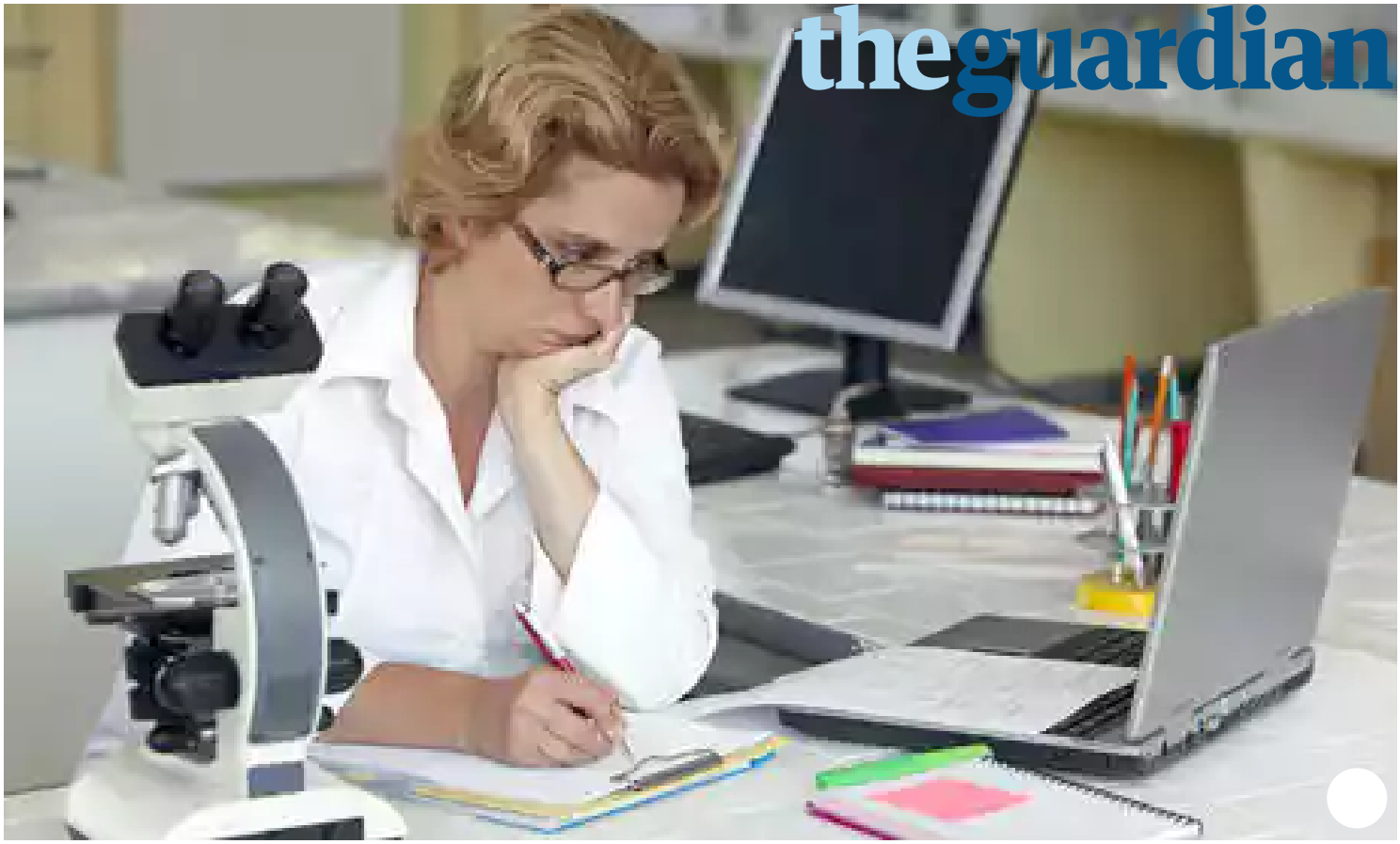

The need for critical science journalism

Too much contemporary science writing falls under the category of 'infotainment'

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The bulk of contemporary science journalism falls under the category of "infotainment". This expression describes science writing that informs a non-specialist target audience about new scientific discoveries in an entertaining fashion. The "informing" typically consists of giving the reader some historical background surrounding the scientific study, summarises key findings and then describes the significance and implications of the research. Analogies are used to convey complex scientific concepts so that a reader without a professional scientific background can grasp the ideas driving the research.

Direct quotes from the researchers also help illustrate the motivations, relevance, and emotional impact of the findings. The entertainment component varies widely, ranging from an enticing or witty style of writing to the choice of the subject matter. Freaky copulation techniques in the animal kingdom, discoveries that change our views about the beginnings of the universe or of life, heart-warming stories about ailing children that might be cured through new scientific breakthroughs, sci-fi robots, quirky anecdotes or heroic struggles of the scientists involved in the

research - these are examples of topics that will capture the imagination of the intended audience.

However, infotainment science journalism rarely challenges the validity of the scientific research study or criticises its conclusions. Perfunctory comments, either by the journalist or in the form of quotes - such as "It is not clear whether these findings will also apply to humans" or "This is just a first step and more research is needed" are usually found at the end of such pieces - but it is rare to find an independent or detailed critical analysis.

Infotainment science journalism appears to operate under the assumption that if a scientific paper has been peer-reviewed and published by conscientious scientists, the results and conclusions are valid. The peer-review process is equated with a "fact checker" role, thus allowing infotainment science journalism to promote the perspectives of the researchers who conducted the studies.

Critical science journalism takes a different approach and focuses on providing a balanced assessment of the work, one that highlights specific strengths but also emphasises specific limitations or flaws. It is no big secret that the majority of research findings published in peer-reviewed scientific journals will probably not hold up when other groups attempt to replicate them. This lack of replicability can be due to research misconduct, systematic errors or other cognitive biases, which commonly occur even in the most conscientious and meticulous scientists.

Therefore, critical science journalism requires a careful analysis of all the data presented in a paper and is likely to uncover key limitations and flaws that scientific researchers themselves do not readily divulge. This form of science journalism can also encompass some degree of investigative journalism. Journalists lack the resources to check the validity of scientific data by performing experiments themselves, but they can track scientific research in a certain area over the course of months and years as multiple research groups attempt to replicate published scientific findings.

Research is analysed in the context of its long-term validity, cataloguing successful and failed replication attempts and incorporating the opinions of dissenting scientists. In this sense, critical science journalism is similar to how scientists routinely discuss new research findings in academic journals.

When a scientist is asked to write an editorial about a new scientific paper, she is expected to not only mention the novelty and significance of the paper - there is also an expectation to point out major flaws and limitations, including those that might have been inadequately addressed during the peer review process.

Such an analytical and critical approach can be somewhat antithetical to infotainment science journalism. It is difficult to write an infotainment-style gripping narrative about the discovery of a new protein that acts as a master regulator of ageing if one has to remind the reader that upon critical analysis of the data, the alleged "master regulator" is just one of 20 other proteins that could also be seen as "master regulators" and that there were potential flaws in how cellular ageing was assessed.

Infotainment science journalism will continue to be the dominant form of science writing, because the portrayal of science as an exciting adventure with great promise and few

uncertainties is bound to garner a large readership. Hopefully, we will also see a growth in critical and investigative science journalism that critically analyses and challenges scientific studies so that readers can choose from a broad array of science journalism offerings.

To help distinguish between infotainment science journalism and critical science journalism, the reader can evaluate a science news article or blogpost using the following criteria:

1. Style

Infotainment science journalism stylistically generates a substantial amount of contagious enthusiasm in regards to the research being reported. The researchers who conduct the research are understandably excited and passionate about their work, and this excitement is conveyed using expressions such as "awesome", "heroic", "paradigm shift" or "revolutionary". The language in critical science journalism articles is less ebullient and presents a more sobering assessment of the significance of the research.

2. Critical analysis of a scientific paper

Critical science journalism points out specific limitations or flaws in a scientific paper, such as inadequate controls or inconsistencies between experiments performed in the culture dish versus animals. This critical analysis can be either based on the science journalist's own assessment or interviews with dissenting scientists. It is not common practice to quote unnamed sources in science journalism. If investigative science journalism becomes more established, unnamed sources may become more commonplace as dissenting scientists might fear reprisals if they were to comment publicly about the work of their peers.

3. Context

Infotainment will give the reader the background about "why" a certain research study was conducted, but "how" a research study relates to other studies in the field is especially important in critical science journalism. How many other groups have attempted to replicate the study and what were their success rates? How does this new scientific discovery rank compared with other published papers in the same field in terms of significance and magnitude of effects? Critical science journalism also tries to ensure that when "balanced views" on a scientific question are presented they truly reflect the reality of opinions among the scientific community. If 98% or 99% of scientists agree that humans contribute to global warming, it would be wrong to give equal weight to the views of the 1% fringe scientists who deny climate change and pass this off as a "balanced view".

4. Negative studies:

From a scientific perspective, a negative study, ie one that fails to show an anticipated effect or one that fails to replicate prior findings, can be just as valuable as positive studies. However, it is difficult to pass off a negative study as an "awesome" new finding that is common in an infotainment style of writing. Therefore, nearly all science journalism that discusses negative studies or failed replication attempts tends to be of the critical and analytical nature.

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