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Journalistic practices of science popularization in the context of users' agenda: A case study of *New Scientist*

Introduction

Popular science journalism is a set of practices for selecting and distributing information related to current academic research and scientific discoveries, applied by media institutions and organisations, and, more recently, by amateurs using the internet. Contrary to popular belief, science popularisation does not consist only in formally transforming scientific texts, i.e. simplifying the language of scientific publications, or introducing narrative devices and visual materials accessible to the average reader. Popular science journalism is a *discursive formation* that involves selection, categorisation, framing, evaluation, and interpretation of scientific studies[1]. Another assumption is that the practices of popular science journalism are subject to the principles of journalistic objectivity and neutrality, which does not necessarily go hand in hand with the commercial model of journalism aimed at increasing the readership and competitiveness of a given media outlet in the market[2]. Science popularisers do resort to various devices to draw attention and elevate their messages' newsworthiness. A related issue is that popular science journalism increasingly depends on pre-fabricated PR materials released from scientific institutions and publishing houses[3] that also wish to draw the public attention.

In that respect, this article considers how to refine the approach to the study of dominant representations of science in popular journalism within current

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[1] G. Myers, "Discourse studies of scientific popularization: Questioning the boundaries", *Discourse Studies* 2003, Issue 5 (2), pp. 265–267.

[2] J. McManus, "Market-driven Journalism", Sage, Thousand Oaks 1994.

[3] Vide, e.g.: M. Bauer, M. Bucchi, "Journalism, Science and Society. Science Communication between News and Public Relations", Routledge, London 2010; M. Chyliński, "Poszukiwanie informacji w dziennikarskich działaniach komunikacyjnych", Wydawnictwo Uniwersytetu Opolskiego, Opole 2015.

market and technological conditions. Just like many other areas of mediation, popular science journalism functions at the intersection of elite, expert discourse[4] and the expanding participatory culture. Thus in this article, I highlight these changing patterns of reception as the context for grasping the role of users' agendas in shaping the hierarchy of relevance of science news. The article includes a brief review of two models which describe contemporary journalistic communication: *agenda-setting* and *news values*, and indicates the need for a calibration of research tools to include content analysis and qualitative methods. I advocate integrating the methods of studying the message and its reception to arrive at more precise conclusions as to what popular journalism "does" to the society[5]. I discuss the merits of such combined methods when applied to science popularisation journalism. Then, I present the results of a study of a sample of the 500 most read popular science texts available on the website of the well-known science magazine *New Scientist*. I discuss which thematic areas and news values are appreciated by the readers, and, upon applying a filter in the form of surveys regarding reader preferences and agendas, I identify, using discourse analysis, the main linguistic means used in the sample to steer readers' attention.

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In its classical form, the agenda-setting theory includes a hypothesis on the opinion-making role of news outlets in terms of shaping the public's hierarchy of importance of specific political and social issues[6]. Through routine exposure to news, the receivers, depending on the structure of the message as defined by editors (*gatekeepers*), develop their understanding of issues which should be ranked as priority problems within a given timespan[7]. The verification of the agenda-setting hypothesis has consisted in a positive correlation between the hierarchy of importance of newsworthy items projected by the media (*media agenda*) and the priorities indicated by the receivers themselves. Thus the theory can be located within the area of constructionist philosophy where the vision of social reality and the relationships between social actors are not reflections of an objective order, but rather of interactional and discursive processes. In the consecutive phase of agenda-setting research (*second-level agenda-setting*), attention has focussed on

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[4] K. Molek-Kozakowska, "The style of EU directives and the discourse of expert rationality", *Stylistyka* 2014, Issue 23, pp. 245–261.

[5] K. Molek-Kozakowska, "Communicating environmental science beyond academia: Stylistic patterns of newsworthiness in popular science journalism", *Discourse & Communication* 2017, Issue 11 (1), pp. 69–88.

[6] M. McCombs, D. Shaw, "The agenda-setting function of the mass media", *Public Opinion Quarterly* 1972, Issue 36, pp. 176–178.

[7] *Agenda setting* is sometimes translated into Polish as "defining the order of the day".

the attributes of specific elements of the message , i.e. on the manner of presenting the news, and the initial interpretations and evaluations assigned to it[8]. That has led to the conclusion that the media suggest not only what we are supposed to think about, but actually also how we are supposed to think about it.

The value of the latter approach within the agenda-setting model lies in enhancing the methods of studying the relationships between the form of a message and the effect on the audience, and in drawing attention to *how* items of news are presented, not just *what* they include[9]. As a result, interdisciplinary studies of the media that draw on semiotics, rhetoric, linguistics, and discourse analysis have been pursued[10]. This article also includes a qualitative perspective associated with evaluating the perceived significance of a news item by recognising the salient discursive strategies and linguistic means of drawing attention. However, it moves on from the analysis of general news into the area of popular science journalism because that is where the manner of providing the public with information on recent scientific discoveries can mobilize people to confront such grave threats as climate change, or shape the reactions of whole societies to stem cells research and genetically modified organisms, for example[11].

In recent decades, studies within sociology of journalism and political economy of the media have also become more revealing of journalistic work. They have described the actual character of journalistic practices, which, in some areas, have drifted from the standards of objectivity and neutrality[12]. Researchers have mainly focussed on the criteria which are used by editors when deciding *what* is to be printed, broadcast or posted on the websites of public institutions and private media corporations. The *news value* model which originated in press research[13] has recently been adapted by the practitioners in

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[8] M. McCombs, "Setting the Agenda: The Mass Media and Public Opinion", Polity, Oxford 2004; vide also: G. Kosicki, "Review of the book: Setting the Agenda: The Mass Media and Public Opinion", *Public Opinion Quarterly* 2006, Issue 70 (1), pp. 124–127; "Agenda-setting w teorii i praktyce politycznej", E. Nowak (ed.), Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej, Lublin 2013.

[9] M. Lisowska-Magdziarz, "Analiza tekstu w dyskursie medialnym", Wydawnictwo Uniwersytetu Jagiellońskiego, Cracow 2007.

[10] A. Firdaus, "Refining agenda setting theory for 21st century media and communication research: Setting the new media research agenda", in: "Agenda Setting: Old and New Problems in the Old and New Media", B. Dobek-Ostrowska, B. Łódzki, W. Wanta (eds.), Wydawnictwo Uniwersytetu Wrocławskiego, Wrocław 2012, pp. 33–35.

[11] M. Bauer, M. Bucchi, op. cit., p. 1–6. Also: K. Molek-Kozakowska, "Popularity-driven science journalism and climate change: A critical discourse analysis of the unsaid", in press.

[12] Cf. M. Schudson, "Discovering the News: A Social History of American Newspapers", Basic Books, New York 1981; G. Tuchman, "Making News: A Study in the Construction of Reality", Free Press, London 1978.

[13] T. Harcup, D. O'Neill, "What is News? Galtung and Ruge Revisited", *Journalism Studies* 2002, Issue 2 (2), pp. 261–280.

the area of journalistic discourse analysis. This strand of research has established that a high editorial value is assigned to pieces of news regarding events which are negative (*negativity*), unexpected (*novelty*), recent/forthcoming (*timeliness*), geographically and culturally close to the receiver (*proximity*), and concern prominent persons or organisations (*eliteness*). Editors also consider the human aspect of an event (*personalization*), its intensity (*superlativeness*), and possible consequences for the receiver (*impact*), as well as the alignment between the issue to be presented and the extant stereotypes and cognitive preferences of the public opinion (*consonance*)[14]. Commercial media also consider items as newsworthy when an issue is controversial (*controversy*), the *human interest* is high, and the entertainment element, e.g. humour, drama, mystery, (*infotainment*) is significant, which are, however, far more difficult to operationalise and quantify as news values realized by linguistic means[15].

Just as in the case of the agenda-setting model, the research perspective of news values has recently been supplemented to include qualitative methods intended for uncovering how a message is shaped, and not only what is being selected. Monika Bednarek and Helen Caple claim that news value is not inherent to the nature of an event, but rather that it can be elevated through strategic applications of language and images. In their extensive research, on print, broadcast and online news, the authors illustrate how the newsworthiness of a message is enhanced by emotional and evaluative features of composition, imaging, vocabulary and phraseology, or even grammar structures[16]. What is important for this study, similar criteria of assigning value to pieces of news and the resulting editorial practices of *tweaking* the value have been identified in studies of science popularisation[17].

Another alarming trend in journalistic practices popularising science, apart from selecting those pieces of information which *sell well* and presenting them in an engaging manner, is using PR sources without any in-depth verification. Journalism scholars working within the critical paradigm warn that in that way popular science journalism can become a mouthpiece propagating data, information

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[14] M. Bednarek, H. Caple, "Why do news values matter? Towards a new methodological framework for analyzing news discourse in Critical Discourse Analysis and beyond", *Discourse and Society* 2014, Issue 25 (2), pp. 135–158.

[15] M. Bednarek, H. Caple, "The Discourse of News Values", University of Oxford Press, Oxford 2017, p. 53. Vide also: J. Fras. "O pojmowaniu infotainmentu i nadmiernej rozrywkowości mediów masowych we współczesnym medioznawstwie", *Środkowoeuropejskie Studia Polityczne* 2013, Issue 1, pp. 7–31.

[16] Vide: http://www.newsvaluesanalysis.com/kaleidographic/ [accessed on: 15.03.2017].

[17] E.g. L. Guenther, G. Ruhrmann, "Science journalists' selection criteria and depiction of nanotechnology in German media", *Journal of Science Communication* 2013, Issue 12 (3) A01, pp. 1–17; F. Badenschier, H. Wormer, "Issue selection in science journalism: Towards a special theory of news values for science news?", *Sociology of the Sciences Yearbook: The Sciences' Media Connection – Public Communication and its Repercussions* 2012, Issue 28, pp. 59–85.

and ideologies which will benefit large science institutions and companies (e.g. pharmaceutical, biotechnological, energy, and military companies)[18]. This, in combination with a low level of media education and critical science literacy, can lead to the imposition of a hierarchy of importance that can be highly manipulative of the public opinion[19].

In line with the reasoning provided above, I aim to focus on how linguistic means, rhetorical devices, and even entire discursive strategies tend to be used by science propagators to shape the representations of the latest scientific advancements and how judgments and evaluations thereof are made[20]. I claim that such an analysis requires an interdisciplinary approach inspired by mediation models that include reception data combined with the methods and procedures of (critical) analysis of journalistic discourse, together with the consideration of the influence of new technologies (audience analytics algorithms) on the distribution of information[21]. Though such research has already been pioneered with respect to general news[22], it is important to stress its significance for science popularization and to further nuance the methodology, the latter also being the goal of this article.

The agenda-setting theory is currently undergoing a methodological reorientation due to the multitude of horizontal information channels (e.g. social media), the amount of user-generated content and the personalisation of media consumption[23]. However, it is still journalism that remains a main venue for science popularisation, as the area where the flow of information usually occurs from elite sources to a mass audience. Nonetheless, receivers possess an ever growing array of tools for selecting science-based content, commenting upon it, and further re-mediating it, especially if it reaches them via digital, not print, media. As a result, they can, even if within a limited scope, apply their agenda to shape the hierarchy of significance of popular science information, or even oppose the representations and evaluations of science, scientists and the results of scientific research projected by science journalism (e.g. through memes).

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[18] M. Bauer, "Paradigm change for science communication: Commercial science needs a critical public", in: "Communicating Science in Social Contexts", D. Cheng et al. (eds.), Springer, New York 2008, pp. 7–25.

[19] S. Perrault, "Communicating Popular Science: From Deficit to Democracy", Macmillan, Basingstoke 2013, pp. 12–16.

[20] E.g. K. Molek-Kozakowska, "Communicating environmental science beyond academia…", op. cit.

[21] J. Richardson, "Analyzing Newspapers: An Approach from Critical Discourse Analysis", Macmillan, Basingstoke 2007.

[22] E.g. M. Bednarek, H. Caple, *The Discourse…*, op. cit.

[23] E. Nowak, "The news effect: shifting salience between media and policy agenda", in: "Political Communication in the Era of New Technologies", B. Dobek-Ostrowska, J. Garlicki (eds.), Peter Lang, Frankfurt am Main 2013, pp. 215–234.

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This study is devoted to elucidating the process of shaping the hierarchy of significance of popular science information, and the scope of possible bottom-up influence exerted by the receivers on it. Using terms drawn from the agenda-setting model, one could ask how, in the times of intense mediatisation of social life, the *media agenda* of organisations which popularise science is modified by individual *user agendas*. It is a pilot study that will be used for further in-depth analyses of the reception of science popularisation, which continues my previous research into the dominant representations of science in popular journalism, particularly with respect to discursive strategies of elevating the value of science-related news items and the applications of linguistic means[24].

The study bases on the material gathered within a period of two years (October 2013 – July 2015) from the online version of a well-known popular science magazine *New Scientist*. This weekly is considered to be one of the most popular[25] magazines popularising science in the United Kingdom, the USA and Australia. It is also distributed globally. Since 1996 it has been publishing its articles online through a subscription-based website. The amount of content in the archive and the articles available (at least in fragments) subscription-free is increasing each day. As of mid-2015, the home page (as well as richly illustrated previews of the most recent reports, reviews, and analyses) included the ranking of five articles most often chosen by readers within a specific period (*most read*). Apparently, the magazine publishers decided that by using a popularity-based algorithm they might draw the attention of the visitors to that which other readers had found interesting. It was the first indication of how users preferences are currently considered in propagating scientific news.

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Each week within the study period, I collected information on articles considered worth reading by *New Scientist*'s website visitors. In total, I collected 500 texts. I used their headlines to classify them according to their thematic areas, and later calculated the percentage share of each category within the entire corpus:

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[24] Cf. K. Molek-Kozakowska, "Pragmalinguistic categories in discourse analysis of science journalism", *Łódź Papers in Pragmatics* 2015, Issue 11 (2), pp. 157–179; eadem, "Framing disease, ageing and death in popular science journalism", *Brno Studies in English* 2016, Issue 42 (1), pp. 49–69; eadem, "Stylistic analysis of headlines in science journalism: A case study of *New Scientist*", *Public Understanding of Science* 2016, *online*, pp. 1–14.

[25] Based on the *New Scientist* website: "130,000 global circulation (with digital editions)", "800,000 global readership as of 2014", "3.8 million monthly unique users of newscientist.com", http://mediacentre.newscientist.com/audience-and-brand [accessed on: 15.03.2017].

Diagram 1. The percentage share of thematic areas (in an alphabetical order)
in the sample
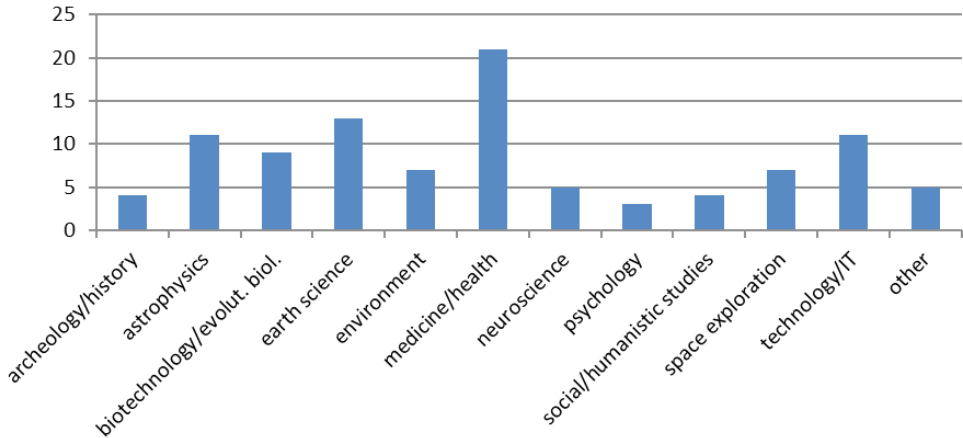
Source: own work.

Data show that the readers consider texts related to medicine and health (21%), biotechnology (9%), and neuroscience (5%) as the most worth reading (35% of the sample in total). When analysing their content, I noted that those included especially research into the diagnostics and therapy of chronic illnesses, such as diabetes, asthma, cardiac illnesses, Alzheimer's disease, various types of cancer, and psychological disorders. A large number of articles in this category applied to new ways of transplanting organs, brain surgery, pioneer gene therapy, slowing down the process of ageing, and explaining the causes of rare diseases. Texts devoted to bionic applications or the results of clinical trials of new pharmaceuticals were also popular. Within the study period, epidemiology and particularly the ways to fight the Ebola virus also ranked high. Another subgroup consisted of practical advice on how to shape one's lifestyle (consumption of sugar, coffee or dairy products, and appropriate fruit intake; the optimum amount of exercise and ambient temperature; recommended prophylactic tests and preventive measures) to live a longer and healthier life. The advice was based on the latest statistical models in population research (*big data*).

Another highly ranking area of interest of the readers related to the Earth and its natural environment (20% of the sample), particularly new data and recommendations in terms of preventing further intensification of climate change. The discoveries in climate studies (weather anomalies), geology (volcanic activity and earthquakes), oceanography (coral reefs), and ecology (the interactions between ecosystems) chosen by the readers based, according to audience analytics, in the developed countries, usually applied to regions close to them.

Information regarding research in botany applied almost entirely to the use of plants for manufacturing medication and food, while the items regarding animals, including insects, focussed on outstanding species or unique behaviour.

The third thematic area important for the public was astrophysics and space exploration (19%), including the controversy associated with the big bang theory and the search for dark matter. The most popular articles included those on discoveries related to Mars, black holes, nearby comets and asteroids, as well as the latest inventions associated with placing satellites in the orbit.

The topics chosen by the readers in the technology theme group (constituting 11% of the sample) referred to the computerisation of everyday life, power generation, the application of newly discovered substances (graphene), virtual worlds, and nanotechnology. A smaller percentage of the texts belonged to the domain of archaeological discoveries, advancements in (pre)historic scholarship, or achievements in social sciences and humanities, including some psychological mechanisms and news on human learning or communication.

In general, one could conclude that the users' agenda in shaping the hierarchy of importance reflected the preferences for universal themes regarding health and life. At the same time, if certain components of lifestyle were presented in a medicalised version, it elevated their significance in the hierarchy of prioritized issues. There was a significant interest in the themes of ecology and cosmology, which might be a result of the continued media presence of technical issues related to the possibilities of space exploration and the political controversy surrounding a successful strategy for curbing climate change. The majority of the science themes chosen by the readers were of an applied nature (not theoretical), and consisted of explaining the phenomena of everyday life, fighting common diseases, improving the standard of living, applying new technologies, and improving the functioning of the individual in the society.

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In the second stage of my study, each of the 500 texts (basing on their headlines and leads was assigned three most prominent news values (according to the base typology by Bednarek and Caple extended to include *infotainment* and *controversy*)[26]. Upon recalculating the results of the 1,500 instantiations of news values into percentages, I achieved the following distribution:

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[26] For example: "**El Niño may make 2014 the hottest year on record**. Hold onto your ice lollies. Long-term weather forecasts are suggesting 2014 might be the hottest year since records began. That's because climate bad-boy El Niño seems to be getting ready to spew heat into the atmosphere" was coded as fulfilling the values of *superlativeness*, *negativity*, *infotainment*.

Diagram 2. The percentage share of the assigned news values
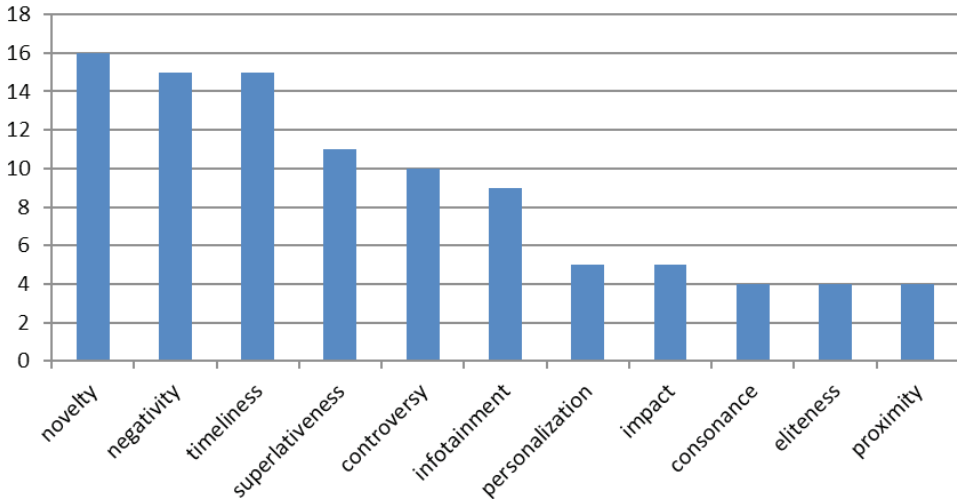
Source: own work.

The results can be interpreted as follows: the heading and the initial paragraph of an article present the topic as important, since they suggest that scientists discovered something they had not expected, or the phenomenon which they had been studying is extreme in terms of its nature or intensity. The most popular presentations of the results of scientific research are either negative or ambiguous, but they are usually provided as the latest findings, which should determine their significance. The entertainment element in the presentation was usually manifested in the special selection of names and context, which helped to draw the readers' attention. The following examples (**heading** and lead) illustrate the typical instances of projecting news values (words, phrases, and structures in italics are those which fulfilled a given value at the level of linguistic means).

Novelty

Revealed: **How Ebola paralyses the immune system.** Deaths in Africa from Ebola reached 1013 earlier this week, with 1848 cases reported. […] With all the activity on the ground in Africa – not to mention the amount of media coverage – it was *something of a surprise* to find that the specific way Ebola kills *has only just been discovered*[27].

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[27] https://www.newscientist.com/article/dn26049-revealed-how-ebola-paralyses-the-immune-system/ [accessed on: 15.03.2017].

Negativity

Brain damage in American football linked to *head trauma*. American Football is a rough game, but *the toll it takes* on players' grey matter is only now becoming clear. For the first time, the number of head impacts on the playing field has been linked with *cognitive problems* and functional brain *abnormalities* in ex-footballers[28].

Timeliness

Surgeon proposes human head transplant operation *as soon as 2017*. Sergio Canavero of the Turin Advanced Neuromodulation Group in Italy *is presenting* his proposal to use brain-dead organ donors to test a head-transplant technique[29].

Superlativeness

Biggest hunting dinosaur was an aquatic shark-gobbler. It ate *whole* sharks, and came equipped with feet like paddles and sealable nostrils that allowed it to swim under water. Spinosaurus, *the largest known* predatory dinosaur, now turns out to be *the only* known dinosaur that spent most of its time swimming. While palaeontologists envisaged it as a sort of *gigantic* heron, it was actually an *enormous* version of a crocodile[30].

Controversy

Sugar *on trial*: What you *really* need to know. It has been called toxic, addictive and deadly, the driving force behind obesity, heart disease and diabetes. *Is sugar really so bad?*[31]

Infotainment

Zoologger: Ants *fight dirty* in *turf war* with spiders: Zoologger is our weekly column highlighting *extraordinary animals* – and occasionally other organisms – *from around the world*[32].

Personalization

Stephen Hawking's new theory offers black hole escape. *Stephen Hawking* has a new mind-bending theory about black holes, the bizarre cosmic objects that

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[28] https://www.newscientist.com/article/dn24420-brain-damage-in-american-football-linked-to-head-trauma/ [accessed on: 15.03.2017].

[29] https://www.newscientist.com/article/dn27703-surgeon-proposes-human-head-transplant--operation-as-soon-as-2017/ [accessed on: 15.03.2017].

[30] https://www.newscientist.com/article/dn26193-biggest-hunting-dinosaur-was-an-aquatic--shark-gobbler/ [accessed on: 15.03.2017].

[31] https://www.newscientist.com/article/mg22129540-500-sugar-on-trial-what-you-really--need-to-know/ [accessed on: 15.03.2017].

[32] https://www.newscientist.com/article/dn26234-zoologger-ants-fight-dirty-in-turf-war-with--spiders/ [accessed on: 15.03.2017].

cemented his reputation as the *world's most famous living scientist.* Rather than getting sucked into a singularity of confusion, read our explainer[33].

Impact

What *will happen* if China adopts a two-child policy? Fears of a *population explosion* were rife in the second half of the 20th century. In the 1960s and 1970s, the global population was growing at an annual rate of 2 per cent, enough to *double the number of people* on the planet every 30 years or so[34].

Eliteness

SpaceX* unveils sleek, reusable *Dragon crew capsule. First cargo, now crew – the *uber-modern* "space taxi" known as the Dragon V2 is ready for passengers. At an unveiling ceremony yesterday, complete with smoke effects and coloured lights, *SpaceX CEO Elon Musk* gave the world its first glimpse of the *upgraded* Dragon spacecraft[35].

Consonance

***Ever felt* a ghostly presence? Now *we know* why.** Ghostly presences – the feeling of someone *near you* when there's no one there – could be down to *your brain* trying to make sense of conflicting information. For the first time, the brain regions involved in such hallucinations have been identified – and a ghost presence induced in healthy people[36].

Proximity

How climate change will affect *where you live.* The *latest report* from the Intergovernmental Panel on Climate Change spells out how climate change *will affect each part of the world*, and what can be done about it. For many regions the IPCC only makes vague predictions, and in some cases the impacts are deeply uncertain[37].

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[33] https://www.newscientist.com/article/dn24937-stephen-hawkings-new-theory-offers-black-hole-escape/ [accessed on: 15.03.2017].

[34] https://www.newscientist.com/article/mg22129615-200-what-will-happen-if-china-adopts-a-two-child-policy/ [accessed on: 15.03.2017].

[35] https://www.newscientist.com/article/dn25652-spacex-unveils-sleek-reusable-dragon-crew-capsule/ [accessed on: 15.03.2017].

[36] https://www.newscientist.com/article/dn26516-ever-felt-a-ghostly-presence-now-we-know-why/ [accessed on: 15.03.2017].

[37] https://www.newscientist.com/article/dn25328-how-climate-change-will-affect-where-you-live/ [accessed on: 15.03.2017].

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The next stage of the study involved filtering the sample to establish which headings of those most popular articles were formulated in such a way as to encourage reading of the texts. That included a survey on the reception of the material among 32 students of English Studies majoring in Cultural Studies (78% women, 22% men), whose language skills were sufficiently advanced[38] to comprehend the popular science content of *New Scientist*. Due to the fact that a survey regarding 500 headings could have been too arduous, each person was given 125 headings[39] with the instruction to specify (1) whether the text included positive, negative or ambivalent information, (2) whether it discussed an important issue close to their experience, (3) whether the heading/lead encouraged them to read the entire article[40].

Regarding the third question, 147 texts received more than 50% of "yes" answers, while 46 texts received over 80% of "yes" answers. That enabled me to select a sample for further linguistic analysis to see how the forms used to present issues may be related to the users' agendas and priorities, and to identify the attention-drawing devices that tend to be used to motivate the readers to increase their exposure to popular science content. Initially, I identified a high correlation between the positive answer to the question regarding the significance of the issue raised in an article in view of its influence on the development of science and the intention to read the article (the correlation should be statistically verified on a larger respondent sample).

Within the course of the study of repetitive linguistic patterns in the downsized sample material, I established that among the 46 headings, 22 included marked modifiers (e.g. *extraordinary*, *vital*, *finally*), or the comparative/superlative degrees of evaluating adjectives or adverbs (e.g. *best*, *hottest*, *more*), or the numeral *first*. Those terms increase the expressive nature of a text to draw readers' attention, and to mobilise their cognitive and emotional resources[41]. Examples included such headings as "Extraordinary stem cell method tested in human tissue", "Exercise

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[38] Levels B2 and C1 of the Common European Framework of Reference for Languages.

[39] According to this procedure, each heading was evaluated by 8 people.

[40] The quantitative data regarding the first two questions is not discussed due to the limited goal of the article, i.e. how the presentation of the issue reflected on the users' agenda and shaped the hierarchy of significance through catalysing the possible intention to seek further content on the site; selected results on the subject are available in: K. Molek-Kozakowska, *Stylistic analysis…*, op. cit., p. 13. The first two questions were also intended to stimulate receivers' reflectiveness.

[41] M. Bednarek, H. Caple, *The Discourse…*, op. cit., pp. 78–105. Polish-language studies of the means of increasing readership, vide, e.g. the works by Walery Pisarek, Janina Fras, Maria Wojtak, Jerzy Bralczyk, Piotr Lewiński, Wojciech Kajtoch, Tomasz Piekota, to name but a few.

may be the best anti-ageing pill ever", "First test to predict Alzheimer's years in advance", which, additionally, tried to present laboratory and experimental studies as something close to the experience of the average reader[42].

8 headings in the sample included personal pronouns (*you*), or the imperative thus realizing the speech act of advice or warning. There were examples of pragmatic directives, which, however, did not have an openly didactic overtone, so they did not connote any obligation of the actions, as for example "Sugar on trial: What you really need to know" or "Meet your unborn child – before it's even conceived".

6 headings had the structure of a question, which implies that the answer to this (important) query is provided in the article, e.g. "Can a computer virus communicate via your speakers?". It is noteworthy that those were not so-called rhetorical questions, as is often the case in tabloid headlines, but rather questions which imitated research questions posed in the applied sciences[43].

6 of the headings selected by the informants as items worth pursuing applied epistemic modality (including such modal verbs as *could* or *may*), which gave the impression of ambiguity or vagueness. This linguistic means often introduces an element of speculation and controversy, as in "El Niño may make 2014 the hottest year on record", or "Withdrawal drug could help cannabis addicts kick the habit". Arguably, this is a manifestation of the strategic device for encouraging the reader to compare various (clashing) points of view in different studies and articles and thus spend more time on the website.

Another interesting finding is when selected headings drew the attention of the readers through a contrived stylistic formula, which is rather unusual for a publisher of science-related materials. Thus, 4 headlines included neologisms, metaphors or idiomatic expressions, while 2 included proper names related to pop culture: "What's behind the snowmageddon that hit the US", "Is this ET? Mystery of strange radio bursts from space". The question whether such a style makes those headings resemble "tabloid language" remains open. Some might argue that in order to be effective, the popularisation of science must fit in with the more general tendency towards entertainment in the media sphere. Popularisers should also take advantage of features typical of participatory culture and refer to the readers' experiences, not just rely on elite, expert discourses of science. It would be advisable to pursue the study of dominant linguistic means applied in headings, leads or introductory paragraphs, or even entire texts, by means of corpus methods in yet another stage of such a study as this one.

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[42] Vide: K. Molek-Kozakowska, *Framing disease, ageing and death…*, op. cit.
[43] Vide: K. Molek-Kozakowska, *Communicating science…*, op. cit.

Final remarks

In conclusion, it should be stressed that the availability of new media technologies results in the diversification of information consumption patterns, which in turn increases the need to combine and triangulate methodologies and consider qualitative methods in studies of the form and reception of informative texts. That applies to two important models describing the hierarchy of news importance: agenda-setting and news values. This pilot study of the contents, newsworthiness features and the specific linguistic patterns of popular scientific journalism used in *New Scientist* indicates a certain scope of the possibilities of users' agendas shaping and personalising the process of making some science news important or relevant. That applies to the preferences in selecting the topics belonging to applied sciences which speak to personal experiences, and which include details on the possibility of solving specific problems (health-related or technological) even if it is supposed to occur only in the distant future.

This case study of popular science journalism considers the process of shaping the hierarchy of importance of pieces of news as a dynamic interaction between (1) the thematic priorities and discursive strategies that impose elite representations of science within the *media agenda*, and (2) the means of negotiating hierarchy and significance of specific science news items, which are correlated with readers' preferences, both in terms of the content and the form of popular scientific information. Further studies would require analysing how one can control readers' attention using the identified linguistic means. In the case of popularisation of science in a mediatised and increasingly diverse society, this is of key importance, as it enables one to protect oneself from the dangerous tendencies of agendas being imposed by elite institutions with some idealised representations of science (as ideologically neutral, applied and celebrated) being normalised while those more critical (e.g. science that caters to big corporations, or increases social inequalities) being displaced.

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**Journalistic practices of science popularization in the context of users' agenda:
A case study of *New Scientist***

(Summary)

The article includes a discussion of two models which describe contemporary communication processes in journalism: *agenda-setting* and *news value*, indicating the need to expand their research tools to include qualitative methods, and merging the analyses of the reception and the message. It also includes indications as to the possibility, or even the social relevance, of the methods for applying those research perspectives to analysing journalism popularising science. Later, I present the results of an analysis of the content of a sample of 500 most read popular science texts available on the New Scientist website. I demonstrate which thematic areas were valued by the readers, and what values are most commonly applied. Further, upon applying a filter in the form of surveys regarding reader preferences, I discuss the main linguistic devices utilised for controlling readers' attention. The shaping of the hierarchy of importance of items of news is the result of a dynamic interaction between (1) the thematic priorities and discursive strategies of imposing elite representations of science within *media agenda*, and (2) the means of negotiating order and values of specific content, which are correlated with readers' preferences, both in terms of the content and the form of providing popular scientific information.

Keywords: agenda-setting, value of news items, popularisation of science, *New Scientist*.