Science and Sensationalism: A journalistic study of the presentation of archaeological discoveries in news media

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Master Thesis

Global Archaeology

Leiden University

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1st of August 2021

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Cover image: Drawing by Lenneke de Lange.

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s1691627

Master Thesis Global Archaeology

Course code: 1084VTG

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University of Leiden, Faculty of Archaeology

Leiden, 1 August 2021, final version

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Preface

To write a thesis is a daunting task, as any university student knows. My Bachelor thesis took nine months to complete and at the time I (naively) compared it to pregnancy. This time, I spent one and a half years toying with ideas, one of which became more and more concrete. The motivation, however, lacked. If there was one thing I had learned from the previous process, it was that it does not matter how long you work on a thesis, as long as you are passionate about the topic. Therefore, just half a year ago, I decided to throw the old material to the side, change subject completely and write a thesis that matters to me, not just for the time being, but in the long run.

The result you find here. A three-month process during which I applied everything I had learned from the two Master programmes I followed the past year. A 20,000+ words piece containing a (in my opinion) much needed assembly of journalistic and archaeological theory and practice. This thesis is representative of the kind of research I have prepared myself to do since the second year of my Bachelor, when I realised public outreach of archaeology is what I want to make a career of. Doing the research, learning how to code in R-language, solidifying my beliefs that public engagement is fundamental to our discipline… it is all part of an important first step towards achieving personal and career-focused goals. Additionally, I hope this thesis helps those not aware of the need for engagement gain understanding of that notion and helps those already aware to put my findings into practice.

And to everyone, enjoy!

Lenneke de Lange, 29 July 2021, Leiden

Acknowledgements

I want to thank Signe Glæsel for assisting me in the use of R, giving expert advice on my statistics, and for keeping me somewhat sane throughout the process (and for cooking so many meals, of course). I want to thank my supervisor Maikel Kuijpers for understanding and supporting the ideas that sparked this thesis, and for helping me turn those thoughts into a valuable research project. Lastly, I must give thanks to Femke Tomas for sorting out the bureaucratic mess that surrounds these projects and for always supporting the academic choices I make.

1

Introduction

In February 2021, a post appeared on the social media pages of Leiden University. Promoting the University's Open Day, the posted video presented the 'typical student' of various Bachelor programmes as selectable game characters. One of these characters was the archaeologist, whose strength, among others, was to "fight fossils" - something not in fact part of the archaeologist's expertise. The mix-up between palaeontology and archaeology did not end there: the girl in the video was holding a dinosaur toy (see figure 1a).

Students of archaeology immediately complained and commented on the post. An hour later, it was removed from the University's social media platforms (though not before receiving over 300 likes on TikTok alone) and after several days a new version was uploaded, in which the archaeologist's strengths had been updated to "excavation powers", "heritage knowledge" and "loves adventure" (see figure 1b).

a.

b.

Figure 1: Screenshots from the original post (a) and the updated post (b) on the Leiden University social media pages (own pictures).

The mistake made by the media team of Leiden University is a common one. Search for "archaeologist" in Google Images and the third picture to appear is that of a man about to launch a pickaxe into a half-excavated dinosaur skeleton. While it is perhaps understandable (from the uninitiated public's point of view) that people confuse palaeontology with archaeology (both involve careful excavation, utilising comparable tools), such is not the only misrepresentation of the archaeological discipline. The general image of the archaeologist that permeates society remains that of the treasure hunter (Almansa Sánchez 2013, 7) and archaeology as a scientific discipline still has not shed the guise of an "anachronistic, self-indulgent luxury" (Fagan and Durrani 2020, 8). Archaeology is seen as entertaining, rather than relevant - let alone relevant to the present (Tarlow and Nilsson Stutz 2013, 2-3). The following quote from Fagan and Durrani (2020, 8) describes this problem precisely:

> "They [non-archaeologists] assume that archaeology is stuck in the world of Tutankhamun's tomb and the attempts to make astonishing discoveries, an academic pastime that flourishes in an ivory tower. From there, it's a short step to labelling it irrelevant and unnecessary in today's fast-changing world. This is absolute nonsense, for archaeology brings the entire human past to life, and gives us much greater insight into ourselves as a species [...] and how we came to be who we are today."

Perpetual incorrect representation of archaeology has caused the public, including those in positions of power, to be blind to the perspectives archaeology has to offer society.

Does it matter that our discipline is not recognised as such? I argue: yes, because public understanding of what archaeologists do is vital. It is vital to archaeology, because its scientific merit and integrity are at stake, and vital to present-day society as well. In their book Bigger Than History (2020), Fagan and Durrani give examples of some of the major global, societal topics

in which archaeology has an important role to play. These topics include climate change, identity (of both ethnicity and gender) and nationalism. Yet, as Rockman and Hritz observe: "For all that archaeology and other components of cultural heritage have to offer to the global response to climate change, currently they are not widely recognized as central components of that response." (2020, 8296). The same goes for the other contemporary issues I mentioned; even when the archaeological community recognises its own added value, the wider public does not[1].

The primary breeding ground of the incorrect image of archaeology are the media. Not everyone has the opportunity to visit museums, let alone an excavation site. However, at their fingertips they find media they have come to associate with the word 'archaeology': movies like *Indiana Jones* and *The Mummy*, or the video game series *Tomb Raider* (see figure 2). Most people acquire their perception of archaeology through such popular media that – first and foremost - are meant to entertain and which have become increasingly accessible over the past decades.

As extensively described and analysed by archaeologist Cornelius Holtorf in the early 2000's, archaeological representation has been abundant in media for a long time. This no doubt encouraged the image of the adventurous, gun-wielding explorer, that was recognised as early as 1949 by American archaeologist Alfred Kidder, who described the contemporary understanding of the archaeologist as "a strong-jawed young man in a tropical helmet, pistol on hip, hacking his way through the jungle in search of lost cities and buried treasure." (Holtorf 2008).

Information on present-day archaeological discoveries, however, reaches the public through *news* media. This is where the public encounters non-fictional archaeology, without the prerequisite of prior interest. I believe it is in that encounter that the presentation of archaeology is most impactful, offered in a formal environment in which people expect to be informed by

[1] For the archaeologically uninitiated reader: a quote reflecting the archaeologist's view on their discipline. "Archaeologists, with their deep time and cross-global perspectives, have dirt-derived insights to contribute to many contemporary issues beyond anthropogenic environmental/climate change, including the causes and consequences of technological shifts and innovations, the origins and manifestations of inequality, and the dynamics of states and markets over the long-term and cross-culturally." (Feinman 2010, 12).

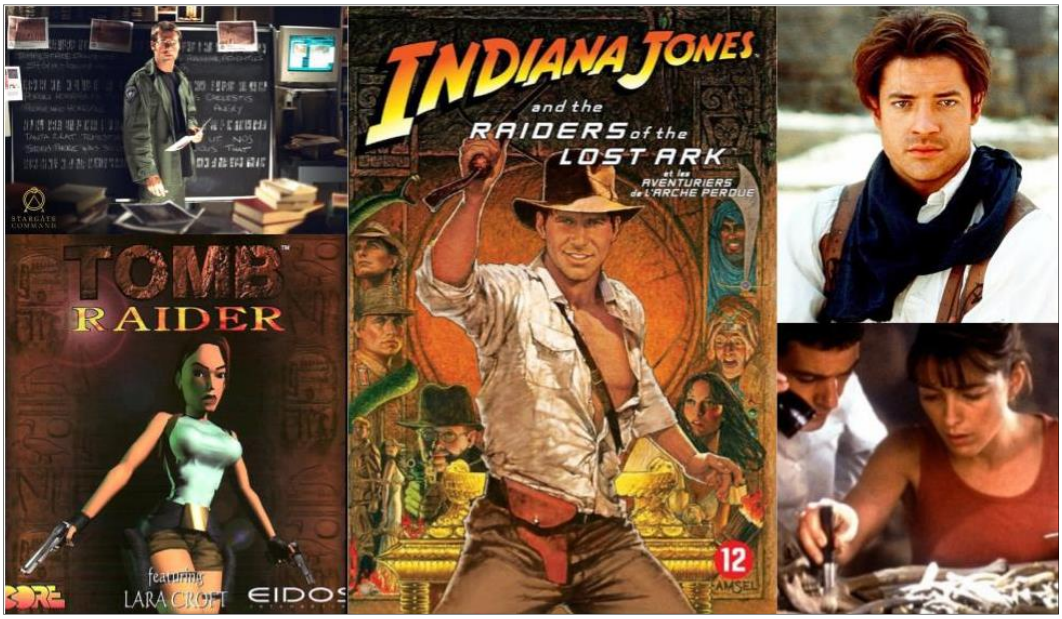

Figure 2: The media's archaeologists. From top left to lower right: Daniel Jackson (*Stargate* series), Lara Croft (*Tomb Raider* games), Indiana Jones (titular films), Rick O'Connell (*The Mummy*) and Kate Ericson (*Timeline*).

facts. Yet, journalists are likely to focus on the sensational aspects of an archaeological discovery, rather than present the perhaps 'boring' reality of archaeological research. Use of stereotypes draws attention to their articles and guarantees reader satisfaction by fulfilling expectations (Heyl *et al.* 2020, 132). Susan Pollock, who studied the framing of archaeology in relation to modern wars, observed: "A reporter or editor […] may draw, implicitly or explicitly, on these prevalent images as a way to create relevance and hence newsworthiness for his or her story" (2005, 92). Therefore, I assume news media, like entertaining media, tend to perpetuate the popular image of archaeology, reaffirming what the public has come to expect of our discipline.

This assumption must be tested. Therefore, by means of a media analysis, this thesis aims to characterise the presentation of archaeological discoveries in (online) print news media in terms of sensationalism. The specific research questions with which this goal is achieved are presented in chapter 3, in order to provide the theoretical background on which they are founded and explicate their full relevance.

Media labelled 'news' also include radio and television broadcasts and increasingly also social media pages dedicated to news. However, for the sake

of manageability, this study examines only textual reports from print newspapers and their online equivalents.

How archaeology is presented in news media is a largely unexplored topic (Maldonado 2016, 556); according to Pollock this is because, for the practicing archaeologist, "[i]t is all too tempting to dismiss [news] reports as factually flawed or highly simplistic." (2005, 78). Reporting of archaeology in news media is regarded as 'archaeotainment' (Holtorf 2007). As such, the focus of archaeological media studies is often on the fictional representations of the discipline and on depictions of 'the archaeologist' (see Holtorf 2007; Clack and Brittain 2007), rather than on the presentation and contextualisation of 'archaeological resource'[2] (such as research results or new techniques and theory). In the last decade, that research focus has shifted toward archaeology in the digital environment; e.g. to how archaeology can engage with the public through social media (Maldonado 2016, 556). However, the importance of news media in the dissemination of archaeological knowledge must not be underestimated, as it is a crucial information space for the public (Merkley 2020). Scholars ought to be attentive to such a space; a call also voiced by Kallén et al. (2019).

The specific focus on sensationalism in this study (defined in the Cambridge dictionary as "the act by newspapers, television, etc. of presenting information in a way that is shocking or exciting"; dictionary.cambridge.org) is incited by the theatrical image of archaeology that is a clear product of exaggeration and aggrandisement. Sensationalism is also a key feature of news stories that are not urgent or of immediately apparent relevance (Molek-Kozakowska 2013, 194). Sensationalising such stories is the journalist's method of drawing attention to the story despite its lack of newsworthiness. By characterising archaeology's presentation in news media in terms of sensationalism, I explore whether this presentation is serious (not sensationalised) or perpetuates stereotypes (using sensational features). A more elaborate description of sensationalism in journalistic products and processes is provided in chapter 2.

[2] 'Archaeological resource' is a term coined by Grima (2016) and functions as a collective description for archaeological knowledge, theory, material and tools.

This study's approach to studying archaeological resource in the news media is to perform a media analysis, a method for monitoring the appearance of a topic in the media within clearly defined concepts. The goal is to examine "who says what through which channel to whom with what effect", in the classic phrasing of communications theorist Harold Lasswell (Lasswell 1948 in Green Saraisky 2015, 27). In journalism, it is applied in research exploring how news portrayals of topics and events condition public perception (see for example Lucrezi *et al.* 2019). In this study, the purpose of performing a media analysis is to understand how archaeological discoveries are presented in news media, based on several variables linked to sensationalism. These variables are: 1) tone, 2) framing, and 3) role of experts, and are at the core of the research questions. These variables are used to examine archaeological information in the news, not the conceptualisation of archaeology. Style choices, complementary pictures and other design features in these articles - which according to Kilgo et al. (2016) also contribute to sensationalism - are excluded from the analysis. The theoretical background to the methods and variables is provided in chapter 3. Further explanation of the process of analysis can be found in chapter 4 as part of the methodology. The results are presented in chapter 5.

The characterisation of archaeology in news media is another step towards understanding the representation of our discipline, but also towards identifying where perception of it becomes skewed. This in turn allows for the exploration of a solution to the incorrect image building of archaeology and its undesirable consequences. In chapter 6, I argue that archaeologists must use the knowledge gained from this media analysis to take responsibility in the dissemination of their research. This includes providing the context in which the work is interpreted by experts, and providing some theory by which it should be understood. Improving archaeology's representation leads to recognition of the discipline's contemporary relevance, which in turn allows its perspectives to be taken into consideration in current social debate.

In the past, archaeologists have not been ignorant of the benefits of public engagement, however, "[f]or the past 30 or so years it was enough to

recognise that the social/political context of research existed" (Hanscam 2019, 4); real public engagement, in which public notions of archaeology are challenged and corrected, was not a widely understood need. Recently, this need has become broadly recognised. Yet, in archaeological literature, a practical approach to what engagement with the public looks like is scarce. This thesis contributes to the understanding of a small part of that concept.

Realising that public engagement is no easy task and that science communication is a discipline of its own, I provide some practical suggestions as to how public engagement could be done to the benefit of all parties involved.

2

Archaeology in the media

An archaeological discovery can be a newsworthy event. *Can* be. Most new findings and insights about the past never make it beyond the archaeological academic sphere. Why are some finds and discoveries picked up by the media, while others are omitted? And what happens to the archaeological information as it passes through the filter of the journalist, turning a complex collection of data and theory (and years of research) into a jargon-free, comprehensible and exciting news story of 400 words?

2.1 Archaeology and journalism

Before investigating these questions through my own research, it is worthwhile looking at existing literature. As mentioned before, there are few journalistic studies related to archaeology, or archaeological studies researching the journalistic take on the discipline. Below, I elaborate on three of those studies that are most relevant for the current research.

Susan Pollock (2005) did a close-reading of newspaper articles of two case studies related to the destruction of cultural heritage during wars in the Near East. She asked the question "how is the past, as it is investigated through archaeology, presented to the public in order to make it seem to matter in the midst of myriad contemporary issues?" (Pollock 2005, 80). She identified U.S. news media's framing of archaeology, and their attempt to make those stories relevant to the average American. The political nature of the stories (the United States military was involved in both wars) was clearly fundamental in their appointment as newsworthy events. The stories about destruction of archaeology served the purpose of demonising the enemy (Al-Qaeda and the Taliban)[3]. In the news stories, geographical distance from the monuments was bridged by drawing on the notion that the Near East is the

[3] "[...] reports assigned very different motivations for the destruction of monuments and artifacts depending upon the party that caused it. When attributable to the Taliban, destruction was regularly portrayed as willful [...] In contrast, damage resulting from the U.S.- led war was described as accidental, a form of regrettable but unavoidable 'collateral damage'." (Pollock 2005, 88)

'cradle of Western civilisation'. Pollock observed that "the past was often cast as part of world heritage, offering a reason for the U.S. to intervene to preserve its material remains." (2005, 91).

Another archaeologist who investigated archaeology in the news media environment is Lucy Shipley (2015). She tracked reports on the discovery of an Etruscan sepulchre containing two individuals and, among other grave goods, a spear. Upon unearthing the find, the director of the excavation, Alessandro Mandolesi, told the press the burial was that of a prince, based merely on the presence of the spear. First Italian, then worldwide media published the story of the Etruscan prince. Five days later, the archaeologists were certain that the individual buried beside the spear was female. Most of the print media that had originally written about the find, did not correct the false reporting. Instead, online news media spread the story of the princess. "Yet of the media that chose to take up the osteological report, not one was critical of the archaeologists' original assumptions about the gender of the body." (Shipley 2015, 474).

The third study is by Kallén et al. (2019) who mapped the media landscape of two archaeological case studies related to aDNA analysis; the Birka warrior who was revealed to be female, and the Sigtuna inhabitants who were immigrants. The authors tracked all articles published about the cases, identifying the direction of the news (who references who, and with that, where misinformation is introduced) and what type of media they belong to (including feature articles, short articles, blog posts, audio, film, academic articles, interviews and to an extent social media, such as Twitter posts and Reddit discussions). The authors concluded: "The media coverage of the Birka warrior and the Sigtuna immigrants demonstrates that they were intertwined in complex processes of communication involving a wide range of actors and media." (Kallén *et al*. 2019, 86). The introduction of modern narratives (such as feminism) was examined, as well as how the media connected these to the archaeology.

The above studies show that the reporting of archaeological finds in news media is of a different nature than the reporting in media aimed at entertaining (including many documentaries). Archaeology in the news is

archaeology that must be relevant in the immediate present, either to contemporary societal issues (such as the challenging of traditional gender norms), or to current events (such as war and human migration).

A much more developed framework for studying science in the media is developed in journalism studies. Journalism studies is a discipline that analyses journalism in all its contexts. For example, it tries to identify what makes a story newsworthy and how it will be picked up by the public, but also how journalists work and what communication between different fields looks like. All of these aspects are relevant when sketching the path travelled by archaeological information in the media environment; in particular, how the news media communicate with the scientific community and what aspects of archaeology would be considered newsworthy.

Taking this approach means the following sections will illustrate more broadly how *science* is presented in the news - and the effects such presentation has on the non-academic public - rather than looking at archaeology specifically (to which I come back in chapter 2.6). Parallels are easily drawn; as Pollock (2005, 90) concludes: "News reports about archaeology are affected by many of the same factors that shape the production of other news stories". This is only partially true, since more recent research has shown that science stories are *not* selected or shaped by the same values as general news (Badenschier and Wormer 2012). I believe Pollock means to say that, like all news stories, archaeological stories must be newsworthy in order to appear in the news.

2.2 Newsworthy science stories

Whether a story is newsworthy is inexplicitly decided by news values, aspects of a story that make it 'worth' communicating to the public. These values do not function as a checklist - a story does not have to meet certain requirements to be published - but they are a guide in identifying *why* certain stories were selected for the limited amount of time and space available to a news medium (Badenschier and Wormer 2012, 79). Because most stories within a beat (a topic within journalism, such as sports) concur with a

specific set of news values, those can be used to judge whether an item is likely to be published or not. News values of general news (politics, economy, current events, etcetera) focus mainly on negativity (conflict and other bad news), familiarity (it involves known people, institutions or communities) and notability (surprise, exclusivity, shareability; Harcup and O'Neill 2017, 1482).

Science news, some argue, adheres to a different set of values. Attempts to identify these have been made since at least 1990 (Ruhrmann 1990) but researchers continue to develop theoretical lists of science-specific news values (see Badenschier and Wormer 2012; Rosen *et al.* 2016). The list of news values curated by Badenschier and Wormer (2012) is profound and extensive. The authors both adapt general news values to fit to science news (e.g., *influence* now including *scientific influence*), and use news value theory from the practitioner's point of view to include news values specifically applicable to science coverage (to arrive at values such as *intention* and *astonishing*). They checked the validity of their list with science editors from major German and French quality newspapers and performed a quantitative content analysis on 192 news articles derived from those newspapers. This led to a compressed list of 14 science news values with the highest impact on news selection (see figure 3). It was found that "newly introduced factors specific for science journalism outperformed many of the classical ones" (Badenschier and Wormer 2012, 80).

14 News factors with the highest impact on the selection process of science news (alphabetic order)

Astonishment	Political relevance
Composition	Range (number of affected people)
Controversy	Reference to elite persons
Economic relevance	Relevance to recipients/society
Graphical material	Scientific relevance*
Intention	Actuality (Trigger)
Personalisation	Unexpectedness

*Scientific journals are the fundamental basis to encode the news factor *scientific* relevance in case the science coverage was triggered by the publication of a scientific paper. This was especially confirmed by the science editors in our survey. Thereby we may say that the reputation of a certain journal strongly determines the value of this news factor. Because of this close connection we renounced a factor of its own for "scientific journal."

Figure 3: List of science-specific news factors as identified by Badenschier and Wormer (2012).

2.3 Making science newsworthy

A story is not always newsworthy to begin with. Little space is dedicated to science news in most regular news media and political and economic news tend to "crowd out" science coverage (Badenschier and Wormer 2012, 62). Current events can help spark interest in science - even when that scientific research is no longer 'new' - and push it to the first pages of the newspaper (Badenschier and Wormer 2012, 63). To name a recent example, the COVID-19 pandemic has ensured science news is covered daily in most news outlets, be it about vaccines or past pandemics (see also the example of Pollock 2005).

There is not always a pandemic or a war to refer science news to, but most journalists know what makes a story newsworthy. This knowledge of what the media consider newsworthy has a downside; Kilgo et al. express the worry that journalists may "purposefully sensationalize stories in order to extend their shelf life" (2016, 1510-1). News values can, instead of being identifiable after publication, be used as a template on which to build a story, in order to make it newsworthy. In the resulting news articles, this is reflected in "selectivity or enhancement, generalization or simplification, [or] emotionalism" (Molek-Kozakowska 2013, 174). These are all aspects of sensationalism. Their identification is not always easy; at what point does one speak of selectivity or generalisation, rather than conciseness with the purpose of fitting the information into a short article?

Sensationalism is an integral (Kilgo *et al.* 2016, 1498), though theoretically undesired (e.g., Grabe *et al.* 2001; Slattery and Hakanen 1994), aspect of journalism. The growing body of readily available sources on the internet means that today, more than ever before, news stories must grab the attention of the reader. In the current media landscape, news publishers battle for clicks and reads. Increasing competition in the news market has resulted in an increase in sensationalist news stories (Hendriks Vettehen and Kleemans 2017). Many communication scholars worry about this fact.

> "While enthusiasm and optimistic extrapolation are natural, it is time to acknowledge that the misrepresentation of research findings through exaggeration or hype is a grave matter for scientific integrity. Misleading statements, irresponsible claims, and credulity create unrealistic expectations, waste valuable research funds, and impede scientific progress." (Scott and Jones 2017, 2219)

In addition to the concern for scientific integrity, I judge forms of sensationalism as having a negative impact on the communication of science. Scientists do not do research in order to make headlines:

> "In archaeology, greatness is not owed the scholar who recovers a fancy tomb or new fossil; rather, proper credit is due to the researcher who places those finds in a broader context that stands the test of persistent re-evaluation and time." (Feinman 2010, 12)

As alluded to in the above quote, the journalistic and scientific agendas do not align. While the journalist seeks out a sensational story about a large tomb full of shiny treasure, the archaeologist is concerned with the proper documentation and interpretation of said tomb and treasure. Ultimately, journalists do not report for scientists, but for the public. In doing so, they use non-scientific language and prefer simplifications. As a result, science that is communicated from the journalist's perspective, does not reflect the perspective of the scientist.

Journalists are not always to blame for sensationalism. Details of a story are sometimes transformed before it becomes a news item, by those that wish to profit from science (Heyl *et al.* 2020, 132) or by scientists that report their finds too early (Shipley 2015).

2.4 Communication between media and science

To science journalists, publications in *Science* and *Nature* are usually newsworthy, because their presence in these prestigious magazines indicates that they contain something ground-breaking and therefore *new* (Rosen *et al.* 2016, 346). Science journalists read the academic papers and reshape them into a newspaper article anyone could comprehend. This is a skill that requires a scientific background and a grasp on statistics (Nanayakkara and Hullman 2020, 1), as well as journalistic capabilities like writing and facilitating comprehension, interpretation and contextualisation (Kovach and Rosenstiel 2014). The journalist is the bridge between the media - and thus the public - and the scientific community.

However, due mainly to the changing (digitising) media landscape and the resulting financial cuts in traditional news media (Scheufele and Krause 2019, 7667), the science section of the news is more often written by 'regular' journalists. They lack the scientific background necessary to give academic papers the journalistic treatment. This, alongside a lack of time and priority (Badenschier and Wormer 2012, 62), results in what has been termed 'churnalism' - to copy a text source directly rather than produce an article yourself. In turn, "the critical, investigative function of journalism is lost" (Heyl *et al.* 2020, 131).

A source most often copied in these instances are press releases of scientific institutions. The problem is, especially with the increasingly competitive nature of science, these "are written in a way that serves the interests of the organisation and are therefore first and foremost PR tools" (Heyl *et al.* 2020, 129); they are meant to make the institution look good, with the purpose of reputation-building and economic gain (Scott and Jones 2017; Heyl *et al.* 2020, 129; 131). Press releases are not an objective source and so require the critical treatment of a journalist all the more. Instead, Heyl *et al.* (2020) have found that press releases were copied nearly word for word by half the news sources they researched, often *without* crediting the original press release.

On the individual level, scientists, too, may try to attain media visibility. This means that scientists, rather than influencing what scientific

stories appear in the news, let themselves be dictated by the media in the topic selection of their research "to such an extent that media criteria may begin to impede the quality and autonomy of science" (Heyl *et al.* 2020, 129). This is called the medialisation of science. Sensationalism plays an important role here. Presenting science with an exaggeration or superlative ('the first…', 'the biggest…', 'the oldest…', etcetera) helps attract a bigger audience (Scott and Jones 2017, 2219; Rödder and Schäfer 2010), but is not necessarily scientifically relevant or even accurate.

No matter whether sensationalism is introduced by the scientist, the institution or the journalist, it is an undesirable development because of how it shapes the public perception of science.

2.5 Public's perception

Especially in science news, writing with the public in mind is a prevalent, if not increasingly deliberated phenomenon (Badenschier and Wormer 2012, 80; Rosen *et al.* 2016, 335). At first, this may sound logical: journalism *is* for the public. However, it is meant to aid the public in shaping opinions and expanding knowledge, to help them put things into perspective - not to feed them what they want to hear. For science journalism, this means illuminating science independently, not promoting it (Joubert 2019), such as happens when journalists copy press releases.

The medialisation of science is a result of sensationalism, because the sensationalist approach to science outreach has raised the expectations of the public (to be entertained, to be shocked, to relate to or even apply scientific results), and because scientists and scientific institutions feel they have to fulfil those expectations. Heyl et al. predict: "when the results then fail to meet these expectations, the consequence is a loss of public trust" (2020, 132). As such, sensationalism constitutes a threat not only to public *understanding* of science, but to public *trust* in science as well. Heyl et al. suggest journalists, science institutions and scientists must all "move away from selling science to society towards talking science with society" (2020, 137). This is especially true because, for many people, the news is the only

means by which they are exposed to outgroups (groups that they are not a part of; Jacobs and Meeusen 2020). This notion can be extended to science, something with which many members of the public never associate. Their exposure to science is through the news. According to Nanayakkara and Hullman (2020), science journalism significantly impacts how members of the public perceive scientific information.

Despite the important role of science journalism for science and the public, Secko et al. (2012) observed that few studies explore the positive effects of science journalism on the public's understanding and image of science. Most research serves as a critique of science journalism. In their study, Secko et al. (2012) wish to shift the focus of science communication research to improving science journalism (see for example Nanayakkara and Hullman 2020). By examining not the effect of science journalism, but the presentation of information, the current study acts as a neutral identifier of what may be improved in science journalism of archaeology.

In regards to critiquing science communication, sensationalism is an obvious subject of study. The problem of sensationalism is that it can be misleading in its reduction of nuance, especially for laypersons who do not have the capacity to contextualise the claims made by the journalist (Intemann 2020, 5). It counteracts several goals of science communication, such as accuracy, predictive relevancy, and facilitation of trust (Intemann 2020, 4). Journalists must somehow mediate between writing an article that attracts attention, and correctly presenting scientific information. In this endeavour it becomes easy to slip into stereotypes; to start presenting to the public that which the public expects (Badenschier and Wormer 2012, 80). While keeping the perception of the audience in mind can be a good thing (a broader audience would be reached, namely also those people that are "science-distant"; Badenschier and Wormer 2012, 81), the negative side is that *scientifically* important research never enters the non-academic sphere for lack of public appeal. It does not receive the public awareness it requires to become an integrated part of people's knowledge of the world. The question then becomes, as aptly posed by Badenschier and Wormer: "Who will tell society what is *really* going on in science?" (2012, 81; my emphasis).

2.6 The media and archaeology

The literature presented in this chapter was derived from journalism and science communication studies. In terms of archaeology, several things can be deduced from the above theories.

News values can be used as a point of reference when studying news items about archaeological discoveries. They can help explain why the journalist highlighted specific parts of the information provided in the original research paper or press release, or why the story was selected for publication at all. In other words, what news values does the story contain that make it newsworthy? For a study concerned with improving the representation of archaeology, it is helpful to know what stories news media consider of interest or interest*ing* to their audience.

Sensationalism has negative effects on the communication and perception of science. While I do not go so far as to say sensationalism constitutes scientific fraud (see for example Wilson 2019), the spread of misinformation is certainly connected to this phenomenon, and in extension, so is the skewed image of archaeology. Reasons to sensationalise a story are not in line with the objectives of science communication, but rather with those of news media that desperately need people to read their stories. Presenting archaeological information as something exotic and adventurous attracts more attention by playing into the existing image of the discipline.

3
Theoretical framework

This study uses the method of media analysis to approach sensationalism in newspaper articles describing archaeological discoveries. These concepts, and the variables derived from them, are detailed below.

3.1 Media analysis

Media analysis is a form of content analysis, the primary method for studying media messages and communication (Zamith and Lewis 2015, 307-8). The unique characteristic of content analysis is that its data is derived from communicative practices[4] (Green Saraisky 2015, 27). In the case of media analysis, this data consists of traditional and social media messages. While often applied in business and economic contexts to gauge consumer demographics and impact of advertisement, in the academic field, the aim of such analyses is to better understand the public contextualisation of topics ranging from policy-making to science (Green Saraisky 2015, 27-8; 38). The analyses are performed within delineated concepts and a predetermined coding protocol; a set of instructions that must be followed by the coder(s). Hence, the strength of content analysis is its replicability (with the same protocol, a similar or an extended dataset could be used) and its reliability (the protocol ensures a level of objectivity, even in human coders; Zamith and Lewis 2015, 309; Green Saraisky 2015, 27).

Media analysis is particularly suitable to my study and the broader issues it addresses as it 1) provides insights into the public contextualisation of archaeology through its presentation in the media, and 2) is a method with a standardised procedure that can be used for quantitative and qualitative

[4] Communicative practices are any means by which two or more individuals communicate; the container of the message, if you will. "Communicative practices focus not on the moment of transmission, when meaning passes from a sender to a receiver, but instead on the means by which such transmissions are created and are able to be repeated across masses of people." (Jordan 2013).

analysis, allowing for larger datasets to be studied in a thorough, reliable and replicable manner.

Quantitative content analysis is focused on counting and measuring and can be performed by computational programs. These use an algorithmic coder that is instructed by a set of rules created by the researcher or imported from previous research (such as sentiment dictionaries). The algorithmic coder cannot fully replace the human coder and is preferably used only to analyse simple variables. Using it in combination with human analysis of the dataset is argued to be the most valuable approach (Zamith and Lewis 2015, 314-5).

Qualitative content analysis is focused on understanding and interpreting, and on testing or developing the predefined concepts that are then used for follow-up (quantitative) content analyses (Elo *et al.* 2014, 1). In the current study, quantitative, algorithmic analysis is used (for the variable *tone*) as well as qualitative, interpretive analysis (for variables *framing* and *role of experts*).

3.2 Sensationalism

There is no consensus on the exact definition of sensationalism and many other words are used to indicate similar phenomena, such as 'hype'. In the introduction, I provided the Cambridge dictionary definition of sensationalism: "the act by newspapers, television, etc. of presenting information in a way that is shocking or exciting" (dictionary.cambridge.org). Kilgo et al. (2016), who did one of a very few studies researching sensationalism in textual online news, focus on the stylistics of sensationalism, both visually and textually. They "conceptualise sensationalism as a style (category and form) that triggers emotion for the reader and treats an issue in a predominantly tabloid-like way" (Kilgo *et al.* 2016, 1499). "Tabloid-like way" refers to tabloid newspapers, who mainly report on soft news, news that is focused on selecting or packaging information in an entertaining and therefore more accessible way (Baum and Jamison 2006).

Soft news is often criticised for not fulfilling the goals of journalism (to inform people so that they can be better citizens of democratic society; Kovach and Rosenstiel 2014). However, Baum and Jamison (2006) showed that soft reporting's information, even when provided in small quantities and in an entertaining context, still impacts the actions of the audience, an indication that soft news information is retained and processed. Soft news has the ability to reach an audience of people who are uninterested in hard news (e.g. politics, economics, foreign affairs; Rosendale and Longcore 2015, 58), which is an advantage when attempting to spread word of your archaeological discovery. However, the entertaining packaging of soft news counteracts the attempts to present archaeology as a relevant science and does not receive the same credit as hard news, nor is it taken as seriously (Baum and Jamison 2006, 947). Soft news generally has a more positive tone than hard news, which is subject to the negativity bias in news (negative stories sell better; Al-Rawi 2020, 168; Soroka and McAdams 2015).

Aside from topic framing (to present the story as vital information, like in hard news, or as 'fun facts', like in soft news), sensationalism is also prominent in word choice. The text of a sensationalist article contains superlatives and other forms of exaggeration (for example, a small fight is described as a riot). A journalist might - to meet the attention requirements of the modern media landscape - place a science topic in a different context, because science news itself generates the least social media interaction (this is the 'categorising' referred to in Kilgo et al.'s definition of sensationalism). Inflating the news values of a story in some cases contributes to the positive tone that can be detected in sensational articles.

To briefly repeat from the previous chapter, sensationalism has a negative impact on the public's perception of science, undermines scientists' attempts to communicate their research, and damages scientific integrity.

From the above theory I conclude that tone and framing are variables that news publishers use to create sensational effects, helping them accumulate an audience. Therefore, they can also be used to detect and measure varying degrees of sensationalism. Below, the variables *tone* and *framing* and the additional variable *role of experts* are explained in detail.

3.3 Tone

Tone, in text, describes the mood of the text and is meant to evoke certain emotions in the reader, if not make clear the emotions or perspectives of the writer themself. Journalistic texts, too, are written with a certain tone, which inevitably influences the reader. Jacobs and Meeusen (2020, 7) argue: "News tone has ramifications for the salience and reception of political issues, because it can steer public opinion in a particular way." The same can be said for other issues in the news. Jacobs and Van der Linden (2018) observed that tone has particular effect when it is significantly unidirectional - positive or negative - because it increases the chance that the dominant tone is internalised by the reader.

To test the direction of tone, in this study, archaeological news articles are subjected to a sentiment analysis, a computational method to study digital texts. Sentiment analysis involves using a dictionary (a list of categorised key words) that is compared to the words in the texts. These words, in turn, are labelled according to the dictionary's categories (positive or negative, and variations of those; Boumans and Trilling 2016, 11). Depending on the scope of the research, a calculation is done to arrive at a sentiment score for each analysed text.

I used the General Inquirer dictionary (DictionaryGI), a list of words compiled over many years by Harvard researchers and consisting of two categories: positive (1,915 words) and negative (2,291 words). The dictionary is not curated for any specific field and can be used in the content analyses of any type of text (Chan *et al.* 2020, 11). This means the dictionary lacks discriminative capacity; it is too general to produce a sentiment score for the particular type of text that is being researched (Young and Soroka 2012, 210). A more suitable alternative for the analysis of news articles would be the Lexicoder Sentiment Dictionary (as has been demonstrated by Young and Soroka 2012). However, due to time constraints and an issue with coding, I was not able to apply the dictionary. Yet, the DictionaryGI remains a widely recognised sentiment analysis tool and was incorporated in the

Lexicoder Sentiment Dictionary because of its expansive word lists. For the scope of this research, therefore, it is a rudimentary but valuable approach.

While still widely used (e.g., Shofiya and Abidi 2021), sentiment analysis has been criticised in recent years. Boukes et al. (2019) concluded that sentiment scores from various dictionaries, applied to the same text, barely overlapped. The results of the DictionaryGI, therefore, may differ greatly from those retrieved with the Lexicoder Sentiment Dictionary (or any other, for that matter). This is something that should be tested in future research. For the time being, the use of an 'off-the-shelf' sentiment dictionary, that has been tested many times, is still able to convey the general sentiment of the texts.

Aside from a sentiment analysis, I include the use of superlative adjectives as part of the variable tone. Use of superlatives and hyperboles is strongly connected to sensationalism, being yet another way to attract attention to one's article in the competitive landscapes of both media and science (Scott and Jones 2017). Superlatives influence the tone of an article by expressing extreme emotion; they are exaggerations, a feature of sensationalism as identified by Molek-Kozokowska (2013). They are strongly connected to clickbait articles (Scott 2021). In analysing use of superlatives, researchers can adopt a range of methods. For example, a predetermined set of variables can be examined in context ('breakthrough', 'game changer', etc.; Jaiswal *et al.* 2020) or the use of superlative adjectives can be researched (Watanabe and Iyeiri 2020). Archaeology often appears in the media with superlative adjectives such as 'oldest', 'largest' or 'first', etcetera, because they describe the type of finds that are deemed newsworthy. I do a count of superlative adjectives to test their frequency in archaeological news articles.

The analysis of the variable tone is performed in order to answer RQ1:

> **RQ1:** Is archaeological news brought in a positive, neutral or negative way?

Both a positive and a negative sentiment score can indicate sensationalism, to a degree. Negative could mean a critical stance is taken (though not

necessarily towards the archaeological discovery), whereas a positive score can be promotional. Especially negativity might also be the result of the context; if this is a controversial one, negative and positive attitudes towards either side of the debate may cause a shift in the sentiment scoring of an article. Again, the sentiment does not have to be directed at the archaeology itself, rather at aspects or consequences of it.

3.4 Framing

According to Scheufele and Tewksbury (2007), framing "is based on the assumption that how an issue is characterised in news reports can have an influence on how it is understood by audiences". It is a way of organising and classifying information, in order to make complex issues accessible to lay audiences. Additionally, the adopted frame emphasises what is most salient about the reported event.

Archaeology is also subjected to framing. Pollock argues this is because "archaeology is never innocent, and its evocation in the news is always part of a larger story and a larger agenda" (Pollock 2005, 92). That larger story is linked to the archaeological story through framing.

Researchers studying the framing of news topics either use a set of predetermined frames to compare to their dataset (that are then adjusted or expanded; Šuljok 2015) or identify and describe frames particular to their dataset. I adopt the latter method since there exists no theory on the framing of archaeological news articles that provides predefined frames. The study by Pollock (2005) was directed at the framing of archaeology in articles about the American wars in Iraq and Afghanistan. The case studies researched here are of an entirely different nature, and the aim is to arrive at a more general understanding of the framing of archaeology than her study provided.

The identification of frames in the current dataset will answer RQ2.

RQ2: In what context is the archaeological information presented?

It is important to recall the distinction between the framing of archaeology as a discipline (whether we are presented as treasure hunters or not), and the framing of archaeological information. My focus being on the sensationalising of archaeological resource in news media, I primarily research the latter.

3.5 Role of experts

I have not found previous studies examining the role of experts in relation to sensationalism. Nevertheless, I argue the two concepts are connected. Especially in science news, expert quotes can affirm or deny the sensational perspective (frame and tone) taken by the journalist. As such, experts can boost or weaken the level of sensationalism. The interference of archaeologists may help redirect attention for sensational finds and entertaining facts towards the meaning the archaeological knowledge holds for the past, present and future.

Research about the role of experts has shown that news articles rarely make mention of expert consensus on a topic. Merkley (2020) argues this is because the consensus (the recognised thought and theory of the expert's discipline) is not what makes the reported event newsworthy - it is background information. Even rarer are instances where the opinions of contrarian experts are given; balance and nuance are not common in news coverage (Merkley 2020). Kallén et al. (2019) argue that experts helped amplify features of the archaeological finds that would attract further media attention, such as narrative elements and what the authors term "imaginary elaborations" (adjectives that enhance the importance or conception of the archaeology).

Based on the assumption that - when present - quoted experts play a role in the level of sensationalism in archaeological news articles, I ask a third research question:

RQ3: Are archaeologists quoted and to what end?

4
Methodology

Generally, news media analyses are performed on a sample of 100 to 200 articles (e.g., Phi 2020; Toker 2020; Stäficulescu and Neagu 2016, Badenschier and Wormer 2012). For this study, the newspaper articles of three archaeological case studies are combined to reach that number. The final selection contains 198 news articles. The case studies were selected based on the above-average media attention they received in the first month after the initial press releases.

4.1 The case studies

The three case studies present several topics around which the media have built newsworthy stories. While there are similarities between them (they are all archaeological discoveries made in 2018 that received above-average media attention), there are differences too. Each case study involves a different era, continent and archaeological method. Together, they form a limited yet diverse selection of archaeological discoveries, providing - after analysis - a relatively broad view of how archaeological research is presented in textual news media.

4.1.1 Cheddar Man

Figure 4: Cheddar Man's reconstructed face (nhm.ac.uk).

In 1903, a complete skeleton was found in a cave in Cheddar Gorge, Somerset, England. It was 10,000 years old and belonged to one of the people who migrated from the mainland to the British Isles when Doggerland was above sea level. The cave which he inhabited contained

several bones, including some showing marks of cannibalism. Those belonged to a migratory group that left Britain long before Cheddar Man's people arrived some 5,000 years later.

In the 1990's, scientists discovered that Cheddar Man's group never left the region, when they matched the Cheddar Man's DNA with a current inhabitant of Somerset, history teacher Adrian Targett. A reconstruction was made of a white, bearded man. In 2018, making use of novel aDNA technology, researchers from the National History Museum and University College London discovered that Cheddar Man had been dark skinned, curly haired and blue eyed (see figure 4). A reconstruction was made by Dutch paleo artists; an image that attracted worldwide media attention, focused mainly around the revelation that the first Brit had been black.

"A made-for-internet scientific discovery that at the same time strikes at the core of modern racial strife", wrote Shree Paradkar for The Toronto Star on February 9, 2018. Indeed, much debate ensued, Cheddar Man (and the scientists who revealed his looks) attracted both hate and praise from the public. The discovery was regarded as controversial (despite the DNA evidence) and accused of being the result of a left-wing agenda being forced upon science. The find was widely politicised and became linked to several modern events and issues.

4.1.2 Mayan megalopolis

In 2018, results became available of a large-scale LiDAR-project in Guatemala, run by The Foundation for Maya Cultural and Natural Heritage

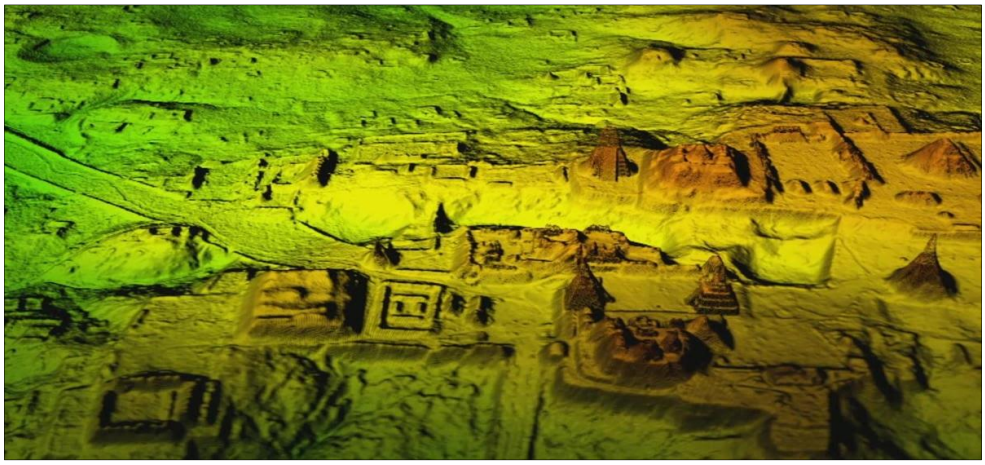

Figure 5: LiDAR imagery of known and unknown Maya infrastructure (cbsnews.com).

(PACUNAM). LiDAR's laser technology revealed a widespread urban landscape sprawling the jungles in the region of Petén. This megalopolis, as it was termed, is ascribed to the 9th century Maya civilisation (see figure 5). Archaeologists had surveyed the region for many years, yet most of what LiDAR revealed, had been unknown to them.

The impressive images and the story they told were picked up by news outlets across the globe. The discovery of a 'lost city' is spectacular and draws the public's attention. A find like this speaks to ideas linked to archaeology's stereotype, with themes like adventure and exploration. The public did not dispute the research results, LiDAR being widely recognised as a reliable technology that had revealed unknown cityscapes before (for example around Angkor Wat). Within a month after discovering the Mayan megalopolis in Guatemala, LiDAR revealed a Mayan city in Mexico as well. The two finds are linked to each other by several news outlets.

4.1.3 HMS Endeavour

In 1778, the HMS Lord Sandwich II was scuttled in the harbour of Newport, Rhode Island. The ship had once been named the HMS Endeavour, the bark that carried James Cook and his crew to Australia (see figure 6), making them the first Europeans to discover the continent. In the 1990's, two amateur archivists were the first to learn of the fate of the ship (the renaming and scuttling), reigniting the search for the ship's wreck.

In September 2018, newspapers around the world reported the rediscovery of the HMS Endeavour. Marine archaeologists of the Rhode Island Marine Archaeology Project (RIMAP) and the Australian National Maritime Museum (ANMM) were closer than ever to identifying which of the many wrecks in front of Newport was

Figure 6: The HMS Endeavour in Whitby harbour, where it was built (rimap.org).

the famous HMS Endeavour. However, the wreck had still not been identified[5]. The search had been narrowed down from a group of five wrecks, to just two potential matches.

Despite being an inconclusive discovery, it gained much media attention. Coinciding with several celebrations related to the European discovery of Australia (in 2018, it was 250 years since the ship had embarked on its mission and several exhibitions related to this had been organised), attention for Cook and his journey were already peaking. The potential discovery came at an opportune time and was able to generate public interest without actually having been discovered. A debate about what countries could lay claim on the wreck, should it be found and raised from the ocean, also immediately ensued.

4.2 Gathering newspaper articles

For the collection of newspaper articles for the media analysis, I initially used Google News. This was not a reliable method in light of replicability (even in an incognito window, with the same search terms and date range, it showed different results each time). The current set of articles was retrieved through the Dow Jones Factiva database (global.factiva.com). A description of the database is provided by the Leiden University website:

> "Factiva International Newspapers provides access to the latest business and industry news. The database allows users to browse through a collection of global content sources from 200 countries, in 26 languages - including newspapers, continuously updated newswires from Dow Jones and Reuters, journals and magazines, websites, blogs, and multimedia." (library.universiteitleiden.nl)

[5] As of April 2020, researchers were *still* searching (australiangeographic.com.au).

Factiva offers many possibilities for narrowing a search and getting relevant results. The exact steps taken during data collection are outlined below as the first phase of the sentiment analysis (see figure 7).

The use of Factiva has proven reliable by many previous studies (see e.g., Llorente *et al.* 2018), but has several limitations. Factiva collects articles daily, but from a random selection of sources each day. It does not contain the full list of publications of any one newspaper. For the current study, this is not a problem, as I want to get a *general* analysis of archaeology in the news media. However, this limitation means my results are not based on *all* existing articles related to my case studies and therefore should not be viewed as a complete database of their news media outreach.

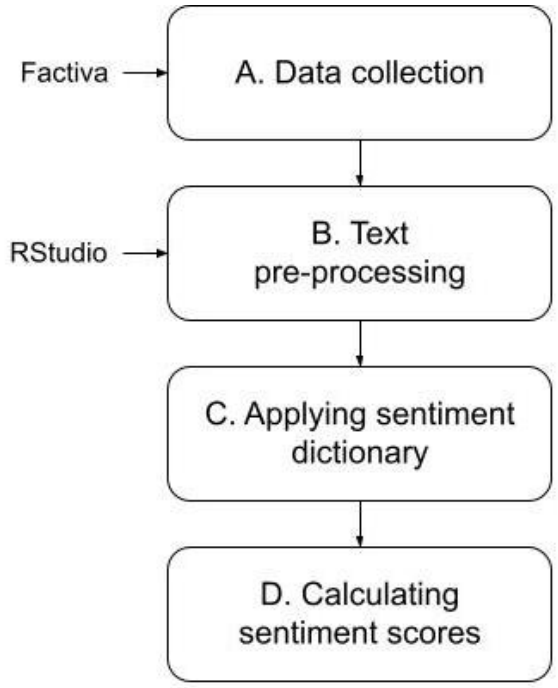

Figure 7: Schematic depiction of the process of sentiment analysis.

A. Data collection

For this study, I only want to study *newspaper* articles about the case studies. I therefore excluded all other Factiva source types (like 'magazines and journals', 'wires' and 'newsletters') and selected only the categories 'Major news and business sources' and 'Newspapers: all'. Factiva's division of sources is not always accurate. Whenever I was presented with a source that did not fit the categories (e.g. Reuters pictures), the result was removed from my selection.

Factiva has a feature to detect duplicates of articles. These are republished updates of an article or copies appearing in a different newspaper (usually the online or local version of the original newspaper). This feature was set to 'identical'. Only exact duplicates were removed from the search results.

The most accurate search terms were found through trial and error; continuously checking whether articles Factiva deemed 'least relevant' still covered the archaeological discovery. To further ensure the articles mentioned the respective case study, I read the headlines and looked at the search terms in context whenever a headline seemed off-topic.

Sets of articles were downloaded in .html format to allow further analysis.

4.3 Tone

4.3.1 Supervised sentiment analysis

A supervised approach to a sentiment analysis uses a set of labelled data, or 'sentiment dictionary', on a set of new data - in this case the articles collected from Factiva. The dictionary consists of words with a "positive" or a "negative" label, which are then matched to the texts of the dataset under analysis. The total amount of negative words used in a text is subtracted from the amount of positive words in said text, and divided by the total amount of sentiment words to get a mean score for sentiment. These steps (B to D; figure 7) are explained in detail below.

B. Text pre-processing

Before the articles from the Dow Jones Factiva database could be used for sentiment analysis, the extracted dataset, in .html format, had to be transformed into an unlisted corpus, which was then turned into a Document Term Matrix (DTM). This placed each article's lead and main text on separate rows. I concatenated the rows so each represented one article (lead and main text combined).

The resulting text bulk underwent further pre-processing steps. I removed English stop words and punctuation and placed all characters in lower case. Because I would be applying an unstemmed dictionary, I did not do stemming[6].

C. Applying sentiment dictionary

The dictionary I selected for the sentiment analysis is DictionaryGI, as explained in chapter 3.3.

Before calculating the sentiment score of each article, it was necessary to check if the positive words from the dictionary were also positive in the context of the articles. I checked the 25 most frequent positive words in context and identified some errors. The word 'like', for example, was not used in a positive way but as suggesting similarity. Words such as 'dark' and 'wreck' may signal something negative in general news (used figuratively), but in the case of archaeology literally indicate things from the past. I removed false positive words and did the same for negative (see table 1 for a list of all removed words).

D. Calculating sentiment scores

I calculated the sentiment score for each article as follows: *(positive – negative) / (positive + negative)*. The sentiment scores could thus range from -1 (negative) to +1 (positive). A score of 0 indicates neutrality.

To normalise for document length I calculated the subjectivity score as well. This is based on the following formula: *(positive + negative) / length*, and ranges from 0 to infinity. The lower the subjectivity score, the fewer sentiment words were used in the text.

[6] Stemming is a process that takes words like 'archaeology', 'archaeological' and 'archaeologist' and creates one term 'archaeol'. 'Archaeol' is not a real word and does not appear in any dictionary. It is possible to use the stem_Completion() function from the tm package to recreate an existing word, but such is an unnecessary step in the scope of this research. Therefore, stemming was omitted altogether.

Table 1: Words removed from the sentiment dictionary

Cheddar Man		Maya megalopolis		HMS Endeavour	
Pos	**Neg**	**Pos**	**Neg**	**Pos**	**Neg**
like	dark	golden	capital	just	war
just	make	just	even	like	prison
human	cave	like	help	well	wreck
make	get	well	death	back	piece
natural	even	back	laid	even	barrier
complete	show	minister	make	board	service
know	race	home	desert		shipwreck
back	hole	security	point		study
	study	art	show		make
	point	know	sort		even
	wild	make	poor		help
	hunter	council	press		board
	death	human	lay		particular
	extinct	guardian	particular		sank
	cool		cut		cannon

4.3.2 Superlatives

As part of sensationalism, I checked the use of superlative adjectives. All words ending in -est were examined and, when part of a superlative (e.g. 'greatest', but also 'best'), added up to be divided by the total number of words of the combined articles of that case study (*total words / superlatives*). To this, I added the total count of the word 'most'[7].

4.4 Frame identification

The identification of framing of archaeological discoveries in news texts happened in two phases.

[7] 'Worst', a unique exception to the superlative rule ending in –rst instead of –est, was encountered a total of three times across all case studies and never in relation to the archaeology. Therefore, I decided to omit it.

Phase 1

After superficial inspection of the articles, scanning their headlines and leads, I developed an initial list of frames. These had a clear description attached, which was further defined in the next stage of the process.

Phase 2

In the second phase, I read every full article, placing each in one of the frames developed in the first phase. When an article did not fit any of those, it was marked to be placed in a new frame together with articles that had a similar deviation from the initial frames.

Articles that were unique in their approach to the archaeological discovery were placed together in group 'H'. For each case study, some articles were too short to fit any of the frames. These were placed together in the 'news flash' group.

4.5 Role of experts

In analysing the role of experts[8], I evaluated whether a direct quote contained neutral or opinionated information. The distinction was based on whether the scientist could give the information based on research, or if it was based on assumption. For example, if an archaeologist specialised in Mayan archaeology said that LiDAR had 'revolutionised' the field, it was considered neutral; the archaeologist knows this based on experience. However, if an archaeologist predicted that finds would be considered 'revolutionary' by the public, it was considered opinion; the scientist, at that point, had no way of knowing how the discovery would be received. Additionally, if a *scientist* expressed a personal reaction to the discovery, it was marked neutral, whereas a statement insinuating how the *reader* should interpret the find was marked as opinionated. Aside from effects on interpretation, there are also instances where archaeologists expressed their viewpoint on debates surrounding the discovery.

[8] The definition of 'expert' here is restricted to archaeologists (or scientists that were part of the archaeological project) and museum curators.

I also marked the purpose of neutral quotes for the text's content; did it provide detail, explanation or contextualisation, was it used to tell part of the story or to add a personal touch? This was all done through qualitative analysis, without counting specific occurrences. The goal was to get a general idea of the expert's role.

5

Results

The media analysis was performed on a total of 198 articles. The Cheddar Man case study contained 100 articles, the Maya city case study 36 and the Endeavour case study 62. The big difference in sample size causes the results to be of different validity. The Cheddar Man results are the most accurate because of the large amount of data.

In the following paragraphs, I present the results of the media analysis, which was based on three main variables: tone, framing and the role of experts.

5.1 Cheddar man

I collected the variables from 100 articles, as selected by Factiva based on the search term *atleast2 "cheddar man"*. How do newspapers write about the reconstruction of Cheddar Man's face?

Tone

The sentiment score (*(positive - negative) / (positive + negative)*) of the Cheddar Man articles has a mean of 0.28 with a standard deviation (SD) of 0.37, which on a scale of -1 to 1 is neutral towards positive (see figure 8). The

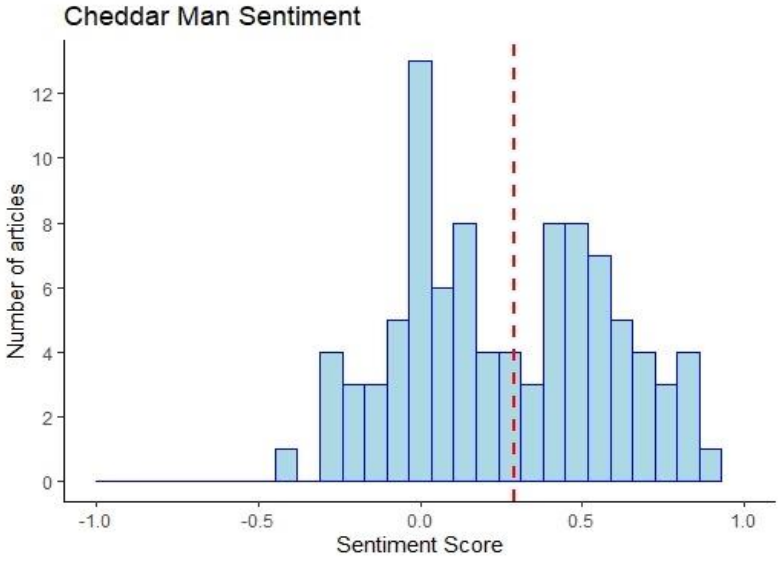

Figure 8: Sentiment score Cheddar Man articles. Mean = 0.28, SD = 0.37.

subjectivity score (*(positive + negative) / length*) - which for Cheddar Man ranges from 0.00 to 0.18 - is 0.06, indicating the articles were not very subjective (see figure 9).

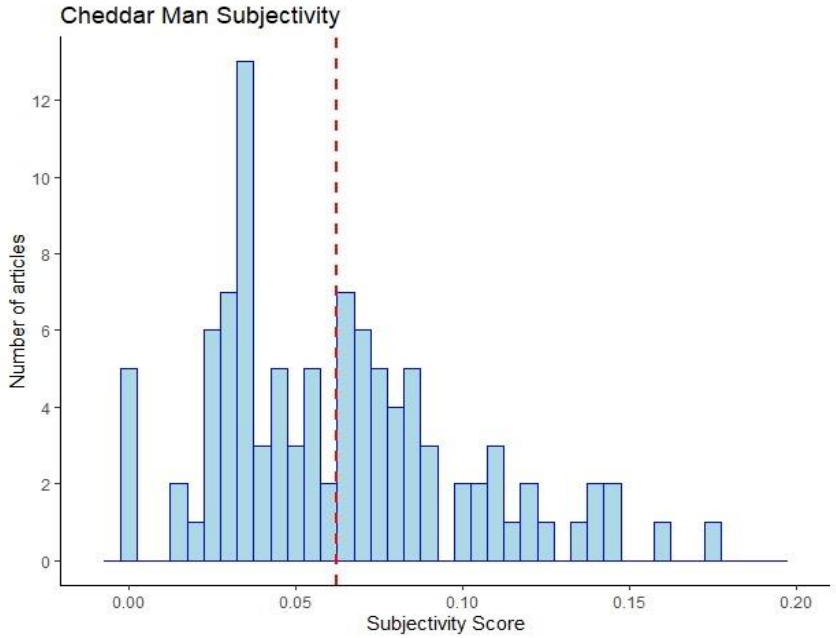

Figure 9: Subjectivity score Cheddar Man articles.

In addition to subjective words, the articles contained another indication of sensationalism: use of superlatives. The combined Cheddar Man articles used 279 superlative adjectives, which amounts to 1 superlative per 136 words.

Framing

I identified seven frames for the cheddar man articles, plus a group labelled 'news flash' (articles too short to assign to a frame) and a group with unique articles (see table 2 and figure 10). I removed six articles in this stage of the analysis (Phase 2 of frame identification) which were not removed by Factiva when they should have (newsletters and identical duplicates).

Table 2: The Cheddar Man frames

Frame	**Description**	**n = 94**
A	Challenging Britishness	19
B	Focus on the internet trolling of Meghan Markle	11

C	Focus on people resembling Cheddar Man	5
D	Focus on the scientific aspects of the story	35
D/A	Equal focus on the science and the racial controversy	4
E	Focus on the Channel 4 documentary	10
F	Articles expressing doubt about the archaeological findings	2
G	News flash*	4
H	Unique contexts*	4

* Groups, not frames

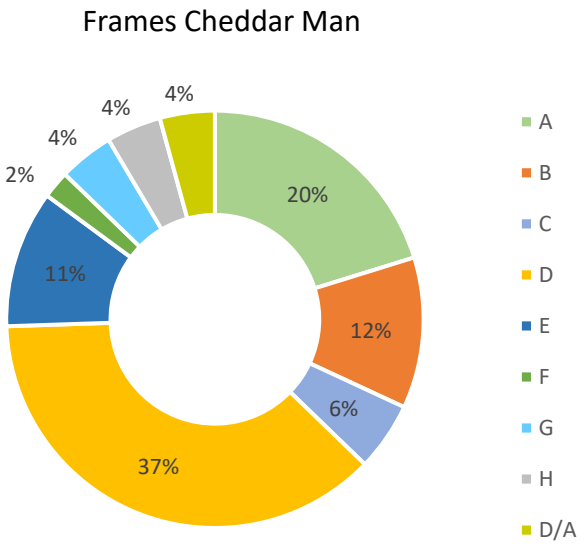

Figure 10: Pie chart indicating the percentage of each frame of the total of Cheddar Man articles.

Making up 37% of the articles, the scientific frame is by far the largest. These are the articles describing the archaeological techniques and context of the Cheddar Man's reconstruction; when the skeleton was found, what research was done before extracting the ancient DNA, and what the discovery means to the archaeological discipline. Within this frame, I identified one outlier that met the requirement of writing only about the scientific aspects of the discovery but provides incorrect information. For example, it states that Cheddar Man either lived with cannibals or was one himself, as deduced from the human chew marks on bones found in his cave. In fact, these bones

date to a people that moved in and out of Britain 5000 years before Cheddar Man's people did, as acknowledged by the other articles in the frame that make a mention of the cannibalism. I put this article in the science frame because it appears to be part of it in all aspects except accuracy. If I had not been aware of the facts surrounding the discovery, I would not have known better than that this is a scientific news article. The identification of frames is based on presentation, not *accuracy* of the presented information.

Following as the second largest frame (20%), is the group of articles writing about the impact of Cheddar Man on understandings of British identity. This frame includes several mocking, column-style articles, in which the writer describes the fictional reactions of British white nationalists to Cheddar Man's black face. Other articles take a more serious approach, for example by touching upon the fact that Cheddar Man proves immigration is nothing new for the British Isles (Aarathi Prasad for The Guardian, 14 February 2018).

The third largest frame involves the Twitter trolling of Meghan Markle (12%). United States politician Paul Nehlen tweeted a picture of Markle with the reconstructed face of Cheddar Man overlaying her own. The articles describe his suspension from Twitter, and relay the reactions in Markle's defence and opposition. The articles provide little to no archaeological context, apart from mentioning Cheddar Man's appearance was recently revealed to be black and that he is considered the oldest-known Brit.

Just one article short of the Markle frame is the set of articles about the documentary in which Cheddar Man's face is officially revealed (11%). This documentary aired on the 18th of February 2018. The articles reporting it are either reviews, providing some archaeological and controversial context, or recommendations from the TV guide that contain a minimum of information on the topic.

First of the smaller frames is the selection of articles that revolve around finding modern humans, common or famous, that look like Cheddar Man, making up 6% of the articles. These news stories either list tweets in which people are jokingly identified as ancestors of Cheddar Man, or write about Adrian Targett, a history teacher who, in the 1990's, learnt he shares

genes with Cheddar Man, proving Cheddar Man's descendants still live in Britain.

Consisting of four articles (4%) is the D/A fame, which focuses on the scientific aspects of Cheddar Man´s controversial skin colour. These articles omit a lot of scientific context that articles in the science frame do contain. Instead, these link the discovery of Cheddar Man's black skin to how this information will be received in a politically divided Britain.

Two articles express doubts about the accuracy of the archaeological research, revealing that the chance of Cheddar Man having 'dark to black skin' is only 76 percent. The headlines make a much bolder statement about inaccuracy than the content can provide. The articles give the same information as the articles in the science frame, with the additional statement that even thorough research results should be approached with a critical stance.

In fact, there is only one article that opposes the discovery fully (this article is part of the documentary frame). The author writes, regarding previous attempts to reconstruct Cheddar Man's face: "A nagging question arose: if everyone else had got it so wrong, why should they have got it right this time?" (Camilla Long for The Sunday Times, 25 February 2018).

The last group consists of articles that were too short to be categorised, often touching upon frames A, C, D and E in one sentence. They are labelled as news flash, making up 4% of all articles.

Role of the experts

The quotes from experts serve many roles in the Cheddar Man articles. The experts provide detail:

> "Cheddar Man existed before farming had spread to Britain. By looking, we can tell he would have been unable to digest raw milk." (*Tom Booth, bio-archaeologist, National History Museum*)

They describe their own experiences and emotions:

> “I first studied Cheddar Man more than 40 years ago, but could never have believed that we would one day have his whole genome — the oldest British one to date.” (*Chris Stringer, research leader in human origins, National History Museum*)

> “I assume that [Cheddar Man’s skin colour] is going to be a big surprise to most members of the public. It was certainly quite a big surprise to me.” (*Ian Barnes, geneticist, research leader National History Museum*)

They explain about processes and techniques that are part of archaeological research:

> "It's quite hard to figure out from the bones how he died, as most illnesses don't leave a trace on human remains." (*Tom Booth, bio-archaeologist, National History Museum*)

The experts also express their views on what impact the find will have on society. Sometimes they give their opinion in a subtle way:

> “What may seem a truth - that people who feel British should have white skin - through time it’s not at all something that is an immutable truth.” (*Yoan Diekmann, computational biologist, University College London*)

Sometimes the experts use more direct phrasing:

> “It may be that we may have to rethink some of our notions of what it is to be British, what we expect a Briton to look like at this time.” (*Rick Schulting, archaeologist, University of Oxford*)

> "People will be surprised, and maybe it will make immigrants feel a bit more involved in the story. And maybe it gets rid of the idea that you have to look a certain way to be from somewhere. We are all immigrants." (*Alfons Kennis, paleo-artist who reconstructed the face of Cheddar Man*)

In the articles expressing doubt, a geneticist who was part of the project said:

> "It's not a simple statement of 'this person was dark-skinned'. It is his most probable profile, based on current research." (*Susan Walsh, geneticist, Indiana University–Purdue University Indianapolis*)

She is the only expert to express critique on the presentation of the findings. Any other opposition in the articles comes from printed tweets or, in one case, the journalist herself (Camilla Long, mentioned above).

Many articles also used the words of the experts outside of direct quotes, to indicate to the reader how they should interpret the discovery. Words like 'extraordinary', 'surprising', 'revolutionary' and 'striking' were repeated by many news outlets.

5.2 Maya megalopolis

I collected variables from 36 articles, as selected by Factiva based on the search term *maya* and guatemala and (lidar or laser).*

Tone

The sentiment score of the Maya articles had a mean of 0.35 with a SD of 0.26, which on a scale of -1 to 1 is neutral towards positive (see figure 11). The

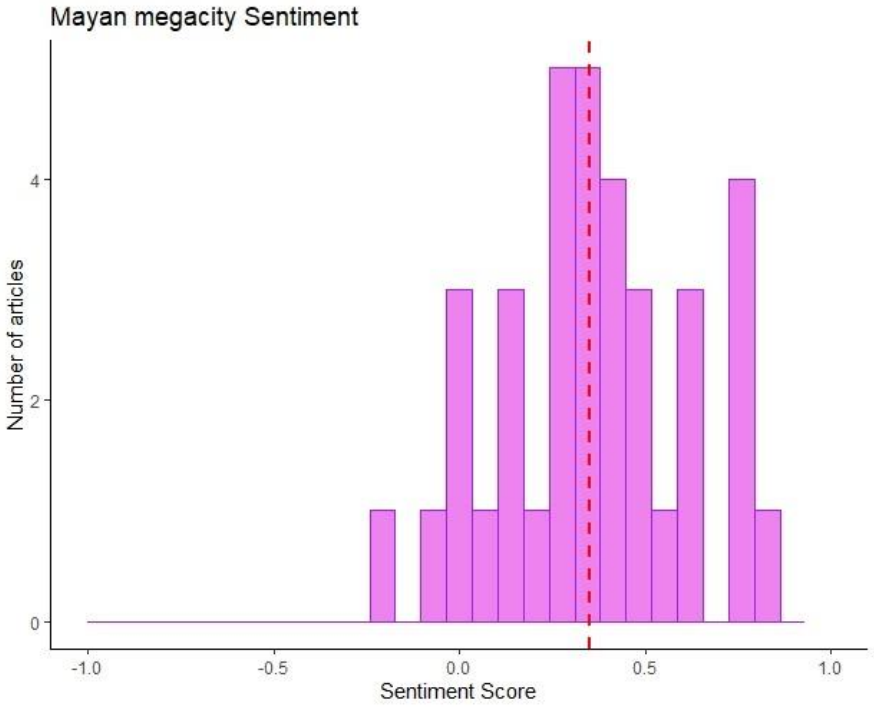

Figure 11: Sentiment score Mayan megalopolis articles. Mean = 0.35, SD = 0.26.

sentiment score has a small spread situated on the positive side of the sentiment range. The mean subjectivity score - which for the Maya articles ranges from 0.05 to 0.11 - is 0.07, indicating most articles were more objective than subjective (see figure 12). The combined Maya articles used 94 superlatives, which amounts to 1 superlative per 134 words.

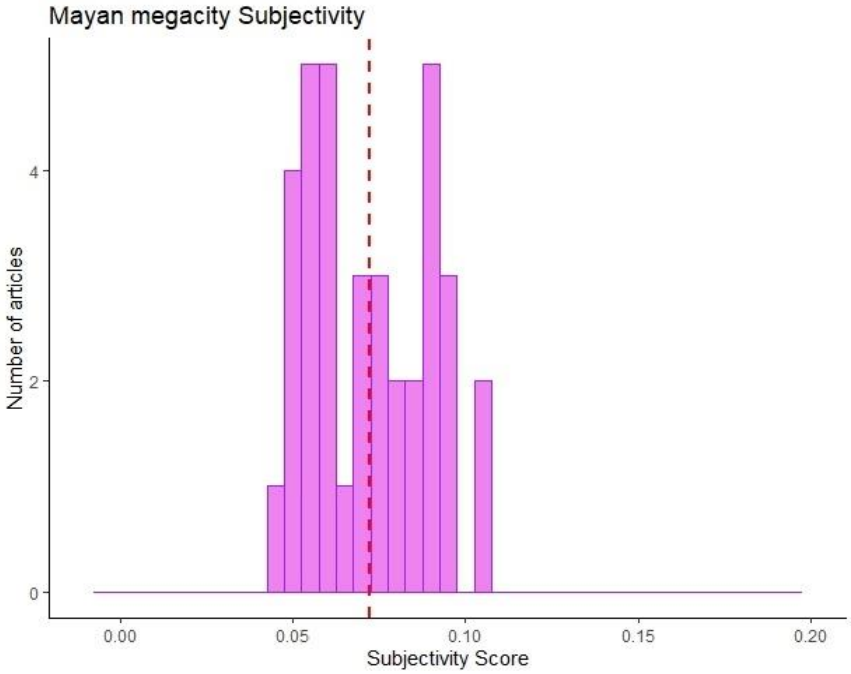

Figure 12: Subjectivity score Mayan megalopolis articles.

Table 3: The Maya megalopolis frames

Frame	Description	n = 32
A	Focus on the Channel 4 documentary	2
B	Focus on the Mexican discovery	4
C	News flash	8
D	Focus on the scientific aspects of the discovery	13
H	Unique stories*	6

* Group, not a frame

Framing

I identified three frames for the Maya articles, in addition to a large group of 'news flash' articles (too short to place in a frame) and group 'H' containing the unique stories (see figure 13 and table 3). An additional three articles were removed in the second phase of frame identification, the selection for close-reading thus totalling 32 articles.

The largest frame (40%) contains the articles focused on describing the scientific details of the discovery. They inform the reader about LiDAR (how it works and how it impacts the archaeological discipline), about what new knowledge has been revealed, and provide some historical context.

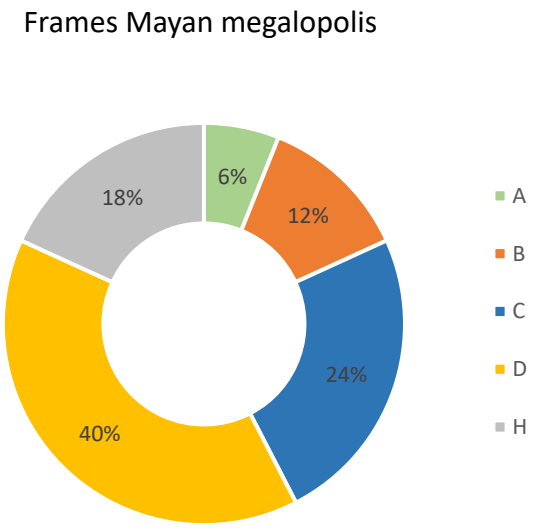

Figure 13: Pie chart indicating the percentage of each frame of the total Maya articles.

The second largest group of articles are those categorised as news flash (25%). These articles rarely exceed 300 words and provide very little detail, while often broaching the same information found in the science frame.

The articles detailing a LiDAR-discovered Mayan city in Mexico form a much smaller frame. These mention the megalopolis discovered in Guatemala, which occurred a few weeks earlier, but continue to describe, in similar fashion to the science frame, the details surrounding the particular discovery of a 'pyramid city' named Angamuco.

The final frame contains articles particularly writing about the documentary that Channel 4 made in cooperation with the researchers who discovered the Mayan megalopolis with LiDAR. The documentary, called 'Lost Cities of the Maya: Revealed', first aired on Channel 4 on the 11th of February 2018. The articles summarise the documentary's contents briefly, as part of the TV guide.

The rest of the articles were put into group 'H'. These articles take a different approach to the megalopolis's discovery, for example by giving the personal account of the director of the documentary, who followed the research team into the jungle, or by hailing the manufacturer of the LiDAR technology. One article links the discovery to the Book of Mormon, in which is spoken of a great city in the south that thrived around the fourth century AD, when Mormon visited. As the author notes: "None of this proves the Book of Mormon true, of course. But it's certainly consistent with the book's historical narrative." (Daniel Peterson for Deseret news, 8 February 2018).

Role of the expert

The experts directly quoted in the Mayan megalopolis articles mainly serve as storytellers; they provide most of the information:

> "The LiDAR revealed an incredible number of new sites and structures. The vast majority of these 60,000+ new features are ruined mounds of Maya houses. However, there are also

> large new cities with pyramids and palaces in the data as well." (*Thomas Garrison, archaeologist, Ithaca College*)

They often give further details:

> "The fortified structures and large causeways reveal modifications to the natural landscape made by the Maya on a previously unimaginable scale." (*Francisco Estrada-Belli, archaeologist, Tulane University*)

The experts also talk about their own experiences in the field:

> "There was this fortress in our area. In 2010, I was within 150 feet of this thing, which would have been a massive discovery in 2010." (*Thomas Garrison, archaeologist, Ithaca College*)

And often add a touch of personal emotion:

> "I know it sounds hyperbolic but when I saw the [Lidar] imagery, it did bring tears to my eyes." (*Stephen Houston, archaeologist, Brown University*)

> "We knew there was going to be more, but the scale of it really blew our minds." (*Thomas Garrison, archaeologist, Ithaca College*)

> "As soon as we saw this we all felt a little sheepish, because these were things that we had been walking over all the time." (*Marcello Canuto, director Middle American Research Institute, Tulane University*)

They also find different ways of describing how important LiDAR and this discovery are for the field of Mayan archaeology:

> "I think this is one of the greatest advances in over 150 years of Maya archaeology." (*Stephen Houston, archaeologist, Brown University*)

> "I don't think you see a lot of discoveries happening across the sciences right now that sort of turn a discipline on its head. It's exciting to know that it can still happen." (*Thomas Garrison, archaeologist, Ithaca College*)

> 'Now it is no longer necessary to cut through the jungle to see what's under it." (*Marcello Canuto, director Middle American Research Institute, Tulane University*)

> "Everywhere you point the LiDAR instrument you find new stuff, and that is because we know so little about the archaeological universe in the Americas right now." (*Chris Fisher, archaeologist, Colorado State University*)

> "LiDAR is revolutionising archaeology the way the Hubble Space Telescope impacted astronomy." (*Francisco Estrada-Belli, archaeologist, Tulane University*)

The experts also call upon other researchers to make use of the data in the context of climate change:

> "We don't use about 92 percent of the LiDAR data. We just throw it out to make our maps but there is incredibly valuable information in that forestry data. [...] that data can be used to determine how jungles recover from forest fires,

> what's the carbon footprint." (*Thomas Garrison, archaeologist, Ithaca College*)

> "We need to marry the interest in pursuing scientific stories with our interest in finding a sustainable model for the area." (*Marianne Hernandez, president PACUNAM*)

Across the frames are articles containing a reference to ancient Greek and Chinese civilisations, emphasising that the Maya civilisation was of the same level as those, and of larger scale than most empires in the European medieval world. This notion is also brought up by expert Reese-Taylor:

> "In Guatemala, LiDAR was used to scan large swaths of what is arguably one of the most populated regions of the world during, what Europeans term, the Middle Ages." (*Kathryn Reese-Taylor, Maya-specialised archaeologist, University of Calgary*)

> "[The Maya] were on the level of highly complex ancient civilisations in Europe, Asia and Africa." (*Kathryn Reese-Taylor, Maya-specialised archaeologist, University of Calgary*)

The words of experts that were used outside of direct quotes, that served to indicate to the reader how they should interpret the find, were 'beyond stupendous', 'extraordinary', 'really big, sensational news' and 'breath-taking', among others.

5.3 HMS Endeavour

I analysed variables for 62 articles selected with Factiva through the search term *(discover* or rediscover*) and endeavour and archaeol**.

Tone

The sentiment score of the Endeavour articles had a mean of 0.38 with a SD of 0.3, which on a scale of -1 to 1 leans towards positive (see figure 14). The subjectivity score - which for Endeavour ranges from 0.01 to 0.15 - is 0.05, indicating most articles were more objective than subjective (see figure 15). The combined Endeavour articles used 84 superlatives, which amounts to 1 superlative per 230 words. The vast majority of these superlatives is the

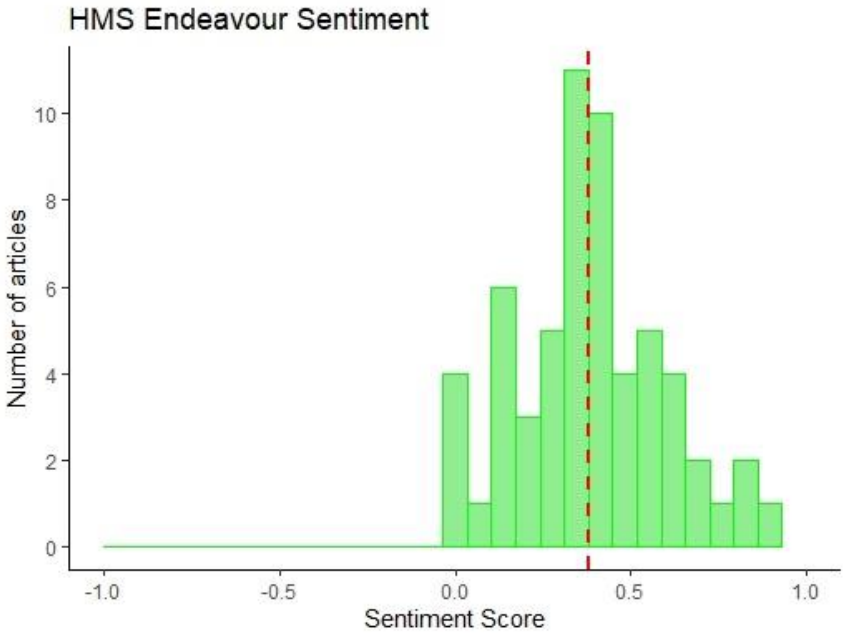

Figure 14: Sentiment score Endeavour articles. Mean = 0.38, SD = 0.3.

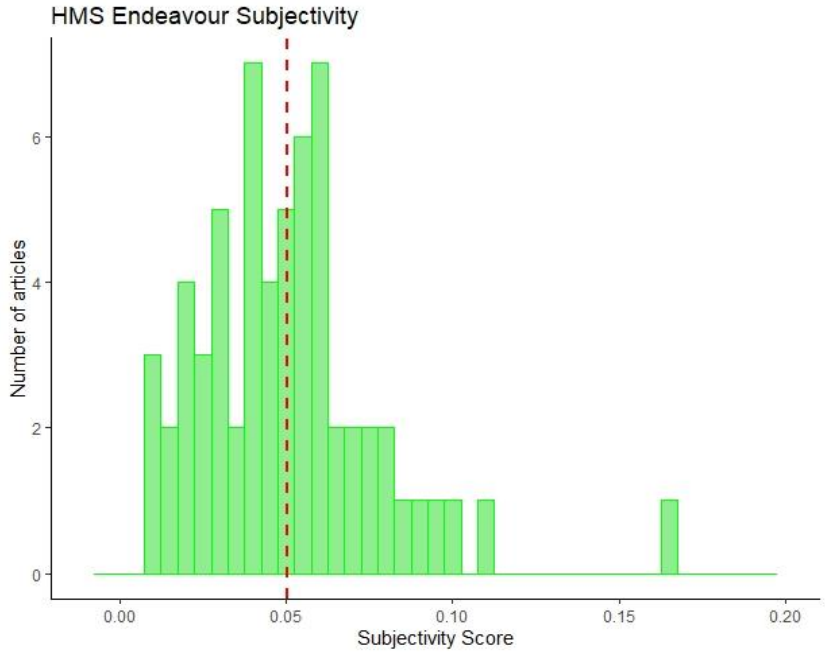

Figure 15: Subjectivity score for the Endeavour articles.

word ‘greatest’, as part of the often-repeated sentence “greatest maritime mysteries of all time”, used primarily in the lead.

Table 4: The HMS Endeavour frames

Frame	Description	n = 60
A	Focus on history of the ship and its crew	5
B	Focus on upcoming fight for ownership	5
C	Focus on museum exhibition about Cook	3
D	Focus on scientific aspects of the discovery	13
E	Focus on uncertainty	6
F	No focus, all subjects touched upon*	9
G	News flash*	15
H	Unique stories*	4

* Groups, not frames

Framing

I identified five frames for the selection of Endeavour articles. Another three groups are included in table 4 and figure 16. These are a group with relatively extensive articles that include information about all frames (group

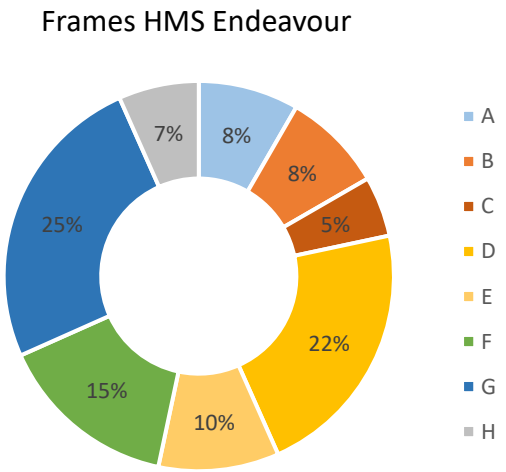

Figure 16: Pie chart indicating the percentage of each frame of the total of Endeavour articles.

F); a group of 'news flashes' (G) that, unlike group F, do not include all aspects of the discovery, yet are too short to be placed in either frame; and the final group of unique articles (H). Two articles were removed at this stage of the analysis.

Once again, the largest frame (22%) is the science frame, detailing the process of (near) discovery. These articles always include some information on the history of the ship as well (frame A), and some touch on the ownership-matter (frame B). Because the science articles provide details about the archaeological process, they also mention that the exact location of the ship is still not known. However, this is brought up indirectly and does not take centre stage as it does in frame E.

The uncertainty frame is the second largest, with just six articles (10%). These frames emphasise the fact that the ship's exact location is still undetermined, and explain what information is necessary before one can speak of the ship's true discovery.

The first of two frames of equal size is the history frame (8%). The articles in this selection provide more detailed information about Cook's voyage on the HMS Endeavour and about the many 'lives' of the ship itself.

The other 8% frame is the set of articles that specifically mention the dispute that will ensue once the HMS Endeavour is raised from the sea. To whom does the wreck belong? Many countries lay claim: England, where it was built; Australia, which would not have been colonised by Europeans without it; the United States, in whose waters it is found; and New Zealand, whose coastline was properly explored and mapped by Cook's crew.

The smallest frame, comprising three articles (5%), is the set of articles describing one of two exhibitions. One is the National Library of Australia's exhibition about Cook's voyage to Australia aboard the HMS Endeavour; the other is the Royal Academy's 'Oceania' exposition, displaying objects from various Pacific islands. These articles make a small mention of the potential discovery of the ship, but go on to describe the objects on display and how they relate to Cook's life.

The largest group of articles is group G; the news flash articles (25%). These give a select amount of information on various aspects of the discovery, but never provide detail on either one.

The group of articles that provide some details about frames A, B, D and sometimes E counts nine articles (15% of the total). These articles have no particular focus but provide a lot of information and selective details.

The unique articles (7%) include a story about how Cook was never officially ranked Captain (and whether he should become one postmortem) and a small town's link to the Endeavour. One text uses the discovery as an introduction to the reporter's anecdotal article.

Role of the expert

The experts' function in the Endeavour articles is mainly to provide detail and nuance on various aspects of the story. They give their professional insights, for example by explaining what still needs to be done, archaeologically:

> "We're carefully gathering very specific samples of timber and we're going to conduct forensic analysis to see what we have. Most of the ships that were scuttled in Newport in August 1778 were built of American or Indian timbers [but] the Endeavour was built in the north of England of predominantly oak." (*Kevin Sumption, director ANMM*)

The experts' quotes about the certainty of the discovery are ambiguous. In some articles, they express great certainty:

> ''We can say we think we know which one it is.'' (*Kathy Abbas, project director, RIMAP*)

> "Early indications are that the team has narrowed the possible site for the wreck of HMB Endeavour to one site, which is very promising," (*Kevin Sumption, director ANMM*)

However, in other articles it is quoted, surrounded by a more cautious approach on the journalist's behalf:

> "But we're not in a position to identify it conclusively. Once excavated it will require ... testing of the [wood and nails], and analysis which won't give us a definitive answer for another 18 months." (*Shirani Aththas, ANMM*)

> "The 25-year-long archaeological study of the Newport transports has narrowed the search for the Endeavour from a fleet of 13 vessels to five, and now possibly to one or two archaeological sites." (*Kathy Abbas, project director, RIMAP*)

The enthusiasm of the media is reined in by the experts by emphasising the long process ahead:

> "This is science. It's not a documentary. It's not something that will be over in 50 minutes. And we've got a lot more work to do." (*Kathy Abbas, project director, RIMAP*)

> "What will ultimately determine which of the ships is Endeavour is if we are lucky enough to do an excavation that finds evidence that it was used as a prison hulk." (*Kevin Sumption, director ANMM*)

Sometimes the clarification is brought more directly, though only in the articles belonging to the uncertainty frame:

> "When I saw those headlines [claiming the Endeavour had been found] I was a bit caught off guard, I thought well, is it now?" (*James Hunter, marine archaeologist, ANMM*)

Experts are also quoted in relation to the ownership matter. Some experts were specifically sought out to explain the claim their country could make:

> “If it came from here, it should come back here. [It is] part of our heritage.” (*Jenny Phillips, Middlesbrough Museums Service, UK*)

Other experts avoided taking sides:

> "I think all the countries affected would want a little piece of it. I would be quite happy if something of the ship went to different places associated with Endeavour's voyage. If it is retrieved I can see a piece in Australia, New Zealand and Britain." (*Alwyn Peel, secretary of the Captain Cook Society*)

> "Oh dear. I think I would rather not say. It should end up wherever is best suited to the ship itself as an object. That is my diplomatic answer." (*Robert Blyth, senior curator, National Maritime Museum in Greenwich*)

In regards to the potential end of the decades-long search, experts add a personal note:

> "It is exciting, we are closing in." (*Kathy Abbas, project director, RIMAP*)

> “To have something like the Endeavour as part of the story of the Cook voyage would be amazing.” (*Ian Coates, director Cook exhibition, ANMM*)

Indirect quotes are rare. Instead, the articles impress the reader by calling the Endeavour’s unknown whereabouts “one of the greatest maritime mysteries”, and often stress how famous this ship is.

6
Discussion

In this chapter I discuss the results from my media analysis and observations I made in the process that are beside the checked variables, the most prominent of which are the news values that I was able to detect after reading all 198 articles for the media analysis. I elaborate on these in chapter 6.2, alongside a discussion on archaeology's framing. All variables related to tone are reviewed in chapter 6.1. The role of the experts is discussed in terms of the archaeologists' responsibility for their research and discipline in the media (chapter 6.3). The effects of archaeology's presentation in news media on the public perception of the discipline is explored in chapter 6.4. Lastly, chapter 6.5 considers some limitations to my research.

It is important to keep in mind the case studies are significantly different in sample size. The results from the Cheddar Man case are more reliable than those of the other two.

6.1 Discussion of tone

Molek-Kozakowska (2013; see chapter 2.3) lists several markers for sensationalism, two of which influence the tone of an article: enhancement and emotionalism. Enhancement[9] is expressed by superlatives or by embellishing the importance of something. Emotionalism means introducing subjectivity into a text. In this study, the sentiment analysis accounts for the latter and a straightforward adding up of superlative adjectives for the former.

Taking all case studies into consideration, the overall tone of news articles presenting archaeological information is neutral towards the positive, though very positive and very negative articles have been identified as well. Because this is the first study to perform a sentiment analysis on archaeological news articles, the scores cannot be compared to the scores of other archaeological news events. There are studies outside of archaeology

[9] Exaggeration (a type of sensationalism identified by Heyl *et al.* 2020) also falls under this heading.

that have calculated the sentiment of science news, but these are often topic-specific[10]. This makes them less suitable for comparison to my sentiment analysis, in addition to being done according to different parameters (e.g., by using a different sentiment dictionary or including a wider range of sources). Until future research offers comparative results, the sentiment scores in this study must be viewed in isolation. Of course, the DictionaryGI being a widely tested sentiment dictionary, the scores remain a valid indication of the tone of the texts.

When analysing my results, two things (that have been mentioned before) must be kept in mind: 1) a negative sentiment score does not signify the article is negative towards the archaeological discovery, but that the text in which that discovery is presented is negative. 2) The sentiment score is calculated in a way that does not account for the length of the texts (and thus is not standardised). As a solution, I added a subjectivity score to put the sentiment scores into perspective. The subjectivity score ranges from 0.0 to infinity, being an addition of all negative and positive words, divided by the length of the text. This score conveys that the Maya texts use the most sentiment words (with a subjectivity score of 0.07), followed by the Cheddar Man articles (subjectivity of 0.06) and the Endeavour case study (subjectivity of 0.05).

The mean sentiment scores provided in chapter 5 give little indication of the sensationalism of the texts without the subjectivity score (based on the substantiated assumption that sensationalism comes with higher subjectivity; see chapter 3). The mean sentiment score for Cheddar Man (0.28) is the most neutral of all three, despite the controversial nature of the find having caused opinionated texts. The mean is statistically neutral because these subjective texts lean to both the negative and the positive side, causing a large spread across the range of -1 to 1 (see figure 8). Another reason the mean sentiment score provides trivial information, is that the public does not read all the articles that have been included in this study;

[10] For example, a sentiment analysis of COVID-19 articles (Ferreira *et al.* 2020), which concluded that the sentiment changed from somewhat negative to neutral over the course of several months; or a sentiment analysis of artificial intelligence in the news (Garvey and Maskal 2020), which concluded that the tone is primarily positive.

they do not arrive at a 'general impression' (a mean sentiment score) of a case study but base their perceptions on one or two articles they came across. The wide spread in sentiment in the Cheddar Man case study indicates that a member of the public is just as likely to read a negative article as a positive one, and most likely to read a neutral piece; the *most frequent* sentiment for the Cheddar Man case study is 0.0. That means that, beside the aforementioned spread balancing the mean score, this case study actually *does* include the largest number of neutral articles. The journalists *not* reporting the controversial topics surrounding the find deliberately wrote an objective account of the discovery, rather than mingling in the debate. In some of the neutral articles, experts did give their opinion, but the subtlety of these quotes has prevented the sentiment analysis from picking up its implied tone.

The Maya and Endeavour article sets have a much smaller spread of sentiment, the majority of articles being on the positive side, making it more likely for the public to have read a positive article. These discoveries did not stir a debate of political nature to the extent Cheddar Man did, and therefore evoked less extreme tones in their reporting.

The discovery of the Maya megalopolis was based on a scientific method that provided unambiguous results. The articles are positive because the find is of a large-scale, empirical lost city - the type of discovery that elicits the incessant image of archaeology. This provides journalists with plenty material to write a sensational story. In reality, the discovery is very 'atypical' of archaeology because the researchers were not even in the field when they made it. This duality is recognised by a reporter of The Guardian, who writes: "Archaeology might evoke thoughts of intrepid explorers and painstaking digging, but in fact researchers say it is a high-tech laser mapping technique that is rewriting the textbooks at an unprecedented rate." (Nicola Davis for The Guardian, 16 February 2018). This kind of relativizing escapes the abilities of the sentiment analysis. The article has a sentiment score of 0.38, reflecting the enthusiastic tone assumed by the journalist in the rest of the article.

While some Endeavour articles do address the possible fight of ownership over the wreck, these articles were not prominently negative, and few in number. The great majority of articles described the circumstances of the discovery in detail (frames A, D, E and F). The *most frequent* sentiment score is 0.33 (10 out of 62 articles have this score). The article set's positivity comes from the hopeful approach taken by the journalists - and the quoted experts - that this time, the ship might truly have been found.

The overall low subjectivity scores of the articles denote that, while indicating a negative or positive tone relative to each other, the sentiment score is trivial; with such a small subjectivity score, the identified positivity and negativity bear little weight.

From the sentiment analysis, the articles seem neutral in tone (displaying little emotionalism), but especially in the Maya and Cheddar Man articles the journalists often enhance the story by using superlative adjectives. Superlatives should be rare in journalistic articles because it assigns often unjustifiable importance to something. In clickbait articles, however, superlative adjectives are very frequent (Scott 2021). Noted across the Cheddar Man articles, a superlative adjective was used once every 134 words, and for the Maya articles once every 132 words. The use of superlative adjectives is rather frequent for a journalistic text, but not extreme compared to clickbait articles (see the study by Scott 2021). The level of sensationalism is enhanced by these superlatives but not to a significant extent.

'Serious' archaeological topics are treated more like general news and are thus objectively reported (like the Cheddar Man articles in the science frame), whereas an 'entertaining' archaeological find is presented in a more liberated way; the journalist inexplicitly writes: 'look how cool this is!', which was the case for both the Endeavour and Maya case studies. Such archaeological finds are used to break the negativity that dominates the news (Soroka & McAdams 2015) and are therefore deliberately presented in a positive light. This reflects the characteristics of soft news, which poses information as entertaining rather than relevant. The positive tone of most

articles from the entire database indicates that archaeology is often presented as soft news (Al-Rawi 2020). As explained in chapter 3.2, such news is not taken as seriously as hard news. Therefore, presenting archaeology in such a way counteracts the attempt to rid archaeology of its 'fun fact' status. However, as Baum and Jamison (2006) demonstrated, it does not mean the provided information is not retained or processed by the reader. Additionally, soft news has the benefit of reaching people otherwise uninterested in the topic at hand.

6.2 Discussion of framing

All case studies were sensationalised to an extent, which corresponds with the research of Kilgo *et al.* (2016), who found that unusual stories are statistically more sensationalised. Archaeological finds are always somewhat unusual because they are not general news events (they do not rely on typical news values; they do not involve any celebrities, nor are they of *immediate* relevance). Yet some discoveries garner more attention than others because of their newsworthiness. As explained, newsworthiness can, in hindsight, be construed through the identification of news values. Here, I use the list of news values that was developed specifically for science news (by Badenschier and Wormer 2012; see figure 3). Each of the case studies has a different set of news values that have granted it space in the newspapers.

For the Maya story these were *astonishment* (due to the scale of the discovered city), *unexpectedness* (it was believed we knew a lot about the Maya civilisation, until now) and *scientific relevance* (the discovery reaffirms the significant contribution of LiDAR to our discipline). Arguably, also *intention* is applicable because the repeated reference and comparison to ancient Greek and Chinese civilisations shows the discovery serves to adjust the image of the Maya civilisation and with it that of South America. The level and scale of the revealed infrastructure contradicts the colonial view that South America and its inhabitants were inferior to the European civilisations that conquered it. The Maya story also attracted media attention because the image of lost ruins hidden in a tropical jungle speaks to the public's persisting

exotic notions of archaeology. Emphasis on exoticness and 'high cultures' (of ancient Greece, Egypt and China) was also noted by Pollock in her analysis of framing in archaeological news articles (2005, 87).

Not surprisingly, some articles made a reference to Indiana Jones. Others, as mentioned above, emphasised how the discovery of these ruins was enabled by a technique the public likely does *not* associate with archaeology, showing awareness on the journalist's part of the public's expectations surrounding archaeology.

In the case of the Endeavour story, the news values are *range* (multiple continents have a stake in the discovery of the ship), *actuality* (the journey of European discovery of Australia celebrated its 250th anniversary in 2018) and *relevance to society* (affected nations have already expressed an interest in displaying the shipwreck in museums as part of their heritage). These news values correspond to what was observed by previous studies of archaeology in the news (see chapter 2.1). The discovery is intertwined with modern matters which warrant its appearance in the news.

The news values of the Cheddar Man reconstruction are *controversy* (despite high probability in the DNA analysis, his skin colour is disputed), *political relevance* (in an increasingly politically divided Britain, Cheddar Man is cast as evidence that white nationalists are ideologically in the wrong), *relevance to society* (simultaneously, Cheddar Man has become the foothold for immigrants and Brits of colour, and has firmly situated himself in debates surrounding racial matters) and *unexpectedness* (the researchers nor the public had imagined the first Brit to be black, and he would not have gotten nearly as much publicity had he been Caucasian). This case study, too, confirms the findings of previous studies that say an archaeological find will be cast within a modern framework of issues and narratives. A find that is inextricably linked to the modern world by its news values, is even more likely to receive a lot of media attention. The observed framing of Cheddar Man substantiates this notion (see below).

I think the news value *graphic material* applies to all archaeological case studies, because the discipline is based around tangible things, and images are likely to accompany the reporting of an archaeological discovery. This study, however, is limited to textual representation and can therefore not determine this. Future research should consider other aspects of representation, such as accompanying pictures and layout.

Archaeological discoveries make the news when they can be linked directly to contemporary events, societal issues, or when they speak to the public's existing (and expected) image of archaeology. Those characteristics are the news values that journalists observe and use to determine within which frame they will present the story, the next step in the process of publishing archaeological discoveries.

In framing, other factors indicating sensationalism, like enhancement and emotionalism, are simplicity, selectivity, and generalisation (Molek-Kozakowska 2013). All of these are part of the framing of a story. The frame boundaries are in part decided by selectivity; the aspect of the full story that is selected for the news story becomes the descriptor for the frame. Simplicity occurs in the level of detail with which a story is told. This, too, was decisive in the labelling of the articles; the descriptions of archaeological processes (that *are* often present) sometimes lacked important details and were simplified for comprehensibility. I do not think this contributed to the sensationalising of the discoveries, but it does influence the representation of archaeology (see chapter 6.4). Generalisation is apparent in a lack of nuance. For example, one of the Cheddar Man articles described two distinct migratory groups as being the same because their bones were found together in a cave (despite these groups inhabiting the cave 5,000 years apart, see chapter 4.1.1).

Because of simplicity and selectivity, the Endeavour case study had a group of short 'news flash' articles even larger than the science frame. These articles were very short and therefore limited to a select part of the available information that was described in basic terms. For the Cheddar Man and Maya case studies, the science frame was the most prominent.

Except in the case of Cheddar Man, frames other than the science frame were very small (recall that frames are distinct from groups). The reason Cheddar Man had multiple large frames can be explained by this case study's link to several modern-day debates and events. Also, the dataset for this case study is much larger than those of the other two, which might explain the greater variety of identifiable frames.

The Maya case study has the largest percentage of science articles (40%) because the find is based on a (at the time) relatively novel technique[11]. The focus is not only on the newfound city, but also on showcasing the powerful potential of LiDAR. It appears that the news value most salient to journalists was the scientific impact of LiDAR. The story, therefore, is framed around that aspect.

The Endeavour case study has the smallest percentage of science articles (22%), despite the opportunity to write about several archaeological methods related to its discovery (wood sampling, archival research, and underwater excavation). These techniques, however, are not new and do not take the focus. Instead, many of the Endeavour articles' journalists preferred to dedicate words to the history of the ship, an aspect perhaps most salient because of the 250-year anniversary of Australia's discovery. Even outside the history frame, articles always included some historic information, the history thus claiming space that would otherwise be dedicated to the scientific process or the ownership fight. This also explains the large amount of non-focused articles (group F); there are many aspects to the story judged as equally relevant by the journalists.

Similarly, in the case of Cheddar Man, there is mention of the history of his people in most articles, but *especially* in the articles of the science frame (which is why I did not identify a separate history frame). The history is part of the science because the information is derived from Cheddar Man's bones, same as the DNA for his reconstruction. The historic information is part of the main discovery.

[11] LiDAR was invented in the 1960's but only in the last decade has it been successfully employed in archaeology (Chase *et al.* 2017).

Generally, the scientific aspects of the three discoveries are prioritised in the news, even when the context of that information varies (depending on the find's relation to contemporary society). Archaeology is primarily presented in a scientific setting. However, those articles that highlight a contemporary social issue or event, show a lack of background information to the science of the story. This is in accordance with the findings of Kallén et al. (2019), who observed that, in the news, archaeological finds are sometimes reduced to a reference, providing the journalist with an opportunity to write about modern concerns (this was especially the case for the Cheddar Man articles of the Markle frame).

6.3 Discussion of the role of experts

The expert quotes served many roles, but the experience and knowledge of the experts were given the most attention. Yet for each of the cases, the experts were also given a chance - or were deliberately cast - to give an opinion on contemporary matters related to the archaeological find. In the case of Cheddar Man, experts gave their opinion on their discovery's implications on racism and migration debates. For the Endeavour, experts not related to the archaeological project were asked who they believe should claim the shipwreck as their heritage. In the Maya case study, the opinions were mainly related to the importance of LiDAR, though one expert subtly expressed that the discovery proves that South American culture was on par with the ancient cultures of Europe and Asia. That quote alludes to the contemporary process of discarding colonial views.

Some of the opinionated quotes facilitated sensationalism. Should they be judged as undesirable? Should the archaeologist only speak of things they know from the research and stay clear from its political aspects?

According to González-Ruibal et al. (2018, 510) representation and storytelling are not the issue causing archaeology to be dismissed as an irrelevant science (the larger problem this study addresses), but a lack of political engagement. Their answer to the above questions would be "no", as archaeologist, you must acknowledge the impact of your research. González-

Ruibal et al. (2018) literally call archaeologists to the "battlefield", pushing them to provoke the public, to explain instead of tell, and to be independent from communities, in order to "reclaim archaeology as a critical form of knowledge production, capable of intervening in pressing social issues with an original insight" (González-Ruibal *et al.* 2018, 513). Other archaeologists believe "the perceived neutrality of an archaeologist provides a mechanism for overcoming community division" (Horning 2013, 12), in which case the answer to the above questions would be "yes", engage only with what you can scientifically demonstrate.

While I acknowledge that politically active archaeology helps make research relatable (as argued by Almansa Sánchez 2013, 10), I disagree with González-Ruibal et al. that representation is not the problem our discipline faces. Representation plays a vital role in the durability of archaeology as a science, and that representation starts with the *pre*sentation - the making accessible - of archaeological resource. The Cheddar Man case study is an example of how even clear results are disputed by the public and are turned into a political issue. Even the articles that were neutral in tone and focused on the scientific aspects of the discovery, all made mention of the find's political implications (an observation in accordance with Kallén *et al.* 2019). As many archaeologists recognise, the archaeological discipline is inextricably linked to politics and society (e.g., Hanscam 2019, 2; Tarlow and Nilsson Stutz 2013, 3). Especially the archaeology that is selected by journalists is likely to already contain a strong link to the present. As such, accurate presentation exudes political engagement and societal value without archaeologists deliberately taking that politically active stance themselves. However, I agree with Pollock and many others that "archaeologists would do well to engage" (Pollock 2005, 92). Without their commitment to the presentation of their research (which, as argued, is likely to be politically laden), the image of the discipline cannot be adjusted, which I stress is important for both the discipline (to retain its scientific integrity, it must be perceived as relevant) and the public (who have much to learn from archaeology's deep-time perspectives).

A quote of Dr. Kathy Abbas (project director of RIMAP), that appeared in only one of the articles, counteracts the notion that archaeologists should engage with all aspects of their research, even the indirect ones. She tries to remain neutral:

> "The Endeavour is considered to be the founding vessel for European Australians. The indigenous populations in Australia are not so happy about it, but that's a political debate that we don't get in to."

The dilemma she faces as a scientist is understandable; the Aboriginal relations to Cook's discovery are not part of her research, yet she is offered an opportunity to teach the public about that context, to engage. In the case of Cheddar Man, most experts expressed their opinion on the current social climate surrounding race and ethnicity and, in doing so, took a public stance against discrimination of non-white Brits.

Larsson (2013) prudently describes the potential consequence of Abbass's passive stance:

> "This should concern us beyond intra-discipline debate [...] Scientific articles should be allowed to study difficult and sensitive subjects; however, doing so demands [from the public] a high level of understanding about the complexity of the terms used to draw conclusions. More to the point, although many archaeologists understand this and stay clear of public discourse on the matter, it will not stop others from making use of these subjects. And unless we take part, they will do so unopposed." (Larsson 2013, 31-2)

Hanscam (2019, 10) adds to this point by recognising that archaeologists do their research within the contemporary world, which influences people's perception of science: "With the ascent of reactionary populism and 'fake news', we have to be even more aware of how our research about the past is

drawn into politics. [...] We can also not allow our voices as academics to be drowned out by those who misconstrue the past". Archaeologists are archaeology's best defence; when others incorrectly appropriate archaeological knowledge, we are best equipped to rectify the situation. To draw a conclusion from these quotes: archaeologists must engage with the media.

From the analysis of the function of expert quotes, I realise two things are currently lacking in that engagement: 1) providing archaeological theory and 2) being critical of the framing of the research.

1) If the public has no idea that theories ultimately dictate the interpretation of the archaeological material (except in the case of hard scientific results, such as the LiDAR imagery), they do not possess the tools to understand archaeology as reflective and important to contemporary society (Hanscam 2019, 8). The three case studies of this analysis may not have been the best candidates along which to provide a theoretical framework (the discoveries are based on scientific results, not on interpretations guided by current archaeological paradigms), but they are the result of certain research trends within archaeology; a context of which the public should be aware. For example, the discovery of Cheddar Man's skin colour sparked accusations from members of the public that the findings were incited by a left-wing agenda. In reality, aDNA analysis is a budding field within the archaeological discipline, and as a result, researchers applied the method to Cheddar Man's skeleton. The reconstruction of his face is a result of that trend and the newly acquired information. If the public were made aware of the background to archaeological discoveries, these kinds of false accusations, that damage the reputation of the discipline, could have been avoided.

2) Out of the 188 articles that were part of the close-reading, only eight were critical of either the archaeological results or the way these were framed by the news media. This observation is an extension of the findings of Shipley (2015) that a critical view on archaeology is lacking in the news. It also explains, in part, the low number of negatively scored articles in my dataset. Some experts did impart nuance, but just two experts are recorded to be explicitly critical. This is in accordance with findings of Merkley (2020),

who concluded that nuance and balance are rarely communicated by experts in the news. However, I believe experts owe it to their research and their discipline to do so. To counter false interpretation and contextualisation of archaeology, archaeologists should be critical of how it is presented. Hanscam (2019, 8) suggests we "target our criticism at what we know to be flawed [...] and persist in bringing this critique into the public sphere." To give an example, Dr. James Hunter did just that in relation to the premature reporting of the identification of the Endeavour:

> "When I [saw] those headlines I was a bit caught off guard, I thought well, is it now? It's tough because being an archaeologist, I like facts, I like certainty. But this feels good. I just don't think I will be able to say it until I see the data."

This quote shows awareness of how the reality of an archaeological find can be misconstrued by the media, and how the archaeologist can push for the truth in a news article.

The idea of critical engagement corresponds with the problems of churnalism that were mentioned in chapter 2.4. The same selection of quotes is repeated in the majority of articles, indicating that most journalists did not engage with the experts themselves. That way, introducing nuance or critical notes is difficult: the quotes are primarily copied from press releases that celebrate the discovery. Few articles use original quotes; the quote of Hunter appears in just two.

Apart from cautious phrasing in the articles of the uncertainty frame of the Endeavour case study, and two articles in the Cheddar Man case presenting themselves as critical but failing to be it, only one journalist in the entire collection of articles from all three case studies was critical towards the archaeology itself. This was in a review of the Cheddar Man documentary. The Sunday Times reporter wrote:

> "The programme also seemed overconcerned to convince us that Cheddar Man somehow 'relates to us today'. Only, who

> cares? Not a single person will identify with a man born 300 generations ago who died in his twenties in a Somerset cave, surrounded by cannibalised bones. And why should they? It would be odd if they did." (Camilla Long for The Sunday Times, 25 February 2018)

In terms of representation of archaeology, this quote shows exactly what is lacking in the public's understanding of the discipline. The question "who cares?" indicates that the valuable lessons archaeological discoveries teach us, are not communicated, leaving many people, including this journalist, impartial to archaeology's contributions to society. In the case of Cheddar Man, I know this not to be true; lessons *were* taught. Several articles appear in my dataset in which non-white Brits explain that Cheddar Man is in fact very relatable to them, and that he makes them feel more comfortable being non-white and British. They certainly care.

In conclusion to the role experts played and should play, I believe engagement with the news media is an important step towards archaeology's recognition as a contemporarily relevant science. "Transforming our daily work into socially committed action can set our profession up as something more than a stereotype", Almansa Sánchez (2013, 10) concludes. As I have demonstrated throughout this chapter, to be taken seriously and to be viewed as socially relevant by the wider public, archaeology must be communicated by archaeologists. This belief is not only incited by a moral code to help society, the discipline itself will also benefit from the proposed change in perspective. I quote Almansa Sánchez once more: "Without a public listening to us, we have nothing to say" (2013, 11).

6.4 Archaeology news' effect on the public

The results of the media analysis show that in newspapers archaeology is presented in a somewhat positive manner and with a focus on the scientific aspects of the story. The effect of such presentation on the public has not

been monitored but the results do not play into known stereotypes of archaeologists as much as has been found for other media. Therefore, I deduce that the image building of the archaeological discipline on the basis of its representation in news media differs from that of entertaining media.

The Cheddar Man case stirred lively debate among the public on social media and in follow-up news articles. This signifies a level of engagement with archaeology at which archaeological results are considered and integrated into contemporary issues as relevant information. However, while many journalists remained neutral in their reporting of the case, Clarke's following statement is not upheld: "the considerable time depth that archaeology provides can often enable the discussion of important topics without the emotion and aggression that deliberation of the contemporary situation often provokes." (Clarke 2016, 139). My study shows: when archaeology is in the news, contemporary situations are inherently deliberated and not without emotion.

Considering the article by Camilla Long (quoted above in chapter 6.3), who wondered why anyone should care for a 10.000-year-old man, the positive presentation of archaeological discoveries perhaps does not hurt the image of our discipline. Recall that tone directs the perception of a topic (Jacobs and Meeusen 2020). Should people read an article with a negative tone towards archaeology, they are likely to assume a similarly negative view. The pointlessness and irrelevance of the discovery described in Long's article, become salient with the public (Jacobs and Van der Linden 2018), thwarting attempts to start presenting archaeology's importance and sincerity, rather than upholding its 'fun fact' status.

Several journalists reflected on archaeology's persisting image, referring to Indiana Jones and how – surprisingly! - the reality differs from his methods. Consider the following fragment from an article by The Washington Post about the Maya megalopolis:

> "Archaeologists have spent more than a century traipsing through the Guatemalan jungle, Indiana Jones-style, searching through dense vegetation to learn what they could about the

> Maya civilization that was one of the dominant societies in Mesoamerica for centuries." (Cleve Wootson Jr. for The Washington Post, 5 February 2018)

This is the lead of the article – the part most likely to be read (aside from the headline) and decisive for the audience to continue reading. Indiana Jones serves as the hook (the thing that draws the reader in); he helps paint a picture that people recognise as archaeology. Then, in the next line, they discover "the latest discovery - one archaeologists are calling a 'game changer' - didn't even require a can of bug spray." The expectations of the public are met and then deconstructed, giving the unsensational facts of the discovery.

It is admirable and promising that most articles in this study did not rely on stereotypes and described the archaeological processes that led to the discoveries, rather than paint an exotic picture. One should not have to invoke Indy's name in order to attract attention to an article. When the public understanding of the archaeological discipline matches reality (when representation is accurate and complete), their expectations of archaeological content can actually be met. Instead of expecting to read about the new Tutankhamun or the long-awaited evidence of alien intervention, the public will know to expect new insights in humanity's relation to nature, new knowledge about migration and multicultural societies, or how to construct durable irrigation systems. Failing to deliver on promises established by sensational headlines and other forms of media decreases public trust in the discipline (Heyl *et al.* 2020, 132; Scott and Jones 2017, 2219). *Not* communicating leads to a perpetuation of the image of archaeologists as "treasure hunters, utopian bookworms or evil human beings who do not understand the needs of people'' (Almansa Sánchez 2013, 9).

Measuring the extent to which these effects occur in the audience of the studied articles, would be a valuable addition to this research. Recall that to many people, the news environment is the only place where they are exposed to communities outside their own, including scientific communities. The case studies each received above average attention in the media (and

thus were exposed to a large number of people), despite those media not making significant use of the stereotypes their audiences expect. It is vital to understand what influence this manner of presentation has on the public image of archaeology, beyond theory-based assumptions and deductive reasoning.

Throughout this thesis, I have given many reasons to strive for a better image and correct representation of archaeology, but there is one more. The public's general understanding and respect for the discipline ensures the spaces of archaeology and heritage increase in value, leading to better financing or improved law-making and caretaking. As Grima (2016) writes: "We simply cannot *afford* to have practicing archaeologists who do not have the awareness, sensibility, and competencies to practice archaeology in a manner that is informed of and responsible for its actual or potential interaction with the wider public." (55, my emphasis). The archaeologist's engagement is the archaeologist's bread; when the public acknowledges the contribution of archaeology to modern life, the financial status of the discipline improves.

To meaningfully engage with news media is a complicated venture. To say, "we have the tools and need only the attitude" (Almansa Sánchez 2013, 10) is a gross underestimation of what it takes to properly communicate science to a potentially uninterested, or worse, sceptical and distrusting public (which, a host of studies shows, is characteristic of the post-truth era news audience). In order to have any impact on the non-archaeological community, the archaeologist must become skilled at science communication - a quality not inherent to the archaeological discipline - and become somewhat of a public intellectual, a rare thing in our discipline (Tarlow and Nilsson Stutz 2013). "A traditional way to become a public intellectual would take years of strong research in contemporary politics, economy and social trends, and a series of writings to be valued and reproduced by peers. In any of the cases, would we still be archaeologists?" (Almansa Sánchez 2013, 10). Apart from lacking the expertise, archaeologists do not have the time to learn these communicational and political skills. The concern that such skills

should replace those of the archaeologist might refrain many archaeologists from expanding their skillset to include science communication.

I suggest that students of archaeology are taught the skills of science communication from the start, as part of becoming a research-focused archaeologist. They will not only learn how to be an archaeologist *within* the sciences, but also *outside* of it. As Larsson puts it: "Public discourse is not the aim and focus of archaeology, but it won't hurt to have our practitioners a bit better prepared when put in such a situation." This brings me again to the importance of engagement as a solution to the issue of archaeology's public misconception. Archaeology is pointless when it is not communicated. Van Aerde and Mallick (2022, in press) address the severity of that fact: "What is the use of knowledge if it merely exists? The transmission, expansion and evolution of knowledge forms the very core of what we can define as culture."[12] Archaeology must gain public acknowledgement of its relevance in order to become or remain an invaluable part of modern society.

Clearly, I am not the first to advocate engagement as a means to improve the image of archaeology. Kallén et al. (2019, 86), who extensively researched archaeology in the news media, also concluded stating: "Great benefits are promised for researchers who are successful in the media, beyond the public visibility which many find attractive." However, Larsson cautions that to be successful in the media requires more than a willingness to be approached. "Journalists don't like to go hunting for reclusive researchers who may be brilliant but will turn out to be unintelligible in a studio or while being interviewed. They want professional people who have shown not just a genuine interest in debate, but also a definite skill in that area." (Larsson 2013, 34). Thus, in addition to teaching archaeologists the basic skills of media engagement, a subset of willing (future) archaeologists could be trained particularly for this purpose; to become hybrid journalist-archaeologists that mediate between the disciplines. By implementing the proposed skills, archaeologists not only become more appealing to

[12] Van Aerde and Mallick (2022, in press) use the definition of culture that was developed by Whitehead and Rendell (2015, 11): "culture is information or behavior – shared within a community – which is acquired from conspecifics through forms of social learning."

journalists, they can initiate the engagement with journalists themselves; a huge feat in growing awareness of our research and its extra-disciplinary benefits.

6.5 Limitations

The biggest limitation to my research is the language. I only analysed articles in English, which is disadvantageous to the Maya city discovery, which was not made in an anglophone country. The Cheddar Man dataset is not only larger because of its controversial nature, but also because it is a British story, thus favouring English language articles.

Another important limitation is the use of a lexicon-based dictionary for the sentiment analysis. The dictionary is not developed for archaeological news and so places allegorically bad words like 'wreck' and 'hunter' in the negative wordlist, while in archaeological context they are entirely neutral words. While I did check for such discrepancies, a self-built dictionary would have raised the validity of the outcome. To make a less effortful improvement to the sentiment analysis, I suggest applying the Lexicoder Sentiment Dictionary, as it is specifically constructed for news articles, unlike the DictionaryGI.

An impairment to the reliability of my analysis is the fact that there was no second reader in the media analysis. Frame identification is usually done by at least two people who each read and label all articles. Especially with hard-to-place articles, this ensures they are categorised as accurately as possible, not according to the whims of one judge.

Then there were several limitations to the use of Factiva, despite being the only manageable and accessible method to retrieve articles at my exposal. First, because Factiva does not have a copy of all articles surrounding the case studies (as it randomly retrieves a selection of articles every day; see chapter 4.2), I did not analyse the complete body of articles that have reported the case studies. Therefore, I was not able to say much in relation to the number of articles; for example, I could not discuss whether controversial discoveries garner more attention. Secondly, the Factiva database makes

mistakes when presenting a selection of articles; identical duplicates that should have been removed are not, and articles from unrequested categories are included. Articles are not always properly parsed (words are not correctly separated), which makes the sentiment analysis less reliable.

The research focus in itself is limited to the presentation of archaeology in news media *in terms of sensationalism*. I did not specifically check for *accurate* presentation or for *graphical* presentation. Both would have been a valuable addition to the research and could in fact influence the level of sensationalism.

A limitation of less direct effect is that different cultures have a different relation to archaeology. Some hold the discipline in much higher regard than others or engage with it more often[13] (Kajda *et al.* 2018). This means reporting of the discipline varies per country. In this research, those effects are not studied and are somewhat tempered by the fact that all articles are in English (despite not all news outlets being anglophone). Additionally, as Kallén et al. (2019) warned in the conclusion of their research, some stories are picked up locally, while others are globally. In terms of the amount of news coverage, this makes a big difference.

[13] This has been extensively recorded by the NEARCH project, in which the public perception of archaeology in several European countries was surveyed. The article by Kajda et al. (2018) provides a summary of the findings.

7
Conclusion

This study was based on the premise that, in media, archaeology is often portrayed as entertainment rather than a serious science (the research results of which are applicable to social issues the modern world faces). From this observation, the need arose to identify where the public perception of our discipline becomes skewed. Taking an innovative approach to this question, the aim of this study has been to characterise the presentation of archaeological discoveries in (online) print news media in terms of sensationalism. The introduction of the concept sensationalism served to help identify whether archaeological information is presented as relevant or as entertainment. A media analysis of 198 articles corresponding to three archaeological case studies was performed on the basis of three primary questions.

RQ1: Is the archaeological news brought in a positive, neutral or negative way? The archaeological news articles were most frequently neutral to somewhat positive. Outliers of very positive articles were found in all three case studies. Somewhat negative articles were identified for the Maya and Cheddar Man case studies. The level of subjectivity is trivial, and the sentiment of the articles therefore too insignificant to contribute to sensationalism. Rather, the positive tone can be explained by the articles' soft news nature, especially in the cases of the Maya megalopolis and the near-discovery of the HMS Endeavour. The frequent use of superlative adjectives does fuel the sensational portrayal of archaeology and was used to draw attention to the finds, but not to the extent clickbait articles would.

RQ2: In what context is the archaeological information presented? Archaeology is primarily presented in a scientific context, meaning research processes and details about the find are highlighted. Such focus does not contribute to the sensationalising of the finds. Again, there are some outliers in each of the case studies. Those articles draw attention to the sensational news values of the

discoveries, such as *astonishing*, to make the story more appealing to a large audience. Not every salient news value sensationalises, though the framing of any news value could create a sensational effect. For example, some of the articles that linked the archaeological discovery to a current social issue, omitted mention of the subtleties of the findings and used them instead to make a political statement. At the same time, the link to political and societal matters demonstrates that archaeology and politics go hand in hand and amplifying that fact in a news article serves perhaps not to sensationalise but to acknowledge that the past matters to the present.

RQ3: Are archaeologists quoted and to what end? The expert quotes served many purposes but were often reused. The same collection of quotes returned in a majority of the articles. In many articles, the experts were quoted in order to explain aspects of the discovery, to complement the main text with details, and to give professional and personal opinions on either the discovery or contemporary topics related to it. By using enhanced phrasing and by inserting themselves into debates surrounding the archaeology, the experts' quotes were sometimes used to emphasise sensational aspects, by presenting the quote in agreement with the opinions of the journalist. Had there been more engagement between the media and the archaeologist, the sensational contextualisation of the experts' contributions might have been avoided. Rarely did the experts introduce nuance to the story.

The above sketches the character of archaeology's presentation in news media. Despite identifiable sensational traits in each of the analysed categories (tone, framing and role of experts), archaeology is not as sensationalised in news media as it is in entertainment media. The articles rarely rely on stereotypes of archaeology to capture the reader's attention. While the entertaining value of archaeology does factor into the selection process of journalists, the disciplinary values are given priority in the final text. Still, the scientific facts are often presented like soft news, serving to break with the negativity that is salient in general news. While the

presentation of archaeology as soft news disregards the discipline's relevance and seriousness, it does reach a larger audience.

Considering the results of this study, it seems news media are an ideal platform on which to work towards a more serious representation of archaeology. News media help contextualise the discipline as a science, allow for the implementation of expert opinion, knowledge and experience, and distribute their content amongst a diverse and far-reaching audience.

In the discussion, I stressed the importance of archaeology's engagement with the public. Doing so through news media paves a relatively easy way towards the improved image of our discipline and prepares us for engagement on other platforms. However, the communication between archaeology and the news media must be improved. The repetition of quotes across news outlets is a bad sign in terms of engagement, indicating that experts and the media barely communicate. Who is to blame? Journalists rely on a standard selection of sources, because of time constraints and because they look for outspoken people. Most practicing archaeologists are not trained for public outreach and their priorities lie elsewhere. This disconnect must be mediated. Therefore, I suggest making communication a part of archaeological education programs and creating a subdivision of public archaeologists that are best described as journalist-archaeologist hybrids.

In order to set up such programs, the understanding of archaeology's interaction with news media must become more complete. For future research, I expressly recommend further exploring the *practical* approach to media engagement. Recording the experiences of archaeologists who have interacted with journalists can teach us valuable lessons, such as pinpointing what journalists leave out of their article and what aspects they emphasise. Performing media analyses with different scopes can help map archaeology's representation in news media more fully, by investigating the accuracy of information, other sensationalist markers such as use of graphical material, and the portrayal of archaeological resource in broadcast news.

Finally, on the basis of this initial study, I provide a list of recommendations that serve as a first step towards practical application of my findings.

And the end of all our exploring
Will be to arrive where we started
And know the place for the first time.
(T. S. Eliot, 'Little Gidding', *The Four Quartets*)

Encouraged by the above quote, I conclude this thesis by briefly returning to the very first paragraph of the introduction. When the Leiden University media team misrepresented archaeology in its promotion for the university's open day, several archaeology students stepped forward to actively and publicly correct the image that was presented. When the university then updated the video, these same students applauded the improvements. They gave a prime example of what engagement with the media is capable of, and how it should be approached.

Practical recommendations: a first step in the direction of meaningful engagement between archaeology and the news media

These recommendations are intended for archaeologists.

1) Familiarise yourself with what aspect of your research might attract media attention, thereby fulfilling the demands of the journalist. This could be a link between your research and a modern issue or phenomenon, something that is visually spectacular, or something that ground-breaking in terms of our understanding of humanity or for the discipline itself.

2) Identify what part of your research contributes to society's understanding of itself. This is about what your research can teach the public. Does this again involve a link with a modern issue (like in step one)? Well done, you have killed two birds with one stone.

3) Reach out to media, do not wait for them to reach out to you.

4) Keep an eye on what the university or research institution to which you are affiliated is publishing about your research. These might promote your research under false pretences or with sensational aspects but are the most likely source to be copied by journalists.

5) Track what is being published in news media and online. Do you see something that is not quite correct or has been sensationalised to a point where your scientific integrity is at stake? Engage! Try to rectify the situation: introduce nuance or provide relevant theoretical/practical contexts to the archaeological processes that shaped your research.

Abstract

When it comes to modern social and human issues, archaeology is rarely recognised as relevant; its valuable contributions are often not incorporated in debates and policymaking. The discipline is dismissed as a hobby for adventurous treasure-hunters. This image is generated by many types of media, as previous studies have shown. It is important for the archaeological discipline as well as the public to adjust that image. This thesis takes an innovative approach to the problem by studying the image of archaeology in news media. It does so from the perspective of sensationalism, whereby a high level of sensationalism is an indication that news media, like other media, present archaeological information with the purpose to entertain instead of to inform. A media analysis is performed on 198 news articles from three archaeological case studies. By examining the variables tone, framing and role of experts, this thesis concludes that news media only marginally sensationalise archaeological information. These results suggest that news media are a favourable platform for the dissemination of archaeological knowledge. News media can help adjust the public perception of archaeology from entertainment to a contemporarily relevant science. However, this requires increased engagement of archaeologists with journalists. Improving the archaeologists' skills of science communication can help overcome the disconnect between news media and archaeology that was observed in the results. This research adds to just a small part of the understanding of archaeology's representation in news media; interaction with the news media on a logistical level must be further explored in the future.

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Appendices

Appendix 1: Example RStudio code sheet (Cheddar Man)

```
#Lenneke de Lange
#10 June 2021
#Sentiment analysis Cheddar Man

library(quanteda)
library(SentimentAnalysis)
library(tibble)
library(dplyr)
library(plyr)
library(ggplot2)
library(XML)
library(rvest)

# Retrieving the dataset
cm <- "MainsearchCM.html"
html_CM <- read_html(cm)
table_cm <- readHTMLTable(cm)

# Seperating the articles
tbls_CM <- html_CM %>%
  html_nodes("table") %>%
  . [2:101] %>%
  html_table(fill=T)

# Unlisting the article dataframes
CM_tbls <- bind_rows(tbls_CM, .id = "column_label")
CMsub_tbls <- subset(CM_tbls, c(X1 == "LP" | X1 ==
                                                  "TD"))

# Merging lead and main text per article
cheddar <- ddply(CMsub_tbls, .(column_label),
                 summarise, X=paste0(X2, collapse=", "))

# Creating a clean DTM
corp_CM <- corpus(cheddar, text_field = 'X')

dtm_CM <- dfm(corp_CM, tolower=T, remove =
           stopwords('en'), stem = T, remove_punct=T)
head(dtm_CM)
```

```
# Wordcloud to check preprocessing
textplot_wordcloud(dtm_CM, max_words=50, color =
                                              'blue')

# Loading the dictionary
GI_dict <- dictionary(DictionaryGI)

names(DictionaryGI) ##to see the categories

# Applying the sentiment dictionary
result <- dtm_CM %>% dfm_lookup(GI_dict) %>% convert(to
                        = "data.frame") %>% as_tibble

result <- result %>% mutate(length=ntoken(dtm_CM))

result <- result %>% mutate(subjectivity=(positive +
                              negative) / length)
result <- result %>% mutate(sentiment1=(positive -
                    negative) / (positive + negative))

result

# Checking use of the dictionary - positive
freqs <- textstat_frequency(dtm_CM)
freqsis <- freqs %>% as_tibble() %>% filter(feature
                              %in% GI_dict$positive)
freqsis

head(kwic(tokens(corp_CM), "even")) ## to see the
                        selected word in context

# Removing positive words that are not positive in
context
pos <- c("like", "just", "human", "make", "natural",
                        "complete", "know", "back")

positive.cleaned <- setdiff(GI_dict$positive, pos)
GI_dict2 <- dictionary(list(positive=positive.cleaned,
                        negative=GI_dict$negative))

freqs %>% as_tibble() %>% filter(feature %in%
                              GI_dict2$positive)

# Checking use of the dictionary - negative
```

```
freqs %>% as_tibble() %>% filter(feature %in%
                                 GI_dict$negative)

head(kwic(tokens(corp), "cool"))

# Removing positive words that are not positive in
context
neg <- c("dark", "make", "cave", "get", "even", "show",
         "race", "hole", "study","point", "wild",
              "hunter", "death", "extinct", "cool")

negative.cleaned <- setdiff(GI_dict$negative, neg)
GI_dict2 <- dictionary(list(positive=positive.cleaned,
                            negative=negative.cleaned))

freqs %>% as_tibble() %>% filter(feature %in%
         GI_dict2$negative)

# Cleaned dictionary results
result2 <- dtm_CM %>% dfm_lookup(GI_dict2) %>%
         convert(to = "data.frame") %>% as_tibble

result2 <- result2 %>% mutate(length=ntoken(dtm_CM))

result2 <- result2 %>% mutate(subjectivity=(positive +
         negative) / length)
result2 <- result2 %>% mutate(sentiment1=(positive -
         negative) / (positive + negative), is.na(0))
result2 <- result2 %>% replace(is.na(.), 0)

result2

summary(result2$subjectivity, na.rm=T) ##to see some
                                       basic statistics
sd(result2$sentiment1) ##to retrieve the Standard
                           Deviation

# Creating a histogram for data visualisation of the
sentiment score
p_CM <- ggplot(result, aes(x=sentiment1)) +
         geom_histogram(col = "blue", fill =
                                "light blue") +
         labs(title = "Cheddar Man Sentiment", x =
         "Sentiment Score",y = "Number of articles") +
```

```
                    theme_classic() + xlim(-1,1) +
     scale_y_continuous(breaks=seq(0, 15, by = 2)) +
           geom_vline(aes(xintercept=mean(sentiment1,
          na.rm = T)),col = "red", linetype="dashed",
          size=1)
p_CM

# Creating a histogram of the subjectivity scores
p_CM2 <- ggplot(result2, aes(x=subjectivity)) +
          geom_histogram( col = "blue",fill = "light
                         blue",binwidth = 0.005) +
          labs(title = "Cheddar Man Subjectivity", x =
     "Subjectivity Score",y = "Number of articles") +
               theme_classic() + xlim(-0.01,0.2) +
     scale_y_continuous(breaks=seq(0, 15, by = 2)) +
     geom_vline(aes(xintercept=mean(subjectivity,
     na.rm = T)), col = "red", linetype="dashed",
                                        size=1)

p_CM2
```

Appendix 2: Database Cheddar Man articles

#	Publisher	Headline	Length	SC	Frame
1	Washington Post.com	Meet Cheddar Man: First modern Britons had dark skin and blue eyes	962	0.08	D
2	Mail Online	Meet my ancestor CHEDDAR MAN: Separated by 10,000 years but linked by DNA, the Somerset history teacher who says 'just look at the family resemblance'	1304	0.21	C
3	Mail Online	Look familiar? Social media users go into meltdown after a reconstruction of 10,000-year-old Cheddar Man shows a resemblance to David Dickinson and Lord Sugar	1691	0.07	C
4	NYTimes.com Feed	'Cheddar Man,' Britain's Oldest Skeleton, Had Dark Skin, DNA Shows	921	0.31	D
5	irishmirror.ie	A day in the life of 'The First Brit' dubbed Cheddar Man who lived 10,000 years ago	854	0.31	D
6	Mail Online	Face of the first Briton is revealed: DNA analysis shows 10,000-year-old man had 'dark to black' skin with BLUE eyes and curly hair - and he shares up to 10% of his DNA with today's Brits	1405	0.25	D
7	Mail Online	Was Cheddar man white after all? There's no way to know that the first Briton had 'dark to black skin' says scientist who helped reconstruct his 10,000-year-old face	1015	0.48	F
8	thetimes.co.uk	Cheddar Man, the first modern human in Britain, had blue eyes... and black skin	1015	-0.10	D/A
9	Weekend Argus	Cheddar Man ancestry goes beyond skin deep	813	0.06	C
10	The Times	Cheddar Man rebrands 'white' Britain	776	0.08	A
11	The Observer	Cheddar Man changes the way we think about our ancestors	1644	-0.22	D
12	The Independent	Discovery that first Britons had dark skin 'reminder that we are all from Africa'	909	0.38	D/A
13	Daily Independent	First Modern Britons Had 'Dark To Black' Skin, Scientists Find	488	0.32	D
14	The Guardian	First modern Britons had 'dark to black' skin, Cheddar Man DNA analysis reveals	733	0.31	D
15	thesun.co.uk	MADE IN CHEDDAR From eating the neighbours to worshipping animal spirits and carving art in caves… a day in the life of Cheddar Man	715	0.41	D
16	The Toronto Star	How Cheddar Man shatters views of immigration	889	0.67	A
17	Mirror.co.uk	Dark-skinned Cheddar Man is hard cheese for the racist morons of the far right, says Brian Reade	660	0.27	A
18	thesun.co.uk	'YOU'RE SICK' Meghan Markle's Suits co-star Patrick J Adams slams Twitter troll for mocking up pic of her as Cheddar Man with Prince Harry	381	0.69	B
19	i	Meet our ancestor: first Briton who lived 12,000 years ago had 'dark to black' skin	535	0.13	D/A
20	Daily Mail	THE FIRST ANCIENT BRITONS; BLACK SKIN, BLUE EYES AND CURLY HAIR. DNA TESTS REVEAL EXTRAORDINARY FACE OF	984	0.69	D
21	Sunday Mail	Facing up to the past	641	0.38	D
22	The New Zealand Herald	The Cheddar Man rolls out a surprise	257	0.20	D
23	The Guardian	Thanks to Cheddar Man, I feel more comfortable as a brown Briton	924	0.06	A
24	Tempo.co	Ancient Briton had Dark Skin, Blue Eyes: Scientists	403	0.48	D

25	Independent Online	Cheddar Man seems like the punchline to a very long joke about our obsession with racial identity	768	0.16	A
26	Tempo.co	Ancient Briton had Dark Skin, Blue Eyes: Scientists	408	0.09	X
27	The Guardian	Cheddar Man changes the way we think about our ancestors	579	0.37	D
28	thescottishsun.co.uk	say cheese Who was Cheddar Man? First modern Brit who had blue eyes and ‘dark to black skin’	628	0.15	D
29	The Daily Mirror	Cheddar Man's hard cheese for far right	607	0.00	A
30	The Independent	Now we know Cheddar man was black, Ukip will want to start deporting white people	984	0.47	A
31	dailyrecord.co.uk	Cheddar Man's face revealed as scientists create reconstruction of first man to live in Britain - and he's dark-skinned	660	0.38	D
32	coventrytelegraph.net	Cheddar Man: Pioneering research reveals what the first modern Brit looked like	669	0.23	D
33	The Telegraph Online	The First Brit: Secrets of the 10,000 Year Old Man, review – a smartly told, fact-filled and inventive documentary	650	0.29	E
34	Mail Online	Republican businessman is branded a ‘sick creep’ after posting a picture of Cheddar Man superimposed onto Meghan Markle's face	325	0.00	B
35	Weston and Somerset Mercury	10,000-year-old Cheddar Man is given a face in Channel 4 documentary	591	0.91	D
36	The Western Mail	Paviland Man - a glaring omission	249	0.51	X
37	Journal du Cameroun.com	DNA shows first modern Briton had dark skin, blue eyes	384	0.40	D
38	Independent Online	Immigrants have been 'moving and mixing' across Europe since ancient times, groundbreaking DNA research reveals	958	0.20	D
39	dailystar.co.uk	US politician SPARKS OUTRAGE after posting ‘racist’ photo of Meghan Markle as Cheddar Man	376	0.31	B
40	Cheddar Valley Gazette	THE Kings and Queens News Team were centre story last week meeting former head...	632	0.14	C
41	walesonline.co.uk	'The First Brit' is known as Cheddar Man and had dark skin and blue eyes	664	0.00	D
42	Mirror.co.uk	Face of 'The First Brit' known as the Cheddar Man revealed – and he had dark skin	663	0.05	D
43	express.co.uk	The First Brit: Human who lived around 10,000 years ago had 'dark to black' skin	678	-0.08	D
44	Independent Online	Twitter suspends Republican candidate for racist Meghan Markle message with image of Cheddar Man	532	0.00	B
45	i	Coming over here, 10,000 years ago...	626	0.71	A
46	Cheddar Valley Gazette	An American politician has been suspended from Twitter after he photoshopped an...	348	0.14	B
47	Mail Online	Alt-right GOP candidate who posted racist picture of Meghan Markle and the Cheddar Man is BANNED by Twitter	401	0.03	B
48	Metro	PUTTING FLESH ON CHEDDAR MAN'S BONES	89	0.24	G
49	The Times	First modern human in Britain had blue eyes ... and black skin	310	0.07	D
50	The Sentinel	Beauty of our ancestry is more than just skin deep	668	0.00	A
51	Bristol Evening Post	Cheddar Man ‘Not pure Aryan’ shock	1381	-0.25	A
52	Daily Record	The Skeleton key to past	504	0.54	D/A

53	i	Climate change wiped out earlier cannibal settlers	225	-0.03	D
54	thescottishsun.co.uk	TWEET OFF Meghan Markle's Twitter troll has profile suspended after mocking up pic of her as Cheddar Man with Prince Harry	392	0.57	B
55	Sky News	Cheddar Man: First modern Briton had dark skin and blue eyes, DNA analysis shows	327	0.19	D
56	Mirror.co.uk	Trump-supporting US politician sparks outrage with racist picture of Meghan Markle mocked up as Cheddar Man	495	0.48	B
57	thesun.co.uk	SAY CHEESE 10,000-year-old 'Cheddar Man' Brit was dark skinned and blue eyed, boffins reveal after DNA tests on oldest complete skeleton	596	0.33	D
58	walesonline.co.uk	Western Mail letters: Thursday, February 15, 2018	1222	-0.50	X
59	thesun.co.uk	BLACK TO THE FUTURE Cheddar Man enrages people who just won't accept that first Brits had black skin	570	0.40	A
60	Daily Star	FIRST-EVER BRIT WAS A BLACK IMMIGRANT	260	-0.12	D
61	The Telegraph Online	Cheddar Man: the first Britons were black, Natural History Museum DNA study reveals	528	0.67	D
62	Washington Post.com	GOP politician mocked Meghan Markle with image of prehistoric black Briton. Twitter banned him.	1098	0.02	B
63	The Sun	Scientists say earliest Britons had dark skin	314	0.00	D
64	The Hamilton Spectator	A GOP politician mocked Meghan Markle as a prehistoric black Briton. Twitter banned him	878	0.00	B
65	The Daily Telegraph	Cheddar Man: confounding British stereotypes	51	1.00	G
66	Weston and Somerset Mercury	Face of the Cheddar Man revealed	49	0.42	E
67	Daily Record	A HUMAN from 10,000 years [...]	66	-0.05	H
68	The Daily Telegraph	The first Britons were black - and their DNA lives on in most of us	438	0.66	D
69	Haaretz	Anti-Semitic GOP Contender Nehlen Banned From Twitter After Racist Meghan Markle Tweet	569	0.44	B
70	Western Daily Press	DNA work keeps revealing surprises in human history	844	-0.10	D
71	Mirror.co.uk	What will Cheddar Man look like, 10,000 years from now?	1207	0.29	A
72	The Daily Express	Dark skin, blue eyes... 10,000-year-old Briton recreated from DNA	428	0.25	D
73	Asian Image	Cheddar Man reminds us UK has been 'a country of migrants for a lot longer than we think'	610	0.40	A
74	Daily Mail	WAS FIRST BRITON WHITE AFTER ALL? SCIENTIST CASTS DOUBT ON DNA EVIDENCE	410	0.60	F
75	Bristol Evening Post	The real face of Cheddar Man	245	-0.03	D
76	The Times	Celebrity Watch	2174	-0.11	H
77	The Sunday Times	Want a lift? You're in the wrong place	1338	0.45	E
78	The Conversation	Five surprising things DNA has revealed about our ancestors	963	0.75	D
79	China Daily	'Oldest Briton' had dark skin, blue eyes	397	0.30	D
80	The Guardian	'He's one of us': modern neighbours welcome Cheddar Man	133	0.71	H
81	The Telegraph Online	How Cheddar Man gave the BNP a new lease of life	1008	-0.23	A

82	Daily Star	'Council tax rise will put us on the streets'	864	0.01	X
83	Coventry Telegraph	Research reveals what first modern Brit looked like	284	0.43	G
84	London Evening Standard	Dark and handsome, Cheddar Man is a real poster boy	156	0.67	A
85	The Times	Catch up	164	0.25	E
86	i	Cheddar Man: the best story I have ever covered	311	-0.23	A
87	The Scotsman	Ayesha Hazarika: We need to talk more about immigration's benefits	821	0.07	A
88	The Sunday Times	Tourist traps	615	0.22	E
89	The Sunday Times	True Briton	454	0.15	E
90	The Times	The First Brit Channel 4, 8pm	112	0.13	E
91	The Guardian	Sunday’s best TV: Akala’s Odyssey; The First Brit; British Academy Film Awards 2018	570	0.20	A
92	Pittsburgh Post-Gazette	EARLY BRITONS HAD DARK SKIN, BLUE EYES	513	0.00	G
93	Weston and Somerset Mercury	A student news team had the chance to meet a journalist from...	172	0.19	C
94	The Western Mail	They miss some inconvenient truths	275	1.00	X
95	The Daily Mirror	Welcome..	369	-0.09	E
96	The Guardian	'Marry the right person' sounds like good advice. I wonder if my wife did	1057	0.29	A
97	sundaytimes.co.uk	What’s on TV today: Sunday	878	-0.01	E
98	walesonline.co.uk	Western Mail letters: Saturday, February 10, 2018	1333	0.04	X
99	Independent Online	After Cheddar Man: How the mongrel English found their home during the Dark Ages	1992	0.09	H
100	thetimes.co.uk	What’s on TV and radio this weekend	3086	0.12	E

Appendix 3: Database Maya articles

#	Publisher	Headline	Length	SC	Frame
1	The Telegraph Online	Hidden Mayan 'megalopolis' discovered under Guatemala jungle could rewrite history of civilisation	725	0.00	D
2	Mail Online	Stunning new images mapping an ancient Mayan 'megalopolis' reveal the site where THOUSANDS of pyramids and palaces now lay hidden beneath thick jungle foliage in Guatemala	849	0.78	D
3	Mail Online	Maya 'megalopolis' featuring thousands of ancient pyramids, palaces and causeways is found hidden under thick jungle foliage in Guatemala	840	0.31	D
4	International New York Times	Lasers Reveal a Maya Civilization So Dense It Blew Experts' Minds	971	0.56	H
5	NYTimes.com Feed	Lasers Reveal a Maya Civilization So Dense It Blew Experts' Minds	957	0.41	X
6	Mail Online	Thousand-year-old 'lost' pyramid city uncovered in the heart of Mexico using lasers had as many buildings as modern Manhattan	1337	0.79	B
7	The Arizona Daily Star	UA-led team uses airborne laser to better map ancient Maya site	667	0.40	D
8	Kingston Whig Standard	Survey reveals Mayan ruins; Guatemalan jungle home to many complex structures, roads built by ancient Maya	791	0.49	D
9	Washington Post.com	Maya civilization was much vaster than known, thousands of newly discovered structures reveal	1009	0.27	D
10	The Toronto Star	Mayan society discovered under Guatemala's jungle; Researchers find scores of undetected structures using aerial mapping	611	-0.24	D
11	Independent Online	The treasures of the Maya world revealed by science	741	0.05	H
12	Iran Daily	Maya civilization much vaster than known	753	0.11	D
13	Arab Times	Teledyne Optech Titan lidar enables discovery of extended Mayan ruins in Guatemala	502	0.78	H
14	Tempo.co	Scientists Find Massive Mayan Society under Guatemala Jungle	581	0.40	D
15	Townsville Bulletin	ANCIENT MAYA CITY	548	0.33	C
16	Daily Herald	Technology reveals Maya world that had been lost in jungle	853	0.00	D
17	Deseret News	Mayan ruins interesting, but not proof	853	0.60	H
18	express.co.uk	Mystery SOLVED: Lasers uncover Maya mega city lost for 1,500 years	695	0.80	D
19	thescottishsun.co.uk	THE LOST WORLD Incredible photos reveal 60,000 lost Mayan structures hidden for centuries under jungle… changing everything we knew about ancient civilisation	574	0.33	D
20	Journal du Cameroun.com	Experts discover hidden ancient Maya structures in Guatemala	303	0.11	C
21	The Guardian	Laser scanning reveals 'lost' ancient Mexican city 'had as many buildings as Manhattan'	1036	-0.07	B
22	Mirror.co.uk	Lost ancient Mayan 'mega-cities' discovered under jungle after being hidden for centuries	446	0.25	D
23	The Daily Telegraph	Laser technology shines light on Mayan 'megalopolis' hidden under the jungle	565	0.14	C
24	thetimes.co.uk	Guatemala forest yields secrets of Maya cities	342	0.60	C

25	Iran Daily	Slovak archeologists discover a key to understanding the Maya	310	0.75	H
26	New York Post	New find: My, oh, Mayan!	276	0.25	C
27	The Hans India	Lasers reveal massive Mayan city buried for centuries	243	0.33	C
28	Independent Online	‘Lost’ ancient Mexican city had as many buildings as Manhattan, laser map shows	468	0.36	B
29	Waikato Times	MAYAN 'MEGALOPOLIS' HIDDEN UNDER THE JUNGLE	297	0.02	C
30	Iran Daily	‘Lost’ ancient Mexican city had as many buildings as Manhattan	384	0.33	B
31	The Hindu	Aerial mapping of city’s solar energy potential takes off	421	0.45	H
32	i	Postcard From... Guatemala	193	0.43	C
33	The Sunday Times	Beneath the surface	416	0.28	A
34	The Sunday Times	Beneath the surface	418	0.60	X
35	sundaytimes.co.uk	What’s on TV today: Sunday	836	0.18	X
36	i	CRITIC'S CHOICE	480	0.46	A

Appendix 4: Database Endeavour articles

#	Publisher	Headline	Length	SC	Frame
1	LoneWolfFilmsNZ.com	As we celebrate the rediscovery of the Endeavour let's acknowledge its complicated legacy	1084	0.43	A
2	Mail Online	Captain Cook's HMS Endeavour is finally found: Wreck of legendary ship used on first voyage to Australia 250 years ago is discovered off the coast of America	1324	0.44	A
3	express.co.uk	James Cook HMS Endeavour MAP: Archaeologists pinpoint location of Captain Cook's ship MAP	666	0.64	D
4	The Telegraph Online	Captain Cook's missing HMS Endeavour 'discovered' off US coast	478	0.63	E
5	Courier Mail	endeavour to right history	564	0.92	D
6	gazettelive.co.uk	Wreck of Captain Cook's famous Endeavour 'found' off US coast	461	0.43	F
7	Mail Online	The battle for the Endeavour: Row over whether America, Australia, or Britain gets the wreck of James Cook's ship ignites as US scientists prepare to announce its location	929	0.13	B
8	express.co.uk	HMS Endeavour FOUND: Wreckage of Captain Cook's ship discovered as sea mystery SOLVED	837	0.50	D
9	Daily Telegraph	LOOK, IT'S COOK!	404	0.13	D
10	The Sydney Morning Herald	All hands on deck to raisethe Endeavour	764	0.67	F
11	thetimes.co.uk	Captain Cook's ship Endeavour found after 25-year search	662	0.50	D
12	The Sydney Morning Herald - Online	HMB Endeavour found: One of the greatest maritime mysteries of all time solved	696	0.26	B
13	The Guardian	Wreck of Captain Cook's HMS Endeavour 'discovered' off US coast	825	0.81	E
14	news.com.au	Could this be Captain Cook's ship?	872	0.57	E
15	The New York Times	Wreckage May Be From 18th-Century Endeavour, Archaeologists Say	770	0.33	D
16	Gold Coast Bulletin	Endeavour search points to US coast	322	0.53	F
17	dailystar.co.uk	Captain Cook's ship 'FOUND' – Wreck of vessel used 250 years ago located off US coast	737	0.26	D
18	Daily Telegraph - Online	Captain Cook's ship wreck 'found'	498	0.18	D
19	Geelong Advertiser	Search for Cook's ship may finally be over	276	1.00	G
20	Darlington and Stockton Times	Archaeologists may have found Captain Cook's Endeavour ship	580	0.13	D
21	thescottishsun.co.uk	SHIP AHOY! Archaeologists 'find captain James Cook's HMS Endeavour' solving one of the greatest ever maritime mysteries	626	1.00	F
22	The Northern Echo	Experts hopeful US shipwreck is Captain Cook's Endeavour	392	0.50	G
23	The Australian - Online	Endeavour resting place found?	631	0.33	D
24	Die Welt	The Lost Treasure	1095	0.00	A

25	Mail Online	Raise the Endeavour! GUY WALTERS reveals secrets of ship that took Captain Cook to Australia including 'rife homosexuality' and relentless boozing after scientists 'find its wreck'	1484	0.00	A
26	Whitby Gazette	HM Bark Endeavour may have been found off American coast	205	0.43	G
27	Yorkshire Post	Speculation mounts that 250-year maritime mystery of Cook's HMS Endeavour may finally be drawing to conclusion off US coast	764	0.43	F
28	The New Zealand Herald	Wreck site 'probably' Endeavour	575	0.14	E
29	Launceston Examiner	Cook's HMAS Endeavour may have been found in United States	404	0.33	F
30	The Daily Post	Hopes high for discovery of Endeavour	322	0.60	G
31	Townsville Bulletin	Closing in on site of Endeavour	243	0.52	G
32	The Age	Endeavour mystery appears solved	532	0.27	F
33	London Evening Standard	'Resting place of Cook's Endeavour found'	463	0.25	G
34	Mirror.co.uk	Captain Cook's Endeavour ship thought to have been found on ocean floor off US east coast	484	0.33	D
35	Evening Gazette	Experts closing in on Cook's ship	542	0.43	F
36	Taranaki Daily News	ENDEAVOUR MAY HAVE BEEN FOUND	478	0.04	G
37	The Daily Telegraph	Endeavour wreck 'found' ... as it sails into a new storm	673	0.33	B
38	Herald-Sun	INCREDIBLE ENDEAVOUR	500	0.60	E
39	Washington Post.com	The ship Captain Cook used to 'discover' Australia may have been found — sunken in a U.S. harbor	1028	0.56	A
40	Horncastle News	The local link to the discovery of HMS Endeavour	417	0.40	H
41	Mirror.co.uk	Bible story of Exodus 'could be true' as archaeologists discover 'ancient' ruins near River Jordan	921	0.36	X
42	Scottish Daily Mail	Found, the wreck of the Endeavour	498	0.50	G
43	The Hamilton Spectator	Researchers say they're closing in on Captain Cook's ship	529	-1.00	D
44	The Marlborough Express	RESTING PLACE OF HMS ENDEAVOUR 'FOUND'	386	0.38	G
45	St George Leader	Ship fight over where Endeavour should rest	400	0.33	B
46	Herald Sun - Online	Astonishing find in search for Captain Cook’s ship	620	0.38	E
47	The Times	Cook's ship Endeavour 'found' off US coast	300	0.23	G
48	Northern Territory News	Hopes Endeavour wreck found	223	0.38	G
49	The Boston Globe	Closing in on Captain Cook's long-lost ship in the waters off Newport, R.I.	454	0.33	F
50	The Boston Globe	Historic ship believed off R.I.	444	0.33	X
51	The Sydney Morning Herald	Discovery perfect timing for library	364	0.33	C

52	Canberra Times	Discovery just in time for National Library's exhibition	685	0.00	C
53	i	Captain Cook's ship 'found off American coast'	290	0.23	G
54	The Daily Mirror	Cook ship found on ocean's floor	272	0.33	G
55	Daily Star	COOK SHIP A-JOY	200	0.56	G
56	The Sydney Morning Herald	O Captain! Not my captain	769	0.80	H
57	Hawke's Bay Today	Cook's Endeavour likely to remain US property	326	0.00	B
58	RTE.ie	'Endeavour' may be found soon	173	0.17	G
59	The Australian	Hulk may be Cook’s Endeavour	341	0.15	D
60	i	What we learned this week	281	0.30	H
61	The Telegraph Online	Oceania, Royal Academy, review: an astonishing blast of a show	1153	0.77	C
62	Manning River Times	My Shout: How a day at the rugby turned into a bush adventure	485	0.71	H