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Culture codes of scientific concepts in global scientific online discourse

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Abstract
This paper utilizes Rapaille's (2006) concept of culture codes and Hall's (2001) encoding and decoding model of communication to identify the culture codes of scientific concepts in global scientific online discourse. As an example, we attempted to identify the culture codes of the concept of "image", because this concept can be interpreted in different ways in Russian and international scientific discourse. To identify these codes, we analyzed the interpretations of the concept of "image" in scientific online discourse in Russia and abroad. We studied the titles, key words, and abstracts of papers published in 2014–2018 that appeared in the Russian Science Citation Index (RSCI) and the Scopus abstract and citation database. As a result, we identified the culture codes of the concept of "image" in Russian and international scientific online discourse and compared the culture codes of RSCI-indexed and Scopus-indexed papers. The method we utilized may be used for revealing the culture codes of any scientific concept (using any citation database), which can contribute to revealing and understanding the interpretations of these concepts by researchers from different countries.

Keywords Culture code · Scientific online discourse · Researchers · Image · Electronic communications · Scientific concept · Globalization

1 Introduction

Contemporary globalized society is characterized by a very high speed of transfer of information in scientific discourse that is becoming more and more international. This is conditioned by the fact that a considerable part of contemporary scientific discourse has moved online and become electronic. Many research papers published by scientists worldwide are indexed in global abstract and citation databases such as Web of Science and Scopus.

Many researchers in different parts of the globe may use the same concepts that appear in the electronic abstract and citation databases, but these concepts can be interpreted differently by researchers from different countries because of the different cultural values, traditions, and perceptions that exist in these cultures. This misinterpretation can prevent international researchers from understanding each other's ideas and receiving the synergetic effect while researching the same concepts.

In addition, there is a considerable part of scientific research that exists only within the national borders of specific countries and is not broadcast internationally. These papers reflect the views of researchers who live in a certain country and have particular cultural values. This type of research remains within the country's borders, and international scientists do not always understand what the national researchers intended.

Most national scientific papers are indexed in national abstract and citation databases. For example, in Russia, this is the Russian Science Citation Index (RSCI), and the vast majority of papers written in Russian are indexed in the RSCI.

Thus, many scientific concepts can have special interpretations in national scientific discourse, and when transferred into the international discourse, these concepts can be misinterpreted, which makes it difficult for the international scientific community to understand them in the way, in which they were intended to be understood.

However, the correct interpretation of scientific concepts in the course of their transition from national to international scientific discourse is essential for successful research in

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various fields. Revealing the culture codes of different scientific concepts might help researchers to better understand the concepts used nationally and internationally and find the common ground when researching the same social phenomena in the global scientific discourse. The necessary condition for revealing the culture codes is a proper analysis of how these concepts are studied in different scientific areas; this can help to identify the correct interpretations of these concepts in global scientific online discourse.

The concept of image is actively used in scientific online discourse to study the social phenomena of the contemporary global network society. In this research, we identified the culture codes of the scientific concept of "image" and made a comparative analysis of the culture codes of this concept in national (Russian-language) and international (English-language) scientific online discourse. The method we used for the concept of image is applicable to any other scientific concept.

2 What is a culture code?

The concept of culture codes is also close to the "cultural visions" described by Rasmussen in *Cultural visions of technology* (2013):

Cultural visions are shared constructs created through linguistic or visual acts. Their purpose is to articulate certain traits and issues of what current and future life situations may hold (Rasmussen 2013, 178).

We suggest that the culture code can predetermine a certain cultural vision of the future in the context of values and norms within the culture of people who live in a particular place. "Cultural visions are shared constructs created through linguistic or visual acts" (Rasmussen 2013). The linguistic and visual acts are in the culture codes; they can be seen through the actions and behavior usual for people in a certain culture in response to the actions and behavior of the interlocutor (Rasmussen 2013).

The concept of culture code is very close to the concept of "cultural marker" used by De Angeli (2009, 213), who analyzes "the cultural markers in the design of personal pages in social networking platforms". In addition, we take into account Triandis's (1989) and Markus and Kitayama's (1991) research on people's behavior that can be explained by their cultural views and values.

Our understanding of the culture codes is also connected with Banerjee's (2003) concept of cultural stereotypes; Banerjee considers that cultures differ greatly in their assessment of the same management language. He states that these variations make discourse-based styles less important but emphasize the basic aspects of global communication (Banerjee 2003). His *Narration, discourse and dialogue: Issues in the management* (2003) is also significant for our research because it discusses different cultural contexts of the discourse about innovation.

In our research, our perception of culture codes is connected with the concept of innovation, which is an outcome of people's intellectual activity, creativity, discovery, and rationalization. Any scientific knowledge contains some innovation potential, because innovation means adopting something new, for example, a new technology, which increases the effectiveness of some processes demanded by the market.

We consider that revealing the culture codes of a scientific concept facilitates understanding this concept in the global scientific discourse, and ensures the synergetic effect from discussing this concept in different cultural contexts, because, as stated by Banerjee (2003), in globalized society, intangible assets have become more significant as companies must accept innovation from various cultural sources.

3 Methodology

To reveal the culture codes of scientific concepts we utilized Rapaille's concept (2006) of culture codes. Rappaille defines a culture code as "the unconscious meaning we apply to any given thing…via the culture in which we are raised" (Rapaille 2006). The culture code contains the images of objects or phenomena that are interpreted through the culture in which people live. Rapaille (2006) compares images and culture codes with a combination lock, where the images are those combinations that can unlock it. Knowing the culture codes can make communication with people from any culture more effective.

To identify the culture codes, we used Hall's (2001) encoding and decoding model of communication, in which he describes encoding as the process of "closure" of multi-accentual cultural representations, in other words, narrowing the range of potential meanings to the most important to this particular social context. Hall considers that the meaning is organized through the production of codes. The closure makes the multi-accentual ideological constructions natural and absolute; as a result, they become a matter of common sense and meaningful discourse (Hall 2001).

According to Eco's theory of semiotics (1976), codes are essential for any communication activity and can be different in different contexts. Thus, we consider that encoded signs and symbols are generalized information, which can be broadened to different contexts. The signs and symbols are encoded in the virtual images and resonate with people's motives in a way that evokes certain behavior (Luhmann 2000), and they can influence the construction and perception of scientific concepts in different national scientific cultures.

In this sense, studying culture codes means researching some kind of semiotic formations that, as stated by Kuzheleva-Sagan and Suchkova (2016), can be understood only through communication. They believe that selecting the proper codes implies some semantic meaning, which, however, can be modified, distorted, or supplemented by some other meanings. Therefore, the correct selection of codes contributes to creating a comprehensive model with an "integrated semantic potential" (Kuzheleva-Sagan and Suchkova 2016).

4 Why the concept of image?

Image was chosen as an example to show how we revealed the culture codes of a scientific concept because the meanings of "image" differ greatly in the Russian-language and the English-language scientific discourse. This is explained by the fact that the Russian имидж, translated into English as image, has a narrower connotation than the English-language "image". This can make it complicated for Russian-speaking and international researchers to interpret the concept of image.

That is why, before we analyze the culture codes of the concept of image in international scientific online discourse, we consider it necessary to understand how image is interpreted in common use, and study the definitions provided by Russian- and English-language dictionaries.

The Cambridge Online Dictionary[1] defines "image" in various ways:

1. A picture in your mind or an idea of how someone or something is;
2. The way that something or someone is thought of by other people;
3. A mental picture or idea that forms in a reader's or listener's mind from the words that they read or hear (Cambridge Online Dictionary).

In English-language scientific communications, the most popular interpretation of "image" is a picture. In Russian, this interpretation virtually does not exist; consequently, "image" is very rarely used in this sense.

In different dictionaries,[2] the Russian имидж (image) is interpreted in some ways similar to each other:

1. As the "image" of a product, service, or person; a combination of impressions that people have about something in their minds, which defines their attitudes (Dictionary of Financial Terms);
2. As a deliberately created image (of person, phenomenon, or object) intended to have an emotional impact on someone aimed at promotion or advertising (Political Science Dictionary);
3. As a stereotyped image of an object that exists in the public consciousness (Big Psychological Encyclopedia); and
4. As the image of a businessperson, an impression that others have of them, and reputation; or image of a company, product, or service to support the position of the company on the market and the brand loyalty of customers (Economics Dictionary).

Thus, the interpretations of "image" are quite different in the Russian-language and the English-language dictionaries. The Russian-language interpretations are very close to the English-language interpretation given by Business Dictionary (BD),[3] which interprets "image" as the general idea that the public has of a product, brand, or company; while the most popular English-language interpretation of "image" is a picture.

These differences can cause misunderstanding and raise some questions: how does Russian-language and English-language research interpret the concept of "image"? What interpretations are more popular in Russian-language and English-language scientific online discourse? And do these interpretations have any common ground? We hope that revealing the culture codes of the scientific concept of image can shed some light on these questions.

5 Methods

5.1 International scientific online discourse

To reveal the culture codes of the concept of image in the international scientific online discourse, we used the Scopus abstract and citation database and analyzed the publications with the key word "image" (indexed in Scopus) in SciVal.[4] SciVal is a very convenient tool for the objective analysis of the international scholarly output because it offers a high-level overview of international research performance upon the direct citation analysis. In SciVal, Scopus-based publications are analyzed and grouped into the topics, which are integrated into multidisciplinary clusters that contain similar research topics.

[1] Cambridge Online Dictionary https://dictionary.cambridge.org/dictionary/english/image.

[2] Academic https://dic.academic.ru/dic.nsf/fin_enc/13606.

[3] BusinessDictionary (BD) http://www.businessdictionary.com/definition/image.html.

[4] SciVal https://www.scival.com/home.

Table 1 Correspondence between the subject areas and the scholarly output in Scopus and the RSCI, and the culture codes of the scientific concept of image revealed in the technical and natural sciences publications

Scopus			RSCI		
Technical and natural sciences					
Culture code	Scopus subject areas	Scholarly output	Culture code	RSCI subject areas	Scholarly output
Image processing	Earth and Planetary Sciences; Engineering; Materials Science; Mathematics; Physics and Astronomy; and Computer Science	728,399 (71.8%)	Image of the Earth and its structure	Physics; Geodesy, Cartography; Geophysics; Geology; Mining; Metallurgy; and Astronomy	144 (0.5%)
Medical image analysis	Medicine; Biochemistry, and Genetics and Molecular Biology	206,370 (20.4%)	Representation of physical health	Biology; and Chemistry	205 (0.7%)

We used the key word "image" and found publications connected with the concept of image in the Overview section. Then we used the *analyze in detail* function, which allows viewing the overall research performance, where we found the tag clouds with keyphrases to reveal the interpretations of the concept of image in different topic clusters. We also found the correspondence between the topic clusters and the subject areas in Scopus, and revealed the most highly cited publications. After that, we divided the publications into two groups: (1) publications connected with technical and natural sciences and (2) publications connected with social and human sciences. We analyzed the data and found the culture codes of the scientific concept of image. Finally, we viewed the abstracts of highly cited publications and found examples of the concept of image in the context of the culture codes revealed.

5.2 Russian national scientific online discourse

To reveal the culture codes of the concept of image in Russian national scientific online discourse, we used the publications indexed in the Russian Science Citation Index (the RSCI). The algorithm of revealing the culture codes of the concept of image in the Russian-language scientific online discourse was different from the one we used for the international scientific online discourse. There is no special analytical tool like SciVal for the RSCI, which is why we had to analyze manually the titles and abstracts of papers with the key word "image" in different subject areas of the RSCI.

We used systematic sampling and studied the titles, key words, and abstracts of every tenth paper indexed in the RSCI from 2014 to 2018. We grouped them into eight topic clusters according to the main emphasis of image interpretations: natural sciences, bio-chemical, economic, management, philosophic, mass communication, educational, and psychological. Then, we used the quantitative analysis of the Russian-language publications indexed in the RSCI and ranked the topic clusters according to the scholarly output (Table 2). After that, we analyzed the interpretations of the concept of image in every topic cluster and revealed eight culture codes of the concept of image in the Russian-language scientific online discourse.

Finally, we used comparative analysis of the culture codes of the concept of "image" in the Russian and international scientific online discourse and revealed the differences between the culture codes of the concept of image in the Scopus-indexed and RSCI-indexed papers.

6 Correspondence between the culture codes in Scopus and the RSCI

To compare the culture codes of the scientific concept of image in the scientific online discourse, we divided the publications into two groups: (1) publications connected with technical and natural sciences and (2) publications connected with social and human sciences. After that, we compared how the concept of image is interpreted in these two groups in the international scientific online discourse (Scopus), and in the Russian national scientific online discourse (the RSCI).

Table 1 shows the correspondence between the subject areas in Scopus and the RSCI, the scholarly output in these subject areas, and the culture codes revealed in the first group of publications (connected with technical and natural sciences). In this group of publications, there are two culture codes in both Scopus and RSCI that can be compared because they have similar interpretations: Image processing (Scopus) and Image of the Earth and its structure (the RSCI), and Medical image analysis (Scopus) and Representation of

Table 2 Correspondence between the subject areas and the scholarly output in Scopus and the RSCI, and the culture codes of the scientific concept of image revealed in the social and human sciences publications

Scopus			RSCI		
Social and Human Sciences					
Culture code	Scopus subject areas	Scholarly output	Culture code	RSCI subject areas	Scholarly output
Body image	Psychology	10,242 (1%)	Image-stereotype	Psychology; Medicine; Healthcare; Professional Safety	2264 (8%)
Loyalty and public support	Arts and Humanities; Business, Management and Accounting	30,868 (3%)	Confidence in the authorities	History; Politics and Political Science; Demography; Integrated Studies of Selected Countries and Regions; Organization and Management	3594 (12.6%)
			Intangible asset	Economics and Economic Sciences; and Other Branches of Economic Sector	9146 (32.2%)
Representation of social reality	Social Sciences	37,941 (3.8%)	Constructing social reality	Philosophy; Cultural Studies; Linguistics; Mass Communications; Journalism and Mass Media; Photographic and Cinematographic; Literature	4384 (15.4%)
			Typification social reality	Sociology; Information Science; Statistics	5277 (18.6%)
			Trust in the society through socialization	Public Education; Pedagogics; Religion and Atheism	3425 (12%)

physical health (the RSCI). However, scholarly output in these groups in Scopus (92.2%) and the RSCI (1.2%) is quite different, which makes it clear that this "technical" interpretation of the scientific concept of image is much more popular in the international scientific online discourse than in the Russian national scientific online discourse. More detailed analysis of the culture codes found in the group of publications connected with technical and natural sciences is presented below.

Table 2 shows the correspondence between the subject areas in Scopus and the RSCI, the scholarly output in these subject areas, and the culture codes revealed in the second group of publications (connected with social and human sciences). The situation with the publications in Social and Human Sciences is quite different to that with the technical and natural sciences. We found three culture codes in the Scopus-indexed papers (7.8%) that can be compared to six culture codes in the RSCI-indexed papers (98.8%): body image in Scopus and image-stereotype in the RSCI; loyalty and public support in Scopus and confidence in the authorities, and intangible asset in the RSCI; and representation of social reality in Scopus and constructing social reality, typification social reality, and trust in the society through socialization in the RSCI. This makes it clear that the "humanities" interpretation of the scientific concept of image prevails in the RSCI-based publications, and is not so popular in Scopus. More detailed analysis of the culture codes found in the group of publications connected with social and human sciences is presented below.

7 Culture codes in the Scopus-indexed papers

To reveal the culture codes of the concept of image in the Scopus-indexed papers, we used SciVal as an analytical tool that shows the research performance upon the direct citation analysis of Scopus-based publications (the detailed

description of how we revealed the culture codes in the Scopus-indexed papers is given in the Sect. 5). Most publications (92.2%) with the key word "image" in the Scopus-indexed papers are found in the following subject areas: Earth and Planetary Sciences, Engineering, Materials Science, Mathematics, Physics and Astronomy, Computer Science, Medicine, Biochemistry, Genetics and Molecular Biology, and some others. The publications in the subject areas connected with social and human sciences are not so numerous (7.8%); they are found in the following subject areas: Psychology, Arts and Humanities, Business, Management and Accounting, and Social Sciences.

We analyzed the data (the correspondence between the topic clusters in SciVal, the subject areas in Scopus, and the tag clouds with the keyphrases in SciVal), and found that there are five culture codes for the Scopus-indexed publications. Two culture codes belong to the first group of publications (connected with technical and natural sciences), with the largest number of publications (934,769 papers): (1) image processing (728,399 papers), and (2) medical image analysis (206,370 papers); and three culture codes are found in the second group (publications connected with social and human sciences) with the total of 79,051 papers: (3) representation of social reality (37,941 papers); (4) loyalty and public support (30,868 papers), and (5) body image (10,242 papers). The second group of publications constitutes only 7.8% of the total number of publications with the key word "image"; however, we believe that this group cannot be ignored because the number of publications is still considerable.

Below is the analysis of the abstracts, titles and keywords of highly cited publications in Scopus-indexed papers with examples of the concept of image in the context of the culture codes revealed.

7.1 Scopus-based culture codes of the scientific concept of image in technical and natural sciences publications

7.1.1 Image processing

The culture code of image processing is connected with technology, and is found in six subject areas: Earth and Planetary Sciences, Engineering, Materials Science, Mathematics, Physics and Astronomy, and Computer Science.

In these subject areas, image is understood as a picture or a graph, and its interpretation is often connected with performing operations on an image. In SciVal, we can trace this in the following topics clusters: Image Classification, Satellite Imagery, Image Segmentation, Image Coding, Image Compression, Image Sensors, and Infrared Imaging. This culture code is also supported by the keyphrases found in the tag clouds for these topic clusters: spectroscopy, radiometers, image reconstruction, image registration, classifiers image analysis, image enhancement, encoding, signal distortion codes, video streaming, grading image, image sensors, digital cameras, pixels, and others.

The Remote Sensing, Image Classification, Satellite Imagery topic cluster are mostly connected with satellite and radar technologies; there are numerous publications connected with hyperspectral (HIS) images. For instance, Zhang et al. (2014) describe a new method of HSI restoration, which can simultaneously remove the Gaussian noise, impulse noise, dead lines, and stripes; Wei Hu et al. (2015) describe the five levels for hyperspectral image classification. Jean et al. (2016) write about the role of satellite imagery in predicting the poverty; they describe how "a convolutional neural network can be trained to identify image features that can explain up to 75% of the variation in local-level economic outcomes".

The Image Coding, Video Signal Processing, Image Compression topic cluster is purely technological and is concerned with measuring the quality of stereoscopic 3D images by binocular integration behaviors. Wang et al. (2015) write about objective quality assessment of distorted stereoscopic images and present a binocular rivalry-inspired multi-scale model to predict the quality of stereoscopic images.

In the Image Sensors, Infrared Imaging, Digital Cameras topic cluster, there are numerous articles connected with image sensors and image processing. For instance, Ma and Fossum (2015) propose a new photodetector for the quanta image sensor. Nakamura (2017) researches image sensors and signal processing for digital still cameras (DSCs), and Yang et al. (2014) write about transactions on image processing presenting a Gaussian mixture model (GMM)-based algorithm for video reconstruction to model spatiotemporal video patches.

7.1.2 Medical image analysis

This culture code is connected with medical diagnostics and application of medical technology. It appears in two subject areas: Medicine and Biochemistry, and Genetics and Molecular Biology. B SciVal the publications from these subject areas are often found in the following topic clusters: Magnetic Resonance Imaging, Image Segmentation, Medical Imaging and Cytology, Image Segmentation, and Medical Imaging.

In these publications, image is interpreted as a picture, and most articles are connected with medical analysis of images. This is illustrated by the keyphrases that appear in the tag clouds: medical imaging, computerized tomography, image registration, computer-aided diagnosis, medical computing, imaging techniques, diagnosis, medical imaging, image classification, image analysis, and others.

In the Magnetic Resonance Imaging, Image Segmentation, Medical Imaging topic cluster, the concept of image is mostly connected with the development of magnetic resonance imaging (MRI). For instance, Ji et al. (2014) present a robust spatially constrained fuzzy c-means (RSCFCM) algorithm improving the accuracy for brain MR image segmentation. Havaei et al. (2017) propose a fully automatic brain tumor segmentation method using a novel convolutional neural networks (CNN) architecture that exploits local features and global contextual features simultaneously. Li et al. (2014) describe a new method of multiplicative intrinsic component optimization (MICO) allowing decomposition of MR images into two multiplicative components, the true image and the bias field. Zhang et al. (2014) prescribe a new HSI restoration method based on low-rank matrix recovery (LRMR) that can remove noises, dead lines, and stripes.

There are several articles connected with image segmentation. Menze et al. (2015) investigate the multimodal brain tumor image segmentation benchmark (BRATS); Oliveira and Tavares (2014) are concerned with infant brain image segmentation and introduce a review of automated image registration methodologies; and Taha and Hanbury (2015) present an effective tool for evaluating 3D medical image segmentation.

The Cytology, Image Segmentation, Medical Imaging topic cluster includes a number of articles connected with medical image analysis (Veta et al. 2015; Xu et al. 2014 and many others). For example, Litjens et al. (2017) discuss image classification, segmentation, and registration; Peng et al. (2014) describe analysis of large-scale multidimensional images and a software platform called visualization-assisted analysis (Vaa3D) and reveal the functions of Vaa3D. Janowczyk and Madabhushi (2016) are concerned with deep learning (DL) as an approach for image analysis in digital pathology, and give step-by-step instructions for utilizing it.

Many authors describe processing histological and histopathological images. Veta et al. (2014) investigate the analysis of breast cancer histopathology images. Spanhol et al. (2016) describe a method based on the extraction and combination of high-resolution histopathological image patches; and Spanhol et al. (2016) introduce a large dataset of breast cancer histopathology images and describe image classification systems.

7.2 Scopus-based culture codes of the scientific concept of image in social and human sciences publications

7.2.1 Body image

This culture code of the concept of image is represented in the Psychology subject area in Scopus. In SciVal, it is widely represented in the Eating Disorders, Anorexia Nervosa, Body Image topic cluster.

In these publications, the concept of image is interpreted in two ways: as "a picture in your mind or an idea of how someone or something is", or "the way that something or someone is thought of by other people".[5] This is supported by the key phrases found in the tag cloud for this topic cluster: self-concept, personality, gender identity, psychology, personal satisfaction, perception, and others.

Publications in this subject area are connected with positive body image (Webb et al. 2015, and others), and with body dissatisfaction. Tylka and Wood-Barcalow (2015a, b) have several publications about body image; they differentiate positive body image and negative body image and also present the renewed body appreciation scale. Holland and Tiggemann (2016) mention the influence of mass media on body image.

There are a number of publications connected with the projection of body image in social media. For example, Fardouly and Vartanian (2015) are interested in the body satisfaction of young women; they research the relationship between their using Facebook and body image concerns. Fardouly et al. (2015) investigate whether the impact of Facebook on young women is different from the one in online fashion magazines, and the impact of Facebook on women's mood and body image. Ghaznavi and Taylor (2015) present content analysis of thinspiration images on Twitter and Pinterest; and Tiggemann and Zaccardo (2015) touch upon the issue of fitspiration, analyzing its influence on women's body image.

7.2.2 Loyalty and public support

The loyalty and public support culture code is represented in 27 subject areas in Scopus. However, the largest number of mentions, where the concept of image is interpreted this way, is found in the Arts and Humanities, Business, Management and Accounting subject areas. The concept of image in these subject areas is generally interpreted from the perspective of its management function, i.e., how image can manage attitudes of public audiences. In SciVal, this interpretation of the scientific concept of image is presented in the Brand loyalty, Brand image, Desertification control topic cluster.

The loyalty and public support culture code is often connected with the role of image in consumption, and generating confidence in the market (Hanser and Li 2015); and the influence of digitalization on brand image management, for example, of non-profit organizations (Huang and Ku 2016). This code is very close to the concept of brand and the quality

[5] Cambridge Online Dictionary https://dictionary.cambridge.org/dictionary/english/image.

of brand, and management of values of customers and different kinds of organizations, for example, sports clubs (Miragaia et al. 2016). The main difference between the concepts of image and brand in these papers is that a brand is interpreted as a term, design, or symbol or function that differentiates the product or service from similar products or services proposed by competitors. Brand image is interpreted as the way how the brand is perceived by the target audiences. The management function of image is revealed through creating brand loyalty (Vera and Trujillo 2017), where loyalty is seen as trust to the organization expressed through public support.

Unlike the economic culture code of image as an intangible asset, this interpretation of image is more social than economic, and is based on universal human values. To put it another way, it means that the code of loyalty and public support emphasizes a broad area for image research connected not only with the monetary value of the brand, its efficiency and productivity, but also with brand awareness, perceptible quality, and loyalty of stakeholders, demonstrated as a reaction to the specially created associations and beliefs of the target audiences of the image.

7.2.3 Representation of social reality

The culture code of representation of social reality implies the philosophic understanding of image, and is presented in the Social Sciences subject area; this understanding is connected with the representation of certain beliefs as part of a specific picture of the world. In this case, the concept of image is associated with social beliefs and attitudes, and their interpretations; image is interpreted as a means for understanding reality. Image is some kind of tool for thematic categorization of reality (De Conti Rivara 2016) in the human mind; people's individual and social desires are implemented through this reality. For example, Duplouy (2018) analyses the image of an ancient city as a place where people start to perceive themselves as citizens.

This culture code is also connected with shaping the world view as part of personal development. For example, some authors discuss the issue of professional development in cross-cultural settings. Researching the image of teachers and students of different nationalities can serve the basis of effective pedagogical approaches contributing to integrating students into the learning environment, and understanding and accepting the cultural differences of the cross-cultural educational environment (Alvaré 2017).

8 Culture codes in the RSCI-indexed papers

To reveal the culture codes of the concept of image in the RSCI-indexed papers, we classified the publications according to the interpretations of the concept of image, and grouped them into eight topic clusters: Engineering, Natural Sciences, Economic, Management, Philosophic, Mass Communications, Educational and Psychological. After that, we revealed one culture code for each topic cluster (the detailed description of how we revealed the culture codes in the RCSI-indexed papers is given in the Sect. 5). Most publications (98.8%) with the key word "image" in the RSCI-indexed papers are found in the following subject areas that belong to social and human sciences: Psychology, Medicine, Healthcare, Professional Safety, History, Politics and Political Science, Demography, Integrated Studies of Selected Countries and Regions, Organization and Management, Economics and Economic Sciences, Other Branches of Economic Sector, Philosophy, Cultural Studies, Linguistics, Mass Communications, Journalism and Mass Media, Photographic and Cinematographic, Literature, Sociology, Information Science, Statistics, Public Education, Pedagogics, and Religion and Atheism. Unlike Scopus-indexed publications, the RSCI-indexed publications in the subject areas connected with technical and natural sciences are not so numerous; they constitute only 1.2%, and are found in the following subject areas: Physics, Geodesy, Cartography, Geophysics, Geology, Mining, Metallurgy, and Astronomy.

We analyzed the titles, key words, and abstracts of every tenth paper indexed in the RSCI from 2014 to 2018 and revealed eight culture codes for the RSCI-indexed papers. Two culture codes are connected with the natural sciences: (1) image of the Earth and its structure (144 papers), and (2) representation of physical health (205 papers). Six culture codes are related to social and human sciences: (3) intangible asset (9146 papers), typification of social reality (5277 papers), constructing social reality (4384 papers), trust in the society through socialization (3425 papers), confidence in the authorities (3425 papers), and image-stereotype (2264 papers).

The analysis of the culture codes of the scientific concept of image in the RSCI-indexed publications is presented below.

8.1 RSCI-based culture codes of the scientific concept of image in technical and natural sciences publications

8.1.1 Image of the Earth and its structure

The culture code of image of the Earth and its structure is formed in the scientific discourse in the following subject areas: Physics, Geodesy, Cartography, Geophysics, Geology, Mining, Metallurgy, and Astronomy. We grouped the publications found in these subject areas in the Natural Sciences topic cluster. In this topic cluster, image is understood as a picture received as a result of electrotomography (Seminsky and Bobrov 2018), 3D numerical simulations with special

geological equipment that researches the Earth surface and interior (Glinskikh et al. 2018), and others.

In many publications in this topic cluster, the concept of image is connected with application of optical devices. For instance, Khaidukov (2015) mentions the image-oriented method of identifying local inhomogeneities using 3D seismic data. In addition, researchers study the image of ore-bearing areas received from remote sensing (Boriskina et al. 2014); Zueva and Suraykina (2016) study images in relation to mapping; Gribok (2016) discusses the image connected with video infographics as a way to visualize statistical and geographical information. This topic cluster also includes the publications viewing image as a picture received with downhole scanning devices (Srebrodolskaya and Fedorova 2017).

8.1.2 Representation of physical health

The culture code of representation of physical health comes from the Biology and Chemistry subject areas that constitute the Bio-chemical topic cluster. In this topic cluster, the scientific concept of image can have quite different interpretations.

The first interpretation is similar to one of the interpretations of Scopus-indexed publications connected with Medical image analysis. For example, image diagnosis of lung diseases connected with prevention of tuberculosis (Sokolina 2017). The second interpretation of the concept of image is connected with such areas as sports (Krasulina and Kazakova 2015), recreation (tourism, in particular) (Fominykh and Kuchinskaya 2016), and others, and is used more often in the perspective of preserving people's health. Besides, image is interpreted from the pharmaceutical perspective. For example, Gusev et al. (2014) state that production and supply of herbs are not only cost-effective but help create a positive image of the region. Both medical and pharmaceutical interpretations are always connected with health issues, for instance, Parkhomenko et al. (2018) mention that oral hygiene and tooth aesthetics are important for good health and image.

In addition, the interpretation of image in this topic cluster can be connected with a sense of comfort and self-satisfaction. In this sense, image is considered as some kind of reaction to social standards and is connected with people's appearance and healthy life-style. For instance, Grosheva (2015) investigates how image can influence women's health; she mentions that women feel better and healthier if they wear stylish clothes and shoes, have a fashionable hairstyle, and good manicure. Verigo et al. (2015) consider that the new generation appreciates healthy body and lifestyle as an element of their image, and, as a result, demonstrate their desire to improving their image through sports and exercises.

8.2 RSCI-based culture codes of the scientific concept of image in social and human sciences publications

8.2.1 Image-stereotype

This image-stereotype culture code is found in the publications in the following subject areas: Psychology, Medicine, Healthcare, and Professional Safety. We grouped these publications in the Psychological topic cluster, because the concept of image is interpreted from the psychological perspective.

In the Psychological topic cluster, image is characterized as "image-stereotype" that appears as a result of emotional evaluation. Image is based on stereotypes, and involves a certain context of evaluating information. Image is able to change people's views and behavior. In this sense, a stereotype dominates over the cognitive, ensuring perception of information encoded in the image (Belobragin 2018 and others).

Researchers study the roles of the nonconscious, the archetype, the myth, the everyday conscious, and the social experience in creating image. Chovdyrova and Klimenko (2018) study the image created by a special psychological method that triggers the mechanism of self-change, driven by personal or social expectations. This method of creating image is used in therapeutic practices as a tool for regulating behavior and managing effective communication.

The psychological interpretation of image is connected with the psychotherapeutic qualities related to managing attention, comforting interpersonal communication, and interpersonal adaptation (Kitikar 2016; Semenova 2017). This means that the focus of research is on the personal image and takes into account personal characteristics of different groups: military people (Shulga 2015), executives (Smirnova 2015), university students (Lukina et al. 2018), scientists (Razina and Volodarskaya 2017), mothers (Takkel and Agapova (2014), and others.

In sum, in the Psychological topic cluster, researchers study the management capabilities of image that can influence mental processes (perception, memory, imagination, and others), mental status (tension, motivation, frustration, emotions, feelings, and others), and mental qualities (character, temperament, predispositions, and others), and the culture code of image is image-stereotype.

8.2.2 Confidence in the authorities

The publications found in such subject areas as History, Politics and Political Science, Demography, Integrated Studies of Selected Countries and Regions, Organization and Management can be grouped in the Management topic cluster. In this topic cluster, image is considered an objective,

deliberately built, and subjectively perceived phenomenon, which can be qualitatively improved and transformed from being ideal to being real. Image research is focused on using image technologies for improving communications. Image, in this sense, belongs to organizational management and politics, where image can manage places and organizations. Image making contributes to building loyalty to authorities and increases the effectiveness of management. The culture code of this topic cluster is confidence in the authorities that makes target publics accept the authorities as legitimate and obey the rules created by the authorities.

In the management topic cluster, many articles are connected with signs and symbols of authority, influencing public opinion, and creating image in politics and business (Kochetova and Burmistrova 2015; Martolina 2016; Kuznetsova 2016; Ustinova 2016). These papers (for example Gayiduk and Lukyantsev 2017) analyze the political actors, the issues of domestic and foreign policy, general and particular interests of image influence, and communications of state and society.

Creating an image is considered an important condition for the legitimization of the authorities; it is connected with a positive vision of the future, which is important for shaping the behavior patterns of the target audiences. Rozanova (2017) states that building the most effective partnership model of the interaction of political institutions and civil society requires harmonizing interests of many social groups in the conditions of public transformations. The stereotyped ideas of community members about the image of the authorities can shape the demand for improving the existing image and the mechanisms for social governance, thereby bringing the existing image closer to the desired one.

Thus, this is what image making is about: to make the target publics believe in the image created for the future, and then build this image in reality. Image making can contribute to increasing employment and creating new sources for the income in the future (Khavinson 2017).

Image can manage perceptions and behavior; it facilitates communication between the authorities and the target publics (Perov 2017; Podgornova and Baryshnikova 2018). The technological effectiveness of the image is recognized by political science and is used to manage the behavior of the electorate and build trust in the authorities.

8.2.3 Intangible asset

The intangible asset culture code is found in the publications in the following subject areas: Economics and Economic Sciences and Other Branches of Economic Sector; thus, we grouped these publications in the Economic topic cluster. The main culture code in the Economic topic cluster is an intangible asset that can be converted into economic capital, which serves as a competitive advantage of those involved in economic activity. The economic topic cluster emphasizes economic activity and the relations that exist within the system of distribution, exchange, and consumption.

In this topic cluster, image is viewed as a tool that can regulate corporate behavior and activity of target audience; it can increase a company's competitiveness and economic value. The papers published in this cluster view image as a combination of ideas and impressions about actors and subjects of economic activity: a person, company, product, or service. In most publications, image is connected with intangible assets and increasing economic performance. Communication and management functions of image (the ability of intangible assets to influence its economic characteristics) are emphasized by Suslov (2014).

The economic understanding of image connotes its integration into economic activity, where image can change the actors' behavior and create a competitive advantage for those involved in the economic activity, because in the conditions of high competitiveness, the pricing and quality of a product do not always define the effectiveness of the economic activity (Bernatskaya and Samanova 2017). Baranova (2015) examines "financial image", and defines it as a deliberately created image of a company that appears as a result of financial interaction with clients, competitors, and other stakeholders.

Image technologies are important for professional communication, building the corporate culture as a resource for increasing the effectiveness of the economic activity. The technologies of constructing the image are used in strategic management; they help to increase competitiveness and economic attractiveness, differentiation from competitors, and brand creation (Unusova et al. 2015).

8.2.4 Constructing social reality

The culture code of constructing social reality is revealed in the following subject areas: Philosophy, Cultural Studies, Linguistics, Mass Communications, Journalism and Mass Media, Photographic and Cinematographic, and Literature. The publications in these subject areas provide some kind of philosophic understanding of the concept of image; therefore, they can be grouped into the Philosophic topic cluster. Image in this topic cluster acts as a key to understanding a culture; image is understood as a combination of signs and symbols and their meanings. Image serves as a tool of creating a consistent picture of the world and constructing social reality, which we consider the specific culture code of image in the philosophic topic cluster.

Philosophic understanding of the concept of image contributes to the holistic perception of image as a combination of emotions, ethics, aesthetic norms, and other values of communicators that constitute this image (Savelieva 2017; Serpilina 2016, and others). According to Metlyaeva

(2017), image is viewed as a component of worldview, which includes some fundamental values: ontological (freedom, honor, fairness, and others), existential (safety, health, welfare, and others), economic (wealth, success, and other material values), intellectual (wisdom, knowledge, intelligence, and others), aesthetic (beauty, grace, humor, and others), moral (honesty, duty, generosity, kindness, nobility, and others), teleological (sense of purpose, high calling, and others), values connected with self-esteem (fame, popularity, prestige, respect, authority, and others), and values connected with relationships (friendship, love, faith, devotion, cooperation, selflessness).

In the philosophic topic cluster, values are seen in terms of understanding and interpreting the image (Ratsiburskaya 2017 and others). This is connected with understanding image as a means to comprehend social reality (the cognitive function of image), which helps people identify themselves in the world around them. For example, creating the image of positive identities in the public consciousness is important for promoting the image of cultural identity (Gaidukova 2017).

The philosophic interpretation of image is connected with constructing social reality. Image is concerned with the demarcation of the objects and phenomena of social reality and shaping perceptions. For example, Fadeev (2014) states that image is considered a combination of signs, codes, and sign systems.

Participating in creating the picture of the world, image also has a function of self-projecting in a culture. While creating an image, individuals not only define their personality, but also pursue their objectives with the image created earlier and shape the necessary qualities. Image reflects the nature of a person who has this image and of the social group that this person belongs to (Sidorova 2014). Image broadcasts value-driven information, acting as a culture code, and manages the unconscious attitudes of people; adapting these codes means belonging to a certain cultural group (Petrova 2014).

8.2.5 Typification of social reality

Publications from Sociology, Information Science, and Statistics subject areas can be grouped into the Mass Communication topic cluster. Publications in this topic cluster study image from the perspective of typification of social reality (Myasnikova and Eyngorn 2017), which is reflected through signs and symbols, and is connected with social groups, communities and institutions. Image reflects and broadcasts the norms that exist in the community and consolidates them in the public consciousness. For instance, Gevinner (2014) gives an example of women's roles in the society, which are typically hedonistic (e.g., slimness and physical attractiveness), while men's roles are more often agonistic (physical strength, aggression, and independence).

In the theory and practice of mass communications, researchers very often study how image influences group consciousness and behavior (Posypanova and Posypanova 2017), changing mindsets and compliance with the standards of conduct in different social communities (e.g., image as a means of achieving social importance). More and more current research is connected with the image of social groups on the Internet (Novikova 2016; Smirnov 2017; Soldatov and Ivanov 2016). For instance, Lisina (2016) researches the image of a person leading a healthy lifestyle in the conditions of network social involvement.

To sum up, image as a phenomenon of mass communication has the functions of classification, structuring, and typification. Image also has regulatory and management functions, as it manages and controls communications. Image is often seen as a tool to manage large social communities that have appeared because of globalization and development of network technologies. Thus, image is perceived as a phenomenon of public consciousness and the culture code of the concept of image in this topic cluster is typification of social reality.

8.2.6 Trust in the society through socialization

Trust in the society acquired through socialization is the specific culture code in the Educational topic cluster that consists of Public Education, Pedagogics, Religion and Atheism subject areas. In the educational perspective, image describes a certain model of mindset and behavior that must be acquired by the younger generation to feel comfortable and safe.

In the Educational topic cluster, image is perceived as a phenomenon connected with upbringing and education. Researchers are interested not only in the image of actors in the educational process (Yakusheva 2018; Morozov 2016), but also in the image of organizations that are involved in upbringing and education (Enenko and Nadtochiy 2015), where image is seen as a tool for learning and motivation.

Image is interpreted as a simplified image-stereotype of social reality, which makes it easier for the younger generation to understand this reality, and can be used as a tool of harmonizing young people's views and values. (Omarova 2016). The reason that image is effective is that people always try to categorize the world around them to make it easier for perception.

Stereotyped images contribute to mutual understanding and interpersonal communication. Shutov (2015) considers that image can serve as a navigator in the continuum of social behavior, pointing at the least dangerous and stereotyped decisions, which contributes to acquiring a sense of

belonging to the society and safety and trust in the world around them.

9 Conclusion

In sum, the method described of identifying the culture codes of scientific concepts utilizing Rapaille's (2006) concept of culture codes and Hall's (2001) encoding and decoding model of communication is important for methodizing the data and identifying how scientific concepts are perceived by domestic and international audiences. Abstract and citation databases in any language are the best sources for obtaining data because they contain valuable and reliable information and reflect different values and perceptions of researchers from different cultures, sciences, and disciplines.

Culture codes are obtained by narrowing the range of potential meanings encoded in publications in various subject areas to the most important ones in a particular cultural context. Only the most frequent mentions can constitute culture codes, as these are steady images fixed in the minds of researchers from different countries. We used the concept of image to test the method of identifying the culture codes of scientific concepts. This method can be applicable to any other scientific concept. Revealing culture codes implies thorough analysis of how this concept is used in different subject areas of national and international abstract and citation databases.

The concept of image investigated in this research has quite different culture codes in the Russian national and international scientific online discourse. Despite the fact that the scientific concept of image is interpreted by both technical and natural sciences, and social and human sciences in Russian national and international online discourse, these interpretations are quite different. In the RSCI-indexed papers, image is mostly studied by social sciences, arts, and humanities (Economics, Management, Philosophy, Mass Communications, Education, Psychology) while in the Scopus-indexed papers, image is more often examined from the technological perspective, and studied by Computer Science, Engineering, Mathematics, Materials Science, Medicine, and some other sciences.

This means that in the Russian national online discourse, image is perceived more as a social and sociological phenomenon that can manage individual and mass consciousness and behavior; the management function is the main function of image; and the most popular interpretation of image is connected with how a person or an object is perceived by others. In the international scientific online discourse, the most popular interpretation of image is connected with its graphic representation (a picture).

We found that Russian-like interpretation of image in social and human sciences exists in the international discourse, but it is not as popular. In Scopus, there are also publications connected with image in business: internal and external image, corporate image, public image, brand image, image of a country, and so on, in the Business, Management and Accounting subject area, but SciVal does not contain special topic clusters for them. This means that these interpretations of image are not highly cited, and, therefore, cannot be considered important to the international scientific communications.

To sum up, we can draw parallels between understanding the concept of image in the Russian national and international scientific online discourse. Metaphorically, this is expressed in similar culture codes of the scientific concept of image that we revealed in Scopus- and RSCI-indexed papers. In the technical and natural sciences discourse, there are the following similarities: image processing in Scopus and image of the Earth and its surface in the RSCI; and medical image analysis in Scopus and representation of physical health in the RSCI. In social and human sciences, the following culture codes are similar: body image in Scopus and image-stereotype in the RSCI; loyalty and public support in Scopus and confidence in the authorities, and intangible asset in the RSCI; and representation of social reality in Scopus and constructing social reality, typification social reality, and trust in the society through socialization in the RSCI.

Knowing such differences and similarities in interpretations of scientific concepts is important for integration of national scientific research into the international scientific discourse, and researchers must keep in mind that quite different interpretations of scientific concepts exist, and take them into account, when they decide to go international.

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