & Van Liere, 1978; Dunlap et al., 2000) and the Global Awareness of Consequences (Stern & Dietz, 1994) scale were chosen for comparison. While original validation procedure contained different methods, in previous studies (Matsuba et al., 2012), NEP and GAC scales reported correlations with the EID scale in English speaking countries, so it was hypothesized 2) that the Russian version of the EID scale would correlate with the listed scales in the current study. The translated scale also was tested for internal consistency, so it was hypothesized 3) that the alpha-score would be close to Clayton's result ($\alpha = .90$).

Procedure. 222 respondents participated (180 female, $M_{age} = 23.6$, $SD_{age} = 6.7$). Most individuals were undergraduate students from Russian universities (58.7%), 55 graduated from university (24.7%), and 37 completed high schools (16.6%). The socio-demographic quality of the sample was expected, because the questionnaire link was advertised via social media and placed in some universities' social media. Data was gathered via online questionnaire platform and did not require participants to be present. Participation in the study was completely voluntary.

The questionnaire was distributed and filled in via Internet; the data was then downloaded and processed in IBM SPSS software.

The 24-item Environmental Identity scale was translated by multiple professional English-speaking psychologists; several prototypes of the scale were developed before reaching the actual version used in the current study, each iteration included a back-translation via several online translation programs (Google Translate, DeepL Translator, etc.), a feedback collection and a discussion (see Appendix 2).

The New Environmental Paradigm scale, developed by Dunlap (Dunlap & Van Liere, 1978) to measure environmental concern, includes fifteen items: eight statements that align the respondent as a supporter of a new environmental paradigm ("The balance of nature is very delicate and easily upset", "Plants and animals have as much right as humans to exist"), which stands for a new, more environmental-oriented world view; and seven that are associated with the dominant social paradigm (DSP) reflecting an anthropocentric position and orientation to nature in an instrumental way ("The balance of nature is strong enough to cope with the impacts of modern industrial nations", "Humans were meant to rule over the rest of nature").

The Global Awareness of Consequences (GAC) scale is based on the tripartite model of environmental concern introduced by Stern and Dietz (1994). It is used

for measuring general level of environmental concern or for distinguishing the values underlying the environmental awareness of the subject. The GAC scale consists of nine items placed on a 5-point Likert scale, and has three subscales: egoistic, altruistic and biospheric values.

Results. Descriptive statistics and reliabilities of the methods are presented in Table 1. Overall, reliability tests showed good internal reliabilities, including translated methods.

Factor analyses indicated three distinct factors explaining 31%, 9% and 5% of the variance respectively. The principal components analysis was used because the primary purpose was to identify and compute composite scores for the factors underlying the translated version of the EID scale. The scree plot indicates significant reduction of eigenvalues after the first factor. Solutions for three, four, five and six factors were each examined using varimax and oblimin rotations of the factor loading matrix. The one-factor solution, which explained 31% of the variance, was preferred because of the insufficient number of primary loadings on the second factor and subsequent factors and the drop of the eigenvalues after the first factor.

Furthermore, it was also found that the EID scale displays significant correlations with environmental concern and all of the GAC scales (see Table 2). These connections give a good evidence for convergent validity of the Russian version of EID scale.

Table 1

Descriptive Statistics of the Scales

Scale	M	Mdn	Mode	Min	Max	SD	Cronbach's α
EID	2.58	2.54	2.71	1.00	5.00	.49	.88
NEP	3.60	3.60	3.40	1.00	5.00	.41	.75
GAC (the main score)	4.05	4.11	4.44	1.00	5.00	.45	.74
Egoistic value	4.34	4.33	4.00	1.00	5.00	.57	.71
Altruistic value	4.16	4.33	4.67	1.00	5.00	.56	.74
Biospheric value	3.67	3.66	3.67	1.00	5.00	.57	.77

Table 2

Connections between Environmental Identity and Investigated Variables

Variables	1	2	3	4	5	6
1. Environmental identity	–					
2. Environmental concern (NEP)	.39**	–				
3. Global awareness of consequences	.27**	.46**	–			
3. GAC Egoistic values	.32**	.31**	.77**	–		
4. GAC Altruistic values	.18**	.31**	.85**	.52**	–	
5. GAC Biospheric values	.14*	.43**	.76**	.30**	.47**	–

Note. * $p < .05$, ** $p < .01$.

Discussion. In general, Russian respondents scored lower than has been found for U.S. and Canada subjects in other studies (M = 55.78 according to the original scoring system vs. Canada M = 60.75 vs. US M = 72.64) (Matsuba et al., 2012) on the EID scale. As expected, the EID scale translation returned a high reliability, $\alpha = .88$, which is close to the original result. Factor analyses indicated one dominant factor accounting for 31% of variance, and two minor ones: environmentalism (9%) and environmental appreciation (5%). Hence, the original factor structure was retained as it was described by Clayton (2003). Additional factors could emerge when the method is administered in a more diverse sample. The found factors coincide with Olivos and Aragonés' (2011) findings, as environmentalism and environmental appreciation were distinct factors in their research with the EID scale.

Results also showed significant connections with constructs familiar to environmental identity — environmental concern and awareness of consequences — demonstrating good convergent validity of the adapted instrument and making it a fair method for further endorsement by the Russian research community.

Clayton (2003) describes environmental perspective as more compatible with collectivism than with individualism, since it highlights the importance of interdependence with ecosystem and refers to duties and obligations for the sake of a better world. Russian culture has lived through periods of both dominating collectivism and individualism, and the latter appears to be confronting a collectivist past in modern days (Mamontov, Kozhevnikova, & Radyukova, 2014). While collectivist cultures display willingness to sacrifice their own resources in order to support the group at large, individualistic subjects tend to prioritize their own needs before the needs of the group — however, the cultural difference perceived in environmental identity scores here requires additional investigation.

The theory of moral expansiveness (Crimston et al., 2016) provides another perspective for the interpretation of the obtained data. The fact that environmental identity is more strongly connected with egoistic values, more weakly with altruistic ones and even more weakly with biospheric values, makes it useful to further investigate its relations with other attitudes toward people and natural entities, in order to see if an environmental identity is generally related to a larger scope of concern. This is the project of the next studies.

To sum up, we can conclude that all of the Hypotheses were fully confirmed, and the EID scale is a useful method for measuring environmental identity in Russian.

Studies 2 and 3 investigated the relationship between EID and other variables. Study 2 looked at the connections between EID and attitudes toward plants. In Study 3, the EID scale was used in order to find and test relations of environmental identity to environmental concern and empathy.

Study 2

This study was aimed at investigating the connections between environmental identity and awareness of the importance of plants as part of the natural world. The importance of a connection with nature, and particularly with flora, and especially for urban residents, cannot be overestimated: nature plays a restorative function,

delivers aesthetic pleasure, supports mental health, and helps people to discover their own individualities (Bringslimark, Hartig, & Patil, 2009; Elings, 2006; Martens, Gutscher, & Bauer, 2011; Raanaas, Evensen, Rich, Sjшstrшm, & Patil, 2011). Both active and passive interactions with the plant world, including walking, planting, or the observation of indoor plants, increase positive functioning in individuals. To sum up, interactions with plants can be a very important psychological resource. Therefore, research on all angles of interaction between people and nature is promising. The attitude to the plant world as a topic increasingly attracts the attention of researchers in different fields of knowledge; even such an area as floropoetics that examines the image of plants in literature, is justified (Sharafadina, 2011).

At the same time, in Russia, the attitude to plants as a part of environmental psychology is still in its infancy (Chistopol'skaya, Enikolopov, Nikolaev, & Semikin, 2017). This is surprising if we take into account that Russia was an agricultural country for many centuries, and in fact every Russian has among their ancestors villagers or farmers. The limited previous research shows, however, that positive relations with plants and flowers in Russians predict not only peoples' subjective well-being but their moral world view and pro-social attitudes as well (Muhortova & Nartova-Bochaver, 2015). This makes the study of relations to the plant world very topical.

At the same time, environmental identity and attitudes to plants are not synonyms. It is possible that people with a strong environmental identity prefer interaction with animals or inanimate nature (for example, different types of tourism). That is why it is important to study whether an environmental identity is a source of generating the relationship to nature in its different forms.

The current study partially fills this gap. As environmental identity is a source of the broad spectrum of environmental attitudes (Clayton, 2012) we have put forward the following Hypothesis: environmental identity is positively connected with awareness of the plant world.

Procedure. In this study, 94 students from Moscow universities participated (78 female, M_{age} = 18.6, SD_{age} = 1.2). Data was collected from students in class as a part of their individual home work in a course on "Psychology of Individual Differences" during 2016–2017. Participation was anonymous and voluntary; participants were granted extra credits. To get information concerning environmental identity, the Russian version of EID was used (Clayton, 2012; see also Study 1). To assess attitudes towards the plant world, the People and Plants questionnaire (PaP) was used (Muhortova & Nartova-Bochaver, 2015). PaP consists of five scales and includes 32 items. The Joy scale (11 items) assesses positive emotions that appear when people observe plants and flowers or interact with them. An example of the item: "When my plants die, I always get upset". The Esthetics scale (8 items) emphasizes beauty of plants. An example of the item: "I like to photograph plants and flowers". The Experience of Interaction scale (4 items) shows how experienced in caring on plants individual is. An example of the item: "I come back with any plant (seeds, seedlings, cuttings) from every trip". The Closeness to nature scale (6 items) measures general positive attitudes to the plant world. An example of the

item: "I feel a surge of positive warm feelings while in the woods". Finally, the Ecology scale (3 items) describes the value of plants in the context of ecological situation. An example of the item: "A person should take care of plants, because life on Earth is impossible without them".

Results. As our sample was not balanced by gender, we calculated all our results on the total sample. First of all, score means, reliabilities, and correlations between EID and PaP scores were calculated (see Tables 3 and 4).

As expected, all of PaP scores were positively connected with environmental identity which means that people who have general positive emotional connections with nature tend to treat plants and flowers well. More specifically, they experience the joy of looking at plants and flowers, appreciate the beauty of living plants as well as images of them, they love and know how to care for plants. Moreover, they feel their closeness to nature in general and understand the role of plants in preserving the eco system.

Results are very homogeneous and easily interpreted: in accordance with our expectations, environmental identity can be related to a broad spectrum of connections with plants.

Discussion. Despite the apparent simplicity, these results are expressive and seem to be promising for further research and psychological counseling. Firstly, they once more confirm the content validity of the Russian version of the EID scale by Clayton (2012). Further, although the plant world is not the whole of nature (that also includes the world of animals and inanimate phenomena), the revealed connections show that the construct of environmental identity is quite universal. Thirdly, our research was explorative, and in fact we haven't any sound theory regarding attitudes to plants in Russian citizens. Thus, we could expect that young

Table 3

Descriptive Statistics of the Scales

Measure	M	SD	Cronbach's α
Joy	2.47	1.06	.94
Esthetics	2.78	.98	.88
Experience	1.86	1.01	.82
Closeness to Nature	3.01	1.01	.87
Ecology	3.22	1.01	.81
Environmental Identity	80.13	22.56	.78

Table 4

Connection (*r*s) between Environmental Identity and PaP Scores

Joy	Esthetics	Experience	Closeness to Nature	Ecology
.68	.60	.58	.63	.46

Note. All connections are significant at $p < .000$.

citizens, on the contrary, do not identify themselves with nature and do not show interest in plants at all. In this case, it would be relevant to search for other sources of natural psychotherapy and self-support for this population. As these results show, experiences of plants were fairly low in this sample, but feelings of closeness to nature and to natural ecology were fairly strong.

Study 3

Environmental identity resembles an archetypical or even a Darwinist approach to human-nature relations explicitly showing that mankind may have left the cradle of wilderness but remains internally its child. While social identities are based on social experiences, environmental identities are formed by experiences with the natural environment. An identity approach considers environmental concern as a significant part of one's self – a product of phenomenal nature. Clayton (2003) defines environmental identity as an assortment of beliefs about the self and a motivator of particular ways of interacting with the world meaning that identity can be a product and a force.

However, environmental identity endorses the idea of interdependence between various parts of nature, considering mankind as a small part of an enormous system. The ability to feel unified with a much larger natural force and experience interconnection with the world resembles the transcendental self-concept. It follows that environmental concern in this case can be perceived as a concern for one's transcendental self: if the whole system is endangered, then the small parts of it also experience threat.

Exploring the idea of transcendence of human consciousness and its interdependence with nature, Schultz (2000) experimented with the concept of empathy with nature. In his study, natural environment and self are linked via the process of internalization of the observable or imaginary nature which serves as a mediator in human-nature relations. While empathy is mostly studied as a social phenomenon (e.g. Davis, 1983; Rothschild, 2006), the effects of dispositional empathy with nature were salient in Schultz's studies. Empathy with nature appears as a young and yet not completely developed construct, despite its promising theoretical potential, and needs exploration, which is one of the goals of the current study. Based on the described transcendence of empathy, we assumed that people with higher environmental identity would empathize more with other life forms, and formed a Hypothesis 1: Environmental identity is positively connected with environmental empathy.

While the current study explores the connection between empathy end environmental identity, it is important to check the connection between environmental identity and social empathy as well. It is logical, to assume that being included in the universal ecosystem, humans would display care not only about the whole system as in Schultz's studies on environmental concern (2000), but also tend to treat sole humans as a part of this system leading to increased sensitivity to others. Hence, we propose a Hypothesis 2: Environmental identity is positively connected to social empathy.

Procedure. A total of 200 respondents participated in the study (168 female, M_{age} = 22.5, SD_{age} = 6.2); the majority of the respondents were women (84%). Most of the individuals were undergraduate students from Russian universities (54%), 55 graduated from university (27.5%), and 37 completed high school (18.5%). Data was gathered via online questionnaire platform; participation in the study was completely voluntary.

Three methods formed the base of the questionnaire, apart from a social-demographic block constructed of age, sex, and education information.

Clayton's EID scale was used to measure the environmental identity of the respondents.

In order to measure environmental empathy, Dispositional Empathy with Nature scale was used (DENS) (Stern et al. 1995). This is based on Davis's IRI scale and collects data using two subscales: Perspective-Taking (e.g. "I imagine how I would feel if I were the suffering animals and plants", "I can very easily put myself in the place of the suffering animals and plants") and Empathetic Concern (e.g. "I feel as though I were one of the suffering animals and plants", "I have tender, concerned feelings for the suffering animals and plants").

Davis's Interpersonal Reactivity Index (IRI) was used to measure social empathy. In order to shorten the questionnaire, only two of the four subscales were used: Perspective-Taking (e.g. "I try to look at everybody's side of a disagreement before I make a decision", "When I'm upset at someone, I usually try to "put myself in his shoes" for a while") and Empathetic Concern (e.g. "I am often quite touched by things that I see happen", "Other people's misfortunes do not usually disturb me a great deal" — a reverse item). Apart from shortening the measure, no additional changes were made.

Results. Descriptive statistics and reliabilities of the scales are presented in the Table 5.

Reliabilities tests showed good internal consistency in our study. After checking internal consistency, data was grouped and passed through a series of non-parametric tests (Table 6).

A linear regression analysis was used to investigate whether the identity predicts environmental empathy and social empathy or not (see Table 7). As revealed outcomes show, both empathy types were significantly predicted by EID; environmental empathy was predicted more strongly (R^2 = .33 compared to R^2 = .09).

Discussion. All instruments used in this study displayed good internal consistency. In particular, the EID scale returned α = .88, which is close to Clayton's results (2003), and provides support for the translated scale (see Study 1).

As expected, a significant correlation was found between the EID and DENS scales; both subscales correlated with EID at a strongly significant level ($p < .01$). It means that environmental identity is connected with environmental empathy confirming our Hypothesis 1.

A significant correlation between the EID and IRI scales was also found at a strongly significant level ($p < .01$) which means that people' environmental identity is connected with social empathy, in accordance with Hypothesis 2. While two

Table 5

Descriptive Statistics and Reliabilities of the Scales

Measure	M	Mdn	Mode	Min	Max	SD	Cronbach's α
Environmental Identity scale	2.57	2.54	2.38	1.00	5.00	.50	.88
Dispositional Empathy to Nature	2.49	2.42	2.25	1.00	5.00	.61	.92
DENS Perspective-Taking	2.46	2.25	2.00	1.00	5.00	.70	.86
DENS Empathetic Concern	2.58	2.50	2.50	1.00	5.00	.60	.86
Interpersonal Reactivity Index	2.73	2.79	2.79	1.00	5.00	.33	.73
IRI Perspective-Taking	2.79	2.86	2.86	1.00	5.00	.37	.71
IRI Empathetic Concern	2.70	2.71	2.57	1.00	5.00	.38	.72

Table 6

Connection (*r*s) between Environmental Identity, Environmental Empathy and Social Empathy Subscales

DENS Perspective-Taking	DENS Empathetic Concern	IRI Perspective-Taking	IRI Empathetic Concern
.47	.51	.26	.29

Note. All connections are significant at $p < .01$.

Table 7

Predictive Role of Environmental Identity for Environmental and Social Empathy Scores

Measure	α	R^2	$F(1,198)$	p
Environmental empathy (DENS)	.77	.33	96.41	.000
Social empathy (IRI)	.19	.09	19.67	.000

aspects of empathy were both significantly connected to EID, environmental empathy subscales display stronger correlation than social empathy.

Moreover, EID also appeared as a significant predictor in both environmental and social empathy, regarding linear regression results. It means that the way we perceive ourselves as parts of nature significantly influences our relations with nature and other people in a positive way. This finding, along with support to existing studies of Schultz (2000, 2001), opens a promising field for future research on

environmental identity and its positive effect on mental health and well-being. At the same time, it is somewhat different from the Schultz (2001) data, which established a negative association between the connection with nature and egoistic values. This difference may be due to the cultural or age characteristics of the sample. On the other hand, it is possible that the investigated connections are nonlinear, and in this case, the mediating variables need to be added.

General Discussion

Together, the present studies serve several purposes. First, they confirm that environmental identity is a valid construct, and the EID scale a reliable measure in Russian culture of that construct. Although not unexpected based on previous research with the EID scale in other countries, this finding is important in paving the way for further research, including cross-cultural studies. Russia presents a context for human-nature relations that is distinct from those in Western nations in the way it contains both individualistic and collectivist themes.

At the same time, the connections of environmental identity with other constructs of similar content generally correspond to those obtained in other countries (Capaldi et al., 2017; Schultz et al., 2001). The main difference from Schultz et al. (2001)'s data was that in Russia the connection of environmental identity with egoistic values was positive. This interesting fact may suggest that in Russia people are in a synergistic rather than complementary relationship with nature, in the sense that their personal interests do not contradict the interests of the natural world as a whole. However, this interpretation needs further research. Future qualitative research could add to our understanding of the way in which nature is conceptualized in Russia.

Second, these results show a connection between environmental identity and the attitude toward plants, that provides additional evidence for the validity of the EID scale. Finally, the results of Study 3 uncover a significant correlation between EID and empathy, not only toward plants and nature but towards other people. This suggests that the EID is related to a broader tendency to be aware of connections to others, including both human and nonhuman entities in our scope of concern. Because environmental identity is associated with early experiences with nature, it may be that early experiences with nature — perhaps even experiences with nature as an adult — can promote concern for other people and ability to take alternative perspectives.

However, the outcomes obtained require further study of how people with high environmental identity rank the value of other natural objects and forms of life. It may happen that the preference for nature to society can also lead to negative consequences in the field of pro-social attitudes. To investigate this question, information is needed about the emotional connectedness with nature and people, the history of human relations with nature, as well as the relationship of environmental identity with other identities, including cultural, religious, and social ones. We can assume that, depending on the degree of the schism between these identities, different types of personality will result, for example, relatively Natural, Social,

Universal, and Marginal (between culture and nature) types. In the authors' opinion, this finding goes beyond the specific phenomena for Russia and can be studied in a wide cultural space.

Although somewhat preliminary, the results of the current study suggest that many Russians do feel some level of environmental identity. Moreover, this is a working construct as it forms a system of dense connections with other constructs.

The field of environmental psychology is growing in Russia and worldwide as people become more aware of the interdependence between human and environmental wellbeing. The study of individual relationships with the natural environment is an important theme in this field.

Conclusion

These results could be relevant to the field of psychological counseling, especially with younger students, suggesting that opportunities for interaction with natural environments could have a positive effect on wellbeing. As the first year of adaptation to the university is stressful, it is necessary to attract all possible resources in order to overcome this. The results obtained here could be valuable for designers and for the organization of guided and un-guided self-help techniques (Nartova-Bochaver, 2009).

Along these lines, the opportunity to contact with nature in the form of its observation, care for plants and pets, or just walking in the park should be promoted. Moreover, such events should be organized by the psychological services of universities, especially those located in large cities. Another point of practical application of the results is the developing design of restorative facilities using images of the natural world or its living representatives.

At the same time, the study has a few limitations that are expected to be overcome in future research. First of all, the limitations of the current study are shaped by the sample characteristics: there were significantly more female respondents (84%), and most of the participants were younger students from various Russian universities (54%). A more diversified sample is advised for future research in order to substantiate our findings. Furthermore, it is possible that, in the absence of control over social desirability, our respondents perceived certain responses as socially desirable, and the level of environmental concern as well as environmental identity could be lower in the general population. More research is needed to replicate and extend these results. Further, the sample was not randomized by gender, or by objective data on the respondents' competence and experience in dealing with nature, and was not free from self-selection bias. In future research, the procedure of data collection should be changed in the direction of greater representativeness.

Finally, we may assume that the majority of the received connections might have a nonlinear character. To get more nuanced results, it is necessary to conduct a study adding mediating and moderating variables.

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Appendix A

The Original Version of the EID Scale

Instruction. Please indicate the extent to which each of the following statements describes you by using the appropriate number from the scale below.

	Item	Not at all true of me	Not true of me	Neither true nor untrue	True of me	Completely true of me
		1	2	3	4	5
1	I spend a lot of time in natural settings (woods, mountains, desert, lakes, ocean).					
2	Engaging in environmental behaviors is important to me.					
3	I think of myself as a part of nature, not separate from it.					
4	If I had enough time or money, I would certainly devote some of it to working for environmental causes.					

	Item	Not at all true of me	Not true of me	Neither true nor untrue	True of me	Completely true of me
		1	2	3	4	5
5	When I am upset or stressed, I can feel better by spending some time outdoors "communing with nature."					
6	Living near wildlife is important to me; I would not want to live in a city all the time.					
7	I have a lot in common with environmentalists as a group.					
8	I believe that some of today's social problems could be cured by returning to a more rural life-style in which people live in harmony with the land.					
9	I feel that I have a lot in common with other species.					
10	I like to garden.					
11	Being part of the ecosystem is an important part of who I am.					
12	I feel that I have roots to a particular geographic location that had a significant impact on my development.					
13	Behaving responsibly toward the Earth—living a sustainable lifestyle—is part of my moral code.					
14	Learning about the natural world should be an important part of every child's upbringing.					
15	In general, being part of the natural world is an important part of my self-image.					
16	I would rather live in a small room or house with a nice view than in a bigger room or house with a view of other buildings.					
17	I really enjoy camping and hiking outdoors.					
18	Sometimes I feel like parts of nature—certain trees, or storms, or mountains—have a personality of their own.					
19	I would feel that an important part of my life was missing if I was not able to get out and enjoy nature from time to time.					
20	I take pride in the fact that I could survive outdoors on my own for a few days.					
21	I have never seen a work of art that is as beautiful as a work of nature, like a sunset or a mountain range.					

	Item	Not at all true of me	Not true of me	Neither true nor untrue	True of me	Completely true of me
		1	2	3	4	5
22	My own interests usually seem to coincide with the position advocated by environmentalists.					
23	I feel that I receive spiritual sustenance from experiences with nature.					
24	I keep mementos from the outdoors in my room, such as shells or rocks or feathers.					

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Идентификация с природой в России: Валидизация метода и связь с заботой о людях и растениях

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Резюме

Идентификация с природой — это концепция собственной личности, определяемая отношениями с миром природы; она имеет большую ценность для прогнозирования социальных установок и поведения. В настоящей работе идентификация с природой исследуется в трех эмпирических исследованиях с использованием одноименной шкалы идентификации с природой (ИП). Исследование 1 (n = 222) было посвящено валидизации русской версии шкалы ИП. Наряду со шкалой ИП, мы измеряли отношение к окружающей

среде с помощью шкал: Новой экологической парадигмы и Глобальной осведомленности о масштабах последствий. Результаты показали, что, в соответствии с исходной версией опросника, русская версия имеет однофакторную структуру и хорошую внутреннюю согласованность (α = .88), что она также положительно связана с озабоченностью экологией, глобальным осознанием последствий, эгоистическими, альтруистическими и биосферическими ценностями. В исследовании 2 (n = 94) изучалась связь между ИП и отношением к растительному миру с помощью опросника Люди и растения. ИП предсказала все переменные, характеризующие отношение людей к растениям: радость, эстетику, опыт взаимодействия с растениями, близость к природе, экологию. Наконец, в исследовании 3 (n = 200) изучалась связь ИП с эмпатией природе и людям. Использовались шкалы Диспозиционной эмпатии природе и Индекса межличностной реактивности. Выявлено, что ИП была положительно связана с обоими типами эмпатии и предсказывала их, при этом сильнее определяя эмпатию природе. Сделан вывод о том, что русскоязычная версия шкалы ИП является работающим надежным инструментом. Кроме того, концепция ИП, по-видимому, связана с более общей способностью контактировать с внешним миром. Как таковая, она имеет потенциал для формирования психотерапевтических программ и конструирования восстановительных окружающих сред.

Ключевые слова: идентификация с природой, эмпатия, природа, растения

Приложение 1

Русская версия Шкалы идентификации с природой

Инструкция. Пожалуйста, оцените утверждения с точки зрения того, насколько они отписывают ваше типичное отношение. Здесь нет правильных или ложных утверждений. Используя шкалу от 1 до 5, отметьте как можно более честно и откровенно, что вы чувствуете в настоящий момент.

	Утверждение	Совершенно не согласен(на)	Не согласен(на)	Трудно ответить	Согласен(на)	Полностью согласен(на)
		1	2	3	4	5
1	Я много времени провожу на природе (в лесу, в горах, пустыне, на озере или в океане).					
2	Я считаю заботу о природе важным делом.					
3	Я считаю себя частью природы, неотделимой от нее.					
4	Если бы у меня было достаточно времени или денег, я бы непременно принял(а) участие в защите природы.					
5	Когда мне грустно или я переживаю стресс, мне помогает провести некоторое время наедине с природой.					

	Утверждение	Совершенно не согласен(на)	Не согласен(на)	Трудно ответить	Согласен(на)	Полностью согласен(на)
		1	2	3	4	5
6	Мне важно жить рядом с природой; я не хотел(а) бы всё время жить в большом городе.					
7	Я много взаимодействую с защитниками природы.					
8	Я верю, что многие социальные проблемы современности могут быть излечены возвращением к сельской жизни, где люди живут в гармонии с природой.					
9	Я чувствую свое родство с другими живыми видами.					
10	Я люблю работать в саду.					
11	Я часть экосистемы, и это для меня важно.					
12	Я чувствую привязанность к некоторому географическому месту, которое оказало серьезное влияние на мое развитие.					
13	Вести себя ответственно по отношению к Земле — практиковать устойчивый стиль жизни – это часть моего морального кодекса.					
14	Знакомство с природой должно быть важной частью воспитания каждого ребенка.					
15	В общем и целом, быть себя частью природы важно для моего представления о себе.					
16	Я бы предпочел(ла) маленькую квартиру с хорошим видом из окна просторному жилью с видом на застроенный район.					
17	Мне нравится ходить в походы и ночевать на природе.					
18	Иногда я чувствую, что явления природы — деревья, ветер или горы — тоже имеют личность.					
19	Если бы у меня не было возможности быть на природе, из моей жизни пропало бы нечто очень важное.					
20	Я горжусь тем, что могу прожить несколько дней в природных условиях.					

	Утверждение	Совершенно не согласен(на)	Не согласен(на)	Трудно ответить	Согласен(на)	Полностью согласен(на)
		1	2	3	4	5
21	Я не знаю произведений искусства столь же прекрасных, как природа — закат солнца или горная гряда.					
22	Мои интересы обычно совпадают с позицией защитников природы.					
23	Общение с природой духовно «подпитывает» меня.					
24	Я храню дома сувениры, принесенные с прогулок на природе — ракушки, камни, птичьи перья.					

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THE NATURE OF WISDOM: PEOPLE'S CONNECTION TO NATURE REFLECTS A DEEP UNDERSTANDING OF LIFE

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Abstract

This paper shows that wise young adults formulate phenomenological intuitions about their relationship to nature that contain many references to advanced modern conceptions of life and 'core cognition'. Enactive cognition – summarized as "being by doing", focuses on a living agent's ability to remain alive through the selection of proper 'behaviors' from the set of coping and co-creating behaviors. Co-creating agents satisfy their immediate needs while improving the quality of the environment on which their need satisfaction depends. They contribute to a thriving environment in which long-term need satisfaction is greatly facilitated. We refer to this skill as 'agent adequacy' that we associate with wisdom. Inadequate agents continually cope with need satisfaction. They might end up in a 'coping trap' where their coping strategies gradually degrade the habitat on which their long-term viability depends. In doing so, they lock themselves in an endless cycle of marginal need satisfaction. We propose concise and precise formulations of three fundamental concepts of the agent-environment relation: adequacy (the ability to satisfy needs in the short and long term), connectedness (referring to a personal bond with other agents or nature as a whole that is experienced as mutual), and beauty (that derives from the environment's ability to produce fragile perfection that is a measure of environmental quality). Analysis of our interviews showed that our (rather wise) group of respondents addressed all three fundamental concepts. We conclude that our theoretically derived agent-environment framework is exemplified by the human-nature relation.

Keywords: enactive cognition, agent adequacy, wisdom, life, nature, beauty, connectedness, peak experiences, phenomenology, core cognition, need satisfaction, self-actualization.

Introduction

This paper shows that (wise) young people formulate phenomenological intuitions containing many references to advanced modern conceptions of 'life" and wisdom about their relationship to nature. We combine theoretical work on the origins of cognition from the perspective of enactive cognition (Andringa, van den Bosch, & Wijermans, 2015) with an (initially) unrelated thesis addressing the phenomenology of connectedness to nature (Angyal, 2018). In our discussions we realized that the interviews with (apparently) wise young adults, on which the thesis

was based, provided many insights and clear formulations about the properties of the connection between a (living) agent and its environment. Here we connect our theoretical approach to the insights conveyed in the interviews and we show a high level of coherence.

Enactive cognition (Di Paolo, Rohde, & De Jaegher, 2010; Thompson, 2004, 2007; Varela, Thompson, & Rosch, 1993) is an approach to cognitive science that starts from defining properties of life as initially formulated in the field of "autopoiesis" (Maturana & Varela, 1991). Autopoiesis means self-production and refers to life's central ability to maintain and produce itself without external direction. Self-production and self-perpetuation occur on the level of living individuals, but the interdependence of living individuals in habitats and ecosystems and the interdependence of the different ecosystems on Earth entails that life as a whole — the biosphere — produces and maintains itself as well. Within enactive cognition, individuals are referred to as "living agents" or "agents" for short. Agents, unlike rocks or hurricanes, are sources of self-initiated activities: "behaviors". Agents are free to select their behaviors as long as these behaviors keep them alive (death obviously ends the self-initiation of behavior). Enactive cognition can therefore be summarized as "being by doing" (Froese & Ziemke, 2009).

The enactive framework allows us to develop cognitive science from the defining properties of life (5 Gya, 5×10^9 years ago) and hence from well before the advent of brains and neurons (about 0.5 Gya), and even multicellular (1 Gya) and eukaryotic life (2.4 Gya). Enactive cognition allows us to study key aspects of cognition without human and cultural biases and idiosyncrasies. In fact, what we summarize below is the cognition shared by all of life that we refer to as "core cognition" (Andringa et al., 2015). We argued that human cognition is scaffolded, via many evolutionary innovations, on core cognition and manifests core cognition in its own idiosyncratic and culturally colored ways. Still, we argue and demonstrate that references to core cognition emerge both spontaneously and clearly in conversations with young individuals who address their connection with nature.

In this paper, we do something that is unusual for psychology: we do not start from a human subject, rather we start from an abstract living entity — the agent — that ensures its own existence through its own doing. And it does so by attending to its own needs and only on success promotes an environment in which need satisfaction is facilitated. In doing so we aim to derive a concise and precise formulation of fundamental concepts of the human-environment relation: adequacy, connectedness, and beauty.

In the next section, we first outline core cognition and identify aspects that we expect to feature in conversations about people's connection to nature. This leads to a number of concepts that we use to analyze the interviews. After the methods section, we present the results as examples of how the expected concepts are formulated by our participants. We conclude with a discussion. Note that when we talk about "agents" we refer to the domain of core cognition: cognition shared by all of life. When we refer to humans, e.g., participants or young adults, we are in a human context in which core cognition is implemented in uniquely human and cultural ways.

Theoretical Framework: Enactive Cognition

Agent Adequacy

Because life self-produces, it is not directed by external forces. Nevertheless, it is subject to the environmental conditions that may promote or impede its viability. Living agents exist on a viability axes with languishing (low viability) on one extreme and thriving (high viability) on the other extreme. In our previous paper (Andringa et al. 2015, figure 2) we described how a number of key concepts of cognitive science arose from these defining properties of life.

In particular, we separated two modes of existence: the coping-mode that aims to protect existence by satisfying pressing needs, and the co-creation mode that aims to contribute to an environment in which the occurrence of pressing needs — and hence the activation of the coping mode — is ever less likely. Success for the coping mode entails satisfaction of immediate needs, and with that its own *deactivation*. For the co-creation mode, the measure of success is its own continued *activation*, and hence a thriving state characterized by continually satisfied needs. Therefore, a key difference between the two modes is an association with (coping) states that agents want to avoid or end, and (co-creation) states that the agent aims for and wants to perpetuate. We refer to "agent adequacy" as the ability to be in the co-creation mode often and to return to it quickly when brought in the coping mode. Vice versa, "agent inadequacy" refers to the *inability* to avoid or end states that the agent does not want to be in.

"Intelligence" as the ability to solve (i.e., end) problems, is a key skill of the coping mode, and "power" defined as "the ability to reach intended results" (Russell, 1938), is a measure of how well an agent copes. Negative emotions and moods, those that we want to end and avoid, are naturally associated with the coping mode (Andringa et al., 2015). So an agent that is driven by deficiency needs (Maslow, 1954) is in the coping mode. Although the purpose of the coping mode is to be discontinued as soon as possible by satisfying pressing needs, this is preconditioned on the successful resolution of the deficiency needs. If the coping agent solves one problem by creating another problem, it can inadvertently ensure its own continuation. We refer to this as a "coping trap".

Agents in a coping trap are often self-responsible for being and remaining in the coping mode by their *inability* to satisfy needs without creating new or more (future) problems/needs. Being and remaining in a coping trap is a telltale indicator of the agent's inadequacy. An inadequate agent maintains a situation it rather wants to end. And it typically does so because of the inability to select behaviors that would end the unfavorable situation. A richer behavioral repertoire, an increased sense of realism, and improved strategies to execute effective behaviors when appropriate makes the inadequate agent (more) adequate. Learning counterproductive strategies and sticking to them (perhaps because the strategies provide some fleeting benefits) increases the inadequacy. Learned helplessness (Maier & Seligman, 1976) can be interpreted in terms of a coping trap since it only occurs for fairly difficult behaviors under the agentic control (Andringa, van den Bosch, &

Vlaskamp, 2013). When agents have accepted that their behaviors are pointless in addressing their needs, they have locked themselves in a coping trap.

In this paper we refer to "wisdom" as "the ability to produce broadly beneficial desired results while taking the full consequences of behavior on the habitat into account" (Andringa et al., 2015). Wisdom allows agents to contribute to the environment in ways that allow the habitat to recover and grow, despite the agent also taking from it to satisfy its needs. This is a definition of wisdom that is not anthropocentric and, in fact, allows individuals of any species to act wisely. A positive sum total of the subtractions from and contributions to the habitat allows the habitat to grow and flourish. Hence it is ever easier for the agent to satisfy its needs without having them become pressing and thus activating the coping mode. Wise agents manifest a deep "understanding" through their ability to work with the tendencies in their habitat to promote its flourishing. While the inadequate agent proves its lack of understanding through the inability to foresee the consequences of its own activities, the wise agent is able to enact its behaviors by avoiding (unnecessary) harm and promoting habitat growth. Wise agents therefore rarely end up in the coping mode through their own doing: they are adequate agents.

Development of Wisdom

In a paper called "Learning autonomy in two or three steps: linking open-ended development, authority, and agency to motivation" (Andringa et al., 2013) we separated three growth phases. In Phase 1 the agent learns to bring its body under control as a suitable vessel for sense-making and purposeful interaction with the environment. In Phase 2 it learns to become an adequate thinker, actor, and problem-solver by learning from whatever its environment (for humans, society) offers. Preconditioned on the success of Phase 2 and hence on becoming sufficiently adequate, the agent progresses to learn to effectively co-create a rich and flourishing habitat (for humans, its natural and societal environment).

The transition from Phase 2 to Phase 3 corresponds to what Ardelt (2000) describes as a difference between the use of "intellectual knowledge" and "wisdom-related knowledge". The goals of the intellectual knowledge strategies are associated with the accumulation of (culturally shared) knowledge and information, and the discovery of new truths. It is focused on the mastery of the outside world through learning how to do the correct things efficiently and without error. It should result in making the world more certain, regular and predictable so that one's future self is better able to deal with the expected. Overall, it improves mastery.

In contrast, wisdom-related strategies are associated with the development of a deeper understanding of salient phenomena and events, and the (re)discovery of significant old truths. It is focused on interpretative knowledge and the question whether or not to influence things. Wisdom results in a mastery of the inner world from self-imposed limitations and the acceptance of uncertainty, irregularity, unpredictability, and the impermanence of the world (both cultural and natural) as a resource. A wise person learn from dealing with the unexpected and still unknown. Overall, wisdom improves one's ability to work with the tendencies of the

world as opposed to frantically controlling and curtailing it. In short, it is co-creation (Andringa et al., 2013).

The skill to co-create is also known as the Daoist term "Wu wei" that means something like "act naturally," "effortless action," or "nonwillful action" (Littlejohn, 2003). Additionally, Maslow (1954) refers to co-creation as being-cognition (B-cognition), which he considered to be essentially associated with self-actualization. Our subjects were selected on the expectation that they had developed a deeper understanding of their relationship to nature, and hence we expected them to be rather wise and self-actualizing.

Pervasive Optimization and Connectedness

We have referred to co-creation as "pervasive optimization" (Andringa et al., 2013). Pervasive optimization is what keeps friendships viable. It does not involve scripted interactions or control. Quite the contrary: it relies on multiple small contributions to each other's viability. For example, being interested in each other, showing at random moments that you care, and providing help and support when appropriate, while leaving each other free. Maintaining healthy friendships is "Wu wei" in action. More generally, pervasive optimization allows agents to thrive in a habitat that is continually maintained and enriched by countless and nearly effortless pervasive optimizations by the living agents that constitute it.

Co-creation (pervasive optimization, Wu wei, or self-actualization) allows the (adequate) agent to form a mutualistic (mutually beneficial) relationship with its habitat. The inadequate agent is preoccupied with its own pressing needs and sees the habitat more as a resource for need satisfaction and self-enhancement than as an environment to be cared for as a basis for long-term need satisfaction. Adequate agents satisfy their needs without letting them develop into pressing – coping-mode activating – needs. They do so by continually investing in habitat quality for (shared) long-term viability. Compared to inadequate individuals, they have developed a richer, more "lived", more personal/idiosyncratic, and more tested understanding of their habitat and their natural and cultural environment. Our subjects experience this as a sense of connectedness, which most of them formulate in unique and deeply personal terms.

Role of Beauty

When we studied the interviews, we noticed a fair number of references to an initially vague concept that we referred to as "beauty". In the beginning this puzzled us. Why were our participants interested in beauty and why did they connect beauty to value? More generally, why would an agent's interest be attracted to beauty and how could it indicate value in an enactive cognition framework? The beauty of a flower, a natural scene, and even a work of art is typically associated with combinations of concepts like fragility, perfection, complexity, interdependence, fleetingness, impermanence, health, and harmony. These concepts refer as much

to the beautiful object as they refer to the quality of the environment that allowed the beauty — as fragile perfection — to emerge.

Hence, the beauty of an environment is suggestive of the environment's qualities to produce fragility, perfection, complexity, interdependence, and harmony. Since the beautiful is generally fragile and fleeting, it requires constant re-emergence to be abundantly visible. Hence prominent beauty is a sign of an environment that promotes highly "optimized" states of existence, which includes high viability states. In retrospect, we could have expected a role for a concept like beauty in our theoretical framework. In this paper we investigate how our informants refer to our new conception of beauty.

Expectations

Figure 1 provides an overview of our theoretical framework. Agents need to satisfy short- and long-term needs. Short-term needs are associated with keeping the individual agent alive. The inadequate agent, mainly through its own inability, struggles with continually unsatisfied pressing needs and is preoccupied with knowledge and strategies that give it more control over its situation, which, for humans, Ardelt (2000) refers to as intellectual knowledge use and Maslow as "deficiency cognition". Adequate agents have learned how to satisfy pressing needs. They are interested to develop and improve pervasive optimization skills that promote the quality of their environment/habitat. This way, needs can be met while enhancing habitat quality. Ardelt refers to this as the use of wisdom related knowledge and Maslow as "being cognition". Note that this process of habitat co-creation has allowed the biosphere to develop from an initially small and fragile state to its current robustness and scope.

We expect that only adequate agents — in our case relatively wise, young adults — feel and act on the inclination to develop high quality pervasive optimization (co-creation) strategies. Inadequate agents are preoccupied with pressing need satisfaction and are, by and large, unaware of these strategies and even of the need for them.

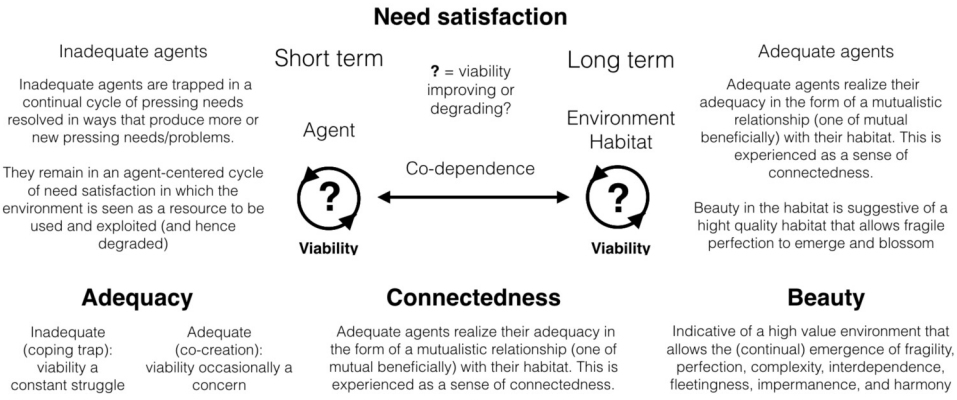
Figure 1 provides an overview of the theory and the resulting key terms. Note that these have been derived from arguments that pertain to living agents in general. In the last theory subsection we show how these key terms pertain to humans.

Wisdom in Humans

In the derivation of the key components of the (generalized) wisdom concept we separated agent adequacy, connectedness, and beauty. Is it possible to connect these concepts to an existing conceptualization of wisdom? We think we can. Ardelt has developed a Three-Dimensional Wisdom Scale (Ardelt, 2003) that separates wisdom in cognitive, affective, and reflective components. However, some of these components can also be interpreted in terms of adequacy, connectedness, and beauty. Below we use quoted phrases from Ardelt (2003, 2006) to show this.

Figure 1

Overview of Theoretical Key Terms



Note. In our analysis we focus on formulations suggestive of agent adequacy, connectedness to the habitat, and perceiving beauty in relation to environmental value. Together these three concepts span important features of the concept of agent wisdom.

Adequacy refers to the ability to resolve pressing problems and to avoid coping traps. Hence *"an inability to make important decision despite life's unpredictability and uncertainties*" is contraindicative. Likewise, the observation *"Things often go wrong for me by no fault of my own"* or *"I either get very angry or depressed if things go wrong"* are indicative of prominent coping and perhaps a coping-trap. On the other hand, *"A perception of phenomena and events from multiple perspectives"* and frequent *"self-examination, self-awareness, and self-insight"* are suggestive of agents that try to make the most of a complex and unpredictable situation.

Connectedness refers to a personal bond with other agents or nature as a whole that is experienced as mutual. Contraindications of connectedness are remarks like *"It's not really my problem if others are in trouble and need help"* and *"a tendency to see the world as either black or white"* or us versus them. But *"the presence of positive, caring, and nurturant emotions and behavior toward others"* and *"the absence of indifferent or negative emotions and behaviors toward others"* are indicative of connectedness.

Beauty refers not so much to beautiful objects or scenes as such, but to the value we attribute to the environment that spawned the beauty and to our intrinsic motivation to care and connect. Remarks like *"In this complicated world of ours, the only way we can know what's going on is to rely on leaders or experts who can be trusted"* is a contraindication because it indicates an external locus of control. Similarly, agreeing with the statement *"Life is basically the same most of the time"* suggests an inability to see value in everyday situations. Overall an unawareness of ambiguity and uncertainty in life makes it difficult to appreciate the fleeting, uniquely harmonious, and fragile perfection of beauty. In contrast, appreciating beauty drives *"the ability and willingness to understand a situation or phenomenon thoroughly"*.

We will use these three conceptions of adequacy, connectedness, and beauty as our guideline to analyze our participant's formulation of their relationship to nature.

Methods

At the basis of this paper is a qualitative, phenomenological study we conducted in Groningen in the spring of 2018. This study was part of a bachelor thesis titled *"The phenomenology of connectedness: An inquiry into the human experience of the natural world"* (Angyal, 2018). It investigated the richness of people's experience of nature. Although the qualitative study was conducted for a purpose other than the present article, we found the material ideal to combine with our theoretical work on wisdom. The study consists of twelve in-depth interviews with selected individuals living in Groningen, that are reanalyzed using our formulations of adequacy, connectedness, and beauty. For a more detailed description of the methodology refer to (Ibid.).

Participants

We made a non-representative sample of the general population, consisting of individuals from our circle of friends and acquaintances. In the phenomenological tradition, it is homogeneity (as opposed to heterogeneity) among the participants that is encouraged for a better understanding of the general "lived experience" we seek to study (Alase, 2017). We wanted them to possess: 1) introspection and the ability to critically reflect on themselves; 2) awareness about matters concerning the environment and human-nature relations; and 3) affinity for an in-depth conversation on a philosophical topic. We aimed to select people who had meaningful stories to tell about their personal experience of nature. The fact that we had previous contact with most of the participants helped them feel comfortable enough to share their feelings and deep insights into such experiences. This helped to reach considerable depth in an interview of less than 60 minutes. Among our participants, nine were university students and three worked as artists. All had or were working towards a bachelor degree. We contacted each participant personally with a short description of the research project and their proposed role in it. We settled on twelve participants (six males and six females) between the ages of 20 and 50 (mean age was 26 year).

Procedure

The interviews took place at different (primarily outdoor) locations chosen by the participants. We recorded nearly hour-long conversations and transcribed them in full for analysis. The main method we applied during the interviews and the subsequent analysis was a phenomenological approach, following the instructions of Hycner (1985), Moustakas (1994), and Lester (1999). In Moustakas" (Moustakas, 1994) definition, the "empirical phenomenological approach" is an attempt to *"return to experience in order to obtain comprehensive descriptions that*

provide the basis for reflective structural analysis that portrays the essences of the experience". We focused on depth rather than structure during the interviews, aiming to bring out the richness of our participants" experience of nature.

The first part of the interview aimed to help their reflection process and to connect participants to their senses, their physical-emotional states, and the current place. The second part of the interviews took a less sense-based and more philosophical turn, following the Hegelian interpretation of phenomenology, which maintains that a phenomenon is *"knowledge as it appears to consciousness"* (Moustakas, 1994). Therefore, question 7 was intended to stimulate participants" intuition. All questions, and the structure of the interview are presented in Table 1.

These questions investigated participants" insights on human-nature relationships and reveal their thoughts about and attitudes towards the natural world. The interviews also had a third, final part, which consisted of a text analysis of nature-based spiritualities. However, for our current purpose, we are only concerned with the data and results from the first two parts of the interviews.

Results

The re-analysis of the interview transcripts (using our current conceptualization of adequacy, connectedness, and beauty) confirmed our participants" deep

Table 1

Interview Structure and Associated Questions

Part 1 — Connecting participants to their senses and their physical-emotional states
1) How are you feeling at the moment? 2) (How) does this place influence how you feel right now? 3) Why did you choose this particular place? 4) How does it make you feel? 5) Is there anything about this place in particular that you enjoy? 6) Do you come here often?
Part 2 — Less sense-based and more philosophical questions
7) When you think of nature, what comes to your mind first? 8) Besides this particular place, do you have general affinity for nature? 9) Do you think human life is qualitatively different from the lives of non-human beings? If yes, how so? If no, why not? 10) Do you feel part of a cycle of life? Do you perceive cycles in life? 11) Do you attribute any intelligence or wisdom to non-human beings? How would you define their concepts? 12) Are you concerned about the state of the environment? Does, for instance, biodiversity decline, species extinction, or ocean pollution affects you emotionally? 13) Do you consider yourself an environmentally conscious person? 14) If yes, how so? Do you sometimes reflect on how your 'being in the world' affects the rest of the world?

understanding of life as wise and self-actualizing agents including the associated peak experiences (Maslow, 1962a, 1962b). We scored wisdom in terms of adequacy, connectedness, and beauty and summarized the results in Table 2.

Each interview was analyzed in terms of: 1) traits of adequacy, 2) experiences of connectedness, and 3) conceptions of beauty. Adequacy was scored in terms of self-reflection [SR], compliance with reality [CR], peak experience [PE], and pervasive optimization [PO]. Connectedness in terms of descriptions of the type of bond mentioned (quiet bonds experienced in everyday nature, peak experiences in wild nature, or a more philosophical/cerebral approach). Beauty is scored in a variety of formulations. All score categories are explained in more detail below. Based on our theoretical framework, those participants who showed indications of adequacy, connectedness, and beauty were identified as wise (agents).

Table 2

Types of Adequacy as Outlined in the Subsection Adequacy

Participants	Adequacy	Connectedness	Beauty
Paula	Yes [SR]	Yes [quiet bond]	Yes [awe]
Sam	Yes [SR]	Yes [quiet bond]	Yes [appreciation]
Maria	Yes [SR]	Yes [wild nature]	Yes [appreciation]
Tom	Yes [SR; PO]	Yes [quiet bond]	Yes [hard to grasp; spiritual]
Ron	Yes [SR; CR;]	Yes [quiet bond]	Yes [connection; appreciation]
Luke	Yes [SR; CR]	Yes [quiet bond]	Yes [perfect]
Jake	Yes [SR; PE; CR; PO]	Yes [quiet bond and peak experience]	Yes [spiritual; motivation]
Kate	Yes [SR; CR; PE]	Yes [quiet bond and peak experience]	Yes [appreciation; value; protection]
Lotte	No	No	? No
Sanne	Yes [SR; CR]	Yes [quiet bond]	Yes [complexity; mystery]
Roland	Yes [SR; CR; PO]	Yes [philosophical]	Yes [harmony; love]
Nora	Yes [SR; CR; PE]	Yes [peak experience]	Yes [protection; value]

Note. SR = self-reflection; CR = compliance with reality; PE = peak experience; PO = pervasive optimization; for an explanation of the types of connectedness and beauty see the subsections on Connectedness and Beauty.

As Table 2 demonstrates, eleven out of the twelve participants showed features of adequacy, experienced a sense of connectedness, and had deep insights about beauty in relation to their nature experience. We also identified different expressions of adequacy, connectedness and beauty, which we will discuss below. Only one participant did not score on any dimension, she will be addressed last.

Adequacy

We summarized indications of adequacy into four categories: 1) self-reflection; 2) compliance with reality; 3) peak experiences; and 4) pervasive optimization.

Self-reflection [SR]

One of the recurring characteristics was the ability to critically reflect on their thoughts, feelings, and actions in connection with nature. Their reflections (Table 3) entailed their sense of connection (or disruption) with the environment.

Table 3

Evidence of Participants' Ability for Deep Self-Reflection

Participant	Quotes
Sanne	(...) living on this boat, I feel this connection and yet disruption with nature. Sometimes I feel like an outsider to the water.
Kate	I realise that it makes me so calm when I'm outside in nature, somewhere more further away from the rest of society (...) that's when I think I'm most happy.
Sam	I feel stuff, I do stuff, but it's nothing compared to the infinite greatness of what is out there. That's how I usually feel.

As the quotes above suggest, participants described their state-of-being in relation to their environment. That is, they show a developed ability to view themselves essentially embedded in the natural landscape that they inhabit.

Compliance with reality [CR]

Another indication of adequacy was a strong tendency among the participants (Table 4) to rely on their experience for a grounded perception of reality, rather than ideologies and consensus-based understandings of the world.

These quotes reflect participants" frustration and apprehension about matters concerning the environment. They seem to resist popular and often simplified interpretations of reality — here exemplified by the "fear paradigm" fueling alarm about the state of the environment. Instead, they support independent thinking and an acceptance of complexity that is inherent to life.

Table 4

Evidence of Participants' Tendency to Comply with Reality

Participant	Quotes
Ron	I'd rather people not dive into the fear paradigm, which...imposes the negative experiences, which are much less than the positive. Creating an illusion of fear that's actually not happening.
Jake	There is a lot of people who disagree with evolution. It doesn't matter how many bones we dig up, how many scientists look at rocks that sedimented over the years...all of that geographic science is in large denial.
Sanne	I think a lot of times we should just let it [nature] be what it is (...) this utopia that we build around it as if nature could be the saviour of everything. As if nature would be this good thing. No, nature can be hard as well, nature can be destructive.

Peak experience [PE]

Some of the accounts describing participants" connection with the natural world involved experiences of high emotional intensity, the presence of a powerful or mystical quality, and the realization that something significant happened to them. This is what Maslow (1964) called a "peak experience" – a common occurrence among self-actualizing people and perhaps even characteristic of self-actualization. These references occurred spontaneously and could sometimes also be scored as a sign of connectedness or in relation to beauty (Table 5).

It becomes clear from these accounts that "peaking individuals" experience an intensifying and broadening of their sense of self while being in typically "wild"

Table 5

Examples of Peak Experiences in Participant Accounts

Participant	Quotes
Kate	We had this one walk when we were climbing this one volcano. (...) you just feel so humble and alive at the same time, 'cause you had this very strong wind at the top and you're just looking over this out-of-earth landscape. (...) and that just makes you feel really overwhelmed. But also really alive.
Nora	(...) in the waves, perhaps I feel more one with all the elements that are around me. And I take them as they come. (...) it's a process of trust in those elements that you don't quite understand and you absolutely cannot control but feel very much part of you when you're communicating with them.
Jake	I've never felt more alive than when I've been on my own a few times in a natural setting, sometimes vulnerable, sometimes not so vulnerable. (...) having this kind of mystical experiences...as having this power over you. It puts you in place, if you feel it.

natural settings. In Angyal (2018), we identified two different types of nature: wild and everyday. We noticed that peak experiences occurred in physically captivating nature settings ("wild nature'), as opposed to the environment participants are normally exposed to ("everyday nature').

Pervasive optimization [PO]

Taking an all-addressing, active, and holistic stance concerning the environment was a common characteristic of adequacy among the participants. As *Table 6* shows, they view themselves as individuals (and humanity as a whole) as relational (rather than isolated entities) for which they feel a shared responsibility. That is, they understand the underlying interdependence in the structure of reality, and thus the significance of their actions on others or the whole.

Table 6

Evidence of Participants' Tendency for Pervasive Optimization

Participant	Quote
Roland	This is literally our purpose, I call it 'Spreading love', but in a very biological sense it just means benefitting the organism. (...) the way we cells benefit the organism, that is, the world we live in, is to live in harmony with it.
Tom	To understand stuff in a whole, it's easy to say that, but it's much harder to do. (...) in economics, we have this compartmentalised thinking. It's just cause it's easier to make theories that way (...) it's actually way more complicated.
Nora	I think whatever I project out...can make just a little bit of a difference. And whatever thoughts or approach I have to life, it's being sent out in some way.
Luke	(...) when you are acting from a compassionate, open-hearted, and loving source, you will have that effect on other beings around you as well....people like to follow others so you can plant seeds by your actions.

Connectedness

During the first analysis of the transcripts (before the current reanalysis), the sense of connectedness emerged as the most meaningful lived experience of nature. Table 7 provides some accounts of feeling connected to and a part of the wide web of relations that constitute ecosystems and the biosphere (and nature in general). In our first analysis of the transcripts we identified two types of connectedness: 1) "Peak experiences in the wild'; and 2) "Quiet bonds of the everyday". As Table 2 demonstrates, three participants reported having had peak experiences in the past, typically in wild nature settings. These were spontaneous, unprovoked responses. A further eight participants had stories of connectedness, of a quieter quality, in everyday settings (hence the "Quiet bonds of the everyday'). One participant had a philosophical theory and not a personal experience to tell about the nature of

connectedness, and one another participant gave no indication of an experience of this sort.

Table 7

Participant Accounts of Connectedness

Participant	Quote
Paula	I feel like when I'm connected to the environment the energy is flowing, like I feel part of it, as if we were one, not just we but the world and me. Just that we are connected and I'm not an isolated person apart from everything what is happening, that we are one, like a big organism.
Luke	I definitely feel that it [interacting with non-human beings] puts me at ease. I think they like it too, because I feel that their energy is positive when I talk to them. I think...it's all about intention of course. It puts me into a relation.
Roland	We are not universes onto ourselves, but we are part of a greater, what I call, organism. We come from this earth, almost literally.
Sanne	There's one lady duck who would always come around...at some point she was just sitting on a deck and I just sat down and for ten minutes we just looked at each other...To just accept we both are, we are together, and we're happy about that. And that can be a very long process. Each animal, each human is getting to know each other.

Beauty

The concept/idea of "beauty" emerged in the interviews often implicitly, in relation to a number of other concepts such as "protection', "value', "connection', "appreciation', "perfect', and "spiritual" with motivating effect on self (for more examples refer to Table 2). Most of the participants emphasized the importance of minimizing the harm or unnecessary influence people inflict upon the environment. Rather, they suggest acknowledging the inherent value and beauty of nature in direct experience with it. It means establishing intimate connections with the non-human inhabitants of our environment, appreciating their value and role in the complex web of relations. Table 8 shows that participants formulate it in diverse ways.

Lacking wisdom

There was one participant whose level of experience and understanding of nature did not reach the depth of the other participants. Her reflections were superficial and clichйd. They revealed less about her own feelings and original thinking and more about her learned and commonplace responses. As Table 9 suggests, even her most significant remarks reflect a shallow kind of environmental awareness and lack the sense of connectedness present in the other accounts.

Table 8

Participants' Conceptions on Beauty

Participant	Quote
Nora	I think if we learn to spend more time within nature and learn to value that more than the way that we are currently doing, which is very technology-based...we're gonna start really losing touch with this other side of life which is very real and true. Whenever you can, go out, feel what it feels like to be really in it.
Kate	That is really important to use that, that appreciation. You can appreciate it because you have this idea of values of what is beautiful and what is not. I think nature has a certain value and we should actively preserve it and that we will only realise it's value once it's gone.
Tom	This other element of things, that are hard to grasp onto like beauty and rituals...you respect something that is beautiful.
Jake	(...) the aesthetics of a mountain, when climbing a mountain, the aesthetics of a rock, the story of the geology of what I'm experiencing, the texture, and the wind, and also the excitement of nature...spiritual is finding beauty or some essence, or some aesthetics, which is very appealing, which motivates me. That could be a spiritual experience.

Table 9

An Example of a Non-Wise Participant

Participant	Quote
Lotte	When I go hiking...I once lost my plastic bottle out of my backpack and I felt so bad that I took another one which I just found on the way to make up for the one I lost. People need to take their own cotton bags to the market and have their stuff put in there instead of plastic. Or, the plastic bags should be made out of something else. When I was a kid, I was very much connected to nature. To little dwarfs. When we went into the forest I imagined them sitting behind the trees because they were afraid of humans, of course. They didn't show but...I imagined them and build in the bottom of trees houses for them.

Discussion

This paper addresses two related topics. On the one hand, it aimed for more conceptual clarity of the relationship between enactive cognition as a general — non-anthropocentric — framework for living agents and anthropocentric definitions of wisdom and self-actualization. On the other hand, we investigate whether the resulting conceptualization complied with the content of in-depth interviews with rather wise and self-actualizing (young) individuals. We showed that our participants produced rich descriptions of their relationship to nature and they manifested

a deep understanding of nature and their relation to it. We expected this depth of understanding to be present in rather wise, self-actualizing individuals for whom developing ever-better co-creation strategies was more important than focusing on coping strategies.

Since our participants were selected to be rather wise, we had only one participant who was unable to produce non-clichйd responses. She produced neither indications of wisdom nor self-derived unique insights of her relationship to nature. She was a very useful participant who showed that producing in-depth responses and demonstrating a deep understanding of our relation to nature might not be easy at all. However, those who did develop it, agree on an essential and rich interdependence between their own thriving and that of the environment. This suggests that true sustainability might be impossible without wisdom.

We showed that our wise participants produced, in the fairly structured context of the interview, a rich tapestry of formulations that make complete sense from the theory of enactive cognition. In particular, we were happy to observe references to agentic adequacy, connectedness, and beauty. We identified *adequacy* as a precondition to developing a more meaningful and in-depth relationship to nature. And we concluded that adequacy, in so far as apparent from the human-nature relation, is expressed in at least four different ways: self-reflection, compliance with reality, peak experiences, and pervasive optimization. Each of these topics is worth further investigation and they might be intimately connected. Peak experiences, for example, might be associated with all three dimensions of agent wisdom and they might be associated with the gradual deepening of understanding of the world.

When we first perused the interview texts, we were surprised by the prominence of *connectedness*. Although we investigated individual's connection to the natural world, we did not expect that connectedness would emerge as a coherent concept. For the current paper, we recognized that connectedness is central to our model of the agent-environment relation, and hence an essential aspect of wisdom. Something similar was true for *beauty*. That also appeared regularly. With the help of our theoretical model we realized that beauty should not be interpreted as referring to beautiful objects or scenes as such, but to the value we attribute to the environment that spawned the beauty and the intrinsic motivation to care and connect this environmental value elicits. Again, this is a central feature of the agent-environment relation.

We are not aware of other theoretical frameworks, rich enough to produce expectations with similar precision, which can explain or predict the key features of the agent-environment relation as we have done here. This paper exemplified this with a rich tapestry of insights in the human-nature relation. Additionally, we showed that (although none of our participants had any knowledge of enactive cognition) the combined, richly formulated responses complied with its central ideas.

As a qualitative study, we cannot prove or disprove any hypothesis. Qualitative studies excel in the discovery and formulation of new concepts and in improving formulations of existing concepts; and that is what we did. Our subject group was clearly rather wise, but we cannot say whether our subjects are representative of

wise young adults. We can only conclude that they produced narratives about their relationship to nature that are interpretable within our enactive cognition framework. All-in-all, and as qualitative studies are supposed to, this study suggests many further studies.

For example, our three concepts — adequacy, connectedness, and beauty — currently have only theoretical and anecdotal evidence. Further research should put these concepts on a more solid grounding. It is also interesting and important for sustainability studies to further investigate how connectedness is triggered. Another topic is the significance of wisdom in improving human-nature relations and the role of peak experiences in nature in relation to a growing understanding of this relation. This study helped to define and exemplify agent adequacy, but we need more studies to learn how to help more people become adequate actors.

All in all, we have helped to elucidate the "Nature of Wisdom" and we have shown that people's connection to nature reflects a deep understanding of life. Perhaps humanity can use this at some point in the future to interact wisely with the environment on which it depends.

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Мудрость: связь с природой помогает понимать жизнь

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Резюме

В этой статье описывается процесс, в ходе которого обладающие мудростью совершеннолетние молодые люди формулируют основанные на интуиции феноменологические знания об их отношении к природе, включающие многочисленные отсылки к современным представлениям о жизни и «базовому познанию». Энактивизм, или «бытие через делание», определяется как способность живого субъекта оставаться в живых посредством выбора правильного поведенияиз набора способов совладающего поведения и совместного творчества. Люди, вовлеченные в процесс совместного творчества, удовлетворяют свои насущные потребности, одновременно повышая ом качество среды, от которой зависит удовлетворение этих потребностей. Они способствуют процветанию и динамичному развитию среды, в которой надолго значительно упрощается

удовлетворение потребностей. Мы называем этот навык «адекватностью субъекта» и связываем его с мудростью. Неадекватные субъекты вновь и вновь сталкиваются с необходимостью удовлетворения потребностей. Они могут попасть в «ловушку совладания», когда применяемые стратегии совладания постепенно ухудшают среду обитания, от которой зависит их жизнь в долгосрочной перспективе. При этом они оказываются заключенными в бесконечный цикл удовлетворения критических потребностей. Мы предлагаем краткие и точные формулировки трех основных понятий отношения «субъект-среда»: адекватность — это способность удовлетворять потребности в краткосрочной и долгосрочной перспективе; связность — это личная связь с другими субъектами или природой в целом, переживаемая как взаимная; красота, истоки которой – в способности окружающей среды создавать хрупкое совершенство, являющееся мерой качества окружающей среды. Анализ проведенных интервью показал, что наша (довольно мудрая) группа респондентов оперировалавсеми тремя основными понятиями. Мы делаем вывод о том, что наша теоретически разработанная концепция «субъект-среда», находит отражение в реальных примерах отношений между человеком и природой.

Ключевые слова: энактивизм, адекватность субъекта, мудрость, жизнь, природа, красота, связность, пиковые переживания, феноменология, базовое познание, удовлетворение потребностей, самореализация.

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Статьи

КРИТИКА ПСИХОЛОГИИ ВО ФРАНЦУЗСКОЙ ФИЛОСОФИИ СЕРЕДИНЫ XX ВЕКА В СВЕТЕ «СПОРА О ПСИХОЛОГИЗМЕ»

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Резюме

В статье анализируется философская критика психологии во Франции 1940–1950-х годов в свете спора о психологизме и на материале идей Ж. Политцера, Ж.-П. Сартра, Д. Лагаша, Ж. Кангилема, М. Фуко. Показана продуктивность применения терминологии «спора о психологизме» по отношению к французской ситуации, характеризуется национальная специфика критики. Философская критика психологии развивается во Франции гораздо позже, чем в Германии, что связано с более длительным процессом обособления психологии от философии. Статья выстраивает хронологию развития психологии как двухэтапный процесс ее институционализации как науки (1870–1940-е годы) и специальности (1940–2000-е годы). Всплеск философской критики приходится на 1940–1950-е годы — десятилетие, когда психология получает право на лиценциат. Автор доказывает, что психологи и философы сталкиваются не непосредственно друг с другом, а в поле философской антропологии, и психология здесь претендует занять место не философии, а основной гуманитарной науки. Психологизм во Франции 1940–1950-х годов связан с претензиями психологии стать основанием антропологии. Антипсихологизм, развитый в рамках философской критики психологии, есть тенденция отстоять философский статус антропологии и доказать, что только при сохранении философской базы антропология может постичь человека как целостность. Философы акцентируют два проблемных момента психологии: 1) отсутствие целостности, разнонаправленность теорий и объяснительных схем, 2) донаучный или мифологический характер ее постулатов. Они расценивают философский критицизм как пропедевтику к антропологии (материалистической или экзистенциальной) и трактуют психологию как исходную точку нового кантианского проекта, а также новой философии науки (как науки о человеке). В этом движении автор выделяет вектор «Политцер — Сартр — Лагаш — Кангилем — Фуко» и подробно анализирует характер критицизма каждого из мыслителей.

Ключевые слова: французская философия, психология, антропология, спор о психологизме, антипсихологизм, Ж.-П. Сартр, Ж. Политцер, Д. Лагаш, Ж. Кангилем, М. Фуко.

Работа подготовлена в рамках гранта для преподавателей магистратур Стипендиальной программы Благотворительного фонда В. Потанина, проект № ГК 170000801.

Известно, что психология прошла сложный путь обособления от философии, и до настоящего времени память об этом процессе проступает в немецкой герменевтике и феноменологии, в англосаксонской философии сознания и французской эпистемологии. В первой половине XX в. философию и психологию объединяло слишком многое, и многочисленные следы «единства и борьбы» в истории этих наук неудивительны: психологи и философы работали на одних кафедрах, боролись за ставки, получали одинаковые степени, но в общем-то занимались разными вещами.

История сложных отношений психологии и философии на немецкой почве, той почве, которая, как считается, породила психологию как науку, достаточно хорошо представлена в критической литературе. Она — обязательный пункт изысканий в исследованиях развития феноменологического движения (Rath, 1994; Bernet et al., 1993; Varga, 2010; Mohanty, 1997; Hopkins, 2006; и др.), причем этот канон сохраняется и в русскоязычных публикациях (Мотрошилова, 1968, 2003; Куренной, 2002, 2010). Прояснение характера этих отношений в Америке тоже имеет достаточно долгую традицию (Kusch, 2005; Бен-Дэвид, Коллинз, 2006), которая до сих пор поддерживается актуальностью междисциплинарных исследований сознания в англосаксонском мире. Французская сцена представляет собой исключение: вплоть до последних лет тема «философия и психология» продолжала оставаться актуальной, но не составляла проблемы критических и исторических изысканий. Единичные работы малого формата, конечно же, существуют (см.: Braunstein, 2012), вышли единичные монографии (Engel, 1966), но отсутствие пристального внимания к этой теме на протяжении десятилетий по-прежнему приводит к сохранению белых пятен в истории французской философии XX в. Почему так произошло, в чем специфика французской ситуации в философии и психологии и что может дать ее прояснение — насущные вопросы.

Французская специфика «спора о психологизме»

Франция конца XIX — середины XX в. переживает ту ситуацию, которую по отношению к Германии принято обозначать как «спор о психологизме». Однако это не означает, что она вызывается одними и теми же детерминирующими факторами и имеет сходные аспекты. Немалые различия немецкой и французской сцен спора о психологизме как раз и приводят к тому, что классические исследовательские наработки в отношении немецкой традиции редко используются в объяснении явлений, которые связаны с развитием критики психологизма во Франции. И здесь необходимо говорить одновременно о содержательных и институциональных аспектах различий.

Французская метафизическая традиция никогда не обходила психологию стороной. Несмотря на противопоставление метафизики и философии, эмпирического и метафизического уровней, в котором французские философы шли вслед за немецкими (Carroy, Ohayon, Plas, 2006, p. 9), познание психологических феноменов было неотъемлемой задачей философского постижения мироздания. Мен де Биран уделял большое внимание исследованию внутреннего

чувства и жизни сознания, воспринимая прояснение первоначальных фактов сознания как фундамент метафизики (см.: Кротов, 2000). Виктор Кузен расценивал психологию как основание метафизической онтологии и сделал немало в разработке метода внутреннего наблюдения (Кротов, 2003). Вполне спиритуалистской по духу в плане отношений философии и психологии как метафизической онтологии и метафизической антропологии выглядит и система А. Бергсона, испытавшего значительное влияние Мен де Бирана, преподававшего психологию и основавшего на ней часть своей теории (Блауберг, 2003).

Теоретические увлечения французских спиритуалистов нашли отражение в их практической деятельности. Когда Виктор Кузен стал работать на государственной службе, он сразу же воспользовался предоставленной возможностью «психологизации» образования: доктрина Мен де Бирана нашла отражение в государственных реформах, и в 1832 г. Кузен перестроил систему теологического образования. Если ранее она включала преподавание логики, метафизики и морали, то теперь ее блоками стали психология, логика, мораль и история (Carroy, Ohayon, Plas, 2006, p. 17–18). Таким образом, Кузен подготовил институциональную почву для появления новой науки: психология преподавалась всем студентам-теологам и философам, а преподавали ее философы. Этот шаг, разумеется, не был одобрен французскими позитивистами, и практически сразу же Конт с последователями заклеймили психологию как мифологическую, иллюзорную науку, не отвечающую критериям объективности. Эти обвинения впоследствии станут неотъемлемой частью французской философской критики.

Если психология была настолько органична французской философии, в силу каких факторов в XX в. начинает развиваться такая интенсивная критика и в чем ее специфика? Является ли эта критика критикой психологии, критикой психологизма или она имеет какую-то иную направленность?

В статье «Психологизм и его критика Эдмундом Гуссерлем» В. Куренной, ссылаясь на М. Рата, пишет о том, что «спор о психологизме в немецкой философии следует анализировать в перспективе отделения психологии от философии и превращения ее в самостоятельную научную дисциплину, то есть в контексте процесса, который завершается дисциплинарной институализацией психологии. <...> Таким образом, сам спор является оформлением дисциплинарно-институционального развода философии и психологии» (Куренной, 2010, с. 174). На немецкой почве институционализация психологии традиционно связывается с появлением кафедр психологии, спор о психологизме часто трактуется как «спор о кафедрах» и привязывается ко времени рубежа XIX–XX вв.: после Первой мировой войны его интенсивность угасает, поскольку немецкая психология превращается в прикладную науку, больше не претендуя на основополагающий статус философии (Куш, 2002). Творцом философской программы психологизма традиционно называется Ф.Э. Бенеке, а сам термин «психологизм» возводится к 1866 г., когда по отношению к ней этот термин использует И.Э. Эрдман (Kusch, 2005, p. 98–100).

Жан-Франсуа Браунштейн показывает, что во Франции термин «психологизм» начинает употребляться раньше, чем в Германии, и споры о психологизме не являются исключительно немецким явлением (Braunstein, 2012, p. 197–212).

Хотя в научной литературе, в частности в словарях, понятие «психологизм» появляется в начале XX в. (1906–1907) и связывается с немецкими спорами, французскую полемику о психологизме следует отнести скорее к 1830–1840 гг., а первое употребление термина «психологизм» на французском языке можно обнаружить в 1828 г. Спор о психологизме зарождается в полемике философов В. Кузена, расценивающего психологию как пропедевтику к философии, и его ученика Т. Жуффруа, отстаивающего использование экспериментальных методов по отношению к внутреннему опыту, с врачом Франсуа Бруссе, всячески защищавшего медицину и физиологию от философского нашествия и жестко критиковавшего концепцию внутреннего опыта сознания. Бруссе поддерживает ярый противник психологии О. Конт, и, как показывает Браунштейн, именно Конт в 1928 г., говоря о работе Бруссе, использует термин «психологизм» для обозначения мишени его критики. К полемике присоединяются другие врачи и философы, и до конца 1930-х гг. она не стихает, а термин «психологизм» начинает использоваться для характеристики последствий обращения к внутреннему опыту сознания и разработки в его отношении метода наблюдения.

На основании штудирования полемики Браунштейн заключает, что в спор о психологизме во Франции было вовлечено слишком много представителей разных дисциплин (философии, физиологии, психологии, социологии), в нем заметно много политических и религиозных коннотаций. Сравнивая его с немецкой полемикой, он подчеркивает: «Он не был следствием конфликта дисциплин, философии и психологии, поскольку в этом действе было, по меньшей мере, трое действующих лиц. Вначале физиологи и врачи противостояли психологам: Бруссе против Жуффруа. Затем врачи выступили против философов: Бруссе против Кузена. Наконец, поспорили сами философы: вначале Конт, а затем и Леру с Кузеном. Эти академические конфликты не всегда имеют одни и те же истоки. <...> Как бы то ни было, проблема психологизма не была исключительно психологической» (Braunstein, 2012, p. 212). Этот вывод согласуетсяс итогами других исследований.

Как показывают Дж. Бен-Дэвид и Р. Коллинз, французская психология как предметное и ролевое поле была достаточно разношерстна. Нельзя сказать, что она развивалась полностью под влиянием немецкой традиции, в рядах французских психологов были и вполне самостоятельные теоретики. Однако говорить о школах здесь также не приходится: у великих отцов французской психологии (например, Рибо или Жане) было немного известных учеников. Все занимались разными областями, многие были выходцами из разных наук. В общем-то здесь мало кто с кем конкурировал и «гибридизация ролей» (процесс конкуренции за ставки между специалистами психологами и философами) была недостаточно выражена (Бен-Дэвид, Коллинз, 2006, с. 50).

Возможно, именно указанная ситуация стала одним из факторов очень долгой институционализации психологии во Франции[1]. Теоретический фундамент

[1] Поворотным считается 1870 г. (Carroy et al., 2006, p. 29). Хронологию институционализации психологии мы приводим на основании материалов указанной работы.

этого процесса составляют работы И. Тэна и Т. Рибо, принесших идеи английского позитивизма и заложивших основы психологии как эмпирической, экспериментальной науки. Вслед за теоретическим прогрессом следует прогресс институциональный: во Франции начинают появляться журналы, общества, лаборатории. В 1876 г. Рибо основывает журнал «Revue philosophique de la France et de l'étranger», в котором на фоне традиционных философских проблем первенство берут проблемы психологические. В 1895 г. Анри Беани и Альфред Бине запускают «L'Année psychologique», первый исключительно психологический журнал во Франции. В 1885 г. учреждается Общество физиологической психологии (под председательством Шарко и вице-председательством Поля Жане и Рибо). При содействии Поля Жане в Сорбонне открывается профиль «сравнительная и экспериментальная психология», Рибо получает кафедру экспериментальной психологии в Коллеж де Франс, и это событие становится первым институциональным прецедентом. В 1900 г. кафедра современной философии Коллеж де Франс достается Г. Тарду и становится кафедрой социологической психологии. Философы начинают уступать психологам свои посты. В рамках всемирной выставки Шарко организует два психологических конгресса. В 1889 г. Рибо вместе с Беани открывают первую психологическую лабораторию, и, начиная с этого момента, лаборатории появляются одна за другой: они не составляют конкуренции кафедрам, однако их структурирование как новых единиц университетской системы способствует институциональному внедрению психологии. В 1900 г. при иностранном финансировании открывается институт психологических исследований, так начинается первая фаза институционализации.

При этом появление психологии как новой предметной и исследовательской области сопровождается скорее обоюдным интересом философии, психологии и медицины, чем ожесточением и полемикой. Увлечение исследованием внутренней жизни сознания, философией и психологией аффектов, исследованиями психических процессов в норме и патологии, прояснением состояний сомнамбулизма объединяет специалистов в содержательном поиске. Методологические диспуты в это время хотя и встречаются, но не определяют отношений. Имеет место своеобразная захваченность новым полем исследований, в котором пока хватает места всем.

Учитывая традицию метафизической психологии и одновременно долгую институционализацию психологии, можно говорить, что спор о психологизме имеет место во Франции в стертом виде и датируется 1920–1950-ми гг. — временем, когда в амбивалентном векторе «философия — психология» меняется распределение линий напряжения и тон начинает задавать не философия, а психология.

Философский критицизм

Философская критика психологии во Франции отталкивается от той же точки, что и в Германии: в 1920–1930-е гг. признание кризиса психологии самими психологами (Куш, 2004, с. 190) развязывает философам руки.

Однако формирование более или менее устойчивой традиции философии переводит ее в другой по сравнению с немецким модус. Основной критической точкой становится не столько сама возможность перенесения психологических данных в философскую плоскость, сколько возможность построения на фундаменте психологии целостного знания о человеке, т.е. развитие философской антропологии. Критика идет в двух направлениях: во-первых, психологии вменяется в вину отсутствие целостности, разнонаправленность ее теорий и объяснительных схем, а, во-вторых, самым уничижительным упреком оказывается упрек в ненаучном, донаучном или мифологическом характере ее постулатов. Философский критицизм представляется при этом некоей пропедевтикой к возможной (материалистической или, напротив, экзистенциальной) антропологии, а психология — исходной точкой нового кантианского проекта, а также новой философии науки (как науки о человеке). И в этом движении заметен вектор: Политцер, Лагаш, Кангилем, Фуко.

Психологизм во Франции, стало быть, связан не с попыткой «сделать психологию основанием философии и наук» (Kusch, 2005, p. 3), а с претензиями психологии стать основанием антропологии. Антипсихологизм, развитый в рамках философской критики психологии, есть тенденция отстоять философский статус этой антропологии и доказать, что только при сохранении опоры на философию антропология может постичь человека как целостность. Психологи и философы сталкиваются не непосредственно друг с другом, а в поле философской антропологии, которая мыслится первыми как цель новой науки психологии, уровень рационального целостного осмысления человека на основании данных эмпирических исследований, а вторыми – как прикладной онтологический проект. Причем, антипсихологистские настроения философов связаны, как ни парадоксально, с развитием психологистских тенденций в самой философии, поскольку возможность оценки антропологии как одного из центральных философских проектов уже предполагает «нисхождение» к психологизму.

Психология здесь претендует занять место не философии, а основной гуманитарной науки. В разношерстном и подчас не дифференциированном предметном поле французской мысли, где гуманитарные науки стремительно развиваются, где медицина, психоанализ, этнология, лингвистика, история с разных сторон познают человека, включая его в многообразные контексты, основополагающим оказывается место объединяющего их центра. Философия, утрачивающая вследствие развития позитивных наук, собственного кризиса, а также всплеска гуманитарных исследований свое фундирующее положение, атакует психологию, чье развитие и первичная институционализация в это время позволяют подозревать ее в претензиях быть основой гуманитаристики. Очень хорошо эту ситуацию описал Эллиот Соубер: «На самом деле это время эмансипации было также и временем изгнания: когда психологи уходили, философы захлопывали за ними двери» (Sober, 1978, p. 165). Здесь философы стремились определить условия, при которых пустят психологов «погостить» ради построения полноценного про-

екта антропологии, однако никак не были готовы к тому, чтобы уступить им статус хозяев.

Теоретической почвой антипсихологистской атаки и ее пусковым моментом становится проект конкретной психологии Жоржа Политцера. В работе «Критика оснований психологии» (Politzer, 1928) молодой (и еще не примкнувший к марксистам) философ всячески ратует за развитие новой психологии, теперешняя психология, по его мысли, должна быть изжита. «В самом деле, — рассуждает он, — возможно, что реформа должна состоять в том, чтобы порвать со всей той психологией, какой она была до сих пор. Кто знает? Возможно, что "психология" — это лишь иллюзия философов, принятая всерьез физиологами, а сама идея научной психологии – выдумка двух последних поколений» (Политцер, 1980, с. 244). Стало быть, обновление психологии – не в преемственности, а в разрыве с наследием и классической традицией. Пока психология не избавилась от ошибок философской психологии, продолжением которой стала даже в своей физиологической версии (у В. Вундта), она не является научной, но может быть квалифицирована только как мифологическая.

В обосновании критического посыла Политцер категоричен: «...Беда не в исследованиях, часть которых находится на правильном пути, а в теории, в которой нет почти ничего такого, что должно было быть. Следовательно, положение таково: по нашему мнению, необходима прежде всего критика...» (Политцер, 1980, с. 331–332). Критика должна перейти от формы к сущности, обратиться от разбора многочисленных психологий к основам психологии как таковой, и тогда оказывается, что она не соответствует ни только критериям науки в общем, но и тем принципам научности, которая сама же и постулирует. Для того чтобы стать психологией не мифологической и иллюзорной, а конкретной, Политцер предлагает ей обратиться к тем формам, которые адекватны исследуемым ею объектам, т.е. к драматической стороне человеческой жизни как «фрагменту жизни отдельного индивида». Политцер объединяет в понятии «материальная мизансцена драмы» опыт человека, условия его жизни, окружающие объекты, отношения между людьми, т.е. объективное и субъективное, физиологическое и психологическое. Так он подбирается к той целостности, которую должна исследовать научная психология, причем, целостности не в абстрактном, а в конкретном содержании.

Конкретность теории — обязательное требование французской критики психологии, объединяющее представителей разных направлений. Антропологизация и конкретизация, что философы видят прочтении Гегеля Кожевым, находит свое воплощение и в философском толковании психологии. Характеризуя поколение 1930-х гг., В. Декомб заявляет: «Восстав против университетского идеализма, оно требует того, что именует "конкретной философией", позднее ее назовут экзистенциализмом» (Декомб, 2000, с. 21). Конкретность философия находит в психологии, и сюда корнями уходят требования пересмотра абстрактных постулатов психологии, разработки ее как конкретной «почвы» философии, требования целостности не только как целостности теории, но как целостности научного исследования.

Восстание «против университетского идеализма» оборачивается у Политцера восстанием против университетской дисциплинарной сетки, против нарождающихся кафедр и постепенно отвоевывающей себе место психологии. Психологический критицизм марксиста Политцера будет восприниматься в этом ключе многими его известными последователями и критиками. «Все в этой работе свидетельствует о старании автора выйти из университетского дискурса, плотью от плоти которого он является. И он прекрасно чувствует, что есть лесенка, по которой из него можно выбраться» (Лакан, 2008, с. 77–78), – говорит Ж. Лакан в цикле семинаров 1969–1970 гг. «Изнанка психоанализа». Фундаментальной работой для современной культуры назовет ее Л. Альтюссер (Althusser, 1996, p. 35), прямо заявив: «Политцер – Фейербах нового времени: его "Критика оснований психологии" есть критика спекулятивной психологии от имени конкретной психологии» (цит. по: Bianco, 2015, p. 12).

Политцер — предшественник. Джузеппе Бьянко даже говорит о явном или неявном присутствии Политцера в работах большинства послевоенных философов Франции: «...Сартр, Лакан, Мерло-Понти, Рикер и Лагаш присваивают темы и философемы "Критики оснований психологии", не признавая истинного отцовства» (Ibid.). В этот ряд можно добавить имена Кангилема и Фуко.

Всплеск критицизма по отношению к психологии наблюдается во Франции в 1940–1950-е гг., и это время связано со второй фазой институционализации психологии как науки и специальности. Уже есть лаборатории и кафедры, выходят работы, психология уже обзавелась своими звездами первой величины: Жане, Бине, Рибо, Тард. Как наука психология вполне закрепилась, теперь начинается ее развитие как специальности, которое будет не менее долгим (если датировать первую фазу 1870–1940-ми, а вторую 1940–2000-ми гг.[2]). Благодаря декрету от 9 мая 1947 г. на филологических факультетах открывается лиценциат по психологии. Правда, вначале преподавателей хронически не хватает, получить такое образование можно только в Париже, Бордо, Страсбурге и Лионе. Психология прекрасно осознают специфику времени: в 1947 г. Даниэль Лагаш в своей инаугурационной лекции по случаю вступления в должность заведующего кафедрой общей психологии в Сорбонне говорит о поворотных временах и о миссии современных психологов (Scudéri, 2012). Это годы ухода пионеров психологии: в 1949 г. Коллеж де Франц оставляет А. Валлон, в 1946 г. умирает Ж. Дюма, а в 1947 г. П. Жане. Психология начинает искать новые пути. Неудивительно, что со стороны философов следует реакция: кто такие психологи и чем они занимаются, чем отличаются выпускники с новым дипломом и на что они претендуют? Эти вопросы – центральные для философской критики.

Обсуждение указанных вопросов становится немаловажным и для идентификации самой философии: критика психологии является частью критического осмысления путей философии того времени (Descombes, 1989). Блуждания вокруг проблемы субъекта, поиски новых интерпретаций в гума-

[2] Только в 1985 г. официально легализуется профессия психолога, психотерапевты ждут легализации своей профессиональной деятельности во Франции до 2000-х гг.

нитарных науках, увлечение психоанализом и психиатрией обращают философию к методологическому уровню психологии, и здесь она во многом не может пойти дальше Политцера. Психология в то время мыслится философами как прикладная, конкретная философия. В чаяниях психологии как конкретной философии марксизм удивительно един с экзистенциальной философией, предвосхищая тот синтез экзистенциального марксизма, который станет в 1960-е гг. основанием антипсихиатрии в Великобритании и Франции.

К конкретности психологию призывает в своем экзистенциальном психоанализе Ж.-П. Сартр в работах по психологии эмоций и сознания, не просто настаивая на пересмотре классической позиции феноменологии, но, как подчеркивает Арно Томе, развивая ту же философскую перспективу критики психологии, что и Политцер. Среди общих критических точек: формирование методологического фундамента психологии по шаблону естественных наук и, как следствие, описание человеческих феноменов (имеющих смысл) как феноменов природы. Разница позиций, на его взгляд, состоит лишь в том, что в своем проекте конкретной психологии Политцер ориентируется на психоанализ, в то время как Сартр избирает феноменологию Гуссерля и Хайдеггера (Tomi, 2012, p. 230).

В основании предлагаемого Сартром метода — прояснение фундаментального выбора, который определяет комплекс черт характера, обстоятельств жизни, саму биографию человека[3]. Выбор как таковой выражается в каждом качестве и каждой мысли, представляя собой бытийную подоплеку индивидуально-психологического портрета личности и ее поведения. Сартр настаивает: «Выбор остается единственным и с самого начала является конкретностью; отдельные действия могут выражать или характеризовать, выделять этот выбор, но они не могут его конкретизировать более, чем он уже есть. Именно этот выбор есть не что иное, как бытие каждой человеческой реальности...» (Сартр, 2004, с. 575) Прояснение выбора и его осознание приводит человека к самому себе и одновременно к пониманию своей природы как человека, поэтому Сартр сводит в экзистенциальном психоанализе два уровня: уровень феноменологической онтологии и уровень конкретной психологии, связывая психологию с философией.

Критика философии находит отклик и в самой развивающейся психологической науке. Ее первые лица обнаруживают те же самые мишени, предлагают те же теоретические ходы и сами обогащают впоследствии философскую критику, направляя ее дальнейшее движение. Самым ярким примером подобного созвучия и влияния во Франции являются идеи Даниэля Лагаша. Этот мэтр психологии, можно даже сказать — законодатель мод в критике, продвигается по той же траектории, что и его коллеги-философы.

В своей работе «Единство психологии» (Lagache, 1949b), а также в статьях того времени он пытается разобраться с царящей в психологии неразберихе

[3] О психологии Сартра как развивающемся проекте см.: Mouzet, 2015. О связи психологии и метафизики и их обоюдном влиянии в послевоенной Франции см.: Fruteau de Laclos, 2015.

идей. Ставя задачу упорядочивания, он объединяет их, исходя из полярностей теории и практики, конкретной и абстрактной психологии, исследований нормы и патологии, организма и среды, поведения и сознания, поведения и значения, психического и соматического, сознательного и бессознательного, индивида и общества, прошлого и настоящего и пр. Лагаш расценивает существующее положение дел как наследие классической психологии и описывает его следующим образом: «...Современная психология... показывает примечательную тенденцию исходить не из оппозиции понятий, а из взаимосвязанных реальностей, к которым они отсылают; кроме того, таким образом преодолевается существующая "апория", а язык становится хотя и более сложным, но в наибольшей степени адекватным положению дел. И находится все больше и больше фактов, иллюстрирующих эту тенденцию» (Lagache, 1949a, p. 2). Противоположные понятия словно конституируют самостоятельные реальности, которые и изучаются психологией, давая ей безграничный горизонт исследований. Обращение к каждой из полярностей приводит Лагаша к мысли о том, что они не отражают реальности, что необходима работа по нахождению «общей категории», промежуточного пространства, по последовательной иерархизации и синтезу. Пока же психология, если и призывает, то к ограниченному частичному синтезу.

Лагаш не говорит о союзе психологии и философии и не настаивает на метафизическом синтезе. Напротив, в противопоставлении наук о природе и наук о человеке, в оппозиции экспериментальной и клинической психологии Кристоф Скудери в своем диссертационном исследовании усматривает имплицитную отсылку к оппозиции психологии и философии. Лагаш говорит о синтезе в пределах психологии, о ее собственном уровне обобщения. Однако хотя его критический пафос возник в рамках психологии, он отсылает нас не к экзистенциально ориентированной (гуманистической) критике, а скорее к эпистемологической, неслучайно он оказывается источником философской эпистемологии психологии.

Попытка отыскать единство психологии продолжается в ранних работах Мишеля Фуко (см.: Власова, 2009, 2015). В конце 1940-х – начале 1950-х гг. он посещает лекции Лагаша. Неслучайно выделенные последним оппозиции понятий становятся одним из сюжетов статьи «Психология с 1850 по 1950 г.». Если дополнить этот сюжет Политцеровым о многообразии психологий, их количественном разрастании и экспансии исследования в психологии, то ранние историко-эпистемологические прозрения Фуко не кажутся принципиально новыми. Он продолжает традицию философской критики, только перемещает ее в другую плоскость.

Если говорить о ранних работах, то статья «Психология с 1850 по 1950 г.» в большей степени развивает посыл Лагаша. Здесь заметно характерное для «Единства психологии» противопоставление наук о природе и о человеке, а также попытка рассмотреть психологию как объективную науку в оппозициях понятий и опорных точек: элементы и ансамбли, эволюция и генезис, показатели и способности, выражение и характер, поведение и институции. Фуко, продвигаясь в игре понятийных опор, показывает, что за привычными

теориями и концептами стоят глубинные основания, которые психология должна пересмотреть. Привлекая также концептуальные ходы «Структуры поведения» М. Мерло-Понти, он демонстрирует, как в своих мытарствах последнего столетия психология пыталась обрести понятийное успокоение и забыть о фундаментальных проблемах. И вот здесь как раз в его устах оживает посыл Политцера, которым вдохновлена статья «Научное исследование и психология».

Опорная точка Политцера и Фуко — постулирование необходимости разрыва современной психологии с психологией классической (Фуко, 2015, с. 199). «Научное исследование» и «научная психология», как демонстрируют оба критика, для современной психологии всего лишь мечта, миф, посредством которого она поддерживает преемственность со своей классической традицией и с традицией объективной науки в лице физиологии. Если Политцер показывает, что исследования психологии множатся день ото дня, не углубляясь к основаниям, то Фуко вдобавок отмечает их важную функцию верификации мифологического тела психологии: они подтверждают друг друга, создавая массив психологической теории. Если Политцер критикует донаучный или ненаучный характер классической психологии и приходит к выводу о ее мифологическом характере, то Фуко вменяет эту мифологичность самой психологии, говоря о ее детскости как неспособности обрести самосознание науки (Там же, с. 277).

Выход таков же, каким мыслит его большинство критиков, — в ориентации на конкретику, что для Фуко представляется обращением к существованию конкретного человека и одновременно к истории. «...Психология является эмпирическим анализом того модуса, которым человеческое существование раскрывается в мире», — заключает он и разъясняет, что в этой задаче она «была бы возможна лишь как анализ условий существования человека и оживление наиболее человеческого в человеке, т.е. его истории» (Там же, с. 228, 230).

Так критика психологии становится исходным моментом развития антропологического и исторического проекта. Основным при этом является вопрос о самосознании – этот вопрос ляжет в основание археологии гуманитарных наук, и археология психологии станет первой подобной попыткой. В интервью Аллену Бадью в 1965 г. Фуко говорит о том, что проблема идентификации, философская критика и вообще сложные отношения с философией — проблема не исключительно психологии, с ней столкнулись все гуманитарные науки. «...Начиная с девятнадцатого века сама психология и благодаря ей гуманитарные науки в целом выстраивают очень запутанные отношения с философией» (Foucault, 2001, p. 467). Психология здесь является наиболее характерным примером, а не исключением из правила, и пример этот отражает то, что Фуко в своих более поздних работах назовет «антропологическим сном» — стремлением выстраивать науку с опорой на идею человека.

В исследованиях самосознания психологии как науки Фуко близок к своему наставнику Ж. Кангилему: свои ранние штудии патологии он развивает под влиянием «Нормального и патологического» (Canguilhem, 1966), а исследования

психологии идут параллельно поискам учителя. В декабре 1956 г. в выступлении на конференции в Париже [4]Кангилем напрямую ставит вопрос об идентификации психологии и начинает свою речь длинным и уничижительным пассажем: «Вопрос “Что такое психология?” для психолога кажется еще более затруднительным, чем вопрос “Что такое философия?” для философа. <...> В то же время для психологии вопрос о ее сущности или, если выразиться скромнее, о ее понятии, ставит под сомнение само существование психолога: если он бессилен дать точный ответ на вопрос, что же он есть, то затруднительно определить и то, чем он занимается. И только в эффективности его деятельности, которая, впрочем, весьма спорна, следует искать обоснование его значимости как специалиста, значимости, которая, не в обиду будет сказано, вызывала бы у философа комплекс неполноценности» (Кангилем, 2012, с. 212).

В свете провокативности этого высказывания заявление о том, что Кангилем отвадил от психологии целое поколение философов, представляется совершенно правомерным (Engel, 1966, p. 12). Элизабет Рудинеско вообще напрямую заявляет, что Кангилем, даже если и не признается в открытую, но жаждет смерти психологии, что он разрушает здание той науки, которую с 1949 г. строил его друг Д. Лагаш, что как марксист и участник сопротивления он воспринимает психологию как «фашистскую» (Roudinesco, 1993).

Как историк науки и человек, который смотрит вглубь проблемы идентификации, Кангилем настаивает на том, что вопрос идентификации не должен приводить к утверждениям о мифологичности или иллюзорности психологии, но статус психологии и ее эффективность обосновывается самими психологами в манере, которая не всегда соответствует критериям научности. Психология вольна, насколько вольной может быть новая наука, расширяющая границы закостенелых дисциплин, и Кангилем обозначает эту вольность фразой «смесь философии без строгости с этикой без требований и медициной без контроля» (Кангилем, 2012, с. 212). Однако, на его взгляд, она слишком вольна для той науки, которая требует научной институционализации.

Почему психология слишком вольна для науки? На этот вопрос Кангилем отвечает, обращаясь к пресловутой проблеме ее единства. Остов понятий и методов психология выстраивает через свой собственный предмет. Она постулирует себя как новую науку о психике и объединяет разнородные теории на основании изучения некой данной области фактов. Тем самым психология в принципе является целостным проектом теоретического сознания, но, по убеждению Кангилема, не единой наукой с методом и связной системой понятий. Этот своеобразный перевертыш: стремление к единству теории, но сохранение противоречивости методологии он называет скорее не научным фундаментом, а «соглашением о мирном сосуществовании» (Там же, с. 213).

[4] Выступление опубликовано в 1958 г. (Revue de Métaphysique et de Morale. 1958. № 1). Однако, учитывая тот факт, что Фуко работал над энциклопедической статьей для А. Гисмана в 1952–1953 гг. (Huisman, 1990), вопрос о влиянии или общем поле дискуссий здесь требует прояснения.

Полемизируя с Лагашем и его попыткой установить единство теорий, но не методов, Кангилем обращается к критике психологии в тех полярностях, которые тем были выделены, и приходит к выводу о том, что психология, освободившись от пут философской спекуляции, утратила идею человека, которая ранее стояла за психологией философской, или антропологической, и человек стал разменной монетой разных психологических теорий. «Кангилем здесь... показывает намерение психологии: она придает своему объекту — человеку как инструменту функциональность и постоянство, и человек становится фиксированным местом в сети обмена» (Milner, 1966, p. 73), — подчеркивает в предисловии к речи Ж.-А. Милнер.

Робер Паж в своем комментарии к выступлению Кангилема, разбирая его позицию, говорит о том, что тот так и не разъясняет связи между философией как способом исследования значения и антропологией и так и не увязывает психологию как либертарианский проект с философской спекуляцией, однако его позиция предполагает эту связь (Pages, 1966, p. 97). Несмотря на философско-научную и историко-научную направленность критика Кангилема начинает восприниматься в этом психологистском ключе.

Если свести фигуры и идеи Политцера и Лагаша, Сартра, Фуко и Кангилема в единой перспективе, отвлекаясь от составления парных дихотомий (что обычно делают исследователи), не ограничиваясь выводами об определяющем влиянии Политцера, не дробя перспективу на школы и направления (марксизм, экзистенциальную философию, эпистемологию), то философскую критику психологии во Франции 1920–1950-х гг. можно трактовать как переосмысление психологии как философской антропологии, как попытку сохранить за психологией тот ее смысл, который в классической психологии Просвещения закрепил за ней К. Вольф (см.: Goubet, 2003).

Просвещенческая светская философия воспринимала психологию как психологию аффектов и пыталась избавиться от обязательного восхождения к философии, однако проделывала это не ради утверждения ее главенства, а ради отстаивания ее самостоятельности. «В эпоху Просвещения онтология уступает место метафизике мыслительной деятельности...» (Шоню, 2008, с. 329), — пишет П. Шоню. Психология просветителей была жизненной мудростью, знанием характеров и души. Формирование на французской сцене психологизма и философского «антипсихологизма» связано с тем, что психология стала воспринимать себя не как самостоятельную или подчиненную, но как главенствующую дисциплину. Однако этих содержательных сдвигов самих по себе оказалось еще недостаточно. Сциентизация философии, да и исследования человека в общем, отвечавшая духу французского позитивизма, сошлась во времени с окончанием первой фазы институционализации психологии, и в этой точке мы видим акцентирование психологистских и антипсихологистских настроений.

В эти годы для Франции значимым оказывается формирование разношерстного предметного поля наук о человеке: психологии, философии, психиатрии, психоанализа.[5] Это даже не междисциплинарное пространство

[5] Об институциональной истории психологии в контексте этого процесса см.: Carroy, 2015.

взаимодействия, поскольку никакой междисциплинарности здесь не формируется, не структурируется самой дисциплинарности. Это также и не пространство четких школ. Справедливым описанием дел в области философии и психологии оказывается то, которое дает по отношению к французской философии как таковой В. Декомб, который подчеркивает: «“Современную французскую философию” нельзя отождествлять ни с эпохой в развитии философии, ни с какой-либо одной школой. Она совпадает с совокупным дискурсом, имеющим место во Франции и рассматриваемым сегодняшней публикой как философский» (Декомб, 2000, с. 8). Дискурс психологии и философии также является не полярным дискурсом наук или направлений, а скорее общим пространством интереса, направленного на человека во всех его проявлениях и сферах жизни — критическим антропологическим дискурсом.

Может ли психология в том виде, в котором она функционирует как наука, стать основанием философского учения о человеке? Может ли стать эмпирическим фундаментом философии? Может ли выступить мостом, связывающим философию с естественными науками? На все эти вопросы французская философская критика дает отрицательные ответы. Принимая психологию в качестве одной из составляющих многоликого поля гуманитарных наук, философия закономерно ее антропологизирует, настаивает на корректировке ее постулатов и методов, стремится переработать ее по шаблону «философии», всегда подчеркивая, что та не может функционировать ориентируясь исключительно на естественные науки. Она не допускает самостоятельности психологии и признает ее значение для науки только в философском модусе. И такая критика выглядит вполне в традиции «спора о психологизме» в его французской специфике и его своеобразии в контексте философии 1920–1950 гг.

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The Critique of Psychology in French Philosophy of the Mid-Twentieth Century in the Light of the «Psychologism Dispute»

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Abstract

The paper discusses the philosophical critique of psychology in France 1940 50's in the light of the psychologism dispute and on the ideas of G. Politzer, J.-P. Sartre, D. Lagach, G. Canguilhem, M. Foucault. The productivity of the terminology of the «psychologism dispute» to the French situation and the national specifics of critique are shown. The author demonstrates that psychologists and philosophers confront each other not directly, but in the field of philosophical anthropology; here psychology pretends to occupy not the place of philosophy, but the place of the basic humanitarian discipline. In France philosophical critique of psychology develops later than in Germany; a longer process of separating psychology from philosophy is the cause of it. The paper shows a chronology of development of psychology as a two-stage process of its institutionalization as a science (1870–1940s) and a specialty (1940–2000s). A peak of

philosophical criticism is the 1940s–1950s: the decade when psychology receives the right to a licentiate. Psychologism in France of 1940–50's is connected with psychology's claim to become the basis of anthropology. Antipsychologism, developed within the framework of philosophical critique of psychology, was the attempt to defend the philosophical status of anthropology and to prove that anthropology can comprehend a person as integrity if keep its philosophical foundations. Philosophers accentuate two problematic points of psychology: 1) lack of integrity, multidirectional theories and explanatory schemes, 2) pre-scientific or mythological nature of its postulates. They regard philosophical criticism as propaedeutic to anthropology (materialistic or existential) and interpret psychology as the starting point of a new Kantian project and a new philosophy of science (as a science of man). The author marks in this movement the vector "Politzer – Sartre – Lagache – Canguilhem – Foucault" and analyzes in detail their criticism.

Keywords: French philosophy, psychology, anthropology, psychologism dispute, antipsychologism, J.-P. Sartre, G. Politzer, D. Lagach, G. Canguilhem, M. Foucault.

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ВЗАИМОДЕЙСТВУЕТ ЛИ РЕАЛЬНАЯ ФОРМА С ИДЕАЛЬНОЙ? ИССЛЕДОВАНИЕ ОВЛАДЕНИЯ СЧЕТОМ НА ЧИСЛОВОЙ ПРЯМОЙ С ПОМОЩЬЮ ЗАПИСИ ДВИЖЕНИЙ ГЛАЗ

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Резюме

В статье рассматривается проблема овладения математическим знанием на примере обучения дошкольников счету на числовой прямой. С помощью записи движений глаз раскрывается многообразие стратегий определения числа на числовой прямой. Показано существенное различие между стратегиями, используемыми взрослыми, стратегиями, используемыми в процессе обучения, и стратегиями детей после обучения ($\chi^2 = 44.936$; $p < 0.001$). Выявленные различия в стратегиях по ряду параметров (направление пересчета вверх или вниз по числовой прямой, положение целевой точки в начале или в конце счета) свидетельствуют о том, что самостоятельные решения детей после обучения в большей степени похожи на решения задач взрослыми, чем стратегии, предложенные при обучении. Анализ данных о движениях глаз и видео совместной деятельности родителей и детей в ходе формирующего эксперимента показывает, что взрослые формируют способ восприятия числовой прямой детьми с помощью жестикуляции и синхронизированных с ней вербальных указаний. Однако родители не раскрывают в ходе обучения идеальную форму, т.е. многообразие стратегий, характерное для взрослого восприятия, а выстраивают базовую, учебную форму действия, надежно доступную ребенку. Несмотря на это, дети самостоятельно дополняют предложенную взрослыми базовую стратегию пересчета другими стратегиями, основываясь на интегральном представлении о числе. Недоступной оказывается лишь стратегия, требующая принципиально иного способа действия: рассмотрения числовой прямой как системы равных интервалов, а не последовательного ряда чисел. Согласно результатам нашего исследования, идеальная, культурная форма восприятия существует в скрытом виде, ребенку необходимо самостоятельно переоткрывать ее, используя как предложенную взрослым базовую стратегию пересчета, так и встраивая конкретную задачу в целостную систему знаний.

Ключевые слова: культурно-исторический подход, Выготский, математическое образование, обучение, идеальная форма, совместная деятельность, числовая прямая, математическое понятие, движения глаз, окулография.

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Исследование математических способностей и обучения математике находится на стыке психологии развития, когнитивной психологии и наук об образовании. Интрига совмещения проблематики и инструментария этих областей в том, что результаты такого совмещения одновременно проясняют фундаментальные закономерности человеческого развития и позволяют делать конкретно-практические выводы, способствующие совершенствованию образовательного процесса. Согласно современным представлениям (Duval, 2006; Hitt, 1998; Presmeg et al., 2016; Radford, 2010; и мн. др.), математическое знание является мультимодальным и формируется как единство множества моделей или репрезентаций, представленных в формальной, вербальной, визуальной, тактильной форме. Наше исследование посвящено изучению процессов овладения одной из таких репрезентаций понятия числа — числовой прямой. Формирующий эксперимент в духе Л.С. Выготского позволяет описать процесс развития и приблизиться к пониманию значения взаимодействия различных компонентов понятия числа в обучении.

Пространственные представления о числовой прямой в составе понятия числа

Согласно данным экспериментальных и клинических исследований, пространственные представления являются существенной составляющей понятия числа, а также того, что принято называть чувством числа (number sence). Результаты исследований А.Р. Лурии (1962) показывают, что арифметические операции разрушаются при поражении теменно-затылочных долей мозга, ответственных за пространственные представления. Пациенты с такими поражениями путают зрительно схожие числа (такие как 69 и 96), а также затрудняются в понимании разрядного строения чисел. Кроме того, возникают ошибки, вызванные разрушением представления о направлении счета, т.е. о последовательном и направленном расположении чисел в числовом ряду и на числовой прямой. Так, при вычитании с переходом через десяток они могут вычесть до десятка, а потом прибавить, двинувшись в другую сторону (например, вычисляя 31−7, они считают 30−7 и потом вычитают еще 1 вместо того, что бы прибавить, и получают 22 вместо 24).

Современные исследования с использованием методов нейровизуализации подтверждают эти данные и показывают, что активация внутритеменной борозды связана с различными арифметическими операциями. В частности, латеральная часть этой области мозга, вероятно, выполняет функцию прослеживания вдоль числовой прямой, сходную с прослеживанием на визуальной сцене при оперировании другими мысленными образами (Hubbard et al., 2005).

С этим выводом согласуются данные поведенческих экспериментов. Феномен, известный как SNARC эффект (Dehaene et al., 1993) заключается в том, что испытуемые отчитываются о маленьких числах быстрее, если числа (или вербальная запись числа — Fias, 1996) предъявлены в левое полуполе, и быстрее о больших числах, если они предъявлены в правое полуполе. Предполагается, что даже решая задачу, не требующую активации представления

о величине числа, испытуемые связывают число с его положением на числовой прямой или в числовом ряду. Аналогичные данные были получены при анализе поворота глаз испытуемыми в темной комнате, т.е. при отсутствии внешней зрительной стимуляции. Решая задачу на нахождение числа по середине между двумя числами, они совершали горизонтальные саккады, причем если первое названное число было больше, то саккады совершались преимущественно справа налево, как будто двигаясь к среднему по мысленной числовой прямой (Loetscher et al., 2008).

Возникновение представлений о числовой прямой в онтогенезе

Каким образом возникают пространственные представления о числе? Одним из механизмов является освоение числовой прямой — одной из внешних визуальных репрезентаций, или моделей, понятия числа. Серия исследований об оценке положения числа на числовой прямой вскрывает основные стратегии и очередность их появления в ходе обучения.

В целом выделяются такие стратегии, как счет от начальной точки, счет от конечной точки и счет от середины отрезка.

Первыми в онтогенезе появляются стратегии отсчета от начальной или конечной точки. Способность уже первоклассников использовать конечные точки показана в ряде исследований (Link et al., 2014; Petitto, 1990; Schneider et al., 2008; и др.). Согласно выводам некоторых авторов (Schneider et al., 2008), дети, уже начиная с первого класса, также могут использовать и серединную точку для нахождения числа на числовой оси, согласно другим данным (Petitto, 1990; Siegler & Opfer, 2003), первоклассники не используют серединную точку.

Более детальный анализ когнитивных операций, лежащих за представлениями о числовой прямой, в отличие от числового ряда показывает, что использование срединной точки содержит представление не только о последовательном расположении чисел слева направо, но также об относительных расстояниях между числами. Такой сдвиг от представления о последовательности к представлению о пропорциональном соотношении (*sequence-to-proportion shift*) наблюдается только к третьему классу[1], когда дети для оценки положения числа на отрезке числовой прямой начинают использовать срединную точку, опираясь на равенство интервалов от нее до концов отрезка (Petitto, 1990).

Другой объяснительной конструкцией по сути того же феномена является предположение, что мысленное представление о логарифмическом расположении чисел на числовой прямой постепенно сменяется адекватным линейным представлением. Так, если в 2-м и 4-м классе превалирует скопление чисел в начале числовой оси (как если бы использовалась логарифмическая линейка для оценки длины), то к 6-му классу это проходит и числа оказываются распределены равномерно, то же наблюдается и у взрослых испытуемых (Siegler & Opfer, 2003).

[1] Третий класс в США посещают дети 8–9 лет.

В ряде работ используется метод регистрации движений глаз при выполнении заданий на оценку положения числа на числовой прямой. Согласно этим данным, дети уже начиная с первого класса чаще фокусируются на концах отрезка числовой прямой, а также на серединной точке, используя все три положения как точки ориентации. При этом превалирующей стратегией является счет от 0 или от середины до целевой точки (Schneider et al., 2008). Данные о движениях глаз, полученные той же группой исследователей (Heine et al., 2010), свидетельствуют о линейных представлениях о расположении чисел на числовой прямой уже в первом классе, несмотря на соответствие поведенческих данных логарифмической модели. Можно говорить, что данные о движениях глаз вскрывают раннее созревание определенных операций, которое может еще не проявляется в итоговом ответе и обнаруживаться в поведенческих данных только более старших возрастных групп. Это соответствует данным С. Голдин-Медоу (см., например: Goldin-Meadow, 1999): телесная (embodiment) подготовка математических знаний и навыков предвосхищает их эксплицитное проявление при непосредственном тестировании.

Как можно видеть, большинство исследований посвящено изучению числовой прямой как уже сформированному ментальному образу, позволяющему выносить некоторые суждения о числах. Нас интересуют механизмы возникновения этого образа и стратегий работы с ним.

Как указывает Л.С. Выготский, «величайшая особенность детского развития заключается в том, что это развитие совершается в таких условиях взаимодействия со средой, когда идеальная форма, конечная форма... реально взаимодействует, реально оказывает влияние на первичную форму, на первые шаги детского развития» (Выготский, 2001, с. 83–84). Идеальная форма — это не записанные правила или определения, хранящие культурное достояние, но сами формы поведения, деятельности, существующие в культуре, окружающей ребенка, такие как речевая деятельность, оперирование бытовыми предметами и знаковыми системами со стороны взрослых. В приложении к освоению математического знания к идеальной форме следует отнести математические действия, в частности, действие пересчета и другие способы количественной оценки, присущие культурному поведению взрослых.

Каким образом происходит усвоение этой идеальной формы? Согласно Выготскому, идеальная форма усваивается в ходе совместной деятельности со взрослым, который раскрывает ее в интерпсихическом взаимодействии с ребенком. В психологии математического образования значительное внимание уделяется микроанализу процессов этой совместной деятельности, в которой ребенок научается воспринимать математические изображения и знаки так же, как взрослый. Л. Радфорд (Radford, 2010) вслед за К. Марксом рассматривает этот процесс как «окультуривание» (domestication) органов чувств в ходе социальной практики. Исследуя видео- и аудиозаписи совместной деятельности учителя и ученика, Радфорд показывает, как все семиотические регистры (визуальная репрезентация, жесты, интонации, их ритм и др.) соединяются вместе, позволяя ребенку наполнить визуальную репрезентацию смыслом, выделись ее существенные аспекты и объективировать (objectification)

математическое содержание изображения. В.-М. Рош (Roth, 2008) детально анализирует, как просодические характеристики речи направляют внимание слушающего и как при этом внимание к одним и тем же частям диаграммы может сопровождаться различными жестами, делающими наиболее выпуклыми необходимые аспекты математического смысла. Р. Бюланд (Bjuland, 2012) подчеркивает значение жестов учителя, включенных в мультимодальную коммуникацию, для формирования ранних алгебраических представлений у учеников, а также показывает, как жесты одного ученика становятся средством переосмысления задачи для другого ученика.

Недостатком приведенных исследований является отсутствие инструмента для непосредственного анализа перцептивных процессов ребенка. О том, что культурный способ восприятия был усвоен, исследователи судят по решению задач и успешной коммуникации с учителем или сверстником. В нашем исследовании с помощью записи движений глаз мы непосредственно проанализировали используемые ребенком стратегии счета на числовой прямой, соотнесли их со стратегиями взрослых и стратегиям, разворачивающимся в интерпсихическом пространстве совместной деятельности.

Эмпирическое исследование формирования культурного способа восприятия числовой прямой

Общей целью эмпирического исследования было изучение механизмов передачи идеальной формы от взрослого к ребенку на примере обучения родителями детей культурному способу действия, а именно счету на числовой прямой.

Конкретными задачами исследования являлись:

1) раскрытие стратегий счета на числовой прямой у взрослых;

2) анализ стратегий ребенка в ходе совместной деятельности ребенка со взрослым в ходе обучения;

3) выявление стратегий восприятия числовой прямой детьми при решении задач самостоятельно после обучения;

4) анализ жестов, интонаций и вербальных указаний взрослых, направленных на трансформацию операциональной стороны восприятия ребенка, выявлений стратегий, использованных в обучении;

5) сопоставление стратегий, присущих взрослым и детям, а также стратегий, актуализированных в ходе обучения.

Исследование выполнено с помощью качественного-количественного анализа глазодвигательной активности детей, синхронизированной с видео- и аудиозаписью жестов и речи детей и родителей. На первом этапе, в ходе качественного анализа, были выделены стратегии восприятия числа на числовой прямой, а на втором этапе статистические процедуры позволили сопоставить применение выделенных стратегий разными группами испытуемых.

Методика

Испытуемые. В исследовании приняли участие 6 пар родителей и детей-дошкольников в возрасте от 5,3 до 6,8 лет. Участвовали двое пап и 4 мамы, 2 мальчика и 4 девочки. (Для удобства, в ходе качественного анализа мы будем называть каждую пару буквами А, Б, В, Г, Д, Е — по порядку участия в исследовании). Возраст детей выбирался исходя из цели изучения процесса развития, т.е. такой, в котором освоение числовой прямой находилось в зоне ближайшего развития детей. Никто из них не видел числовую прямую до исследования и не знал, как самостоятельно решить экспериментальную задачу. За участие в исследовании детям давалось печенье Барни.

Небольшое количество испытуемых определялось трудоемкостью качественного анализа, потребовавшего для оценки стратегий восприятия ручного анализа всех фиксаций испытуемых.

Процедура и материалы исследования. Всего испытуемым предлагалось решить 3 вида задач на счет в пределах 10, задача каждого типа предъявлялась 8 раз с разными ответами (от 2 до 9). Основной задачей был счет на числовой оси.

На оси, изображенной в интервале от 0 до 10 (см. рисунки 1, 2, стимульный материал предоставлен образовательной платформой Uchi.ru), каждое целое число было отмечено риской. Были подписаны числа 0, 5 и 10, они отмечались более жирными рисками. Такая числовая ось существенно отличается от принятой в исследованиях стратегий оценки положения числа на числовой оси. Во всех известных нам работах (Heine et al., 2010; Link et al., 2014; Petitto, 1990; Schneider et al., 2008; Siegler & Opfer, 2003; Sullivan et al., 2011; и др.) в качестве числовой прямой используется горизонтальный сплошной отрезок с рисками и подписями чисел только на концах. Выбор нами более математически нагруженной визуальной модели обусловлен следующим. В большинстве из этих работ исследуется внутреннее, ментальное представление о числе и возможность трансформировать его в пространственные соотношения. Целью же нашей работы было изучить процессы становления культурного восприятия внешней визуальной модели числа – числовой оси, поэтому наш стимульный материал более полно отражал систему отношений, стоящую за пониманием числового ряда в пределах десяти.

В большинстве работ исследуется восприятие и процессы оценки взрослых (Link et al., 2014; Sullivan et al., 2011; и др.) и школьников с 1-го по 6-й класс (Link et al., 2014; Schneider et al., 2008; и др.), чаще используется ось от 0 до 100 (Heine et al., 2010; Schneider et al., 2008), но в некоторых работах — ось до 10 (Link et al., 2014), до 1000 (Sullivan et al., 2011) или даже до 10000 (Link et al., 2014). Нас же интересовала ситуация, когда дети еще заведомо не сталкивались с числовой прямой в ходе формального обучения, поэтому нашими испытуемыми стали дошкольники; однако для того, чтобы задача находилась в их зоне ближайшего развития, мы выбрали числовую прямую от 0 до 10.

Испытуемым предъявлялись числовая ось, над одной из рисок которой располагался кузнечик. Наверху того же слайда предъявлялось задание: «На какой точке сидит кузнечик?». Ответ давался нажатием цифры на клавиатуре. В том случае, когда число 5 было целевым, соответствующая риска не была подписана.

Использовалось две интерферирующих задачи: счет бусин, расположенных на экране в хаотичном порядке, и выбор банки с указанным количеством фруктов из трех банок, предъявленных на экране. Таким образом интерферирующие задачи также задействовали операцию счета, но не использовали визуальную модель «Числовая ось» и не актуализировали операции счета на ней.

Процедура проведения исследования для каждой диады была следующей.

На первом этапе производилась запись движений глаз родителя, который сначала решал основную задачу, а потом две интерферирующие. Таким образом мы получали информацию о стратегиях счета у взрослых. Во время этого этапа ребенок знакомился с процедурой калибровки и записи движений глаз, а в процессе прохождения задач родителем занимался складыванием пазла и не имел возможности предварительно ознакомиться с задачами.

На втором этапе к исследованию приглашались оба участника: ребенок находился перед монитором для записи глазодвигательной активности, а взрослый садился рядом. Взрослому давалась инструкция: «Помогите ребенку решить задачи. Чувствуйте себя свободно. Вы можете прерывать ребенка в любой момент и давать дополнительные разъяснения». Таким образом у взрослого создавалась установка на активное взаимодействие с ребенком. Необходимость такого достаточно настойчивого побуждения взрослого к активному вмешательству в процесс решения задач была обусловлена результатами пилотажа, который показал, что иначе родители склонны предоставлять детей самим себе и минимально вмешиваться в процесс обучения.

На третьем этапе производилась регистрация движений глаз при самостоятельном решении задач ребенком. Сначала ребенок решал интерферирующие задачи, а затем переходил к основной, решая ее повторно после обучения родителем.

Аппаратура

Запись движений глаз проводилась с помощью установки SMI RED с частотой регистрации 120 Гц. Положение головы участников фиксировалось с помощью подбородника, чтобы облегчить детям процесс калибровки и необходимость удерживать голову в достаточно узком коридоре, позволяющем осуществлять запись движений глаз. Использовалась пятиточечная калибровка. Экран (21 дюйм) располагался на расстоянии 45 см.

Взаимодействие ребенка и родителя записывалось на внешнюю видеокамеру с частотой 30 Гц. Стимуляция подавалась с помощью программы Experiment Center 3.1 с подключаемым пакетом Observational package для записи взаимодействия на внешнюю камеру. Для записи глазодвигательной

активности использовался iViewX 3.1, качественный анализ результатов проводился в программе Begaze 3.1, также использовалось собственное программное обеспечение, написанное в Mathlab 2014b и позволяющее более точно синхронизировать данные внешней видеокамеры и данные о движениях глаз. Для статистического анализа использовался пакет SPSS 20.0.0.

Результаты и их обсуждение

Стратегии счета взрослых и детей: идеальная форма и ее усвоение

Как показали решения интерферирующих задач, все наши испытуемые уже владели числовым рядом и были способны к последовательному пересчету отдельных объектов, делая ошибки лишь в редких случаях. Следовательно, в ходе прохождения основной серии задачей являлась именно координация числового ряда и незнакомой визуальной модели, а не усвоение порядка счета.

Качественный анализ записей движений глаз небольшого количества испытуемых позволил нам оценить используемый способ действия в каждой пробе, что рассматривается как перспективный, но трудоемкий шаг (Schneider et al., 2008). Запись движений глаз одного из родителей не была произведена вследствие его косоглазия. В некоторых случаях (в 4 пробах из 136) выявление способа действия было затруднительно из-за потери взора, такие пробы не учитывались. Таким образом, мы получили данные о способах перцептивных действий взрослых, детей при решении задачи совместно со взрослыми и детей при самостоятельном решении. В ряде случаев испытуемые использовали сразу две стратегии, вероятно, проверяя свой результат, тогда мы засчитывали обе.

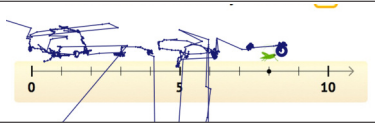
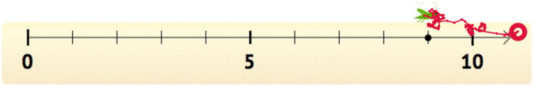
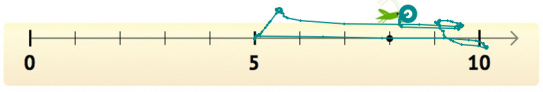
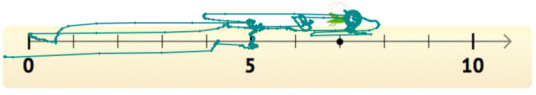
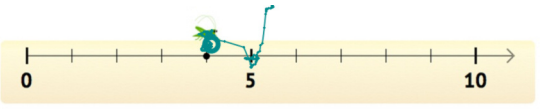
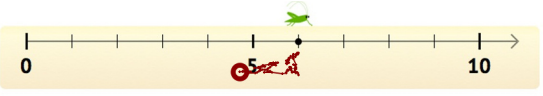
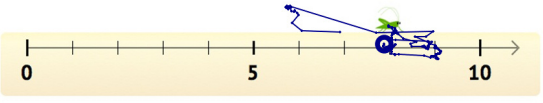
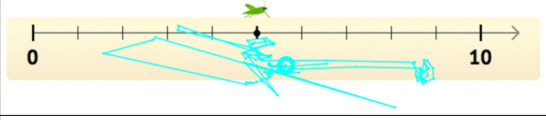
Опишем стратегии, которые использовались взрослыми и детьми для определения числа на числовой прямой (таблица 1 содержит примеры сырых данных о движении глаз, соответствующих определенным стратегиям). В целом они повторяют стратегии, указанные в работе Петитто (Petitto, 1990), но имеется существенное расширение.

Большинство стратегий связаны с пересчетом рисок на числовой оси. Однако риски можно считать разными способами: можно считать от 0 до целевой точки, это всегда будет счет по числовой оси «вверх», в порядке, соответствующем числовому ряду (стратегия 1). Другой стратегией будет счет от целевой точки до числа 0, это будет счет «вниз» (стратегия 2). Результат получится один и тот же, но ребенку придется применить нетривиальное знание, что результат счета не зависит от порядка пересчета (Gelman, Gallistel, 1978).

Кроме того, можно пользоваться числом 10, обозначенным на конце отрезка числовой прямой, и посчитать, сколько делений от целевой точки до числа 10 (стратегия 3, это будет счет «вверх»), или посчитать, сколько делений будет от числа 10 до целевой точки (стратегия 4, счет «вниз»). Кроме того, можно использовать серединную точку. В данных были представлены три из

Таблица 1

Стратегии определения числа на числовой прямой

№	Стратегия	Пример сырых данных о движениях глаз	Р	ДО	Д
1	От 0 вверх к целевой точке		1	23	17
2	От целевой точки вниз к 0		8	4	9
3	От целевой точки вверх к 10		2	6	5
4	От 10 вниз до целевой точки		4	8	4
5	От 5 вверх к целевой точке		7	12	7
6	От 5 вниз к целевой точке		6	9	7
7	От целевой точки вниз к 5		3	0	5
8	Сопоставление с предыдущим ответом		3	0	1
9	Оценка расстояния до ближайших точек		5	1	0
10	Ответ за одну фиксацию		6	2	2

Примечание. Р — родители, ДО — дети при обучении, Д — Дети.

возможных четырех стратегий, опирающихся на число 5: счет от числа 5 к целевой точке «вверх» и «вниз» в зависимости от того, было ли целевое число больше или меньше пяти (стратегии 5 и 6), а также счет от целевой точки к числу 5 «вниз» для чисел больше пяти (стратегия 7). Для целевых чисел меньше 5 счет вверх от целевой точки до числа 5 является, по всей видимости, нецелесообразным.

Стратегии сходны с указанными Петитто (Petitto, 1990) по ориентационным точкам. Однако такие стратегии характеризуются непосредственным пересчетом на числовой оси, используемым довольно редко при оценке положения числа на числовой прямой без делений (Link et al., 2014). Нами исследуются несколько другие процессы: не приблизительной оценки положения числа на числовой прямой, а точного вычисления. Стратегии сходны в общих чертах, но отличаются по конкретной операциональной реализации. Кроме того, нам удалось детальнее описать существующие стратегии за счет качественного анализа записей движений глаз отдельных субъектов, тогда как в существующих работах анализируется лишь частота фиксации в разных частях числовой оси и точность полученной оценки, а на основе этого делаются предположения о стратегии.

Таким образом, по своему операциональному составу действия вычисления варьировались по следующим характеристикам:

1) точка ориентира (orientational point) (0 — стратегии 1 и 2; 10 — стратегии 3 и 4; 5 — стратегии 5, 6 и 7);

2) направление пересчета (вверх по числовой оси — стратегии 1, 3, 5; вниз по числовой оси — стратегии 2, 4, 6, 7);

3) позиция целевой точки в пересчете (счет до целевой точки — стратегии 1, 4, 5, 6; счет от целевой точки к точке ориентира – стратегии 2, 3, 7).

В некоторых случаях испытуемые использовали в качестве точки ориентира целевую точку предыдущего задания (стратегия 8).

Помимо стратегий пересчета, нам удалось выявить принципиально другую стратегию, она применялась для целевых точек 5 и 8 (стратегия 9). Испытуемый смотрел на целевую точку, а затем быстро, зачастую даже без фиксаций, переводил взгляд к соседним ориентационным точкам. По всей видимости, эта стратегия связана с оценкой относительных расстояний от точек-ориентиров до целевой.

Еще один вариант глазодвигательной активности — это ответ после единственной фиксации на целевом числе (стратегия 10). В данном случае данные о движении глаз не дают оснований для выявления стратегии, но можно предположить, что она не требовала пересчета. Эта стратегия встречалась для целевых чисел 2, 6 и 9, т.е. близких к точкам ориентира, а также для вопроса о числе 5, где испытуемые могли ориентироваться на выделенную риску.

Мы сравнивали частоту встречаемости разных стратегий у родителей, детей под руководством родителей и детей, решавших задачи самостоятельно. Анализ с помощью таблиц сопряженности показал, что имеются существенные различия в предпочитаемых стратегиях ($\chi^2 = 44.936$; $p < 0.001$).

Как видно из таблицы 1, отражающей, сколько раз была использована каждая стратегия, дети преимущественно пользовались стратегиями с пересчетом. Стратегия 9 была доступна практически только взрослым. Это согласуется с данными исследований о том, что дети только к 3-му классу начинают понимать числовую прямую как отражающую расстояния между числами, лишь тогда они начинают использовать стратегию пропорциональной оценки расстояний (Link et al., 2014), которая у взрослых становится доминирующей (Sullivan et al., 2011).

Далее мы сравнили различия между группами для разных стратегий пересчета, разделив их по указанным выше факторам: 1) точка ориентира, 2) направление пересчета, 3) позиция целевой точки.

Не выявлено статистически значимых различий в использовании чисел 0, 5 или 10 в качестве *точек ориентира* взрослыми и детьми дошкольного возраста. Согласно литературным данным, уже первоклассники способны использовать конечные точки (Link et al., 2014; Petitto, 1990; Schneider et al., 2008; и др.). Мы дополнили эти данные информацией о дошкольниках. Мнения о доступности использования серединной точки в литературе расходятся (Link et al., 2014; Petitto, 1990; Schneider et al., 2008; Siegler & Opfer, 2003). Однако в нашем случае серединная точка была специально выделена и даже подписана, вероятно, поэтому ее использование оказалось доступно дошкольникам.

По двум другим факторам различия наблюдаются. Так, стратегии, используемые в разных сериях различаются *по направлению пересчета* ($\chi^2 = 9.576$; $p = 0.008$). Как видно из таблицы 2, взрослые чаще считают «вниз» по числовой оси (если совершается пересчет, то он делается вверх только в 32.3 % случаев), тогда как дети при обучении чаще считают «вверх» (66.1 %). Когда же дети считают самостоятельно, то они занимают промежуточное положение — считают «вверх» в 53 % случаев, что отличается от стратегий взрослых на уровне тенденции ($\chi^2 = 9.576$; $p = 0.056$).

Это выявляет интересный факт: поведение детей при самостоятельном решении в большей степени соответствует идеальной форме, наблюдаемой у взрослых, чем то поведение, которое дети показывают в процессе обучения. В предположении, что в процессе обучения взрослые передают ту самою идеальную форму, те способы счета, которыми обладают сами, этот результат выглядит парадоксально. Природа этого факта раскрывается ниже при анализе стратегий, выбираемых взрослыми для обучения.

Также обнаруживаются значимые различия *в позиции целевой точки* ($\chi^2 = 8.574$; $p = 0.014$). Как видно из таблицы 3, взрослые пользуются как стратегией счета к целевому числу (58.1 %), так и стратегией счета от целевого числа к точке ориентира (41.9 %), однако в процессе обучения дети используют стратегию счета до целевого числа, т.е., например, «0-1-2-3-4!» или «5-6-7!» в 83.9 % случаев, а стратегию счета от целевой точки до точки ориентира только в 16.1 % случаев. Как и в случае с *направлением пересчета*, самостоятельные решения детей в большей степени похожи на стратегии родителей (64.8 % при счете к целевой точке и 35.2 % при счете к целевой точке) и статистически от них не отличаются.

Таблица 2

Направление счета в разных группах

	Счет «вниз» (справа налево)	**Счет «вверх» (слева направо)**
Взрослые	67.7%	32.3%
Дети на стадии обучения	33.9%	66.1%
Дети	46.3%	53.7%

Таблица 3

Позиция целевой точки при счете в разных группах

	Счет от целевой точки к ориентационной	**Счет от ориентационной точки к целевой**
Взрослые	41.9%	58.1%
Дети на стадии обучения	16.1%	83.9%
Дети	35.2%	64.8%

Таким образом, дети, как и взрослые, свободно пользуются всеми тремя *точками-ориентирами*: 0, 5 и 10. При этом взрослые предпочитают считать от точки-ориентира *к целевой точке*, у детей в ходе обучения это предпочтение выражено в крайне сильной форме, а при самостоятельном решении задачи дети предпочитают считать к целевой точке в меньшей степени, чем при обучении, и их стратегии больше похожи на стратегии родителей. Та же закономерность выявляется при анализе *направления счета*: взрослые предпочитают считать вниз по числовой прямой, дети при обучении, напротив, предпочитают считать вверх, а при самостоятельном счете их способы действия опять же оказываются ближе к стратегиям взрослых, чем к продемонстрированным при обучении. Таким образом, способы действия, заложенные в обучении, не только не совпадают со способами действий взрослых, идеальной формой, но и отличаются от нее больше, чем способ действия, к которому приходят дети в итоге, встречаясь с задачей один на один.

Процесс обучения: совместная деятельность и усвоение идеальной формы

Какие же стратегии использовали взрослые при обучении детей? Следует отметить, что дети довольно легко справлялись с заданием, поэтому взрослые в большинстве случаев давали пояснения только при решении первой задачи. Трое из шести взрослых (пары А, В, Г) поступили совершенно одинаково: после непродолжительной ориентировки ребенка в числовой оси с указанием на 0, 10 и 5 они предложили детям научиться считать от нуля (рисунок 1). Каждый из них ритмически переводили палец с риски на риску, называя 0, а

потом побуждая ребенка к счету жестом и интонационным акцентом или вербальным вопросом («дальше?», «теперь?»). Вербальная составляющая при этом постепенно сокращалась, а жест оставался до конца. Еще одна мама (пара Е) попыталась научить ребенка именно этой простейшей стратегии, однако ребенок не дал ей этого сделать, предпочитая решать задачу своим путем: число 3 она определила как отличающееся на 2 вниз от числа 5. Все описанные выше родители были мамами, папы вели себя немного по-другому[2]. Один папа (пара Д) сразу предложил ребенку считать за его указа-

Рисунок 1

Взрослый знакомит ребенка с расположением чисел на числовой прямой, предлагая пересчитать их вслед за дугообразными указательными жестами. Видно, что ребенок задерживается на числе 5

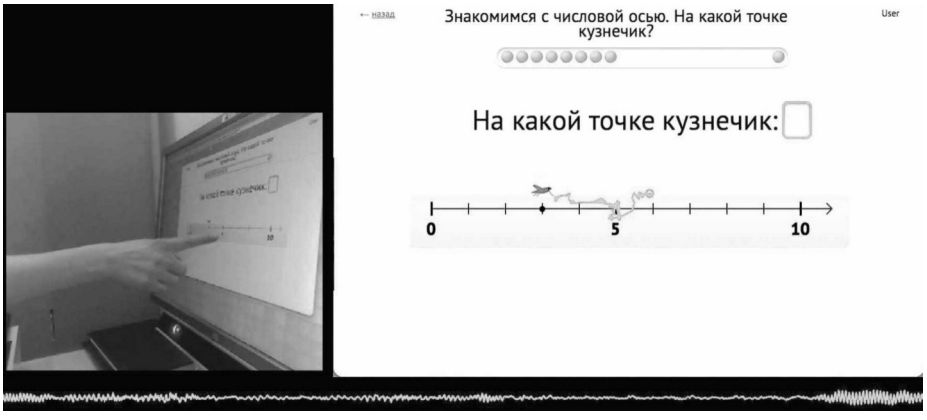


Рисунок 2

Взрослый указывает ребенку решение задачи, делая дугообразные движения пальцем

[2] Интересно, что поведение между мамами и папами сильно различалось, но для каких-либо обоснованных выводов, безусловно, нужна большая по объему выборка.

тельными жестами, более того, методично предлагал это на протяжении всех восьми задач, что ребенок послушно и делал (рисунок 2). Другой папа (пара Б) вообще не давал никаких указаний в первой задаче и позволил ребенку разобраться самостоятельно. Таким образом, все родители, кроме одного, предложили своим детям именно стратегию 1: счет от числа 0 до целевой точки, несмотря на то, что за все время эксперимента эта стратегия использовалась только одним взрослым один раз.

Лишь двое родителей попробовали предложить детям другие стратегии. Папа из пары Б, когда кузнечик сидел на точке 5, предложил использовать стратегию 9 — оценить точку 5 как середину между 10 и 0. Ребенок, проследив глазами вправо и влево по его указаниями, после этого посчитал от нуля до целевого числа (стратегия 1). Впоследствии при самостоятельном решении задачи он не стал использовать предложенную папой стратегию, а использовал снова стратегию 1. Мама из пары А после отсчета ребенка о числе 6 предложила считать от метки 5 (стратегия 5). Ребенок попробовал применить это в следующей задаче (число 9), однако мама предложила там считать от 10 вниз до числа (стратегия 4). Ребенок применил эту стратегию в этой и следующей задаче. Однако при самостоятельном решении этих задач предложенных родителем стратегий не использовал и считал до 8 и 9 от нуля (стратегия 1), хотя в некоторых других пробах использовал, помимо стратегии 1, стратегии 2, 5 и 7.

Обобщим результаты эксперимента по стратегиям обучения. В ходе совместной деятельности взрослые демонстрировали детям совсем не ту стратегию, которую использовали сами, но некоторый «базовый» способ действия, необходимый для овладения данной визуальной моделью: пересчет единичных интервалов (стратегию 1). Демонстрация же других способов, проделанная в редких случаях, не привела к усвоению детьми более сложных стратегий. Получается, что идеальная форма, существующая в культуре как способ решения перцептивной задачи взрослыми (Выготский, 2001), фактически не была развернута в интерпсихическом виде в ходе взаимодействия, как это предполагал Л.С. Выготский. В интерпсихическом взаимодействии мы увидели не способы действия взрослых, передаваемые ребенку в совместной деятельности, а сознательную реконструкцию взрослыми того способа действия, который необходим для овладения счетом и который может быть усвоен ребенком в ходе взаимодействия на этом этапе. Этот способ действия можно назвать специально выстроенной учебной формой. Однако это не значит, что другие способы действия оказались для ребенка недоступны: дети сумели на основе других знаний и представлений о числе дополнить базовый способ действия и сами применяли значительно более разнообразные стратегии, чем те, которые были предложены родителями. Ориентационные точки были выделены на стимульном материале и тем самым доступны непосредственному восприятию, которое могло повести за собой культурный способ действия с числовой осью. Кроме того, акцент на точках-ориентирах делали многие из родителей при первой презентации числовой прямой ребенку.

Также дети считали не только вверх, как показывали им родители, но и вниз, и не только к целевой точке, но и от целевой точки.

Примечательно, что особенно сложной для освоения детьми оказалась стратегия 9, в которой оценивается относительное расстояние от ориентационных точек до целевого числа. Данная стратегия требует овладения принципиально иным свойством числовой оси, чем остальные стратегии. Если стратегии 1–8 опираются на представление о числовом ряде как упорядоченном наборе чисел, то для реализации стратегии 9 необходимо понимать числовую ось как отражающую пропорциональные отношения между числовыми интервалами, т.е. необходимо преодолеть сдвиг от представления о последовательности к представлению о пропорциональном соотношении (sequence-to-proportion shift), наблюдающийся, как правило, к 3-му классу (Petitto, 1990).

Согласно данным нашего исследования, дети свободно восполняли и самостоятельно обогащали стратегии в рамках заданного родителями культурного способа действия – пересчета интервалов, однако принципиально иной способ оценки, основанный на соотношении интервалов, не был им доступен даже после указаний родителей. Учебная форма действия, выстраиваемая взрослыми, эффективна в том случае, если находится в зоне ближайшего развития ребенка. В противном случае, даже если ребенок следует за стратегией взрослого, он не включает ее в свои самостоятельные способы действия в дальнейшем.

Выводы

С помощью качественного микроанализа записей движений глаз, синхронизированных с аудио- и видеозаписями взаимодействия детей и их родителей, нами был детально рассмотрен процесс формирования культурного восприятия числовой прямой в качестве визуальной модели абстрактного числового ряда. Было проанализировано восприятие числовой прямой взрослыми, т.е. существующая в культуре идеальная форма восприятия, а затем прослежены пути передачи идеальной формы от взрослого к ребенку и после этого оценен результат обучения – сформированное у ребенка восприятие. Понятно, что подобный эксперимент лишь моделирует процесс освоения идеальной формы, который в экологичной ситуации разворачивается в течение длительного времени. Однако мы полагаем, что некоторые ключевые особенности могут быть выявлены уже в таком кратком прослеживании.

Во-первых, в ходе интерсубъективного взаимодействия идеальная форма не разворачивается в том виде, в каком она существует в культуре. Напротив, в ходе обучения воссоздается специфическая элементарная практика, учебная форма, которая считается доступной для ребенка и при этом позволяет надежно решить поставленную задачу, хотя и не оптимальным образом. По сравнению с этой базовой стратегией пересчета, которая спонтанно предлагалась ребенку в обучении, стратегии, используемые взрослыми, значительно гибче и вариативнее. Они наполнены эвристиками, проистекающими из более

широких знаний о числовом ряде, чем знания, необходимые при простом пересчете.

Во-вторых, дети, в целом следуя за стратегиями, предложенными взрослыми и интериоризируя их, как это предполагает Л.С. Выготский, одновременно существенно обогащают их и насыщают дополнительными способами действия, используя собственные предварительные знания о числовом ряде и его применении.

Положение о взаимодействии идеальной и реальной формы как источнике обучения и развития требует аккуратного пересмотра. Взаимодействие со взрослым действительно оказывает существенное влияние на возникающие у ребенка культурные формы восприятия, однако в ходе этого взаимодействия ребенок встречается не с идеальной, конечной формой восприятия взрослого, а с упрощенной формой поведения взрослого, специально созданной для ситуации обучения, учебной формой. Далее дети активно дополняют эту базовую стратегию, предложенную взрослыми. В итоге их самостоятельная форма восприятия приближается к идеальной форме восприятия взрослых по сравнению с той базовой учебной формой, которая была развернута в ходе взаимодействия со взрослым.

На примере анализа счета на числовой прямой можно сказать, что идеальная форма восприятия существует в скрытом виде: ребенку необходимо самостоятельно открывать ее, используя как предложенную взрослым базовую стратегию пересчета, так и встраивая конкретную задачу в интегральную систему знаний.

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Does the Real Form Interact with the Ideal Form? A Study of the Teaching-Learning to Count on the Number Line by Means of Eye-Tracking

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Abstract

The article investigates acquisition of mathematical knowledge in collaboration with an adult as it is exemplified by preschoolers' learning to count on the number line. A qualitative analysis of the eye-movements reveals the diversity of possible strategies in determination of a number on the number line. The developmental experiment discloses the mechanisms of emergence of these strategies in children. The quantitative comparison of the adults' strategies, the strategies, which are involved in the teaching-learning process, and the strategies that the children used after the learning stage demonstrates the process of development (χ^2= 44.936; $p < .001$). We distinguished the statistically significant differences between the stages in the ratio of counting up versus down along the number line and in the ratio of counting from versus towards the target point. The results demonstrate that children's strategies after the learning stage are more similar to the adults' inherent strategies than to the strategies that were introduced by the adults during the teaching stage. The analysis of the videos of shared activity that was synchronized with the eye movements showed that the adults demonstrated the basic strategy to the children at the teaching phase as they guided children's perception by their pointing gestures and speech. However, the adults did not expose the ideal form, namely the diversity of their own strategies during their teaching. Nevertheless, the children were able to supplement the given teaching/learning form of counting from zero up along the number line to the target point with a variety of strategies by themselves, relying on their coherent notion of the number concept. The strategy that required the sequence-to-proportion shift was the only one that children were not able to constitute by themselves. According to our results, the ideal, cultural form of perception exists in the latent form, and a child needs to re-constitute it in their own practice. The children rely on the basic strategy and enrich this strategy as they include it in the integral conceptual knowledge about numbers. The results enrich our understanding of microgenesis of mathematical knowledge during the collaboration with an adult and open perspective on learning as an active reinvention of ideal form on the ground of cultural practice.

Keywords: culture-historical approach, Vygotsky, mathematics education, teaching, learning, ideal form, shared activity, number line, mathematical concept, eye-tracking, oculography.

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CONTROLLED DISCOVERY: THE EXECUTIVE FUNCTIONS IN INSIGHT PROBLEM SOLVING

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Abstract

Executive functions could play an important role in insight problem solving, however their character, content, and pattern of dynamics may significantly differ from the role of executive functions in non-insight problems. We employed a dual-task paradigm with probe-tasks to track the dynamics of executive functions load in working memory. Two experiments in which we investigated the dynamics of executive functions load in insight and non-insight problems with simultaneous implementation of the Eriksen flanker test are described. Differences in the dynamics of various executive functions in insight problem solving were not revealed. But we found that the dynamics of reaction time in the probe-tasks differs between insight and non-insight problem solving. The results reveal that insight problem solving demands less executive resources, but the executive functions load is significantly greater than the baseline. Also we found that various phases of insight problems require different amount of executive resources. The non-insight problems featured a significant executive functions load after the phase of reading the problem. In insight problem solving we observed an improvement of probe-tasks performance after the phase of reading the problem in the middle of the problem solving process. We speculate that this result reveals an impasse phase that is related to an executive functions load decrease. Surprisingly, we observed a significant increase in the executive functions activity immediately prior to the awareness of a solution. It might be due to controlled solution processing after noticing new elements of a problem that lead to the final solution.

Keywords: insight, problem solving, executive functions, conflict detection.

Introduction

Enough controversies have accumulated in the field of insight research regarding the question: are there any specific insight processes for creative problem solving (Ohlsson, 2011; Weisberg, 2015)? On the one hand, some data indicates that insight problems are simply a variety of intellectual problems and therefore they do not require any special processes (Kaplan & Simon, 1990). On the other hand,

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some data indicates the necessity for special mechanisms for insight problem solving (Öllinger, Jones, Faber, & Knoblich, 2012).

Duncker (1945) suggested that problem conditions in insight problem solving do not allow us to find the correct answer, because there is a contradiction (conflict) between requirements (goal) and the conditions of a problem. The aim of a solver is to determine and resolve this contradiction. The resolution of various conflicts presupposes the special processes of conflict detection. The current data of brain correlates of creativity and insight indirectly indicates the importance of conflict detection functions in insight problem solving. A number of studies on brain activity in creative problem solving point to a significant activity in the anterior cingulate cortex (ACC) in insight and artistic creation, but not in creativity (Dietrich, Kanso, 2010). The work of ACC accompanies the discovery of unexpected failures, and perhaps provides conflict monitoring and the detection of contradictions (Botvinick, Nystrom, Fissell, Carter, & Cohen, 1999).

The work of ACC is a part of the executive functions. The conflict detection executive function involved in contradiction resolution within a problem could be a part of insight problem solving. Therefore the executive functions could be important in insight, but conflicting results were obtained in research of the role of executive functions in insight problem solving. Numerous attempts to explain insight problem solving from the problem space theory viewpoint aimed at explaining insight through step-by-step algorithms and control (Kaplan & Simon, 1990; MacGregor, Ormerod, & Chronicle, 2001) with the work of the prefrontal cortex. At the same time, as shown in several studies (Jarosz, Colflesh, & Wiley, 2012; Reverberi, Toraldo, D'Agostini, & Skrap, 2005), prefrontal cortex disruption results in in the improved creative problem solving. At first sight, it is possible to detect a significant contradiction between the statements: "the executive functions (working memory) play an important role in insight problem solving" versus "the executive functions (working memory) do not play an important role in insight problem solving" (Chein & Weisberg, 2014; Lavric, Forstmeier, & Rippon, 2000). This discrepancy could be resolved if we accept that working memory involves various independent executive functions. In that case, if one function (such as updating or control), is broken, busy or locked, the other function (for example, conflict detection), may be operated independently.

We propose that different executive functions could play different roles during the process of problem solving. Each executive function performs its role in a problem depending on the pliability of the problem material. The role may include not only constant activity, but local activities in some episodes of solving. The local activities of executive functions could play an important role in problem solving, but at the same time they may hardly be measured by methods that summarize the activity of the entire process in the problem. Hypothetically, cognitive control provides understanding of problem requirements during the initial stages while conflict detection is a crucial component of impasse overcoming. Thus, we need a method that tracks the dynamics of executive functions during different stages of problem solving to understand the insight processes.

Method

The executive functions of working memory in problem solving are studied with traditional methods, using a result-oriented approach. The traditional approach suggests the influence (or relation) of an executive function on the efficiency of problem solving. Using data from neural activity studies and a working memory distraction method allowed us to draw conclusions about the role of some functions in general. We introduce an indirect method of the assessment of executive functions dynamics in working memory via a probe-task. We use the probe-task based on Kahneman's (1973) resource model and his experimental technique.

According to the resource model, the cognitive resource is allocated to execute different tasks. If tasks are performed simultaneously, the resource is allocated according to the subjective importance (the effectiveness of one task depends on another task: if the primary task requires more resources for its implementation, this amount will be taken from the secondary, or additional, task. In this case, the effectiveness of the additional task will degrade or the additional task may be canceled).

Our method is based on the competition between different tasks for the general cognitive resource in working memory. We used a probe-task to track and reveal changes in working memory. The probe-task is an implementation of the additional task throughout the primary task (in our case the primary task is problem solving). The dynamics of resource demands in the primary problem may be seen via the reaction time dynamics of the probe-task. If the reaction time in dual task trials is greater than in single task trials, then the primary task requires more resources.

Experiment 1

This experiment was aimed at selecting a relevant probe-task to insight solution. Various probe-tasks are related to different functions, and they could detect various patterns of dynamics in insight problem solving.

The main purpose of this study was to test the hypothesis that the insight solution has specific patterns of executive functions load that rely on the conflict detection. This general hypothesis can be specified in three partial hypotheses: 1. The dynamics of executive functions load are different in insight and non-insight problems. 2. There is a specific pattern in the dynamics of executive functions load in insight problems, i.e. there is the significant dynamic of the reaction time in probe-tasks in insight problems. 3. Conflict detection is a specific mechanism of the executive functions in the insight solution. The third hypothesis can be verified if two conditions are met: 3.1. There is an influence of conflict probe-tasks on the dynamics of the reaction time in insight problems; 3.2. There is a significant increase in the reaction time in conflict tasks in the middle stages of the insight solution.

To test these hypotheses, we employed the 2×2×10 factorial within-subject design. The first factor was primary a problem-type with two levels: insight and non-insight. The second factor was a probe-task with two levels: conflict and non-conflict. The

stage acted as a grouping variable with ten levels (stages). The only dependent variable is a reaction time in the probe-task.

Method

Participants

Participants were 32 (23 women) people, aged 20 to 27 (M = 21.78; SD = 1.41). The majority of the sample consisted of undergraduate and graduate students of Yaroslavl State University. All participants were tested individually, took part voluntarily, and were not paid for their participation.

Stimuli

We employed the dual task paradigm that included insight and non-insight problems as the primary task, and the probe-task as the additional task. A modified Eriksen flanker test was employed as the probe-task. The flanker test as well as the Stroop test is a well-established correlate of the ACC activity (Botvinick et al., 1999). This probe-task is simple and it may be performed simultaneously with the primary problem.

The two following types of probe-tasks were employed in Experiment 1.

(a) The non-conflict task.

Participants were shown the pictures of two alternatives: a row of five arrows directed to the left and a row of five arrows directed to the right. Participants were instructed to respond by pressing the left key if they saw the row of arrows directed to the left and the right key button if they saw the row of arrows directed to the right. The participants' goal was to perform the task as quickly and accurately as possible.

(b) The conflict task.

Participants performed the same task, except that the central arrow had an opposite direction: if the flanker arrows were directed to the left, the central arrow was directed to the right, and vice versa (Fig. 1). Participants were instructed to respond by pressing the left key if they saw the central arrow directed to the left and the right key if they saw the central arrow directed to the right ignoring the flanker arrows.

All probe-tasks were presented in the center of a screen. The row of arrows included five black arrows on a white background. A mask consisting of black crosses on a white background was presented between stimuli.

We used two types of problems as primary tasks:

Figure 1

An Example of Stimuli Used in Experiment 1

(a) Non-insight problems.

These problems have clear conditions, the algorithm of solution, and the answer logic. Participants know all important operators to find a correct solution. The example of a non-insight problem: "How can you divide 9 apples into equal parts if we have 12 children and we cannot cut an apple into more than 4 parts?" (Answer: Every child will receive 3 parts of an apple).

(b) Insight problems.

These problems require a change of operators or a system wherein the participant does not know a new system of operators. Answers are found suddenly and the process is often associated with an emotional response. The example of an insight problem: "How can you take one from 29 and get 30?" (Answer: XXIX –> XXX).

The problems used in the experiment were balanced in average solution time. The average solution time was ranked by the time needed for problem solving in a single task.

The experiment was performed with PsychoPy2 scripts version 1.81.02 (Peirce, 2008) on the Asus X550V computer with a 15.6" screen.

Procedure

All participants exercised in practice trials (single probe-tasks without problem solving) before the experimental trials. The practice trials included a single performance of each type of the probe-tasks. In this experiment we employed three types of practice trials: (a) a simple choice between two alternatives (red or green squares were presented to a participant; if the participant saw a red square, they should press the right arrow on the keyboard, if they saw a green square — the left arrow); (b) the non-conflict condition; (c) the conflict condition. The simple choice task with colored squares was employed only in the practice trials. Instructions were presented to participants in-between the probe-tasks.

When the participants had performed the practice trials, they proceeded to the experimental trials. Each participant attempted to solve 16 problems (8 insight problems and 8 non-insight problems) with various probe-tasks (the conflict and non-conflict conditions). The problems were presented on the top of a screen. All problems and probe-tasks were presented in random order. The participants solved the problems and at the same time they performed the probe-tasks, which lasted throughout the problem solving session. The probe-task trials repeated indefinitely for as long as it took to finish the primary problem. The participants solved the problems verbally. If the participants could not suggest a hypothetical solution after more than two minutes, the experimenter gave them a verbal hint. After the solution of the problem, the participants had a break (no more than one minute) and then proceeded to the next problem.

To control the influence of verbalization on the increase in the reaction time in the last stages we analyzed the data of insight problems performance from the beginning of the problem until the moment when the participants expressed an emotional reaction (found a solution principle) prior to the verbalization of the correct answer. The experimenter registered markers of the insight whenever they

occurred. Data record for insight problems stopped after a participant's emotional reaction or a solution principle were found. Data record for the non-insight problems stopped after the correct answer was reported.

A participant's reaction time was recorded in milliseconds and used to assess the dynamics of the cognitive processes. We assume that a greater reaction time in the probe-task indicates that lesser cognitive resources were allocated to the probe-task due to greater cognitive resource demands of primary problem solving. Thus, the reaction times in the probe-tasks are indicative of the executive functions load dynamics.

Data analysis

Each of 32 participants solved 16 problems (512 problems in total), but some problem solving trials were excluded: we excluded unsolved problems; trials that had the reaction times more 20 seconds (in this case we assumed that participants did not cope with the simultaneous implementation of two tasks); problems that were solved in less than 50 seconds (due to the possibility that participants already knew the answer). Remaining 317 experimental situations (173 insight trials and 144 non-insight trials) were averaged for each participant.

After collecting the data and excluding some trials we divided each problem in 10 stages that were equal in time. We adhered to the requirement of maximum divisibility and suggested that 10 stages are optimal for our goals, but the number of stages is contingent. We consider each stage as an equal time interval that is not definitely related to certain problem solving phases. The division into 10 stages is useful to track the dynamics and overlap patterns of resources allocation during various problems. The phases with various cognitive processes (comprehension, representational change, impasse, etc.) could be established through the analysis of quantitative data obtained within these stages.

We found the average reaction time in the probe-tasks in each of 10 stages. The next step of our data analysis was to collect all the average reaction times in each stage of the solution from each participant. The value of each stage of the solution represents the average reaction time of each participant in this stage of the problem solving. Thus, we are able to combine each participant's solution times into a single data structure. We have found the average reaction time of the probe-task during various stages of solving insight and non-insight problems separately. Besides, we have obtained the data on the average reaction time during various stages in conflict and non-conflict conditions.

Extreme values of reaction times above 3 IQR in every stage were identified as outliers. Trials with the outliers as the stage values were excluded from further analysis. Then we averaged different trials in every condition for every participant. Finally we analyzed 58 averaged trials in the conflict condition (32 insight and 26 non-insight problems) and 58 trials in the non-conflict condition (30 insight and 28 non-insight problems).

Results

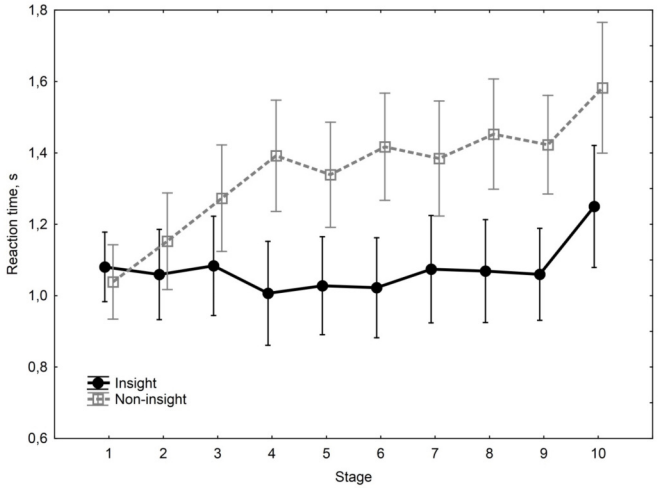
A three-way repeated measures ANOVA was conducted to test for the main effects and interaction between the problem factor (insight vs. non-insight), the probe-task factor (conflict vs. non-conflict), and the stage factor (stages 1 to 10) on the reaction times. Mauchly's test of sphericity indicated that the assumption of sphericity was violated, therefore a Greenhouse-Geisser correction was used. The results revealed the main effect of problem types ($F(1, 24) = 36.95$, $p < .001$, $\eta_p^2 = .61$) on the reaction time. The values of the reaction time during non-insight problems were greater (M = 1.35, SD = 0.64) than those in insight problems (M = 1.07, SD =0.48). The results also revealed the main effect of the stage factor ($F(5.14, 123.41) = 9.74$, $p < .001$, $\eta_p^2 = .29$), and a significant interaction between the problem and stage factors ($F(4.57, 109.57) = 4.46$, $p = .001$, $\eta_p^2 = .16$). This means that we found different patterns of the probe-tasks dynamics during insight and non-insight problems (Figure 2).

A one-way repeated measures ANOVA with a Greenhouse-Geisser correction revealed the main effect of the stage factor among non-insight problems ($F(5.65, 135.57) = 8.1$, $p < .001$, $\eta_p^2 = .252$) as well as among insight problems ($F(3.76, 109.05) = 4.46$, $p = .004$, $\eta_p^2 = .125$). Executive functions load significantly vary from stage to stage in insight and non-insight problems differently.

We can see an increase in the reaction time of the probe-tasks in non-insight problems from the fourth stage and onwards until the last stage. The same described pattern of the dynamics of executive functions load was observed in both the conflict and non-conflict probe-task conditions. The results of a two-way repeated measures ANOVA with a Greenhouse-Geisser correction did not reveal

Figure 1

The Executive Functions Load Dynamics in Insight and Non-Insight Problem Solving in All Conditions. Vertical bars denote .95 confidence intervals.



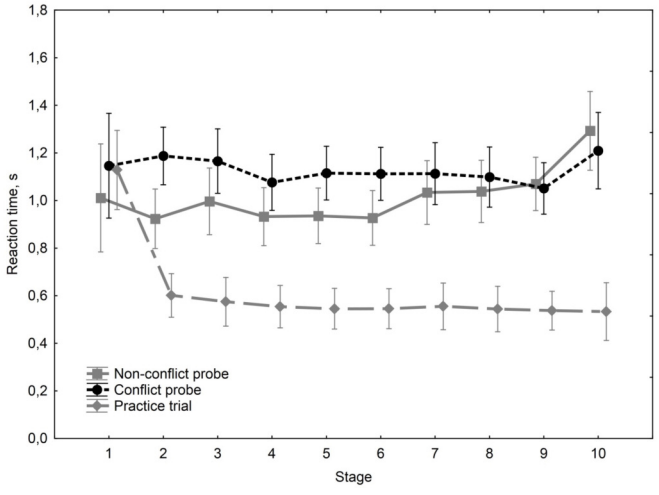
any interaction between the probe-task and the stage factors in non-insight problem solving ($F(4.16, 88.8) = 0.81$, $p = .527$, $\eta_p^2 = .033$). Thus, the increase of reaction time in the non-insight problems is resistant to various probe-task conditions. The dynamics of executive functions load in non-insight problems reveals a gradual increase of the reaction time. We speculate that this increase is associated with working memory load: one needs to keep the problem in mind, store intermediate solutions, predict next steps, etc. Non-insight problem solving generally competes with the probe-tasks more than the insight problems. We argue that the results show that non-insight problems require more cognitive resource and they are related to the activity of the central executive of working memory. The revealed pattern of dynamics does not provide a detailed picture but it shows only the overall effect of the executive functions. Thereunder, we can conclude that Hypothesis 1 was confirmed. The dynamics of the executive functions load is different in insight and non-insight problems.

To test the other hypotheses we analyzed the data on insight problem solving. A two-way repeated measures ANOVA with a Greenhouse-Geisser correction within insight problems revealed the main effect of the stage factor ($F(3.76, 109.05) = 4.15$, $p = .004$, $\eta_p^2 = .125$). We found an increase in the reaction time in the final stages of insight problem solving, especially during the tenth stage. There was a significant dynamics of the reaction time in the probe-task in insight problems (Figure 3). This means that we confirmed Hypothesis 2.

Nevertheless, we did not found a significant interaction between the probe-task factor and the stage factor ($F(5.36, 155.52) = 2.15$, $p = .058$, $\eta_p^2 = .069$) in insight problem solving. The results of a three-way repeated measures ANOVA with a Greenhouse-Geisser correction did not reveal interaction between the probe-task,

Figure 2

The Dynamics of Insight Problem Solving in the Conflict and Non-Conflict Conditions. Vertical bars denote .95 confidence intervals



problem and stage factors as well ($F(4.88, 117.07) = 1.14$, $p = .341$, $\eta_p^2 = .045$). This data does not support Hypotheses 3.1 and 3.2. We found similar patterns of the dynamics in the executive functions load using various probe-tasks. Moreover, we did not find any increase in the reaction time in the middle of problem solving related to conflict detection. At the same time, we observed an unexpected increase in the reaction time in Stage 10.

Discussion

In Experiment 1 we obtained data that supports the specificity of insight solution, because the results revealed that non-insight problems required a greater involvement of the executive functions than insight problems. Moreover, we observe the same patterns of non-insight problems dynamics in various conditions. This pattern of dynamics was found in previous studies (Korovkin, Vladimirov, & Savinova, 2014). This tells us that this pattern of the executive functions work is persistent. Although we excluded the period between first markers of an aha-reaction and verbalization of correct answers from the analysis, we observed an increase in the reaction time during the last stages of insight problems. Probably the slowdown of probe-tasks performance during the last stages indicates that the executive functions activity is related to the production of an answer, but not to its verbalization. Thus, we have confirmed Hypothesis 1.

We observed a significant dynamics of executive functions load in insight problem solving that differs from the dynamics in non-insight problems. We argue that various phases of insight problems require different amounts of the executive resources. The results reveal that insight problem solving demands less executive resources, but the executive functions load is significantly greater than in the practice trials. The executive functions load is observed throughout the solution, but there is an increase in the last stage prior to the answer. The specific pattern of executive functions load dynamics in insight problems supports Hypothesis 2.

At the same time we did not find any influence of the probe-task factor on the reaction time in insight problems (Hypothesis 3.1). The differences between the dynamics of the probe-tasks in insight problems are just above .05 p-level. The tests did not reject the null hypothesis that the dynamics in the conflict and non-conflict probe-tasks is similar. In any case, the observed dynamics in both the conflict and non-conflict conditions differs from what we expected to find. Moreover, it is impossible to make clear conclusions about specific peaks of the reaction time increase or decrease in the middle of insight problems (Hypothesis 3.2). Surprisingly we found an increase in the executive functions load prior to the solution discovery.

There are some limitations in this experiment. One would assume that probe-tasks would benefit from the defocusing of attention. Using the peripheral arrows as a source of information was not controlled in this experiment. Defocusing could shift the attention focus to the periphery and greatly simplify the task. To control for this possibility, we have to use bidirectional peripheral arrows in the probe-tasks. Therefore, we designed and conducted Experiment 2 to test the pattern of the dynamics observed in Experiment 1.

Experiment 2

Experiment 2 was conducted to rectify the shortcomings of the previous study. We modified the probe-tasks by adding bidirectional peripheral arrows to focus participants' attention on the central arrows.

We employed the 4×10 factorial within-subject design. The first factor was a probe-task with four levels: non-conflict, perceptual conflict, motor conflict, and complex conflict. The stage acted as a grouping variable with ten levels (stages). The only dependent variable is the reaction time in a probe-task.

Method

Participants

Participants were 32 (23 women) people, age 13 to 39 (M = 20.85; SD = 3.99). The majority of the sample consisted of undergraduate and graduate students of Yaroslavl State University. All participants were tested individually, took part voluntarily, and were not paid for their participation.

Stimuli

In this experiment we modified stimuli of the probe-tasks. We added a neutral arrangement of the bidirected arrows row. The addition was necessary to exclude a speculation that Experiment 1 effects may be due to the confounding variable, for example, various conditions for attention switching in conflict and non-conflict tasks. We included new probe-tasks to verify that the strengthening of a conflict leads to more vivid effects in the problem solving dynamics. We employed two types of conflicts: a representational (or perceptual) conflict and a motor conflict. The representational conflict is a conflict between perceived information from the periphery and the motor response. The motor conflict is a conflict between the automatic response and the instruction.

Totally we employed four probe-tasks in Experiment 2:

a) The non-conflict task.

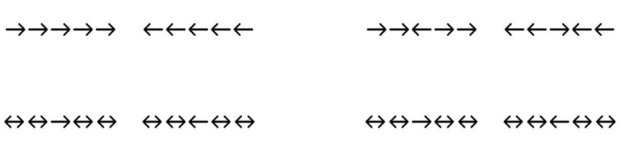
Participants were shown two alternatives: the central arrow was directed either to the left or to the right (Figure 4). Contrary to Experiment 1, this task had a central arrow that was surrounded by congruent or neutral flanker arrows. Participants were instructed to respond by pressing the left key if they saw the central arrow directed to the left and the right key button if they saw the central arrow directed to the right. The participants' goal was to perform the task as quickly and accurately as possible.

b) The perceptual conflict task.

Participants performed the same task, except that the central and flanker arrows pointed in contrary directions. For correct response it was necessary to spot

Figure 4

An Example of Stimuli Used in Experiment 2



the central arrow direction and to press the appropriate key (for example, left arrow — press "left") ignoring the noncongruent flanker arrows.

c) The motor conflict task.

A row of arrows was presented to participants as in a non-conflict task but instruction demands to conversely respond to the central arrows direction. If the central arrow was directed to the right, the participant had to press the left key and vice versa.

d) The complex conflict task.

This task is similar to the perceptual conflict task but with an inverse instruction as in the motor conflict task. We expected that this task was the most difficult due to both the perceptual and motor conflicts.

All probe-tasks were presented in the center of a screen. The rows of arrows included five black arrows on a white background. A mask consisting of black crosses on a white background was presented between stimuli.

In Experiment 2 we used only 8 insight problems. Problems were presented on the top of a screen. All problems were controlled for difficulty levels.

Procedure

Participants solved problems and at the same time performed the probe-tasks. The experiment was designed similarly to Experiment 1 (it also included practice trials with each probe-task in the single task condition before the experiment).

Data analysis

Each participant solved 8 insight problems (256 in total). But we excluded unsolved problems; trials with the reaction time values of more than 20 seconds and trials with more than 50% of errors in the probe-task (in these cases we assumed that participants did not cope with the simultaneous implementation of two tasks); problems that have been solved in under 50 seconds (due to the possibility that participants already knew the answer). Thus, we obtained 161 data points for statistical analysis. The next steps of the data analysis were the same as in Experiment 1. We excluded the cases with outliers of the reaction time above 3 IQR in every stage. Finally we analyzed 23 averaged trials in the non-conflict condition, 20 averaged trials in the perceptual conflict condition, 21 averaged trials

in the motor conflict condition, and 26 averaged trials in the complex conflict condition divided into 10 stages.

Results

A two-way repeated measures ANOVA with a Greenhouse-Geisser correction revealed the main effect of the stage factor on the reaction time values ($F(3.9, 46.85) = 4.01$, $p = .007$, $\eta_p^2 = .25$). The analysis did not reveal the main effect of the probe-task factor on the reaction time ($F(3, 36) = 0.1$, $p = .959$, $\eta_p^2 = .008$) as well as interaction between the stage and probe-task factors ($F(6.29, 75.48) = 0.47$, $p = .834$, $\eta_p^2 = .038$). These results indicate that there is no significant differences in patterns of the executive functions load in various probe-tasks (Figure 5).

A one-way repeated measures ANOVA with a Greenhouse-Geisser correction demonstrated that there are significant changes in the executive functions load dynamics in the non-conflict ($F(5.25, 115.6) = 2.32$, $p = .045$, $\eta_p^2 = .095$), perceptual conflict ($F(3.9, 74.03) = 5.36$, $p = .001$, $\eta_p^2 = .22$), motor conflict ($F(3.67, 73.43) = 2.59$, $p = .048$, $\eta_p^2 = .115$), and complex conflict ($F(3.99, 99.79) = 4.81$, $p = .001$, $\eta_p^2 = .161$) conditions.

Generally the dynamics of executive functions load in insight problems was significant and had the same pattern as in Experiment 1 (Figure 6). We may see the

Figure 5

The Dynamics of Insight Problems Solving in the Probe-Task Conditions. Vertical bars denote .95 confidence intervals

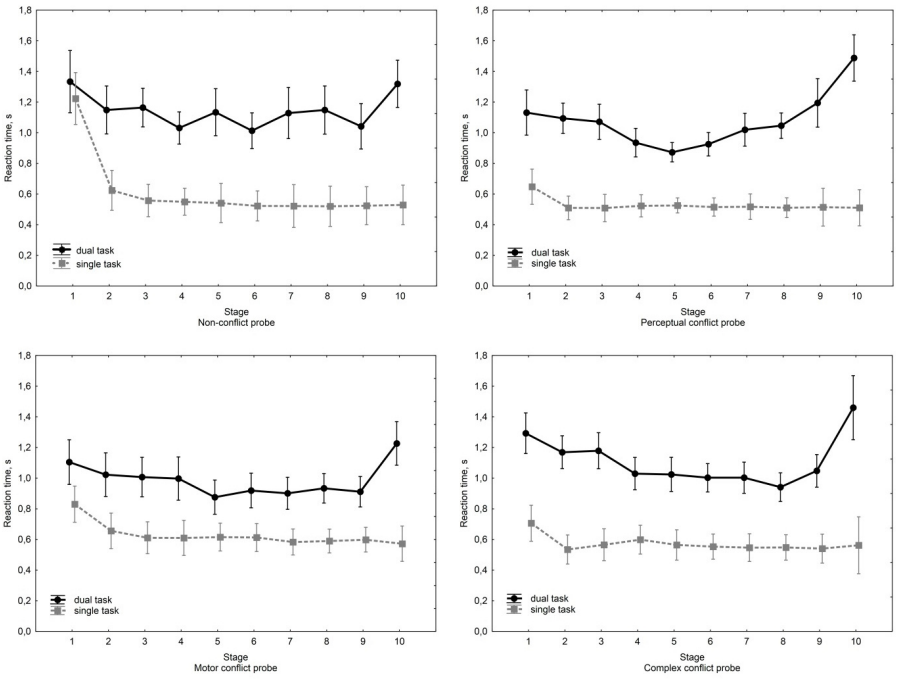
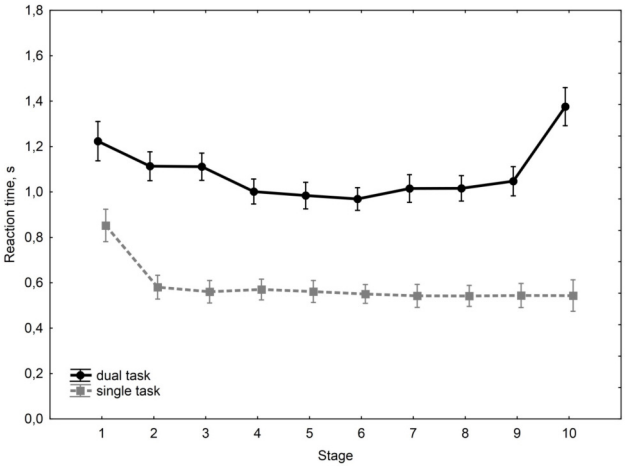


Figure 6

The Average Dynamics of the Executive Functions Load in Insight Problem Solving. Vertical bars denote .95 confidence intervals



similar dynamics in every probe-task with local declines in the middle of the solution and an abrupt increase in the executive functions load in the last stage of the solution. Thus, we may conclude that hypothesis 2 was confirmed. There is a specific pattern of the dynamics of executive functions load in insight problems.

Unexpectedly, the probe-task factor in Experiment 2 did not indicate a significant effect on the dynamics of the reaction time. Despite the fact that the complex conflict condition includes very conflicting processes we did not reveal any significant differences from the other probe-tasks. Similarly, there is no pronounced increase of the reaction time in the conflict tasks in the middle stages. Therefore there is no evidence to confirm Hypotheses 3.1 and 3.2.

Discussion

The results of Experiment 2 support the findings of Experiment 1. We found a robust pattern of the executive functions load during insight problem solving. As well as in the results in the previous experiment, Experiment 2 revealed a decrease in the reaction time in the middle stages in insight problem solving. We argue that the first part of insight problem solving involves an average level of the executive functions activity, the middle part of problem solving has a decrease in the executive functions activity, and the last part of problem solving features an abrupt reaction time increase immediately prior to the correct answer finding.

These results are the opposite to what we initially expected. Nevertheless, we found other remarkable features of the reaction time dynamics in insight problem solving. The revealed increase in the reaction time in Stage 10 in all conditions indicates the executive functions activity prior to solution finding. We suggest that insight processes such as representational change could occur during this period.

Apparently, the final period of a solution is extremely demanding in terms of cognitive resource.

Similarly, we think that a decline of the reaction time in the middle of solution indicates that an impasse occuring in this phase demands less cognitive control. Since the cognitive resource was no longer needed for problem solving, as the impasse phase is far less cognitive demanding, it was relocated elsewhere – to the probe-task, resulting in the temporary reaction time acceleration. If participants rejected problem solving after the middle of the solution and did not perform any information processing regarding the solution, the reaction time must have been the same in the experiment and practice trials (dual task vs. single task performance). The proof of information processing during the impasse rather than a rejection of the solution is that reaction time in insight problem solving was significantly greater than in the single task even during the sixth stage ($t(31) = 6.92$, $p < .001$, $r = .649$) on average for all tasks.

General Discussion

The results of the experiments revealed differences of the levels and dynamics of the executive functions load between insight and non-insight problems. This data shows that insight problems have the other content of ongoing processes in working memory. The first half of the solution of both problem types equally involves the executive functions that appear to be related to problem comprehension. The resources can be allocated to reading a problem, identifying essential conditions and building a representation based on these conditions. But then patterns of the executive functions become very different. There is a significant increase in the reaction time in non-insight problems in any probe-tasks, which is associated with a crucial involvement of the executive functions in non-insight problem solving process. Meanwhile, it appears that nothing like this happens to the probe-task reaction time in terms of the executive functions in insight problem solving. Moreover, a significant decline of the reaction time occurs in all probe-tasks. However, it does not mean that a solver quits problem solving. A part of the resource continues to be distributed to the problem. Immediately prior to behavioral manifestations of finding a solution (Stage 10), a rise of the reaction time in the probe-tasks during insight problem solving is observed. This indicates a significant resource allocation to insight problem solving even before a solution is found. As shown, the work of the executive functions is not associated with a simple verbalization of the answer, and apparently is aimed at the production of a solution even prior to the awareness of the right answer. Here we need to point out that both automatic (unconscious) and voluntary (conscious) executive functions should be considered. This fact is yet another argument in support of the idea of the existence of unconscious mechanisms of solution preparation prior to insight (Ellis, Glaholt, & Reingold, 2011; Thomas & Lleras, 2009).

Apparently the goal of this study — to find a relevant probe-task to insight problems — was achieved. The Eriksen flanker test as a probe-task can be used to reveal the dynamics of the executive functions load in insight problem solving.

Nevertheless, the modifications of the probe-task did not reveal any significant differences in the dynamics. This means that we cannot come to a conclusion about various executive functions during different stages. Thus the main hypothesis of this study that an increase in the reaction time in the probe-task related to activating the conflict detection could be revealed before finding the solution of insight problem was not confirmed.

On the contrary, we observe an opposite picture with a slight acceleration of the reaction time in all probe-task regardless of the conflict features. It could be assumed that the decrease in response time is due to the fact that the primary problem just fades into the background and attention focuses on the probe-task, which ceases to be secondary. An insight problem becomes secondary and continues to be processed. Also we observe a steady rise of the executive functions load during the final stages just prior to the detection of the correct solution. This pattern is typical for dynamics of all kinds of probe-tasks. This allows us to speak about the modulation of general executive functions activity before finding the correct solution. The fact that the executive functions load steadily increases before an aha-moment suggests that insight is associated with the implementation of latent automatic executive functions in problem solving.

Thus, we can conclude that the executive functions play an important role in insight problem solving. At the beginning of problem solving it is necessary to comprehend a problem and to develop solutions in the end. In the middle of problem solving there is a significant decrease in the reaction time related, in our opinion, to the inhibition of the executive functions. At the same time, we have no direct evidence of the conflict detection and monitoring function activity in insight problem solving. This is due possibly to the short duration (instantaneity) of this process.

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Контролируемое открытие: Управляющие функции в решении инсайтных задач

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Резюме

Управляющие функции могут играть важную роль в решении инсайтных задач, однако их характер, содержание и паттерны динамики могут существенно отличаться от роли управляющих функций в решении неинсайтных задач. Мы использовали парадигму двойной задачи с использованием заданий-зондов для отслеживания динамики загрузки управляющих функций в рабочей памяти. В статье описаны два эксперимента, в которых исследовалась динамика загрузки управляющих функций в процессе решения инсайтных и неинсайтных задач одновременно с выполнением флангового задания Эриксена. Не было выявлено различий в динамике разных типов управляющих функций при решении инсайтных задач. Однако, было обнаружено, что динамика времени реакции при выполнении заданий-зондов отличается при решении инсайтных и неинсайтных задач. Эти результаты показывают, что инсайтные задачи менее требовательны к ресурсам управляющих функций, хотя загрузка значительно выше фонового уровня. Также выявлено, что на различных этапах решения задачи требуется разное количество ресурсов управляющих функций. Неинсайтные задачи проявляют значимую загрузку управляющих функций после этапа чтения задачи. В инсайтных задачах, напротив, наблюдается улучшение выполнения заданий-зондов после этапа чтение задачи в середине процесса решения задачи. Мы считаем, что этот результат выявляет этап тупика, который связан со снижением загрузки управляющих функций. Неожиданно, были получены данные о наличии значимого увеличения активности управляющих функций непосредственно перед осознанием решения. Это может быть связано с необходимостью контролируемого процесса решения после того, как испытуемый замечает новые элементы задачи, ведущие к итоговому решению.

Ключевые слова: инсайт, решение задач, управляющие функции, обнаружение противоречий.

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Короткие сообщения

СВЯЗЬ СТЕПЕНИ КЛАСТЕРИЗАЦИИ ЛЕКСИКО-СЕМАНТИЧЕСКОЙ КАТЕГОРИИ СО СКОРОСТЬЮ ПЕРЕЧИСЛЕНИЯ ВХОДЯЩИХ В НЕЕ ОБЪЕКТОВ

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Резюме

В ситуации, когда испытуемых просят перечислить названия объектов, принадлежащих к лексико-семантическим категориям (члены категорий), члены одних категорий перечисляются быстрее, чем члены других. Результаты исследований процесса выполнения данной задачи позволяют предположить, что фактором данного различия лексико-семантических категорий может быть степень кластеризации их членов: категории, члены которых лучше сгруппированы, имеют в этом отношении преимущество. Для проверки этого предположения использовались категориальные нормы для русского языка, содержащие данные о среднем количестве членов категорий, перечисляемых испытуемыми за единицу времени, и о кластерах, содержащихся в категориях и влияющих на ответы испытуемых. Анализировались данные по 22 категориям («драгоценный камень», «четвероногое животное» и т.д.), для каждой из них было подсчитано число кластеров с парной близостью больше 3, данный показатель выступал как степень кластеризации. Как оказалось, по этому показателю категории значительно варьируют: в то время как у двух категорий («драгоценный камень», «инструмент плотника») он был равен нулю, у четырех других («четвероногое животное», «предмет одежды», «родственник», «птица») он был больше 10. Корреляция степени кластеризации со средним числом перечисляемых членов категории составила 0.838; $p < 0.001$. Этот результат согласуется с предположением о роли степени кластеризации членов лексико-семантической категории как фактора скорости перечисления входящих в нее объектов. Однако такими факторами могут явиться и другие различия структур лексико-семантических категорий, в частности, может играть роль тип этой структуры.

Ключевые слова: семантическая память, репрезентация, лексико-семантическая категория, категориальные нормы, кластеризация.

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Введение

Результаты ряда исследований хранения и извлечения информации из семантической памяти в норме и патологии (см., напр.: Warrington, Shallice, 1984; Pilgrim et al., 2005) выявили различия между стимулами, принадлежащими к разным лексико-семантическим категориям. В частности, было показано, что испытуемые быстрее осуществляют категоризацию названий живых объектов, чем неживых (Pilgrim et al., 2005).

В настоящей работе рассматривается диссоциация таких лексико-семантических категорий, как «фрукты», «инструменты плотника» и т.д. в ситуации, когда испытуемых просят перечислять названия объектов, принадлежащих к одной из таких категорий, в течение некоторого времени (category fluency task). В отечественной литературе использовались термины «семантическая вербальная беглость» (Алфимова, 2010) и «семантическая беглость» (Дроздова и др., 2015). Эта диссоциация состоит в том, что названия объектов, принадлежащих к одним категориям, перечисляются быстрее, чем названия объектов, принадлежащих к другим категориям, что отражает, надо полагать, различия в скорости извлечения из семантической памяти. На данное различие лексико-семантических категорий обращалось мало внимания, исследователей больше интересовало сопоставление результатов, полученных на отдельных категориях (как правило, «животные») с данными, полученными при использовании другой задачи, когда испытуемых просят перечислить слова, начинающиеся на определенную букву (см.: Bokat, Goldberg, 2003).

Различие лексико-семантических категорий в скорости извлечения релевантной информации выступает очевидным образом в категориальных нормах. Категориальные нормы — это списки слов, которые носители данного языка называют (точнее, записывают или вводят в компьютер), когда их просят перечислить названия объектов, входящих в лексико-семантические категории (члены категорий). В категориальных нормах указываются также показатели «степени принадлежности» членов категорий категориям — с какой частотой данный член категории был упомянут при перечислении, как часто он был упомянут первым, иногда — каков его средний порядковый номер в последовательности упоминаний. Эти нормы основываются на ответах достаточно большого числа испытуемых, перечислявших члены некоторого числа категорий. Так, нормы У. Баттига и У. Монтегю (Battig, Montague, 1969) для американского варианта английского языка основываются на ответах 442 испытуемых, перечислявших члены 56 категорий. Более современные нормы для американского английского (Van Overschelde et al., 2004) основываются на ответах еще большего числа испытуемых (от 633 до 710 в зависимости от категории); перечислялись члены 70 категорий. Нами (Григорьев, 2004) были опубликованы категориальные нормы для русского языка (для 23 категорий); нормы для 20 категорий основывались на ответах 113 испытуемых, для 3 категорий – на ответах 83 испытуемых. Категориальные нормы для разных языков собирались и другими исследователями. В этих нормах зачастую приводятся данные о среднем количестве перечисленных членов каждой

категории. Эти средние широко варьируют. Например, в нашем исследовании (Там же) испытуемые перечислили в течение 30 сек., записывая свои ответы в розданных им тетрадях, в среднем 9.73 терминов родства и всего 5.09 инструментов плотника. Будем называть данный показатель, отражающий зависящую от категории скорость извлечения релевантного материала из семантической памяти, продуктивностью категории. Различия категорий в продуктивности нельзя объяснить тем, что размеры категорий различаются: корреляция между продуктивностью и количеством упомянутых всеми испытуемыми членов категории в наших данных была практически нулевой (Там же, с. 74)[1]. Различия лексико-семантических категорий в продуктивности обнаруживают межъязыковую согласованность: корреляция полученных нами значений продуктивности 22 категорий с соответствующими значениями этих категорий, полученными У. Баттигом и У. Монтегю, составила 0.743 (Там же).

Есть данные о различии мозговых механизмов перечисления членов разных категорий: в одном нейровизуальном исследовании было показано, что при перечислении животных и инструментов активизируются частично несовпадающие зоны мозга (Vitali et al., 2005).

Чем можно объяснить различие лексико-семантических категорий в продуктивности? В исследованиях, использовавших задачу перечисления членов категории, было замечено, что члены категории генерируются группами с небольшими временными интервалами между словами в группе и большими интервалами между группами; при перечислении членов лексико-семантических категорий (выполнении задачи «семантическая беглость») слова из одной группы имеют тенденцию быть семантически связанными (см.: Troyer et al., 1997). Если лексико-семантические категории различаются по степени своей семантической дифференцированности, т.е. по тому, насколько четко в них выделяются подкатегории (кластеры), содержащие семантически связанные слова, то следует ожидать и различий между ними в продуктивности: в четко дифференцированной категории искать придется в основном кластеры; переходы от слова к слову внутри кластера осуществляются без особых поисковых усилий, в то время как в нечетко дифференцированной категории объектом поиска становится большое число слов. Таким образом, мы предполагаем, что степень кластеризации лексико-семантической категории является фактором ее продуктивности.

Мнение, что одни категории могут содержать больше легко идентифицируемых группировок, чем другие, высказывалось в литературе (Diaz et al., 2004). Однако действительно ли это так? Ситуация проясняется, если для нескольких категорий будут выявлены содержащиеся в них и влияющие на ответы испытуемых кластеры, на основании чего категории можно будет сопоставлять по степени кластеризации. Для ряда категорий такие кластеры были выявлены в нашем предыдущем исследовании (Григорьев, 2004) по

[1] Мы не будем соотносить здесь данный факт с существующими представлениями о соотношении продуктивности и размера категории.

ответам испытуемых, участвовавших в сборе данных по категориальным нормам русского языка, с помощью специальной процедуры. Эта процедура будет вкратце описана ниже. По количеству кластеров в категории можно оценить степень ее кластеризации и получить ответ на вопрос, действительно ли категории различаются в этом отношении. Следующим же шагом может стать определение связи степени кластеризации категории с ее продуктивностью.

Нельзя сказать, что связь степени кластеризации перечисляемых членов лексико-семантической категории и продуктивности перечисления не рассматривалась. Так, в работе (Robert et al., 1997) сообщается о существовании такой связи. В этой работе единицами наблюдения служили испытуемые, перечислявшие члены одной лексико-семантической категории «животное». Эти испытуемые различались по количеству семантических кластеров в своих ответах, а семантические кластеры идентифицировались экспертами[2]. Исследования, в которых единицами наблюдения были бы категории, нам неизвестны. Встречаются лишь предположения на этот счет (Diaz et al., 2004). Настоящая работа представляет собой попытку восполнить этот пробел.

Таким образом, задачей настоящей работы является проверка гипотезы, согласно которой продуктивность категории, т.е. среднее количество перечисляемых членов категории, отражающее скорость извлечения релевантного материала из семантической памяти, связано со степенью кластеризации категории. Наличие данной связи свидетельствовало бы о том, что семантическая дифференцированность категории является фактором ее продуктивности: члены категорий, которые содержат больше легко идентифицируемых группировок, будут перечисляться быстрее, т.е. испытуемые будут называть большее число членов таких категорий за единицу времени.

Метод

Материалом исследования послужили данные о продуктивности и кластеризации категорий (Григорьев, 2004). В нашей работе 2004 г., как уже указывалось, представлены нормы для 23 категорий. Из этих 23 категорий 22 были взяты из набора Баттига и Монтегю, а одна («ягода») была добавлена. Для нее не была рассчитана продуктивность, поэтому в настоящем исследовании данные по ней не применялись. Используются, таким образом, данные по 22 категориям.

Оценка кластеризации категорий

Для определения того, в какие кластеры испытуемые объединяют члены категорий, нами был разработан специальный алгоритм кластерного анализа.

[2] К сожалению, данные авторы приводят корреляции между числом сгенерированных слов и числом кластеров в последовательности этих слов. Очевидно, что, при постоянной степени кластеризации чем больше генерируется слов, тем больше в них будет кластеров. Если бы эти авторы представили корреляцию числа сгенерированных слов с отношением числа кластеров к числу сгенерированных слов, можно было бы делать выводы о роли кластеризации.

Он состоял в следующем. (1) В качестве исходного множества кластеров берется множество упомянутых всеми испытуемыми членов категории. (2) В качестве меры парной близости между кластерами берется отклонение наблюдаемой частоты их соседства от частоты их соседства, которую следует ожидать при случайной генерации членов категории (ожидаемой частоты), в единицах стандартного отклонения этой ожидаемой частоты. (3) Выбирается пара наиболее близких кластеров, выбранные кластеры объединяются, в дальнейшем рассматриваются в ответах испытуемых как один кластер, этот кластер включается во множество кластеров. (4) Возврат к (2). Данная процедура не является ультраметрической: кластеры могут непосредственно входить в более чем один кластер вышестоящего уровня.

Пояснения требует расчет парной близости между кластерами. Он основан на следующих соображениях. В последовательностях генерируемых испытуемыми членов категории два кластера могут либо соседствовать, либо нет. Легко показать, что вероятность случайного соседства двух кластеров, т.е. того, что два кластера случайным образом окажутся в последовательности рядом друг с другом, равна $2/n$ (n – число кластеров в последовательности), а вероятность того, что они не будут соседствовать, соответственно, $1 - 2/n$. Во множестве испытаний с двумя исходами ожидаемая частота реализации одного из исходов равна сумме вероятностей реализации этого исхода в отдельных испытаниях, а ожидаемая дисперсия этой частоты — сумме произведений вероятностей двух исходов (см.: Edwards, 1964, p. 50–51). Таким образом, ожидаемая частота соседства двух кластеров во множестве последовательностей, где оба они присутствуют, равна сумме $2/n_i$ (n_i – число кластеров в i-й последовательности), а ожидаемая дисперсия этой частоты — сумме произведений $2/n_i \times (1 - 2/n_i)$. В качестве меры парной близости используется разность наблюдаемой и ожидаемой частоты соседствования двух кластеров, деленная на корень квадратный из ожидаемой дисперсии (подробнее о проблеме парной близости см.: Григорьев, 2004, с. 87).

Подчеркнем, что кластеры выделялись на основании ответов испытуемых, а не априорных соображений и мнений экспертов.

В нашем исследовании 2004 г. для каждой категории представлены 11 образовавшихся первыми объединений кластеров. В таблице 1 приводятся в качестве примеров объединения для двух категорий: «четвероногое животное» и «инструмент плотника» (по: Там же, с. 96, 108).

В качестве показателя степени кластеризации категории в настоящей работе взято количество объединений с парной близостью больше 3 (т.е. с достаточно низкой вероятностью случайного соседства) среди 11 представленных кластеров. Если два кластера объединяются в один с парной близостью больше 3, считается, что они соседствуют в ответах испытуемых неслучайно, достаточно большое число испытуемых назвали соответствующие члены категории один за другим. Другими словами, мы имеем дело с устойчивым объединением членов категории. Количество таких устойчивых объединений и берется как показатель степени кластеризации категории.

Таблица 1

Примеры объединений кластеров для двух категорий

Номер объединения	Состав объединения	Близость	Состав объединения	Близость
	Четвероногое животное		*Инструмент плотника*	
1	собака, кошка	13.08	молоток, долото	2.43
2	тигр, лев	5.78	пила, станок	2.21
3	собака, кот	5.27	гвоздь, гвоздодер	2.00
4	лошадь, корова	4.80	пила, молоток, долото	1.95
5	кошка, лошадь	3.92	рубанок, шайба	1.87
6	волк, лиса	3.89	рубанок, ключ	1.87
7	тигр, слон	3.87	долото, напильник	1.87
8	волк, заяц	3.59	пила, напильник	2.00
9	заяц, волк, лиса	3.43	рубанок, наждак	1.86
10	лев, зебра	3.42	рубанок, долото, напильник	1.73
11	мышь, крыса	3.31	пила, болгарка	1.73

Результаты и обсуждение

Средние количества перечисленных членов категории и количества объединений с парной близостью больше 3 для 22 категорий представлены в таблице 2.

Как можно видеть, степень кластеризации значительно варьирует. В случае двух категорий («драгоценный камень», «инструмент плотника») в ответах испытуемых вообще не обнаруживается устойчивых группировок, в то время как в случае четырех других («четвероногое животное», «предмет одежды», «родственник», «птица») устойчивых группировок больше 10. Как и предполагали некоторые исследователи (Diaz et al., 2004), одни категории содержат больше легко идентифицируемых группировок, чем другие. По сути дела, продемонстрирована структурная неоднородность лексико-семантических категорий. Существование структурной неоднородности лексико-семантических категорий, рассматриваемых как языковые образования, а не с точки зрения их представленности в семантической памяти, известно лингвистам (см.: Филлмор, 1983). Однако в нашем исследовании эта неоднородность выявлена по ответам испытуемых, что дает право рассматривать ее в психологическом плане, полагая, что она характеризует репрезентации категорий в семантической памяти. Таким образом, помимо того, что различные лексико-семантические категории кодируются, по-видимому, разнородными признаками, их репрезентации, можно полагать, также являются структурно неоднородными.

Таблица 2

Средние количества перечисленных членов категории и количества объединений с парной близостью больше 3 для 22 категорий

Категория	Количество объединений с парной близостью больше 3	Среднее количество перечисленных членов категории
Драгоценный камень	0	5.45
Четвероногое животное	11	8.26
Вид ткани	0	6.00
Цвет	8	8.48
Предмет мебели	9	8.05
Овощ	6	6.99
Предмет одежды	11	8.66
Вид транспортного средства	7	7.08
Кухонная посуда	10	7.53
Вид спорта	7	6.78
Наука	3	6.10
Рыба	4	7.43
Родственник	11	9.73
Часть здания	5	6.25
Цветок	2	7.28
Фрукт	7	7.16
Дерево	6	8.56
Птица	11	8.45
Профессия	2	6.81
Металл	2	5.90
Инструмент плотника	0	5.09
Музыкальный инструмент	5	7.37

Коэффициент корреляции, равный произведению моментов (Пирсона), для переменных в таблице 2 составляет 0.838; $p < 0.001$; коэффициент ранговой корреляции (Спирмена) составляет 0.817; $p < 0.001$. Таким образом, гипотеза о связи кластеризации категорий и скорости перечисления ее членов подтвердилась. Это согласуется с предположением, что степень кластеризации лексико-семантической категории (и ее репрезентации) является фактором ее продуктивности. Возможная структурная неоднородность лексико-семантических категорий оказалась подходящим объяснением их различий в продуктивности.

В заключение отметим, что структурная неоднородность лексико-семантических категорий не может быть сведена к различию в степени кластеризации. Действительно, простой количественный показатель не дает указаний на то, что могут существовать разные типы структур таких объектов. Так, лингвисты (Там же) выделяют разные типы структур семантического поля (по сути дела, лексико-семантической категории): партономия, парадигма и т.д. Тип структуры лексико-семантической категории также может быть фактором ее продуктивности. Так, кажется вероятным, что высокая продуктивность категории «родственник» является в значительной степени следствием того, что данная категория представляет собой прототип парадигмы. Действительно, то, что одна оппозиция терминов родства (по полу родственника) регулярно повторяется на разных градациях других оппозиций (по поколению, родственной близости), значительно облегчает задачу испытуемого.

Добавим, что показатель степени кластеризации категории может подлежать разным истолкованиям при разных типах ее структуры. Например, в случае парадигмы высокая кластеризация обусловлена большим количеством парных объединений, основывающихся на небольшом числе одних и тех же связей. При другом же типе структуры — таксономии — за высокой кластеризацией может стоять меньшее число не обязательно парных объединений, основывающихся на разнообразных связях.

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The Relationship between the Degree of Clusterization of Lexical-Semantic Category and the Speed of Recitation of Its Objects

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Abstract

In the task of reciting objects belonging to lexical-semantic categories (category members), participants recite the members of some categories faster than the members of another. Results obtained in the studies on this task suggest that the degree of clusterization of categories' members may be the factor, which causes this difference between categories: categories, which members are grouped better have an advantage. To verify this suggestion, categorical norms for Russian language, which contain data about the average numbers of categories' members recited by participants per unit of time, and about the clusters in categories, which affect participants' responses, were used. Data on 22 categories (Precious Stone, 4-footed Animal etc.) were analyzed; for each of them the number of clusters with pair proximity above 3 was calculated; this number was used as a measure of degree of clusterization. It turned out that the categories significantly vary with respect to this measure: while for two categories (Precious Stone, Carpenter's Tool) it is zero, for four others (4-footed Animal, An Article of Clothing, A Relative, A Bird) it is above 10. The correlation between degree of clusterization and the mean number of category members generated was .838; $p < .001$. This result is consistent with the suggestion about the role of degree of clusterization of the members of lexical-semantic categories as a factor of the speed of recitation of objects belonging to it. However, other differences in structure of lexical-semantic categories may be such factors; in particular, a type of this structure may play a part.

Keywords: semantic memory, representation, semantic category, category norms, clusterization.

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СВЯЗЬ КРЕАТИВНОСТИ, ЦЕННОСТЕЙ И КОНФЛИКТНОГО ПОВЕДЕНИЯ СОТРУДНИКОВ

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Резюме

Феномен креативности привлекает внимание исследователей, однако до сих пор не были определены основные характеристики креативной личности. В ряде исследований креативную личность связывают с такими чертами, как автономия, предприимчивость, радикальность, открытость опыту и нейротизм (Любарт, 2009). В статье производится анализ теорий и исследований, посвященных изучению взаимосвязи креативности с чертами характера и конфликтным поведением. Был сформулирован основной исследовательсикй вопрос, заключающийся в необходимости уточнения данных о конфликтном поведении креативной личности по выборке сотрудников организаций, а также комплексного анализа связи креативности, черт характера и ценностей сотрудника. Цель исследования — изучение связи креативности, ценностей, особенностей характера и конфликтного поведения личности. Основываясь на концепции дивергентного мышления как креативности Д. Гилфорда (Guilford, 1950), было проведено корреляционное исследование на выборке в 720 человек (397 женщин и 323 мужчины). Положительная корреляция получена с ценностями самостоятельности и достижений, и отрицательная — с ценностью скромности и конформизма. Связь с факторами Большой пятерки, экстраверсии и открытости опыту проявилась на слабом уровне. Также креативность положительно связана с копинг-стратегиями принятия решений, принятия ответственности и дистанцирования, а отрицательно — с поиском социальной поддержки, бегством-избеганием и позитивной переоценкой. На основе полученных результатов исследования предлагается эмпирическая модель взаимосвязи креативности, ценностей, факторов большой пятерки и копинг-стратегий. Результаты проведенного исследования могут применяться в различных бизнес-процессах ассессмента и управления персоналом.

Ключевые слова: креативность, ценности, копинг-стратегии, конфликтное поведение, Большая пятерка, корреляционное исследование, регрессия.

Традиционно под креативностью понимают способность к созданию нового продукта, соответствующего текущему контексту деятельности (Amabile, 1996; Sternberg, Lubart, 1996; Яголковский, 2007). При этом новизна может изменяться от минимальной оптимизации известного ранее решения до принципиальных нововведений (Sternberg, 2010). Д.Б. Богоявленская в своих работах указывала, что креативность является склонностью к нетрадиционному и оригинальному мышлению, выходом за рамки общепринятых традиций (Богоявленская, 2002). Однако новизна продукта имеет тесную связь с внешней

ситуацией, предполагая его адаптивность и соответствие контексту (Sternberg, Lubart, 1991).

Еще одним вариантом понимания креативности можно считать дивергентное мышление, творчество, способность к поиску абсолютно различных и новых вариантов решения (Guilford, 1959)(Guilford, 1950, 1959).

Исследователями выделяются определенные личностные черты, положительно связанные с креативностью (DeCaro, Wieth, 2007; McCrae, 1987). Во-первых, открытость новому опыту и любопытство. Люди с такими чертами готовы искать новые решения по существующим проблемам, не держась за стереотипы. Другой чертой является индивидуализм, поскольку нонконформные идеи зачастую вызывают отрицательную реакцию общества. Таким образом, креативность в некоторой степени стимулирует развитие склонности к риску в деятельности, способности отойти от групповых стереотипов и продвинуть новую идею (Любарт, 2009). Более того, необходимо также отметить более эффективную адаптивность и восстановление организма после интенсивных стрессоров у креативной личности. В ситуации стресса креативные личности быстрее находят решение и эффективнее прогнозируют развитие ситуации (Eschleman et al., 2014).

Исследования, посвященные решению задач в условиях стресса, показывают, что тип совладеющего поведения связан с эффективностью решений (Delahaij et al., 2011). Респонденты, прибегающие к аффективному копингу, демонстрируют меньшую продуктивность. В исследовании подчеркивается связь фокусировки респондента на поиске решения как значимого предиктора эффективности в условиях стресса.

Совмещая результаты исследований, можно предположить, что креативность может быть связана с типом совладающего поведения.

Эта связь уже предполагалась исследователями (например: Холодная, 2008), однако в современной психологической литературе можно отметить явный дисбаланс в исследовании этой проблемы. Внимание исследователей часто приковано к выборкам испытуемых школьного возраста, в то время как заметен недостаток исследований взрослой выборки.

Ряд исследований посвящен особенностям совладания взрослых креативных личностей в организационном контексте. Так, творческие команды демонстрируют снижение продуктивности в условиях конфликтного взаимодействия, отрицательной обратной связи и неверно построенной системы мотивации (DeClerq, Rahman, 2017; Forbes, Domm, 2004). При этом отмечается особая эффективность действий креативных сотрудников по совладанию с конфликтными ситуациями (Chen, Chang, 2015; Farh et al., 2010; Janssen, Giebels, 2013; Santos et al., 2015). Эти исследования в большей мере фокусируются на связи креативности с внешними критериями, традиционными для организационной психологии, а сами связи личностных характеристик, ценностей, совладания со сложными ситуациями остаются без внимания.

Настоящее исследование посвящено поиску связи между выраженностью личностных черт, ценностных ориентаций креативной личности с предпочитаемыми стратегиями совладания со сложными ситуациями для взрослой выборки.

Концептуально замысел исследования можно выразить следующим образом (см. рисунок 1).

Результаты проведенного исследования могут быть использованы в подборе персонала и ассессменте, бизнес-консультировании и прочих мероприятиях, направленных на повышение эффективности интеграции креативных членов команды в продуктивное взаимодействие с другими.

Исследовательский вопрос заключается в поиске значимых связей между личностными чертами, параметрами креативности, ценностями и стратегиями совладания со сложными ситуациями.

С одной стороны, креативные команды эффективнее совладают с конфликтными ситуациями, однако, с другой, демонстрируют снижение продуктивности, что формирует теоретическое противоречие, составившее основу проблемы исследования. Кроме того, проблема также связана с необходимостью расширения выводов о совладающем поведении креативной личности для взрослой выборки, что имеет особую актуальность в организационной среде.

Метод

Респонденты

В исследовании приняли участие 720 человек (397 женщин и 323 мужчины), сотрудники крупных организаций, занятые на позициях среднего и более высокого уровня менеджмента, , возраст варьировался от 22 до 55 лет.

Материалы и процедура исследования

В эксперименте симулировались условия ассессмента, согласно ранее достигнутому соглашению с руководителями организаций. Респондентам предлагались к заполнению следующие тестовые формы:

Рисунок 1

Визуализация замысла исследования

1. Тест вербальной креативности Д. Гилфорда (Guilford, 1950). Был выбран первый субтест — придумать как можно больше применений простому предмету в течение пяти минут. Итоговый балл состоит из показателей беглости, гибкости и оригинальности. Показатели методики наиболее четко операционализированы, поддаются количественному анализу и независимы от прошлого опыта респондента.

2. Тест ценностных ориентаций Ш. Шварца (2008). Тест состоит из 57 вопросов и измеряет выраженность следующих ценностей: самостоятельность, стимуляция, гедонизм, достижения, власть, безопасность, конформизм, традиция, благожелательность и универсализм.

3. Тест на способы совладающего поведения Р. Лазаруса (Крюкова, 2007). Тест состоит из 50 вопросов и следующих шкал: позитивная переоценка, поиск поддержки социума, дистанцирование, принятие ответственности, принятие решений, бегство-избегание.

4. Тест Большой пятерки в адаптации А.Б. Хромова (2000). Данная форма к настоящему моменту является единственной открытой к некоммерческому использованию. Измеряет пять факторов: экстраверсия — интроверсия, привязанность — независимость, самоконтроль — импульсивность, эмоциональная стабильность — нейротизм, экспрессивность — практичность.

5. Анкета с социально-демографическими характеристиками (пол, возраст, должность, доход, город проживания, уровень образования).

Результаты

Статистический анализ произведен в среде R Studio с использованием пакета psycho.

Коэффициенты внутренней согласованности для показателей ценностей, факторов Большой пятерки и копинг-стратегий позволяют рассматривать результаты исследования как достоверные.

Средние значения, стандартное отклонение и коэффициент внутренней согласованности (альфа Кронбаха) для каждой переменной представлены в таблице 1.

Таблица 1

Описательная статистика переменных исследования

Показатель	M	SD	Альфа Кронбаха
Большая Пятерка			
Согласие	56.90	9.25	0.725
Открытость опыту	52.51	7.88	0.685
Экстраверсия	56.85	8.59	0.876
Нейротизм	37.03	9.82	0.873
Самоконтроль	62.02	9.46	0.792

Таблица 1 (продолжение)

Показатель	M	SD	Альфа Кронбаха
Ценности			
Самостоятельность	4.64	0.57	0.881
Стимуляция	3.91	0.72	0.879
Гедонизм	3.58	0.82	0.882
Достижения	4.41	0.59	0.882
Власть	3.76	0.74	0.874
Репутация	4.06	0.69	0.88
Безопасность	4.30	0.67	0.909
Конформизм	3.09	0.88	0.893
Традиция	3.90	0.71	0.903
Скромность	3.50	0.81	0.863
Благожелательность	4.79	0.46	0.859
Универсализм	3.86	0.70	0.868
Креативность			
Беглость	11.44	4.71	NA
Гибкость	7.67	2.73	NA
Оригинальность	26.67	13.36	NA
Общий показатель	45.78	20.11	NA
Копинг-стратегии			
Самоконтроль	10.40	4.66	0.801
Конфронтация	6.55	3.63	0.875
Бегство-избегание	9.40	4.93	0.814
Принятие решений	7.65	4.93	0.88
Принятие ответственности	6.83	5.34	0.841
Дистанцирование	6.73	5.25	0.832
Поиск социальной поддержки	10.85	4.99	0.843
Позитивная переоценка	9.60	4.90	0.896
Социально-демографический блок			
Пол	1.48	0.50	NA
Возраст	36.05	9.38	NA
Образование	3.00	0.38	NA
Доход	3.11	0.70	NA

Примечание. NA — мера согласованности для данного показателя не применяется.

Тест на нормальность с использованием критерия Шапиро–Уилка показал, что распределение показателей значимо отличается от нормального ($p < 0.05$), следовательно, параметрический коэффициент корреляции Пирсона не может быть рекомендован к применению. Для корреляционного анализа, данные которого представлены в таблицах 2, 3 и 4, был выбран непараметрический коэффициент корреляции Спирмена. В связи с анализом большого количества корреляций, была также проведена поправка на множественные сравнения по методу Бонферрони-Холма (Westfall, Young, 1993). Поправка была применена на общее количество корреляций между всеми переменными.

В таблице 2 представлены связи креативности и копинг-стратегий. Таким образом, наиболее значимую положительную связь с креативностью имеют стратегии принятия ответственности, принятия решений и дистанцирования. Отрицательная связь креативности обнаружена с показателями поиска социальной поддержки, позитивной переоценки и бегства–избегания. Слабая

Таблица 2

Результаты корреляционного анализа переменных креативности и копинг-стратегий с применением коэффициента Спирмена

Копинг-стратегии	Поправка Бонферрони	Беглость	Гибкость	Оригинальность	Общий показатель
Самоконтроль	после	−0.19**	−0.18**	−0.23**	−0.22**
	до	−0.19***	−0.18***	−0.23***	−0.22***
Конфронтация	после	−0.26**	−0.25**	−0.27**	−0.28**
	до	−0.26***	−0.25***	−0.27***	−0.28***
Бегство–избегание	после	−0.52**	−0.48**	−0.55**	−0.55**
	до	−0.52***	−0.48***	−0.55***	−0.55***
Принятие решений	после	0.54**	0.50**	0.57**	0.58**
	до	0.54***	0.50***	0.57***	0.58***
Принятие ответственности	после	0.63**	0.58**	0.68**	0.68**
	до	0.63***	0.58***	0.68***	0.68***
Дистанцирование	после	0.66**	0.61**	0.69**	0.70**
	до	0.66***	0.61***	0.69***	0.70***
Поиск социальной поддержки	после	−0.66**	−0.61**	−0.70**	−0.71**
	до	−0.66***	−0.61***	−0.70***	−0.71***
Позитивная переоценка	после	−0.54**	−0.49**	−0.57**	−0.58**
	до	−0.54***	−0.49***	−0.57***	−0.58***

* $p < 0.05$, *** $p < 0.01$, *** $p < 0.001$. Поправка Бонферрони-Холма применялась ко всем переменным.

отрицательная связь наблюдается со стратегиями самоконтроля и конфронтации.

Несмотря на то, что авторами методики Большой пятерки (Р. Маккрае и П. Коста) фактор открытости опыту традиционно связывается с креативностью, была обнаружена крайне слабая положительная связь между двумя данными феноменами (см. таблицу 3). Также слабую положительную связь с креативностью имеет фактор экстраверсии.

В таблице 4 представлены взаимосвязи креативности и ценностных ориентаций. Положительную связь можно отметить с ценностями самостоятельности и достижений. Отрицательную связь — с ценностью конформизма, крайне слабую отрицательную связь — с ценностью скромности.

Обсуждение результатов

Анализ результатов связи креативности и копинг-стратегий продемонстрировал положительную связь с дистанцированием, принятием решений и принятием ответственности. Кроме того, креативность отрицательно связана со стратегиями бегства-избегания, позитивной переоценки и поиска социальной поддержки. Таким образом, можно отметить стремление креативной личности к излишней переоценке своей роли в сложившихся жизненных ситуациях, а также к избеганию взаимодействия с другими. С другой стороны, подобная личностная характеристика также связана со способностью ответственно подходить к

Таблица 3

Результаты корреляционного анализа переменных креативности и Большой Пятерки с применением коэффициента Спирмена

Факторы Большой Пятерки	Поправка Бонферрони	Беглость	Гибкость	Оригинальность	Общий показатель
Согласие	после	0.07	0.00	0.04	0.05
	до	0.07*	0.00	0.04	0.05
Открытость опыту	после	0.15**	0.1**	0.14**	0.15**
	до	0.15***	0.1**	0.14***	0.15***
Экстраверсия	после	0.11**	0.08*	0.13**	0.13**
	до	0.11**	0.08*	0.13***	0.13***
Нейротизм	после	−0.07	−0.09*	−0.07	−0.08*
	до	−0.07*	−0.09*	−0.07*	−0.08**
Самоконтроль	после	0.00	−0.02	0.02	0.01
	до	0.00	−0.02	0.02	0.01

* $p < 0.05$, *** $p < 0.01$, *** $p < 0.001$. Поправка Бонферрони-Холма применялась ко всем переменным.

Таблица 4

Результаты корреляционного анализа переменных креативности и ценностей с применением коэффициента Спирмена

Копинг-стратегии	Поправка Бонферрони	Беглость	Гибкость	Оригинальность	Общий показатель
Самостоятельность	после	0.18**	0.20**	0.18**	0.18**
	до	0.18***	0.20***	0.18***	0.18***
Стимуляция	после	0.04	0.04	0.04	0.05
	до	0.04	0.04	0.04	0.05
Гедонизм	после	0.02	0.01	0.02	0.02
	до	0.02	0.01	0.02	0.02
Достижения	после	0.10**	0.13**	0.12**	0.12**
	до	0.10**	0.13***	0.12**	0.12***
Универсализм	после	0.08*	0.10*	0.07	0.08*
	до	0.08*	0.10*	0.07	0.08*
Конформизм	после	-0.15**	-0.17**	-0.18**	-0.17**
	до	-0.15***	-0.17***	-0.18***	-0.17***
Традиция	после	-0.08*	-0.07	-0.05	-0.06
	до	-0.08**	-0.07	-0.05	-0.06
Скромность	после	-0.08*	-0.07	-0.08*	-0.08*
	до	-0.08**	-0.07*	-0.08**	-0.08**
Благожелательность	после	0.01	0.04	0.01	0.01
	до	0.01	0.04	0.01	0.01
Власть	после	0.03	0.03	0.04	0.04
	до	0.03	0.03	0.04	0.04
Репутация	после	0.04	0.04	0.06	0.05
	до	0.04	0.04	0.06	0.05
Безопасность	после	-0.05	-0.07	-0.08*	-0.07
	до	-0.05	-0.07	-0.08**	-0.07*

* $p < 0.05$, *** $p < 0.01$, *** $p < 0.001$. Поправка Бонферрони-Холма применялась ко всем переменным.

результатам своего труда и ошибкам. Креативная личность склонна к независимости от общественного мнения, активности в решении задач и повышенной ответственности, что, в свою очередь, подтверждается результатами

других исследований (Waples, Friedrich, 2011). Таким образом, результаты не противоречат гипотезе об автономности креативной личности, однако гипотеза о предпочтении стратегии конфронтации остается неподтвержденной. Полученные результаты указывают на высокую адаптивность творческих сотрудников, в том числе благодаря использованию активных копинг-стратегий, предполагающих динамическое взаимодействие с окружающим миром. Стратегия дистанцирования как отвлечение от общественных норм и стереотипов может быть полезна на различных этапах творческого процесса – от создания продукта без постороннего влияния до попыток изменения своих реакций на внешнюю критику. Стратегия принятия ответственности может быть полезна в аспекте конфликтного взаимодействия благодаря повышению осознанности действий и пониманию критичных ситуаций, которые нуждаются в реалистичной оценке их роли в происходящем. Стратегия принятия решений напрямую связана с дивергентным мышлением как креативностью и предполагает комплексный анализ причин ситуации, ее возможных решений и выбор наилучшего. Таким образом, можно предполагать способность креативного сотрудника предпринимать больше попыток выхода из конфликтной ситуации.

Результаты анализа демонстрируют значимую положительную связь с ценностями самостоятельности и достижения. Отрицательно связаны с креативностью ценности конформизма и скромности. Обладающая дивергентным мышлением личность демонстрирует автономность в деятельности, самостоятельность, стремление к достижениям и результатам, однако также склонность к риску и нонконформизму, проявляющуюся в отрицании общественных норм. Таким образом, результаты не противоречат гипотезе о присущей креативной личности автономии (Creswell et al., 2013). Поведение креативного человека может быть воспринято внешним наблюдателем как конфликтное ввиду нонконформизма и самостоятельности деятельности, однако гипотеза о конфликтности не нашла своего эмпирического подтверждения. Творческий процесс, предполагающий отход от групповых норм и правил, может негативно восприниматься в организациях, зачастую имеющих определенный регламент работы. Более того, стремление креативного сотрудника к самостоятельности, индивидуальной работе и ответственности за ее реализацию вызывает ряд конфликтных ситуаций при работе в командах. Отсутствие ценности скромности и выраженность стремления к достижениям может дополнительно провоцировать конфликтное взаимодействие, а также нехватку его продуктивного решения ввиду особой ориентированности креативного сотрудника на собственный интерес.

Теснота связи креативности и фактора открытости опыту также не дает оснований отвергать гипотезу о наличии связи данных феноменов. Следует отметить особую значимость данных о связи креативности и открытости опыту (Любарт, 2009): авторы теории Большой пятерки факторов ставят знак равенства между данными показателями (McCrae, 1987), что подтверждается более современными исследованиями (Silvia et al., 2009), а также работами, посвященными изучению феноменов открытости в организациях (Eschleman

et al., 2014; Waples, Friedrich, 2011). Текущее исследование позволяет подтвердить данную связь лишь на крайне слабом уровне, отождествление данных понятий не является обоснованным. Данные указывают на разницу интерпретации креативности как дивергентного мышления и фактора Большой пятерки. С другой стороны, в конструкт открытости опыту входят показатели любопытства, сензитивности и мечтательности, которые, как указывают психологические исследования, присущи креативной личности (Eschleman et al., 2014; Benedek et al., 2013; Amabile, 1996). Таким образом, несмотря на то, что фактор открытости опыту не измеряет креативность, он тесно связан с чертами характера, присущими ей. Компоненты открытости опыту увеличивают чувствительность креативного сотрудника к внешним воздействиям. Мечтательность и любопытство позволяют создавать продукт за гранью общественных стереотипов, а также придают дополнительную мотивацию. Однако сензитивность может быть направлена как на особую чувствительность к собственным стремлениям, так и на враждебную реакцию на внешнюю критику.

Можно также отметить связь креативности с иным фактором Большой пятерки — экстраверсией. Возвращаясь к базовому определению Д.Б. Богоявленской, можно отметить особое место коммуникативных навыков в творческом процессе (Богоявленская, 2002). Таким образом, значимо не только создание инновационного продукта, но и способность к убеждению окружения в его полезности и необходимости. Кроме того, ввиду склонности к автономии и нонконформизму, поведение креативной личности может быть неверно истолковано обществом. Выраженная экстраверсия как открытость общению выполняет балансирующую функцию. Кроме того, экстраверсия позволяет учитывать потребности общества для создания наиболее релевантного контексту продукта (Amabile, 1996). В аспекте конфликтного взаимодействия творческого сотрудника экстраверсия позволяет эффективно найти общий язык и нивелировать возможные проблемы наиболее продуктивным для оппонентов способом.

В общем виде основные результаты исследования можно представить следующим образом (см. рисунок 2).

Полученные в ходе проведенного исследования результаты позволяют сделать следующие выводы.

1. Обнаружена значимая связь креативности как дивергентного мышления с копинг-статегиями принятия решений, дистанцирования и принятия ответственности, а также отрицательная связь со стратегиями бегства-избегания, позитивной переоценки и поиска социальной поддержки.

2. Обнаружена значимая связь креативности как дивергентного мышления с ценностями самостоятельности и достижения. Отрицательно связана креативность с ценностями конформизма и скромности.

3. Теснота связи креативности и фактора открытости опыту не дает оснований отвергать данную гипотезу исследования. Эта особенность может являться предпосылкой склонности к дистанцированию для снижения внутреннего напряжения.

Рисунок 2

Найденные в исследовании связи

4. Стоит также отметить тенденцию к связи креативности и экстраверсии как склонности к общительности и умению адаптироваться в социуме.

Ограничения и перспективы будущих исследований

В качестве ограничений следует отметить формат корреляционного исследования, который в отличие от экспериментальных условий не дает четкого представления о взаимовлиянии факторов, а также не позволяет исследовать реальное поведение. В данном случае исследователь может опираться на вербальный тест креативности, в то время как остальные методики остаются самоотчетными и подверженными социально-желательным ответам. Для наибольшей точности проводимого исследования планируется углубленное изучение гендерных и возрастных, а также профессиональных особенностей личности.

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The Connection Between Worker's Creativity, Values and Conflict Behavior

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Abstract

The creativity phenomenon attracts the researchers' attention, but the main characteristics of the creative personality have not been determined yet. In a number of studies creative personality is associated with such features as autonomy, enterprise, radicality, openness to experience and neuroticism (Lubart, 2000. The paper offers analysis of theories and studies devoted to the relationship between creativity, character traits and conflict behavior. Based on the review, the main research question was formulated as the need to extend data on the conflict behavior of the creative person to the sample of employees of organizations, as well as provide comprehensive analysis of the relationship between creativity, character traits and employee values. The aim of the paper is to study the relationship between creativity, values, personality traits and conflict personality behavior. Based on the concept of creativity as divergent thinking of D. Guilford (1950), a correlation study was conducted on a sample of 720 people (397 women and 323 men). Positive correlation is observed with values of independence and achievement, and negative correlation - with values of modesty and conformism. The connection with the Big Five factors of extraversion and openness to experience was low-level. Also, creativity is positively associated with coping strategies of decision-making, taking responsibility and distancing, and negatively - with the search for social support, avoidance and positive reassessment. The results of the study offer an empirical model of the connection between creativity, values, the Big Five factors and coping strategies. The research results can be applied in various business processes of assessment and personnel management.

Keywords: creativity, values, coping strategy, conflict behavior, big five, correlation, regression.

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К юбилею Александра Григорьевича Асмолова

АЛЕКСАНДР АСМОЛОВ. ПРАЗДНУЕМ ЮБИЛЕЙ...

Но ведь время жизни исчисляется не годами. А.Г. Асмолов — человек сквозь время. Его творчество — объединительно. В нем — разные времена, и разные пространства мысли и чувств: психология, биология, образовательная политика, поэзия, публицистика. Асмолову, в отличие от многих из нас, дано ощущать гражданственность науки, которой служит. Он, если вооружится известной метафорой, не «прораб духа»,он — «движитель» мысли в ее участности, действенности, включенности в жизнь.

Асмолов, если вспомнить слова одного из наших философов, есть «республика субъектов». Он родился лидером в семье лидеров. Его выдающаяся семья, его прекрасные учителя, его — *ровесники* разных возрастов (именно ровесники притом возрастов *разных*), его одаренные ученики («одаренные *им* самим как личностью, а не только мамами-папами), — все это в нем живо, все в движении, все воплощается. Как там сказано у Аристотеля? — «Неподвижный источнник движения?» С Асмоловым — не проходит! Он — само беспокойство, страстность, натиск, передающиеся тем, кто рядом.

Асмолов пристрастен. Не о нем ли, среди своих друзей, близкая ему по юности Белла, писала стихи о пристрастности? «Все остальное ждет нас впереди. Да будем мы к своим друзьям пристрастны! Да будем думать, что они прекрасны! Терять их страшно, бог не приведи!» Быть другом, и в этом смысле быть пристрастным, — это его дар бесценный, и каждый кто был близок ему в сложных ситуациях жизни мог бы сказать: «Асмолов сделал для меня все, что мог». Асмолов — его пристрастность в отстаивании интересов близких ему людей, готовность жертвовать временем, деньгами, здоровьем, быть жестким и категоричным, если требуется. Он может быть «неудобен». Его находчивость и разящее остроумие беспощадны, если кто-то позволяет себе неосмотрительность в оценке его друзей.

Его наука — это *его* наука. Начиная с первых работ «От психофизики чистых ощущений к психофизике сенсорных задач» (совм. С М.Б. Михалевской) (1974 г.) и сейчас (в работах постнеклассического направления), Асмолов отстаивает проблему субъектности. Психоаналитики бы сказал: «Проекция» — и были бы, по своему, правы! Субъектность автора во всех работах Асмолова (начиная с его курсовой, написанной полвека назад) вполне отчетливо проступает, не оставляя равнодушными всех, как пристрастных, так и равнодушных.

Каждая книга Асмолова и многие его статьи — событие. Назову лишь несколько книг. «Культурно-историческая психология и конструирование миров» (1996), учебник «Психология личности» (помню обсуждение книги, вопрос: «На какой платформе стоите?», ответ Асмолова: «Хватит стоять! Пора бы уже и поехать!»), «По ту сторону сознания: методологические проблемы неклассической психологии» (2002), «Оптика просвещения: социокультурные перспективы» (2012). Масштаб охватываемых тем огромен: от проблем эволюционной биологии до человека в поиске смысла. Особенно дороги мне его ранние книги: «Деятельность и установка» (1976), где была предпринта попытка соотнести теорию деятельности А.Н.Леонтьева и теорию установки Д.Н.Узнадзе (это был старт нашего сотрудничества с Асмоловым, посвященного инерционным и надситуативным моментам движения деятельности), а также его самые последние работы, посвященные преадаптации к неопределенности (2017), междисциплинарный проект «Mobilis in mobile: личность в эпоху перемен» (2018). Личностное отторжение «адаптивности», как приспособления к социуму, в работах Асмолова состоялось вполне...

И в этом — особая ипостась его, как политика. Смелость — это то, что, может быть, первым, бросается в глаза. Каждодневный риск человека, живущего в наше время. Родные и близкие поражаются, но остановить не могут. Чиновничья орава, уповая на свой административный ресурс, в своей огульной критике человека, движущего время вперед, ничем не рискует (разве что — потерять достоинство, с которым итак неважно). СМИ неистовствует, но смириться Асмолову не дано. Он знает, на что идет. Индивидуальность свою отстаивает, позиции не сдает.

Асмолов рассказывал мне, как Геннадий Алексеевич Ягодин, возглавлявший тогда наш перестроечный Госкомитет образования, журил его (в шутку, конечно): «Ты у нас чиновник молодой, начинающий...». Это было время, когда Асмолов стал работать в должности главного психолога этой организации. Асмолов так и остался – «начинающим»: начиная и проводя настоящие, а не фиктивные, реформы в образовании. Он не врос в кресло чиновника, он сразу из него вырос. Роль чиновника-функционера была ему тесна. И сейчас, как в те далекие годы, он продолжает борьбу с чинократией. Сегодня он член Совета по развитию гражданского общества и правам человека, и этот высокий статус, думаю, как раз по нему.

По итогам XIV Национального психологического конкурса «Золотая Психея» (2013) Асмолов стал победителем в номинации «Личность года в российской психологии». Из нашего представления на конкурс, подготовленного членами большого жюри Владимиром Петровичем Зинченко, Людмилой Николаевной Собчик и мной: «Асмолов не только пишет о неадаптивности, он являет собой то, о чем пишет (что, согласимся, бывает редко!). При этом ничего похожего на прожектерство. В отличие от людей, живущих «завтрашним днем» и упускающих настоящее во имя того, что будет упущено в будущем, Александр Асмолов всецело принадлежит настоящему, живет настоящим, вполне присутствует здесь и теперь. Не адаптируется, и не просто теоретизирует о «неадаптантах». Он – действует. Творит то, к чему, быть

может, рано или поздно придется «адаптироваться» тем, у кого приспособление в крови. В его трудах – не «преадаптация к будущему» (поспорим с Асмоловым!), а предвоплощение будущего».

Асмолов поднимается «над» адаптацией. Он сам никогда ни для кого не превратится в образец, потому что он — единственный. Такой, как есть. Человек своего времени, — времени перемен.

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