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Dealing with climate change risks on-line: Graphical representation of 'global warming' in the Russian segment of Internet

Hacer frente a los riesgos del cambio climático en línea: Representación gráfica del "calentamiento global" en el segmento ruso de Internet

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Content

ABSTRACT:

The graphic representation of 'global warming' in the Russian segment of Internet is studied via content analysis of web-images collected by query to two most popular on-line search engines. The results show that these web-images can be assigned to several topics, from which ice melting, drought, and flooding are dominant. The studied graphic representation is poorly-justified, biased, and irrelevant to Russia and Russians. Functioning of the Russian segment of Internet for minimization of climate change risks should be improved.
Keywords: Climate changes , Content analysis , Risk , Russia , Web-images.

RESUMEN:

La representación gráfica del "calentamiento global" en el segmento ruso de Internet se estudia a través del análisis de contenido de imágenes web recopiladas por consulta en dos de los motores de búsqueda en línea más populares. Los resultados muestran que estas imágenes web se pueden asignar a varios temas, de los cuales la fusión del hielo, la sequía y las inundaciones son dominantes. La representación gráfica estudiada está mal justificada, sesgada e irrelevante para Rusia y los rusos. Debe mejorarse el funcionamiento del segmento ruso de Internet para minimizar los riesgos del cambio climático.
Palabras clave: Cambios climáticos, análisis de contenido, riesgo, Rusia, imágenes web.

1. Introduction

Global climate changes that are popularly labeled as 'global warming' are one of the most principal challenges to the modern society. The essence of the relevant problems and their

essential complexity are explained in the fundamental works of DiMento & Doughman (2007) and Houghton (2009), as well as in numerous articles, including those influential published by Karl & Trenberth (2003), Gardiner (2004), Dore (2005), Hirabayashi et al. (2013), Wheeler & Von Braun (2013), Clapp et al. (2018), and Norgaard (2018). Understanding and management of climate change risks seems to be ambitious, but very urgent tasks to be posed and solved at the national level. Russia is a large country with rich and diverse natural resources. Its vulnerability to climate changes has been discussed, particularly, by Pavlov (1994), Meleshko et al. (2004), Alcamo et al. (2007), Bulygina et al. (2007), Dronin & Kirilenko (2008, 2011), Govorkova et al. (2008), Forbes & Stammler (2009), Sharmina et al. (2013), and Davydova (2017). Generally, it is evident that the problem of climate changes is very important to Russia, and it should be addressed adequately.

Rapid growth of IT-environment (e-environment, Internet environment) is an important process linked to globalization. This environment has started to shape understanding of our own being, and, consequently, it is sensible to examine its relevance to the problem of global climate changes. As IT-environment varies depending on cultural, socio-economic, and other national peculiarities, such an examination can be focused on particular countries. The main objective of the present article is to characterize graphical representation of 'global warming'-related topics in the Russian segment of Internet. This can facilitate our understanding of how the information distributed on-line is important to global change risks.

2. Conceptual remarks

Climate change risks are linked closely to how these changes are perceived by the society. The relevant questions are discussed in the works of O'Connor et al. (1999), Sheppard (2005), Leiserowitz (2006), Etkin & Ho (2007), Hamilton & Keim (2009), Weber (2010), Spence et al. (2011), Hansen et al. (2012), Aksit et al. (2018), and Essl & Mauerhofer (2018). A few studies of the same kind – e.g., Graybill (2013), Anisimov et al. (2017) – focused on Russia. Evidently, significant awareness and correct understanding of global climate changes by the society determine lower (in the form of preparedness) or higher (in the form of unpreparedness) risks. Climate change perception has three important premises, namely availability of information, communication of information, popularity of information. The central word in all these cases is 'information', and, thus, it is sensible to address to its sources.

Undoubtedly, information plays outstanding role in environmental governance (e.g., Yashalova et al., 2017). The role of Internet as important source of information related to global climate changes has been noted by several specialists, including Berrens et al. (2004), Smarr (2010), Taddicken (2013), de Kraker et al. (2014), and Leal Filho et al. (2015). Presumably, this source becomes more and more important in many countries, including Russia where on-line search serves the main way of the both elementary and advanced information collecting, especially for young generations. Importantly, Internet users depend not only on information presented on individual web-pages, but on summarized results of search with special engines. The influence of such results is especially important when information on any complex, but poorly-known phenomenon (like global climate changes) is looked for. Modern on-line search engines supply information in different forms, two most important from which are web-texts and web-images. Apparently, the latter are especially impressive and, thus, important for perception, especially when users attempt to find information on a too 'abstract' phenomenon with too general textual definitions (global climate changes are example of such a phenomenon).

In regard to the above-said, an analysis of graphical representation of 'global warming' in Internet seems to be urgent. Its results can be further interpreted with regard to global change risk. For instance, main topics of web-images indicate on which knowledge is communicated to the broad audience. This knowledge may differ from what the actual state and the expected consequences of climate changes in any country. In such a case, special strategies can be implemented to improve the information distributed by Internet in order to decrease the degree of climate change risk linked to the societal unpreparedness.

3. Material and method

The present study is based on content analysis of web-images relevant to global climate changes that are most popular in the Russian segment of Internet. The data for this analysis are collected as follows. In Russia, two most popular engines are Google (google.com) and Yandex (yandex.ru) (>90% of users prefer these) (Mamatov & Brusenskaya, 2015; Tultaev, 2016). The both seem to be essential for finding information on global climate changes. These most popular on-line search engines are used to generate results for the query <global warming> (the exact Russian words are used in fact). Web-images are searched only. The first 100 web-images resulted from Google search and the same number of images resulted from Yandex search are judged the most popular, i.e., the most 'visible' to ordinary users. The informal term 'global warming' is preferred to the formal term 'climate changes' because the former is more popularized, and it is expected many (if not the most) users will search Internet for 'global warming'.

The content analysis of the selected web-images is three-folded. First, preliminary qualitative analysis of what is shown on the selected images permits to specify tentatively some major topics relevant to climate changes. Second, images are assigned to these major topics. It should be noted that some images may be assigned to two or even more topics, and some images represent information 'noise' because these are irrelevant to 'global warming'. Third, the number of web-images relevant to each topic can be calculated. The results illustrate the graphical representation of 'global warming' in Internet. For the purposes of the present analysis, attention is paid to topics relevant to various consequences of global climate changes.

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4. Results

The graphic representation of 'global warming' in the Russian segment of Internet is very diverse. The information 'noise' is low, and consequences of global climate changes are shown on 60–80% of web-images. The rest are chiefly very 'abstract' views and symbols of 'global warming' in general.

The main topics relevant to consequences of global climate changes include 'Drought', 'Flooding', 'Ice melting', 'Dangers for animals', 'Frost', and 'Hurricanes'. It is necessary to indicate on the presence of web-images that demonstrate schematically causes of global climate changes. Among the results of Google search, the most numerous are web-images showing ice melting (chiefly in polar environments) as a result of warming (Table 1). Significant amounts of images are assigned to the topics 'Drought' and 'Dangers for animals' (often dangers for polar bears). The results of Yandex search differ (Table 1). The most numerous are web-images showing such consequences of global climate changes as flooding and drought. Generally, it appears that the results of Google search are more heterogeneous than those of Yandex search.

The noted difference in topic percentage, heterogeneity of results, and emphasis between the results of Google search and Yandex search indicates on somewhat unjustified ('smoothed') graphic representation of 'global warming' in the Russian segment of Internet. Usage of different on-line search engines leads to different vision of the problem. Moreover, the presence of the evident emphases (ice melting in the case of Google search and flooding in the case of Yandex search) implies that this graphic representation is anyway biased.

Table 1
'Global warming' consequences as represented on popular web-images images in the Russian segment of Internet

Topic	**Number of web-images, %**	
	Google search	**Yandex search**
Drought	16	19
Flooding	5	29
Ice melting	39	4

Dangers for animals	15	6
Frost	4	0
Hurricanes	0	1
Causes of climate changes	8	4

Note: The sum is <100% because some web-images do not reflect the relevant issues (a kind of information'noise')
Source: The authors' own assessment

5. Discussion

The results of the present study indicates on several peculiarities of the graphic representation of 'global warming' in the Russian segment of Internet. Undoubtedly, these are important to climate change risks. First of all, the diversity of this representation implies that the perception of climate changes by the Russian Internet users is expected to be more or less comprehensive. However, being unjustified and biased this representation influences on this perception negatively making the knowledge acquiring from Internet unbalanced.

Special attention should be paid to the spectrum of topics and the content of the relevant web-images. Undoubtedly, information is better perceived when it is meaningful to Russians. All consequences of climate changes that appear on the selected web-images are expected in Russia. However, many of them will be restricted to only particular territories (Table 2), some of which are not densely-populated. Moreover, ice melting is often understood in positive sense, i.e., as a possibility of better use of the Northern Searoute along the Arctic coasts of the country. The content of the web-images is often unrelated to Russia. Views and symbols of deserts and desertified lands, open oceanic coasts, ultra-modern cities, etc. are suitable to explain consequences of 'global warming' to the broad public, but these are not associated with the stereotypic view of Russia. Arctic environments, polar bears, etc. are relevant to this country, but only to its very northern, almost uninhabited part that has been never visited by the majority of people. As a result, the documented graphic representation of 'global warming' limits contribution of the Russian segment of Internet to minimization of global change risks via increase in the societal preparedness. The available representation supports significantly treatment of 'global warming' as more 'abstract' and less 'real for Russia' and 'expected for Russia' phenomenon.

Table 2
Relevance of the 'global warming'-related topics
on web-images to the territories of Russia

Topic	**Territory**
Drought	Russian South and South Siberia
Flooding	entire country
Ice melting	Russian Arctic
Dangers for animals	Russian Arctic
Frost	?
Hurricanes	Russian Far East

Source: The authors' own assessment

The interpretation presented above implies that the graphic representation of 'global warming' in the Russian segment of Internet has to be improved. Special and well-coordinated efforts are necessary not only to erase poor justification and biases in this

representation, but also to increase in its relevance to Russia and Russians. This is possible to achieve with implementation of special strategies and tools of on-line marketing.

6. Conclusion

The undertaken analysis of the web-images relevant to the issue of global climate changes in the Russian segment of Internet permits making three general conclusions:

1) the graphic representation of 'global warming' in the Russian segment of Internet is more or less comprehensive;

2) this representation focuses on such 'global warming' consequences as ice melting, drought, and flooding;

3) the documented representation does not avoid poor justification and biases, and the content of web-images is not well-related to Russia and Russians, which limits the importance of the Russian segment of Internet for minimization of global change risks linked to the societal preparedness.

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