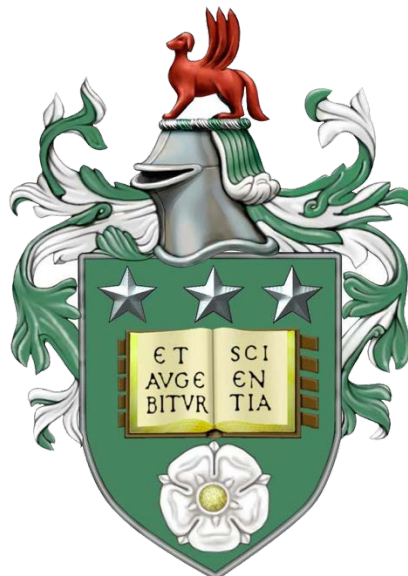


The usage of statistics in the articulation of information quality in news reporting

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Abstract

This study examines the usage of statistics by journalists in delivering information quality. It examines the articulation of statistics in the area of crime and health in the UK through an original theoretical framework constituting a set of five quality dimensions: Relevance, Accuracy, Timeliness, Interpretability and Accessibility. Each dimension is conceived in this study as a threshold to guarantee the quality of information in news. These five dimensions have been evaluated by using a triangulation of methods: content analysis, semi-structured interviews and focus groups. In this way it was possible to understand the whole journalistic workflow, from production to consumption, on how statistics are articulated throughout in order to substantiate quality news stories. In addition, two further secondary methods have been applied, including Close-reading Rhetorical Structural Analysis and Q-sort analysis, in order to validate the main methods and in an attempt to obtain a deeper insight into usage and articulation of statistical information in news.

The study particularly highlights the dichotomy between the normative and professional aspirations of journalism, whereby statistics help support the quality of news, and there is a desire to strengthen the ability of storytellers (journalists) through use of numbers. The research discovered tensions and issues that were key factors in the articulation of quantitative information. At the centre of the analysis, the study found that while the concept of quality, and its dimensions, remains a theoretical aspiration among journalists, what they aim to achieve is ultimately credibility and authority. Quality statistics do not automatically translate into quality news, mainly because of internal and external interferences that this study tried to bring to surface. Also, contrary to initial expectations, numbers do not seem to fully satisfy the five quality dimensions when dealing with crime and health news stories.

The relevance of statistics in journalism studies cannot be overemphasised. Nowadays journalists examine on a daily basis, and against the pressure of time, masses of quantitative information related to economic, political and social phenomena, including scientific and academic research reports, public opinion data, political polls, and official and non-official datasets. This is why a discussion about quality and its dimensions, is even more crucial. It is therefore the aim of this study to improve our understanding of the usage of statistics as a primary means for the construction of journalistic quality upon which a deep reflection is becoming even more urgent in times of 'post-truth' journalism.

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“The birth of a new fact is always a wonderful thing to experience. It’s dualistically called a ‘discovery’ because of the presumption that it has an existence independent of anyone’s awareness of it. When it comes along, it always has, at first, a low value. Then, depending on the value-looseness of the observer and the potential Quality of the fact, its value increases, either slowly or rapidly, or the value wanes and the fact disappears”.

Robert Pirsig (1928-2017)
Zen and the Art of Motorcycle Maintenance, 1974, p.34

“What if there were no such thing as a hypothetical situation? What I mean (and everybody else means) by the word Quality cannot be broken down into subjects and predicates. This is not because Quality is so mysterious but because Quality is so simple, immediate, and direct”.

Robert Pirsig (1928-2017)
Zen and the Art of Motorcycle Maintenance, 1974, p.185

Chapter 1: Introduction

1.1 Overview

The relevance of statistics in journalism studies cannot be overemphasised. At the centre of the articulation of statistics, as I will explore in this thesis, are the issues of quality and trust. In this research, I look at how journalists engage and articulate statistics to normatively achieve quality while in search of credibility.

To examine this usage, my research develops an explanatory theoretical framework that sees quality of the news through a series of dimensions. I then explore how journalists make use of numbers in their attempt to achieve – successfully or otherwise – these dimensions, and the strategies and approaches journalists undertake in that process. The research has adopted a multidisciplinary approach that integrates a series of qualitative and quantitative research methods to allow a comprehensive and holistic examination of the role statistics play in the articulation of quality news and to ask what this means for an informed and democratic citizenship.

In order to ensure that stories are credible and trustworthy, journalists examine on a daily basis, and against pressures of time, floods of information related to economic, political and social phenomena, including scientific and academic research reports, public opinion data, political polls, consumer surveys, official and non-official datasets, among other sources. It is the assumption of this research that journalism, understood as an information vehicle, still plays a pivotal role in the mutual construction of statistics itself and society, and shortens the distance between policy makers and citizens.

Modern society has been recognised as an Information Society (Castells, 2011; Daniel, 1980; Mattelart, 1996, 2003), in which information is needed to keep the arteries of democracy and civic participation oxygenated. One of the forms that this ‘information’ takes is numeric data, which both conveys and creates the meaning of things. Indeed, today we are witnessing an increase in the type of information that is translated in such data and numbers that drive our daily lives for decision-making, from health data to educational data and crime data and beyond. Thus, it is cogent to understand not only the role statistics play in society but also how news stories that convey these numbers legitimate and contribute to the mutual construction of social reality (Searle, 1995). If information is the vital breath of democracy, the quality of such information is the element that keeps our society in good health by helping citizens to make sound and safe decisions. Therefore, who mediates this information – and also how it is mediated – becomes an increasingly relevant actor in the arena of a data-driven society.

It is because of this growing need of a data-driven sensibility, to be able to understand society at both practical and theoretical levels, that this empirical research explores the articulation of statistical information in journalism practice by focusing on journalists as the main sense-makers of the data in the information landscape (which I later refer to as the *Infosphere*). This thesis looks in particular at how journalists manage and engage with numbers when they collect data. By doing so, it consequently explores the practical use of such quantitative information in the articulation of quality news stories. In this sense, it further examines whether the quality of statistics impacts on the articulation of quality in news stories. As such, this research proposes to build an innovative account of how statistical information is used in quality news reporting specifically through a mixed methods analysis. The research considers key concepts such as: quality journalism, the quality of statistics and information quality. The research will make use of the background of the Philosophy of Information as theorised by Luciano Floridi (2011) as this philosophical construct was helpful to address the issue of quality when applied to the journalistic workflow.

The methodology of this research is based on quantitative and qualitative methods. It uses a mixed methods strategy while analysing current research literature in the area of journalism. Initially it conducts a content analysis to closely inspect news articles from different newspapers. However, given the sheer amount of available data, the study delimits its scope to crime and health news beats. After that, it examines articles using a close reading structural rhetorical technique in order to discover whether there is an emphasis, or an absence, of specific quality dimensions in the news. The research goes on to investigate through semi-structured interviews how journalists interpret their own practice around the use of statistics and in relation to quality and how they make sense of statistics in general when producing their stories. Lastly, although this research does not intend to focus on news audiences but rather on news production and media representation, focus groups were conducted to help better understand the public's engagement and reactions when exposed to statistical information.

The content analysis results offer important insights about the use of statistical information in news reporting of crime and health. In both news beats statistics are used as hard facts and there are significant failings in satisfying all quality dimensions. For example, the lack of interpretability and coherence within the narration causes an over-emphasis of numbers that leads to the paradox "more numbers = less quality". The close reading suggests an exaggeration of the use of numbers, often mixing together different statistical sources demonstrating a lack of understanding of the difference between official and non-official sources. The semi-structured interviews highlight the awareness and confidence towards the numerical skills of journalists and their opinions about the usage of statistics, and their criticism against statistics driven by politics. Most

importantly, it looks at their understanding of quality. To conclude, focus groups explored audience perceptions, which were very often over-reactions mixed with hyper-criticism, when the readers dealt with news that makes use of numbers, an aspect that I will explain in more detail in subsequent chapters. Broadly speaking, this research found that statistics bring credibility and trust to the news but not necessarily quality.

All these findings are contextualised in relation to a broad range of literature taken from Media and Communications studies, Journalism studies and Information studies with the purpose of highlighting how these areas of research overlap when dealing with quantitative information. A technique of comparing and contrasting was adopted as a means of observing points of strength and of weakness in each area of the literature. It was shown that the notion of quality, because of its ambiguity, is the most common concern among readers, but it is also often underestimated and perhaps 'snubbed' by journalists in favour of a more approachable, down-to-earth, widely accepted notion of credibility.

This research concludes by maintaining that statistics are an important part of the articulation of quality news. Even if the quality of statistics does not impact directly on the overall narrative quality of news articles, the results of a poor understanding of its dimensions can spark confusion and doubts and inspire unnecessary over-scepticism among readers. This is a kind of reaction that is detrimental, if not for the storytelling itself, which is a creative act, but for the journalistic mission of informing the public. This research argues that by being aware of the five dimensions of quality both in statistics and in news, which are later detailed in this work, journalists could successfully achieve the journalistic mission to inform and educate their readers.

Furthermore, the research also suggests a general deficiency in the training of journalists regarding the interpretation of statistical releases and their databases, something that has been highlighted in similar studies (Nguyen & Lugo-Ocando, 2016) and is now corroborated by my findings as one of the key issues to be addressed. Indeed, one of the innovative contributions of this thesis is to pinpoint unequivocally that it is not only time pressures, nor access to data – key culprits in relation to flaws and pitfalls – but the educational background of reporters that needs to be addressed. While traditional explanations have blamed journalists' ability to manage datasets and verify critically statistical sources on the current speed of the news cycle, my work suggests instead that blame lies in a lack of skills among those in the newsroom. Therefore, the main question around how journalists use statistics to deliver quality in their work is ever more pertinent as a guide for the research rationale.

1.2 Research Background

1.2.1 Information Society and Statistics

As mentioned earlier, the use of statistics in journalism can be understood within the context of the Information Society. The notion of the Information Society took shape during World War II with the invention of artificial intelligence machines (G. Dyson, 2012). It only became a standard reference in academic, political and economic circles from the 1960s but the neologism, created at that time to describe the new society, would not come to light until the advent of the “information revolution” and the arrival of the Internet (Mattelart, 2000, 2003). Information technology enthused and fuelled Western society with its limitless power of calculation and information processing through the rise of computers and related software. All areas of human knowledge were involved, including the practice of journalism. The two techniques of Computer-Assisted Reporting (CAR) (Garrison, 1998; Maier, 2000) and Precision Journalism (Meyer, 2002) were able to harness the power of calculation in order to produce a new form of journalism based on quantitative information.

It is important to remind ourselves at this stage that the idea of a society ruled by information is deeply rooted in the spirit of the Enlightenment, which was itself inspired by “a blind belief in numbers” (Mattelart, 2003, p.5). This ‘social project’ dated back to the 17th and 18th centuries, where thinking in terms of what is countable and measurable became a way to reach a universal truth through a universal language (Mattelart, 2003). Mathematics and scientific reasoning were the paths for the perfection of human society. In this respect, it was the French Revolution that marked a high point in the quest for a ‘geometrical certitude’ in society and it was during the Napoleonic era that statistics became widely spread in the use of governments and started to be reported in the media (Desrosières, 2002; Stigler, 1986). In 1789 the T-square and the level were the two emblems of Equality and attributes of the goddess Philosophy, the incarnation of Reason. The ideal of egalitarian “levelling” that would bring men closer together inspired by the Declaration of Human Rights led to the introduction of a new system: statistics (Saetnan, Lomell, & Hammer, 2010).

Statistics as we know it today stemmed from (1) a philosophical grounding and (2) a political context. Generally speaking, the use of the word ‘statistics’ is rooted in the concept of the modern nation-state and that of stable borders. From 1660 the notion of *Staatkunde*, or ‘state knowledge’, was promoted after the Treaties of Westphalia (1648) as a way of meeting the needs of state organisation. The etymology of statistics also comes from the Latin *statisticum collegium*. Subsequently the notion was defined by Gottfried Achenwall (1719-1772) as the ‘state science’ or *Staatwissenschaft*. The aim was “illustrating the

excellences and deficiencies of a country and revealing the strengths and weaknesses of a State” (Stigler, 1986).

The philosophical ground behind the notion of statistical information can be synthetically found in the works of two philosopher-mathematicians: Gottfried Leibniz (1646-1716) and Nicolas de Condorcet (1743-1794). Leibniz is extremely important in our understanding of the Information Society because he believed the nature of logic to be an essential step in developing the idea that it is possible for thought to manifest itself in a machine. Leibniz came very close to automating the thinking process by implementing binary arithmetic and a *calculus ratiocinator* or ‘arithmetic machine’. For Leibniz and his contemporaries, more efficient methods of calculation were needed to meet the requirements of modern capitalism. The German philosopher laid the foundations of the algorithmic writing that allowed George Boole in 1854 to find the beginning of an autonomous discipline of computer sciences that came into being hundreds of years later.

In an effort to “establish a universal language”, a language of signs that would bring “geometrical certitude”, the Marquis de Condorcet proposed a new way “to bring to bear on all the objects embraced by human intelligence, the rigour and accuracy required to make the knowledge of truth easy and errors almost impossible” (Mattelart, 2003). Today we know that this language would have made broad use of charts, tables, methods of geometrical representation and descriptive analysis. Related to the perfectibility of human society, Condorcet elaborated a view based on a new relationship with history; that by observing the frequency with which an event occurred, it was possible to predict the future, at least in probability terms. Therefore, probability theory became a new means of objectivising human society and it proposed a method for making choices in the event of uncertainty. This was a decisive step forward that distanced the Modern Age from the Ancient Age of Greeks and Romans (Bernstein, 1996).

As a matter of fact, at the beginning of the Enlightenment, the quarrel between the Ancients and the Moderns, pivotal for the History of Ideas and an essential feature of the European Renaissance, began to transform and shape the view of history that would lead to modernity. Condorcet himself, in *Sketch for a Historical Picture of the Progress of the Human Mind*, analysed some issues that arose with the Modern Age, such as the impact of printing on scientific development, the formation of democratic opinion and the growth of the ideal of equality:

His vision of the benefits of communicating practical and theoretical knowledge and of increasing opportunities for scientific exchange, took the form of a determinist philosophy. Progress, exponential process, was seen to accompany the irresistible

ascension of the 'general illumination of minds' (Crowley & Heyer, 2015).

The industrial society, the 'mother' of the information society, was about to begin and numbers would become its own language.

1.2.2 Reporting numbers as information

Quantification through numerical information was therefore the basis upon which the construction of a "new" Western society was built. Alfred Crosby, in his thoughtful and revealing investigation of the role of quantification, gives a beautiful example of the complexity of trading some 800 years ago. It involves the Italian merchant Francesco di Marco Datini (Crosby, 1997):

On November 1394 he transmitted an order for wool to a ranch of his company in Mallorca in the Balearic Isles. In May of the following year the sheep were shorn. Storms ensued [...] Then the wool was divided into thirty-nine bales, of which twenty-one went to a customer in Florence and eighteen to Datini's warehouse in Prato. The eighteen arrived on 14 January 1396. In the next half year his Mallorcan wool was beaten, picked, greased, washed, combed, carded, spun, then woven, dried, teased and shorn, dyed blue. Napped and shorn again, and pressed and folded. These tasks were done by different groups of workers [...]. At the end of July 1396, two and a half years after Datini had ordered his Mallorcan wool, it was six cloths of about thirty-six yards each and ready for sale (1997, p.35).

This quote is interesting for the purpose of this research because Crosby (1997) draws attention to the care, the precision and the quality that Marco Datini needed to keep track of things, but also notes that each step of the above, each exercise involving a task by some other actor, had to be paid for, and in the end Marco Datini needed to know that he was going to make a profit. No wonder there was a need for bookkeeping. Interestingly, it was only during Datini's career that Hindu-Arabic numbers began to be used. Prior to 1383 his books have all the numbers written out in words. This is one of the major achievements in Western society and the most important intellectual breakthrough. One that also had a huge impact on the way our civilisation has come to understand itself.

Having briefly mentioned bookkeeping, I want to stress the importance of it for the origin of numbers reporting in the news. The beginning of the double-entry bookkeeping system is often associated with the name of the Italian Luca Pacioli (1445-1517) described as the 'father of modern accounting'. In his 600 page book *Summa de Arithmetica, Geometria, Proportioni et Proportionalia*

(1494 and reedited in 1994) we see the beginning of what Max Weber would call the “rationalisation of society” (Ritzer, 1983) or what modern sociologists have labelled “bureaucratisation” (Blau, 1956; G. Cochrane, 2018).

It is my opinion that as bookkeeping gives us eyes to see what others cannot, akin to news reporting, we can then make sound decisions and have informed opinions. Such rigorous accounting procedures formed one of the necessary foundations of the Industrial Revolution. If this would be regarded as the genesis of a way of ‘reporting numbers’ for large consumption, the genesis of statistics, as we conceive it today, can be traced back only to the 17th and 18th century, yet it was not until the Victorian period that numbers began to circulate on a systematic basis and this was thanks to the considerable expansion of the British press.

Newspapers were the most important vehicle during the late Georgian and Victorian periods; but other media have also experienced considerable growth during this time as well including pamphlets, periodicals and novels. As Mark Hampton (2008, 2010) has argued, during the mid-Victorian period, the press was conceived as an instrument of “popular enlightenment” as it aspired to what he terms an “education ideal”, later replaced by a “representative ideal” (Mitchell, 2009). The ‘daily-ness’ of modern news has been traced back to the 17th century but it became an entrenched aspect of political life only in the late 18th and early 19th centuries.

In short, just as the flow of statistics gradually intensified after 1800, so too did the flow of news items. Numbers, facts, news – all were now subject to systematic collection, circulation and consumption. The development of electric telegraphy led to a new way of producing news: the news agency. Reuters, for example, was established first in Britain in 1851 with the aim of enhancing the possibilities of the telegraph and by the end of the century events abroad could be relayed within hours. At the time the British Empire was not just confined to the nation-state but was cross-border and global in nature.

In the wake of this technological revolution, Adolphe Quetelet was a pivotal figure. In the 1830s Quetelet helped to set up the Statistical Society of London (SSL). In 1841 he also helped with the design of the British census. The most striking feature of Quetelet was his promotion of an international exchange of statistical innovations. This led him to organise the first *International Congress of Statistics* in Brussels in 1853 (Saetnan et al., 2010). By bringing together the heads of statistical agencies from across Europe, the Congress aimed to harmonise administrative procedures and produce internationally comparable data. In 1885 the International Institute of Statistics was born and still continues working today.

1.2.3 Political Arithmetic, Public Sphere and Numerical Information

The idea that statistics is strictly related to the notion of state is strengthened by William Petty (1623-1687) who coined the term 'political arithmetic' (which later evolved into political anatomy) as the new art of reasoning through statistical information linked to the mission of the state. In 1685 he published *Five Essays on Political Arithmetic* in which he suggested the division of statistical records, elections and opinion polling. Since then, statistics as a knowledge system has become inseparable from its 'political contingencies' (Saetnan et al., 2010).

In this regard, historians Alain Desrosières and Theodor Porter (Porter, 1986, 1996) have widely considered the interrelation between statistics and political life. Desrosières' history of statistics examines the co-constructive interaction between, on the one hand, the scientific process of description, coding, categorising, measurement and analysis and, on the other hand, the administrative and political world of action, decision making, intervention and improvement. Desrosières highlights how different actors, tools, techniques, structures, events, actions and so on, contribute to the establishment of a Foucauldian "regime of truth" (Hall, 2001; Taylor, 1984), which reached a high position of hegemony from the 1940s until the 1970s.

Theodor Porter (1992) is also concerned with analysing the political power of numbers in modern societies:

Received wisdom has long been that quantitative methodologies won a place in the social sciences and in governance thanks to their demonstrated effectiveness within the natural sciences, and that their effectiveness there is due in large part to the natural ability of numbers to imitate and describe nature (Saetnan et al., 2010, p. 4).

It is often said that one can deceive much more easily with numbers than with other forms of speech. That is why Porter (1992) introduces the importance of credibility, impartiality and, above all, objectivity into the context of public life. For him and others, objectivity meant withholding judgments and resisting subjectivities when accounting for the outside world. In one of his famous works Porter (1986) notes how many statistical practitioners in the 19th century were embedded within the public sphere, self-consciously trying to transform society at large. Porter emphasised how statistical science transformed the very meaning of 'public reason' as soon as statistical science began to develop an ethos of detachment rather than engagement.

Historian Adam Tooze (A. Tooze, 2006; J. A. Tooze, 2001) succinctly expresses the intellectual positions of the two aforementioned scholars: "a torrent of numbers accompanies both bureaucratic communication and the public

discourses that are characteristics of modernity” (p.54). And indeed, even today statistics are not free of controversy among members of the public, experts and politicians. Numbers are often consumed with suspicion.

Modern philosophers like Alain Badiou (2008) point to the hegemony of statistics and the way numbers immobilise any proper critical engagement with the present complexity. Badiou explains that: “we live in the era of number’s despotism, something which means we have become incapable of posing more abstract questions concerning freedom, justice, and the true nature of citizenship” (Badiou & Sedosfky, 1994, p.14). The point Badiou makes here is about how numbers help to ‘objectify’ society and by doing so sets the groundwork for the emergence of the modern notion of state and bureaucratic power.

The argument that instead of engaging in rational-political debate, members of the public are forced to become consumers of ‘manufactured’ forms of opinion and culture, including statistics, has been a valid argument among Habermas supporters (Jürgen Habermas, 1991). And indeed it was Habermas himself who viewed the application of numerical information in the public sphere (like opinion polling) as part of its degeneration during the 20th century (Habermas, 1996).

Habermas defined the public sphere as “a realm of our social life in which something approaching public opinion can be formed” (1978, p.32) and also “a sphere which mediates between society and the state” (1978, p.33) forming “a principle of public information which once had to be fought for against the arcane policies of monarchies and which since that time has made possible the democratic control of state activities” (1978, p.35). What was called public opinion was increasingly used by statesmen and politicians as a form of authority and then eventually ‘decayed’ into a series of battles between groups of interests. Today historians are more inclined to speak of a series of competing public spheres distinguished by gender, political affiliations and class. Like statistics and modern governance, the historiography of the modern public sphere is rich, complex and theoretically sophisticated. The complex nature of the modern public sphere demonstrates however that numerical information has multiple functions in shaping the forms of reasoning practised within the public sphere itself.

The key medium for the modern public sphere was the newspaper (Saetnan et al., 2010). By the Victorian period, the press was regarded as a significant source of popular accountability. Popular titles prospered between the 1830s and mid-1850s. In the 1880s, *The Star* quickly established a circulation of 200,000, and in 1911 *The Daily Mirror* became the first paper to reach a circulation of one million (Conboy, 2002, 2006).

Those years witnessed what Ian Hacking (Hacking, 1982) called “an avalanche of printed numbers” and marked a threshold with respect to the breadth of issues suitable for enumeration. Population was the first concern but also other modern administrative domains such as the judicial, military, economic, educational, medical, criminal and other domains.

If words and not numbers seem to dominate the debates and narratives within the public sphere between 18th and 20th centuries, nevertheless these words and numbers were often used in conjunction as much as they are today. They complemented each other and both were seen as vehicles of persuasion (Yalch & Elmore-Yalch, 1984). In that age, statistical accounts and statistical journalism relied on a narrative style that today scholars call ‘social realism’¹, which became the dominant paradigm of the time and the prevalent explanatory framework to understand the outside world. It was the time of Eugenics and Empire, both of which would appropriate statistics to legitimise their own discourses of power (Denis, Langley, & Rouleau, 2006; Hacking, 1982). Criticism towards these numbers would have to wait some years until Walter Lippmann wrote the article *Elusive Curves* in April 1935, in which he castigated those analysts who attempted to “predict the future” by employing “statistical curves” (Seyb, 2015).

While this turn to statistical analysis was understandable in an age “in which the greatest triumphs of man have been achieved using quantitative measurement” (Seyb, 2015), an overreliance on statistical manipulations, Lippmann observed, could cause analysts to give the statistical curve an authority that it did not deserve, an authority that could suspend reason and common sense in deference to the stature of the findings.

“The best statisticians,” Lippmann cautioned, “are very sceptical. They respect their tools but they never forget that they are tools and not divining rods” (Seyb, 2015). Statistical findings, according to him, must be measured against the standards of “common sense and general knowledge”. A failure to do so, was to engage in a positivism whose insistence on pattern and order could generate a picture of the world that was so misleading that it could thwart, rather than inform (Bevir & Rhodes, 2015).

¹ I don't refer here to the particular form of art as developed in the Soviet Union. With this term I want to suggest the possibility (still unexamined in scientific literature) that without “social realism”, sociological and statistical methods may not have developed in the the way they did. I want to suggest that there were alternative forms of narrative as well. *Oliver Twist* by Charles Dickens for example was published in the same years of the SSL's journal. The novel by Dickens offers a starting point to reflect on how numbers are integrated into stories not only to offer a complete and more persuasive narrative account, but also to highlight previously unexamined social issues.

This intellectual heritage would be further developed by Philip Meyer in the 1970s in his seminal book *Precision Journalism* (Meyer, 2002). In it he addresses concepts and methods from the quantification approach to understanding social trends by suggesting that journalism should widely engage with social science methods. Meyer's aim was to drive journalism towards a more scientific approach, which is why the term 'precision' refers to quantifiable facts measurable through statistical performance and data analysis. In this sense, Meyer distances himself from a story-telling approach to journalism.

[...] When well-used, numbers can draw attention to the relevant conditions among all the noisy buzz and glare of the Information Age. In a world where not much is certain beyond death and taxes, we are sometimes tempted to give up on quantification, preferring instead to rely on intuition and story-telling. But the advantages of numbers, used properly, is that their strength can itself be quantified (Meyer, 2002).

Therefore, precision journalism is seen both as a theory of news and as a set of observations techniques focused on reporting and analytical skills. Meyer's goal was to turn journalists into social scientists. While there are many differences in both the perspectives and interests of social scientists and journalists, there are also significant overlaps in the professional concerns of the two groups. I personally share the view of Fawcett, when she says:

While journalists talk of 'objectivity' and 'impartiality', social scientists hold the ideals of 'reliability' and 'validity'. However, just like journalists, social scientists rely on certain rules of procedure, both in terms of methodology and presentation of findings (Fawcett, 1993).

Over the years, social scientists, more than journalists, have given special attention to refining their techniques of observation (Meyer, 2002). Indeed, one of the major criticisms sometimes made of social science is an overemphasis on the development of observation techniques and an under-emphasis on substantive theory and questions. However, because social scientists have spent so much time reflecting upon and studying their techniques of observation and quantification, journalism can profitably borrow a great deal from social science in order to increase the quality, accuracy and credibility of news reporting (Fawcett, 1993). In short, what has come to be called 'precision journalism' is the adaptation of such social science quantitative techniques to news reporting, the kind of journalism under analysis in this work.

1.2.4 The notion of quality in a quantified world

In a way, we can suggest that the notion of 'quality' is embedded in the idea of 'precision'. The history of quality is as old as civilisation, and precision in the measurement of length, mass and time was achieved in the ancient Hindustan Valley around 3000 BC (Plofker, 2009). Moreover, both in ancient Egypt and the pre-Columbus civilisations of America, the dimensions of the pyramids and other constructions show a high degree of accuracy related to precision (Burton, 2011).

However, the use of tolerance systems for the specification of quality and statistical principles to monitor quality have more recent origins. In fact, what can be called the quality movement may be traced back to medieval Europe (Crosby, 1997). Craftsmen began organising into unions called guilds in the late 13th century. Manufacturing in the industrialised world followed the craftsmanship model throughout the 18th century.

Objective methods of measuring and ensuring dimensional consistency evolved in the mid-1800s with the introduction of go gages. Henry Ford's moving automobile assembly line was introduced in 1913. This required that consistently good-quality parts were available so that the production assembly line would not be forced to slow down. In 1924 Walter A. Shewhart introduced the basic ideas of statistical quality control. World War II then brought recognition of quality to manufacturing industries and military applications.

At that time the United States emphasised not only statistics but approaches that embraced the entire organisation ecosystem. In the following years a movement known as Total Quality Management (TQM) was born and it is still successfully adopted today at a global level. TQM, which is not part of the present study, was particularly useful in the mid-1990s to measure reporters' work through a numerical 'grid system'. In general, in order to serve productivity, media organisations defended such codified evaluations systems as necessary for reducing inefficiency, managing costs and encouraging performance together with professional growth. But many reporters found this inappropriate for a professional activity; reducing reporting to only scores or grades or statistical measurements can be 'traumatic' for journalists. The situation can be easily summarised as follows:

If you overlay some factory model onto newsroom, you begin to detract from the thing that makes for a good newsroom: creative freedom. You can put a quantified system into any newsroom, but good journalists won't work there (Osborne, 2001, p.23).

Several individuals made significant contributions to quality control and improvement. Worth mentioning are W. Edwards Deming, Joseph M. Juran,

Philip B. Crosby and Armand V. Feigenbaum. With the advancements of the computer sciences in late 1980s, the perspective on quality changes position and becomes prominent to the point that, according to Luciano Floridi:

Lacking a clear and precise understanding of IQ properties causes costly errors, confusion, impasse, dangerous risks and missed opportunities. Part of the difficulty lies in constructing the right conceptual and technical framework necessary to analyse and evaluate them (Floridi & Illari, 2014).

If the Information Age brings to the surface the notion of information not as a good or a service, but as a product, the notion of information quality becomes pivotal among those organisations that deal with such information, newsrooms included. Very little has been done however to investigate whether the use of statistics, a tool of precision, would improve the quality of news reporting or not, and this is why I want to tackle this issue in this thesis.

1.3 Statement of the Problem

As we have seen in the background of the research, statistical information is at the roots of modern Western society and it is conceived as a tool of its representation. Based on this idea, numerical information rulers were – and are – able to make sound decisions that could affect, in a positive or negative way, society as a whole. Our Western society would be unthinkable nowadays without the development of measurements, taxonomies and parameters. Quantification has been applied to all fields of human knowledge, arts included (Crosby, 1997). We have also seen that the idea of quantification has its roots in the Enlightenment project.

The notion of quality, with its own history, has also been under scrutiny since the Industrial Revolution and only recently codified as a practice. Moreover, its legitimate definition has been pervading debates for more than twenty years. Ultimately, journalism conceived as a ‘gate’ between official bodies and citizens took possession of mathematical tools in a decisive way from the 1970s to improve the accuracy and credibility of news reporting.

The question that addresses the problem statement is: what would happen if quality is not achieved? One of the points I set out to explore in this thesis is how quality is on the one hand a central element for the advancement of a democratic society while on the other it is largely elusive. If some consider quality as the glue that holds together trust and credibility in journalism, others think that failing to achieve quality would be detrimental at all levels (e.g. in politics, economics, education, health and in tackling crime to mention a few) and that it

would negatively impact on the message conveyed. In the specific case of journalism, where quality is at the heart of the journalistic practice, a failure in achieving it would result in breaking the unspoken 'social contract' (see Chapter 6) between journalists and readers.

There have been a number of important works referring to quality in the news (Abramson, 2010; Anderson, Williams, & Ogola, 2013; Lewis, Williams, Franklin, Thomas & Mosdell, 2008; Vehkoo, 2010) to which I will be referring in this study. These works however only exacerbate the problematic nature of quality in the news. Since Umberto Eco wrote *Apocalyptic and Integrated* (Eco, 2000) scholars have been cautious about setting cultural standards. What is quality for one community might not be so for another. Nevertheless, beyond post-modernist relativism², there is the need to embrace a sense of journalism as a public service even when is practiced by the lowest denominator in the media landscape. It is in this sense that my work embraces and undertakes the task of trying to define quality.

Research on this issue is still underdeveloped in the Media and Communication field and particularly in journalism studies. This is one of the main reasons for this study, which is designed to analyse the aspiration of quality in the news in relation to how statistical information is used in journalism, in the context of expertise and public trust being at near historic lows, according to the report *Public Trust in Government 1958-2017* released in May 2017 by the Pew Research Centre.

1.4 Research Rationale

This study aims to further knowledge about how quantitative information is used by journalists, news editors and freelancers by assessing statistical-driven stories produced by journalists. It mainly looks at how these numbers are articulated in the news and presented to readers. In so doing, it develops an explanatory framework about the nature and characteristics of both process and outcomes in relation to news production.

The work reminds us how much the quality of information is crucial in the journalistic workflow (Lewis, Williams, & Franklin, 2008; Lewis, Williams, Franklin, Thomas, & Mosdell, 2008). Methodological issues in this work are addressed by means of mindful discussions around theory and practice, theoretical frameworks and pragmatic implications. On one end of the spectrum, this study offers a

² With this term I refer to postmodernism that professes ultimate relativism. Post-modernism, a 20th-century philosophical movement is characterised by an acute scepticism. In particular it questions whether there can be an objective framework for discussing intellectual problems. It is interesting when applied to journalism as it can be used to highlight the role of ideology in affirming and maintaining political and economic power.

comprehensive assessment of statistical-driven stories across four newspapers in the UK, and thus offers an insight into numeric and analytical skills regarding statistical information. At the other end of the spectrum, it explores attitudes of educated audiences towards statistical-driven stories, with an emphasis on health and crime stories.

One topic worth discussing here, as a matter of priority, is the importance of quality dimensions and their definitions. This is because in relation to news consumption, readers (audiences) may consider different aspects of quality. Different dimensions of quality matter to different people at different times depending on their cultural context, needs and expectations. Some research is more concerned with just one quality dimension (Floridi & Illari, 2014), that of *credibility* or of *trust*, whereas the present research aims to be more complete in covering all dimensions. In fact, based on an in-depth review of literature about journalism studies and Philosophy of Information, I will design and consolidate – as part of the originality of this research – a set of five quality dimensions that serve as a foundation upon which this research is built, namely: (1) Relevance, (2) Accuracy; (3) Timeliness; (4) Interpretability; (5) Accessibility.

Although there is a growing volume of research around Information Quality (IQ), few works have dealt with statistical information quality in the context of Media and Communication studies, and even fewer with journalism in particular (Cushion, Lewis, & Callaghan, 2017; Nguyen & Lugo-Ocando, 2016). Hence the results of the present work can potentially throw new light on the way quality associated with statistical information is understood both by journalists and among readers.

A very brief review of ‘quality’ in the field of Media and Communication research shows that ‘quality’ and its dimensions are an integral part of the overall evaluation of content. This fact itself justifies the importance of having a robust set of five quality dimensions as this study aims to do. For example, Mayo and Leshner (2000) have conceptualised ‘quality’ as a rating of superiority applied to communication messages, and define ‘quality’ as an evaluation of how informative, important, interesting, and well-written a news story is. Slater and Rouner (1996) defined “message quality evaluation” as an overall assessment of the stylistic quality of the message. Others like Chaiken and Eagly (1989) and Tormala, Briñol, and Petty (2006) identified adjectives such as good, interesting, enjoyable and important, all of them grouping together to form what they named ‘story quality’. According to these authors, we as readers tend to assume that ‘story quality factor’ is distinct from factors relating to credibility evaluations.

I have chosen a triangulation of methods for this research – content analysis, qualitative interviews and focus groups – as suggested by Altrichter, Feldman, Posch, and Somekh (2013) because researchers tend to use

triangulation for validating quantitative research instruments when the research phenomenon under investigation has little theoretical background (Hussein, 2009, p.15) as in the case of the present research. The classical benefit of triangulation reported by various methodologists is the validation of qualitative results by quantitative studies.

The results of the research will also be used to contribute to the development of the journalistic profession in the way quality is communicated through statistical-driven stories. The study also presents an opportunity to re-think the role that quality should play in the flow of numerical information managed in the journalistic practise.

1.5 Aims and Objectives

The main goal of this study is to analyse the uses of statistics in news reporting and to understand whether quality statistical information results and impacts on quality journalism. It aims to produce an original body of knowledge about how journalists use statistical information to impart quality to their stories, and to evaluate how journalists use numbers to articulate information quality.

To be clear, the aim is not to make comparisons between numerate journalists and innumerate journalists or to assess their mathematical knowledge, nor is it to make comparisons or establish causal relationship between crime and health issues. The study does not discuss personal dissensions with regards to political views that could spark disagreements, especially among the participants of the focus groups. In addition, it was not the aim of this study to look at how journalists cognitively process numbers or how they read statistical releases. Instead, the study analyses the ways in which statistics are used to achieve the quality dimensions across a sample of British national newspapers when reporting health and crime issues.

Since the literature on the uses of statistics in health and crime news is minimal (Nguyen & Lugo-Ocando, 2016), the research design was conceived with the objective of considering and comparing multiple data and analytical methods with a critical approach.

The five main objectives of this study are to: (a) identify and describe the uses of statistics and their articulation in health and crime news; (b) explore the extent to which the five quality dimensions are satisfied in news reporting; (c) scrutinise how statistics are understood by the audience; (d) provide new insights into what constitutes information quality in journalism; and (e) make a useful contribution to the advancement of the journalistic profession.

With regard to the ways in which statistics are used to articulate information quality in news reporting, the data was analysed through a triangulation of methods, combining content analysis with a selected close reading, in-depth interviews and focus groups. The decision to triangulate these methods was made to strengthen the accuracy of the study and achieve a methodological richness.

The research assesses the uses of statistics regarding: newspapers, periodicity, length of articles, type of statistics, sources quoted, human interests involved, critical evaluation, and timeliness, among others. In order to describe how statistics are used to articulate information quality a close reading of a small sample was adopted.

In terms of scrutinising how statistics are managed and communicated to audiences, in-depth interviews were conducted with journalists and editors-in-chief from *The Guardian*, *The Times* and *The Financial Times*, and with freelancers who routinely deal with statistical information. In terms of contributing to the advancement of the journalistic profession in better communicating quality statistics, this study provides a comprehensive analysis that aims to find gaps in knowledge in the literature.

Furthermore, the analysis is supported by a multidisciplinary literature review which provides an extensive background in order to contextualise the use of statistics in the history of journalism and in the Philosophy of Information (PI) when addressing the notion of quality.

1.6 Definitions of Main Terms

It is important to define some of the key concepts used throughout the research. I have adopted conventional notions to ease the understanding of the study. When exploring the field under analysis three terms need to be taken into consideration: (1) Quality; (2) Statistics; and (3) Philosophy of Information;

Quality (1) is at the centre of this study. Many attempts have been made over the last decades to define “quality” in general terms. There is a wealth of research which will be extensively analysed in this study but for the present purposes two notions are proposed: that of (1a) quality statistics and of (1b) quality journalism.

To the researcher, the term (1a) quality statistics can only be applied to official statistics. In Chapter 4 there is a comprehensive review of the most important reports and government White Papers related to this topic. According

to the website of the Office of National Statistics (ONS) “the quality of a statistical product can be defined as the ‘fitness for purpose’ of that product. More specifically, it is the fitness for purpose with regards to the European Statistical System dimensions of quality. The dimensions of quality statistics, for which I have developed five dimensions, are of extreme importance in the articulation of numerical information in news reporting.

The notion of (1b) quality journalism is a highly contested one and it has been at the centre of the debates for at least fifty years as this study will establish in Chapter 2. However, for the purposes of this research, I argue that quality journalism is achieved through the use of quality statistics. Therefore, quality journalism is guaranteed if and only if all five dimensions are satisfied in the outcomes.

The starting point of this research stems from three recent studies. The first two were conducted by the *Reuters Institute for the Study of Journalism* based at the University of Oxford: *What Is Quality Journalism* by Johanna Vehkoo (2010) and *Quality Journalism, The View From The Trenches* by Jarmo Raivio (2011). The third is *Defining and Measuring Quality Journalism* by Stephen Lacy and Tom Rosenstiel (2015) under the School of Communication and Information at Rutgers University. These three studies are the most up-to-date research on quality journalism, organically collecting and analysing, through qualitative semi-structured interviews, the opinions and reflections of a broad range of professionals. All three studies aim to find a possible definition of quality journalism and common points of agreement among respondents.

Statistics is a fundamental concept (2). According to the Royal Statistical Society and its official website, statistics “change numbers into information. Statistics is the art and science of deciding what are the appropriate data to collect, deciding how to collect them efficiently and then using them to answer questions, draw conclusions and identify solutions”. This study uses the term statistics often in conjunction with the word ‘information’. ‘Statistical information’ is used interchangeably with ‘numerical information’ and ‘numbers’. Statistics may be presented also by mean of visual graphs, formulae or written narratives (R Franzosi, 2017). Also, I will consider as statistics the sources related to stories of crime and health (see Chapter 5) as key data sets for journalists when they communicate a specific set of statistics or make a statistical claim.

Philosophy of Information (PI) (3), refers specifically to the work of Luciano Floridi (2011) who coined the term in the 1990s and who has published extensively in this area with the aim of elaborating a unified and coherent conceptual framework for the whole field of Philosophy of Information. It is my intention to apply, wherever possible, this philosophical approach to the topic under study.

According to the Stanford Encyclopaedia of Philosophy, the Philosophy of information historically “deals with the philosophical analysis of the notion of information both from a historical and a systematic perspective. With the emergence of empiricist theory of knowledge in early modern philosophy, the development of various mathematical theories of information in the 20th century and the rise of information technology, the concept of ‘information’ has conquered a central place in the sciences and in society” (Ladyman, 2014a). However, Luciano Floridi puts an emphasis on the rise of computers that are at the centre of the information revolution. He states that “the UNESCO Observatory on the Information Society have well documented that the information revolution has been changing the world profoundly, irreversibly, and problematically since the fifties, at a breath-taking pace, and with unprecedented scope, making the creation, management, and utilisation of information, communication, and computational resources vital issues” (Floridi & Illari, 2014). As I will explain later in the thesis, it is my opinion that this philosophical approach is more now than ever before of extreme importance in the practice of a type of journalism which aims at being data-driven and harnessing the power of the Internet.

1.7 Overview of the structure of the thesis

The following summary of the forthcoming chapters provides a brief outline of the structure of the thesis. Chapter 2 reviews existing literature about quality journalism and focuses on the ambiguity and convergence of the concept among scholarly writing/research. It also focuses on the problems of defining and measuring the concept of quality for research. It also tries to link the concept of quality to that of objectivity, the latter seen as a way to overcome subjective approaches. The chapter concludes by exploring how scientific methods are used in journalistic practice as a means to convey credibility and authority.

Chapter 3 introduces some philosophical challenges that take into account the branch of philosophy known as Logic. Adopting such a philosophical approach to the main question of the thesis and how this relates to the concept of quality allows me to embrace a more critical approach to the topic under analysis and I then contextualise it into journalistic performance.

Chapter 4 moves on to consider some philosophical views, mainly taken from the branch of Logic known as Philosophy of Information. This was of great help in laying the theoretical ground for the research methodology. The normative importance of the concept of quality in democratic life is also explored in light of the UK government reports and normative theories of journalism.

Chapter 5 presents the main qualitative and quantitative methods used in the study and explains the triangulation of these methods. This chapter also provides a detailed explanation of the data collection and the data analysis.

Chapter 6 deals with the main contribution of this thesis to the debate about statistics in journalism. It presents the key-findings divided by method: content analysis, close-reading rhetorical structure analysis, semi-structured interviews, focus groups and Q-test.

Chapter 7 outlines general conclusions based on the outcomes of Chapter 6. Furthermore, it highlights their implications on how journalists manage statistics and more specifically how numbers are articulated by journalists to legitimate their stories through a scientific lens. This chapter concludes with suggestions for future research and how we as researchers should engage with questions about the role of statistics in producing quality journalism.

Some limitations that need to be highlighted, which were the product of time and resource restrictions. Firstly, we cannot assume that the findings and contributions explored here in relation to newspaper journalism in the UK have universal applicability. Despite important overlaps among journalists from all over the world in relation to their practices and around their news cultures, there are nevertheless equally important differences among them as the Worlds of Journalism Study Project has recently highlighted (see worldsofjournalism.org). Thus one of the key challenges is to examine how these results and conclusions compare across the globe and challenge or not the ideal of a 'universal journalist' (Randall, 2000).

The other area to further this research is in relation to news audiences and how they perceive, engage and use this statistical information. Although my research provides some initial insights by carrying out some exploratory research by means of the focus groups, this only proves the need to advance more empirical investigation in this area. Given how neglected this area is, this is perhaps the biggest challenge of all in the research and one which I am totally committed to investigating.

Chapter 2: The never-ending debate on quality in journalism

2.1 The issue of an agreed-upon definition of *quality journalism*

Quality is a conceptual labyrinth and it is even more complex when applied to journalism. Because of this, quality journalism can be conceptualised in a variety of different ways. It is also because of this that similar definitions are more relevant than others within specific national and cultural contexts. Furthermore, different people in different countries perceive the concept of quality and the idea that it originates from differently.

There are no universal quality criteria carved in stone. Judgements of quality are often culture-specific or related to one's socio-economic background and level of education. Interestingly, not even the Pulitzer Prize, one of the world's best-known awards for journalistic excellence, has a set of criteria for judging what makes a piece of journalism distinguished enough to win the Prize.³

Nowadays journalists have come to accept that they compete on a global scale with other citizen-journalists (Allan, 2009) in the so-called 'information marketplace', and their knowledge contributes to the quality of their work (Shapiro, 2010). It is still debateable in academia how this role of 'adding value' to ubiquitous information can be described and evaluated.

For the removal of doubt, I consider journalists to be 'information workers' rather than 'knowledge workers'⁴ by adopting the definition given by Peter Drucker in 2012:

An Information Worker is a person who uses information to assist in making decisions or taking actions, or a person who creates information that informs the decisions or actions of others (2012, p.5).

³ On the website www.pulitzer.org it is explicitly written, under point 6, that only the Nominating Juries and The Pulitzer Prize Board can determine exactly what makes a work 'distinguished'.

⁴ When Peter Drucker originally articulated the idea of a 'knowledge worker' in 1959, he was proposing a classification with the primary goal of describing the work of people who applied knowledge directly, and in a unique way, to the tasks assigned to them. As computing technology infused within organisations it became a new tool for understanding an organisation's data. Over time though, computer programming became more sophisticated. Some of the knowledge workers found their way into computer programming and computers became more capable of applying knowledge to data without human intervention. More details: www.seriousinsights.net

Decades ago, Jo Bardoel (1996) identified that as the audience is gaining more choices in their access to information, a journalist would change “from an unavoidable to an avoidable link in the chain of information possession” (p.61).

Leo Bogart (2004), who researched journalists’ views on quality standards over two decades, concluded that while “the hallmark of any craft or profession is an adherence to certain generally accepted standards of performance and a respect for meritorious achievement” (2004, p.40), the assessment of quality in journalism remains “as murky as critical judgment of poetry, chamber music or architecture” because the abilities of the field are “as intangible as those of any art” (Bogart 2004, p.44). Likewise, Robert Picard (2000), pointed out that quality is a central element in achieving the social, political and cultural goals asserted for journalism in democratic societies. He argues that this concept becomes problematic when applied to journalism, because measurability is difficult (see section 1.3 for more details).

Ray Anderson (1970) frames the issue of quality in a broader democratic process, convincingly suggesting that it is possible for the function/role of the fourth estate to be a characteristic of quality news providers, or better, of ‘information providers’:

The specific understandings of it can be seen to be core requirements for the functioning of democracy to the fullest extent that it would appear is possible in a considerably less than perfect world. Quality will therefore be broadly measured according to the extent to which journalism performs the information provider role (1970, p.371).

In addition to this, levels of news information (or ‘Levels of Abstraction’ [LoAs], as they will be referred to in further parts of in this work, following the theories of philosopher Luciano Floridi) are argued to be necessary for a well-functioning democracy, or rather for democracies in general. In this regard, Jesper Stromback (2005) has identified a four-fold typology of democracy. One of the four which is worth mentioning is the competitive democracy where journalism should meet the democratic need for an in-depth ‘information provider’ and ‘watchdog’ for those in power, with particular emphasis on the platforms and records of political parties and the key political players with a fair use of numbers and statistics.

Quality is therefore a highly problematic topic in the context of journalism and it has been thoroughly analysed, as thoroughly described in Shapiro’s definitions of quality, which illustrates the several ways in which quality should be evaluated and conceptualised. To date the quality literature review by Ivor Shapiro represents both one of the most comprehensive and unavoidable essay

for scholars in the field of communication studies, at least concerning the theoretical framework.

Significant research about quality journalism was also conducted in 2010 by UNESCO, which produced a series of three documents aimed at comprehensively setting a matrix of quality indicators in the Brazilian journalism scenario (unesdoc.unesco.org). These reports are of extreme relevance in the literature about quality journalism even if the South American country belongs to a different journalistic culture⁵. In spite of this cultural difference, I think it is useful to take a cursory look at the core concept and the outcomes of these UNESCO reports. In one of them in particular, Josenildo Guerra (2010) claims that a culture of quality evaluation similar to the one existent in other areas, such as industry, commerce or service, has not been entirely adopted in newsrooms.

According to Guerra (2010), quality is a linking resource between the sphere of production and the consumption of goods and services, stressing in this way the origin of the idea of quality as we understand it nowadays comes from the Industrial Revolution and its development of the mass production processes.

Following this evolution of the idea of quality, UNESCO researchers highlighted the formulation of Quality Journalism Indicators, defined and applied within a Quality Management System (QMS), which may help to monitor journalistic companies and allow media companies to identify more accurately quality attributes and practices in journalism.

In the analysis of Guerra (2010), quality supposes, as a basic premise, the fulfilment of demands from clients and society. Quality is an organisational resource that links the spheres of the production of goods and services and their consumption. For producers, the effective consolidation of quality management and its implementation has competitive advantages for the organisation. The sphere of consumption and the indication of quality seem to guarantee that the product really does contain the features and functionality the customer wants. It offers security about consumption, due to the 'quality' label's credibility with consumers. The commitment to quality is therefore a central part of the discourse of many organisations, and newsrooms often include this in their daily routines as news producers. Indeed, as reported by American researchers (Slack, Chambers, & Johnston, 2010), business newspapers and management magazines are dominated by articles about quality. To them it seems that we as society have experienced a 'quality revolution'.

⁵ The literature on the journalistic cultures in Latin America is too vast to be addressed here. Worth reading for a general view is *Journalism Across Cultures: An Introduction* by Levi Obijiofor and Folker Hanutsch, Palgrave (2011). See also the next footnote.

As a matter of fact, in the wake of this ‘quality revolution’, the International Standardization and Accreditation Services (ISAS) and the Media and Society Foundation (MSF) carried out some very insightful investigations⁶. The former is a private organisation dedicated to certification and accreditation services whose mission is to support private, public and government institutions in establishing and maintaining quality standards in the public interest and then verifying their commitment to those standards. The latter is a Swiss non-profit organisation whose mission is to encourage the development of standards for communication organisations.

The outcomes of their research are summarised in thirteen dimensions: a) quality of information; b) quality of content; c) ethics; d) independence; e) relations with advertisers; f) relations with the public; g) relations with public officials; h) transparency; i) audience surveys; j) human resource management; k) work organisation; l) infrastructure; and m) relations with contractors and suppliers. These investigations aimed to merge the quality dimensions of assessment, management criteria of firms and companies, and the sphere of journalistic activity together.

Shapiro’s (2010) position in this regard, however, is sceptical as he advocates the existence of considerable hostility by journalists in accepting corporate or institutional concepts such as ‘quality assurance/assessment’ or even ‘best practices’, but this hostility is not proven or substantiated by any academic research. According to Robert Picard (2000), this concept of stipulating quality attributes and measuring journalistic performance in meeting those attributes (as part of a process of continual improvement), is *intuitively appropriate* for journalism and communication scholars. If Picard’s intuition is right, the pragmatic question would be: what are therefore the quality requirements for products in journalism?

Within the sphere of journalistic activity, on the one hand, it could be argued that from the public’s point of view there are two basic requirements for news: *truth* and *relevance: truth*, because it is expected to apprise the public of the facts; *relevance*, because not all facts are newsworthy. On the other hand, from the journalistic point of view, the two requirements are: *accuracy* and its *estimation*. In both cases we encounter the first difficulty: justifying such attributes as being quality standards and substantiating them both scientifically and theoretically. However, there are ambiguities and some convergence on the aforementioned concepts, which will be addressed in the following section.

⁶ Reports can be downloaded from www.media-society.org.

2.2 Ambiguity and convergence on existing journalistic paradigms

Ivor Shapiro (2010), in his comprehensive literature review on quality journalism, argues that frequently, almost daily, the practice of journalism is evaluated through different lenses. One is in the newsroom, where the reporter's work is assessed in the editorial management's workflow. A second is through the audiences that evaluate journalists' performance. The third lens of daily evaluation is the journalism school classroom where the production work of students is assessed for pedagogical purposes. And then there are studies of those involved in journalism scholarship, media criticism and other academic investigations of the journalistic production.

It is not my goal to design an evaluative framework here; I will therefore stand on Shapiro's shoulders in order to attain a thorough understanding of the existing paradigms upon which three distinct approaches converge: 1) the study of the professional culture of journalists; 2) reflections on journalism as an art form to be located within the field of arts and humanities; and 3) sociological surveys of journalists' criteria of 'quality' and 'excellence'.

Below I will briefly summarise the key points made by Shapiro.

a) News culture

Do journalists possess a common and definable set of traits or values? According to Mark Deuze the answer is affirmative thanks to a common "occupational ideology" (2005, p.445) characterised by a "collection of values, strategies and formal codes" (2005, p.447). For Stuart Allan "the news values of newspapers were being recast by a new language of 'dailiness', one which promoted a peculiar fascination for facts devoid of 'appreciation' to communicate a sense of an instantaneous present" (2014, p.16).

This ideology can be summarised under five headings: 1) *Public service*: journalists provide a public service (as watchdogs or 'news-hounds', active collectors and disseminators of information); 2) *Objectivity*: journalists are impartial, neutral, objective, fair and (thus) credible; 3) *Autonomy*: journalists must be autonomous, free and independent in their work; 4) *Immediacy*: journalists have a sense of immediacy, actuality and speed (inherent in the concept of news); and 5) *Ethics*: journalists have a sense of ethics, validity and legitimacy.

b) Journalism as a form of expression

In 1993 Stuart G. Adam released a Poynter Institute monograph titled *Notes Toward a Definition of Journalism: understanding an old craft as an art form* in which he defined journalism as a form of expression used to report and comment on the final result of individual production of journalists and the culture in which they work. This product is marked by five 'principles of design': 1) news or news judgment; 2) reporting or evidentiary method; 3) linguistic technique; 4) narrative technique; and 5) method of interpretation or meaning. Adam explained that his ideas on what constitutes and differentiates journalism began when, as a juror in an awards program, he was obliged to invent his own 'scoring system'. He therefore suggested it was possible to "locate journalism in the territory of art and the humanities" (Adam, 2006, p.344).

c) Surveys on "quality" and "excellence"

The roots of survey research on how quality is articulated and substantiated in journalism can be seen in the study *The Elite Press: Great Newspapers of the World* by John C. Merrill (1968). Merrill's quality indicators included expansion of reader's education and intellect; good writing/editing; independence and financial stability; integrity; power to influence opinion leaders; social concern; staff professionalism and intelligence; strong opinion and interpretative analysis; world consciousness; and emphasis on politics, international relations, economics, social welfare, culture, education and science. A few years later, the same author (Merrill & Lowenstein, 1971) proposed more detailed internal and external criteria, such as editing and proofreading care, frequency of quotation and allusion.

With regard to the three points above there is no mention of the methodology used and especially how the concepts are measured. This deficiency seems to make the points weak at a scientific level but agreeable under a theoretical perspective and at least by intuition.

Philip Meyer, on the contrary, is less theoretical and much more pragmatic in *The Vanishing Newspaper* (2010). He explains that:

If we can agree on enough interesting elements of quality that are measurable, and if there is statistical evidence that they are driven by some common underlying force not directly measured, we can make a good claim that the underlying force, even though it might be latent, is in fact quality (2010, p.68).

He does not exactly give us a definition of quality journalism but he attempts to define quality as credibility (Vehkoo, 2010), even if it is still not clear what he means when talks about a “common underlying force”.

Johanna Vehkoo (2010), who has summarised Meyer’s viewpoint, says that he produced a cogent, empirically tested case for the link between quality journalism and profitability called “the profit controversy”. Meyer offers news organisations a practical way of looking at their business from the point of view of quality and public service and how this is perceived by the end users. Accordingly, journalistic quality has its visible manifestations once readers’ reactions to reporting are studied. Meyer looks specifically at: *credibility* and *influence* in local communities; *accuracy* in reporting; *readability*; and the importance of *editing*. The main conclusion is what became famous as the *Influence Model* – this theory claims that quality in journalistic content increases societal influence and the credibility of news:

If entrepreneurs learn anything from newspaper history, it should be that trust has economic value, and that trust is gained through quality content. If the influence model works, the successful transitions will be by newspapers that use savings in production and transportation to improve their content (Meyer 2010, p.188).

Later Meyer extracted from the responses of editors four broad dimensions of quality: ease of use, editorial vigour, news quantity and interpretation (Meyer & Kim, 2003). According to Winfried Schultz (2000) there are basically three conditions that determine quality and performance of journalism in a free, open society. First, the resources; secondly, the legal and political order; thirdly, the professional standards, behaviour and values. In addition to that, there are different methods to approach these three conditions.

With specific regard to the methodology, some studies start by interviewing people in the profession and trying to uncover their insights based on experience (Albers, 1992). Other studies survey audiences and ask them to assess media quality (Ebert, 2003). A third approach proceeds from media laws and extracts the standards for a norm-compliant media performance and journalism of high quality (Schatz, HoBfeld, & Egger, 2013). Also, Denis McQuail has highlighted that the criteria for journalistic quality are closely connected with basic values of a free, democratic society, values like freedom, equality, social security and order (McQuail, 1992).

It is also worth citing George Gladney, who abstracted from the literature eighteen standards of journalistic excellence paradigms and divided them into nine ‘organisational standards’ and nine ‘content standards’. Through a survey of newspaper editors, he found that the top-ranked content category standards were, in order: strong local news coverage; accuracy; good writing; visual appeal;

strong editorial page; community focus; news interpretation; lack of sensationalism; and comprehensive coverage. The top organisational standards were: integrity; impartiality; editorial independence; staff enterprise; editorial courage; community leadership; staff professionalism; influence; and impartiality (Bovaird & Loffler, 2003).

More recently, the Media Management Center based at Northwestern University in the US, launched a resource guide called *Managing for Excellence – Measurement tools for quality journalism* (2000) in which they answer questions like: how well are the readers served, and, how can this be improved? The outcomes are built around five telescopic ideas: mastery of the basics; developing consistency; learning from mistakes; developing self-corrective actions; developing a value propositions, what the Centre calls “unique, relevant value” (2000, p.22).

As can be seen by the list above, even if there are some convergences on existing paradigms, there is no single common framework for measuring quality journalism. Yet it is possible to suggest that the frameworks based on the existing paradigms are all intellectually coherent and ‘intuitively appropriate’, even if each seems either too complex or not comprehensive enough to meet the needs of ‘insider’ and ‘outsider’ evaluators.

In order to fill such a gap, Shapiro (2010) again suggests some indicators that could be ascribed to the practice of journalism under specific topics. This means that quality refers to an attribute that can, in principle, be tested factually, even measurably, in order to answer the question, does this work constitute quality journalism or not? He suggested an evaluative ‘standard’ through a test for determining whether or not quality journalism exists.

The topics used by Shapiro are, briefly, the following:

- *Discovery*: this topic includes the nature and the scope of journalistic curiosity, the choice of subject matter, its focus and angles, the potential and social benefit of the investigation and the extent to which it might further journalism’s democratic functions. In sum, discovery is the identification of an event, issue or question as ‘newsworthy’. It also includes issues related to research methodology, such as sourcing procedures and values, promises to sources, reliance on official and secondary sources, as well as interviewing methods.
- *Examination*: this topic is strictly related to methods of verification. Documentary evidence and bibliographic research methods; data-mining techniques and statistical analysis; and reliability of Web resources either from ‘closed’ or from ‘open’ sources.

- *Interpretation*: this topic is associated with in-depth analysis; breadth of context; and ideas like fairness, proportionality and emphasis.
- *Style*: this topic is associated with the faculty of written and spoken clarity, ease of reading, viewing or navigation; engagement, interactivity and significance; word choices, image choices, data visualisation, infographics, packaging and structure.
- *Presentation*: this topic is related to the collective effort involved in producing, packaging and collating works of journalism. They include the relationship of form to content, packaging and labelling; placement, design and layout; the separation of fact and opinion (if any); a publication's range of subjects and genres; and the difference between 'grabbiness' and sensationalism. Other issues might include harm-avoidance; legal constraints; and the actual impact of a work on its audience (Shapiro, 2010: pp.152-154).

Given such disparities and lack of homogeneity at three levels – terminological, theoretical and cultural – I believe that finding a suitable framework to address the research questions could be very challenging. In the next section, I will use a magnifying lens in an attempt to frame exactly where the problem lies.

2.3 Problems in measuring journalistic quality

Most of the definitions of quality asserted by observers of journalism present remarkable problems for those who attempt to measure quality. Taking as an example the list of topics summarised by Shapiro (2010), it is evident that the intrinsic problem resides in measurability. How can we measure veracity, emotional proximity and comprehensibility? According to Picard (2000), when we focus specifically on journalism, the issue of intangibility of the product and the difficulty of measurement are problematic. Consequently, we are forced to rely on surrogate measures for performance. Accordingly, measuring *completeness*, *breadth*, *truthfulness*, *reliability*, or *context* is never possible or practical because no person is in a position of full knowledge in which to make such evaluations:

One cannot even set an effective standard for the types of stories or new mix that make up quality because the standard would become invariable and the events and issues of coming days cannot be forecasted because no one can foretell the future (Picard 2000, p.99).

This statement could disprove what has been written in the previous section. As a consequence, the first question would be: does this mean that it is

either impossible or fruitless to evaluate journalists' efforts toward articulating quality journalism? I believe that the answer is no.

To begin with, it is advisable to start dealing with such issues by considering the journalistic workflow. Journalism is not in itself a product or service. In my view, we have to carefully consider, for example, the mental activity of journalists that produces *values* in the forms of news, features and commentary. Journalists react as if they were *Inforgs*⁷, organisms that bear information and make sense of it by their activity, literally immersed in what the philosopher Luciano Floridi calls *Infosphere* (2002; 2011). It is the mental activity that creates additional value by editing, drawing parallels between stories and numbers and, above all, as Plato in *Cratylus* would say, "knowing how to ask and answer questions" (Silverman, 1992, p.51)⁸.

Following Picard's suggestions, it is possible to measure those activities that make these mental activities possible and therefore affect its quality. In so doing, one can produce surrogate measures of quality journalism. This happens because journalism is not merely a function of the active brain (Picard, 2000). It results in the brain *processing information* collected for the purposes of creating journalism.

The better the information obtained, the more effort is placed in developing knowledge and understanding, and the more journalists can *process* the information better and thus produce quality journalism. In other words, journalistic quality is a function of journalistic activity and those activities that *process* and produce information can be measured. These activities can be illustrated in the following figure.

⁷ Inforgs is a neologism coined by Luciano Floridi to describe what constitutes an infosphere. The usage of the word describes organisms that are made up of information rather than 'standalone and unique entities'. This description of inforgs allows them to exist in the infosphere as natural agents alongside artificial agents. Inforgs can be part of a hybrid agent that is, for example, a family with digital devices such as digital cameras, cell phones, tablets, and laptops.

⁸ Coincidentally Plato's quote lies at the core of the *Interviewing Principles* paper released by the Columbia Journalism School.

See <http://www.columbia.edu/itc/journalism/isaacs/edit/MencherIntv1.html> (accessed on 14th January 2018).



Fig. 1 *The process of producing quality journalism.*

The entire range of activities in the process cannot be obviously measured but it is possible to assess the activities that abstract major elements. Circled below are those elements that could be a matter for careful analysis.



Fig. 2 *Measurable elements of the process of producing quality journalism.*

In order to complement and substantiate Picard's viewpoint, it is useful to apply to Fig. 2 the concept of *mind boxes*. This concept comprises all of the factors that 'box' ideas and information into a specific composition or shape within the minds of both news reporters and their audience. They include the frames that result from the 'boxing' process. The notion of mind boxes sees the mind 'at the heart of the box' in a dynamic, often unpredictable interpretative role, trying to get to grips with a reality that is mediated frequently by inaccurate or incomplete information (J. R. Anderson, 2014, p.16).

According to J. R. Anderson (2014) the idea of mind boxes conveys more effectively than pre-existing analytical tools the way that individuals' views of the world are limited and constrained by a wide and still growing variety of influences:

They are to considerable extent the other side of the coin to story boxes and story boxing processes, insofar as the latter are the means by which stories are shaped for presentation to the interpretative minds of the audience and can become part of the mind boxing process (2014, p.16).

The ‘mind boxing process’ is an innovative theory and seems to tangentially refer to the broad philosophical area of Logic and its ultimate attempt to distinguish good reasoning and bad reasoning. Regarding this topic, the literature is extensive, especially for what concerns the probabilistic model of cognition and its relation to inductive reasoning, which I return to in Chapter 3.⁹

2.4 The manifold dimensions of quality and their problematic categorisation

An important feature of the literature on quality journalism as well as on Information Quality (IQ) is an attempt to categorise quality in dimensions. Stepping quickly back to ancient philosophy, one could find useful the definition of quality made by Aristotle. The Greek philosopher analysed the idea of quality (from Latin *qualitas*) in his seminal work, the *Categories*.

Aristotle divides quality as follows: habits and dispositions; natural capabilities and incapacities; affective qualities and affections; shape. In spite of the fact that he has been severely criticised by scholars such as John Ackrill (1988), Aristotle’s categories of quality idea has had its defenders, like Saint Thomas Aquinas, who affirmed that:

[...] We take into account whether a thing be done with ease or difficulty; whether it be transitory or lasting. But in them, we do not consider anything pertaining to the notion of good or evil: because movements and passions have not the aspect of an end, whereas good and evil are said in respect of an end (Ackrill 1998, p.89).

⁹ Explanations at a functional level have a long history in Cognitive Science. Virtually all attempts to engineer human-like artificial intelligence, from the Logic Theory Machine to the most successful contemporary paradigms, have started with computational principles rather than hardware mechanisms. The great potential of probabilistic models of cognition comes from the solutions they identify to inductive problems, which play a central role in cognitive science. Most of cognition, including acquiring a language, a concept, or a causal model, requires uncertain conjecture from partial or noisy information. A probabilistic framework lets us address key questions about these phenomena: How much information is needed? What representations underpin the inferences people make? What constraints on learning are necessary? These are computational-level questions and they are most naturally answered by computational-level theories (Griffiths, 2010).

On the other hand, the mode or determination of the subject, in regard to the nature of the thing, belongs to the first species of quality, which is habit and disposition: for the Philosopher says (Pasnau, 2002), when speaking of habits of the soul and of the body, that they are “dispositions of the perfect to the best; and by perfect, I mean that which is disposed in accordance with its nature” (Aquinas, *Summa Theologica*, Part I, Second Article, Q. 49, Art.2).

I believe that a pure philosophical reflection on the polarity ‘quality/qualities’ is extremely important because it creates a connection with the pre-Industrial Revolution Age and it highlights how this polarity of concepts is historically dear to humanity because it is also linked to the metaphysical and ontological ‘realm’. Journalism is a sort of ‘realm’, which is particularly important given the fact that journalism as we know it today is a by-product of both the Enlightenment and the Industrial Revolution. Philosophy sees *qualities* as related to subjective feelings and *quality* to objective facts. For this reason, this kind of philosophical debate appears relevant for both journalists and communication scholars.

According to Shoemaker and Reese (1996) the quality of something depends, on the one hand, on the criteria being applied to it and from a neutral point of view, on the other hand, not determining its value (the philosophical value as well as economic value). Under a subjective point of view, something might be of quality because it is useful, because it is beautiful, or simply because it exists. Establishing and searching the binary polarity ‘quality/qualities’ involves therefore the *understanding* not only of what is useful but also of what is beautiful and what exists in accordance to our needs and wants.

In this way John Locke wrote his *Essay Concerning Human Understanding* (1905, then 1948). For the English philosopher, father of Classical Liberalism, it is important to make a distinction between primary and secondary qualities. Primary qualities are intrinsic to an object, a thing or a person, whereas secondary qualities are dependent on the interpretation of the subjective mode and the context of appearance.

Following Aristotle’s steps, Robert Pirsig (1999) analysed a sort of Metaphysics of Quality¹⁰, and he has tried to solve the never-ending debate reconciling those views in terms of non-dualistic holism in the attempt to dissolve such a polarity. *Qualities* versus *quality* is therefore an inspirational debate which has seen a radical change in recent history especially when humanity passed through the Age of Masses towards the Digital Age, also known as the Age of Information when the very concept of quality seems inseparable from its opposite,

¹⁰ More details about the *Metaphysics of Quality* on www.moq.com

that of *quantity*. Over the “ages” the attempt to categorise the qualities, and to fit the concept of quality into categories, has been declined by both academia and practitioners into what is best known as *quality dimensions*.¹¹

Scholars across disciplines have identified four, five, six, seven and even eight dimensions, each of which has complementary, similar or different definitions depending on either the area they are apply to, or the cultural context they are moving within. I will review here the commonly accepted eight-fold and seven-fold dimensions and then I will consider those dimensions in the context of Information Quality (IQ) research, which is supportive of the main theoretical argument presented in this work.

The following tables show definitions and dimensions of quality as they are theorised by David Garvin (1988) in Tab.1, and by Roberta Russell and Bernard Taylor (2005) in Tab.2.

DIMENSION	DEFINITION
Performance	The primary operating characteristics of a product.
Features	The ‘bells and whistles’ of a product.
Reliability	The probability that a product will fall within a specified period of time.
Conformance	The degree to which the design or operating characteristics of a product meet pre-established standards.
Durability	The amount of use a product can sustain before it physically deteriorates to the point where replacement is preferable to repair.
Serviceability	The speed, courtesy, competence, and ease of repair.
Aesthetics	The look, feel, taste, smell and sound of a product.
Perceived Quality	The impact of brand name, company image and advertising.

Tab. 1 *Dimensions of Quality according to D. Garvin (1998).*

¹¹ The best interpretation of all dimensions of IQ is affected by purpose. Purpose is a *relational* rather than relative concept: something has (or fails to have) a purpose for something else. I shall refer to this as the ‘purpose problem’, otherwise called ‘fit-to-purpose’ or ‘fitness for purposes’. In the on-line section *Quality in the Office of National Statistics* in the UK is written: “the quality of a statistical product can be defined as the fitness for purpose of that product”.

DIMENSION	DEFINITION
Time & Timeliness	Customer waiting time. On-time completion.
Completeness	Customers get all they ask for.
Courtesy	Treatment by employees.
Consistency	Same level of service for all customers.
Accessibility & Convenience	Ease of obtaining service.
Accuracy	Performed correctly every time.
Responsiveness	Reaction to special circumstances or requests.

Tab. 2 *Dimensions of Quality according to R. Russell and B. Taylor (2005).*

Drawing a parallel between quality dimensions in business and information quality dimensions can help to properly address the issue. In Tab.3 below, it is possible to make a useful comparison between category and dimensions.

Information Quality CATEGORY	Information Quality DIMENSIONS
Intrinsic IQ	Accuracy, objectivity, believability, reputation, relevance
Accessibility IQ	Access, security
Contextual IQ	Relevancy, value-added, timeliness, completeness, amount of data
Representational IQ	Interpretability, ease of understanding, concise representation, consistent representation

Tab. 3 *Comparison between IQ category and IQ dimensions.*

Above I have taken into consideration one of the earliest and still most influential categorisations of IQ dimensions made by Wang (1998). One can see a slight discrepancy between the three tables (such as for the dimensions of *accuracy* and *timeliness* for example).

Paraphrasing Illari (2014), the concern is clear: there is no settled agreement even on the most deeply embedded dimensions and, as a consequence, categorisation appears to be problematic. However, this lack of convergence may not to be a problem, but now it is necessary to contextualise at least three dimensions such as of those of *objectivity*, *relevance* and *accuracy* in the context of journalism practise.

2.5 Pursuing Objectivity and Quality

In a traditional fashion, the notion of objectivity (Maras, 2013; Ward, 2015) was for a long time closely associated with quality. The former is undoubtedly important when the latter is the goal of newsrooms driven by moral choices

(Knowlton & Reader, 2009). The success of delivering objectivity therefore impacts on the overall quality of a specific product, whether it is a TV programme or a newspaper article. We can assume that the greater the objectivity in quality initiative, the easier the decision whether an article is ready to be published or not. However, the concept of objectivity in journalism is far more complex and deeply rooted in its practices and culture.

Michael Schudson argues that “the belief in objectivity is a faith in ‘facts’, a distrust in ‘values’, and a commitment to their segregation” (1978, p.6). He said that this concept had fully emerged as a guiding principle by the 1890s. The experience of World War I, and its logic of propaganda, changed the course of the concept. Thus, from the 1920s on, the idea that humans, either individually or collectively, build the reality they deal with has held a central position in social thought and encouraged a more sophisticated ideal of ‘objectivity’ among journalists (Schudson, 1978).

What is more, as scientific progress acknowledged advancements in each field of science and technology, the notion of “scientific objectivity” was conceived as freedom from personal biases. According to this view (Wien, 2005), science is objective to the extent that personal biases are absent from scientific reasoning, or that they can be eliminated in a social process. The consequences do not depend on researchers’ personal preferences or idiosyncratic experiences. That, among other things, is what distinguishes science from the arts, for example.

According to Winifred Shultz (2000), objectivity is therefore the most problematic quality criterion because it stimulates associations with a highly controversial philosophical concept as Fig. 3 shows. However, there are ways of deconstructing the objectivity concept in more concrete terms, which are linked to rules of everyday practice in journalism, as Westerstahl (1983) has demonstrated.

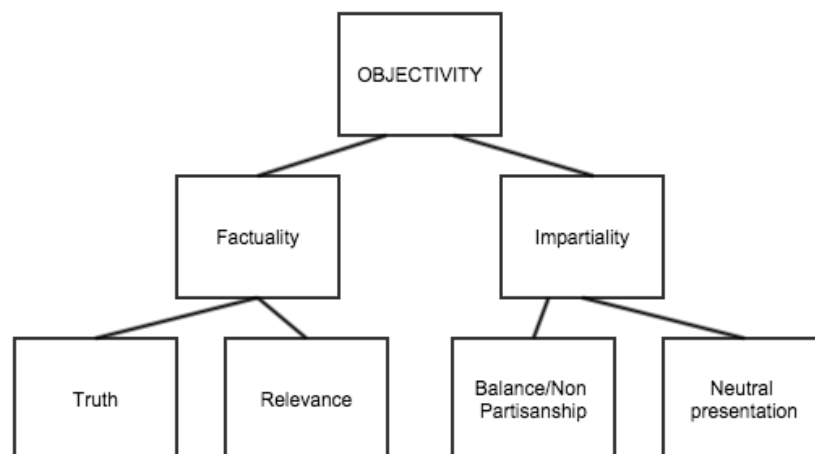


Fig. 3 *Features of objectivity.*

A first-level subdivision of objectivity (Fig. 4) makes a distinction between *factuality* and *impartiality*. While the former can be further differentiated into the aspects of *truth* and *relevance*, the latter comprises the aspects of balance (or non-partisanship) and of neutral presentation.

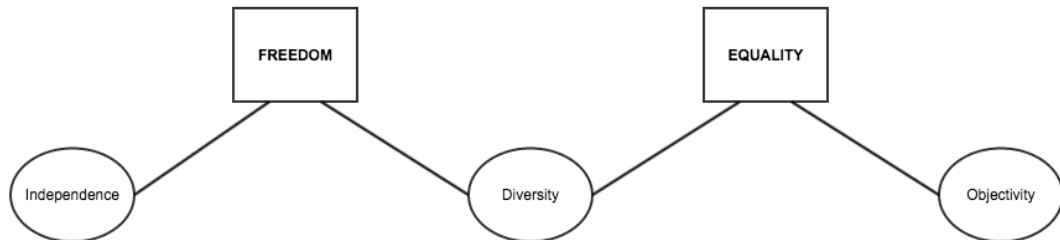


Fig. 4 *First-level subdivision of objectivity.*

The above figure shows the logical interrelations of these concepts. *Independence*, *diversity* and *objectivity* are abstract norms and they are also, to a certain degree, interconnected with each other (Wien, 2005).

Independence has two meanings: independence *from* and independence *for*. The former includes not only independence from the state but also from pressure groups, advertisers and from the owners of mass media. The latter means, above all, independence for advocacy and for taking a ‘watchdog’ role.

Diversity comprises two aspects, which are partly interdependent: diversity of content and diversity of access. Diversity (or plurality) of content relates to several different dimensions, like opinions, topics, issues, persons and groups, and geographic regions. The demand of diversity of access means that all relevant social groups and political actors must have access to mass media. This is also referred to as the forum function of mass media. Two different principles are considered for applying the access postulate equal (or open) access and proportional (or reflective) access. Equal access means that each group receives equal attention in the media in terms of space or time. Proportional access means that the attention is allocated according to the importance or size of different groups in reality.

These two principles play a special role in election campaigns when the attention given to different political parties in the news and in election broadcasts is a critical matter (Wien, 2005). I will consider objectivity in more depth in the following section.

2.6 Scientific methods in journalism practices

The first course in journalism took place at the University of Missouri in the US from 1879 to 1884, and the first trade union of journalists was founded in England in 1883. At that time, the discipline resembled to a great extent what Elizabeth Blanks Hindman in *Spectacles of the Poor* (1998) calls “mainstream journalism”, which according to Wien (2005) remains the type of journalism the vast majority of journalists perform today:

Mainstream Journalism is represented by professional norms and uses certain techniques of news-gathering and construction. A mainstream journalist tries to be objective, remains distant from her or his subject, finds information in official places, and presents that information in particular ways (Hindman 1998, p.177).

The modern scientific breakthrough and the growing complexity of society brought new questions for those “particular ways through which information is presented” (1998, p.178).

According to Walter Lippman “the general citizenry had neither the time, the ability nor the inclination to inform itself on important questions. [...] The remedy had to be boards of experts who could distill the evidence and offer the residue facts” (quoted in Petersen, 2003, p.256). Those experts could be those *inforgs* (Floridi, 2010), namely journalists, who are able to acquire certain information about specific topics. The idea is that if journalists borrow most of their tools from the scientific methodological toolbox, they can declare themselves as having the same degree of objectivity as scientists.

Richard Streckfuss (1990) explains the reason why Lippmann argued that journalism should utilise scientific methods in order to achieve objectivity:

Lippmann’s usage of the words objective, science, and scientific are significant. Adapting scientific method for human affairs, including journalism, was central to the thought of the decade. [...] Objective reporting, as he [Lippmann] envisioned it, would not create passive justification for the status quo, as is often assumed now. Those advancing the idea of applying scientific methods to human affairs – in all areas, not just journalism – were political liberals. They attempted to create a system of values using scientific method, borrowing from the philosophy of pragmatism expounded by Williams James and its variant, instrumentalism, set forth by John Dewey (1990, p.979).

With the clear connection to the positivist scientific ideal, one could have expected that the 'lippmannian' attempt to save and improve the journalistic concept of objectivity would be quietly forgotten. To a certain degree, it may be argued that this seems not to have been the case – Philip Meyer is widely cited for having invented two closely related schools of journalism: Precision Journalism and Computer-Assisted Reporting (CAR). Meyer (2002) observed that:

A better solution is to push journalism toward science, incorporating both the powerful data-gathering and -analysis tools of science and its disciplined search for verifiable truth. This is not a new idea. Walter Lippmann noted seventy years ago that journalism depends on the availability of the objectifiable objects. [...] Scientific method offers a way to make happenings objectified, measured and named (2002, p.4).

Later, Meyer noted that Precision Journalism “means treating journalism as if it were science, adopting scientific method, scientific objectivity and scientific ideals to entire process of mass communication” (2002, p.5). Meyer points out that the social science methodological apparatus should include statistical data processing. I agree with Wien, who defines Meyer’s book as an easy-to-read version of a textbook in statistics.

Paraphrasing Meyer, in pursuing objectivity beyond objectivity Precision Journalism demonstrates the applicability of social science research methods to the very real problems of newsgathering in an increasingly complex society. It produces work that both the researchers and the craft people could appreciate. The tools of sampling, computer analysis and statistical inference increased the traditional power of the reporter without changing the nature of his or her mission: “to find the facts, to understand them and to explain them without wasting time” (Meyer 2002, p.3).

However, in Meyer’s idea, the objectivity model was designed for a simpler world, a world still untouched by the deluge of data that the Internet has brought in less than a decade. According to Wien, during the 1960s American journalism failed to meet the essence of the concept and the consequent frustration led the media to embrace a ‘new journalism’, which freed journalists from the constraints of objectivity by granting them artistic license to become *storytellers*, but this was exactly what Philip Meyer feared, as the following suggests:

This [failure] pushes journalism toward art. Its problem is that journalism requires discipline, and the discipline of art may not be the most appropriate kind. A better solution is to push journalism toward science, incorporating both the powerful data-gathering and –

analysis tools of science and its disciplined search for verifiable truth (2002, p.4).

Following the first edition of *Precision Journalism*, in 1989 the physicist Lawrence Cranberg said: “journalism itself is a science, and a properly qualified, responsible journalist is a practicing scientist” (1989, p.47). As a matter of fact, knowing what to do with data and information is the essence of the new Precision Journalism. The problem may be thought of as having two phases: the input phase, where data is collected and analysed, and the output phase, where the data is prepared for entry into the reader’s mind. Journalists who adopt the two phases and adapt the tools of scientific methods to their own work can be in a position, Meyer assures us, “to make useful evaluation with the more powerful objectivity of science” (2002, p.10).

Under this view, it is commonly accepted that journalists already share some of the characteristics of scientists, often without knowing it. Among them:

- *Scepticism*: “If your mother says she loves you, check it out”, is an aphorism from the journalistic culture, not science, but it fits both equally well. Neither journalists nor scientists are content to rest with what popular opinion or authority claims is true. Truth is always tentative, and always has room for sharpening and improvement.
- *Openness*: The key word is “replicability”. A good investigative reporter documents his or her search for truth, making a paper trail that other investigators can follow to reach the same conclusion.
- *An instinct for operationalisation*: To test a model, a scientist thinks about the processes that the model represents and where they lead. Then he or she looks for a place in the observable world where aspects of that process can be measured in a way that will confirm or refute the model. That process of finding the observable and testable piece is called operationalisation. Both scientists and investigative journalists depend on it. The confirmation of a theory is its power to predict the results of an operational measurement.
- *A sense of the tentativeness of truth*: In the ancient argument between absolutism and relativism, science is most comfortable with pragmatism. The test of an idea is whether it works. The truths that science discovers are welcomed when they improve our understandings or our technology, but with the recognition that they might be replaced by stronger truths in the future. This concept is not an easy one for journalists, whose quest for simplicity and certainty makes absolutism appealing.
- *Parsimony*: Given a choice between rival theories, we generally prefer the simpler one. The best theory explains the most with the least. The Copernican theory of the universe prevailed over the

older system of Ptolemy because it was simpler. In order to account for the motion of the planets, Ptolemy proposed a system of “epicycles”, in which each planet moved in orbits within orbits around the earth. As instrumentation got better, astronomers detected movements that the theory could not explain unless more epicycles within epicycles were postulated. Putting the sun at the centre of the system eliminated the need for epicycles.

The positivist ideal seems to pervade both Precision Journalism and Computer-Assisted Reporting (Wien, 2005) and this is perhaps the most important philosophical point made so far. Great emphasis is placed on instructing journalists in the use of the computer. Even though in a newly revised edition of *Precision Journalism* the emphasis is placed more on scientific methods, while the computer aspect is downplayed, the importance of the relationship between journalists and computer language processes still remains a hot topic not sufficiently addressed by academia. The map below exemplifies the theoretical schools of journalism and how they developed over a century.

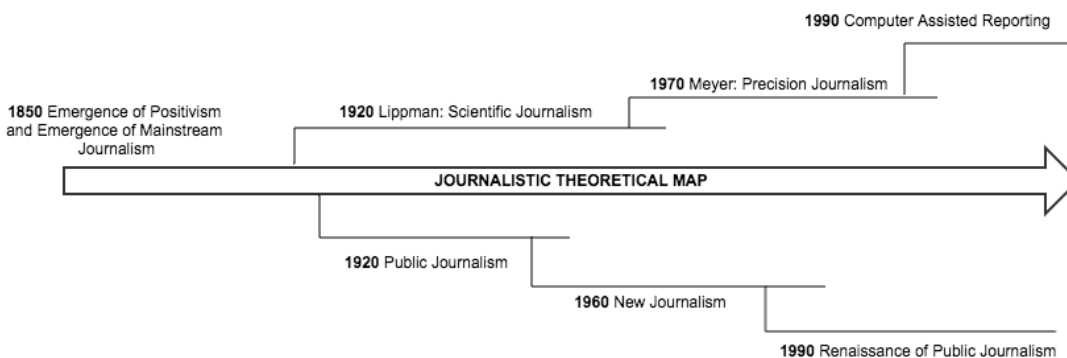


Fig. 5 Theoretical map (Westherstal, 1983).

Rosenberg (2015) enriches the debate further by introducing the concept of Pragmatism in journalism, first developed by Charles Saunders Pierce. Pragmatism was particularly important because it did not consider science as a realm apart that could dictate what we had to accept. On the contrary, Pragmatism cast science as common sense made more rigorous and systematic, but still, fundamentally, common sense.

Rosenberg believes that the key to all of this was that Pragmatism said we have to evaluate things in terms of how well they work *in relation to a given purpose*, and did not presume to dictate which purposes were legitimate and which were not:

Science itself does not have a single purpose. It has one purpose when we are trying to form a hypothesis, and an altogether different process when we are trying to test that hypothesis. “Seek truth” and “shun error” are two sharply contrasting imperatives, each with its own logic, shared with a myriad of other, non-scientific endeavours, a vast multitude of which are simple, everyday, mundane (2015, p.32).

This difference between Positivism and Pragmatism had direct consequences for journalism. Beginning with an example: the status of expert knowledge and how lay people relate to it are taken to follow the *prototypical model* of the scientist/layperson duality:

If one takes the positivist approach, the scientists are priest-like figures with special access to truth, and the same is true of all the experts whose understanding journalists rely on to create true pictures of the world, in order to explain it to the masses (Rosenberg 2015, p.34).

These contrasting views on the nature of knowledge¹² translated into the nature of journalism are at the core of a great debate between Walter Lippmann and John Dewey. On one hand, Lippmann (*Public Opinion*, 1922, then 1948) argued that it was an expert-guided process, in which journalists relied on experts to set the parameters for the great mass of people. It describes a process in which unquestioned knowledge flows down from above.

On the other hand, Dewey argues that it is a process in which questions rise up from below. In Dewey’s viewpoint (*The Public and its Problems*, 1927; *The Quest for Certainty*, 1929), there is no division between fact and opinion, but neither is there pretence that some are purely factual, while others are ‘trapped’ in mere opinion: “we all have partial knowledge, we all are embedded in our points of view, but we can all gain a broader understanding by engaging in a common quest for understanding” (Rosenberg, 2015, p.37). The debate lies at the foundation of the “idea” of journalism itself but at the same time it is a sort of archaeological showcase where the great concepts dear to journalism are displayed.

¹² The debate occurs within the “boundaries” of the Western philosophical tradition. To explore a different perspective on the same topic by Asian philosophies, I would suggest the book *The Dao of the Press: a Humanocentric Theory* by Shelton Guaratne (2006) which posed itself in the broad area of De-Westernization of media models. The title recalls another famous book *The Tao of the Physics* by Fritjof Capra.

Over the years, society and technology have changed quickly, together with old views. We are living in the hyperhistory¹³ now, as stated by Luciano Floridi, and the roles of journalism practices and journalism business have also changed dramatically in less than a decade. Indeed, looking at journalism through the lenses of the Philosophy of Information (PI) could cast both a vivid and a renewed light on the core concepts dear to journalism and at the same time complement and integrate, if that is possible, old views with new ones. I will try to explain in detail how PI might contribute to the current journalism debate on quality in the following chapter.

¹³ According to Luciano Floridi, humanity has passed through three ages of development: prehistory, history and hyperhistory. In prehistory there are no ICTs; in history there are ICTs, which record and transmit information, but human societies depend mainly on other kinds of technologies concerning primary resources and energy; in hyperhistory, there are ICTs, which record, transmit and, above all, process information, increasingly autonomously, and human societies become vitally dependent on them and on information as a fundamental resource in order to flourish.

Chapter 3: Statistics in journalism practice and principle

3.1 Logical foundations in journalism

This section is dedicated to how statistics is used in journalism practice, and in order to better deal with such a controversial topic I will be starting by applying a multidisciplinary approach, including the study of Logic and cognitive psychology, as well as Social Sciences, because I believe we can find efficient paths to analyse the usage of statistics in the context of journalism.

Holly Stocking and Paget Gross (1989) highlight the failure of journalism and journalism education to employ research by cognitive psychologists with regard to the kinds of errors and biases that can negatively alter the processing of information. According to Stocking and Gross, there is a lack of academic research that looks explicitly at the way journalists mentally process information when reporting and gathering the news because there are a number of specific errors and biases that “have been found in a variety of professions across a variety of tasks” (1989, p.4) as well.

Interestingly, if errors and biases are examined from the perspective of cognitive psychology, several of the errors and biases are also studied in the branch of philosophy known as Logic. Philosophy of Information (PI) also belongs to this branch. As Elliot Cohen writes:

Since the latter discipline is directly concerned with providing standards for assessing the adequacy of reasoning, it may prove helpful to keep in mind certain of its fundamental concepts [sic]. Reasoning itself can be understood as a process of making inference. That is, when people reason, they come to conclusions on the basis of evidence (1985, p.7).

In information processing, factors like prejudices, prior expectations, values, poor insight, visual conditions, and emotional stress affect the ‘quality’ of this inferential reasoning. Stocking and Gross are clear in warning journalists about committing ‘the eyewitness fallacy’, that is the fallacy of overestimating the reliability of eyewitness reports as compared with other sources of information.

In Logic (Minnameier, 2010) there are three kinds of inferences. Firstly, *deduction*, known as ‘top-down’ logic, is the process of reasoning from one or more general statements (premises) to reach a logically certain conclusion. Secondly, *induction* is a reasoning in which the premises supply strong evidence

for the truth of the conclusion. While the conclusion of a deductive argument is supposed to be certain, the truth of an inductive argument is supposed to be probable, based upon the evidence given. Finally, *abduction* is a form of logical inference that goes from observation to a hypothesis that accounts for the reliable data (observation) and seeks to explain relevant evidence. In abductive reasoning, unlike in deductive reasoning, the premises do not guarantee the conclusion. The fields of law, computer science and artificial intelligence research have renewed interest in the subject of abduction. Diagnostic expert systems frequently employ abduction.

Stocking and Gross (1989) articulate their analysis in seven steps: a) underutilisation of statistics, b) confirmation bias, c) misperceptions of risk, d) sample errors and biases, e) misunderstanding of regression, f) hindsight bias, and g) illusory correlation. In particular, 'underutilisation of statistics' clarifies to some extent people's tendency to give more weight to eyewitness accounts more than other type of evidence. In so doing people tend to favour anecdotal or case history information over base rate statistical information. The reason why people favour anecdotal information over base rate information still remains unclear.

What the study of Stocking and Gross suggests for journalists who routinely use anecdotes to 'personalise' the news is a need to handle anecdotal information with considerable caution:

Some sources are masters of the anecdote. Intentionally or unintentionally, they may present anecdotal data that do not square with more abstract statistical information. If reporters fall victim to the tendency to favour vivid anecdotal information over pallid but reliable statistics, they, and their audiences in turn, may be misled (1989, p.6).

Psychologists such as Nestor and Schutt, (2014) conducted research which proved that preconceived ideas can be very powerful in shaping what we see, understand and remember. The tendency for people to seek, select and recall data according to pre-existing expectations or theories is called 'confirmation bias'.

Victor Cohen and Lewis Cope (2011) identify five areas where journalists fail: 1) journalists sometimes overstate, oversimplify and over-interpret; 2) journalists work too fast; 3) journalists often omit necessary caution and perspective; 4) seeking balance in reporting a controversial issue, journalists sometimes forget to emphasise where the scientific evidence points; and 5) journalists are influenced by intense competition.

Mathematician Allen Paulos (2013) also highlights two kind of side-effects: the *halo effect* and the *anchoring effect*, which state that the availability error is

the tendency for people to make judgements or evaluations in light of the first thing that comes to mind. In other words, there are two reasoning procedures worth describing here. First of all, when people seek information related to one theory, they are resistant to seeking information with respect to another theory at the same time. People test theories one at a time, or sequentially.

Secondly, as people seek information with which to test their theories, they tend to use a theory-confirming strategy. For instance, a reporter who has theorised that there is a crime wave against the elderly may unconsciously seek out sources that confirm this theory; the potential and actual elderly victims in a bad part of town, or the head of a crime prevention program for the elderly. In addition, the reporter may ask questions of these sources (about increases in reported crimes, efforts to reduce crimes) that confirm the theory, without asking probing questions that might disprove the hypothesis (Stocking and Gross, 1989).

Expectations may not just influence the sources to which reporters turn and the types of questions a reporter may ask, but they may also influence a journalist's evaluation and selection of data. One pervasive bias in perceivers' decisions about what information is most relevant or credible is the tendency to regard information that is consistent with one's *a priori* theories as the worthiest pieces of information. Finally, when one is testing a theory about the nature, causes or outcome of an event, the information that will be selected as most useful is information that is consistent with one's theory.

3.2 *Ars conjectandi* in journalistic performance

Mathematics deals with certainty and statistics deals with uncertainty (Taylor & Pacelli, 2008). It is also widely accepted that journalists work routinely in information overload with uncertainty. In this regard, Allen Paulos (2013) is very straightforward in saying that:

Newspapers are daily periodicals dealing with the changing details of everyday life, whereas mathematics is a timeliness discipline concerned with abstract truth. Newspapers deal with mess and contingency and crime, mathematics with symmetry and necessity and the sublime. The newspaper reader is everyman, the mathematician an elitist (2013, p.3).

Journalists must not only be able to navigate a landscape full of numbers but also use statistical reasoning skills to make sense of the information they

have to hand. However, statistical literacy along with information literacy¹⁴ “is unarguably critical to those who seek to explain scientific ways of knowing to general audiences” (Dunwoody & Griffin, 2013, p.529). Definitions of numerical literacy vary widely, but Diana Coben (2000) offers one useful definition:

To be numerate means to be competent, confident, and comfortable with one's judgements on whether to use mathematics in a particular situation and if so, what mathematics to use, how to do it, what degree of accuracy is appropriate, and what the answer means in relation to the context (2000, p.35).

Dunwoody and Griffin agree that statistical reasoning¹⁵ comes into play when an individual meets decision-making situations in the context of incomplete information. What is more, statistical literacy is viewed by many as distinct from numeracy:

Much of statistical reasoning combines ideas about data and chance which leads to making inferences and interpreting statistical results. Underlying this reasoning is a conceptual understanding of the important ideas, such as distribution, centre, spread, association, uncertainty, randomness and sampling (Garfield, 1998, p.783).

Other researchers (Gigerenzer et al., 2007) also argue that all citizens should attain reasonable levels of ‘statistical literacy’ and take journalists to task for communicating risk probabilities in ways easily misperceived by audiences. Garfield agrees on the value of these cognitive skills for “journalists and science writers, who are interested in how to best explain and critique statistical information in the media” (1998, p.785).

Victor Cohn and Lewis Cope (2011) point out that: “even when we journalists say we are dealing in facts and ideas, much of what we report is based on numbers” (2011, p.10). Although systematic evidence is sparse, journalists probably fare no better at either numerical or statistical literacy than do other segments of the population. Yet much of the essential information that underlies today’s news reflects decision making under uncertain conditions.

¹⁴ The *Prague Declaration* of 2003 states that Information Literacy “encompasses knowledge of one’s information concerns and needs, and the ability to identify, locate, evaluate, organise and efficiently create, use and communicate information to address issues or problems at hand; it is a prerequisite for participating effectively in the Information Society, and is part of the basic human right of lifelong learning”.

¹⁵ It is the *ars conjectandi*, which is basically the capacity of doing mathematics without numbers. *La logique, ou l’art de penser*, published in 1713 by Jakob Bernoulli, concerned fundamental combinatorial topics such as his theory of permutations and combinations. The book is the basis of what is now called the *Law of large numbers*.

The secret language of statistics, so appealing in a fact-minded culture, is employed to sensationalize, inflate, confuse, and oversimplify. Statistical methods and statistical terms are necessary in reporting the mass data of social and economic trends, business conditions, “opinion” polls, the census. But without writers who use the words with honesty and understanding and readers who know what they mean, the result can only be semantic nonsense (Huff, 1954, p.6).

The above quote makes clear how the use of statistics in reporting is vital in the life cycle of information news. Since the 1970s we have been witnessing an authentic “data analysis revolution” that is anti-probabilistic, according to Rolf Biehler (1994). John Tukey (1977) expresses the attitude to probability in the American Exploratory Data Analysis tradition as “data analysis instead of statistics is a name that allows us to use probability where it is needed and avoid it where we should. Data analysis has to analyse real data” (1977, p.51).

There are basically two cultures of statistical thinking related to considering ‘paradigms’ in Thomas Kuhn’s sense as constitutive of science: “among others, a paradigm contains techniques and methods, world views, attitudes and exemplars. Exemplars are prototypical examples showing to which cases and how theory is applied” (Kuhn & Hawkins, 1963, p.45). According to Biehler, *probabilists* do not form such a clear-cut group with shared convictions. On the surface, we find the basic split into *personalists* (subjectivists) and *frequentists* (objectivists). Beneath that surface a rich structure of different meanings can be reconstructed in history and current practice, but a distinction could be made also between *realists* (or objectivists) and *relativists* (or historicists).

This opposition runs through many controversies in the epistemology of sciences, but for statistics it offers some original aspects once it is combined with the former – which distinguishes the languages of sciences and of action – in such a way to make visible four different attitudes in relation to statistical argument (Desrosières, 1998, p.336).

From a journalistic perspective, is meaningful for future research in this area focusing on these four different attitudes in relation to statistical arguments. That is because, according to Alain Desrosières (1998), the realistic position postulates that there are objective things, existing independently of observers and exceeding singular contingencies:

This is, typically, the language of Quetelet: there are regularities and stable relationships. Statistics aims at ‘approaching reality’. It sets itself problems of ‘reliability of measurement’. [...] But, while

remaining in the language of science, it is possible to reconstruct a genesis, and the social practices that have led to a solid statistical object. There are historical and social processes of constructing and solidifying equivalences and mental schemes. It is up to science to reconstitute them, by describing how social facts become things, through customs, law, or social struggles. The language of this position is that of social history, or of a constructivist sociology of knowledge (1998, p.336).

Probabilists led to the Probabilistic Revolution which summarises the probabilistic developments in the sciences in the period between 1800 and 1930. The history of the Probabilistic Revolution (Romizi, 2012) is an interesting counterpart to the Data Analysis revolution that began in the 1970s (Biehler, 1994) because it is precisely in this historical stage that Precision Journalism is located, which is a type of journalism that bases its investigations on statistical analysis. Philip Meyer's words, the founding father of Precision Journalism, are significant to understand the change in journalism practice since the Probabilistic Revolution occurred:

It is the things that vary that interest us. Things that do not vary are inherently boring. [...] News writers and policy makers alike are always wondering how much of the variation is caused by heredity and how much by environment, whether it can be changed, and whether it correlates with such things as athletic ability, ethnic category, birth order, and other interesting variables.

Variance, then, makes news. And in any statistical analysis, the first thing we generally want to know is whether the phenomenon we are studying is a variable, and, if so, how much and in what way it varies. Once we have that figured out, we are usually interested in finding the sources of the variance. Ideally, we would hope to find what causes the variance (Meyer, 2002, p.43).

Statistical applications in both journalism and science are aimed at finding causes, but so much caution is required in making claims of causation that the more modest concepts are used much more freely. Modesty is becoming, so think of statistics as a quest for the unexplained variance. It is a concept that you will become more comfortable with, and, in time, it may even seem romantic. (2002, p.51)

Quoting Virgil, it can be said that the 'meyerian' statistical reasoning applied to journalism helps to find "the causes of things" (Gale, 2000), that *rerum cognoscere causas* aims at discovering the inherent and interesting variance of things because it is the variance itself that makes news, and particularly

unexplained variance in any interpretation. It is quite evident how revolutionary, profoundly positivist and thought-provoking Meyer's message is.

3.3 Does terminology matter?

At this stage it is important to make clarifications about terminology. In this thesis, I am taking into consideration "the usage of statistics", as the title suggests. But what kind of statistics? I will deal with what is called Social Statistics in the definition given by Hubert Blalock Jr (1960):

Social statistics is the use of statistical measurement systems to study human behaviour in a social environment. This can be accomplished through polling a group of people, evaluating a subset of data obtained about a group of people, or by observation and statistical analysis of a set of data that relates to people and their behaviours. Social scientists use social statistics for several purposes, including: the evaluation of the quality of services available to a group or organisation; analysing behaviours of groups of people in their environment and special situations; determining the wants of people through statistical sampling (1960, p.12).

To this general definition I prefer to add the reflections given by Daniel Dorling (1999) who specifies that:

Statistics are a social product. [...] In a simple sense, statistics are a social product simply because they are produced by people. But they are also firmly located in the aims and tensions of the societies that produce them – whether expressed by organisations of government, trade or campaigns. In literature it is said that every text has a context. With statistics it is not just that what is discovered depends on the society from which those numbers are drawn [sic] (1999, p.48).

The viewpoint that social statistics are a product of their context is widely applied in academic research. In *Demystifying Social Statistics*, Dot Griffiths, John Irvine and Ian Miles (1979) distinguish four views of critics of statistical practice and more generally scientific practice, which are worth summarising here:

- An "anti-science" approach that would dismiss all statistics because "it inevitably turns people into objects to be manipulated and controlled and is contrary to basic human values" (1979, p. 65).

- An “alternative technology” approach, that concerns itself with “convincing people of the social, environmental and health hazards of such high technologies as supersonic aircraft, nuclear reactors, factory farms and automated production lines, and by providing them with alternatives...small-scale and controlled by individual or community” (1979, p. 67).
- A “social responsibility” approach mainly applied in science. This view sees statistics “as ethically neutral, asocial, bodies of knowledge and techniques: they could be used for good purposes or abused for bad ones” (1979, p. 68). This seems a widespread attitude among statisticians themselves: “socially responsible statisticians argue for appropriate codes of practice for statistical work, aiming to limit the political misuse of statistics” (1979, p. 68).
- The last is called “radical science”, which recognises the achievement of the first three views in attaining changes to statistical policy or practice, under particular circumstances, but goes on to point out that if statistics are a product of society then they are never neutral: “they cannot be ignored nor can they be substantially changed unless society itself changed” (1979, p. 69).

Another terminological issue worth addressing here is whether ‘usage’ can be applied instead of ‘use’. Both words are often used in the same way by many English speakers (both native and ESL learners). The meanings of these two words do overlap sometimes, but they are not true synonyms, as the tables below illustrate:

USAGE (n)
The act of using something
The way that something is used
A firmly established and generally accepted practice or procedure

Tab. 4 *Definitions of ‘Usage’ according to the Oxford Dictionary.*

USE
(n) the act of using, employing or putting into service
(n) what something is used for
(v) to put into service; to make work
(v) to take or consume

Tab. 5 *Definitions of ‘Use’ according to the Oxford Dictionary.*

In general, when thinking about the differences between these two words, it is helpful to keep in mind that the term ‘usage’ refers to conventions or patterns and often refers to language or words and how they are used, accepted and understood. The word ‘use’ has a much broader meaning and is found in more

varied contexts. For this reason, I prefer the word 'usage', which seems to be more appropriate within the context of this thesis.

3.4 The role of statistical agencies as information-foraging providers

Marcia Bates (1989), librarian at UCLA, compared the actions of someone searching for information to those of someone picking berries:

The metaphor of 'information landscape' and the conflation of information searching with nourishment seeking led to the emergence of several food-based metaphors, which were put forward to help researchers understand the problems of searching (Olcott, 2012, p.155).

This metaphor led other researchers to draw further outcomes. Because, according to Anthony Olcott (2012), food for most creatures is clumpy, with large empty or non-productive spaces in between areas where their food may be found (areas which themselves are of varying degrees of richness), animals were found to engage in a constant struggle to strike the best balance among the following factors:

How much nourishment is being gained in one place; how rapidly the resources of that place are being depleted (meaning that it takes more energy expenditure to get the same amount of nourishment); the nourishment gains that might be realised by moving to a new foraging area; and the potential costs of traveling to the new area, including those incurred if the new area must be discovered (2012, p.156).

Peter Pirolli (2007), 'founding father' of the of Information Foraging Theory, points out that "the optimal forager is the one who has the strategies, mechanisms, diets, and so forth, that maximize the calories per unit of effort expended" (2007, p.31). By this analogy, the optimal information forager is one who maximises the value of knowledge gained per unit cost of transaction.

It is my view that statistical agencies behave as information foragers and I think that the *statistical information = food* metaphor offers some suggestive elements to be considered. Interestingly, *some berries = statistical information* are available openly, others are kept under confidentiality agreements, considering confidentiality "in terms of the tension between the rights of the respondent and the public's 'right to know'" (Dale, 1999, p.86).

In the current state of affairs, dissemination of official statistical information requires consumers. Such a simple statement can make the complex process of providing and using official statistics sound rather like selling berries: “many national statistical institutes (NSIs) now have marketing sections that do indeed mimic many of the functions of the retail sector, although the extent to which the activity truly is marketing is debatable” (Blakemore, 1999, p.61).

Statistical agencies and governments are deeply intertwined. Government statistics, by their nature, address existing government policies. Therefore, governments and other bodies can decide to commission statistics “as a means of doing nothing, or to give an image of doing something” (Dorling & Simpson, 1999, p.34).

The *United Nations Statistic Division* has listed the most important statistical agencies in the world. The UK and the US have the following:

US:

Bureau of the Census

Bureau of Economic Analysis

Bureau of Justice Statistics

Bureau of Labor Statistics

Bureau of Transportation Statistics

Department of Commerce (STAT-USA)

Office of Energy Statistics

National Center of Health Statistics

The National Center of Education Statistics

United States Department of Agriculture Economic Research Service

UK:

UK Statistics Authority

Office for National Statistics

A fundamental role of the aforementioned agencies (Swanson & Van Dijk, 2006) is to provide relevant statistical information on the economic and social conditions of a country and its citizens. They represent the most trusted sources used by journalists. This activity is important to an open, democratic society, whether for developing government policy, making business decisions, or helping individual citizens make their daily economic choices, or in shaping news.

It can be suggested that their *raison d'être* lies in the production of high-quality and timely statistical information. Their effectiveness depends on its credibility, the relevance of their information, the *accuracy* and *accessibility* of their products and services, the attainment of high professional standards, and

the control of the burden on citizens as respondents to the specific surveys. Such information about the state, which is gathered by the state for policy purposes, is essential to enable citizens to evaluate government activities:

Terms such as the 'information commons' hark back to the days when villagers could graze animals on common land which was a resource freely available to all. The 'information commons' are deemed to be analogous, all citizens having the right to access, process and analyse information. The 'information commons' are further protected in the USA through the freedom of information policy, which in essence states that all government information is to be accessible by citizens unless the information is explicitly deemed to be secret, sensitive or confidential (Blakemore, 1999, p.62).

These agencies publish and disseminate statistical information in a wide variety of forms and channels and the media outlets play a crucial role in informing citizens about the latest release of official statistics. Most citizens get their statistical information from the media. The extent to which the agencies can gain access to the news media and communicate effectively through them has an enormous impact on how well they can inform the general population.

In other words, it is in the interest of these agencies to make every effort to ensure that the media report accurately and in a timely fashion on their news releases. Reports in the media have two complementary objectives:

- 1) to inform the general public about the population, society, economy and culture of the nation. This information will guide them in doing their jobs, raising their families, making purchases and in making a multitude of other decisions; and

- 2) to demonstrate the relevance of the agencies to the government and the general public, so that they can anticipate greater public support for their programmes, as well as improved respondent relations and greater visibility of their products and services. To obtain media coverage, the agencies must develop a working relationship with journalists who are very much the 'gatekeepers' of access and meaning between statistical agencies and the general public. Most journalists recognise these agencies as a major news source. The clearer the communication to journalists, the more likely they will provide positive, accurate and informative coverage, not only of the data but the appropriate interpretation.

Therefore, it can be suggested that the main challenges of statistical agencies would be: 1) to prepare press releases which are understandable to journalists and thus understandable to the general public as the ultimate

audience; and 2) to create an ongoing working relationship with journalists to ensure that they remain interested in reporting on such releases.

Two types of journalists may cover a statistical agency. There are 'beat' reporters who have expertise in fields such as business and economics – and are probably statistically literate – and there are reporters who are general news journalists. These latter individuals do not regularly cover an agency's releases and may not have expertise in any particular field such as economics. Consequently, they are probably not statistically literate.

In the context of informing the public through the media, 'statistical literacy' clearly implies the ability to understand the implications of the released statistical information. The challenge is therefore to ensure journalists get the story 'straight' and report the analysis in a statistically correct way. Consequently, it is beneficial that journalists have a certain degree of statistical literacy without being required to have a degree in statistics. In this regard, the study conducted by Sharon Dunwoody and Robert J. Griffin (2013) gives a very interesting insight, even if limited to the situation in Germany.

All things considered, the role of a statistical agency is not to create statisticians out of journalists, but to help journalists in whatever way possible to do their job. Today journalists face tremendous time constraints and do not have the capacity to analyse raw data independently, and to make things worse, reduced editorial budgets have made 'beat' journalists who can build up specialised knowledge a declining phenomenon.

Joel Best (2012) is very cautious in illustrating the problem and he addresses the issue in a more opaque way. He presents a series of case studies of the way in which mass media report statistics so that social problems are constructed and sustained. Best argues that only by understanding certain regular ways in which journalists behave, and thereby improving quantitative literacy, can the general public have/obtain an informed and appropriately critical view of statistical data relating to public issues.

Best identifies '*number laundering*' as a key feature of the media reporting of statistics. Here, a number appearing in one news report becomes a source for everyone interested in the social problem it describes: "Its origins as someone's best guess are now forgotten and, through repetition, it comes to be treated as a straightforward fact" (Best, 2012, p.35). But how exactly is this information gathered by journalists? One of the ways to gather information both in the US and in the UK is through their Freedom of Information Acts. That of the US was introduced in 1966, becoming law on 4th July 1967. According to the United States Department of Justice Guide to the Freedom of Information Act, it "firmly

established an effective statutory right of public access to executive branch information in the federal government”.

Likewise, the UK’s Freedom of Information Act 2000, which came into full force on 1st January 2005, extended the right of access by the public (individual or corporate) to information held by public authorities. In both cases, essentially every item of information must be made available on request (and on payment of an appropriate handling fee) unless it is specifically excluded from coverage, although:

Of course, the acts do not apply to private bodies. Indeed, it is in the interests of competition between such bodies that they can keep their commercial data confidential. For this reason, and because of the universal use of electronic means of transferring data, sophisticated data encryption schemes are used (Hand, 2007, p.226).

In order to run efficiently, governments need to collect data about their people. Many other information-foraging bodies and governmental subsidiaries also need to make use of this data. However, business, people and other organisations will often only divulge data if they can be sure that it will remain confidential. This can pose a problem because this need for confidentiality requires some complicated legal manoeuvres. An alternative is to adjust the data to try to make it impossible to discover information about individuals. This topic is of particular concern for journalists who deal with statistical data analysis.

Leon Willenborg and Ton de Waal (2001), are experts in such ‘adjustment’ of data, defining *disclosure control* as “the discipline concerned with the modification of statistical data, containing confidential information about individual entities such as persons, households, businesses, etc. in order to prevent third parties working with these data to recognise individuals in the data and thereby disclose information about these individuals” (2001, p.1). There would be little point in ‘modifying’ the data to the extent that it became useless for its intended ‘fitness for purpose’. Measures of *information loss* are used to quantify the extent to which a particular adjustment compromises the quality of the information-forage, but unfortunately these measures are often an unfamiliar process for journalists.

In conclusion, whatever way one looks at it, the current situation is just the same as with progress in any other scientific or technological area: you cannot stop progress. All you can do is attempt to steer it in morally and ethically proper directions. American Congressman Jerrold Nadler made the same point when he appeared before the US Technology and Privacy Advisory Committee in November 2003, noting that: “the question isn’t whether technology will be developed, but rather whether it will be used wisely” (2004, p.42). I believe that

this wisdom must be the priority for both statistical agencies and journalists in order to better serve the public interest.

3.5 Usage of statistics as rhetorical device

When drafting this literature review, one of the first observations my supervisor made in the form of a question was: *if your study were reported in the newspaper, what would the headline be?* It is only now that I appreciate the importance of such a question. By considering the newspaper headline question I also considered what kinds of claims a statistical story can make and what makes a claim interesting. My image of the journalist who deals with statistics was gradually strengthening in my mind, conceived as a mixture of an honest lawyer and a good storyteller, with the virtues of a good detective. Putting these things together I came to the conclusion that the purpose of statistics is to organise a useful argument from quantitative evidence using a form of rhetoric. Rhetoric in journalism, as well as in statistical presentation, is unavoidable and indeed acceptable as soon as it involves public participation, which is in its essence the formation of the idea of democracy. Journalists inside and outside schools or academies are concerned with encouraging public participation, bringing to life the 'publics' of 'public affairs'. Such concerns are especially apparent in the public or civic journalistic movement and its research.

Sociological approaches to journalism such as those represented in Dan Berkowitz's *Social Meanings of News* (1997) share some commonalities with rhetorical perspectives on writing processes, discourse communities, and scientific and technical discourse. These demonstrate the congeniality of several approaches to the study of communication processes and genres across disciplines (Dorling & Simpson, 1999). Whether statistics is used as a stylistic device or a rhetorical means that contributes to a melodramatic picture of the world (Abeslon, 2012), or it is used to improve story credibility (Koetsenruijter, 2011), the purpose of this chapter is to locate the field of statistics with respect to rhetorical and journalistic narrative, numerical and narrative forms, 'figures of speech' and 'figures of arithmetic', as in one formulation from the 1830s. Moreover, numbers and narratives have maintained throughout history not just a complementary relationship as vehicles of persuasion, but also a strong antagonism over numerical and narrative modes of aggregation that manifest in forms of social realism. In conclusion, the central theme of this chapter is that quality statistical information involves arguments that convey an interesting and credible point.

3.6 Understanding statistical claims

The general public distrust statistics because media manipulation often confuses them with misleading statistical claims (Hutton, 2010; Nobels and Schiff, 2007). Politicians, for example, quote economic statistics (Avakov, 2010; Sabillon, 2005; Ullah, 1998) whereas their challengers cite evidence of coming bankruptcies and ruin. When people lie with words, the public can hypothetically detect false words with more ease than deceitful statistics but, I think, blaming statistics themselves is neither reasonable nor useful.

It is my opinion that when statistical analysis is carried out responsibly, public scepticism undermines its potentially useful application. A more mature response would be to learn enough about statistics to distinguish quality and honest conclusions from skulduggery and foolishness. From this consideration stems the importance of teaching statistics (Gelman & Nolan, 2017; Hulsizer & Woolf, 2009) that is also able to deepen the argumentative nature of statistical claims (Van Eemeren & Grootendorst, 2004).

According to Robert Abelson (2012) in the media we find the statistical claims that can be summarised in the following six points:

1. *Stand-alone statistics*: in making a claim with an isolated number lies the problem that the audience may have no context with which to assess the meaning of the figure and the assertion containing it.
2. *Simple comparison*: the idea of comparison is crucial. To make a point that is at all meaningful, statistical presentations must refer to differences between observations and expectation, or differences among observations.
3. *Standards of comparison*: given a single statistic, many different observations or expectations may be used as standards of comparison: what is compared with what may have a substantial influence on the question asked and the answer given.
4. *Choose among candidate explanations*: for any observed comparative difference, several possible candidate explanations may occur to the investigator. In a given case, this set of explanations may include accounts varying widely in their substance and generality, ranging from a dismissal of the observed difference as a fluke or an artificial triviality to claims that the observations support or undermine some broad theoretical position. It is the task of data analysis and statistical inference to help guide the choice among the candidate explanations. The chosen explanation becomes a *claim*.
5. *Systematic versus chance explanations*: To understand the nature of statistical argument, we must consider what *types* of explanation

qualify as answers to certain questions. One characteristic type, the *chance* explanation, is expressed in statements such as ‘these results could easily be due to chance’ or ‘a random model adequately fits the data’. Indeed, statistical inference is rare among scientific logics in being forced to deal with chance explanations as alternatives or additions to systematic explanations.

6. *Exaggeration of systematic factors*: Journalists usually overestimate the influence of systematic factors relative to chance factors. In general, all of us exaggerate our ability to predict the behaviour of other people. We have difficulty thinking statistically about human beings.

It is my view that the aforementioned points should be taken into account in the specificity of content analysis as they give shape and substance to the statistical content of those items of news that this thesis aims to analyse.

3.7 The persuasiveness of a statistical argument: the MAGIC criteria

There are many dimensions of data and several properties of its analysis and presentation that govern its persuasive force. Robert Abelson again (2012) has elaborated his own criteria through the acronym MAGIC, which stands for: *magnitude, articulation, generality, interestingness* and *credibility*. *Magnitude* refers to the strength of a statistical argument, which is enhanced in accord with the quantitative magnitude of support for its qualitative claim; *Articulation* refers to the degree of comprehensible detail in which conclusions are phrased; and *Generality* denotes the breadth of applicability of the conclusions. To support broad conclusions, it is necessary to include a wide range of contextual variations in a comprehensive research plan or to cumulate outcome data from many interrelated but somewhat different studies. High-quality and well-articulated evidence is necessary for a statistical argument to have maximal persuasive impact, but it is not sufficient. Also vital are the attributes of the research story embodying the argument.

The last two criteria – *Interestingness* and *Credibility* – are related to an effective journalistic narrative and deserve to be examined in more depth, thus I will now broaden the discussion of the narrative aspects of statistical claims by focusing on these two criteria.

3.7.1 Interestingness of a statistical argument

Philosophers, psychologists and others (Hidi & Baird, 1986; Kim, 1999; Shimoda, 1993) have extensively analysed what it means for a story to be interesting. For example, Robert Abelson's view (1995) is that for a statistical story to be theoretically interesting, it must have the potential, through empirical analysis, to change what people believe about an important issue. The key ideas are change of belief and the importance of the issue.

What makes a statistical claim interesting to a research audience is an extremely important consideration because when a journalistic statistical story becomes a conversation piece, further discussions will be generated. High interest acts as a magnifier, and low interest as a filter. Yet the nature of interestingness is elusive.

I believe that interestingness is linked to the concept of *theoretical interest*. Here we are concerned specifically with the interestingness of research claims based on statistical evidence; thus, we might equally use the term *scientific interest* which I understand to be a statistical story that is scientifically interesting because it has the potential to change what scientists believe about important causal relationships.

In this regard, the key concept is *change of belief*, which consists of strengthening old or creating new beliefs, of weakening existing beliefs, or of modifying beliefs depending on context. I refer here to potential belief change (Chambliss, 1994): a journalist may make claims that are not accepted and therefore do not actually change what people believe (Wade, Thomson & Watkins, 1994). In some cases, acceptance depends on the persuasive force of the statistical evidence. Even if the surprising claim is persuasive on paper, cycles of argument and counterargument may be necessary before beliefs change. The tension might finally be resolved by the acceptance, rejection or modification of the initial claim.

According to Abelson, interestingness is tied to *importance*. The importance of any empirical result is a direct function of the number of consequences it has for relationships between pertinent to the issue at hand. The importance of the issue, in turn, depends on its density of connections to other (important) issues. However, scholars of a particular topic such as Wade, Thomson and Watkin (1994) agree in generating dense networks of conceptual relationships within the topic area, thus lending by sheer weight of the number of relationships an aura of apparent importance to each contribution to the topic. But to non-specialists in the area, the topic might have very little importance, because knowledge gained does not shed much light on the understanding of other topics. I refer to this phenomenon as the *illusion of importance* (Smith,

2004). In this regard, I want only to emphasise that knowing a lot about a particular subject matter creates subjective importance for it, whether or not it is objectively warranted. Nevertheless, the key question in diagnosing the importance of a given result is: *what can I learn from this about other things that are also important?*

3.7.2 Credibility of a statistical argument

Credibility refers to the believability of a research claim (Posner & Kouzes, 1998). It requires both *methodological* background and *theoretical* coherence especially if dealing with the journalistic narrative (Lamble, 2004). Claims based on sloppy experimental procedures or mistaken statistical analysis will fall victim to criticism by those with an interest in the results. The credibility of a research claim can sustain damage from other sources. The claim may violate prevailing theory, or even common sense.

If the criteria or quality dimensions previously mentioned are met satisfactorily, but the claim of the story lacks credibility, the reported results will likely be rejected. When a news story advances claims that many or most readers consider incredible, these claims are vulnerable to serious challenge (Loffelholz, Weaver & Shwartz, 2008). The burden of proof shifts back and forth between the investigator and the critic in what might be referred to as 'ball-playing' (Newell, Aitchinson, & Grant, 2014).

There are two different ways in which a journalistic claim may not seem credible to readers (Choi, Watt, & Lynch, 2006): the claim may be based on poor methodology, or it may contradict a strongly held conception, a popular theory, a world view, or even just common sense. However, I have always believed that *criticism is the mother of methodology*. To some extent this is a major feature of this chapter; that argument is intrinsic to the statistical and narrative contents of journalistic outcomes.

In conclusion, in an attempt to narrate social conditions and to involve the public opinion about the topics under scrutiny, numerical and narrative forms have developed in conjunction an "aggregative epistemology" (Crook & O'Hara, 2012), or a way of knowing the world in terms of aggregates and of framing social issues in terms of parts and wholes. This is a feature that needs to be carefully addressed in order to fully understand the argumentative power that statistics develop when aggregated to journalistic narratives.

Chapter 4: The normative importance of ‘quality’

4.1 Introduction

In order to better understand the importance of ‘quality’ in the news, the role of statistics in providing it and the implications for journalism practice in the context of political communication, it is worth beginning by looking at the Command Paper¹⁶ released under the New Labour government (1997-2001) under the title *Statistics; A Matter of Trust*.¹⁷ This consultation paper effectively illustrates the goals of government statistics as follows: “Quality needs to be assured. Official statistics must be sufficiently accurate and reliable for the purposes for which they are required. The production and presentation of official statistics needs to be free from political interference, and to be seen as such, so that the objectivity and impartiality of statistics is assured” (1998, p.5).

In this sense, the UK Statistics Authority has adopted a structure broadly similar to that of the *European Code*, which sets out a number of high-level principles, each of which is further amplified by a series of more detailed practices (or ‘indicators’ in the European Code). Also, the UK *Code of Practice for Official Statistics*¹⁸ and the assessment programme that follows have been informed by, and are consistent with, both the *UN Fundamental Principles of Official Statistics*¹⁹ and the *European Statistics Code of Practice*²⁰.

According to Mark Pont, member of the board of directors of the UK Statistics Authority, the *European Code* has proved an effective basis for the international process of “peer review” and “the Statistics Authority believes that a similar approach will provide a sound foundation for the Statistics Authority’s quality assessment function” (Code of Practice: 8). One of the strong points of the *Code* is its emphasis on the role of the user, and the need for statistical producers to consider the wider use that is – or may be – made of statistics. In addition to meeting specific policy needs within government, there is increasing demand by people working in research, academia and journalism for statistics in many aspects of social and economic life. This is the reason why official statistics

¹⁶ Command Papers are considered by the UK Government to be of interest to Parliament but are not required to be presented by law.

¹⁷ The paper can be found here:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/260823/report.pdf (accessed on: 13th January 2018).

¹⁸ <http://www.statisticsauthority.gov.uk/reports---correspondence/reports/report-2.pdf> (accessed on: 13th January 2018).

¹⁹ <http://unstats.un.org/unsd/dnss/gp/FP-New-E.pdf> (accessed on: 13th January 2018).

²⁰ <http://ec.europa.eu/eurostat/documents/3859598/5921861/KS-32-11-955-EN.PDF> (accessed on: 13th January 2018).

should meet the high expectations of civil society without the propagandistic use made by politicians or elites. With regards to this, the *Code* is clear:

Statistics must be as accurate and reliable as they reasonably can be, and free from political interference. In addition, they must also be planned to meet the future needs of society, and communicated in ways that are as helpful as possible to those who rely on them to inform their decisions (2010, p.5).

The strategy consultation paper *Measuring Quality as Part of Public Service Output*²¹ substantiates this point further by urging that: “independent, authoritative and reliable information and methodologies are needed, in an area of political and public interest” (p.15) and Mark Pont clarifies that:

The term ‘user’ of statistics is used here to mean any organisation or person whose decisions or actions are beneficially influenced by official statistics; and similarly, ‘potential user’ is anyone who might be so influenced. This need not mean that the user directly inspects statistics or performs calculations. It may be more a matter of being influenced by messages derived from the statistics. For example, if crime statistics suggest that thefts are deemed to be a use of statistics; and such uses create their own demand for statistical data to be available in particular forms and levels of detail. The interpretation is central to the *Code* (2010, p.4).

I employ the term ‘user of statistics’ to mean the ultimate consumer of statistical information. In fact, the ‘users of statistics’ are both journalists and readers: the journalists when they manage official statistics and use them as primary sources; the readers as they consume statistical information provided by news reporting. Both are ‘beneficially influenced’ by using official statistics.

Overall, one can say that journalism and statistics share the same goal: they are there to serve the public interest.²² Both journalism and statistics claim

²¹ <http://www.ons.gov.uk/ons/guide-method/ukcemga/about-ukcemga/consultations/measuring-quality-as-part-of-public-service-output.pdf> (accessed on: 13th January 2018).

²² According to the BBC Academy of Journalism: “Journalists may sometimes breach an individual’s legitimate expectation of privacy because it is in the public interest to tell people what they are doing – they may be corrupt, or anti-social. Incompetent or unethical doctors, plumbers - even journalists - can be a danger to the public. Indeed, the debate about the boundary between legitimate journalism and intrusion into the private life of individuals, and what might be justified in the public interest, has rarely been so much in the public eye or subject to a judge’s scrutiny.” The Lib Dem leader Nick Clegg pointed out that journalists should not fear being prosecuted under computer misuse, data protection and bribery law: “The amendments propose a new defence for journalists who unlawfully obtain personal data (section 55 of the Data Protection Act) where they do so as part of a story that is in the public interest, a public interest defence in the Computer Misuse Act, and a public interest defence in the Bribery Act”. For an insight into the

normatively to provide objective and balanced information that can inform both the public and leaders in the process of designing, implementing and scrutinising public policy. It is precisely in this context that ‘quality’ comes into play in defining journalism standards; that is, in its ability to accurately offer values, judgements and information that improve the overall democratic process and encourage civic engagement with public policy. Indeed, modern journalism as a social practice aims to ‘assess’ those in power. This is not to say of course that everything in public policy can or should be measured, but to highlight that journalism’s ability to evaluate outputs is at the core of its relationship with society in playing the role of ‘watchdog’ of power.

In the introduction to *Number and Numbers* (2008), philosopher Alain Badiou notes the abundance of statistics in contemporary Western societies. He says: “the ideology of modern parliamentary societies, if they have one, is not humanism, law or the subject. It is numbers, the countable, countability” (Badiou, 2008, p.32). He also noted that: “we live in the era of number’s despotism” (Badiou & Sedofsky, 1994), which means we have become incapable of posing abstract questions concerning freedom, justice, and the true nature of citizenship, something that journalism has the duty to question and ‘assess’ as ‘watchdog’ of the powerful.

Thinking in terms of what is countable and measurable became the prototype for truthful discourse, and it determined the scope of the quest for the perfectibility of human society. According to Armand Mattelart (2001), “the idea of a society governed by information is inscribed, as it were, in the genetic code of the social project inspired by a blind belief in numbers” (p.45). Statistics and arithmetic, or political anatomy, opened up a new territory for practical science and the tools of statistical observation developed within the conceptual framework of political arithmetic, in which John Graunt saw “a new light for the world” (2001, p.13). However, as Chamont Wang (1992) says: “statistics is infinitely rich in its subtlety and esoteric beauty [sic]” (1992, p.6), showing how ambiguous statistics are in both covering and revealing ‘facts’ in accordance with those in power.

The idea of ‘quality’ does not escape this context but, on the contrary, can second the political agenda in terms of reporting outcomes. This was perfectly illustrated in the consultation paper *Establishing the Principles*²³ (which explained

relationship between journalism and public interest, see the working paper by Steven Barnett *Journalism, Democracy and the Public Interest*, available at: <https://reutersinstitute.politics.ox.ac.uk/sites/default/files/Journalism%20Democracy%20%26%20Public%20Interest.pdf> (accessed on: 18th January 2018).

²³ <http://www.statisticsauthority.gov.uk/reports---correspondence/reports/report-2.pdf> (accessed on: 18th January 2018).

the role of quality in the context of public service output and its measurement), and further developed in the *Atkinson Report*²⁴, which regards quality as an intrinsic part of output. Moreover, the UK *Government Statistical Service (GSS)*²⁵ is committed to providing users with information on the quality and reliability of its statistical outputs, along with the methods that have been used to produce them, and the report *National Statistician's Guidance on Quality, Methods and Harmonisation*²⁶ provides readers with insightful guidelines.

I believe that Principles 4 and 8 of the *Code* (January 2009, pp.20-24) are the key foundational sections for those who want to be committed to quality issues:

Principle 4, Practice 2

Ensure that official statistics are produced to a level of quality that meets users' needs, and that users are informed about the quality of statistical outputs, including estimates of the main sources of bias and other errors, and other aspects of the European Statistical System definition of quality. (2009, p.25)

Principle 8, Practice 1

Provide information on the quality and reliability of statistics in relation to the range of potential uses, and on methods, procedures, and classifications. (2009, p. 25)

With regards to this, Mark Pont (2010) had the following to say:

Each organisation should have a policy, which states where and which quality output measures will be reported. For example, the organisational policy may state that all first releases will include a core set of quality measures or include a web link to quality information in their 'Noted to editors'. All key statistical outputs should have basic quality information as the minimum. The policy may also state that for each statistical product a reference report is produced which contains measures that do not change from one release to another (2010, p.6).

²⁴ *The Atkinson Review: Final Report* is the culmination of a year-long review of the measurement of UK government output and productivity. Sir Tony Atkinson from Nuffield College, Oxford, led the review supported by a team seconded from the Office for National Statistics, HM Treasury, Department of Health, and the Bank of England. A key objective of the review was to recommend methods and approaches that could be used to measure UK government output. In addition to recommending a general framework and principles, the report focuses on practical solutions for measuring the key functional areas of health, education, public order and safety and social protection.

²⁵ <https://gss.civilservice.gov.uk/> (accessed on: 18th January 2018).

²⁶ <http://www.statisticsauthority.gov.uk/national-statistician/ns-reports--reviews-and-guidance/national-statistician-s-guidance/index.html> (accessed on: 20th January 2018).

Strictly speaking, in order to enable users to determine whether outputs meet their needs, it is recommended that output producers report quality in terms of the five quality dimensions as set out by the *European Statistical System (ESS)*²⁷, namely: Relevance; Accuracy and Reliability; Timeliness and Punctuality; Accessibility and Clarity; and Coherence and Comparability. These dimensions can coincide with the same journalistic dimensions used in statistical news driven narratives, if not in practice then at least in their theoretical components.

For the sake of clarity, I refer to the definitions of what quality measures and quality indicators are, according to the *2013 Guidelines for Measuring Statistical Output Quality*²⁸.

Quality measures are defined as those items that directly measure a particular aspect of quality. For example, the time lag from the reference date to the release of the output is a direct measure. However, in practice, many quality measures can be difficult or costly to calculate. Instead, we can use quality indicators to give insight into quality.

Quality indicators usually consist of information that is a by-product of the statistical process. They do not measure quality directly but can provide enough information to provide an insight into quality. For example, in the case of accuracy it is almost impossible to measure non-response bias, as the characteristics of those who do not respond can be difficult to ascertain. In this instance, response rates are a suitable quality indicator that may be used to give an insight into the possible extent of non-response bias (2013, p.7).

Along with the ESS dimensions, the *Atkinson Report* usefully summarises the approaches to measuring quality by using quality indicators (showing the successful delivery of outputs), or alternatively to use evidence on change in outcomes, which can be attributed to the incremental contribution made, for example, by public services in the public interest.

On the other hand, quality measures based on user surveys may be helpful for some quality domains, but there are issues about whether 'subjective' measures from successive sample surveys can be used as a chronological series

²⁷ <http://ec.europa.eu/eurostat/web/main/home> (accessed on: 25th January 2018).

²⁸ I wish to highlight here the remarkable work on rankings, quantification and indicators carried out by Wendy Espeland, Professor of Sociology at Northwestern University in the US. She is presently writing a book about the effects of commensuration, the process of translating qualities into quantities. In it she aims to investigate how media rankings have influenced higher education, how efforts to measure homosexuality have shaped gay and lesbian politics, and the commensurate practices necessary in order to transform air pollution into a commodity that is traded on futures markets.

– they may be distorted by changing expectations. According to Karen Dunnell, national statistician, and Peter Smith, chairman of UKCeMGA Advisory Board (2007), the *Office of National Statistics (ONS)*²⁹ is working with experts to develop further practical guidance on acceptable techniques in these areas, aiming to understand and reduce error rather than to set a standard for ‘perfect’ measures, which may be unattainable. This is an extremely difficult area and perfect techniques for error detecting are not available. Also, on this point, the ONS is developing further technical guidance (2007), working with subject experts. These ongoing works are indicative of how the subject to be addressed is extremely delicate and complicated.

4.2 Accessing the closed world: statistical quality in the wild

The interest in quality issues, such as *trustworthiness* and *provenance* for instance, has increased among private and public organisations as well as among newsrooms worldwide, as witnessed over the last twenty years by computer-assisted and data-driven journalistic techniques. The reasons for this feverish attention might be summarised in the following general but fundamental three points (Walczak, 2004):

1. Exponential growth in the number of real and potential users of information, both at local and international level. This is partially due to the globalisation progress that fosters information access/ collection thanks to IT technologies;
2. Improvement in the education level of, and as a result, better preparedness of citizens for individual use of statistical information related to, but not limited to, international affairs;
3. Deeper and pervasive democratisation process in economic and social life resulting in awareness promoted within wide social spheres. The number of people who demand wide and free access to a varied range of information is constantly increasing. This is a vital aspect and has importance to the wider audience from an information quality point of view.

It is helpful to briefly consider a scenario in which the quality of each of the points mentioned above could not be guaranteed nor understood. This lack of clear understanding of quality can only lead to detrimental consequences: costly errors, confusion, impasse and missed opportunities, remaining at a generic level. Indeed, part of the difficulty lies in putting together the right conceptual framework that is necessary to evaluate and analyse quality in the journalistic workflow.

²⁹ <http://www.ons.gov.uk/ons/index.html> (accessed on: 20th January 2017).

Regarding IQ, Luciano Floridi points out that despite a wealth of available results, these results seem to have had a limited impact because research in the area has failed to combine and cross-fertilise theory and practice. This chapter intends to move away from this limitation by attempting to sketch a theoretical framework suitable for the purposes of news reporting by 'cross-fertilising' philosophical studies and some urgent quality issues that impact on society.

In fact, statistics, data analysis and information quality are becoming critical for human beings and organisations. Defining, manipulating, measuring and improving the quality of social data and information that are exchanged in our everyday life, in business, in the administrative processes of public administration and in newsrooms, is becoming a constantly growing worry not just for practitioners, but also for those working in academia.

Paraphrasing the book *Cognition in the Wild* (Hutchins, 1995) it is my point to consider quality issues 'in the wild' where the term 'wild' refers to human cognition in its cultural and political habitat "whose particular character has consequences for error detection and correction" (1995, p.78). Hutchins discusses in detail the tension between the costs and benefits of error occurrences and constraints and how these processes inevitably affect a system's efficiency and individual learning. From the journalistic point of view, the ability to detect error is linked to the ability to assess the reliability of a source. From the statistician's point of view, this ability deals with what is known as 'threats to internal validity'. One significant constraint here appears to be open versus closed world assumptions, a factor that influences quality by posing itself as a 'semantic constraint'. I argue that understanding these assumptions, in database management for journalistic purposes for example, means having understood where the short line that divides truth from falsehood lies, and in so doing, distinguishing the signal from the noise.

Italian scholars Scannapieco and Batini (2005) expand this discussion further by saying that we can take into consideration the challenges and changes in the information quality paradigm when they are studied not only in the captivity of traditional database systems, but also in the information ecosystem – a kind of ecosystem produced by networks and semantic information extraction processes in our everyday lives. This ecosystem is also what we need to analyse when we attempt to understand the role of quality statistical data in shaping truthful and credible news. The goal of this chapter is therefore to make a comparative review of the recent literature on statistics and information quality by providing various insights in order to attempt to define what kind of role statistics quality plays in maintaining high-quality journalism.

4.3 Approaching quality: a cross-Atlantic affair

I will now summarise some historical points about how the issue of information quality has developed over the last few years. I will emphasise the methodological components, because they represent a solid background upon which I will base answers to my research questions. The issue of quality in general, and Information Quality (IQ) in particular, appears in the field of Computer Science in the 1990s, when a research group based at Massachusetts Institute of Technology (MIT) launched and defined the field. Members of this group were greatly influential and the community has thrived since then.

The message that the MIT group wanted to convey is that quality of information is information that is fit for purpose, and this goes far beyond mere accuracy of information, an issue under constant scrutiny for those journalists committed to this cause. Since the MIT group elaborated the IQ measures as data management for business, they conceived data as a valuable and important product even if the consumers of that product are internal to the organisation. It is now commonly accepted that IQ is a multidimensional concept with accuracy being only one dimension of quality.

From the US to Italy, from the MIT group to the so-called 'Italian School', the step is short and quality has become a cross-Atlantic affair. Two different methodological approaches, diverse but complementary, are worth reviewing here; their results brought to light that academic approaches try to cover all aspects of quality, whereas practitioners focus on particular problems of their context, a kind of separation that leads to some interesting insights. The first methodological approach was called 'empirical' by Scannapieco and Batini (2006); the second was called 'ontological' by Wand and Wang (1996).

The first methodology consists of surveying IQ professionals, both academics and practitioners, about what they consider important quality dimensions and how they classify them. This empirical approach is based on initial work by Wand and Wang (1996) and, in line with the focus on information users, data consumers have also been interviewed (Scannapieco, Missier, and Batini, 2005). The categorisation made by R. Y. Wang (1998) at the MIT is one of the earliest and still most influential categorisations of quality dimensions. However, the aforementioned papers do not *define* quality dimensions such as objectivity, timeliness and so on, instead they *categorise* them. Wang for example, talks of having "empirically derived" quality dimensions (1998, p. 38). It can be said that the most important result, as an initial starting point, is that information consumers need more than merely accurate information.

The second methodology refers to an ontological approach and attempts to understand quality errors and how they are generated. Illari and Floridi (2015)

comment that the assumptions are not always clear but the conclusions are interesting, the authors also suggest that future research should conduct testing to discover whether or not they enhance quality practice. The ontological approach seems to fit the purpose of journalism because it links the quality practice to error detection and therefore it is a test for the reliability of a source.

Methodologically speaking, the first major area of developing quality is in unstructured data, particularly on *trust*, *provenance* and *reputation*. The questions are simple: where do the data come from (provenance), are they any good (trust), and is their source any good (reputation)? To answer these questions and to approach quality issues, the Italian School developed the idea of the 'polygen' model, which dealt with the problem of heterogeneous sources, which seems particularly suitable for the purposes of journalism. *Provenance* is generally offered to the user by tagging data with where it comes from, and what has happened to it before it gets to the user. However, according to them, much more work is needed on how to model and measure the *trustworthiness* of data and the *reputation* of particular sources.

Indeed, ensuring the quality of statistical data has been a continuing concern for those in the information systems profession. It is commonly accepted that the principal role of an information system is to present views of the real world so that members of an organisation can create products or make suitable decisions. According to Ken Orr (1998), if those views do not substantially agree with the real world for any extended period of time, then the system is a poor one and, ultimately, "like a delusional psychotic" (1998, p. 25), the organisation will begin to act irrationally. Orr supports the theory of the feed-back-control system (FCS) in which data quality is the measure of the agreement between the data views presented by an information system and that same data in the real world. He thinks that the real concern about statistical data quality is not to necessarily ensure that the quality is perfect, but rather that the quality of the data in our information systems is accurate enough, timely enough, and consistent enough for the organisation to survive and make reasonable decisions. "In conclusion" Orr continues, "the real difficulty with data quality is change. Data in our databases is static, but the real world keeps changing" (1998, p. 26). In fact, real sense data constitutes the raw material for the Information Age. However, unlike physical raw material, data is not consumed and it can be reused repeatedly for various purposes, including for journalistic purposes.

Chengalur-Smith, Ballou and Pazer (1999) provide an example that seems to be suitable for the case of journalism driven by statistical analysis. They identify and discuss four dimensions of quality that can be found in Laudon's study of data problems in the US criminal justice system: *accuracy* could refer to recording facts about the positioning of a criminal case correctly; *completeness* in having all relevant information recorded; *consistency* to a uniform format for recording

relevant information; and *timeliness* in recording the information immediately following the occurrence of an event.

Alongside the deepening of some theoretical issues of quality, it must be said that there are some very interesting developments in quality practice, as statistical information has come to pervade all human activities. The increasing availability of data and its use by multiple people and groups in science means that databases are increasingly crucial infrastructure for science. In this area the work of Sabina Leonelli at the University of Essex (2014), for example, is important to understand that nowadays quality information is vital to a well-functioning society as well as also being hard to underestimate, especially in the field of journalism which is constantly challenged by the advancements of technology and emerging analytical skills.

4.4 Philosophical challenges to quality

Focusing on many possible dimensions and metrics by focusing on structured data, the Italian School individuates 13 methodologies for the assessment and improvement of data quality, in which there is a total of about 220 different dimensions. The most frequently cited dimensions are *accuracy*, *completeness*, *consistency*, *timeliness* and *currency*.

Batini et al (2015) illuminate the influencing factors on quality, and I will briefly focus on the open versus closed world assumptions, an issue also strongly debated among computer science and informatics practitioners and academics. Rather than explaining in detail what these assumptions state (that would require a separate article), I will use them here as metaphors to exemplify the approach journalists have when dealing with statistical databases.

Generally speaking, the closed world assumption (CWA) usually holds in regard to databases, meaning that any statement that is not known to be true is false. In knowledge bases, the open world assumption (OWA) states that any statement that is not known, cannot be predicated as either true or false. Accessing this CWA by understanding it, is in my view, one of the crucial factors that might influence the quality of the results, or the credibility dimension of news. Journalists, by unlocking these assumptions, can critically use the CWA as a basis for their investigations.

This issue strictly relates to the relationship between *data*, *information* and *truth*. Some of the quality dimensions aforementioned pose the question of adherence to a certain representation of the real world. A critical question pertaining to philosophical disputes is whether quality pertains to facts of sense

or rather to laws of logic, or else whether information quality is a matter of synthetic rather than analytic knowledge.

This issue seems to speak to the language of philosophy in particular about the two dogmas of empiricism against which Quine (1951) provided substantial arguments in favour of a holistic perspective. On the one hand, Quine rejected the distinction between truths independent from facts, and truths grounded in facts; on the other hand, he contrasted reductionism as the theory according to which the meanings of statements come from some logical constructions of terms, exclusively referring to immediate experience.

This issue may also be related to the problem of knowledge of things by *acquaintance* (unstructured data) and by *description* (structured data) as stated by Bertrand Russell, for example: "We shall say that we have acquaintance with anything of which we are directly aware, without the intermediary of any process of inference or any knowledge of truths" (1910, p.86). Hence, knowledge by description connects the truths (carried out by statistical data) with things with which we have acquaintance through our direct experience with the world (sense-data).

It is evident that the question highlights one of the most controversial issues discussed in Western (also in Eastern) philosophy so far by posing the question of adherence to a certain representation of the real world. Russell analyses this issue by using the term *data* and particularly distinguishing *hard data* from *soft data*: "the hardest of hard data are of two sorts: the particular facts of sense, and the general truths of logic" (1910, p.88). At this point journalists should ask themselves to what extent quality dimensions may pertain to the domain of both hard and soft data. Therefore, the critical question is whether quality pertains to facts of sense or rather to laws of logic.

Besides the main research questions, this thesis also has a second goal, which is that of investigating whether philosophical research can help to clarify basic issues and influencing factors of statistical data quality for journalistic purposes by bridging areas too often confined to technical perspectives in computer science and informatics. I am in favour of a more holistic perspective suitable for tackling what I described in the introduction as a landscape 'in the wild', in which statistical information is published, processed and used with the purpose of creating credible and truthful news.

4.5 Does information quality translate into quality journalism?

4.5.1 Theories about Information Quality (IQ)

I will now review the most important theories about Information Quality because it will help to better contextualise the issue tackled in this thesis and will allow me to seek an answer to the main question of this section: if journalists deal with a wide range of ‘modes’ of information (Poster, 1990) (statistical information or by other origin) on a daily basis and thus need the best information possible, does information quality translate into quality journalism?

Indeed, understanding information quality can be a crucial and pressing task, particularly from the viewpoint of journalism. When selecting information, journalists must concern themselves with the quality of the information available. At that stage, they act as if they were *Inforgs* in the *Infosphere* (Floridi, 2002), and they are also the actors of the Fourth Revolution (Floridi, 2014). They are not interested in just any information; they require the best information available for their purposes.

As noted by Patrick Wilson, a person wants “to have what we can call the best textual means to his end” (1968, p.21). This challenging passage translates not only into what makes information the best information available but also into the nature of information quality. According to Jens-Erik Mai (2016; 2013), the quality of information is something that exists or is developed in tandem with the meaning of information. Assuming that the matter in the hands of journalists is information, we therefore have to frame the conception of Information Quality.

It is evident that nowadays more and more people, especially journalists, are weighed down by information overload, or should I say ‘information explosion’³⁰, and it also seems to be a fact that more information exists than ever before, so its quality is a central element. “The most developed post-industrial societies live by information, and Information and Communication Technologies (ICTs) keep them oxygenated” (Illari & Floridi, 2014, p.2), thus the better the quality of information exchanged the more likely it is that such societies will thrive. To address the topic in a more detail and to contextualise it within the research

³⁰ The term ‘information explosion’ seems to have appeared at about the start of the Kennedy Administration in the early 1960s, when it was first used to describe the burgeoning number of articles being churned out by scientists around the world. Already by January 1966 *Newsweek* had produced a cover story, tied to the publication of a book by Marshall McLuhan, entitled “Goodbye? to Gutenberg” predicting the end of the information world as it had been. In the same year an internal CIA study, the Cunningham Report, had flagged what it called “More Is Better” attitudes. “We were hypnotised by statistics and bits of information, particularly in the military and academia”, the Cunningham Report complained.

questions of this thesis and its urgency, I will take two examples: the US and the UK.

In the US, the *Information Quality Act*, also known as the Data Quality Act, enacted in 2000³¹ left “undefined virtually every key concept in the text”. So, it required the Office of Management and Budget “to promulgate guidance to agencies ensuring the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies” (Congressional Report Service, 2004). Unsurprisingly, the guidelines have received much criticism and have been under review ever since (United States Government Accountability Office, 2006).

In the UK, some of the most important efforts in dealing with Information Quality issues have concerned the health care system. Already in 2001, the *Kennedy Report*³² acknowledged that: “the assessment of the performance of clinicians and information for the benefit of patients depends on the collection, analysis and dissemination of data”. However, in 2004, the *NHS Information Quality Assurance Consultation* still highlighted that “consideration of information and data quality are made more complex by the general agreement that there are a number of aspects to information/data quality but no clear agreement as to what these are”.

Lacking a clear and precise understanding of IQ standards (such as *accessibility, accuracy, availability, completeness, currency, integrity, redundancy, reliability, timeliness, trustworthiness, and usability*) causes costly errors and confusion. The first *International Conference on Information Quality* was organised in 1996. In 2006 the Association of Computing Machinery launched the new *Journal of Data on Information Quality*.

In more details, we have to distinguish between two primary types of information:

1. that which is usually measured by reference to the psychological states of people (for example, “I am overwhelmed by all the information about the economic meltdown”)
2. that which is usually measured by number of bits, gigabytes, terabytes, etc. (for example “The British Library contains 10 terabytes of information”)

³¹ It is usually called the *Information Quality Act*. See: http://www.whitehouse.gov/omb/inforeg_agency_info_quality_links (accessed on: 25th January 2018).

³² The report is written by Prof. Sir Ian Kennedy and is available at the following link: <http://www.heartofengland.nhs.uk/wp-content/uploads/Kennedy-Report-Final.pdf> (accessed on: 25th January 2018).

Those concerned with the first kind of information are typically focused on the amount of information transferred. Those concerned with the second kind of information are typically focused on the transfer of messages between people. Mai (2013) further subdivides this group into: 1) those who are mostly concerned with the systems that facilitate the transmission of messages; and 2) those who are mostly concerned with the meaning of the messages being transferred.

Drawing connections between Journalism Studies and Information Sciences, we can say that both are concerned with the production, organisation, retrieval and use of information, and in this context information is thought of as being more or less equivalent to documents, or more precisely to the ideas, opinions, claims or facts represented or expressed in books, journals, newspapers, photos, films, and webpages, but also spreadsheets, graphs and figures. In other words, the kind of information studied is typically information created by people to communicate with other people about something. It could be intended to communicate, to argue, to inform, to convince, or to state a particular idea. Whatever the circumstance, it is produced with the aim of creating meaning for the receiver of the information. In this sense information can be thought of as a vehicle in a communication process.

In order to gain insight and to be able to explain various phenomena in human communication, information creation and transformation, and the development of information systems, an overarching framework seems highly desirable, even necessary. Reviewing the literature in this context would take us far away from the research questions dealt with in this thesis so it is enough for the purposes of this chapter to cite Wei Hu and Junkang Feng (2004) who have found that all of these theories may be incorporated within a unique framework, which would help make sense of them, and make good use of them in *understanding* information and information flow. Semiotics and semantic information theories can be related and complementary to each other especially in the context of the Information Source-Bearer-Receiver (S-B-R) framework.

Hu and Feng believe that such a framework should be formulated “from the point of view of how information is created, carried and finally received” (2004, p.3). Therefore they have created a framework consisting of Information Source, Information Bearer and Information Receiver, and the links between them. They call such an abstract model the ‘S-B-R Framework’. However, how can we abstract this model for the purposes of journalism?

Particularly instructive is the “fundamental equation” that Bertram Brooks formulated in 1980, which is written with the language of the mathematical logic, with the intent of developing a foundation that permitted “an objective rather than a subjective theory of knowledge” (1980a, p.125) and in which “information and knowledge are of the same kind” so that they can “be measured in the same

units" (1980b, p.76). The following equation expresses in pseudo-mathematical language what Brookes meant: $K [S] + \Delta I = K [S + \Delta S]$. In its very general way, the knowledge structure $K [S]$ is changed to the new modified structure $K [S + \Delta S]$ by the information ΔI , the ΔS indicating the effect of the modification (1980a, p.131).

Theoretically, if we were willing to test this equation in the broad area of journalism we would discover that this equation might be the secret to well-balanced journalism. But I am aware that it is not the goal of this research to test this formula even if, perhaps, this was exactly the hope of Walter Lippmann when he affirmed that: "only the discipline of a modernised logic can open the door to reality" (2012, p.86).

Provocations apart, Ronald Day (2008) says that an understanding of such a formula can allow one to jump from information bits to information overload as if they were of the same kind. This approach and understanding of information is:

A well-established tradition of library and information-science theory that understands ideas as being quasi-empirical objects – generated in the minds of authors – that are contained in documents and that are sought by and transferred to the minds of information seekers or users upon reading, viewing or listening (2008, p.1644).

This thought is an important step to understanding the interplay, or interrelation, between data, information and knowledge. Instead of conceptualising data as – 1) building blocks for information; 2) being of the same nature as information to allow for unified measurements; or 3) being different from information in order to establish information as what is true and verifiable – this concept can be viewed as a vehicle used in the production and exchange of meaning. Therefore, information is conceptualised as signs used in communication to produce and exchange meaning.

Paraphrasing Umberto Eco (1977), a sign is not only something that stands for something else, it is also something that can and must be interpreted. Charles Saunders Peirce (1966) developed a more elaborate conceptualisation of the basic idea expressed by Eco, formulating the sign as a triadic relationship. According to J. Buchler, Peirce's editor:

A sign, or representamen, is something that stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects, but in reference to a sort

of idea, which I sometimes have called the ground of the representamen (1966, p.99).

It is vital at this stage to understand the quality of information, because when that information is used to communicate and exchange ideas, that information can be trusted. In the case of journalism practice, this represents the keystone upon which we (can) base journalistic values and their successful application. I agree with Mai, who suggests avoiding casting the notion of information quality among the “pathologies of information” (under which lies the danger of inventing problems for which the only solution is “the services of library/information professions”) (Mai, 2013).

Specifically, the notion of IQ should be addressed in a broader context and it needs to be tied to and build on Philosophy of Information, and therefore apply the outcomes to journalism practices. The notion of IQ, like that of quality journalism, goes undefined in its respective area of research. Scholars note that quality is an elusive and abstract concept and articulate a set of attributes that make up information quality.

Thomas Chesney (2006) in his analysis on Wikipedia’s dimension of *credibility* noted that “information with high quality is usually considered to have some or all of the following characteristics: Up-to-date, relevant, accurate, economic for the purpose at hand, on time and understandable to the person who needs it” (quoted in Mai, p.681). Ofer Arazy and Rick Kopak (2011) asked students to evaluate information in terms of “quality” (*accuracy, completeness, objectivity and representation*), and Soo Yeung Rieh (2002) based his research on previous cases in order to look for *goodness, usefulness, accuracy/validity, recency, perceived quality, actual quality, expected quality, authority and reliability*.

The list in Tab.6 overleaf contains those concepts that have been associated with information quality and fits perfectly with the one list discussed in Tab.1, Tab.2 and Tab.3 and later developed in Tab. 10 pag.102 of this study. Each of these concepts has, of course, multiple meanings and interpretations.

<i>accurate</i>
<i>appropriate</i>
<i>authentic</i>
<i>authoritative</i>
<i>balanced</i>
<i>believable</i>
<i>comprehensive</i>
<i>correct</i>
<i>credible</i>
<i>current</i>
<i>good</i>
<i>neutral</i>
<i>relevant</i>
<i>reliable</i>
<i>objective</i>
<i>true</i>
<i>trustworthy</i>
<i>understandable</i>
<i>useful</i>
<i>valid</i>

Tab. 6 *Attributes of Information Quality.*

Some argue that IQ is a subjective construct, and that “users of the information have to make judgments about its quality for themselves” (Rieh & Belkin, 1998, p.53). At the same time the focus of much research is on ‘quantifying’, ‘measurement’ or the determination of a ‘true quality control measure’ for information quality. Others agree that information quality is a subjective construct (in the mind of the individual information user), but at the same time they believe that “some dimensions may be less context-sensitive, relying more on intrinsic indicators that span across all tasks” (Mai, 2013, p.31).

Between these views, David Lankes (2008) casts light on the notion of IQ, and his ideas fit with the purposes of journalism. He wants to move the understanding of the credibility of information from its current site in concepts of authority to a more dynamic position of reliability. Lankes understands the credibility of information to be determined by “the individual receiving the information, and as such applies a mentalistic and individualistic construct that does not depend on external factors such as the information received, or the context in which the information is received” (2008, p.669). He argues specifically that “reliability and authority can be seen as opposite ends of a spectrum of credibility approaches” (2008, p.681). At one end of the spectrum we have authority where “pre-existing agreements are in place and assumed: the conversation is over”, and at the other end of the spectrum we have “reliability

[where] the conversation is open and ongoing” (2008, p.681). Interestingly, Lankes walks the line between defining credibility as an inherent property of information and developing an understanding of credibility that is solipsistic and divorced from social interactions and contexts, “in an effort to overcome this challenging balancing act” (2008, p.668).

Hilligoss and Rieh (2008) suggest a unified framework to understand the user’s assessment of credibility. They think the assessment can be divided into three levels:

1. the conceptualisation of credibility employed by the person [truthfulness, believability, trustworthiness, objectivity, reliability];
2. the general rules of thumb employed;
3. specific cues from source or content.

In the final discussion of the paper they found that “context emerged as an important factor that influences the three levels” (p.1481). Given their focus on the individual user in the study, explains Mei (2013), the authors do not consider the contextual dimension in detail, and their framework focuses mostly on the aspect of credibility assessment. Reijo Savolainen (2011) further splits the balancing act into two components: quality and credibility – by restricting information quality to “the message’s information content” and information credibility to “the qualities of the author of the message” (p.1254).

The above is of great importance if applied to the journalistic workflow, as quality and credibility are the foundations of journalistic values. However, it is my view that information reliability, authority, trust and quality could be understood within the larger context of information literacy. When journalists seek information of high quality in the *Infosphere* they do so within an intricate web of information problems, information-interactions and social-cultural contexts. By quoting Jack Andersen (2006) we understand how important information literacy is for journalism:

Information literacy covers the ability to read society and its textually and genre-mediated structures. Information literacy represents an understanding of society and its textual mediation. We might go as far as to say that information literacy implies a critique of society insofar as it includes a particular use and reading of particular information sources and use of particular forms of communication (2006, p.217).

One aspect of this understanding of information literacy is the ability to judge the quality of information. Such assessments will always be driven by the particular context, and within a particular understanding of the society in which the information is used. Translating this to journalism, this means that it is valid

for the different types of journalistic cultures and related legal or political frameworks. At this stage a more sophisticated conceptual framework is needed for dealing with these notions and especially for establishing a better notion of information quality in journalism (Andersen, 2006), thus I shall now turn to the concept of Levels of Abstraction (LoAs).

4.5.2 The concept of Levels of Abstraction (LoAs) applied to journalism

Journalists should be extremely attentive to the concept of sources (Soley, 2008; Manning, 2000, 2008), to its decline and also to the role that such a concept plays within the epistemology of the journalistic discipline. Scholars like Paul Manning and Lawrence Soley (2008), to name just two, ask: what makes a source the source *par excellence*? What are the features of a subject that arouses journalistic curiosity? Can these features be found in other levels of abstraction? If so, what are the rules that differentiate the levels of abstraction of a journalist from, for example, that of a historian?

The first similarity can be found in the idea of storytelling. In both cases the story must adhere to the facts and to the reality. Yet if history performs its storytelling through the observation of inherent messages of either historical remains or sources from the past, journalism instead performs storytelling about “contingency and daily life” comparable to what Umberto Eco defined as “historiography of the instant”³³.

Additionally, journalism also plays a role of mediation between the information source and its recipient. This function therefore has two main arguments: a) the source (the information delivered by the source); and b) the receiver, the reader as information user. In logical mathematical terms it can be said that the function is determined when the argument ‘reader’ is equal to zero (or rather, it is virtually and provocatively possible to do journalism without readers) whereas when there is no source, there is no mediation, therefore no journalism.

I suggest that this sort of mediation is to be interpreted as an ‘incessant journalistic negotiation’ that aims at highlighting how the interaction between the three systems is significant and seamless. If journalism is therefore a function that negotiates and mediates the informational interests of two classes of subject, we can talk of journalism as a *systemic interface* between the system that delivers the product ‘information’ (the sources) and the one that consumes and uses (the reader). In other words, we talk about a Level of Abstraction that interfaces, thanks to its transformation rules, two different LoAs.

³³ The quotation is commonly attributed to Umberto Eco. A precise reference is not available.

The notion of interface is expected to possess a point of continuity and of unity between two entities or systems. In case this does not exist, the interface itself is a system of transformation and adaptation that transforms what a system delivers in input mode into something receivable by the other system. This means that the reader cannot *tout court* be called 'information user' (the original 'product', the raw material, the source); if so, the following things would fail: the necessity of mediator, of the interface, of the journalistic level of abstraction and, ultimately, that of the journalist. It would be much more appropriate to define the reader as the user of a mediation process that journalism triggers.

This view draws attention to the workflow, the method and the practices through which the mediation is carried out, or rather the modalities through which the interface between source and reader is achieved, and in so doing on quality, completeness and righteousness of the Levels of Abstraction of the journalist. This level would indeed be achieved in order to meet certain requisites, such as *precision* – as advocated by Philip Meyer – *efficacy* and *objectivity* of the observation of the object 'source'. The pragmatic question is therefore: how is it possible to mediate and negotiate without affecting the source or the information that one aims to deliver?

Journalism scholars Bill Kovach and Tom Rosenstiel, in *The Elements of Journalism*, seem to have an answer: "the journalist is not objective, but his method can be. The key [is] in the discipline of the craft, not in the aim" (2001, p.83). This deviation on the method and on the discipline, anticipates the concept of 'verification'. According to the authors, journalism should rely on the discipline of verification because this is the only feature that distinguishes journalism from other forms of storytelling in which fantasy does not represent an obstacle. For example, in fiction and other arts, adherence to a factual reality is not a problem and it can be avoided at any stage of storytelling. In journalism, the opposite case is seen. Kovach and Rosenstiel focus on the systematicity of how this concept is developed to transform storytelling into journalism (2001, p.80). They note that "in the end, the discipline of verification is what separates journalism from entertainment, propaganda, fiction, or art. Journalism alone is focused first on getting what happened down right" (2001, p.79). I perceive between the lines that the authors consider journalism to be the only discipline that deals with the conventional 'truth', the only one which exists and is unamendable.

In other cases though, such as in those disciplines that deal with history, historiography or law, one behaves like an interpreter of remains and materials of the past, the historic truth, adopting an approximation partially conscious of a 'processual truth', based on documental proof. On these premises, the 'journalistic truth' is the only one able to approach the factual reality claiming to be a primary source of authentic reality. This discipline of verification consists of giving truth-value to sources and information. In so doing journalists should

comply with specific stages that are aimed at guaranteeing objectivity in the evaluation.

The principles below are valid not only if applied to the journalistic workflow but also to the intelligence cycle:

“A more conscious discipline of verification is the best antidote to the old journalism of verification being overrun by a new journalism of assertion, and it would provide citizens with a basis for relying on journalistic accounts.

[...] We began to see a core set of concepts that form the foundation of the discipline of verification.

- Never add anything that was not there.
- Never deceive the audience.
- Be transparent about your methods and motives.
- Rely on your own original reporting.
- Exercise humility” (Kovach & Rosenstiel 2001, p.89).

However, the discipline of verification does not abstract from a comparison between an information body and the factual reality that was generated (Dover, Goodman, & Hillebrand, 2013).

An example might be useful here: if we are working in an office three levels below ground and a colleague tells us that it is snowing outside, it would be better for us go out and verify the claim, if we want to give a truth-value to that information. If it is snowing (or it has snowed, the source can indeed have a different chrono-reference) the information given has (or had) a truth-value. On the basis of these outcomes the source can be considered reliable (giving it a reliability-value) not only because of its adherence to the factual reality, but also because of its significance. If in August our colleague keeps telling us each hour that it is not snowing outside, even if the information given is true, this will not add any higher reliability-value. This means that for information to be considered information it should renew the body of knowledge of the receiving system.

In this example, the information given has been verified on the basis of the five senses of the information user, whose perception renewed the state of his body of knowledge. Unfortunately, such directedness is not often possible. Supposing that I have been prevented from verifying directly the information about the snowfall, I could have used other methods: perhaps using CCTV, or a thermometer, or making a call to a friend. These ‘sensors’, or sources, are no more than agents of information that expand our ability to perceive and interact with another agent of information (perhaps another colleague located at level -2) with a guest system. The journalist, or his LoAs, verifies the information in the

same way, seeking within a system other agents of information that can validate the information given by his/her source.

It is therefore feasible to claim that the first property observable is:

S is a source if and only if its reliability can be verified

Therefore, because it is possible to verify only one source through the discipline of verification, one can assume a second property, which is:

S is a source if and only if it delivers information which can be verified

As previously noted, it is almost impossible to verify certain types of information through direct experience, and in the specific case of the reader/information user this can never be verified. Moreover, colleagues, CCTV and sensors can consciously or unconsciously deceive or show true (or false) information that might not correspond to the factual reality.

This double relationship between source/information and factual reality significantly increases the variability of interpretation so a continued/continuous verification of sources (and of the information) is made indispensable. This verification is actually triggered through a certain number of agents of information that validate the source itself. At least in principle this improves the reliability not only of the verified source but also of the entire system of verification.

At this stage, the key words are 'reliability', 'network of agents of information' and 'network of sources'. We can therefore express the concept in this way:

S is a source if and only if it delivers information whose truth-value Vs can be verified by a sufficient number of sources Sx so that it possesses a certain grade of reliability Rx, and that is within the network of sources N

The above is a description of a methodology of validation and verification of the sources as strongly advocated by Kovack and Rosenstiel:

When the concept [of objectivity] originally evolved, it was not meant to imply that journalists were free of bias. Quite the contrary... Objectivity called for journalists to develop a consistent method for testing information – a transparent approach to evidence – precisely so that personal and cultural biases would not undermine the accuracy of their work (2001, p.81).

They implicitly support the third pillar/concept described earlier concerning the discipline of verification, namely: “be transparent about your methods and motives” (2001, p.82), which can be read as transparency of the Level of Abstraction.

However, if we want to go into detail with specific regard to the LoAs of the journalist, we have to highlight the peculiar strategic relationship between source, news and the intimate and intrinsic structure of the source itself. Some argue that the very concept of source is at the core of the epistemology of journalism (Franklin & Carson, 2010; J. Lewis, Williams & Franklin, 2008; Sanders, 2010). Many authors have pointed this out starting with Gaye Tuchman (1972, 1978) because it lies at the basis of the news. One can also argue that there is a growing need for classifying the sources into a formal scheme so that the features, relations and, above all, the usability are enhanced.

Sergio Lepri (2010) defines the concept of ‘journalistic source’ as follows: “journalistic sources are those people and those documents that deliver information about circumstances [which are] objects of news reporting when the journalist is in position of being a direct witness” (Lepri, Accornero, & Cultrera, 2010, p.280). An analysis of this definition reveals an interesting distinction. In a given circumstance (an event or a fact) two cases can be observed: a) the journalist is a direct witness and therefore he/she can be present physically at the time and place of the circumstance with his/her perceptual skills; and b) the journalist is not a direct witness. We can thus argue that the source is verified in the case of b) even if it is legitimate to consider the hypothesis that journalist and sources are the same.

Lepri’s definition illustrates two types of sources, later validated by Adam Penenberg (2010): *human source* and *documentary source*. This means that the information delivered can be respectively verbal or textual. However, the most important feature for a source to be considered a journalistic source, is that it should not only be/provide information about ‘circumstances’ but also be information about circumstances worth being reported and therefore an object of news.

At this stage, if we have to establish which properties transform any object into a specific source, we should affirm that:

A source can be whatever thing delivers information about news

As a result of this reasoning, the question would be: journalistically speaking, what differentiates news from information about a circumstance? I think that the answer lies in one of the many definitions that define US journalistic practices ‘news is what newspaperman make it’, therefore news is what a

journalist determines to be news. This definition sounds good as it is, but if a journalist decides what 'information about circumstances' becomes news, then he/she also decides what the source is. The logical conclusion that can be drawn is that:

A source is whatever thing a journalist decides to be a source

This statement leads to one of the last questions: what are the elements with which a journalist confers newsworthiness to a given circumstance, to an event or to information? According to Lepri ten news-values can be attributed to news (2005, p. 12). The following points can also be considered as observable variables of the LoAs of a journalist:

1. Originality and frequency
2. Geographical or metaphorical nearness
3. Dimension of the fact
4. Communicability
5. Level of dramatisation
6. Level of conflict between subjects involved
7. Practical consequences and impact
8. Human interest
9. Idea of progress
10. Social prestige

Sergio Lepri (2005) again suggests a set of parameters to follow with regard to the newsworthiness of facts. More precisely he divided the parameters into two groups. In the first group: a) the object; b) the subject; and c) the circumstances. In the second group we can find: a) source; b) information mean; c) competition; and d) the journalist. The first group is focused on the socio-informational effects and their impact on the information user. The second group is concerned with an evaluation of the ontology of news and that of the source.

In order to summarise these points, and for the purposes of the LoAs of a journalist, we can say the following:

something is a journalistic source if it is...

- *Informative* – the information delivered about facts can potentially become news;
- *unpublished* – the information delivered updates the user's body of knowledge;
- *relevant* – the information delivered about facts has socio-informational relevance;

- *engaging* – the information delivered has the purposes of emotionally engaging the user;
- *authoritative* – it possesses a proved authority;
- *honest* – correct and loyal in drawing explicit relations to specific lobbies;
- *referenced* – the information delivered about facts is also validated by competitors;
- *comprehensible* – in terms of the various degrees of understanding of journalists.

It is worth noting that John Merrill (1974) put together the discipline of verification and the awareness of the origin of information (Duffy & Freeman, 2011). He argued particularly that: “the discipline of verification is what distinguishes journalism from other forms of communication” (Merrill, 1997, p.38). At this point another question still remains unanswered: can a robust discipline of verification disclose and remove lies and disinformation? More specifically, can a discipline of journalistic verification detect statistical fallacies, numerical lies or simple innumeracy?

4.5.3 Disinformation and lies: the irrelevance of truth

In 2013 Paul Craig Roberts published *Why Disinformation Works. In America “Truth has no Relevance. Only Agendas are Important”*, which helped to define two important concepts: that of disinformation and that of lies. Disinformation can be extremely dangerous. It can directly cause serious emotional, financial, and even physical harm if people are misled about important topics, such as medical treatments, investment opportunities, or political candidates. In addition to this, and perhaps more importantly, it can cause damage indirectly by eroding trust and therefore inhibiting our ability to effectively share information with each other.

Inaccurate information (or *misinformation*) can mislead people whether it results from an honest mistake, negligence, unconscious bias, or (as in the case of disinformation) intentional deception. Disinformation comes from someone who is actively engaged in an attempt to mislead. This threat to the quality of information has become much more prevalent in recent years. New information technologies are making it easier for people to create and disseminate inaccurate and misleading information. For instance, Darrel Huff, Joel Best and Mark Monmonier, despite the titles of their books, are not willing to deliver instruction manuals for liars. They are intended to help all of us to avoid being misled by showing us the various ways that people might try to mislead. Don Fallis (2014) is clear in this regard:

Disinformation is a type of information. More specifically, disinformation is information that is intentionally misleading. That is,

it is information that (just as the source of the information intended) is likely to cause people to hold false beliefs. The most notable type of disinformation is the lie. According to the traditional philosophical analysis, a lie is a false statement that the speaker believes to be false and that is intended to mislead (2014, p.231).

Some philosophers simply equate disinformation with lying, such as James Fetzer (2004a; 2004b) who claims that disinformation “should be viewed more or less on a par with acts of lying. Indeed, the parallel with lying appears to be fairly precise” (2004: 231). Lies are not the only type of disinformation and Fallis criticises Fetzer’s analysis:

1. Unlike lies, disinformation does not have to be a statement. Fetzer’s analysis incorrectly rules out what we might call *visual disinformation*.
2. Unlike lies, disinformation does not have to be false. Fetzer’s analysis incorrectly rules out what we might call *true disinformation*. Several philosophers have pointed out that even accurate information can be intentionally misleading.
3. Unlike lies, disinformation does not have to be intended to mislead. Fetzer’s analysis incorrectly rules out what we might call *side effect disinformation*.

While most philosophers agree that a lie must be intended to create a false belief, they disagree about what that false belief must be about. For instance, many philosophers claim that a liar must intend to mislead someone about the *accuracy* of what we actually say. In contrast, some philosophers claim that a liar only needs to intend to mislead about *his believing* what he says.

Finally, other philosophers like Luciano Floridi (2004) go even further and claim that a liar just has to intend to mislead someone about something. So, in addition to (a) the accuracy of what he says and (b) his believing what he says, there may be other things that a liar might intend to mislead others about.

Mislead about the content being accurate. <i>Examples: lies</i>
Mislead about the source believing the content.
Mislead about the identity of the source.
Mislead about an implication of the content being accurate. <i>Examples: false implication</i>

Tab. 7 *Examples of definition for ‘misleading’.*

As far as information articulation and production is concerned, Luciano Floridi points out that “the process of information is defective” (2004, p.101) in

many other ways. So, we have to conclude that the flow of information is manipulated both in principle and by a third party. As a matter of fact, the most obvious example of manipulating the flow of information is *censorship*. This sort of manipulation can take place at various stages of the communication process, as seen in Tab.8 below.

Disseminate misleading information. <i>Examples:</i> disinformation.
Restrict information access. <i>Examples:</i> censorship.
Biased information access. <i>Examples:</i> search engine personalisation.
Hide information. - Mask (<i>Ex.:</i> steganography → cryptography) - Repackage - Dazzle - Decoy
Make access to information difficult.

Tab. 8 *Examples of definition for 'disinformation'.*

In addition to manipulating the flow of information between other parties, one can hide his/her own information from others in order to keep them in the dark as in the case of propaganda (Bellamy & Taylor, 1998; Miller, 2004) and spin-doctoring (Hollins & Bacon, 2010; Kristensen, 2006; Miller & Dinan, 2007), for example. With *masking* (or *camouflage*), the person or the thing to be hidden is not intended to be seen at all.

By contrast, with *repackaging*, the person or the thing to be hidden is made to look like something else – this is relevant for the argument of the thesis as the issue of 'statistical repackaging' can be the most arduous problem journalists can face when dealing with numbers. In this regard, Joel Best (2012) memorably describes the production of 'mutant statistics', whereby the meaning of numbers is "stretched, twisted, distorted, or mangled" (2012, p.62). Steganography is the study of how to mask information. It is one step beyond cryptography. Not only does it keep other people from deciphering a message, but it also keeps other people from even knowing that there is a message. Finally, *dazzling* is quite common in the context of information. The work by Cristiano Castelfranchi at the University of Siena in Italy refers to this technique as "obfuscation", mostly known by intelligence officers as "information pollution" (Castelfranchi, Falcone, & Pezzulo, 2003; Castelfranchi & Poggi, 1994; Castelfranchi & Tan, 2001).

To sum up, an awareness of the diverse ways in which people might try to mislead us is highly advisable because it can theoretically help us to avoid being misled by disinformation, which represents a serious threat to information quality.

Also, a better understanding of the essence of disinformation, together with a robust discipline of journalistic verification, can facilitate research on techniques to discover different methods of detection.³⁴

³⁴ 'Fact-checking' can be considered one of them.

Chapter 5: Methodology

5.1 Introduction

This chapter presents the research methodology of the study and looks at how the conceptual and theoretical frameworks are understood in the context of empirical studies. It describes the different research strategies, why they have been adopted, and how data was gathered, questioned and organised. Consequently, the chapter illustrates the epistemological and methodological assumptions while also scrutinising the techniques used. The main objective of this work is to study the uses of statistical information to deliver quality in the news.

The chapter aims to explain how the research was designed to address the research questions of the study and therefore to: 1) rationalise the philosophical assumptions behind the research strategies; 2) to illustrate the techniques for the data gathering and methodology; and 3) to justify the selection of sources, interviews and focus groups.

5.2 Research Methodology

The purpose of this research is to analyse the uses of statistics through five quality dimensions in news reporting by asking how journalists make sense of statistics to deliver quality to their news stories. Moreover, it seeks to analyse how journalists manage quantitative information when reporting news and specifically how statistics are used to articulate and maintain quality information that could meet the readers' expectations and understanding.

I use a mixed method approach, which consists of a triangulation of qualitative and quantitative methods. This method is increasingly adopted and attached to research practice and recognised by academia as the third major research approach or *research paradigm* (Johnson, Onwuegbuzie, & Turner, 2007). The importance of such a triangulation is the validity of the results that can lead to a more balanced and detailed answer to the research questions by also comparing and contrasting different accounts of the same situation (Turner & Turner, 2009). The aim is to develop a 'practical theory' that would help to rationalise the issue under scrutiny (Altrichter, 2010; Altrichter, Posch, & Somekh, 1993).

To delimit its scope, this study looks at news stories of health and crime in the United Kingdom. Previous case studies of health (Robinson, Coutinho,

Bryden, & McKee, 2013) and crime news (Jairo Lugo-Ocando & Faria Brandão, 2016) are considered and reviewed regarding their methods and data analysis techniques. The scrutiny of four British newspapers with their Sunday editions – *The Guardian* and *The Observer*, *The Times* and *The Sunday Times*, *The Daily Mail* and *Mail on Sunday*, *The Daily Mirror* and *The Sunday Mirror* – considers two quality newspapers, one mass market title and one middle-market newspaper (Bingham & Conboy, 2009; Frewer & Shepherd, 1994; Kleebauer, 2015).

The three-phases operationalisation of research includes: (1) content analysis followed by a close-reading structural analysis; (2) semi-structured interviews; and (3) focus groups followed by the Q-sort test. Content analysis looks at the articulation of quality statistics through five quality dimensions. The perspective adopted is quantitative, therefore the five dimensions of quality were reduced to five variables which were statistically analysed. These variables aim to examine whether the five quality dimensions of statistics are satisfied in the articulation of news reporting, with an emphasis on health and crime news. Close-reading analysis looks deeper at the articulation of statistical information as a rhetorical device. Semi-structured interviews investigate the uses of statistics from the perspective of those journalists who routinely engage with numbers. This approach enables the researcher to look closely at journalists' thoughts and their 'work rituals'. The last stage includes focus groups with participants who are active readers of newspapers. The discussions were essential to gather participants' attitudes towards statistical-driven stories. It was a unique point of view to understand how readers consume numbers, how they criticise or justify them. The focus groups were followed by the Q-sort test aimed specifically at capturing their subjectivity by sorting statements into a provided and specifically designed grid.

The chapter begins with the rationalisation of previous research and then contextualises this research alongside the overall research topic, which is the use of statistics as a means to deliver quality news.

5.3 Research Questions (RQs)

The main RQ for this research is:

- **How do journalists engage with statistical information to deliver quality to the news?**

The two main sub-questions that follow on from the main RQ are:

- Does quality statistics automatically lead to quality journalism?
- Does information quality translate into quality journalism?

Other minor questions ask:

- Does the nature of a statistic's source affect the news reporting?
- What is the purpose of statistics in news reporting?
- Do journalists emphasise a certain type of statistics?
- What statistics sources do journalists use most often?
- How does the audience engage with statistical-driven stories?

5.4 Research Design

Research designs are developed to carry out formative research to test and refine designs based on theoretical principles derived from prior research. The approach of *progressive refinement* in research design involves writing a first version of a design to see how it works (Collins, Joseph, & Bielaczyc, 2004). To Creswell (2004), the design should include different approaches or the only approach used by the researcher and, to be effective, it should link to the philosophical and theoretical framework of the study. The research design should also have the dual goals of refining both theory and practice. Overall, it could be considered the map of the study. The mixed method used in this research should be understood in a broader “cross-sectional design” (Cook et al., 1983; Johnston & Brady, 2002) which allows a combination of quantitative and qualitative research.

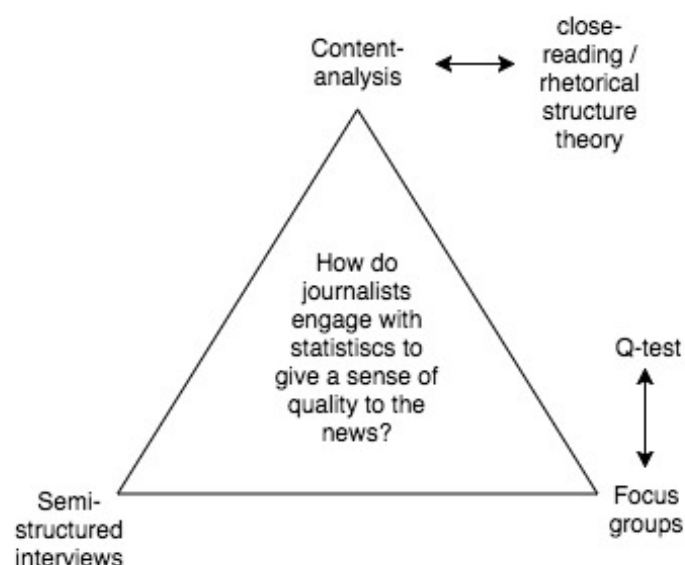


Fig. 6 The cross-sectional design of the study.

The idea of triangulation was introduced first by Campbell and Fiskes (1959), who referred to “multiple operationalism” (p.32) in which more than one method is used as part of a validation process that guarantees that the explained variance is the result of the phenomenon under scrutiny and not of the method. In this sense, it was claimed that the convergence of findings stemming from two or more methods “enhances our beliefs that the results are valid and not a methodological artefact” (Bouchard Jr, 1976, p. 268).

Although recognising that triangulation may not be suitable for all research purposes, there are some advantages as it: (a) allows researchers to be more confident in their results; (b) stimulates the development of creative ways of collecting data; (c) can lead to thicker, richer data; (d) can lead to the synthesis or integration of theories; (e) can uncover contradictions; and (f) by virtue of its comprehensiveness, may serve as a litmus test for competing theories (Jick, 1979).

The quantitative methods used in this study are content analysis and Q-sort analysis. Content analysis is often used to describe written communication through quantifiable variables where the researcher reads a body of texts on a systematic basis and then provides a quantitative description. In fact, this study seeks to provide a better understanding of the meanings and uses of statistics and their quality dimensions in news reporting of health and crime. It is not the primary method as it is conceived by the researcher as cross-sectional with the other methods. It will seek to answer: (a) whether quality statistics translate into quality journalism; (b) where journalists put their emphasis; (c) what type of statistics they use; and (d) what is the main statistical source that journalists use.

The Q-sort method is the systematic assessment of participant viewpoints and it is often described as a process of assessing coherence and consistency. The Q-sort test is often used in psychology, as well as in social sciences, to understand ‘human subjectivity’ through a mathematical procedure. The technique, which is widely used in audience research, stemmed in this study from the qualitative method of focus groups and answered the question about the attitudes of readers towards statistical information in news reporting.

Qualitative methods involve close reading through the lenses of the Rhetorical Structure Theory (RST), semi-structured interviews and focus groups. In particular, the RST behind the close-reading analysis focuses on how articles that contain numerical information function. It pays attention to words and sentence construction. I decided to adopt this method thanks to its analytical approach in evaluating and examining how texts are organised and how they relate to each other.

Interviews were used to address and understand the 'ritualistic protocols' of sense-making of quality statistics. Focus groups addressed the back-end of this flow of quality statistical information and explored attitudes and viewpoints of readers, including to what degree the audience is engaged with statistical-driven stories.

All techniques were used to (a) understand why and how journalists engage with statistical information; and (b) analyse how quality statistics is managed from news production to news consumption in an overarching and comprehensive flow that involves journalists first and, ultimately, readers as end consumer of quality statistical information. This qualitative strategy seeks to investigate the meanings of various forms of the quality-making process in statistical information for news reporting by answering the main RQ.

5.5 Data collection

Alongside the rationalisation of the philosophical assumption behind the research techniques, I identified three reasons for combining quantitative and qualitative research. First, combinations were used to enable confirmation and corroboration of each other through triangulation. Second, combinations were used to enable and develop analysis in order to provide richer data. Third, combinations were used to initiate a new mode of thinking in Media and Communications studies by attending to paradoxes that emerge from the two data sources.

On the one hand, the quantitative approach helps to detect each of the five quality dimensions and embraces the main research question from precise points of view. In this study, the variable is the uses of quality statistical information. On the other hand, the qualitative approach deals with the understanding of this variable and refers to the perception of meanings and articulation of statistical information.

Therefore, by triangulating these two approaches, I was able to present an overarching answer to the main RQ with an in-depth description of the phenomena. For this study, the triangulation of methods was crucial to examining how statistics is used to articulate quality statistical information and how journalists legitimate and substantiate their stories using numbers.

On a historical note, we have witnessed a change in Media and Mass Communication Research methods since 2000. According to Trumbo (2004), who has conducted a census and a critical analysis of eight journals from 1990-2000, a mixed methods approach was used in 60% of the studies. In his opinion, this is due to the adoption of exclusive approaches. However, "we are currently in a three methodological or research paradigm world with quantitative,

qualitative and mixed methods research all thriving and coexisting” (Johnson et al., 2007, p.117).

This three-research paradigm can be seen in contrast to Thomas Kuhn’s (1962) assumption of a single paradigm characterising ‘normal science’. By adopting a ‘holistic’ methodological approach I would suggest that a three-paradigm methodological technique might be better because each approach has its strengths and weaknesses to be shown by the researcher. Perhaps ‘normal science’ is not best for social research; nonetheless, a continual interaction between Kuhn’s normal and ‘revolutionary’ science will instil researchers with a good degree of balance.

Researchers such as Denzin, Lincoln and Guba have made statements in favour of this three-paradigm approach. For example, Lincoln and Guba (1985) claimed that “there are indeed many opportunities for the naturalistic investigator to utilise quantitative data” (p.3). Guba and Lincoln (1989) also stated that “the information may be quantitative or qualitative. Responsive evaluation does not rule out quantitative modes, as is mistakenly believed by many, but deals with whatever information is responsive to the unresolved claim, concern, or issue” (p.22). Furthermore, Guba and Lincoln noted that “both qualitative and quantitative methods may be used appropriately with any research paradigm” (1998, p.194). In light of this, two paradigms have been adopted: pragmatic and critical (see Tab.9 below).

Paradigm	Ontology	Epistemology	Theoretical perspective	Method
<i>Pragmatism</i>	Reality is constantly negotiated and debated, interpreted in light of its utility.	The best method is one that addresses the problem statement.	Research through design. Philosophy of Information.	Content analysis. Q-sort method.
<i>Critical</i>	There is more than one reality. Realities are socially constructed entities under constant change.	Reality and knowledge are both socially constructed and influenced by a ‘power game’ from within to society.	Historical perspective. Cultural context and work practises.	Close-reading. Semi-structured Interviews. Focus Groups.

Tab. 9 *Research paradigms adopted in the study.*

Within these operationalisation processes, data was collected from a total of 439 articles that made use of numerical information in the portrayal of health and crime news. Such data gathering allowed the compilation of materials for statistical analysis. The collection of articles was realised on the basis of contents and uses of health and crime data in daily newspapers that were accessed through Lexis Nexis and searched in the indexing within two topics: (1) medicine and health; and (2) crime, law enforcements and corrections, and within a span of four years, between 2013 and 2016 inclusive. Later, it looked at the presence of numerical information in the body of the articles. Consequently, 8 (n=8) articles were critically analysed for the purposes of close-reading using a multi-levels approach as addressed by the Rhetorical Structure Theory.

A total of 14 semi-structured interviews were realised in 2016 among political correspondents, health editors, freelancers and data editors at *The Guardian*, *The Times*, *The Financial Times* and *Trinity Mirror*. In the second half of 2016 and beginning of 2017 focus groups were conducted in the Leeds and Manchester areas for a total of 4 focus groups that involved 22 participants. In terms of results, significant excerpts from the interviews were used to show how statistical-driven stories are produced at the front-end and consequently consumed at the back-end of the news-assembly line.

In an attempt to integrate the theoretical framework with empirical evidence, I was also able to validate the importance of having a triangulation of methods by offering a 'third paradigm' choice and generating significant answers to the main research questions. With this mixed method design and with such a wealth of data, I was able to reach a more detailed body of knowledge and to suggest that mixed methods research is likely to provide superior research findings and outcomes in the analysis of statistical information in the journalistic workflow than a one-way approach.

5.6 Data analysis

The data analysis of the articles was conducted using SPSS software (v.23, IBM SPSS), the body of 439 data sets were entered into the software where Frequencies and Cross-tabulations were performed along with, wherever the outcomes give a statistically significant result, Multiple Correspondence Analysis (MCA) and simple Correspondence Analysis (CA) tests. For the scope of the research design, I chose regression to find frequencies and multiple correspondence analysis to determine possible relationships. Similarly, a correlation technique was used to detect associations among the 26 variables (see Table 11).

Data analysis is the process of making sense of raw data and turning it into usable information. A succinct and effective definition of what data analysis has been provided by Hatch:

Data analysis is a systematic search for meaning. It is a way to process qualitative data so that what has been learned can be communicated to others. Analysis means organizing and interrogating data in ways that allow researchers to see patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories. It often involves synthesis, evaluation, interpretation, categorization, hypothesizing, comparison, and pattern finding. It always involves what H. F. Wolcott calls “mindwork”. Researchers always engage their own intellectual capacities to make sense of qualitative data (Hatch, 2002, p.22).

In terms of qualitative data analysis, the interviews and focus groups generated a huge amount of data, which seemed overwhelming at first glance. One hour interview could take more than six hours to transcribe in full. The transcription of focus group discussions would take even longer than that, leading to more than fifty pages of transcripts. I overcame this limitation by reducing the data, according to Robson (2016), whose advice was followed and corroborated by Yin (2013), who points out that data analysis consists of a number of stages, for example examining, categorising and tabulating or otherwise recombining the evidence in order to address the initial goal of a study – to do so, depending on how many researchers are available at the moment of the data analysis, data has to be reduced into a manageable body.

Rabieh (2004) build on this concept and suggest that the purpose should drive the analysis; they believe that “analysis begins by going back to the intention of the study and survival requires a clear fix on the purpose of the study” (Rabieh, 2004, p.657). Following this concept, although difficult at times, was extremely helpful for managing the data, making sense of what was going on, removing extra and irrelevant information and “travelling safely through the maze of large and complicated paths of information” (Rabieh, 2004, p.658). In the interview data analysis I therefore reported only those excerpts to me relevant in the attempt to answer the research questions.

The main source of the qualitative data analysis was the recorded oral data derived from the interviews and the focus groups discussions in the form of audiotapes using a semi-professional TASCAM DR-22WL device. I also found it useful for the construction and analysis of data to make observational notes to capture non-verbal communication expressed, especially by the focus groups participants, to use in the analysis.

5.7 Content analysis

This study looks at the media content in printed UK newspapers. It analyses health and crime news through a quantitative viewpoint while examining the frequencies of the variables. It seeks to offer meaningful data on how journalists satisfy the five dimensions of quality statistics and interrogate variables such as Relevance, Accuracy and Reliability, Timeliness and Punctuality, Interpretability and Coherence, and Accessibility. It aims to put into dialogue an overall amount of 26 variables like gender of journalists, type of news, type of source, and nature of statistics, among others, in order to extract a picture of how numbers are used to articulate news.

In the field of Media and Communication studies, content analysis has been widely used for in-depth analysis of media content and media logic. In the first case, content is a type of information directed towards an end-user or an audience (Hoffert, Cremin, Ali, Smoot, & Strull, 2002). In the second, media logic is defined as a process through which media transmit and communicate information (Altheide, 1979; Dahlgren, 1996).

The 'founding father' of the content analysis technique, the behavioural scientist Bernard Berelson (1912-1979) offered a suggestive definition: "[content analysis] is a research technique for the objective, systematic and quantitative description of the manifest content of communication" (Berelson & Lazarsfeld, 1948). Berelson wrote *The Analysis of Communication Content* with Paul Felix Lazarsfeld (1901-1976), an American sociologist who belonged to the Logical Empiricist movement of the Vienna circle of philosophers (Hahn, Neurath, & Carnap, 1929; Uebel, 2012). Lazarsfeld earned a doctorate in Mathematics and is famous among Communication scholars for the Two-Steps Flow of Communication Theory, which claims that most people are not directly influenced by mass media, but that they rather form their opinions based on opinion leaders who interpret media messages.

Content analysis was also known as 'quantitative newspaper analysis', whose history has been described by Klaus Krippendorff in his seminal book *Content Analysis, An Introduction to its Methodology* (2012). The transition from 'quantitative newspaper analysis' (mainly journalistic-driven), to the current content analysis (largely applicable to most fields of research), happened in the 1950s because of two main reasons: (1) analysts began to employ new statistical tools borrowed from other disciplines, especially from survey research but also from experimental psychology; and (2) content analysis data became part of larger research efforts and so content analysis no longer stood apart from other methods of inquiry (Krippendorff, 2012).

The technique is nowadays widely and successfully applied to the study of journalism. The literature is huge and this study is inspired by a recent wealth of studies, among them: Lansdall-Welfare et al. (2017), Robinson et al. (2013), Nicholls (2011) and Rosie et al. (2004). For example, in the paper by Lansdall-Welfare et al. (2017) a simple content analysis was performed on 150 regional British newspapers. The method allowed the authors to identify specific events like wars or epidemics. The advantage of this data-driven method was to complement the traditional method of close-reading in identifying trends within some historical corpora.

With regards to the method of sampling, this research benefits from Lacy et al. (2001), Lacy, Robinson, and Riffe (1995) and Riffe, Aust, and Lacy (1993). Lacy et al. (2001) especially poses the question of how many sampled edition dates are needed to adequately represent the population during a particular period of time. They suggest that the solution would be a stratified sampling that yields constructed weeks. It is not the intention of this study to analyse a trend over time, such as the evolution of statistical information/communication over a period of years. The three pieces of research mentioned however represent for this study an excellent starting point on a reflection about sampling as illustrated in section 5.7.1.

Overall, this research strategy aims to provide an answer to the main RQ by offering an additional description of how journalists use quality statistics in reporting health and crime. There is however a scarce body of knowledge on how journalists access and interpret numbers when producing news stories by making sense of quality statistics.

Thus, by applying the very definition of content analysis, which is conceived as a scientific tool that makes replicable and valid inferences from texts, this study attempts to use two techniques: multilevel modelling and multiple correspondence analysis. In this way, I conform to three basic principles of the scientific method, which content analysis stems from, namely: (1) objectivity: which means that the analysis is pursued on the basis of explicit rules, which enables different researchers to obtain the same results from the same documents or messages; (2) systematicity: the inclusion or exclusion of content is done according to some consistently applied rules whereby the possibility of including only materials which support the researcher's ideas is eliminated; and (3) generalisability: the results obtained by the researcher can be applied to other similar situations (Prasad, 2008).

5.7.1 Sampling

In Media and Communication research, sampling is a method to systematically select a subgroup, or sample, from a larger population in order to estimate features of the population. In other words, according to Krippendorff (2012),

sampling is the limitation of observations to a functional subset of elements that is statistically representative of the total universe. In its essence, sampling is a means to describe the population through the analysis of a smaller subgroup.

At the beginning of this study, four daily national newspapers were selected together with their Sunday editions: *The Guardian* and *The Observer*, *The Times* and *The Sunday Times*, *The Daily Mail* and *The Mail on Sunday*, *The Daily Mirror* and *The Sunday Mirror*. Accordingly, the four newspapers were selected on the following three criteria: (1) impartiality and trust; (2) news values; and (3) accessibility to their databases. The first criterion is based on a survey commissioned by the BBC from the IPSOS Mori Institute soon after the Savile scandal and based on responses from 1,864 adults (over 15 years old) to whom were given a scale with a score from 1 (-) to 10 (+).

The IPSOS Mori results have shown that *The Guardian* and *The Times* titles were equally considered unbiased and trustworthy, whereas *The Daily/Sunday Mirror* and *The Mail* titles were slightly under the average. This picture enriches the news value frame which was chosen as the second criterion. News values are crucial to articulate the dimensions of quality information that substantiate the news stories by timeliness, prominence and trustworthiness. Accessibility was also considered a valid criterion, as it facilitated considerably the work of the researcher in terms of maximisation of time. All eight newspapers were accessible, archived and coded in the Lexis Nexis database. This way, the articles were gathered into a body of texts easily manageable by a lone researcher.

The sampling of texts in content analysis has been thoroughly described in the seminal work by Klaus Krippendorff (2012), who distinguished three major sampling techniques: random sampling, systematic sampling and stratified sampling. Krippendorff argues that “the sampling of texts needs the plan to ensure the sample population does not transfer any biases into the answers to the research question” (2012, p.102).

The study uses a systematic random sampling methodology while asking how quality statistics articulate quality news and legitimate stories using numbers. As suggested by Krippendorff, “systematic random sampling selects units within a list of pre-randomised possible units”. Therefore, *The Guardian* and *The Observer*, *The Times* and *The Sunday Times*, *The Daily Mail* and *The Mail on Sunday*, *The Daily Mirror* and *The Sunday Mirror* were selected at a national level and among the traditional journalistic categorisation of newspapers (Connell, 1998; Örnebring & Jönsson, 2004); as at the present research: two broadsheets and two tabloids (Hallgren, 2012).

5.7.2 Coding

At the origin of the coding, I summarised the five dimensions of quality, their explanations and key features in the table below, a strategy that aimed to facilitate the subsequent analysis at statistical and journalistic level and to answer the main research question: how do journalists engage with statistical information to give quality to their work?

Dimensions and their explanation	Key features
RELEVANCE	
The degree to which statistics meet current and potential needs of the users.	Any assessment of relevance needs to consider: Who are the current and potential users of the statistics? What are their needs? and How well the output meets these needs
In journalism, the concept is related to that of engagement or cultural proximity that involves emotions or interests.	Human interests at the centre of the story and cultural proximity. The statistics establish the appropriateness of the example, the credibility of the owner as a source.
ACCURACY AND RELIABILITY	
In statistical terms this is the closeness between an estimated result and the (unknown) true value.	This point involves: Sourcing Corrections
In journalism, it is considered one of the key principles in news reporting.	Accuracy means not only getting the objectively verifiable 'facts' right - names, places, dates of birth, quotes, the results of sporting fixtures - but accurately reporting opinions expressed by those who you report (BBC Journalism Academy). Verification and self-evaluation.
TIMELINESS AND PUNCTUALITY	
Timeliness refers to the lapse of time between the period to which the data refer and publication of the estimate. Punctuality refers to the time lag between the actual and the planned dates of publication.	Key feature should include the following: Production time; Frequency of release, and Punctuality of release
In journalism, this emphasises what is new. It is part of the journalistic value of newsworthiness.	When did or will the event happen? When will the audience know about the story? What is the deadline?

INTERPRETABILITY AND COHERENCE	
Interpretability is the degree to which statistical information is easily comprehensible. Coherence is the degree to which all the parts fit together well in a logical order.	Interpretability may be addressed in terms of: Statistical narrative Coherence should be addressed in relation to: Other statistics in the same domain; Sources and outputs
In journalism, those who write for broadsheets will usually have a good command of language and be able to argue their point well. They will often use a deductive style of reasoning; this involves a logical progression of points which confirm the original statement. Nonetheless, one should always be aware that their main objective is to sell newspapers and hence they may be likely to sensationalise the numbers.	Key features may include: Statistical argumentation How numbers fit in the storytelling
ACCESSIBILITY	
Accessibility is the ease with which users are able to access the data. It is also relating to the format(s) in which the data are available and the availability of supporting information.	Specific areas where accessibility may be addressed include: Assistance to locate statistical information
Journalists shares this point with statisticians.	Making datasets easily accessible on online platforms Downloadable datasets

Tab. 10 *Five quality dimensions used in coding.*

I made use of codes to highlight the five dimensions in Tab. 10 (which shows the quality dimensions in the left column in the context of statistics and journalism, and key features in the right column) by adopted the following 26 categories to not only answer the main RQ but also the related sub-question: does information quality translate into quality journalism? For the full codesheet and related codebook see the Appendix 4 and 5.

1.	journalname	Name of the journalist.
2.	journogender	Gender of the journalist.
3.	paper	Name of the newspaper.
4.	date	Year of the newspaper.
5.	periodicity	Period of the year when the article was published (in trimesters).
6.	length	Number of words in the article.
7.	genre	Journalistic genre of the article.
8.	topic	Main topic of the article.
9.	category	Under which category does the topic fall?
10.	typstats	What type of statistics is present?
11.	typedata	What type of data is present?
12.	verification	Is there any mention of missing/partial statistics?

13.	source1	What is the main source of statistics?
14.	source2	Source provenance.
15.	source3	How many statistical sources are cited?
16.	humans	Do the stats used involve any human interest topics?
17.	reliability	Are the stats reliable?
18.	validity	Are the stats valid?
19.	addvalue	Are the stats managed/manipulated by the journalist?
20.	evaluation1	Does the article contain any comments on the stats?
21.	evaluation2	If yes, what type of comments?
22.	criticality1	Does the article contain any criticism of the stats?
23.	criticality2	If yes, what type of criticism?
24.	statsclaim	What is the statistical claim?
25.	timeliness1	Time passed between the statistical release and the publication of the article.
26.	timeliness2	Time passed between the research fieldwork and the statistical release.

Tab. 11 *Variables and relative questions that guided the manual compilation of code-sheets.*

On the theoretical side, Krippendorff has succinctly summarised the skill of coding as “a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rule of coding” (2012, p.23) and considers coding a means to build long-lasting records for short-lived phenomena by creating a bridge between observation and interpretation. I followed the advice given by Miller and contained in her seminal book on language and communication (1951) that: “in order to handle larger blocks of verbal material in a statistical way, it seems necessary to reduce the variety of alternatives that must be tabulated” (Miller, 1951). This was the reason that I created a manageable body of 26 variables.

5.7.3 Multilevel modelling

Media and Communication research is concerned with performing levels of analysis that can be differentiated into four types: macro-macro, macro-micro, micro-micro and micro-macro. The two within-level relationships are linked by the two cross-level relationships that are consequently explicated by various theories of organisational, institutional and social processes.

Multilevel modelling is particularly useful for this study as it seeks to answer the sub-question: do quality statistics automatically lead to quality journalism? Thus, it applies the levels as follows: journalist (Level 1); newspaper (Level 2); quality dimensions (Level 3); and type of source (Level 4). These variables cast an insight on the four levels that link journalists to a certain newspaper to an awareness of the five dimensions of quality statistics and an inclination to prefer official or non-official type of sources.

Through these lenses, statistical communication is thus conceived as a process from production to consumption that occurs at both micro-individual and macro-social levels. In other words, according to Pan and McLeod (1991), mass communications and the media consist of persons in bureaucratic organisations producing diverse messages for multiple consumers with impact on individuals, families and social systems. Similarly, statistics is generally communicated by organisations through press releases to journalists and from them to the general public. The graphic developed below is after McNelly's 1959 Theory of News Flow and explains the flow of this statistical news, which was illustrated in Section 2.1.

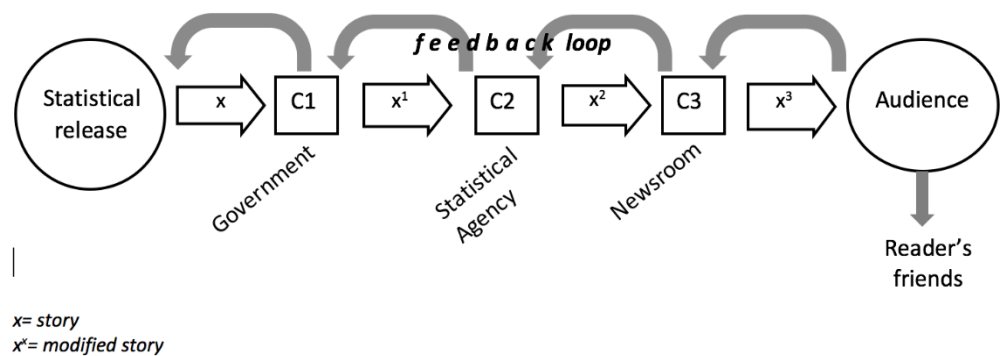


Fig. 7 The flow of a statistical release through government (C1), agency (C2) and newsroom (C3) to finally reach the readers and their friends.

Such systems can be observed at different levels and as a result produce data with variables observed at several distinct hierarchical levels. This leads to research and analysis problems that focus on the interaction of variables, which describe the individuals and variables that describe the groups. This kind of research is now generally referred to as *multilevel research*. The next step of this is a kind of statistical analysis that evidences in a dynamic way how the variables under scrutiny can reveal one or more answers to the main RQ.

5.7.4 Statistical analysis

Together with Frequencies and Cross-tabulations the statistical analysis used here are also Multiple Correspondence Analysis (MCA) and Correspondence Analysis (CA), which are descriptive methods that allows the analysis of the pattern of relationships of several categorical dependent variables. In this way, the present study aims to investigate the possible relationship between journalists and their uses of statistical information. As such, it can also be seen as “a generalisation of principal component analysis when the variables to be analysed are categorical instead of quantitative” (Abdi & Valentin, 2007, p. 66). In fact, all 26 variables are categorical.

As already applied to the study of journalism by Hovden (2012), Hartley and Ellersgaard (2014), Umbricht (2014), Wessler and Rinke (2014) and Zuell (2010), MCA is mainly used in such research to examine several categorical variables. Though χ^2 (chi-square) can be used to determine whether a statistically significant relationship exists between categorical variables, χ^2 does not provide details into the nature of the relationship. MCA offers an insight into the relationship between variables by displaying on a map which variables tend to appear together (Jensen, 2013). The method was relevant in highlighting the nature of relations between journalistic sources and newspapers. It helped to seek an answer to sub-questions like: do journalists emphasise a certain type of statistics? What statistics sources do journalists use most often?

5.8 Close-reading Rhetorical Structural Analysis

In this study, close-reading analysis is a text-centred strategy that aims to seek an answer to the question of how journalists articulate news stories on health and crime using statistics. It looks to analyse whether quality statistics are articulated with regards to the five quality dimensions. Therefore, after the content analysis, I performed a close-reading of a systematically selected sample of 8 (n=8) news articles, one from each newspaper in each topic, four related to health and four to crime news. To be sure, I adopted a two-phased approach: a macro-structural text analysis that made use of graphical representation, followed by a structural text analysis.

To Brummet, who dedicated a comprehensive book to this technique, “close reading is the mindful, disciplined reading of an object with a view to deeper understanding of its meanings” (Brummett, 2009, p. 53). Accordingly, this study looks at the relations between parts of text behind four UK newspapers and how health statistics and crime statistics were covered by also including those factors that triggered the flow of information quality.

It is acknowledged that *media texts* present versions of the world through the ‘packaging’ (other scholars would say ‘framing’) of events and characters into stories, and this is particularly true for journalism. Structural text analysis through the lens of the Rhetorical Structure Theory (RST) is therefore an analytic way to gather information about how journalists make sense of statistical information. Textual analysis applied to journalism has been passionately defended by Fürsich (2009) and Phillipov (2013) who have argued about the importance of implementing such a research method as it focuses on the underlying ideological and cultural assumptions of the texts.

More precisely, RST postulates that there is a hierarchically connected structure of texts, where all components play a role with respect to other components in the text, thus explaining coherence. In most cases, RST presents written text as a tree-like structure with rhetorical relations holding between parts of the text. According to Van Dijk (1986; 1988a; 1988b) news reports are organised by a conventional news schema. He proposes a relevance ordering of news. The most important information is the Main Event and it is usually in the initial Summary of Headline and Lead, which is followed by Context, History and Consequences in a strict order (Zhang & Liu, 2016). This schema is commonly referred to as the ‘inverted pyramid’ structure. Such a form puts immediate, relevant and the most newsworthy information at the very top and then the remaining information follows in descending relevance, with the least important at the bottom. In Chapter 7 I will thoroughly describe the importance of this analysis while asking how numerical information is structured in news.

	Topic	Newspaper	Date	Title	Author
1	Crime	The Guardian	17/10/2013	Crime figures fall to record low.	Owen Bowcott
2	Crime	The Times	18/10/2013	Savile effect seen in higher number of reported sex attacks.	David Brown
3	Crime	The Daily Mail	23/04/2014	Violence drops 12% as alcohol prices rise.	James Slack
4	Crime	The Daily Mirror	13/02/2015	Drink blamed for 53% of all adult assaults.	N/A
5	Health	The Guardian	9/12/2015	Infant death rate in US drops to historic low, CDC reports.	Ellen Brait
6	Health	The Times	31/12/2016	Why healthier eating is making us fatter.	Tom Whipple
7	Health	The Daily Mail	29/12/2014	How baby boomers are invading the countryside.	Peter Campbell
8	Health	The Daily Mirror	16/12/2013	Drink sensibly to guard your mental health.	David Babington

Tab. 12 *Details of articles analysed in Chapter 7.*

5.9 Semi-structured interviews

This strategy aims at substantiating and complementing the findings of both content and close-reading analysis. It seeks to understand how statistics are used to articulate news. Also, it points to the understanding of the quality dimensions, how they are applied throughout the journalistic workflow and to analyse the cultural context within which the articulation of statistics happens and is legitimated by what has been described by Tuchman (1972) as ‘a strategic ritual of objectivity’.

A semi-structured interview is a qualitative method of inquiry that combines a pre-determined set of open questions, which prompt discussion with the opportunity for the interviewer to explore specific themes. Interviews are particularly useful for getting the story behind a participant's experiences. The interviewer can pursue in-depth information around the topic under study (McNamara, 1999). In general, qualitative research interviews seek to describe the meaning of a central theme in the life/world of the subjects. According to Kvale (2008), the main task in interviewing is to understand the meaning of what the interviewees say.

I was confident that this technique would have provided a unique perspective on the work of those journalists who routinely deal with numbers. Thus, 14 interviews were realised between 2016 and 2017 with journalists from *The Guardian*, *The Times*, *The Financial Times*, *The Trinity Mirror* and freelancers.

Basically, there are three types of interviews: structured, unstructured and semi-structured. The reason why I chose a semi-structured approach is because it is a "form of interviewing that has some degree of predetermined order but still ensures flexibility in the way issues are addressed by the informant (Dunn, 2000, p. 61).

One main disadvantage was encountered in carrying out the interviews, what has been identified by Wengraf (2001) as the 'double attention' problem, which is "that you must be both listening to the informant's responses to understand what he or she is trying to get at and, at the same time, you must be bearing in mind your needs to ensure that all your questions are liable to get answered within the fixed time at the level of depth and detail that you need" (2001, p.194). In the present study, interviews were audio recorded, which has the inherent advantage of accuracy when it comes to transcription. One of the strategies that helped me to overcome the 'double attention' problem was taking succinct notes in the form of both brief sentences and conceptual maps. Taking notes was also helpful to check whether all the questions had been answered and to add further questions when necessary.

Again, with regards to this type of qualitative interviews, Jennifer Mason (Mason, 2002a, 2002b) argues that, despite the large variations in style and tradition, all qualitative and semi-structured interviewing has certain core features in common, as also noted by Edwards and Holland (2013): (1) the interactional exchange of dialogue (between two or more participants, in face-to-face or other contexts); (2) a thematic, topic-centred, biographical or narrative approach where the researcher has topics, themes or issues they wish to cover, but with a fluid and flexible structure; and (3) a perspective regarding knowledge as situated and contextual, requiring the researcher to ensure that relevant contexts are brought into focus so that the situated knowledge can be produced. Meanings and

understandings are created in an interaction, which is effectively a co-production, involving the construction or reconstruction of knowledge.

All three features highlighted by Mason can be found in the 14 interviews realised for the present research. The face-to-face technique allowed an 'interactional exchange' that captured the dynamics of the work of journalists; the thematic approach was also helpful to gather thoughts, opinions and concerns with respect to the journalistic profession itself. The flexible structure of the questions allowed me to go beyond and explore neighbouring areas of knowledge concerning statistical education and wrongdoings in the management of numbers. Lastly, the interviews highlighted the context in which the ability of making sense of statistics happens and how the construction of quality news brings risks and advantages and, most importantly, the interviews permitted an understanding of the logic behind the quality-making process.

5.9.1 Sampling

In terms of the conducted semi-structured interviews, a purposive-sampling strategy was adopted. Purposive sampling strategies are non-random ways of ensuring that particular categories of cases within a sampling universe are represented in the final sample of a project. The rationale for employing a purposive strategy is that the researcher assumes, based on *a-priori* theoretical understanding of the topic being studied, that certain categories of individuals may have a unique, different or important perspective on the phenomenon in question and their presence in the sample should be ensured (Mason, 2002b; Trost, 1986). Thus, I identified 14 journalists ranging from political correspondents and health editors to data journalists and freelancers with the main commonality of working with numbers to deliver stories on a daily basis.

Code	Newspaper	Journalist's Role
#INT01	<i>The Guardian</i>	Home Affairs' Editor
#INT02	<i>The Guardian</i>	Political correspondent
#INT03	<i>The Times</i>	Data journalist
#INT04	<i>The Times</i>	Health Editor
#INT05	<i>The Financial Times</i>	Head of the Data team
#INT06	<i>The Financial Times</i>	Data journalist
#INT07	<i>The Telegraph</i>	Home Affairs' Editor
#INT08	<i>The Telegraph</i>	Journalist
#INT09	<i>Trinity Mirror</i>	Crime reporter
#INT10	<i>Trinity Mirror</i>	Journalist
#INT11	Freelance	Data journalist
#INT12	Freelance	Open data award 2016
#INT13	Freelance (former BBC)	Data Educator, BBC World News
#INT14	Freelance (former BBC)	Former BBC Statistics

Tab. 13 Codes used for the analysis of journalist interviews.

5.10 Focus groups

Focus groups involve talking with people but in ways that are self-conscious, orderly and partially structured. I conceived this method to support interviews and content analysis to answer the main RQ but also to seek an answer to how readers react to numerical information. The advantage is that it can reveal a wealth of detailed information and deep insight otherwise impossible through other methods. This technique was both a great challenge and a great opportunity for the objectives of this study as it represents a chance to fill a gap in the literature and to provide a deep understanding of complex thinking such as the response to numerical information in news.

An advantage is that focus groups “have high face validity and the technique is easily understood and the results seem believable to those using the information and the results are presented in lay terminology embellished with quotations from group participants” (Krueger & Casey, 2014, p.76). Another advantage, according to the literature, is that focus groups are low cost compared to the richness of the results that they provide. When well-executed, a focus group creates an accepting environment that puts participants at ease, allowing them to thoughtfully answer questions in their own words and add meaning to their answers (Mbu, Aloysius, & Menjo, 2014).

However, we know very little about how readers interpret and read statistics and at the moment of the time of writing no research has been found on this specific topic. The work of Jenny Kitzinger however remains a point of reference in Media and Communication research (Eldridge, Williams, & Kitzinger, 1997; Kitzinger, 1990, 1994, 1999) for her precise analysis of the needs of the audience and their implications when responding to media messages, texts and contents. Kitzinger recognises that:

Any theory about the media is incomplete if it does not take audiences (or “readers”) into account. We may analyse texts and the processes through which they are produced, but without understanding audiences, such analyses can imply more than they deliver. To fully assess the media’s role in society – its mediation, limitations, and sometimes unexpected implications – we need to study how people “read”, use, and respond to the media. This is perhaps the most difficult task of all (Kitzinger, 2004, p.241).

The role the readers have in information consumption and the importance of an attentive evaluation have been pointed out in Section 3.1, where I reviewed government reports concerning quality statistics. In one of them, the *European*

Statistical System Handbook for Quality Reports, other areas were identified, which are relevant to measuring and reporting on quality: the assessment of user needs (the readers) and perceptions. According to that report, users should be the starting point for any quality considerations and so information regarding their needs and perceptions should be obtained as a priority.

This last point is suitable for assessing statistical-driven news in supporting the five dimensions with the logical conclusion that quality, and its assessment, are in fact unavoidable issues for both communication scholars and media professionals. Regrettably for journalism studies, this area – news audiences – is one of the less studied in the field mainly because “audience is a shifty concept” (Nightingale, 1996, p.194). Nightingale warns us that: “the audience-text relation is a chimera, which can only ever be apprehended partially” (1996, p.196).

The problematic relationship is indeed real but I disagree with Nightingale. The audience-text relation is not a chimera, a monstrous hybrid creature of the Greek mythology, whose name has been used by Nightingale to describe the audience as composed of disparate parts, perceived as wildly imaginative and implausible to research. Audience analysis involves complex techniques of course, therefore it has to be seen as a part of a whole ‘landscape’. “Audiences get defined from particular sites, in relation to particular spaces, and within particular contexts” (Hay, Grossber and Wartella, 1996, p.152), and for this reason, the ‘particular context’ I want to analyse is that of numerical information. The ‘particular space’ or ‘landscape’ is that of the British press and I believe that focus groups are the best method to investigate readers’ attitudes towards the use of statistics in news.

A key characteristic in focus groups is the interaction between participants of the group (Morgan, 1997). This makes them different from semi-structured interviews which rely on the interaction between interviewer and interviewee. Focus groups are also different from interviews because it is possible to gather the opinions of a large number of people, in this case 22 (n=22), for comparatively little time and expense. Tab. 14 below shows the composition of the focus groups.

Code	Date	Location	N of participants	Sex ratio (male/female)	Age range
#FG1	6/11/2016	Leeds	6	3 M/3 F	35-65
#FG2	3/12/2016	Leeds	6	2 M/4 F	35-45
#FG3	21/01/2017	Manchester	5	2 M/3 F	30-40
#FG4	5/02/2017	Manchester	5	3 M/2 F	30-40

Tab. 14 *Focus group demographics.*

Given a lack of research on how statistics in news are understood by readers, the main challenge of this study lies in the preparation of the written materials. I developed four newspaper stories related to health and crime: one

with authoritative (official or expert) data, and one with anecdotal data. These stories were based on real-world data-driven facts and were extensively rewritten to adhere to the five quality dimensions. More specifically, stories using reporter-generated evidence were based on conclusions on independent data analysis from the reporter whereas stories using authoritative evidence were based on the conclusions of official and expert source analysis.

The titles of the pieces (full articles in the Appendix) used in the focus groups are as follows:

- A) Violent crime in England and Wales is up 24%, police figures show. *Murder rate rises 20%, knife crime 9% and gun crime 7% according to police recorded crime figures* (expert data);
- B) Violent crime in England and Wales is rising, police reports. *Murder rate rises as well as knife crime and gun crime according to police* (anecdotal data);
- C) Cancer rates up 12% in 20 years, say Cancer Research UK. *Survival rates have also increased over past 40 years, but researchers emphasise that four in 10 cases could have been prevented by lifestyle changes* (expert data);
- D) Cancer rates up in 20 years. *Survival rates have also increased but researchers emphasise that only a few cases could have been prevented by lifestyle changes* (anecdotal data).

The idea behind the focus groups was to attempt to simulate a group of friends or people who have things in common and feel relaxed talking to each other. The facilitator kept the group on topic using a set of questions that were used in each focus group. The set of questions however was not directive, allowing the group to explore the subject from as many angles as they pleased. This technique was crucial to the achievement of the research objectives and in working out patterns, attitudes and beliefs regarding the uses of statistics in news and their quality dimensions.

5.10.1 Recruitment of participants

Focus group results cannot generally be used to describe how an entire population would respond to the same questions, so the type of sampling used to describe whole populations is not necessary. Thus, a purposive-sampling strategy was also adopted by thinking of who would have provided the best information possible for the purpose of understanding how statistical-driven stories are understood. The participants were selected using the online platform Meetup.com, which gathers people with similar interests and sorts them out by profiles. Using this method of recruitment, 96 potential participants were reached

and then almost a quarter (n=22) were then selected and invited to attend the four (=4) focus groups.

A purposive-sampling technique was therefore the best choice to select the population of this study because I believed the participants had the most relevant knowledge and the most up-to-date information with regards to the topic of the present study, the use of statistics in journalism.

5.11 Q-sort method

In line with the originality of theories and methods that this study offers and in order to offer another view on how readers manage statistical information, I decided to improve the qualitative data collected through the focus groups by adopting the Q Methodology. One of the intentions behind this choice was to gather readers' opinions and thoughts on statistics in news quantitatively without making use of questionnaire or surveys.

Q Methodology has been employed in research on audiences since the 1960s, but has not fully entered Media and Communication audience research, thus most scholars remain unfamiliar with it. However, Q Methodology offers several advantages and is a valuable addition to the researcher's toolkit either in the field of Media and Communication or Social Sciences. On a theoretical basis, Q Methodology provides insights into audience subjectivities "in a much richer way than that provided for example, by conventional surveys, while providing more structure and better replicability than purely qualitative approaches such as focus groups or semi-structured interviews" (Schroder, 2012, p.801).

On February 2017, Charles H. Davis of the Faculty of Communication and Design at Ryerson University in Toronto, Canada, released a paper on the bibliography of Q Methodology in audience research (2017) and the results were essentially that this quantitative approach is undergoing a revival after a decade of neglect in the 1990s. Davis and Michelle (2011) explain how the Q method stands out from both qualitative and quantitative methods. Their explanation is worth reading in full:

The qualitative-quantitative divide in audience research remains largely intact. Indeed, every audience or mass communication research methodology textbook makes a basic distinction between quantitative and qualitative methodologies, since these two approaches are commonly considered to reflect fundamentally different epistemologies and utilities. And, while mixed-method approaches are increasingly favoured, the methods themselves are generally not true methodological hybrids, and are more often used

for quite distinct yet complementary purposes. Audience behaviours, attitudes, socio-demographic attributes, and the correlates and causal relationships among them are generally investigated with quantitative methods, while audiences' understandings, perceptions, feelings, motivations, and desires are generally investigated with qualitative methods such as open-ended interviews, focus groups, and ethnographic observation (2011, p.528).

While Davis and Michelle explain the reasons behind the researcher's choice of qualitative and quantitative approaches, which are largely used in this study, Brown, Selden, and Durning (2007) maintain that Q Methodology was explicitly designed to objectively uncover and analyse similarities and differences in the subjective viewpoints of individuals, "a task at which it excels" (Davis & Michelle, 2011, p.529). It is an exploratory interpretation, an intensive methodology, suitable for small populations of respondents, and is 'fortified' through recourse to the statistical operation of factor analysis ('Q' is the statistical symbol for the factor analysis technique). Accordingly, 22 participants was a suitable population to perform the Q Method.

The principle of Q Methodology consists of presenting a person with a set of statements related to a certain topic, and then asking them to put these statements into a grid based on a scale ranging from 'agree' to 'disagree'; this operation is called Q sorting (in some literature the most common name of the method is Q-sort). Q sorting consists of statements not being factual expressions but mutually exclusive, opinion problems based on an assigned significance.

The Q-sort I adopted after the focus group discussions consisted of 30 statements in relation to the issue 'understanding of statistics' of the four newspaper articles subdivided in A, B, C and D (see the Appendix). The grid shaped as an inverted-pyramid was categorised in scale from -5 (strongly disagree) through 0 (neutral) to +5 (strongly agree). Participants were invited to agree or disagree with the statements related to the articles they previously read (see Appendix for the example adopted in this study).

Technically, the factor analysis, which is nowadays used in Communication research (McCroskey & Young, 1979; Park, Dailey, & Lemus, 2002) and Journalism studies (Costera Meijer & Bijleveld, 2016; Kioussis, 2004; Meyer, 1988), was helpful in analysing the variability among the observed variables and in finding latent independent variables. However, the Q analysis used for this study is both a quantitative and qualitative research method at the same time. It is quantitative because it uses the factor analysis as a calculation method, and qualitative because of descriptive approaches that should be done for each factor, tracked down and substantiated by the qualitative data collected during focus group discussions.

The major advantage of this method was that it made use of one of the most important statistical techniques with a potentially huge exploratory analysis: structures of subjectivity gathered from the participants during the Q-sorting were subjected to a factor analysis and resulted in factors that only represent segments of subjectivity.

In the end, by cross-analysing the Q-test results with the qualitative data from the focus groups, I gathered a detailed picture of the attitudes, also expressed in terms of subjectivity, towards numerical information in the news. This way the study provided a deep insight into the issue of statistical uses in news from a collective point of view (such as that of the focus group) to a more single one nuanced with psychological motivations and contradictory attitudes towards numerical information according to what Paul Ricoeur has called 'hermeneutics of suspicion'.

5.12 Ethical considerations

The research has been approved by the Ethical Committee of the University of Leeds according to the Light Touch Ethical Review guidelines (original document in Appendix). Two important ethical issues worth mentioning here are confidentiality and anonymity. Participants were assured that all the data collected would remain secure on a computer accessible by password only; that information supplied would not be broadcast and would remain confidential, and also that the names of participants would be kept anonymous.

Focus groups posed a different issue in relation to confidentiality therefore the researcher asked participants to treat the discussions as confidential. In this regard, Cameron (2005) observes that: "it is appropriate to remind people to disclose only those things they would feel comfortable about". The researcher avoided such sensitive issues by considering topics that were not controversial or sensitive, such as health and crime.

5.13 Conclusions

This chapter has explained in detail the research design, the methods and questions that drove the whole study. It has also rationalised the data collection and the different approaches together with the operationalisation of the research. It described how quantitative and qualitative methodologies were utilised and the reasons why these methods were considered the best options to answer the question of how statistics are used in the articulation of information quality in news reporting.

Chapter 6: Findings

6.1 Introduction

This chapter presents the analysis of the data collected followed by a discussion of the research findings that resulted from each method. It provides a detailed account of the findings, in the hope that these results will elucidate the uses of statistics in articulating the five quality dimensions in news reporting. In this sense, the chapter aims to answer the main research question of this study: how do journalists engage with statistical information to deliver quality news?

Overall, the findings suggest that journalists tend to use statistical information as a tool to fulfil their deontological expectations of producing quality journalism. However, as it became clear from the interviews, one of the underlying motivations seems to also be the need to achieve credibility and authority, which entails a certain degree of building up the ability to persuade by means of trust. In other words, while journalists tend to make normative claims about the use of statistics to improve the 'quality' of their outputs, the same data suggests that statistics also play a role in fulfilling aspirations around credibility and influence. This aspirational aim was further challenged by the audience's attitude towards statistical information in the news. Even though this study is not primarily concerned with audience studies, the focus-group data highlighted that there is a problem of 'public trust' in numbers, particularly around the way they are published and conveyed through news media.

The importance of these findings lies in the fact that this apprehension towards statistical information can eventually result in a broken 'social contract' (a non-written agreement between journalists and their readers). This informal contract, made explicit since the early 20th century, has awarded journalists the ability to 'speak' in the name of the public, and a degree of legal protection, in exchange for responsibility for truth and trustfulness. This is achieved by making sure that they adhere to explicit codes of practice and/or legal regulations (as in the case of broadcast news media in the UK).

Therefore, the incorporation of numbers into their stories seems to be directed at fulfilling some of the requisites of this contract, as they catalyse 'quality' in terms of transparency, reliability and context to the stories. This contract – in most Western countries – has been formulated around practices associated with the notion of objectivity, including fairness, balance and detachment. Consequently, the use of statistics is seen by many journalists as helping to underpin these practices and achieve the core notion.

The findings also suggest that journalists engage with numbers in a reactive manner, rather than a proactive one, by letting the statistics set the agenda. This could be interpreted both as a way of fulfilling the aspiration of

objectivity, and a manifestation of the journalists' inability to intervene with these numbers beyond a descriptive level.

Certainly, statistical reports are believed to be truthful in principle since numbers are treated, as Alain Desrosières (2002) would say, as 'social facts' by journalists. Consequently, these numbers are presented without critical thinking and without a theoretical framework that would allow a more comprehensive interpretation of the statistics in the news stories. Paradoxically, this lack of critical thinking – which is not carried out because of a lack of skills and apprehensions about possible subjectivity – has a negative effect on the delivery of quality, as numbers are often presented in a stand-alone format without context and often without critical elaboration. The content analysis confirms these findings, as it shows a serious lack of critical thinking around the numbers reported. Only on a few occasions did I find that the statistical sources were questioned or cross-referenced to others, as often happens with more traditional news sources.

The interview data brings to light the underlying dynamics behind the content analysis data. They suggest that journalists work under the constraints of limited educational backgrounds, and struggle with the challenges imposed by diminishing resources in their working environment, which tends to compromise normative aspirations around ethical values in the newsrooms. Most importantly, the understanding of the meaning of 'quality', according to the interviews, is very vague, and it seems not to be fully integrated into the daily journalistic routine. Nevertheless, there is a wish to convey a 'completeness of information' and to achieve quality as a goal, even though this is neither properly defined nor fully embraced in practice.

Finally, I want to highlight another set of findings around time and time-constraints, as this is often one of the reasons cited as preventing journalists from achieving 'quality' in their work. As several authors have pointed out (Bell, 2000; Phillips, 2012; Reich & Godler, 2014; Starkman, 2010), journalists struggle with deadlines and timely access to information, and this often has a negative impact on their ability to work effectively with data (Borges-Rey, 2016; Coddington, 2015; Seth Lewis, 2015). My findings suggest that this is not necessarily the case. This consideration is related to the timeliness dimension, which refers to the reportage of up-to-date and timely statistics within three months of their release. The data also suggests that, on many occasions, the statistics used by journalists had been available for some time, but that this has made no difference in relation to the ability of the journalists to process them.

So as to be able to analyse the findings in detail, this chapter is structured in five sections: section 6.2 describes and examines the findings derived from the content analysis of each variable through descriptive statistics; section 6.3 aims to conduct a close-reading rhetorical analysis of sampled news articles; section

6.4 focuses on the qualitative analysis of the semi-structured interviews with journalists; section 6.5 looks at the focus group data; and section 6.6 analyses the results of the Q-sort analysis. Each section will be followed by a critical discussion of the findings and their link to the theoretical framework, as contained in the earlier half of the thesis, and to current research, in order to place the new data collected in the context of existing literature and in doing so, underline a need for academic reflection on the topic.

6.2 Content Analysis

This section presents the results in the form of graphs and tables, which were used to identify the frequencies, percentages and correlations of most of the 26 collection points, divided into five dimensions, as previously explained in section 5.7.2. The data was evaluated using SPSS Statistics (Version 23) and covers topics such as crime and health in *The Guardian* and *The Observer*, *The Times* and *The Sunday Times*, *The Daily Mail* and *Mail on Sunday*, *The Daily Mirror* and *The Sunday Mirror* between 2013 and 2016. The aim of this method is to provide an answer to the main research question: how do journalists engage with statistical information to deliver quality in their news stories?

The content analysis examines, in quantitative terms, how journalists engage with the five quality dimensions in the articulation of statistical information. From the results, two of the main findings are worth mentioning here as an introduction: (1) there is an over-reliance on official statistics, which poses serious questions about the nature of the journalist-source relationship in terms of the quality dimension of Accessibility; and (2) there is a lack of critical thinking about statistical reports, which seems to drive journalists to omit information in relation to the quality dimensions of Accuracy and Timeliness. I will now analyse every dimension in detail to shed light on some problematic aspects of the articulation of statistics by journalists.

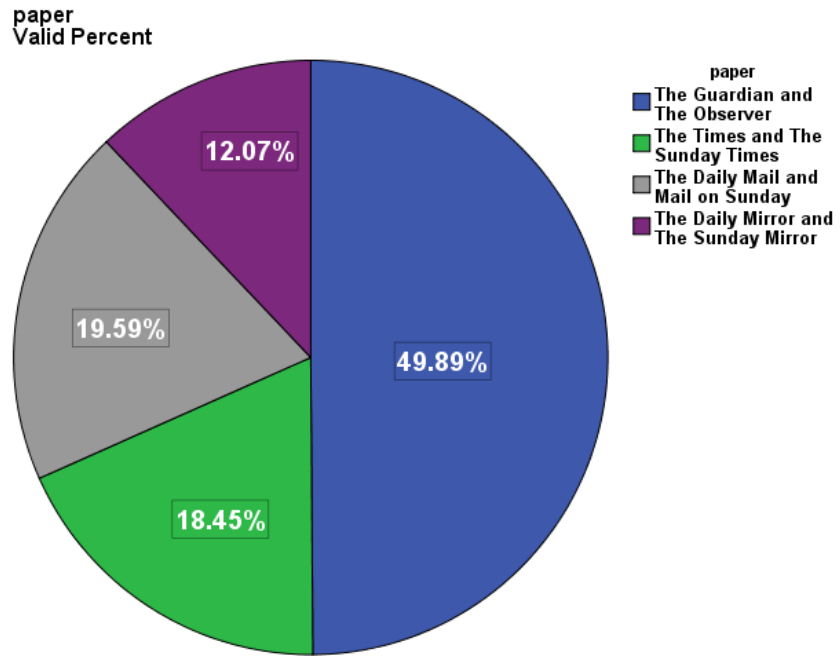


Fig. 8 Sample of newspapers analysed and subdivided by title.

Of the 439 articles containing data, 219 (constituting 49.89% of the total) were published by *The Guardian* and *The Observer*, followed by *The Daily Mail* and *Mail on Sunday* with 86 articles (19.59%). The third position is occupied by *The Times* and *The Sunday Times*, with a slightly lower number of articles than the *Mail* (81, or 18.45%). *The Daily Mirror* and *The Sunday Mirror* come last, with only 53 articles, or 12.07% of the total. These results suggest that *The Guardian* and *The Observer* make use of statistics in a much more extensive way compared to the other newspapers analysed, showing their clear inclination towards using numbers.

The table below shows that there is no remarkable difference in the use of statistics in the coverage of crime and health news overall. The number of articles per topic is well distributed across the newspapers.

Topic	Frequency	Percent	Valid Percent	Cumulative Percent
Valid medicine and health	222	50.6	50.6	50.6
crime, law and corrections	217	49.4	49.4	100.0
Total	439	100.0	100.0	

Tab. 15 Newspapers divided by topic.

A general overview of the data shows a substantial homogeneity in the use of statistics over the four-year period 2013-2016, with 222 articles about medicine and health and 217 about crime, law and corrections. The procedure through which the newspapers were indexed might explain, however, the preponderance of statistics in the sample.

From a different perspective, the picture seems to change when looking at each newspaper individually, as shown in the table below.

paper	topic		Total
	medicine and health	crime, law and corrections	
<i>The Guardian and The Observer</i>	101	118	219
<i>The Times and The Sunday Times</i>	46	35	81
<i>The Daily Mail and Mail on Sunday</i>	50	36	86
<i>The Daily Mirror and The Sunday Mirror</i>	25	28	53
Total	222	217	439

Tab. 16 Cross-tabulation of paper with topic.

On closer examination, it can be said that statistics in medicine and health are used more in *The Times* and *The Sunday Times* (46 articles, compared to 35 on crime) as well as in *The Daily Mail* and *Mail on Sunday* (50 articles, compared to 36 on crime), whereas the statistics for crime-related issues are used more in *The Guardian* and *The Observer* (118 articles, compared to 101 on medicine and health) and in *The Daily Mirror* and *The Sunday Mirror* (28 articles, compared to 25 on crime), but in the last two newspapers there is little difference in the coverage of the two topics. This difference, despite being small, might say something about the editorial preferences of the newspapers. Such preferences can be understood through the newspapers' willingness to appear 'scientific' to their readers, as if the reporting of numbers only – seen as part of a scientific process in the pursuit of what Philip Meyer called “precision journalism” (see Chapter 3) – would easily lead to ethical validity, transparency, impartiality and, ultimately, quality.

Regarding this use of statistics, the American Press Institute claims that: “the statistics establish the appropriateness of the example, the credibility of the owner as a source on local business activity, and telegraph to readers that the story involved a higher level of reportorial effort”. The use of statistics also seems to be part of an ethical procedure that allows journalists to acquire more credibility and authority. But, as the results of the content analysis show, this does not automatically lead to neutral and unbiased information. In other words, statistical information does not translate automatically into quality journalism.

This 'higher level of reportorial effort' that can be translated into the umbrella term of quality, is articulated, I argue, in the five dimensions of Relevance, Accuracy, Timeliness, Interpretability and Accessibility. All these dimensions mark the threshold in the achievement of quality. Wherever possible, I will look at each dimension on two levels: to see how journalists use statistics to successfully achieve each dimension and how statistics help to successfully achieve such dimensions.

6.2.1 First dimension: Relevance

Journalists use the concept of relevance to engage their readers and make them feel part of the story: "the first challenge is finding the information that people need to live their lives. The second is to make it meaningful, relevant and engaging. Engagement really falls under the journalist's commitment to the citizenry" (Rosenstiel & Kovach, 2001, p.189). Relevance is one of the criteria that journalists look for when assessing potential news: "it considers stories about issues, groups and nations perceived to be relevant to the audience" (Harcup & O'Neill, 2001, p.263).

A news item is deemed relevant when it is meaningful to the readers. It can be summarised in a sentence: "people care most about things that affect them" (American Press Institute). To be meaningful, statistics should also be relevant: "statistics should be germane to the democratic debate [...] in ways that are relevant to the democratic process and cycle" because "[statistics] inform decisions right across society and those decisions affect the lives of us all" (Bumpstead, Alldritt, & Authority, 2011, pp.1-2).

I argued previously in this work that Relevance is a threshold of quality. But in order to analyse whether this threshold has been fully achieved or not, I made use of a concept which stems from the idea of relevance: the human interest (Figenschou & Thorbjørnsrud, 2015). In journalism theory, human interest is sometimes described as "getting the story behind the story" or "putting a human face on the news" (Lynch, Kent, & Carlson, 1967, p.675). Indeed, human-interest journalism takes a closer, more personal look at the news. In its essence, "human interest is the universal element in the news" (Hughes, 1940, p.37). This dimension is evaluated here by cross-tabulating the variable of *humans with other variables of *paper, *topic, *category and lastly *genre. This is because I assumed that the human-interest aspect of the use of statistics has some degree of correlation with (1) the newspaper, (2) the topic, (3) the category journalists deal with, and (4) the genre of the article.

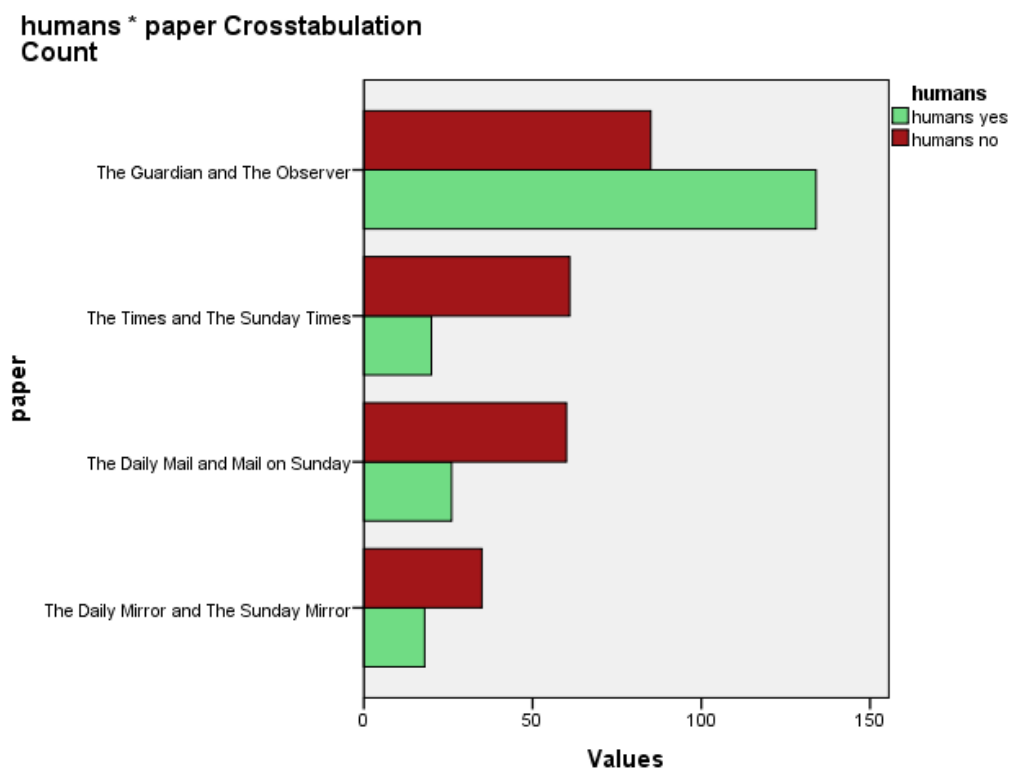


Fig. 9 Cross-tabulation of newspapers with the human interest variable.

	Paper				Total
	<i>The Guardian and The Observer</i>	<i>The Times and The Sunday Times</i>	<i>The Daily Mail and Mail on Sunday</i>	<i>The Daily Mirror and The Sunday Mirror</i>	
Humans yes	134	20	26	18	198
Humans no	85	61	60	35	241
Total	219	81	86	53	439

Tab. 17 Cross-tabulation of the variables *paper and *humans.

To the question: *Do the statistics involve any human-interest issue?* the answer is generally no. According to the data, *The Guardian and The Observer* emerge with 134 articles (out of 219) that integrate statistically driven arguments with human-interest issues in the editorial line. The statistics used in the other newspapers only occasionally involve statistics with the purpose of conveying human-interest stories. Division by topic will help to understand this result better.

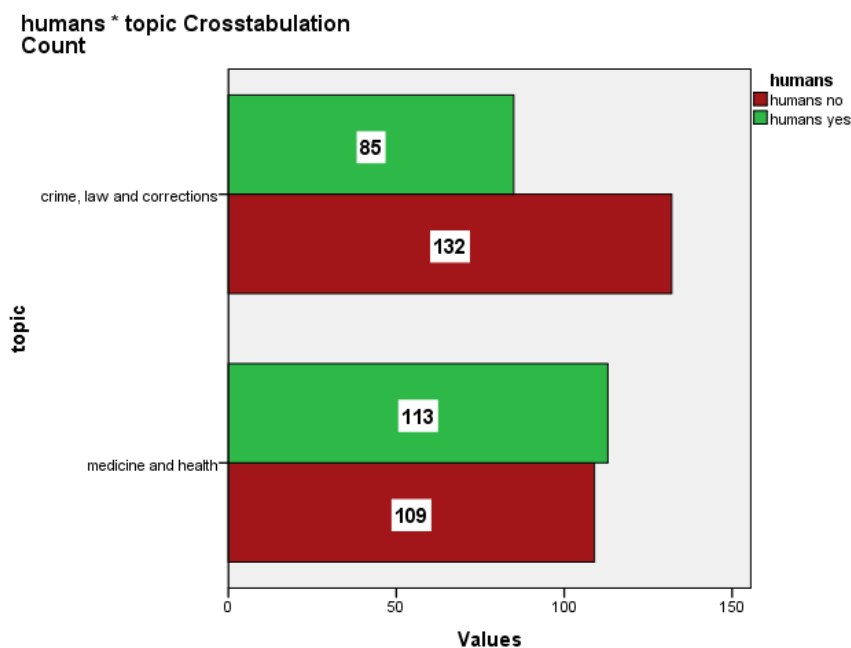


Fig. 10 Cross-tabulation of topic with the human interest variable.

The above bar-chart shows that medicine and health stories are the most represented under the variable of human interest. Taking into account previous research in the area, these results seem to confirm the results of a study by Entwistle and Hancock-Beaulieu (1992), who noted clear differences between quality and popular press coverage of health, noting that “the quality press provides more satisfactory information about health issues” (1992, p.22). In that study, for example, epidemiological information, such as morbidity/mortality rates and incidence of prevalence, was given in 26% of quality articles mentioning diseases, but in only 13% of popular articles.

In my study, public health (mental and sexual health), sex offences, diseases and disorders, and epidemiology are those categories where statistics are used to address the human-interest criterion. Referring to quality journalism, Robert G. Picard (2011) reports that on the specific subject of medicine and health coverage, the literature is scarce. However, recent work by Daniel C. Hallin remains a cornerstone study in the area, especially when he refers to the forms of ‘biocommunicability’ as manifested in health-care reporting (Briggs & Hallin, 2007, 2016; Hallin & Briggs, 2015). Pietro Ghezzi at Sussex Medical School has also recently conducted leading research in the UK on evaluating quality health news online (Chumber, Huber, & Ghezzi, 2015; Maki, Evans, & Ghezzi, 2015; Yaqub & Ghezzi, 2015).

In one case, Weitkamp (2003) examines the coverage of health in five UK national newspapers and confirms earlier reports (like that of Hansen, 1994) that within the branch of science reporting, medicine and health-related topics tended

to dominate newspaper reports, accounting for more than 50%, whereas the next most popular, biology-related topics, accounted for less than 20%. Weitkamp also explains that this may reflect the need to make news stories *relevant* to the readers. An explanation reflected on this first dimension where statistics are used to make news stories sound relevant and to address human-interest issues in stories.

A closer analysis of the categories into which the two main topics are subdivided, shows the following numbers: public health (mental and sexual health) with 42 articles, sex offences with 29, diseases and disorders with 10, and, lastly, epidemiology with 10. These numbers represent 25.74% of the total articles.

Contrary to the aforementioned study by Entwistle and Hancock-Beaulieu (1992), which showed that quality newspapers covered causes more often than treatments, and that in popular newspapers, the responsibility for health is placed with the individual, my own findings suggest that health statistics are articulated in ways to be *relevant* to the readers. Examples of this occur in *The Daily Mail*, in *The Daily Mirror* and in *The Times*, which focus more on the victims of treatments or diseases, while *The Guardian* makes use of statistics particularly to inform about newly released medical reports or about health-care policies.

In other words, *The Daily Mail* and *The Times* give more space to stories where the statistics substantiate the main argument, whereas *The Guardian* places the statistics at the centre of the story, becoming its main element.

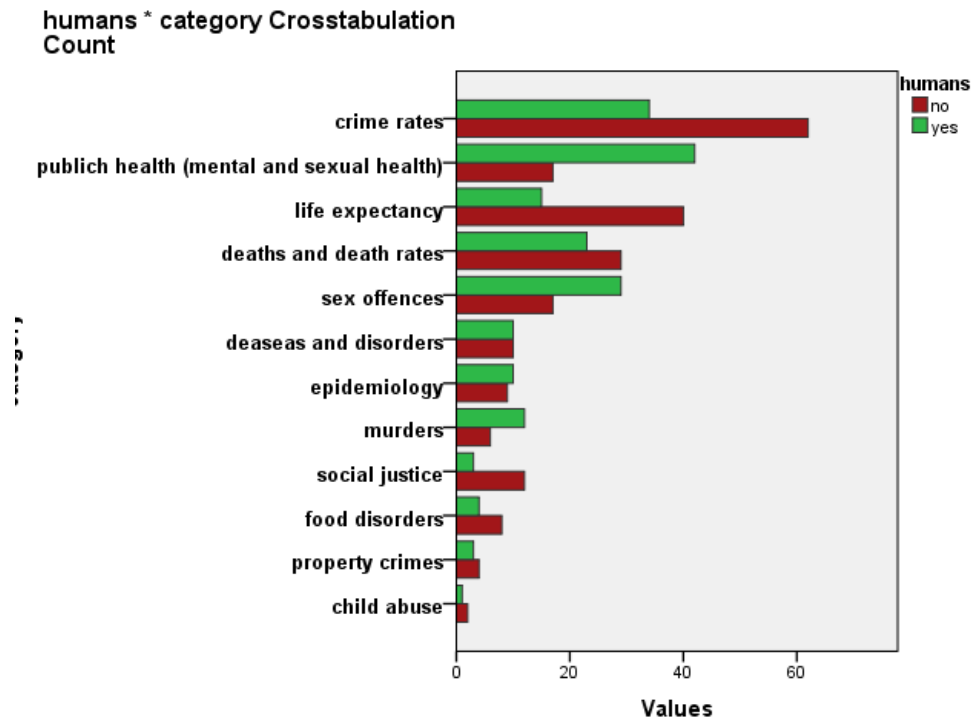


Fig. 11 Cross-tabulation of the human interest with the category variable.

To make a story relevant, an appropriate writing style is one of the skills required (Mencher & Shilton, 1997). To further this point, writing about statistics, and with statistics, is one of the main concerns not only for journalist educators and journalistic organisations (see, for example, *Working with Numbers and Statistics: A Handbook for Journalists* by Charles Livingston and Paul Voakes, and *Understanding Statistics: A Journalist's Guide* by the Knight Center for Journalism in the Americas) but also for statistical agencies (see, for example, *National Statistician's Guidance* from the UK Statistics Authority and *Making Data Meaningful* by the United Nations).

To assess this specific aspect, I found it particularly useful to examine the genre of the article as a variable by cross-tabulating *humans with *genre. The results are shown in the pie charts below (Fig. 12).

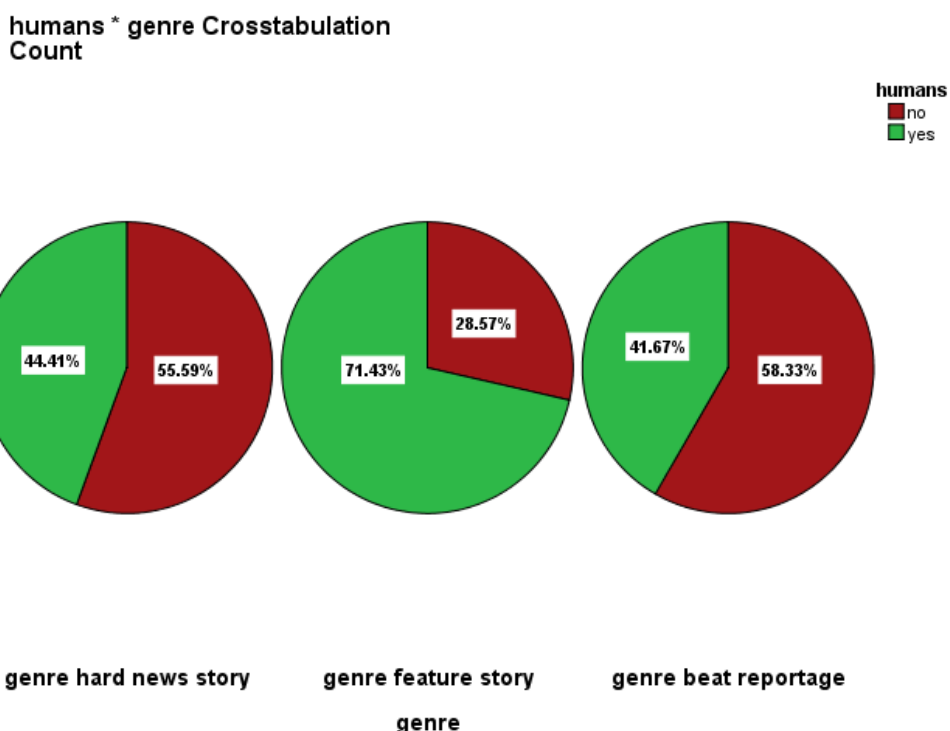


Fig. 12 Cross-tabulation of the variable *humans and *genre by percentage.

The data suggests that beat-reportage and hard news do not contain, in more than half of the articles, human-interest issues. Beat reportage (58.33% with 'no' human interest) is about "informing the readers" and is also "the regular coverage of a topic or a governmental agency" (Mencher & Shilton, 1997, p. 22). Similarly, hard news (55.59% with 'no' human interest) is up-to-the-minute news related to politics or economics.

Again, when I asked: *Do the statistics involve any human-interest issues?* in the specific case of *genre, feature stories appear to be better represented, with 71.43% human-interest stories. This looks coherent with the use of numbers in the journalistic practice, as we will see in the interviews later in the chapter, where the data analysis and its interpretation of data can take hours or even days to be finalised, impacting, in this way, on the speed of the news production cycle (Rosenberg & Feldman, 2008).

Statistics seem to be, therefore, mostly used by journalists to produce feature-articles. This means that articles that make use of statistics are often written in feature style, which allows journalists to write a long story containing expert opinions and offering not only the big picture of an event, but also telling the reader what happened in detail: "feature writing is often seen by the aspiring journalist as a release from the structural and stylistic restrictions of hard news by allowing much more creativity of thought and opinions" (Rudin & Ibbotson, 2002, p.58). In fact, this is confirmed by the data in Tab. 18, which shows that

over half of the news items (almost 52%) containing statistics had more than 500 words, the minimum length to consider a story a 'feature' story.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	long story	228	51.9	51.9	51.9
	short story	211	48.1	48.1	100.0
	Total	439	100.0	100.0	

Tab. 18 *Length of the articles analysed divided by length.*

6.2.2 Second dimension: Accuracy

For evaluating the second quality dimension, Accuracy, I made use of two key concepts in journalism: verification, and criticality or critical thinking (Ruminski & Hanks, 1995, p.4). Journalists should be able to verify (verification) and question their sources as part of the journalistic ritual (Shapiro, Brin, Bédard-Brûlé, & Mychajlowycz, 2013, p. 657) and demonstrate this investigation with a high level of critical thinking (criticality) (Browne & Keeley, 2007), which translates into an accurate level of argumentative skills (accuracy), leading to support, or refute, a statistical or scientific source (Dunwoody, 1982, p.196). According to Bill Kovach and Tom Rosenstiel, journalism is considered to be "a discipline of verification" because "in the end, the discipline of verification is what separates journalism from entertainment" (2001, p.79). The question *is there any mention of missing/partial statistics?* helped me to see whether journalists verified or not the statistical source upon which their stories were based. In particular, this helped me to evaluate whether the journalist had actively interrogated the source rather than passively accepting what had already been written. The binary answers yes/no clarified the data in relation to Accuracy, conceived as a quality threshold.

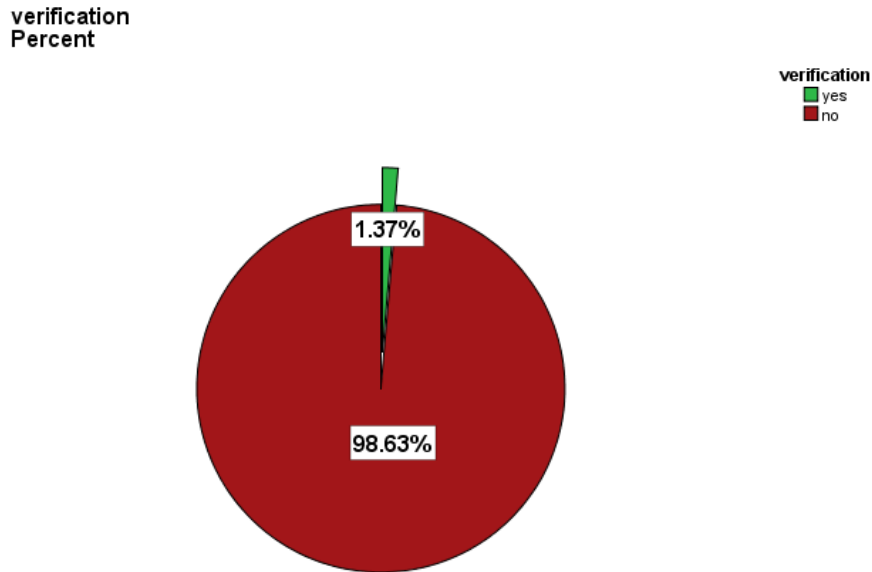


Fig. 13 Percentage of *verification variable.

According to the pie chart above, there is no evidence that journalists in almost 99% of the articles questioned the sources of the statistics used. This is an interesting finding, given the fact that among the five quality dimensions, Accuracy is the most important indicator of “a strong ethical commitment [...] towards [...] truthfulness” (Keeble, 2008, p.13). This is not fully achieved here. The Reuters Handbook of Journalism says that “accuracy is at the heart of what we do” (MacDowall, 1992, p.32) while Paul Bradshaw, a journalist and expert in data analysis, claims that “accuracy can influence how we analyse data stories or our publication of data itself” (2013a). Accuracy is therefore an essential dimension in the assessment of quality.

On the one hand, journalists do not verify the statistics themselves and, on the other, they do not use statistics to verify or cross-reference. This cross-verification as a constituent of a ‘mediated knowledge’ (Godler & Reich, 2017) can also be a strategy of communication (Hansen & Paul, 2015), a good sign of critical thinking in the delivery of quality information. It seems, however, not to be fully integrated into the journalistic practice.

Furthermore, inspired by a wealth of research regarding differences between the genders in performance in mathematics (Hyde, Fennema, & Lamon, 1990; Lindberg, Hyde, Petersen, & Linn, 2010; Spencer, Steele, & Quinn, 1999), I wanted to see which gender tended not to mention any missing or partial statistics. I wanted to see, in terms of percentages, whether the problem was due to the gender of the journalist or not. Results show that males tended not to report any type of verification (260 articles), with 59% of the total articles.

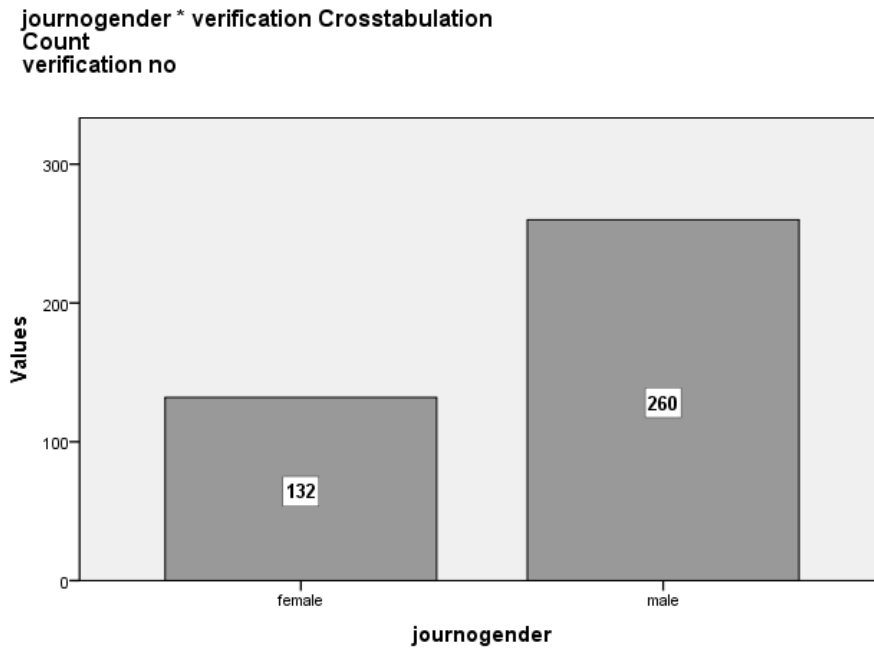


Fig. 14 Cross-tabulation between the *journogender and *verification variables.

As already explained in Chapter 5, I have split the concept of Accuracy into factual, practical and scholarly criticism (Richards, 2003). Factual, or empirical criticism is an objection raised about facts due to something wrong with the evidence of the known experience relevant to it (Collett, 1989). Generally, the presentation of facts is deemed biased, and important relevant facts are missing. Practical criticism (Craig, 1984; Feighery, 2011) is an objection or appraisal that refers to relevant practical experience – in this case related to the practical application of statistics in the everyday life of citizens. Among the three types of criticism, scholarly criticism is perhaps the most important in journalism (Klaehn, 2003). A scholarly critic digs deeply into a problem, is very argumentative, and tries to be as neutral as possible.

By analysing *evaluation2 and *criticality2 separately, I could observe whether journalists critically engaged with the statistical sources or not. Hence, by crosstabulating the variables *topic and *criticality2, I wanted to see what type of criticism (factual, practical, scholarly or none) was used by journalists with respect to the topics of crime and health.

		criticality2				Total
		factual	practical	scholarly	no criticism	
topic	crime, law and corrections	2	4	5	206	217
	medicine and health	6	4	5	207	222
Total		8	8	10	413	439

Tab. 19 Cross-tabulation of the variables *topic and *criticality2.

The results show that there is an overwhelming majority; 94% of articles contain 'no criticism' in the two topics of health and crime. This result is also supported by using two other variables, such as *source1 with *evaluation2.

Count

		evaluation2			Total
		positive	negative	no comments	
source1	unknown	2	3	59	64
	non-official statistics	4	4	76	84
	official statistics	13	9	269	291
Total		19	16	404	439

Tab. 20 Cross-tabulation of the variables *source1 and *evaluation2.

From the table above, we can see that there is an over-reliance or, better put, an over-citation of official statistics, with 61% of the articles publishing official statistics without explicit verification or critical thinking. The percentage reaches 92% if we include 'non-official' and 'unknown' sources in the count.

These results have serious implications in the context of delivering quality. In this regard, it is relevant to remember the report *Citation Statistics: On the Use of Citations in Assessing Research Quality*, commissioned in 2008 by the International Mathematical Union (IMU), whose results can be summarised in two main points: 1) the sole reliance on citation data provides, at best, an incomplete and often shallow understanding of research; numbers are not inherently superior to sound judgements; 2) while numbers appear to be 'objective', their objectivity can be illusory. Because this subjectivity is less obvious for citations, those who use citation data (journalists) are less likely to understand their limitations.

As for the news reporting of statistics, and citation of statistical reports, we see that in more than half of the articles (61%) analysed the 'objectivity' of official reports is not questioned. Here, the often-controversial journalist-source relationship, well known in Journalism Studies, is vividly brought to light. The journalist-source relationship has been described by academics such as Herbert Gans (1980) as "part dance and part tug-of-war" (p.45), while Jerry Palmer (2000) calls it a transaction in which both "journalists and sources have motives which lead them to interpret events in particular ways" (p.67).

In the present study, sources are often statistical reports, government scientific studies and the opinions of expert statisticians who are considered scientists by the scientific community. The book *Scientists and Journalists* (1986), though old, is still valid because it highlights risks and benefits of the role of scientist-as-source within the production of news. Among the risks, the book highlights the over-citation of government scientific reports because they are believed to have high credibility and authority, and therefore there is no need for

them to be reviewed critically by journalists. As Tony Harcup (2006) puts it: “If a contributor’s view is contrary to majority scientific or professional opinion, the demands of accuracy may require us to make this clear” (p.174). My findings indicate that this clarification does not happen, and when dealing with the dimension of Accuracy, this can hugely impact on the delivery of quality.

6.2.3 Third dimension: Timeliness

The third quality dimension refers to the ‘Timeliness’ with which journalists make use of statistical reports. Official statistical reports are generally released publicly in the form of a bulletin, every three months, by the Office of National Statistics (www.ons.gov.uk). It is important here to remind ourselves that the issue of time of release and publication of statistics in the public domain has been contested over the years by the authorities and journalists alike (Jairo Lugo-Ocando & Faria Brandão, 2016). Moreover, the UK Statistics Authority has recently ended pre-release access to official statistics³⁵.

The reason for this change was explained by journalist Ben Chu, who wrote: “the move brings to an end a practice that has long been criticised by experts as serving no legitimate governmental function and running the perennial risk of market-sensitive data leaking” (Chu, 2017). Timeliness in relation to statistics in the news remains a sensitive area, and one which is constantly revisited by those dealing with numbers, particularly around crime (Altheide, 1997; Blanes & Kirchmaier, 2017; Chibnall, 2013; Sheley & Ashkins, 1981). Therefore, it is crucial at this stage to evaluate whether the three month time limit after release is satisfied or not.

I cross-tabulated the variables *paper and *timeliness1 to see whether a statistical report had been used by the journalists within the period of three months. The results are shown in Fig. 15. The results reveal that *The Daily Mirror* and *The Guardian*, with their Sunday editions, make use of statistics that are over three months old, as does *The Daily Mail*. What is interesting, however, is the high rate of the unknown age of statistics, which covers a significant proportion of articles (a total of 53.5%) that do not mention the year or date of the statistics’ release. The highest score in this regard is *The Times* and *The Sunday Times* with 51.8% of articles that do not contain any time reference.

This translates into a lack of transparency for readers, although possible explanations can be found in the use of numbers as contextual references or just to substantiate a claim. If the latter is the case, then one can reiterate the claim that journalists not only use these numbers to enhance quality

³⁵ www.ukstatisticsauthority.gov.uk contains the downloadable official letter from John Pullinger, National Statistician, to Sir David Norgrove, Chair of the UK Statistics Authority.

in their stories, but also to give credibility (as they expect that numbers will have this effect).

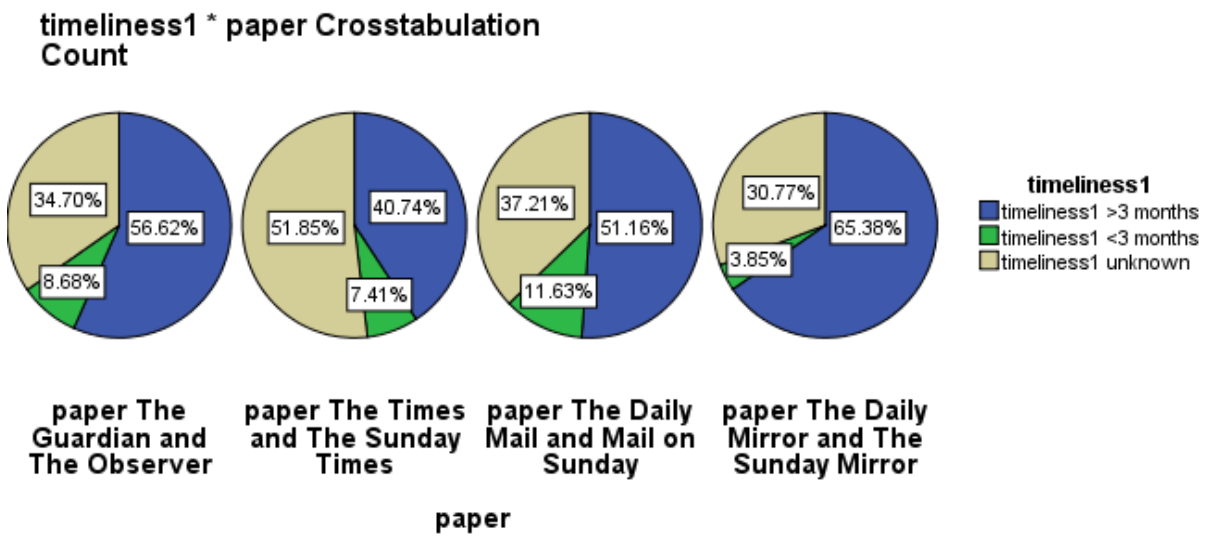


Fig. 15 Cross-tabulation of the two variables of *timeliness1 and *paper.

By cross-tabulating *topic and *timeliness1, the situation does not differ much, with slightly more than 53% of articles lacking timeliness in the reporting of dates and years of statistics, whether for health or crime stories.

Count		timeliness1			Total
		>3 months	<3 months	unknown	
topic	crime, law and corrections	112	20	84	217
	medicine and health	123	17	82	222
Total		235	37	166	439

Tab. 21 Cross-tabulation of the variables *topic and *timeliness1.

In terms of quality, this lack of transparency in relation to Timeliness might negatively affect the credibility of the story by compromising the overall ‘completeness of information’ delivered to the readers. This is because “time plays an important part in any newsgathering operation both in terms of getting the story and in terms of when the event became newsworthy. An event must be topical within the period of publication” (Frost, 2015, p.25). Delivering such completeness means that journalists have a responsibility to report an important matter in a timely fashion, and that it is crucial that they allow their audiences to know which period these statistics refer to, given the fact that they are a snapshot of a set of events.

6.2.4 Fourth dimension: Interpretability

Interpretability refers to the use of statistics as a tool that can help reporters and audiences elucidate more comprehensively the meaning of a given story and, at the same time, help reporters scrutinise the same story better.

Therefore, to be effective and to enhance civic engagement with the news, the statistics in the story should be easily interpretable by the readers. By means of statistics journalists are able “to turn moral claims into empirical claims” (Ettema & Glasser, 1998, p.78). By facilitating interpretation, statistics should therefore allow greater civic engagement and interaction with the story. Statistics that provide additional rationales and explanations to specific events have, therefore, a crucial role in enhancing quality in the news. To put it succinctly, a set of statistics that can contribute, for example, to contextualising a specific event in the wider perspective of public policy, or that allow audiences to understand how the event will affect them, is in fact adding quality to the news.

In order to evaluate this quality dimension, I firstly focused on the two most commonly used statistical narrative tools: stand-alone statistics and statistical comparisons (Abelson, 2012). The first refers to statistics that are isolated, stand-alone figures, while the second makes comparisons between observations and, in this case, statistical reports or expert opinions. In the second, statistical comparisons are, by definition, able to clarify the meaning of specific news stories.

The majority of the articles used stand-alone statistics (almost 82%) followed by a simple comparison. Both stand-alone and comparison statistics should make the story interpretable. In the context of this study, Interpretability means a good verbalisation of the technical vocabulary and terminology typical of statistics and mathematics.

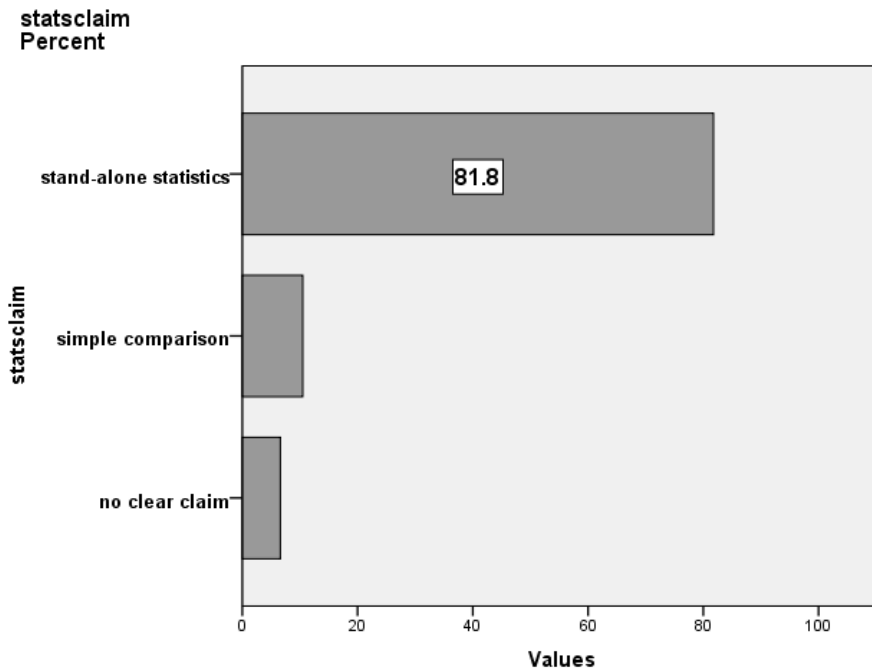


Fig. 16 Percentage of the variable *statsclaim.

As Fig. 16 shows, almost 82% of the articles used stand-alone statistics as a preferred way of verbalising data-driven stories, and therefore it is unlikely that these statistics somehow make these topics easier to understand. The ability to interpret the meaning refers mainly to the verbalisation of statistics, which is a key point in making a statistical claim easily interpretable to readers.

However, following what Morrow and Weston (2015) illustrated in their chapter entitled *Statistics Need A Critical Eye*, the verbalisation of statistics is understood here as only a part of a wider context of defending arguments with statistics. To go deeper into the analysis, this result should be corroborated by the scrutiny of the type of statistics that are used in the articles, whether descriptive or inferential, and in which topic they are used most. This is because each type of statistics makes a distinctive contribution to the way journalists and audiences make sense of the outside world.

In the case of crime, for example, many authors have discussed the contributions that both descriptive and inferential statistics make in relation to the way the public constructs social reality around deviation (Lugo-Ocando, 2017). Therefore, analysing the type of statistics is an important step in assessing the quality dimension of Interpretability.

Indeed, being able to make a distinction of descriptive or inferential statistics is essential in “comparative reasoning” (Pfannkuch, Regan, Wild, & Horton, 2010) and, I argue, also in the news reporting of statistics, which involves

a considerable degree of reasoning skills (Dunwoody & Griffin, 2013; Knowlton & Reader, 2009).

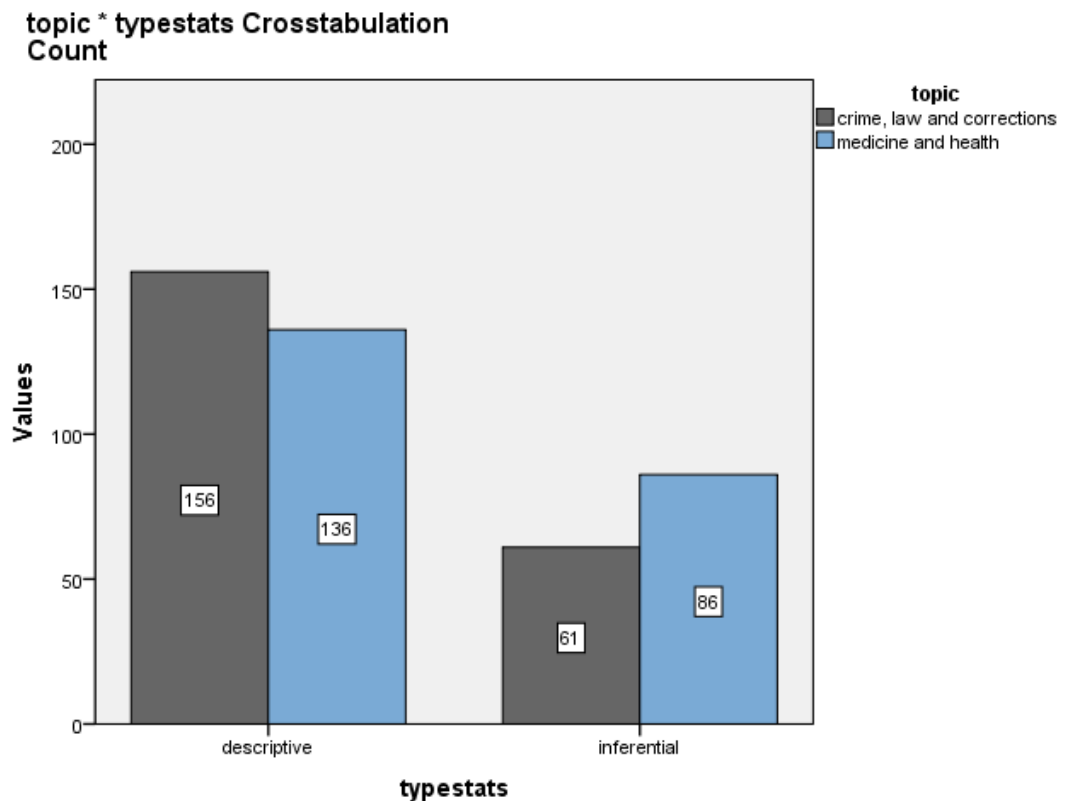


Fig. 17 Cross-tabulation of the variables *topic and *tpestats.

Fig. 17 shows that descriptive statistics are used preferentially for crime stories (156) whereas inferential statistics are used for health stories (86). This result agrees with the literature in the area (Osborne & Wernicke, 2003), which sees descriptive statistics as the primary statistical tool of the crime analyst and of the crime reporter too (Lugo-Ocando, 2017). Descriptive statistics involve summarising data into a format that provides a 'descriptive' picture of an event or a series of events. Other descriptive techniques in crime reporting are measures of variability and measures that define the relationship (association) between two or more data elements. Descriptive statistics are also used for medicine and health topics, but slightly less often (136). Compared to descriptive statistics, inferential statistics are used less in general (147, compared to 292). The topic where journalists use inferential statistics most is, however, medicine and health (86). This is not a popular statistical method in healthcare, as some literature in the area suggests (Allison et al., 2000; Fowler, Jarvis, & Chevannes, 2013), mainly because inferential statistics are compiled by a process of inductive reasoning based on the mathematical theory of probability and knowledge, and among doctors and nurses there seems to be very little knowledge of this type.

These data could be explained by a reliance of journalists on official public health and crime reports. Indeed, while news values around health tend to overwhelmingly refer to the probability of someone being affected by a specific condition (or being cured by a treatment), crime reporting tends to focus instead on wider trends reported to officials by the different police bodies. While to a reporter it seems perfectly acceptable to use inferential statistics when referring to a health issue, he/she might not be so open to referring to survey-based information when dealing with crime.

A recent study by Hayat et al. (2017) shows that P-values and confidence intervals (results from the use of inferential statistics) appear in more than 76% of public health reports that were analysed. Similarly, inferential statistics are not journalists' preferred method, and only seem to be applied to health issues when necessary.

Overall, these findings suggest that journalists' choice of which statistics to use influences their ability to interpret the meaning of each story. It also seems that, in terms of enhancing quality, these choices make little difference, and reporters do not seem to link these choices to the need to improve the verbalisation of statistics or to develop the contextualisation. In this sense, one can argue that practice does not match aspirational expectations around quality.

It is precisely because journalists rely so much upon the official sources that they have limited opportunity to make their own choices around which statistics to use. Hence, crime reporters will be more likely to use stand-alone statistics and use inferential or descriptive statistics depending on the news beat they cover. This is because that is the information they receive from official sources, a practice that is, in the end, detrimental to quality, as we have seen here.

6.2.5 Fifth dimension: Accessibility

Another crucial dimension of quality is to know whether the use of statistics helps to make the information more transparent and, consequently, reliable (accuracy). This Accessibility cannot be understood in terms of interpretability (as examined above) but instead needs to be seen in relation to transparency. In other words, the normative expectation is that the use of statistics should contribute to the ability of journalists to make the stories more accurate.

To analyse this dimension, I examined the number of statistical sources that were cited in each article as a way of evaluating, in quantitative terms, whether journalists were giving the same type of scrutiny to statistics as they did to other sources (where they often cross-referenced more than one source). My assumption was that the greater the number of sources, the more accessible the

story was, as it would present not only a greater diversity of statistical views, but also these statistical views would cross-check each other (this, of course, is a general assumption). In the context of an assessment of ‘completeness of information’, quantifying how many sources are cited inside a newspaper article is important.

Citing more sources has its advantages and disadvantages. One of the advantages is that of showing a degree of completeness by comparing and contrasting different sources “because otherwise you would have been hooked into competing anecdotes” (Ettema & Glasser, 1998, p.78). There is, however, a drawback to this advantage, as it is up to the journalist to manage the multiple sources coherently by “testing the information against known facts or other sources” (Frost, 2015, p.69).

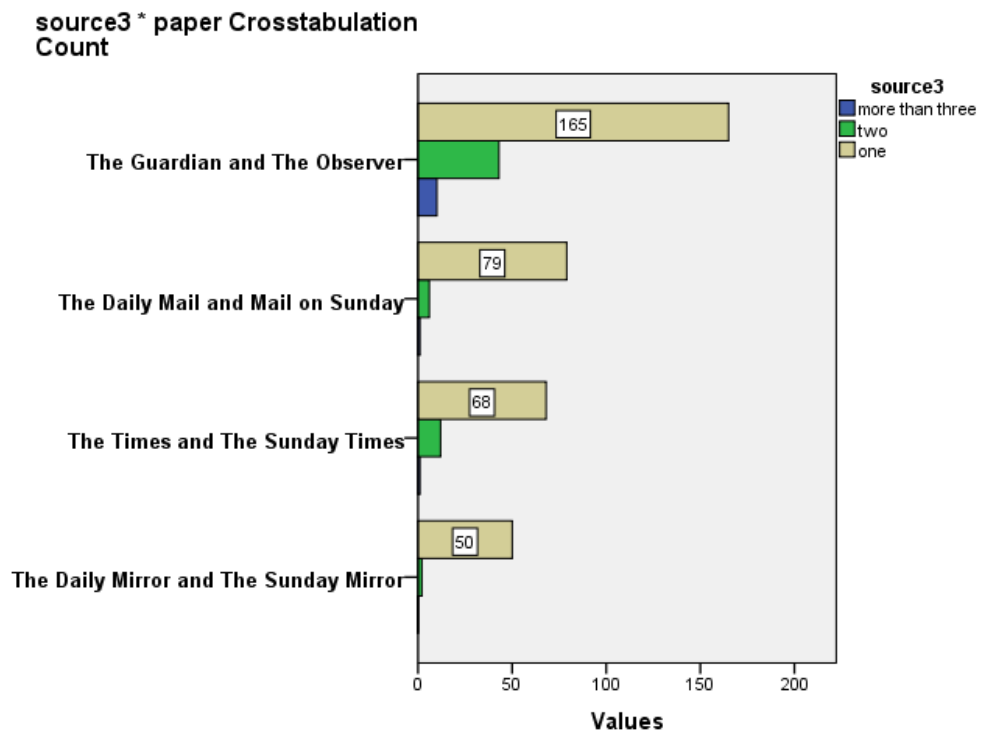


Fig. 18 Cross-tabulation of the two variables *source3 and *paper.

In response to this, as Fig. 18 suggests, most of the articles across the four UK newspapers relied on one source only. Some might argue that this is perhaps better than having none, but I disagree. I believe that by having only one statistical source, the story, if anything, might become even less accurate, as it depends on only one source that is provided in most cases by government officials. This in turn can affect the transparency of the story, as there is no cross-examination of the validity of these numbers. In other words, one single statistic can also mean one single version of the story, obscuring the journalists’ ability to challenge official accounts.

Fig. 19 shows that journalists make use of one source only in the two topics studied here: 81% in health and 84% in crime stories. Other significant data show a 54.7% citation of government reports, followed by 23% where sources are not mentioned, as highlighted in the table below.

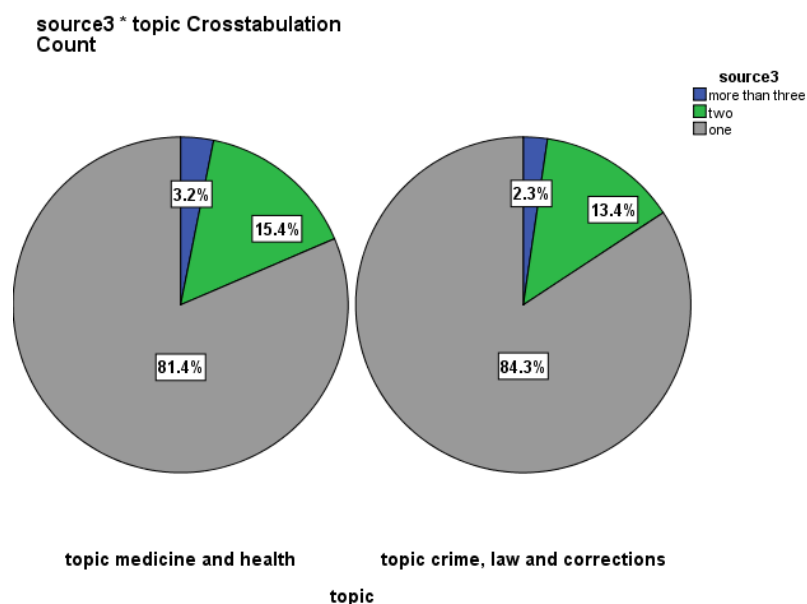


Fig. 19 Cross-tabulation of *source3 and *topic by percentage.

Again, similarly to the Accuracy dimension, the journalist-source relationship appears to be crucial in this quality dimension, especially as far as the *not mentioned* sources are concerned, which account for 23% of the total articles analysed. This means that where only source was used, one quarter of the journalists did not mention where the statistics came from. In those cases, for reasons that are not possible to identify through content analysis alone, the journalist failed to identify the source. This is an important finding that brings to light a previously unseen journalistic deficit in relation to the reporting of statistics. However, journalists' "bad habit" of not citing primary sources is well known in the academic literature (Ewart, Cokley, & Coats, 2004; Franklin & Carlson, 2010).

Ben Goldacre warned readers of *The Guardian* with an article in 2011 entitled *Why Don't Journalists Link to Primary Sources?* Also, the on-line Reuters Handbook of Journalism clearly states that: "our reputation for accuracy and freedom from bias rests on the credibility of our sourcing. [...] A named source is always preferable to an unnamed source". In addition, if we consider the overlapping of duties and the Levels of Abstraction (see 4.5.2) between a journalist and a historian, Martin Conboy (2013) says that journalists should not rely on one source only "to understand a phenomenon or a social trend, but on many, so that they can construct their own interpretations about the present or the past by means of comparison among sources by sifting information contained

in many sources, by listening to many voices” (Howell & Prevenier, 2001, p.69). In general, by identifying the sources, journalists bring transparency and accessibility to the information: “Unfortunately, virtually all news sources, by their very nature, provide information that is distorted, either because of pressure of time or resources or because of a deliberate desire to deceive. This is why it is so important to check one source against each other” (Frost, 2015, p. 69).

		paper				Total
		The Guardian and The Observer	The Times and The Sunday Times	The Daily Mail and Mail on Sunday	The Daily Mirror and The Sunday Mirror	
source2 government reports	Count	112	43	59	26	240
	% within source2	46.7%	17.9%	24.6%	10.8%	100.0%
	% within paper	51.1%	53.1%	68.6%	49.1%	54.7%
	% of Total	25.5%	9.8%	13.4%	5.9%	54.7%
international organisations (UN standard)	Count	15	4	1	2	22
	% within source2	68.2%	18.2%	4.5%	9.1%	100.0%
	% within paper	6.8%	4.9%	1.2%	3.8%	5.0%
	% of Total	3.4%	0.9%	0.2%	0.5%	5.0%
NGO's	Count	13	1	1	1	16
	% within source2	81.3%	6.3%	6.3%	6.3%	100.0%
	% within paper	5.9%	1.2%	1.2%	1.9%	3.6%
	% of Total	3.0%	0.2%	0.2%	0.2%	3.6%
academic independent	Count	10	2	4	2	18
	% within source2	55.6%	11.1%	22.2%	11.1%	100.0%
	% within paper	4.6%	2.5%	4.7%	3.8%	4.1%
	% of Total	2.3%	0.5%	0.9%	0.5%	4.1%
private organisations	Count	25	2	6	9	42
	% within source2	59.5%	4.8%	14.3%	21.4%	100.0%
	% within paper	11.4%	2.5%	7.0%	17.0%	9.6%
	% of Total	5.7%	0.5%	1.4%	2.1%	9.6%
not mentioned	Count	44	29	15	13	101
	% within source2	43.6%	28.7%	14.9%	12.9%	100.0%
	% within paper	20.1%	35.8%	17.4%	24.5%	23.0%
	% of Total	10.0%	6.6%	3.4%	3.0%	23.0%
Total	Count	219	81	86	53	439
	% within source2	49.9%	18.5%	19.6%	12.1%	100.0%
	% within paper	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	49.9%	18.5%	19.6%	12.1%	100.0%

Tab. 22 Cross-tabulation of the variables *paper with *source2.

The selection of sources is very problematic, as the literature regarding this issue has shown (Franklin & Carlson, 2010). Sometimes journalists choose a source based on their familiarity (Xie & Joo, 2009) while others do so based on

their own area of expertise (Allgaier, 2011). Journalists have even, in a reportage crisis, come to rely on familiar sources (Meer, Verhoeven, Beentjes, & Vliegthart, 2017). The issue has been further problematized in recent years by what Lewis et al. (2008) highlighted as the increasing reliance on pre-packaged information released from those 'information subsidies' on public relations input (referred to as 'information foraging providers' in paragraph 3.4).

Therefore, to see whether there was a correspondence between newspapers and the type of source-information subsidies (government statistics or non-official statistics), I decided to perform a correspondence analysis (CA) to explore possible relations among the two categorical variables of *source2 and *paper. I produced a biplot (Fig.20), which offers a visual display of each of the values in the dataset plotted with their axes. This provides a global view of the trends within the data.

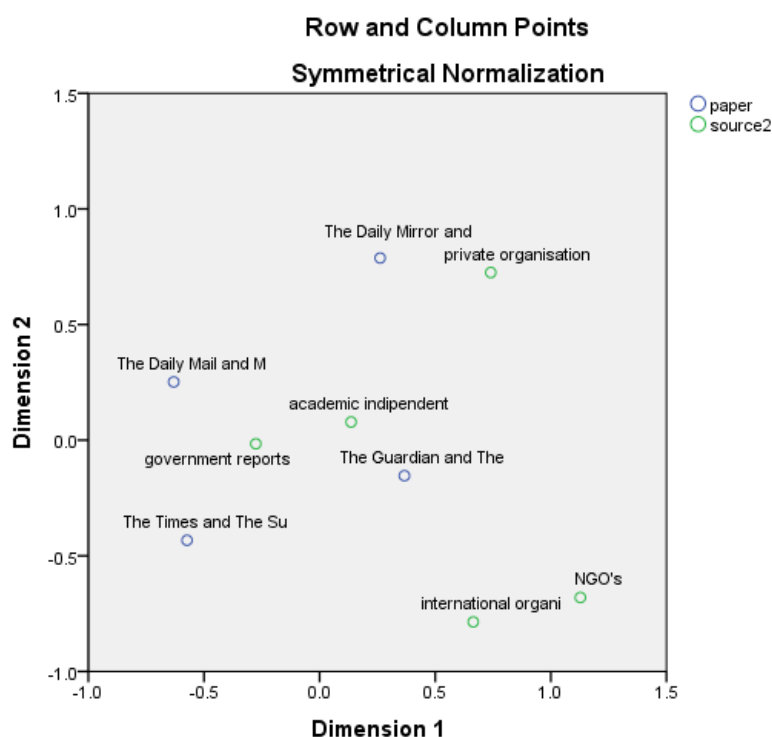


Fig. 20 Biplot (exploratory graph) obtained from variables *paper and *source2

The distance between any row points or column points in Fig. 20 gives an idea of their similarity (or dissimilarity). Also, distances between row and column points can be interpreted differently. It is worth noting that *The Daily Mirror* and *The Sunday Mirror* are close to private organisations and *The Guardian* and *The Observer* are close to independent academic reports and slightly less close to government reports. This means that there is a relationship or correspondence (not necessarily an over-reliance) between *The Daily Mirror* and private organisations and *The Guardian* and academic reports.

A general consideration based on the CA leads to results indicating that journalists need non-official statistics in these newspapers. Nowadays there is an increasing amount of information, produced by non-official organisations, where the quality standards vary greatly. In their routine, journalists include the production, for example, of specialised statistics: “Official sources cannot be universally accepted as the best choice only because they have been produced by public institutions” (UN Statistical Division, Committee for the Coordination of Statistical Activities, CCSA 2016). Also, when reporting issues from or about countries that are politically sensitive and relatively ‘young’ in terms of existing statistical standards, official or government statistics may not always reach quality standards (Mort, 2006).

In conclusion, Accessibility, as a threshold of quality, suggests two forms of interpretation. One relates to the use that journalists make of statistics in order to present more accessible information and make sure that statistics (official and non-official) are accessible enough for readers to be able to check for validity and reliability. The second relates to the accessibility of statistics themselves by those journalists skilled enough at ‘scraping’ the data (Bradshaw, 2013b).

6.2.6 Summary of the findings

Through the lenses of the five dimensions chosen at the beginning of the study as a threshold for quality, I observed that journalists engage with numbers in a reactive rather than a proactive way, passively reporting statistics without critical engagement. This attitude towards numbers vividly brings to light some journalistic shortfalls in terms of credibility and authority.

This pentagonal approach to quality enabled me to also assess the nature of this lack of critical engagement and explore how journalists can engage with statistics to successfully incorporate every single dimension and to analyse how statistics help to achieve such dimensions. A full discussion of the findings will follow the close-reading rhetorical Section 6.2. For each single quality dimension, below is a summary in five points.

1) First dimension: Relevance. Humans behind the numbers?

In this dimension, statistics should be used to make stories *relevant* to the readers, by adding human interest as a way of contextualising isolated events in the wider societal context. In this sense, the findings show that newspapers have different strategies when using statistics to ‘humanise’ their stories. In *The Daily Mail*, *The Daily Mirror* and *The Times*, statistics appear to be at the centre of the stories as the core of the argument. In *The Guardian*, statistics are instead used to substantiate the story and to make the particular news story part of a wider societal problem. Indeed, there are different ways to articulate the dimension of

Relevance to deliver quality, and this is in accordance with the news values of the newsrooms. The data indicates that certain types of statistics are relevant in health news while crime news tends to use others. Contrary to my initial expectations, the overall results suggest, however, that Relevance, understood through the human-interest criterion, is not used to achieve quality.

2) *Second dimension: Accuracy. An 'art' for all and none.*

As the literature in the area of journalism suggests, Accuracy should play a pivotal role in news production for every journalist, with no exception. However, in terms of verification and critical thinking, this quality dimension contains surprising results. The data suggests that an overwhelming 98.63% (see Fig.13) of statistical reports are neither verified nor questioned. This means that journalists rely exclusively on official data without any critical engagement, regardless of the topic. This attitude clashes with the deontological duty of verifying the sources, which is one of the globally accepted ethical norms that keeps the journalistic profession cohesive across cultures. Statistics are supposed to increase the accuracy of news, but without proper verification or cross-referencing with other statistical sources, the achievement of accuracy to deliver quality remains at a merely theoretical level.

3) *Third dimension: Timeliness. Numbers cannot be part of a scoop.*

In relation to the third dimension, Timeliness, the results show that statistics often come from statistical reports more than three months old, especially in the case of medicine and health. This contradicts common assumptions and claims that journalists do not have enough time to evaluate and give sufficient consideration to numbers. The results also suggest that journalists do not cite the year of the statistical report in almost 40% of the articles, which, as already suggested, might be because statistical information is used to substantiate stories or underpin assertions made by journalists. The reasons will be explored later during analysis of interviews in Section 6.4.

4) *Fourth dimension: Interpretability. The words of numbers.*

As discussed here, Interpretability means a good verbalisation of the technical vocabulary and terminology typical of statistics and mathematics. This quality dimension is concerned with the ability to make data easily interpretable, and also to use the data to make the story more accessible or understandable. Almost 82% of the articles used stand-alone statistics as the preferred way to verbalise data-driven stories, suggesting that this quality dimension is not achieved either.

5) *Fifth dimension: Accessibility. Looking behind the curtain.*

This dimension was examined by looking at the numbers of sources used in each story and their nature. The analysis showed an over-reliance on official statistics and government reports. This can be explained by the way journalists

tend to approach and engage with news sources in general. Thus, the way journalists relate and engage with their sources appears to be crucial under this quality dimension. The findings show that 25% of the articles analysed had not identified the source. This suggests that the attempt to make information more accessible by incorporating statistics is a procedure that does not necessarily translate into quality.

6.3 Close-reading Rhetorical Structure Analysis

Results from the close-reading rhetorical structure analysis suggest two things. (1) Statistics are articulated differently according to the topic. On the one hand, crime statistics are articulated in different levels of structure and seem to be logically arranged, with a good degree of coherence. On the other hand, in the health news beat, statistics are treated differently. Most of the time the story-telling comes first, which suggests that numbers are much more contextualised into a frame. (2) A high number of levels of structure in the articles do not guarantee coherence between the statistical points and between the different parts of the text. This is particularly noticeable in *The Guardian*, which seems to link the different parts of the text together more cohesively, whereas *The Times*, *The Daily Mail* and *The Daily Mirror* often do not coherently support the different statistical points contained in the texts.

I carried out a detailed analysis of the findings from the close-reading phase, using the Rhetorical Structure Theory on eight ($n=8$) articles, one from each newspaper, four related to crime issues and four to health. This research strategy aims to present an overview of text organisation, particularly how numerical information is used in the articulation of texts, by paying attention to relations and coherence in the text. I will make use of tree-diagrams to visualise the connections between parts of the texts. The analysis intends to demonstrate the coherence, or lack of it, within the articles by answering the following question: *How are statistics used in the articles?*

6.3.1 *The Guardian's* latest statistics on crime

Article No.	1
Newspaper	The Guardian
Title	Crime figures fall to record low
Author	Owen Bowcott
Date	17 October 2013
Words	716
Sentences	20
Keyword density	crime 19 (6%)
Sentence structure	1. Crime levels are continuing to fall steadily,

	<ol style="list-style-type: none"> 2. according to the latest statistics, with offences recorded by the police in England and Wales dropping by 5% over the past year. 3. Latest responses to the annual crime survey- the other official measure of offending, based on interviews rather than police figures- 4. show an even greater decline of 7% to a level that is less than half its peak in 1995. 5. Within this overall pattern, however, 6. there are significant exceptions: muggings have risen sharply by 8% and sexual offences are up by 9% over the past 12 months.
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Tab. 23 Breakdown of Guardian crime article.

The first six sentences of the article shown in Tab. 23 are articulated in four levels of structure. The first level shows that the satellite 1. constitutes a *preparation* for the units 2.-6. This means that the first sentence “*crime figures are continuing to fall steadily*” prepares the argumentative ground of what comes later in the article. The second level goes into more detail, showing that the nuclei 5. and 6., by using the phrase “*within the overall pattern*”, are in relation to *interpretation* with 2.,3. and 4. In this case, despite a relation of *contrast* between unit 5. and 6., by means of the adverb “*however*”, the latter units are used to interpret the statistical claim made in the units 2.-4.: “*offences recorded by the police dropping by 5% over the past year*”. The third level features an *elaboration* relation between 3.-4. to the satellite 2. This level makes use of an interesting articulation of statistics. Here the journalist explains to the reader how measurement is done in crime surveys (3.) and then goes on to elaborate and expand the reflection on the statistics given (4.). Lastly, the fourth level highlights that 4. taken in isolation as a satellite is an *evidence* of 3., where numbers are used by the journalist to support the annual crime survey.

Fig. 21 displays four levels of structure of the article which are generally cohesive and coherent in the articulation of four statistical points within the parts of the text. It is noticeable that the two first statistical points (“*dropping by 5%*” in 2. and “*decline of 7%*” in 4.) are both in opposition and in elaboration with the last two points (“*have risen by 8%*” and “*are up by 9%*” both in 6.), without diminishing the coherence of the articulation of numbers.

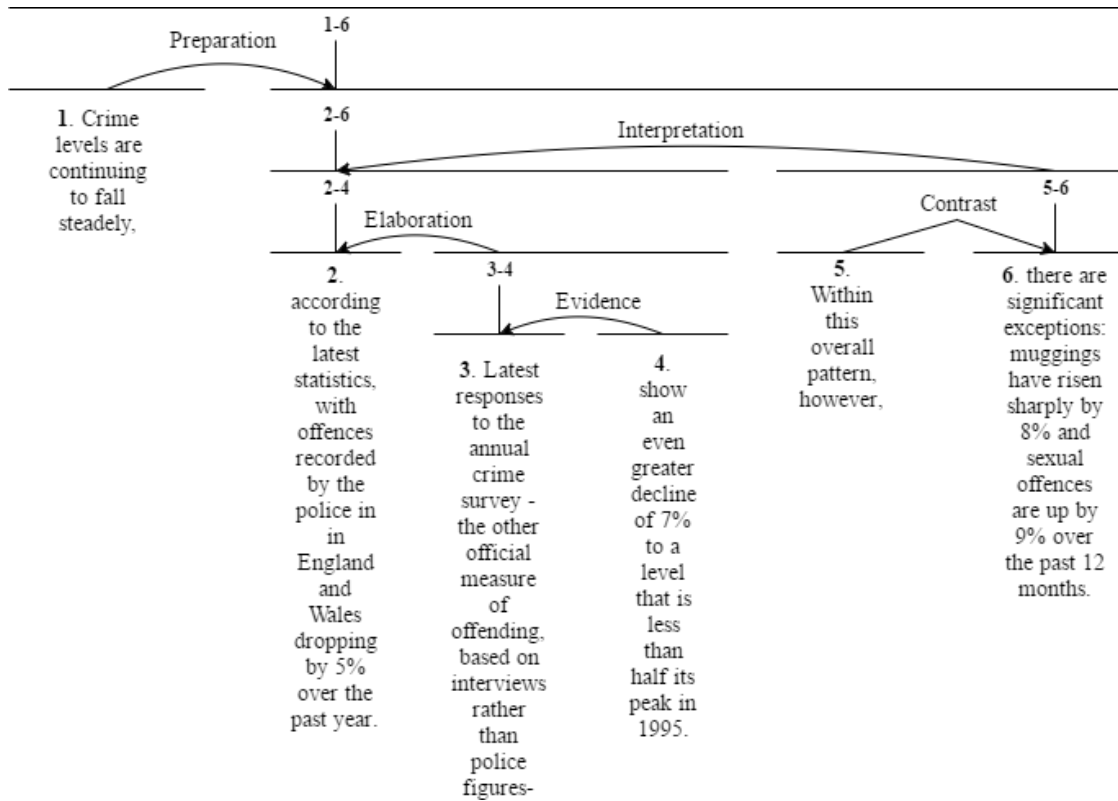


Fig. 21 Close-reading structure for article No. 1.

6.3.2 The “Savile effect” on sexual offences, according to *The Times*

Article No.	2
Newspaper	The Times
Title	Savile effect seen in higher number of sex attacks reported
Author	David Brown
Date	18 October 2013
Words	427
Sentences	16
Keyword density	crime 6 (3%)
Sentence structure	<ol style="list-style-type: none"> 1. The number of sexual offences reported to police 2. has increased by 9 per cent after the investigation into Jimmy Savile 3. but recorded crime has fallen to a record low. 4. The Crime Survey for England and Wales recorded 8.5 million incidents against households and adults in the year to June, a fall of 7 per cent and the lowest since interviews began in 1981. 5. Police received reports of 3.7 million offences over the same period, the ONS said yesterday. 6. Thefts were up by 8 per cent, with evidence suggesting that the rise was driven by pickpockets taking smartphones.

Tab. 24 Breakdown of Times crime article.

In this article, three levels of structure are to be analysed. The first level sees the satellite 1. being a *preparation* for the rest of the five sentences 2.-6. The sentence “*the number of sexual offences reported to police*” introduces the issue and the subjects involved in the article. The second level puts in relation of *interpretation* the nuclei 4.-6. to 2.-3. The numbers-based facts reported in the latter sentence interpret and develop the statistical claim made in 2.: “[the violence] *has increased by 9 per cent*”. Within this level, we can notice a *contrast* relation between 2. and 3., where it is claimed that despite an increase in sexual offences reported to police, recorded crime has dropped to a record low. In this case, the causation-correlation fallacy is evident. If there is a causation between an increase in sexual offences because of the occurrences after the Jimmy Savile scandal, there might be no correlation between the scandal and the actual reports of offences. Also, the period between 1981 (4.) and “*yesterday*” (5.), that is October 2013, publication date of the present article, is too long to make a mindful judgment of the statistics. To conclude, the third and last level also presents contradictory evidence. Sentence 6. includes thefts in the reportage, which is not coherent with the statistical claim made in 1. and in the title of the article. All in all, the analysis reveals that, despite a good level of structure, the numerical information points reported in this article are not coherent.

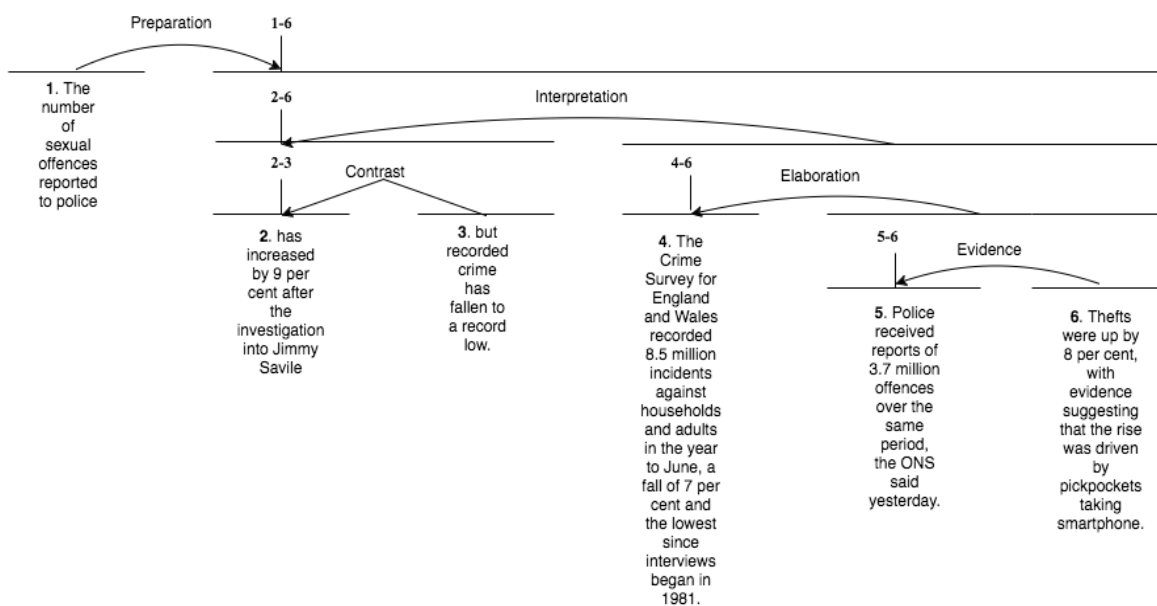


Fig. 22 Close-reading structure for article No.2.

6.3.3 The “clear link” between alcohol and behaviour, reported by *The Daily Mail*

Article No.	3
Newspaper	The Daily Mail
Title	Violence drops 12% as alcohol prices rise
Author	James Slack
Date	23 April 2014
Words	409
Sentences	14
Keyword density	violence 10 (4%); alcohol 10 (4%)
Sentence structure	<ol style="list-style-type: none"> 1. A rise in alcohol prices has led to a sharp reduction in booze-fuelled violence, 2. a study shows. 3. The number of people injured in serious violence dropped by 12 per cent last year, 4. with 32,000 fewer people treated for injuries relating to violence in England and Wales. 5. There is a clear link between a reduction in binge drinking and better behaviour according to the report from Cardiff University. 6. Police and doctors have warned for years that easy access to cheap alcohol can fuel mayhem on Britain's street.

Tab. 25 Breakdown of *Daily Mail* crime article.

As we can see from Fig. 23, the first six sentences of the article have three compact levels. The first level worth analysing is the use of the *evidence* relation between units 5.-6. (“*according to the report from Cardiff University*” and “*police and doctors have warned for years*”) and 1.-4. (“*a rise in alcohol prices*”, “*the number of people injured dropped by 12 per cent*” and “*with 32,000 fewer people treated for injuries*”). The satellite 5. with the phrase “*there is a clear link*” confirms the statistical claim made in the title and in 3. “*the number of people injured dropped by 12 per cent*”. The second level features an *elaboration* relation of the statistical points in the unit 3.-5. which elaborate and develop unit 1.-2. “*a study shows*”. The third level is characterised mainly by the *interpretation* relation between 4. and 3. “*with 32,000 fewer people*” which is supported by the *evidence* relation with 5. “*according to the report from Cardiff University*”.

Overall, the article has a high density of statistical points, closely and clearly connected to each other by strict levels of relations that give the article a sense of coherence and clarity.

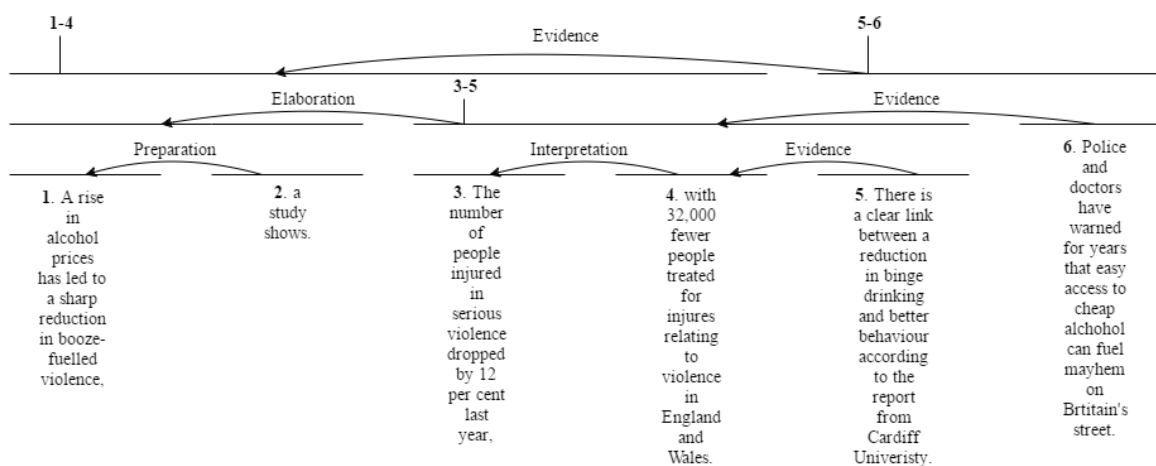


Fig. 23 Close-reading structure for article No.3.

6.3.4 Men innocent victims of alcohol, *The Daily Mirror* reports

Article No.	4
Newspaper	The Daily Mirror
Title	Drink blamed for 53% of adult assaults
Author	N/A
Date	13 February 2015
Words	115
Sentences	6
Keyword density	violence 3 (4%)
Sentence structure	<ol style="list-style-type: none"> 1. Alcohol was involved in more than half of all violent attacks on adults, with men the most likely victims, 2. latest crime figures show. 3. Of more than 1.3 million incidents in England and Wales in 2013/2014, 4. 53% occurred after one of the parties had been drinking. 5. The ONS figures also showed 62% of victims of alcohol-related violence were men. 6. Two-thirds of attacks between strangers involved booze, while a third of domestic violence and 43% of assaults on police happened after drinking.

Tab. 26 Breakdown of *Daily Mirror* crime article.

This article presents a compact two-level structure. If the first level shows unit 5.-6. as an *elaboration* of 1.-4. with “*The ONS figures also showed*”, the second level shows three types of relations: 2. is *preparation* of 1. with “*latest crime figures show*”; 4. is *interpretation* of 3., “*53% occurred after*” interprets and develops “*of more than 1.3 million incidents in England and Wales in 2013/2014*” and lastly, 6. with the phrases “*two-thirds of attacks*” and “*a third of domestic violence*” and “*43% of assaults*”, has a clear *evidence* relation with 5. “*the ONS figures also showed 62% of victims of alcohol-related violence were men*”.

Overall, the article presents a high density of statistical points in only two levels of structure, but the points are strictly connected. The articulation of such statistics is logical and coherent between the parts of the text.

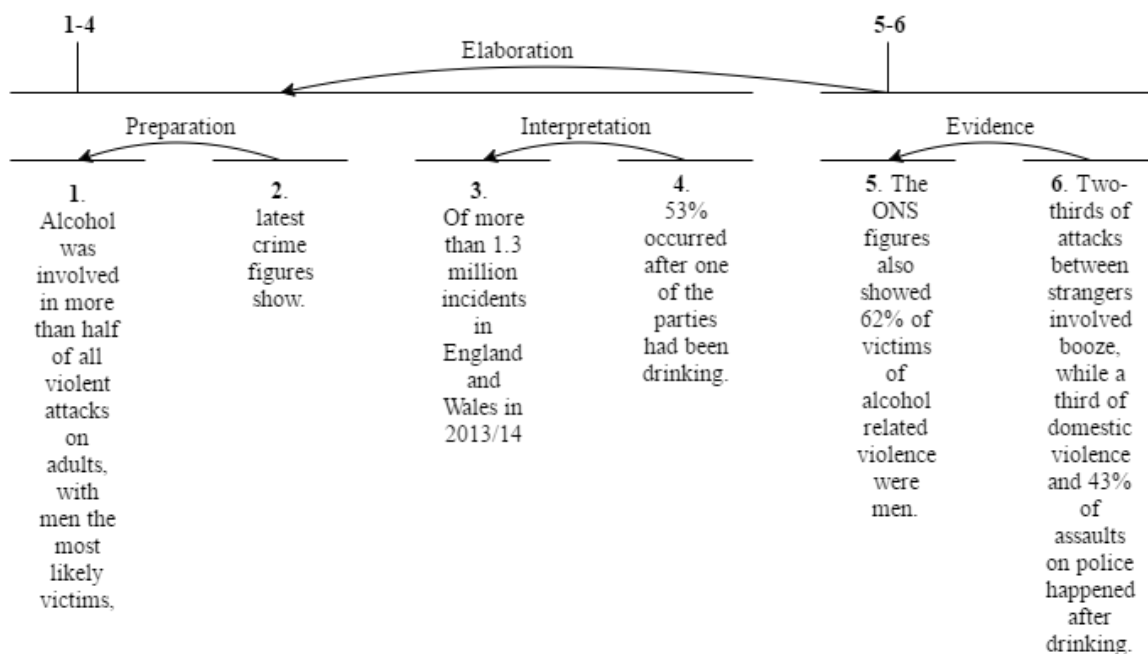


Fig. 24 Close-reading structure for article No.4.

6.3.5 Crime impacts on health, *The Guardian* claims

Article No.	5
Newspaper	The Guardian
Title	Decline in violent crime ends as attacks on older people rise
Author	Alan Travis
Date	20 April 2016
Words	673
Sentences	17
Keyword density	hospital 7 (2%)
Sentence structure	<ol style="list-style-type: none"> 1. A steady seven-year decline in serious violent crime in England and Wales has come to an end with a significant increase in attacks against people aged 50, particularly women, according to new hospital data. 2. Returns from 91 hospital emergency departments, minor injury units and walk-in centres show that 210,215 people needed treatment after being violently attacked in the 12 months to September 2015. 3. Attacks on women over 50 appear to have soared by 20% from 5,156 in 2014 to 6,165 in 2015, according to the hospital data, 4. and though the researchers say the figures are reliable, they have little idea why more attacks on older woman are happening. 5. The authors of the annual study by the violence research group at Cardiff University said that after successive

	<p>annual falls in the number treated for violent crime injures in England and Wales,</p> <p>6. this is the first time since 2008 that the data has shown little change.</p>
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Tab. 27 Breakdown of Guardian health article.

The article related to health issues presents only two simple levels of structure but is densely written. The first level includes a *preparation* relation where the satellite 1. introduces the ground of the nuclei 2.-6. with “a steady seven-year decline in serious violent crime in England and Wales has come to an end”. The arrowhead points backward for the *interpretation* relation: nuclei 5.-6. is an *interpretation* of 2.-4. Four numerical information points can be found on the second level: 3. is in an *evidence* relation with 2. “attacks on women over 50 appear to have soared by 20% from 5,156 in 2014 to 6,165 in 2015, according to the hospital data”. 6. is an *elaboration* of 5. by using “this is the first time since 2008 that the data has shown little change”. Satellites are tightly and logically connected to each other, showing a high degree of coherence between the parts of the text.

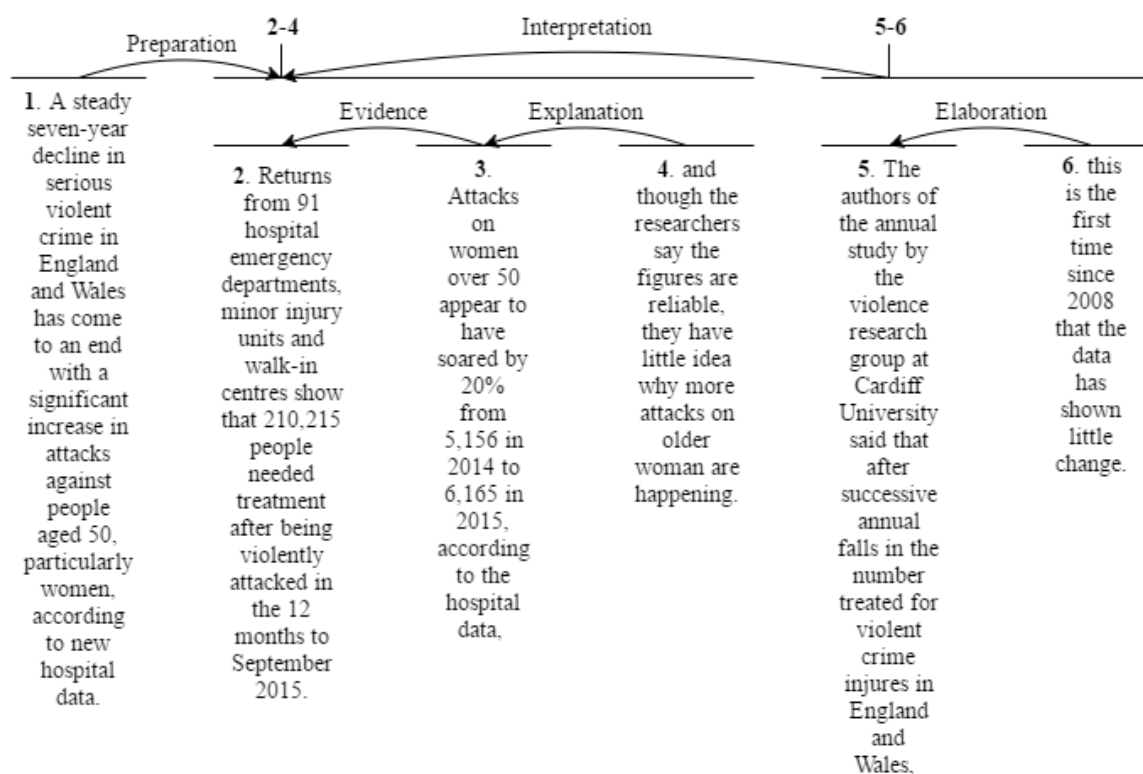


Fig. 25 Close-reading structure for article No.5.

6.3.6 The numerical reasons behind obesity, according to *The Times*

Article No.	6
Newspaper	The Times
Title	Why healthier eating is making us fatter
Author	Tom Whipple
Date	31 December 2016
Words	839
Sentences	38
Keyword density	people 12 (3%)
Sentence structure	<ol style="list-style-type: none"> 1. It looks like a familiar tale of obesity Britain. 2. Salad sales are down, red meat sales up. 3. There are twice as many egg and bacon fry-ups eaten every morning, three times as much butter consumed. On average, people take in 500 calories more each day. 4. Except, this isn't obesity Britain. 5. These figures about the nation's diet are from 40 years ago. And the paradox is: back then people were slimmer. 6. Public Health England released data this week showing that 70 per cent of middle-aged Britons are either overweight or obese.

Tab. 28 Breakdown of *Times* health article.

This article shows an intricate four-level structure. The first level is characterised by a doubled two *contrast* relation: 5.-6. with 4. and 1.-3. with 4. again, which highlights the contradiction with satellite 1. The division, theoretically between two parts of the text, happens with the phrases “*it looks like a familiar tale of obesity Britain*” and “*except, this isn't obesity Britain*”, together with “*these figures about the nation's diet are from 40 years ago*”. Going into detail about the other levels of structure, we can notice that 6. is used as *evidence* for the statistical statements in the nuclei 2.-3. “*Public Health England released data this week showing that [...]*”. The last level indicates that 5. is an *elaboration* of 3. “*these figures about the nation's diet are from 40 years ago*” and 3. is an *explanation* of 2. “*Salad sales are down, red meat sales up*”. The article begins with six confusing sentences that overlap each other in terms of structure levels and statistical referencing. Overall, the article is weak in coherence, and therefore potentially misleading in the way it presents the numerical information.

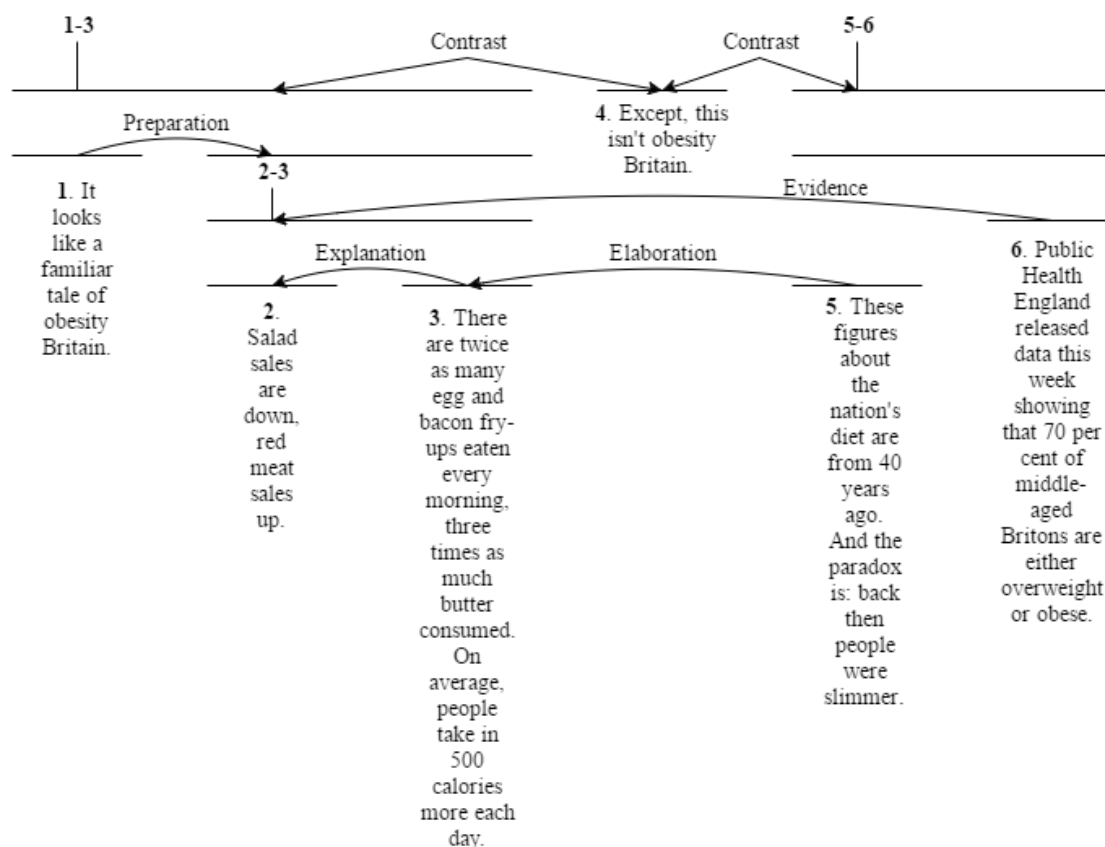


Fig. 26 Close-reading structure for article No.6.

6.3.7 The baby-booming statistics of *The Daily Mail*

Article No.	7
Newspaper	The Daily Mail
Title	How baby boomers are invading the countryside
Author	Peter Campbell
Date	29 December 2014
Words	437
Sentences	20
Keyword density	baby 4 (2%)
Sentence structure	<ol style="list-style-type: none"> 1. They are more likely to be well-off, in good health and enjoy a long retirement. 2. So perhaps it is no surprise that the baby boom generation has settled in one of the most picturesque parts of the country. 3. A corner of South Devon has been named as the baby boomer capital of Britain, 4. with a third of residents in the South Hams area aged between 50 and 68. 5. Situated in an area of outstanding natural beauty, the district is popular with tourists and sought-after among wealthy city dwellers looking for second homes and older people hoping to downsize or retire to the countryside. 6. Nestled among the rolling countryside and sandy beaches are the towns of Salcombe and Dartmouth, as well as Totnes and Ivybridge, which borders Dartmoor.

Tab. 29 Breakdown of Daily Mail health article.

This article has a four-level structure, but, in the first six sentences analysed, does not present any numerical points. The statistical information comes soon after the seventh sentence. Despite this limitation, it is worth analysing it, as it is an interesting exception to stories with numerical information. Of the four levels, the most remarkable is the third, where the satellite 2. is in an *explanation* relation with 1. “*it is no surprise that the baby boom generation has settled in one of the most picturesque parts of the country*”. Another valuable relation is the *motivation* of 6. with 5.: “*nestled among the rolling countryside and sandy beaches are the towns of Salcombe and Dartmouth, as well as Totnes and Ivybridge, which borders Dartmoor*” motivates the claim-statement “*the district is popular with tourists and sought-after among wealthy city dwellers looking for second homes*”. The article is indicative of how statistics are not the priority in this type of story, even though numerical information is used throughout the rest of the article. Overall, the text presents a coherent and well-structured beginning to the story.

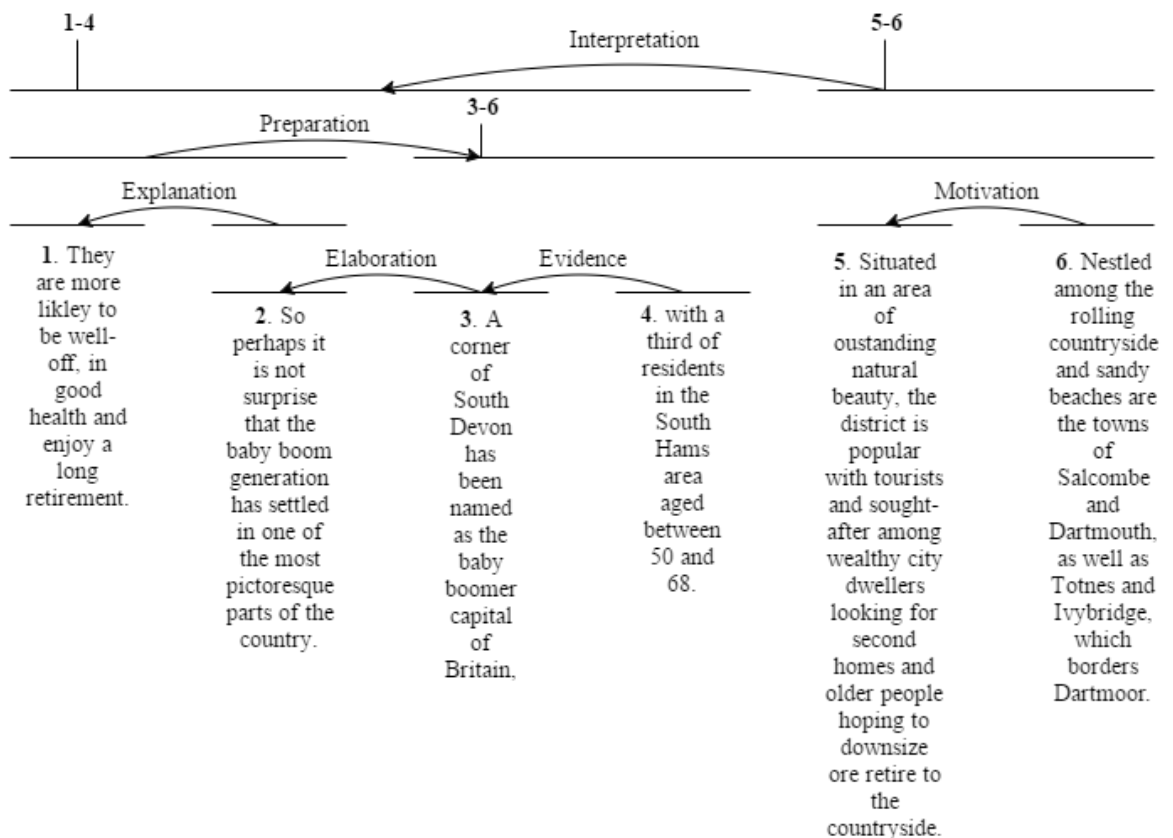


Fig. 27 Close-reading structure for article No.7.

6.3.8 Christmas' gift is stress, according to *The Daily Mirror*

Article No.	8
Newspaper	The Daily Mirror
Title	Drink sensibly to guard your mental health
Author	David Babington
Date	16 December 2013
Words	767
Sentences	30
Keyword density	alcohol 22 (6%)
Sentence structure	<ol style="list-style-type: none"> 1. The Christmas holiday period is traditionally a time for celebration. 2. While many people will be looking forward to having time off work, 3. the impact of Christmas can be profound and not always positive, especially when there's a lot of alcohol around. 4. At Action Mental Health, we're very aware of the difficulties which Christmas can present. 5. A range of factors contribute to making Christmas a busy and potentially very stressful time of year. 6. These includes pressures of shopping, time, financial concerns and social demands, as well as general over-indulgence and lack of physical exercise.

Tab. 30 Breakdown of Daily Mirror health article.

This article presents a highly structured three-level text that rotates around the satellite 4. “*at Action Mental Health, we're very aware of the difficulties which Christmas can present*” that appears to be, however, isolated from the rest of the six sentences. At the first level, 1. is in *preparation* relation with 2.-3. only, whereas 5.-6. is an *explanation* of 2.-3. only. At the second level, it is remarkable that 3. and 1. are in *contrast* relation: “*The Christmas holiday period is traditionally a time for celebration*” contrasts with “*the impact of Christmas can be profound and not always positive*”. Also, 6. is an *explanation* of 5., with the phrase “*these includes pressures of shopping, time, financial concerns and social demands, as well as general over-indulgence and lack of physical exercise*”. The last level only features an *interpretation* relation of 3. with 2.: “*the impact of Christmas can be profound and not always positive, especially when there's a lot of alcohol around*” interprets “*While many people will be looking forward to having time off work*”. Overall, the article shares the characteristics of article number 7; statistics is not the priority and numerical information comes only after the sixth or seventh sentence.

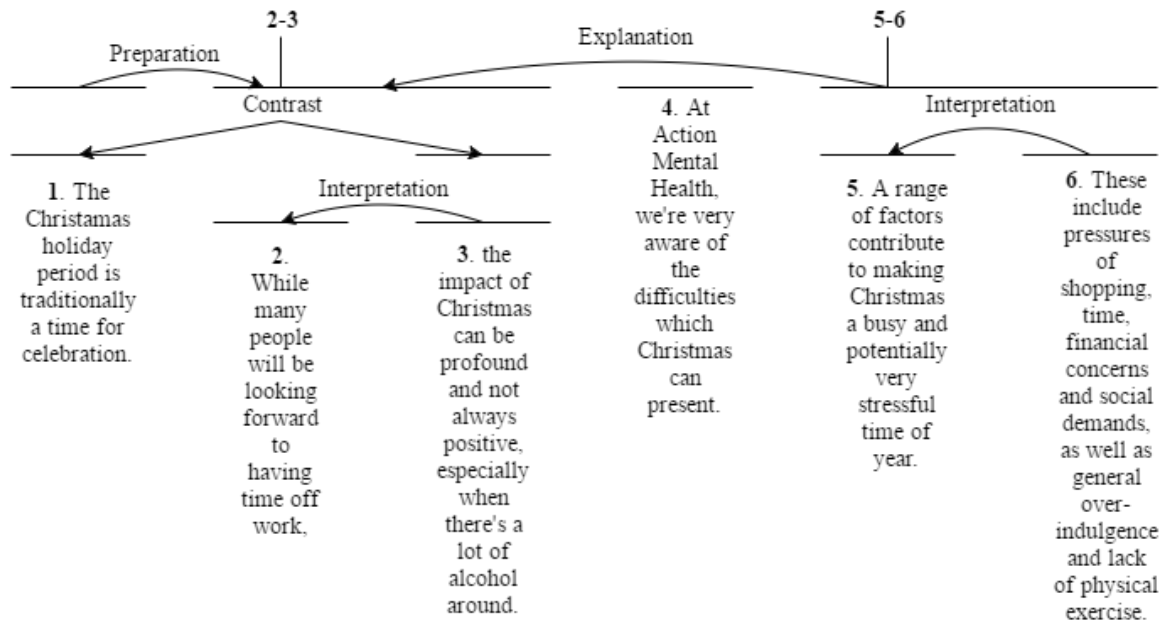


Fig. 28 Close-reading structure for article No.8.

6.3.9 Summary of the findings

The close-reading rhetorical analysis method is used in addition to content analysis. As a more qualitative approach, it helps to cast further light on how statistics are articulated in the news by using another method of data collection. In general, the analysis suggests that statistics are articulated in one or more levels of structure which eventually impact on the overall coherence of the article. Articles No. 1, 6 and 7 are the most articulated, with four levels of structure, whereas the others make use of two levels (Articles No. 2 and 4) or three levels (Articles No. 3, 5 and 8). Health news can be densely written and compacted into only two levels, as in the case of Article No. 5, or more diluted over four levels, as in the case of Article No. 7. This means that concerning health issues, statistics can be introduced soon at the beginning of the story or diluted to give more space to the story-telling. Crime statistics are articulated more densely, as in Articles No. 1, 2 and 3. The use of statistics is predominant, but often lacks coherence between the parts of the text, as in Article No. 2.

Overall, this means that a high level of structure does not guarantee coherence and clarity. Among the four UK newspapers *The Guardian* seems to be the only one that makes a more coherent use of statistics. In the context of quality, this analysis gives an insight into how numbers are articulated inside the articles and highlights the problematic aspect of coherence when the moment comes for the journalist to put the numbers in a coherent and cohesive frame.

6.3.10 Discussion

Statistical information is one of the means used by journalists to tell stories about the world we live in, and statistics are a powerful tool that enables journalists to be more analytical and to fulfil the ultimate goal of being more scientific when constructing social reality. When seen through five quality dimensions however, the use of statistics in news reporting reveals interesting but also problematic insights.

The research findings show that we cannot assume that statistics in journalism practice are used to automatically deliver quality to the news, but rather to fulfil the normative aspiration of quality: “This guarantee of quality of information is not something that can be instantly provided and some news outlets can be considered more reliable than others” (Frost, 2015, p.54). The popular assumption that an extensive use of numbers improves the quality and transparency of news seems to be challenged by the results of this study. Numbers can bring persuasiveness and credibility, but when the time comes to evaluate their quality through the pentagonal approach of the quality dimensions, numerical information emerges as lacking accuracy, timeliness and, sometimes, relevance. Despite this misuse of statistics, numbers are still a fundamental tool to legitimise stories and promote data-driven arguments. This is evident, for example, in the two specific dimensions of Interpretability and Accessibility.

Making statistics easily interpretable with a good verbalisation of numerical terminology seems to be both a concern and a goal of those journalists who try to hook the readers’ attention. The Interpretability dimension is specifically concerned with the stylistic aspect of statistics, and it reveals that numbers are undeniably central in the articulation of news, both in health and crime news, and that statistical claims are often simplified by using stand-alone statistics. This dimension was further developed by the close-reading rhetorical analysis, which showed that sometimes numbers are not the priority and they are not used by journalists to capture the readers’ attention or to inform, but rather they are used from the middle of the article onwards in heavily structured sentences that do not add anything in terms of clarity of expression and coherence. Nevertheless, from the researcher’s point of view, the pentagonal approach (Fig. 29) to quality statistics in journalism has the great methodological advantage of accessing quality from different angles.

Each dimension appears to be a path to quality or, strictly speaking, every dimension has the potential to lead to a quality understanding. Similarly, from the journalistic perspective, every dimension is used by journalists under certain circumstances. However, we cannot focus exclusively on the unsuccessful uses of statistics when dealing with quality. This is because the legitimisation of stories through numerical information is done by using one of the dimensions, or more

than one at a time, in an effort to achieve the quality which is understood here as a synonym for 'completeness of information'. Also, the legitimisation of stories occurs under certain circumstances and limitations of the journalistic practice and newsroom rituals that cannot be assessed through content analysis alone.

In conclusion, content analysis and close-reading rhetorical analysis only shows a snapshot of the uses of numbers and says little about the underlying dynamics that lead to certain decisions. This is why I have incorporated additional qualitative methods into the analysis. For an overview of how the results inform the quality dimensions through the pentagonal approach, Fig. 29 provides a visual summary.



Fig. 29 *The pentagonal approach to the concept of quality.*

6.4 Semi-structured Interviews

The results from the content and close-reading analysis were used to develop the interviews, which offer an explanatory framework as to why journalists do what they do. The semi-structured interviews aimed to explain the findings from this analysis and answer the question of how statistical information is used to articulate and legitimate quality. Furthermore, the interviews allowed me to underpin the dynamics behind the journalistic uses of statistics and how journalists understood the meaning of quality within the journalistic workflow. To do this, I collected the data from fourteen ($n=14$) journalists from *The Guardian*, *The Times*, *The Financial Times*, *The Telegraph*, *Trinity Mirror* and freelancers. This section presents the results of these interviews, which can be summarised in three key findings:

(1) The first key finding is concerned with an understanding of the concept of quality that generally appears to be scarce among the interviewees. Journalists lack a definition of what quality is in its broadest sense, therefore they tend not to incorporate this concept into their daily routine. Rather, they are aware of one or more dimensions that could lead to quality, such as that of verification or accuracy, for example. But quality is conceived as a value to aspire to – it is understood as a path that can lead to a more perfect way to be a journalist, a sort of attitude of perfectionism that can easily be threatened by internal and external factors in a day-to-day work routine.

(2) The second key finding highlights two main internal issues that can prevent journalists from attaining quality: statistical innumeracy and statistical accessibility. In the first case, the educational background of the journalists, and lack of mathematical training and statistical reasoning, is a major stumbling block that can hinder journalistic speed, negatively impacting on the news production cycle. In addition to this, the lack of easy access to statistical reports can prevent journalists from delivering news in a timely fashion.

(3) The third key finding evidences an external factor: the politics of numbers. Journalists see statistics as a political tool and therefore as biased at source. However, even if they are aware of this political bias, they tend to prefer the safest route and make use of official and government statistics without being critically engaged with them.

6.4.1 Key finding 1: The problematic sense-making of 'quality' through its dimensions

The content analysis showed that there is no single case where the five quality dimensions are comprehensively addressed. There can be an emphasis on one or more dimensions at the same time, but the data did not suggest that quality, as it is interpreted in this study, is fully achieved. In seeking to know what the

causes are, I contacted journalists who routinely deal with data and statistics to understand how they use numbers when writing a story. I wanted to evaluate their quality-awareness, that is, a very basic understanding of what quality and its dimensions are and what they mean for them when applied to the journalistic daily routine.

The importance of this assessment lies at the historical level. Theodore Porter has argued that because of numbers' longstanding association with rationality and objectivity, quantification can be a useful "strategy for overcoming distrust" (Porter, 1996, p.22) especially in professional fields that are susceptible to external criticism.

At a time when the notion of 'datafication' of society (Baack, 2015; John Walker, 2014) is replacing the idea of 'quantification' (Crosby, 1997; Wootton, 2015), becoming more and more pervasive, we might expect the standards of journalistic evidence to become increasingly quantitative and statistically driven. But it seems not to be the case. Distrust in government is even more evident nowadays than before (see Jamie Grierson, Briton's Trust in Government, Media and Business falls, *The Guardian*, January 16th, 2017).

As Tim Berners-Lee puts it, in *The Data Journalism Handbook*, "it used to be that you would get stories by chatting to people in bars, and it still might be that you'll do it that way sometimes. But now it's also going to be about poring over data and equipping yourself with the tools to analyse it and picking out what's interesting" (Gray, Chambers, & Bounegru, 2012, p. 12). Through the interviews, I will follow what Berners-Lee suggests and try to determine whether journalists equip themselves with these important quantitative tools.

To begin with, among the fourteen journalists interviewed, only two were critical (#INT09; #INT13) of the concept of quality. Three (#INT01; #INT04 and #INT07) remained silent on the issue of quality. The others, however, could identify and capture single dimensions that constitute the concept of quality, as a pre-determined set of five dimensions.

To be honest I never happened to think about this idea of quality. The first thing that comes up in my mind is the sense of being loyal to my readers. I mean I have no rights to cheat on the information I provide. I should be as accurate as I can be. And for what concerns statistics I should make use of my skills at their best in order to perform the data analysis. Make sure that the numbers are accurate. (#INT09)

Quality is simply a myth. We need to be down to earth. I don't see quality as a tangible and achievable concept as a whole. It is abstract and journalists do not deal with abstractions and theories. We have

deadlines and we need to come up with results that is a story, no matter what. (#INT10)

The quotes above reflect, from the beginning, two big problems with quality and its definition/s. On the one hand, journalists do not think specifically about the idea of quality as they are much more concerned with the idea of 'loyalty' to their readers and 'accuracy' when dealing with statistics. It is interesting that #INT09 tends to rely on his own data analysis skills without seeking the help of professional statisticians. This leads to the second quality dimension used for the content-analysis: Accuracy. The data gathered contradict, in fact, what #INT09 said: almost 99% of journalists do not mention any partial or missing statistics in their stories. This means that, from my own perspective as a researcher, there is no evidence as to whether journalists critically question the statistical source they use or not.

On the other hand, the very idea of quality seems to be a hindrance to the speed of journalistic routine. #INT10 suggests that deadlines are often seen as something to fulfil 'no matter what'. This can be related to the third of the quality dimensions: Timeliness. According to this journalist, the speed and routine in newsrooms do not allow journalists to use fresh datasets. This validates the 53.5% of data (from the content analysis, see Fig. 15) older than three months and, perhaps most surprisingly, the 38% where no reference time is mentioned at all. This can be explained by the limitations journalists have experienced since June 2017 in accessing pre-released statistical reports, and the answer might also explain the gap between the normative claims of quality and the pursuit of trust and credibility. Other journalists provided more explanation when asked about quality:

I think quality goes together with verification. Being journalists, we have the duty to verify our sources and use government statistics because official. Yes, I would say that official sources are of quality and we can use them with no fear. (#INT02)

Quality is not only but delivering a good story, a story that is credible. Yes, I think statistics can enhance this credibility. Statistics are the cause and the effect. The cause because a statistical analysis can trigger a good credible story. The effect because they are the mean through which you can show the evidence of what you are talking about. (#INT14)

By these means, 'verification' and 'credibility' represent the drivers through which an achievement of quality would therefore be possible. Verification of statistical sources would be the key to delivering quality, and credibility would be the ultimate goal. However, as we have seen with the content analysis, verification of sources failed in almost 99% of the articles analysed (see Fig.13).

#INT02 mentions that official sources automatically mean quality and journalists use them without asking questions.

I perceive a contradiction here. If verification is central to quality, the usage of sources, whether they are official or non-official, should be accompanied by a good degree of scepticism and critical thinking and we should not blindly trust them as the phrase ‘with no fear’ would suggest. In fact, this is confirmed by the content analysis that shows under the variables *criticality2 and *evaluation2 that the overwhelming majority of articles do not contain any type of criticism, or comments regarding the statistical sources.

#INT14 argues that statistics enhance the story’s credibility and that quality is not just a credible story. According to him, statistics themselves are the means to deliver credibility because they are used to support hard facts and show the evidence of journalistic claims. He talks also about two specific quality dimensions: Accessibility and Interpretability conceived as “*the evidence of what you are talking about*”. The above consideration is supported by recent literature that shows how statistical information tends to reinforce the institutional perspectives typically found in news coverage (Wahl-Jorgensen et al., 2016).

Another journalist pointed out the balance that a kind of journalism that uses statistics should achieve.

Quality journalism has a meaning if it is used in the public interest. It is well researched journalism and non-sensationalised. It is an intelligent way of making journalism. I personally use data as just another source of news - I use statistics to interpret data and construct well researched, non-sensationalised, meaningful stories and deliver quality. (#INT08)

In this case, quality conveys an idea of impartiality and balance and, most importantly, journalists link the idea of quality to public service (Ettema & Glasser, 1998). This point has been recently corroborated by Stephen Cushion when he says “when scrutiny is applied, it is often through the lens of impartiality rather than an attempt at objectivity” (2016, p.2). According to #INT08, balance represents the smartest way to achieve quality journalism. She stresses the fact that statistics are “*just another source*”. Rather than talking about what makes statistics official or non-official, this journalist says that statistics are to be considered a good source for “*well-researched and non-sensationalised*” journalism. Indeed, the risk here is that statistics could be ‘entertaining’ by publishing sensationalised numbers with odd correlations (Gallagher, 2014) rather than ‘informative’ (Livingston & Voakes, 2005). This point is further clarified by another journalist:

There are criteria to follow. If journalism doesn't meet these criteria it's little more than sensationalistic fluff. Some of the best articles I've read, or programs I've listened to, take one seemingly unintelligible and complicated concept and break it down piecemeal through the lens of a relatable character. Quality journalism is telling the truth by telling –nonfiction- stories. (#INT11)

This journalist acknowledges the existence of certain criteria, similar to Harcup and O'Neill (2001) and their criteria about what is news. When asked to rationalise such criteria, only one journalist, however, was willing to go into detail, as described below (numbers in square brackets are to simplify the reading):

As someone who contributes to a journalism project that tries to put an emphasis on data quality reporting over data quantity, the characteristics that I believe embody quality journalism are:

[1] *All facts and data should be verifiable.* “Number of people with diabetes up to 60% in the last decade” *is not particularly verifiable.* “NHS spokesperson told reporters at a press conference that diabetes is up to 60% in the last decade” is verifiable. If you attribute something to someone, it should be appearing in your notes (or on audio) and this should be available to reviewers who actually review it to verify that what you wrote matches your notes. Datasets work in a similar way. They should be available both to the journalists who are dealing with that and to the readers, who might want to get access.

[2] It must be neutral. Lots of material that is passed off as neutral fundamentally is not. And when people do meet up with neutral, fact-based information, this type of neutral journalism often leads to accusations of bias because they are unable to understand what neutral means. People should be able to draw their own opinions from the facts alone and here from simple statistics.

[3] The topic is newsworthy. The newsworthiness should be measured by answering all the key questions: who, what, where, when, why, how? Same for statistics. And it should be current, reporting on an event that took place in the past 48 hours. In the case of statistical releases, they shouldn't be older than 1 year. Otherwise news ceases to be news. Though facts do not cease to be facts.

[4] It needs to be written for an international audience, explaining why this matters. Putting context in for an international audience is important. Also, putting in the key facts matters. I have read sport reporting where I got to the end and had zero idea what sport was being discussed.

[5] It needs to comply with a style *guide and be reasonably well written.* (#INT09)

The above quotation touches on some of the five quality dimensions: [1] relates to Accessibility; [2] to Accuracy; [3] to Relevance and Timeliness; and

both [4] and [5] to Interpretability. In summary, according to #INT09, quality journalism should: (a) follow five criteria to be successful; and (b) privilege the quality of data over the quantity.

If point (a) corroborates the main assumption of this study, point (b) touches on a very long-debated issue of data overload (Nordenson, 2008; Whitney, 1981). Implicitly, it brings to light that quality criteria, or quality dimensions, can be conceived as an effective means of counteracting and making sense of such an abundance of data. To prevent such quantity of data from deteriorating their quality, another journalist points out the attention on (1) the time factor and (2) the expertise that makes quality news and can impact on overall data management:

In my opinion, quality is expertise plus time. I regard all kinds of people as experts, if one has no formal education or can't even read but has a lot of hands-on experience with ducks, this person will probably be a duck expert. Sure, it might take a while to understand this kind of expertise because it has taken a path wildly different from what most people in the media profession have taken, namely schooling. That's expertise, but it takes expertise of expression to publish this expertise and it will take time to reflect on one's opinion. If this is done properly, quality will be produced. Transparency should never replace objectivity, it's a condition of objectivity. Transparency without objectivity is by itself not a bad thing but should only serve as a flag warning an opinion is biased or without expertise at best. Since objectivity is an ideal and something which can never be fully reached, every article that is published as objective should be transparent. That's why scientific research references are the very building blocks of its argument. In most quality journalism, we assume objectivity and I believe it's what they strive for as well, but I would like to see their resources more prominently. More scientific if you like. (#INT07)

Journalist #INT07 makes a link between 'transparency' and 'objectivity'; cardinal points for those who conceive the journalistic profession under the lens of the Social Sciences, as it was for Philip Meyer. The point made by #INT07 is useful to understand two points. On the one hand, expertise is a key factor to produce quality. Expertise, as such, requires time to be assessed, and this is a pre-condition in the achievement of quality. On the other hand, the time factor sounds secondary in relation to expertise, and time can be practically used to evaluate expertise. This takes us back to the quality dimension of Timeliness.

In the content analysis (see section 6.2) we have seen that journalists make use of statistics that are more than three months old. Therefore, they have enough time to perform an appropriate data analysis over that time period. From the qualitative point of view, however, there is no explanation or justification of

how they maximise their time. A reliance on expert opinions would explain a deferential attitude, which is the opposite of the kind of journalistic attitude that claims to be 'scientific'. The true scientific attitude is that of being sceptical even towards expert opinions (Gannon, 2004), in line with what Richard Feynman is believed to have said: "science is the organised scepticism in the reliability of expert opinions".

In the literature review I also referred to the Philosophy of Information (PI), and this approach is also very much concerned with evidence gathering and expert opinion. In this regard, PI sees the evidence produced by expert opinion as information about the person's experience of the given topic. There is some exchange of information that occurs between individuals who apply methods to generate evidence and individuals that evaluate the generation of evidence (Baumgaertner & Floridi, 2016). This 'exchange of information' happens between journalists and statisticians or data experts. Again, this is confirmed by the content analysis that shows that 55% of the articles make use of official reports and report expert interviews.

To paraphrase Kovach and Rosenstiel, objectivity calls for journalists to develop a consistent method of testing statistical information so that personal and educational bias does not undermine the transparency of their work. If this is good in theory, it is not in practice. The next journalist contradicts what the two authors have just said to be the basic 'elements' of journalism and introduces what is the second key finding of the interviews: statistical innumeracy. #INT10 focuses on numeracy and its importance for finding stories that are relevant and informative:

Journalism that not only scratches the surface, but gives a broad context. Well written, good graphics and maps, hard topics explained clearly, relevant in the longer run. If you're comfortable with numbers, you can dig deeper and find stories that otherwise would stay untold. And you can always look at a dataset from another angle: for example, what happens if you take a larger or smaller window of a time series? And a lot of reporting sticks to the average. But what about the median? Why not draw a chart that shows all the variation? To me, these are elements of a high numeracy quality journalism. (#INT10)

According to #INT10, statistical numeracy should be part of the sense-making of quality. It is a skill that enables journalists to write deeper stories by looking at data from different perspectives. Again, the content analysis showed that, regarding the quality dimension of Accessibility, journalists should be able to make statistics accessible (see section 6.2.5). Failing to know how to treat data and publish it in an accessible manner because of lack of statistical training would negatively impact on the overall quality. This point about mathematical numeracy can be further developed by explaining key finding 2.

6.4.2 Key finding 2: The internal interference to quality: statistical innumeracy and statistical accessibility

So far, the interviews have shown the problematic sense-making of quality through each dimension. I shall now consider the first of the two main interferences to quality journalism by considering the difficulties journalists experience in managing numbers, as #INT07, #INT08 and #INT11 succinctly highlight:

Many journalists have no mathematical qualifications and don't know what to do with numbers. (#INT07)

Without a doubt: statistical knowledge is lacking. It is still very underdeveloped in journalism. (#INT08)

The main disadvantage is lack of understanding of statistics. It is sometimes time consuming, you need a lot of skills (data gathering, cleaning, analysing, visualising, reporting). (#INT11)

Statistical innumeracy is the first internal interference to the achievement of quality. This seems to show that the use of numbers in news reporting is still not fully understood by journalists. On the one hand, literature in the area also highlights the lack of statistical training, which remains underdeveloped (Nguyen & Lugo-Ocando, 2016), and on the other, journalists complain about how the data analysis process would increase the journalist's workload. In the era of speed-driven journalism, performing statistical analysis would therefore be time consuming (Juntunen, 2010).

Not everything can be measured and converted to data. Some argue that if you can't measure it, it doesn't exist. But new phenomena may be hard to count, things fall between the cracks of different categories, phenomena that are currently too small to measure (but one day will be important). Sometimes this means that no secondary data is available and you have to collect the numbers on your own. But often quantitative data is just not the right format. Sometimes you need a good narration to tell a story. (#INT03)

#INT03 elucidates what happens when dealing with statistical data. There are internal difficulties that pose a threat to quality. For example, secondary data are often not available, and often not in compatible formats. Also, a story needs to be narrated by means of a clear verbalisation of mathematical terminology. This is specifically related to the quality dimensions of Accessibility, the use of statistics to make information more accessible, and Interpretability, the use of narrative tools to improve a story.

Balancing accessibility and interpretability is crucial to the delivery of information quality (Howard, Lubbe, & Klopper, 2011), especially in journalism. There is also the assumption that numbers through science can explain everything in the world (Santos, 2013; Weinberg, 2004), but the traditional way of talking to people cannot be entirely replaced by figures (Ettema & Glasser, 1998), and statistics themselves cannot explain everything (Reinhart, 2015), as #INT12 observes:

Statistics can't explain everything; and it's no substitute for talking to people. Numbers can tell you that criminals are very likely to commit further crimes where you live, but they don't explain why that might be in the case. (#INT12)

At this stage, it is important to understand how journalists engage with statistics when dealing with crime and health stories. We have seen in section 6.2, on content analysis, that newspapers adopt different approaches when reporting crime and health statistics. #INT14 and #INT9 offer an insight into the challenges they experience:

Crime statistics is a mess. Since there is no officiality, journalists can twist it at their pleasure. Health statistics are different, another world. In that case, my experience tells me that it's the methodology used that give validity, but again, only a bunch of journalists can detect whether a methodology is correct or not. (#INT14)

The main challenge is making statistics-led stories accessible to the public. This is crucial for medical journalism. Sometimes you know something is important such as NHS trust mortality rates. The challenge then becomes how to write the story in a way that is both accurate and accessible to the public who will probably not have much of a statistical background. (#INT09)

I observe here two urgent issues in the articulation of crime and health statistics: methodology and accessibility. Methodology – how data are gathered and collected – seems to be neglected by most journalists who deal with crime, maybe because their educational background does not allow them to spot fallacies, or because there is no homogeneity in how statistics are collected, especially in the area of crime. For this reason, they should be equipped with more stringent investigative tools. In the journalistic practice, the methodology of seeking evidence can be found mostly in investigative journalism techniques at the crossroads with some open-source intelligence methods. In the case of crime statistics, the cause might lie in the huge problems that crime statistics have in relation to their categorisation and collection. According to a 2006 independent review commissioned by the UK Secretary of State of the Home Department:

“crime statistics have long been recognised as having a number of weaknesses. [...] A number of attempts have been made over the last years to address these problems, but they largely remain”. Also, as far as health statistics are concerned, a recent study by Yavchitz et al. (2012) confirmed that half of medical reporting is subject to spin, which casts serious doubts on the reliability of mainstream medical and health journalism.

Accessibility is also at the centre of concerns for those who deal with health statistics (Kendrick, 2014). In the case of health statistics, however, this should be translated into transparent risk communication (Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz, & Woloshin, 2007). Almost 85% of the articles on both crime and health topics have shown that journalists use only one source – the most accessible one. Lack of accessibility to a wealth of varied sources is not the only problem. #INT06 considers other difficulties, for example the lack of clarity of numerical terminology contained in certain non-official sources.

There are lots of traps you can fall into when analysing data, such as confusing percentage points with percentages, not understanding confidence intervals and not considering data suppression for small numbers. If you make any of these mistakes your story is likely to be less accurate and therefore of lower quality. (#INT06)

Inferential statistics make the story sound more authoritative and, if you wish, scientific. Where descriptive statistics are for everybody with a minimum of mathematical skills. (#INT14)

The last quote can be seen through the lens of the content analysis data in the quality dimension of Interpretability. In section 6.2.4 I made a distinction between descriptive and inferential statistics; descriptive statistics are used most for crime stories and inferential statistics in health news. Regardless of the preference for one method or the other, a constant effort to appear ‘scientific’ is noticeable. In the pursuit of this scientific value lies the risk that scientists themselves pursue their own goals, and these goals often involve raising money for their research. In doing so, they sometimes formulate their findings in a way that can mislead journalists into believing a study to be more significant than it is (Bell, 2016; Dunwoody, 2014). There is, however, another interference that is voiced even more strongly by the journalists interviewed, and that is the political interference of statistics, which is addressed as key finding 3.

6.4.3 Key finding 3: The external interference to quality: the politics of numbers

The third interference to quality is external and it comes from those statistics that are biased or deemed to be biased for political reasons. The interrelation between

numbers and politics is not only a historical affair (Stigler, 1986), but a lively and timely matter that influences our daily lives. This urgent and growing concern has been widely addressed in recent work by Lorenzo Fioramonti (2013, 2014) who exposed the hidden agenda underpinning the use of statistics. The following analysis shows that among journalists there is also a very tangible concern about the use of statistics for political ends:

There are thousands of companies, pressure groups and political parties out there trying to influence the news agenda with numbers. It seems obvious that news organisations should have at least one person helping journalists get the numbers right. (#INT13)

Official data is politicised. The Government has an interest in presenting numbers in a way that suits it, and even non-partisan organisations often present their data in a way that reflects the news agenda. For example, the ONS publishes a section on gender differences in pay when it publishes its annual pay survey. (#INT02)

The viewpoints of the two journalists regarding this ‘politicised’ data are exemplificative and confirm what the writer Tim Harford illustrated in his article *How Politicians Poisoned Statistics* published in the *Financial Times* in April 2016, which centres on the basic argument that in politics we are witnessing a rise in “statistical bullshit”, or misleading statistics.

To make things worse, when I asked about differences between official and non-official statistics, I often perceived a hesitation. This would explain the over-reliance on government reports, as the content-analysis showed. This also explains the dichotomy of the proactive/reactive approach to numerical information. A proactive approach would help to eliminate problems before they even have the chance to occur; its opposite, the reactive approach, is based on responding after something has happened. When journalists cannot recognise the difference between official and non-official, they tend to react and use data released by well-known national government bodies.

Other journalists have changed their opinion regarding government statistics and have become more proactive, rather than reactive, as in the case of #INT13. It is interesting to note a shift in the opinions, now being more sceptical than ever, mainly due to recent political occurrences, such as the Brexit referendum and the US presidential elections:

Before Brexit and Trump I would've said statistics is not politicised. But today there is a lot more criticism of experts and the numbers they use to explain and convince. 'Lies, damn, lies and statistics'. So, statistics are used a lot in politics, but in a marketing way: to prove one's own

point and to convince, not to explain the truth. A lot of the time data used is cherry picked and used, charts are misleading. (#INT13)

This puts forward the belief that the government uses data from third party bodies for marketing purposes. Therefore, by selling a product, which in this case is the statistical report, numbers are used to convince and persuade people about the product's quality by means of 'branding'. Generally, the position of journalists is well summarised in the following statement:

In the main I don't think the figures released by the ONS and other government departments are politicised at source. But yes, data can be interpreted in different ways. This means that different political sides can spin statistics to fit their agenda. This was particularly apparent during the EU referendum campaign. (#INT09)

For the question of how statistics are used to deliver quality, this represents a crucial point. Even though there is a good awareness of what quality means and of the risks concerning the political bias, journalists seem to prefer to play safe and make use of official statistics. Within the newsroom, subjective decisions are made, journalists use the data they want, and they tend to support this data by means of expertise and officiality. In this way, they wish to protect the quality they want to convey from external interferences

6.4.4 Summary of the findings

The interviews expand the findings and our views of the topic. Despite a high level of quality-awareness, and despite the fact that journalists clearly identify what the drivers that lead to quality journalism are, two main problems can still damage this predisposition or ambition towards quality. One issue is related to a gap between the data releases and their comprehension by journalists, which entails two other problems, the validation process of such data and an over-reliance on official government data. The second main issue is training; considering that only two of the journalists interviewed have a mathematical background, it became clear from the analysis that the lack of statistical training would negatively impact on the adherence to all five quality dimensions. Also, given the problems of accessing and validating the data, the traditional mechanism of verification and validation used in other journalistic fields is not performed by journalists when dealing with numerical information.

6.4.5 Discussion

In answering the main research question of how journalists use statistics to deliver quality in their stories, this research found three main interferences that prevent journalists from attaining quality in the news: (1) the low level of

understanding of what quality is; (2) statistical innumeracy, mainly caused by a lack of mathematical training together with statistical accessibility and its limitations; and (3) the political side of numbers that is perceived as a potential interference to the transparency of the journalistic workflow.

It is important to remember here that The National Council for the Training of Journalists in the UK claims that 'maintaining quality' should be at the centre of the journalistic profession. Journalists, however, have a low level of quality awareness and there is a gap between what they understand as 'quality' and what they do to maintain it during the data manipulation process. This gap clearly impacts on the articulation of quality statistics in news reporting.

Despite statistical agencies claiming to be free from political interferences, as for the Office of National Statistics in the UK, according to the personal experience of a former government statistician and now informer, Jacob Ryten (2012), there are at least three types of interferences "which can be found in just about every country with a long enough history of official statistics" (2012, p. 9): 1) to 'muzzle' (prevent or delay publication of statistics ready to be published); 2) to handcuff (prevent regular surveys from taking place); and 3) to takeover (government officials occupy the physical space of the statistical agency; according to Ryten there are examples of this in the Latin American region).

The first interference to quality raises concerns over the journalists' ability to properly describe what role quality plays in both the journalistic workflow and in the data manipulation process. Therefore, there are reasonable doubts regarding how they write their stories and use the data to achieve quality. Quality seems, therefore, far away from the journalistic practice of data analysis in newsrooms. This perhaps sounds quite drastic, but it has also been noticed by Jarmo Raivio (2010) in the Reuters Oxford report entitled *Quality Journalism: The View from the Trenches*. In this report, Raivio concluded that "quality journalism" seems to be a highly elastic concept, maybe "to the point of not being very meaningful at all" (2010, p.74). However, in the present study such quality illiteracy goes in tandem with that of statistical illiteracy. In fact, this leads to the second interference, statistical literacy, which is crucial in the articulation of quality statistical information. If the importance of the uses of statistics in newsrooms is shared among the journalists interviewed, the lack of training is even more apparent.

Most journalists have never done any scientific or statistical training and often have never been asked to have knowledge in quantitative methods, even in Logic and Argumentation or Probability. In this respect, I agree with Johanna Vehkoo (2011) in her Reuters Oxford report entitled *What is Quality Journalism and How it Can be Saved*, where she came to the conclusion that journalists must specialise: "journalists will have a set of skills that allows them to be truly platform-

agnostic in their work” (2011, p.73). According to Vehkoo, journalists should be experts able to create a following, perhaps even a community, around their stories. This point has already been addressed by Barbie Zelizer (1993), who points out that journalists represent the interpretive community.

Journalists are members of a professional collective that offers an interpretation of key social and political trends, in this case using the interpretative tools of statistical analysis. In addition to this, expert authority and statistical accessibility bring forward the controversial issue that involves official statistics and its credibility: there is no practical way of verifying if such statistics are right or wrong, and this leads to the conclusion that we either believe what the official agency tells us or we do not, but proper verification seems beyond anyone’s capabilities, especially in the time constraints of the journalistic workflow. The case of official crime statistics is exemplificative, as they are an inaccurate reflection of our everyday experience of crime (MacDonald, 2002) and efforts have been made by the UK Statistical Authority (2010) to overcome such limitations.

The third and last interference to quality, as the findings describe, is represented by the political side of statistics and its impact on the five dimensions. This point has its historical roots in what Max Weber (Mommsen, 1974; Weber, 1946) prophesied as a rational bureaucratic legal society. Our Western society has indeed become a bureaucratized society where Michel Foucault (Espeland & Stevens, 2008; Sauder & Espeland, 2009) identified the ‘quantificatory episteme’, which is the ‘science’ of quantifying the human experience (Frängsmyr, Heilbron, & Rider, 1990) and of turning raw information and data into knowledge. In recent history “nothing was left untouched by the statisticians” argues Ian Hacking (1982, p. 280), who links the rise of statistical thinking to the Foucauldian concepts of Biopower, Biopolitics and Regimes of truth.

Doing journalism in an era of data abundance poses questions of growing significance, because it involves “some of the most fundamental aspects of news and its production”, and questions around “what such changes actually mean for news, democracy and public life” (Seth C. Lewis, 2015, p. 321). The maintenance of quality and its dimensions are subjected to these changes and struggle between figures of arithmetic and figures of speech (Poovey, 1993), between the needs of politics and the needs of journalists (Meehan, 2000; Prewitt, 1986). Under these constraints, journalists perform statistical analysis and report numbers in a way that might resemble a form of standardised and predictable ‘McJournalism’ (Franklin, 2003): “while market theorists claim diversity and quality as the essential products of competition, the reality is McJournalism and McPapers with similar stories” (Keeble, 2008, p.161). Consequently, the public tends to receive information that is not always up to quality standards and, as I will illustrate in the section 6.5, this makes newsrooms and governments an

object of suspicion, fostering in this way feelings of anxiety and mistrust (Tateno & Yokoyama, 2013), for example, in the cases of risk communication (Renn & Levine, 1991), crime (Heilbrun, Wolbransky, Shah, & Kelly, 2010) and health issues (Bennett, 2010).

6.5 Focus groups

This section deals with focus group data and ends the use-of-statistics cycle in news by exploring readers' views and attitudes towards statistical information, asking: *How does the audience engage with statistically driven stories?* The focus groups were organised in Leeds and Manchester and involved twenty-two ($n=22$) participants. Participants read four ($n=4$) articles that contained anecdotal and official data related to crime and health news.

I will summarise the data analysis in one major area, which is the key finding of this methodology. This is followed by an expanded description of participants' narratives about their views on the use of statistics in news reporting. Excerpts from focus group discussions and words used by participants are integrated into this narrative to provide a greater understanding and appreciation of the ways in which statistics are experienced, understood and talked about by participants.

The findings suggest that quality articulated in five dimensions fails to be transmitted through news reporting. Readers are particularly sceptical about three main areas: (1) authority, where statistical expertise, the 'branded statistics', is seen by the participants as part of a hidden process that aims to manipulate public opinion; (2) accessibility, mainly related to ways of obtaining full access to public statistics; and (3) accuracy, which involves the methods of data collection, which are often unclear. Throughout the four focus groups, the prevailing attitude was that of scepticism towards what was reported through statistics, undermining in this way any effort in the pursuit of quality from the journalists.

6.5.1 Key finding: The three A's of distrust: Authority, Accessibility, Accuracy

Focus-group participants were asked to discuss the numerical information as presented in the articles, to give their own definitions of quality and, wherever possible, to summarise their understandings of the statistics contained in the four articles. I found that nearly all the participants could not define or grasp the concept of quality. Hesitation and silence were the common 'answer' to questions about quality. A few individuals, three at most, expressed their views on quality as, for example, "*too complicated to define*". The attitude was extremely critical, ranging from simple doubts to rejection of the concept: "*talking of quality in*

numbers is like talking about honesty with politicians, I don't believe in it, I don't believe it is possible".

On the one hand, the silence I witnessed seems to speak volumes about how the readers were not aware enough of quality to discuss its multiple definitions and the implications that these could have on the public discourse of statistics and their values in democratic life. On the other hand, the feeling of 'hostility', or 'suspicion', is not exclusively towards the concept of quality itself – it goes beyond involving the concept of public trust.

In this regard, the effort of the UK government to improve the public's trust in statistics has been admirable. *Statistics: A Matter of Trust*, a Consultation Document released in 1998 by the Labour government aimed at finding 'modern' ways to improve public perception of statistics by claiming that "reliable official statistics are a cornerstone of democracy". The following year, the report *Building Trust in Statistics* was released, with a clear statement that "official statistics need to be of assured quality and be compiled and presented in a way which is free from political interference". Since then, the last accessible report in 2014 was published with the title: *Public Trust in Government Statistics: A Review of the Operation of the Statistics and Registration Service Act 2007, Session 2013-14*. These three government documents are perhaps the most significant in casting some light on the various strategies to improve trust in the government. Despite such efforts, there are still tangible problems in 'communicating with statistics', as another government report highlighted in 2013.

What I call the three A's of distrust, are in fact areas where readers experience a lack of confidence. Based on the qualitative data collected from the focus groups, I identified the following three areas: (1) authority: readers are sceptical, specifically about the nexus of expertise-authority-competence; (2) accessibility: readers are sceptical and concerned about full public access to statistics; and (3) accuracy: readers are sceptical about the methodology of data collection by journalists. These are clear signs of distrust in statistics.

To begin with, I argue that this lack of confidence in the statistical data, as published in the news media, might lie in what Theodor Porter would call the 'engagement-detachment' game that is played by the readers. Indeed, during one focus group, two participants offered an exchange of opinions that is representative of a willingness to be engaged with statistics (a willingness to listen) and at the same time a reluctance to accept them as truth (a willingness to suspect):

P4: Statistics have fallen into disrepute, partly because they are often manipulated by those who have an agenda. I have seen it claimed that, statistically, very few people die because of Islamic

terrorism when compared to other forms of terror. When I actually looked into the statistical evidence for these claims it was utterly bogus, since it failed to recognise so many examples as being religiously motivated.

P3: The same in health, like the example of the article we are reading today. But people who do that probably aren't deliberately trying to mislead, they are only seeing the data that suits their preconceptions. (#FG1)

These participants acknowledge that there is an obstacle that prevents them from trusting numbers: statistics seem to be miscommunicated by those who have a political agenda. Also, they feel manipulated by those who want to use them to fit their “*preconceptions*”, or already established assumptions. These statements are indicative of a general but consistent attitude toward numbers in news.

An explanation might be found in history, in the evolution of the concept of *public reason* whose concern “is the very basis of our collectively binding decisions [...] it envelops all the different elements of a constitutional democracy [...] in which we ought to stand to one another as citizens” (Larmore, 2003, p.368). The journalism-statistics-public relationship reason is even stronger in the UK because “contemporary public life in Britain would be unthinkable without the use of statistics and statistical reasoning. Numbers dominate political discussion” (Crook & O'Hara, 2011, p.22). But this relationship entails what I have previously called an ‘engagement-detachment’ game, as P5 of #FG1 suggests when he says: “*people are not numbers and democracy is not a number*”.

Throughout the sessions, participants were asked to expand on this feeling that was described with words such as “*anxiety*”, “*frustration*” and “*tension*”. Two participants summed up such a feeling as follows:

P5: People are not numbers and democracy is not a number. Numbers impose a rigid, mechanistic system upon us which is deeply unpleasant. And why should you trust something you cannot understand that has been thrust on you by experts, many of whom are being paid money to support certain ideas? (#FG1)

P4: The problem is that most people don't understand statistics. People fear what they don't understand. In an age where everyone is clever, telling them they don't understand something is the biggest insult. It taps into people's fears and insecurities. Greedy politicians are just capitalising on it. (#FG2)

Because the use of statistics looks rigid and imposing, it is perceived as “*deeply unpleasant*”, a kind of feeling known in the scientific literature as ‘math anxiety’, often described as “a feeling of tension, apprehension, or fear that interferes with math performance” (Ashcraft, 2002, p.181). In addition, participant P4 criticises the fact that readers are forced to believe in something that has been previously elaborated by experts who seem to be paid to drive public opinion in certain directions. The expertise-authority-competence nexus, when dealing with statistical reporting, is criticised even further. This is what I consider to be the first of the three A’s of distrust; authority, which encompasses a strong degree of scepticism towards expert opinions somehow related to the political sphere.

Politics and “*greedy politicians*” are often blamed for making money and taking advantage by also “*throwing facts number-based on gullible readers*”. Politics is seen as a major threat to the supposed neutrality of statistics. Again, interviewee P6 insists on a sort of connivance between journalists and politicians, whereas the debate between P1 and P2 in #FG3 highlights a problem of expertise:

P6: You all are correct. But there is no separation between politicians and journalists who have become very intertwined. In some cases, joined at the hip with a new class of journalist politician, like Johnson and Gove. And so low have standards of journalism become that politicians’ views of journalists are often well known. With opinion and statistics selected to continuously present those same fixed political views. (#FG3)

P1: I think this article is taken from The Guardian and statistics are there only to be abused. Such as in the repeated stories about the pay gap. It’s been at the forefront of making false assertions via bad stats for years, with the pattern being too strong to be simply down to ignorance. Look at their “the web we want” data, for example. Stories are not randomly assigned to people of various colours or genders, meaning that you cannot make any assumptions about whether colour or gender affects the amount of abuse received, yet this paper did that, repeatedly. I can’t take any opinion about statistical integrity, or usefulness, or quality, seriously if it’s made on The Guardian.

P2: There is no such thing as bad stats just bad analysis, I think. (#FG3)

The Guardian is not a credible source of statistical information, according to this reader. The word “*abuse*” certainly denotes a strong position but at the same time, his argument denotes a good knowledge of scientific, mathematical issues: “citizens encounter statistics in multiple life contexts: as readers, listeners, viewers, workers, or actors in community activities, civic duties or political events”

(Roten, 2006, p.243). H. G. Wells' prophecy, at the beginning of the 20th century, that "statistical reasoning will one day be as necessary for efficient citizenship as the ability to read and write" seems to have become a reality here.

When asked to define quality, P1 in #FG3 juxtaposed the concept of quality with that of "usefulness" and most importantly that of "integrity". The Organisation for Economic Co-Operation and Development (OECD) says that integrity refers to "values and related practices that maintain confidence in the eyes of users in the agency producing statistics and ultimately in the statistical product". Integrity is, however, only a driver that can lead to quality. This means that when participants are asked to define the concept of quality, they make use of related concepts. When they look at the negative sides of the use of statistics, they can easily recognise when quality is lacking, regardless of the newspaper's business model (Meyer & Kim, 2003). Their attitude does not seem to change, even when asked to specifically comment on health statistics and crime statistics in the news.

P1: By reading this article about health I can only say that NHS statistics are particularly misleading. If a patient is an arranged emergency admission they will pass through casualty to an assessment area and then possibly to ward. One patient, three attendances. That's how the government can get away with claiming emergency services are overwhelmed. They are not, they are simply underfunded and the attendances triple counted. Unless independently collected never trust NHS statistics. (#FG3)

Without going into the details of the NHS's system of emergency admission, the view of this participant is clear: health statistics are misleading. He also recommends that statistics should be "*independently collected*" in order to be trusted. For example, the concept of integrity is paramount in medical statistics to prevent poor-quality research (Altman, 2002).

The concept of integrity is a good point and makes a distinction regarding the sources by indirectly revealing that non-official sources might have a higher level of accuracy because they are perceived as independent. Despite this hint of positivity, there is an obstacle that prevents statistics from attaining quality and that is accuracy. Accuracy is in fact the second A of distrust, part of the key findings explained in this section. The literature in this regard is extensive and has spanned, over the years, both health (Gigerenzer et al., 2007; Sainsbury & Jenkins, 1982) and crime (McDevitt et al., 2003; Price, 1966). Another participant pointed the finger at the marketing side of statistics, which brings us back to what the journalists said during their interviews, and to the literature review (section 3.4):

- P1: *One thing is for sure, commercialisation is at the forefront of data analytics, big data and statistical release, finding ways to milk the populace of hard-earned funds, this is not for the good of society but for the good of corporations. It has come to the stage where an apple is bad for you (unless fully organic), because it has pesticides in its very make up... we are nearing a point of no return.*
- P2: *I agree. Statistics themselves have been commercialised to the point of tedium. (#FG3)*

Together with political ends, commercial ends represent another obstacle to building trust in statistics: “many national statistical institutes (NSIs) now have marketing sections that do indeed mimic many of the functions of the retail sector, although the extent to which the activity truly is marketing is debatable” (Blakemore, 1999 p.61).

This lays the groundwork for the third A of distrust: Accessibility. This is in fact the reason behind the decision of the Office of National Statistics to end the practice of allowing access to the pre-release before the official release. Traders might exploit leaked UK statistics to make money (Chapman, 2017). This important aspect also came to light in another focus group session, where the sale of statistics was seen as an impediment to the delivery of an honest and truthful depiction of society.

- P2: *Well if governments and newspapers told the truth in the first place, we might not have been here to talk in this focus group... Also, context needs to be given, always. Personally, I think that's the way they like it as actually statistics can reveal a lot.*
- P1: *But what is truth, man?*
- P3: *It is totally dependent on the question asked.*
- P1: *The thing that actually happened and its context or at least its source given if not seen first-hand. I meant indirectly that statistics are an amazing tool to ferret out truths, but seem to be maligned because of misuse by the few. (#FG2)*

This exchange says a lot about trust in government. In this regard, Uri Friedman from *The Atlantic* reported in *From Trump to Brexit: Trust in Government is Collapsing Around the World* that an international survey by the PR firm Edelman showed how people tend to trust business more than government because “business at least gets stuff done”.

It is obvious that statistics, in their two-sided feature, do not have a good reputation among the participants, as some comments contain a high dose of scepticism and suspicion. In another session, one participant gave a very mindful

explanation, by pointing out that this negative attitude could be softened if only a sampling method strategy were used:

P1: I think that a good article as a good piece of research can create good statistics, if good sampling methods are used, and if the researcher or the journalist is able to ensure their own performances don't influence the results too much. But statistics can never represent the absolute truth. Also, I think the problem is more about how people try to use statistics to win arguments, and how they portray their chosen statistics as if they were proof that they are right. If statistics were used with a little more intellectual modesty, and with more honesty about the limits being used, there might be less hostility towards them. (#FG2)

Again, the participant's claim is that statistics "can never represent the truth" and P1's argument centres on three main issues: (1) how people try to use statistics to win arguments; (2) how they portray their chosen statistics; and (3) how to be sure that journalistic performance does not influence the results. Misuse of statistics is a tangible concern among all participants because they do not see how they are produced, as the two following quotes succinctly illustrate:

P3: It's not the statistics. It's how they are used and by whom.

P4: ...and for what purpose

P5: Yes, but the person who prepares the statistics has some responsibility for trying to ensure that they are as unambiguous as possible.

P1: ...and how they are compiled. (#FG1)

P2: Well I am a quantitative researcher and I can say that we are quite modest about what our data are telling us. Our findings then get reported on by layman such as journalists and politicians, and by the time they reach the public, they are reported as ironclad "facts" whatever that means. This is not an issue of statistics, and, of course, by no means reduces the validity of the point you are making in your comment.

P3: I am on the same page. I mean most researchers clearly define very strict limitations on how their findings may be interpreted. (#FG3)

The usage of statistics implies an interpretation first, and then those numbers are put into a frame and disseminated in the public sphere to be "invoked and disputed as a critical part of public debate" (Crook & O'Hara, 2012, p.264). Statistics can be considered part of the democratic value of a nation. According to Bumpstead and Alldritt (2011) from the UK Statistics Authority: "in a democracy, decision making is ultimately made by the people, therefore statistics

cannot only be the book-keeping of the state. They must be understood and used by the many” (p.4). One of the issues raised, however, is the vocabulary and the verbalisation used which is not easy to understand:

- P1: It annoys me when mainstream media report an average of some value as if that were sufficient. They seldom, if ever, indicate how the sample was chosen, what the whole population is, when the sample was collected and most importantly what the variance was, or the trend.*
- P2: Indeed “average” seems to be the most misused word in statistics as in the two articles we have just read. It is not typical. Or most common, or the middle of a range of variables even though most journalists seem to think that it is.*
- P3: Perhaps that is why it is referred to as the “mean” value?! (#FG1)*

When layman journalists perform data analysis they must be sure that results are not biased and the methodology of collecting statistics is clear. This would depend on the skills journalists have acquired by direct training. But, as seen in section 6.4, many journalists suffer from a ‘blind spot’ for numbers (Nguyen & Lugo-Ocando, 2016). This view was further developed in another focus group session:

- P1: The saying attributed to Disraeli stems from a misunderstanding of statistics, and should read “there are lies, damned lies, and misused statistics”. The problem lies not in the statistics themselves but the cherry-picking of them for political ends.*
- P2: Oh, that is so true. Genuine statistics are cherry picked for political gain, whilst disregarding other data that does not promote the cause. The data remains true but can also be very misleading. (#FG2)*

“Cherry-picking” is one of the methodological concerns that could influence the outcomes of the data analysis. I have already addressed this issue in the Literature Review in section 3.4 mentioning Marcia Bates (1989), a librarian at UCLA in the US, who compared the actions of someone searching for information to those of someone picking berries, but the political interference is a constant worry and genuine statistics are cherry picked for political gain.

- P4: You are right. Most of the polls were conducted over the phone or face to face, and people are likely to please the interviewer. Even though they are said to be representative of the country’s population. In the UK, most polls were conducted online, which is a method more likely for people to be honest in their answers. The flip side is that, even though about 90% of the UK*

population have access to the Internet, most polls were not representative of the whole universe, leaving out segments with limited access to the Internet. (#FG3)

A failure or a 'betrayal' of public trust in numbers has created an echo of suspicion and a high level of judgment that was tangible across the four focus group sessions, which took place during these two turbulent political moments in the UK and the US. The Brexit referendum and the US presidential elections did not foster a positive attitude among the public towards numerical information.

As far as public trust in official statistics is concerned, even experts do not agree with each other. Ian Simpson from the Royal Statistical Society writes that any change in trust in official statistics can be seen through a comparison between questions asked in 2014 and those asked in 2016:

So, did we find any drop in trust in official statistics in 2016? The answer is no. Indeed, we found some evidence of small increases in positive attitudes towards official statistics. Despite Gove's comments about experts, there continues to be a widespread belief that official statistics are important for understanding Britain (92% of those giving an opinion agreed) and that statistics produced by ONS are free from political interference (70% of those giving an opinion). Both these figures have remained stable over the past couple of years (Simpson, 2016, p.5).

This opinion is, however, challenged by what Jamie Grierson has written for *The Guardian* in an article entitled *Britons' trust in government, media and business falls sharply*. "The annual trust barometer survey by PR firm Edelman has for the first time published a separate UK-specific supplement, which showed a sharp drop in levels of trust in the last 12 months. Trust in the British government, which was already low at 36% at the start of last year, fell to 26% by the start of 2017, the survey showed". This quote helps to explain what I mean by the 'echo of suspicion':

- P2: *Ahaha. Leave a bunch of monkeys in a room with a typewriter, sooner or later you'll get Shakespeare. Leave a bunch of politicians in a room with objectivity sooner or later they'll find an argument against it.*
- P3: *However, the probability of a universe full of monkeys typing a complete work such as Shakespeare's Hamlet is so tiny that the chance of it occurring during a period hundreds of thousands of orders of magnitude longer than the age of the universe is extremely low...*
- P2: *So, statistics are useful. For finding out about monkeys.*
- P1: *I tend toward the belief that what you'll likelier get is a broken typewriter. (#FG2)*

The image of monkeys with a typewriter is used here to metaphorically explain that even non-expert people can perform statistical analysis and sooner or later get the numbers right. Most importantly though, this last quote underlines, with a quite vivid image, a distrust towards the uses of statistics in news reporting.

6.5.2 Summary of the findings

The analysis of the focus group transcriptions reveals one prevailing attitude in the articulation of statistics in news reporting: a constant scepticism about their portrayal of social reality and their scope, mainly for political or commercial ends. Together with this attitude there is also a noticeably low understanding of what quality means in its broadest sense and what role it has in the sense-making of statistics. I observed three main areas where trust in statistics is lacking, called the three A's of distrust: authority, accessibility and accuracy.

Authority is part of the expertise-authority-competence nexus and is seen by the participants as manipulative of public opinion. Accessibility is related to the full access to public statistics, often problematic because they are filtered for marketing purposes. Lastly, accuracy relates to the methodology of data collection and its integrity, which is often not transparent enough for a public understanding of statistics. In summary, the delivery of quality is hugely compromised when the moment comes to assess the audience's point of view. Statistics do not help to achieve quality and journalists do not seem able to guarantee 'completeness of information'.

6.6 Q-sort analysis

This section only analyses the Q-sort data to support the focus group data and is not intended as an independent and comprehensive method. It aims only to corroborate the focus group analysis with more insight about participants' viewpoints in the context of the four articles read during the focus group sessions. By doing so, this analysis will ask: *how does the audience engage with statistically driven stories?*

In addition to the main qualitative data from the focus groups, the Q-sort evaluates the individuality of the 22 ($n=22$) participants who were invited to fill out a pre-arranged, forced-choice frequency distribution grid designed for use with a set of 30 items. The grid contains spaces or ranking positions ranging from -5 (strongly disagree) to +5 (strongly agree). By evaluating the individuality of the participants, the Q-sort methodology can confirm, disprove or add more information to what has been discussed in the focus group sessions.

Number of sorts	22
Range	From -5 to 5
Depth	1 2 3 3 4 4 4 3 3 2 1

Tab. 31 *Q-sort details.*

6.6.1 Key finding: Decision-making on hold

Items listed by ranking (>50% of significance)		
1. The articles are easily comprehensible.	-5	strongly disagree
18. I think the statistics in A support the overall argumentation (health).	-4	
3. The data are easy to understand.	-3	
16. In general, I consider B-articles more reliable than A-articles.		
31. I think the statistics used in these articles can improve the information quality.	-2	
28. In B-articles, statistics are not appropriately represented.	-1	
11. In general, A-articles are more trustworthy than B-articles.		
15. I consider A-articles more reliable than B-articles.		
12. In general, B-articles are more trustworthy than A-articles.	0	neutral
27. In A-articles statistics are not appropriately represented.	1	strongly agree
24. I think the statistics in B-articles support the overall argumentation (crime).		
30. I do not think the statistics used in these articles can improve the information quality.	4	
5. There is no difference between A-articles and B-articles (health).	5	

Tab. 32 *Summary of the Q-sort test.*

Tab. 32 shows the result of the analysis of the frequency distribution of 22 sorts that were filled-in after having read the four articles (see Appendix 1). In brief, articles with the letter A make use of official data whereas articles with the letter B make use of anecdotal data. The use of a flattened, or platykurtic, distribution offered a great opportunity to get a fine-grained discrimination at the extremes of the distribution, a strategy that allowed me to maximise the advantages of having participants with a good topic knowledge.

The data shows that participants did not find the statistics easily comprehensible at first glance (-5) and that the data used were not easy to interpret on careful reading (-3). Even though they thought statistics were presented in an appropriate way, the rank -1 would suggest that this presentation of statistics could be improved. It is interesting to notice, for the aim of this method, that more than half of the participants gave 0 to one of the most significant statements: "*B-articles are more trustworthy than A-articles*". This means that participants did not agree or disagree with the fact that anecdotal data

are more trustworthy than official data (explained further later in this section). It is worth observing that when asked about the two different topics of crime and health, participants did not spot any difference in health articles (+5), whereas crime statistics with some officiality seem to support, quite well, the overall argument (+4). In general, more than half of the participants thought that statistics do not improve the quality of the information provided.

These results should be read within the context of the focus groups where the participants showed a high level of 'suspicion' towards the use of statistics in news reporting. In that circumstance the members of the focus groups were invited to share their own views with their fellow participants, but during the Q-sort they were forced to assess themselves and their convictions individually.

Therefore, the fact that statistics do not mean quality of information would confirm the critical and judgmental nature of their views. Furthermore, the fact that trustworthiness has a neutral position means that the participants were not able, in the end, to make a sound judgement between official and non-official statistics, and hence any decision-making was suspended.

6.6.2 Discussion

In May 2013 the UK House of Commons released a report, entitled *Public Trust in Government Statistics*, whose main goal was that of implementing ways to improve the perception of the public about official statistics from the ONS and the Statistics Authority. However, by analysing the focus group sessions and the Q-sort tests contextualised with the recent literature, it seems that this goal has not yet been fulfilled.

The research question was: *how do readers interpret and understand quality statistics in news articles?* Indeed, the challenge here is not whether the readers are skilful enough to disprove statistical claims or spot mathematical mistakes, but whether they 'believed' the statistical information to be true or not, and the reasons behind their interpretative, often cynical, choice to disbelieve an 'article of faith' (Blumler, 1979), as the statistical information often aspires to be presented. The voice of the readers who attended the four focus groups has emerged as a suspicious reaction towards the numerical information. Suspicion was felt, in all sessions, towards all the aspects under evaluation, in particular in the articulation of the numerical information and how this is interpreted by the readers. Therefore, what Paul Ricoeur has called 'hermeneutics of suspicion' appears to be the best way to read the audience attitudes towards those newspapers that make use of numbers to legitimatise their stories.

I argue that the readers' voice has been channelled mainly through the theoretical lens of a hermeneutics of suspicion and particularly between a

willingness to suspect and a willingness to listen, in what Theodor Porter would call an 'engagement-detachment' game. Applied to media studies, this theory has dealt with the role of the media in shaping consciousness, and consequently opinions, of the audience: "the hermeneutics of suspicion can also be seen in the main traditions of research that have formed around specific understandings of the media and its impact on audiences" (Mathieu, 2015, p.253).

This attitude to suspicion can be better understood through the active/passive role that audiences play when consuming media content. Generally speaking, the active audience is rational and selective whereas the passive audience is gullible and vulnerable (Abiocca, 1988). The focus group data suggests that readers have an active role in judging and questioning what a newspaper article should or should not say, and how it does so. This active audience role also shows an individualistic and 'impervious to influence' approach towards the numerical information. To be precise, the active audience concept was theorised by the social psychologist Raymond Bauer, frequently cited among uses and gratifications theorists and critics (Blumler, 1979; Ruggiero, 2000). For them, the work of Bauer is a milestone in driving a 'paradigm shift' from an 'administrative' approach to a more receiver-oriented research perspective or, as Stuart Hall would describe it, to a more decoding perspective.

I argue, however, that hermeneutics of suspicion is valid especially in the context of this study, not only because hermeneutics is the name for a way of dealing with texts, but also because Paul Ricour has said that all texts present us with the challenge of believing that the true meaning of the text emerges only through interpretation.

The qualitative analysis shows that the interpretation of numerical information, and what the purposes of such numbers are, happens under vigorous debates. The participants in the focus groups suspected that there were two main goals, perceived as a hidden agenda: political and commercial ends. Therefore, the statistical dissemination through news reporting has the clear objective of manipulation, according to the focus groups. They also acknowledged that statistics cannot always tell the truth. Even if it is not clear what the truth should be for them, it is clear that by crossing the focus group data with the Q-sort data that this situation of confusion, scepticism and suspicion against numbers might be caused by their inability to make sound decisions. Even highly educated people such as the members of the focus groups, who are equipped with a high level of skills in reading and text comprehension, are in trouble when the moment comes to make sound decisions based on numbers.

On the one hand, judgment skills are proved to be very analytical, mainly driven by an agnostic attitude towards numbers, often challenged as if it was an 'article of faith'. On the other hand, the use of numbers in news reporting does

not help to improve any decision making, but rather to deadlock it, with the consequence that any further progress cannot be made.

In conclusion, the hermeneutical act of interpreting numbers occurs between the readers and the statistics, where statistics is commonly defined as numerical facts assembled and clarified so as to present significant information. Hermeneutics is therefore the assembling and clarifying of facts so as to present meaningful information. Statistics, thus, is the hermeneutics of numbers, and the interpretation of quality statistics in news translates into a constant, multifaceted, often challenging, 'dialogue' between readers and numbers.

6.7 Conclusions

This chapter has presented the empirical findings from the content analysis, close-reading analysis, interviews, focus groups and Q-sort analysis and aimed to examine how statistical information is articulated in news reporting through five quality dimensions through a triangulation of these methods. Within this research framework the articulation of statistics appears to be one of the means through which journalists aspire to deliver quality in the news.

Although this study suggests that there are internal and external interferences to quality I conclude that even an emphasis on only one of the five dimensions (such as Interpretability and Accessibility for example) or on different dimensions such as those of 'usefulness' or 'integrity' could represent an attempt at quality. Notwithstanding this reassuring approach, a contrary side is undeniable: a simple aspiration to quality is indeed not enough to gain the readers' trust and maintain it over time. Among the key findings, what this study also reveals is a big gap between what journalists think they do through the articulation of statistics, and what is perceived by readers. This gap results in a kind of broken 'social contract' between journalists and their readers (Sjøvaag, 2010).

Four levels of stratification emerge from the data analysis: (1) the governments that support (2) statistical agencies in their release of statistical reports to the (3) journalists who are in charge of making them available to the (4) readers. All four levels rotate around the need to achieve, maintain and transmit quality, as the Fig. 30 illustrates.



Fig. 30 *The 'quality ecosystem' with four levels of stratification.*

This need for quality is at the centre of what I call a 'quality ecosystem'. But the transmission and maintenance of such quality seems to undergo a change between the newsrooms and those readers who are actively engaged in questioning the numbers reported in the news. This change of perspective is mainly due to external and internal interferences that fail this aspiration to quality and affect how journalists engage with numbers. These considerations are supported by a body of research that suggests there is currently a miscommunication between the scientific community (the statisticians), the media, and the public because of misrepresentation, miscommunication, inaccuracy and distortion of information.

While journalism and statistics can support a mutual 'construction of society' (Lincoln, 2014; Saetnan et al., 2010), what the findings reveal is that journalists articulate statistics as a means to make news objective and truthful in their aspiration to quality. However, because quality is not attainable in the short term, in the lengthy quality-making process of statistics, journalists often misrepresent numbers by failing to satisfy basic quality dimensions like, for example, Interpretability, which refers to the lack of clarity of expression and cohesion between statistical points contained in the articles, and Accessibility, which mainly refers to the methodology of data gathering that should be communicated to the readers.

From this perspective, a lack of mathematical training among journalists is one of the major problems impacting on the transmission of statistical quality. The

failure to transmit quality statistics to audiences impacts on how readers react when exposed to statistical information.

Ultimately, this study points out that in our rational and technological society we need, more than ever before, a better educational background in scientific and mathematical language, even for journalists, as well as a basic knowledge of the branches of philosophy such as Logic and Argumentation that deals with Statistical and Probability thinking, as, for example, in the Philosophy of Information.

Chapter 7: Conclusions

7.1 Introduction

This thesis has highlighted the dichotomy between the normative and professional aspirations of journalism that statistics can help underpin the quality of news, and the desire to strengthen the ability of storytellers (journalists) to persuade audiences by means of numbers. To this end, the research has examined tensions and issues around the articulation of statistics and numbers in the practice of journalism and, in doing so, has pinpointed trust in news as the central aspect of such tensions. Although initially the concept of trust was not at the centre of the analysis, it gradually became so, not only in terms of the gap between journalists' reports and news audiences' perceptions, but also in relation to the ability of journalists to tell stories using data-driven argumentation and, ultimately, numbers.

The research aimed to improve our understanding of the use of statistics as a primary means for the construction of journalistic quality. The areas under analysis were crime and health news in the UK. In this context, the findings confirmed that the use journalists make of statistics plays a crucial role in the construction of both social reality and readers' reception of public affairs. The research also aimed to emphasise how journalists engage with numbers in the journalistic practice of quality storytelling. At the centre of such analysis is the link between the articulation of statistics and the ability to produce quality news. Hence, the research project embraced 'quality' as a central concept.

The originality of the present work also lies in the five quality dimensions that I developed specifically for the study of the journalistic content. In general terms, each dimension deals with different issues: 1) relevance – the degree to which a statistically driven story meets reader expectations in terms of content and coverage; 2) accuracy – how well sourced a story is and whether official and non-official statistics are used; 3) timeliness and punctuality – the time between the date of publication and the date to which the data refers, and the time between the actual publication and the planned publication of a statistic; 4) accessibility and clarity – the ease with which readers can access/read data, and the quality and sufficiency of metadata and accompanying advice; and 5) coherence – the degree to which data derived from different sources or methods, but that refers to the same topic, is similar.

The study found that while the concept of quality remains a theoretical aspiration among journalists, what they aim to attain is credibility and authority;

statistics do not translate automatically into credible and authoritative news, mainly because of internal and external interferences, and numbers do not seem to fully support the main arguments when dealing with crime and health news. For example, the findings show that there are still some drawbacks in relation to the quality dimensions of Timeliness and Interpretability.

In relation to the dimension of Timeliness, the content analysis results show that statistics often come from statistical reports that are more than three months old. The results also suggest that journalists do not cite the year of the statistical report in almost 40% of the articles. According to the journalists interviewed, time also represents an internal interference in the attainment of quality and therefore seems detrimental for the overall credibility.

Interpretability is understood in this thesis as a good verbalisation of the technical vocabulary and terminology typical of statistics and mathematics. This quality dimension is concerned with the ability of journalists to make data easily understandable, and to make the story more understandable for their readers. The content analysis data shows that almost 82% of the articles made use of stand-alone statistics as the preferred way to verbalise data driven stories. This was confirmed by the interviews, which showed that journalists, when needed to summarise and interpret the data, write the story in the easiest and quickest way possible.

More decisively following such findings, the study debunks the traditional claim that this tension is the result of time constraints and other types of pressure or interference, and instead confirms that, among the journalistic community, the lack of capabilities and skills is the main culprit for the misappropriation and misuse of statistics in the news. In fact, the research exposes a gap in mathematical education that eventually prevents journalists from attaining accuracy when reporting data. Thus one of the key tasks ahead is to generate better capabilities among journalists and their audiences in their ability to manage and interpret data (Halevy & McGregor, 2012; Kanari & Millar, 2004).

Having said that, these capabilities cannot be based exclusively upon instrumentalist needs to be accurate in the dissemination of statistics, but should focus on the critical interpretation of these numbers. My results show an urgent need for critical thinking when dealing with numbers as shown for the dimension of Accuracy, where critical thinking was set as one of the criteria in the attainment of quality. These capabilities must combine a set of functions that are feasible to achieve for each journalist and that gives both the reporters and the public the ability to deconstruct and reconstruct the world around them.

Boosting these capabilities is urgent because this knowledge gap not only affects data collection and accuracy but also the ability to fulfil the potential of

statistical data as a tool to enhance democratic citizenship. To be sure, as this research has showed, the current use of statistics in the news has led to an over-scepticism and even suspicion among readers, as the focus group data suggests. This is because many among the public seem to see through to the fact that these numbers are often not there to 'inform' but to 'convince', and in the context of their personal lives these numbers do not seem to be conveying the truth.

These perceptions might seem to be counter-intuitive, since the main goal of statistics is precisely to foster public reason by means of rationality, or rather mathematical rationality. Indeed modern societies operate today within a mathematical framework that validates truth through statistics and data (Restivo, 2013; Tait, 1986). However, it is precisely because society has been overloaded by information that it is so crucial for journalism to be able to present and dissect such information in a complete and critical manner, as much as it possibly can. Journalists therefore need to adhere to the deontological duty to guarantee a 'completeness of information', which can be understood ultimately as 'quality'.

Sociologists and scholars in mathematics agree that statistics make sense of the world we live in (Levitin, 2016) because statistical information offers a powerful insight into rational thinking. From Euclid to Gödel, these are the means through which a universal truth has been underpinned by mathematical thinking. Consequently, the appropriate use of such information is thus essential to draw conclusions and, most importantly, influence policy decision-making. Hence, it is vital that both journalists and the public learn to understand and engage with both statistics and the concept of quality, as many of the decisions we make in our daily lives are based on numbers and driven by the perception we have of quality. Within this framework, understanding the articulation of statistics inside the dynamics of journalistic practices, when dealing with quality, is crucial for the scope and the aims of this thesis.

Chapter 1 gave an overview of how statistics has historically developed as a vital part of what is called the Information Society. On the one side, statistics itself was known as 'political arithmetic' and therefore used for political aims. On the other side, the reportage of numbers was used for financial reasons and its roots can be seen in the old Italian city-states, known as maritime republics, where the accurate reportage of numbers was essential among merchant class members. All this happened at the dawn of the invention of journalism. The chapter also explored how the notion of quality came to be and was set against the concept of quantity.

In light of my findings it can be seen that even if the socio-cultural landscape has changed from the past, some dynamics are still the same. Think, for example, about how politics still pervades the production of numbers and their dissemination. The communication of numbers still plays an important role for

policy decision makers and among those who work with information such as journalists. The interviews showed, for example, that even if technology changes at fast speed, the persuasive nature of numbers still remains the same as for the challenges to read and interpret such numbers.

Chapter 2 reviewed the literature on quality journalism and focused on the ambiguity and convergence of the concept among scholarly work. It also focused on the problems of measuring the concept of quality for research and tried to link the concept of quality to that of objectivity, the latter seen as a means to overcome subjective approaches. The chapter concluded by exploring how scientific methods are used in the journalistic practice. Also, in this case, the findings show that the concept of quality journalism is still controversial among practitioners and that quality does not necessarily translate into objectivity. Journalists in general do not ignore the concept of quality, as it is set as a standard aspiration, but they have trouble in defining such a concept. According to them, credibility and to some extent, authority, is much more achievable when delivering a statistically-driven story. Against the literature that almost unanimously sees quality journalism as a necessary goal for the practise of journalism, my results instead show a low level of awareness about quality among those journalists who routinely deal with data. Generally speaking, the concept is perceived as fragile and easily targeted by external and internal factors, such as educational background, that prevent its full attainment.

Chapter 3 introduced some philosophical challenges, taking into account the branch of philosophy known as Logic. Adopting such a philosophical view to the issue of the thesis allowed me to embrace a more critical and solid methodological approach to the topic under analysis, and I then applied it to journalistic performance, especially in relation to critical thinking, which entails a good degree of logical reasoning.

Chapter 4 also adopted some philosophical views, mainly taken from the Philosophy of Information. This was of great help in laying the theoretical ground for the research methodology for what concerns the five dimensions of quality. The normative importance of the concept of quality in democratic life was also explored in light of UK government reports. This was particularly pertinent to analyse as it gives a tangible idea on how quality is one of the main concerns of the UK government when it intends to set up policies to improve official statistics and on ways to improve its communication.

Chapter 5 presented the methodology in its triangulation of qualitative and quantitative methods, detailing the data collection process and the approach to data analysis. Chapter 6 represented the main contribution about statistics in journalism, which was debated throughout the thesis. It presented the key-

findings divided per method: content analysis, close-reading rhetorical structure analysis, semi-structured interviews, focus groups and Q-test.

In summary, the key-findings for the semi-structured interviews are threefold. The first concerns the problematic sense-making of quality through its five dimensions; the second involves statistical innumeracy and the educational background of journalists and statistical accessibility around the methods of data collection and interpretation for the purpose of story-telling; and the third has its main point on the political ends of official statistics and the issue of data manipulation. The focus group data identified three main issues linked together by a common feeling of scepticism. In this case the three A's of distrust were identified: *Authority*, *Accessibility* and *Accuracy*. *Authority* – readers are sceptical about the nexus of expertise-authority-competence; *Accessibility* – readers are concerned about full public access to statistics; and *Accuracy* – readers are sceptical about the methodology of data collection by journalists.

7.2 General Discussion

This research has filled some of the gaps in the areas of both statistics in journalism and quality journalism. In addition, it has questioned the usage of statistical data as a normalising and objectifying tool by looking at crime and health reporting. The research has brought attention to the existing links between statistical information and its uses and articulation in news stories. This included examining the role that statistics play in the production of daily news, particularly as tools in the construction of social reality, and how these numbers can be decontextualized and used to entertain rather than to inform the public. In addition to this, when we look more closely at the relationship between quality and journalism we need to consider questions related not only to the broader notion of quality, as central to the discipline of journalism, but also to the association of statistics with the idea of scientific value, credibility and authority. It is the very idea that statistics are perceived of as bearers of quality, credibility and authority that is under scrutiny here, mainly because numbers are considered neutral and, most importantly, scientific (Benedictus, Miedema, & Ferguson, 2016; Field, 2016).

Precisely at the intersection between this aspiration to be scientific and the use of statistical narratives to persuade – figures of speech and figures of arithmetic – lies the work of those journalists who are willing to apply the analysis of data to improve their stories. This willingness to use mathematical tools to write a story, to analyse the social reality and to make predictions wherever possible, is however challenged by one or more factors at the same time. This research has identified at least three types of interferences: 1) the sense-making of quality

news is often understood differently at macro-level (every newsroom applies different deontological values) and at micro-level (every journalist deals with some personal ethical and educational issues); 2) an internal interference, which refers to the lack of statistical training that seems to slow down the data analysis work and consequently affects the understanding of how to get access to data and statistical reports; and 3) an external interference, which comes from government policymaking in terms of statistical data collection and methodology, perceived as biased at source and restrictive at end.

The above-mentioned findings seem to be the translation into practice of what Walter Lippmann theorised in his unfortunately little cited April 1935 article, *Elusive Curves* (Seyb, 2015) in which he sharply criticised those who try to understand future trends by employing statistics. The present findings show that little has changed since Lippman's time. In a more gradual sophistication of quantitative measurements (for example the booming of Big Data), our society is over-reliant on data and statistics now more than ever to make decisions and to predict the future. On the same subject, philosopher Rene Guénon (2001) foresaw in his book, *The Reign of Quantity and the Signs of the Times*, the decline of the West tied up in the 'illusion of statistics' and its obsession with quantification.

Lippmann also observed that journalists, who wear the clothes of analysts of reality, give the statistical curve an authority that it indeed does not deserve, an authority that could suspend reason and common sense to condescend the reputation and prestige of the otherwise known 'branded statistics', which can be identified in official statistics.

"The best statisticians", Lippmann cautioned, "are very sceptical. They respect their tools but they never forgot that they are tools and not divining rods" (quoted in Seyb, 2015). Again, according to Lippmann, statistical findings must be measured against the standards of "common sense and knowledge" (quoted in Seyb, 2015). A failure to do so would lead to a dangerous positivistic insistence, which could generate a misleading picture of the world that could thwart, rather than inform. Walter Lippmann triggered a still ongoing and controversial debate known today as The Bell Curve Debate (Herrnstein & Murray, 2010; Jacoby & Glauberman, 1995), which revolves around the notions of human intelligence and class structures. In this debate statistics are purposefully distorted to support the main argument that blacks' IQ scores are significantly lower than whites.

What the findings of my thesis also show is that the 'positivistic insistence', mentioned by Lippmann, translates into an aspiration of journalists to be scientific, and therefore objectifying the reality they try to tell.

Despite the appreciable aspiration to be scientific, this goal remains largely just an aspiration, with little avail upon quality. The content analysis evaluated the

five quality dimensions that constitute the notion of quality, and the data indicated that all five quality dimensions are never fulfilled in just one single article, but rather these dimensions are used as an access point to this aspiration to quality. Through the lenses of the five dimensions, this study shows that there is no evidence that journalists engage critically with numbers even though they think they do. Three of the five dimensions are worth mentioning here: Accuracy, Timeliness and Accessibility.

Accuracy in news production is a keystone of the journalistic profession. However, I found that in many instances this concept fails to be adopted in practice and the evidence suggests that only in very few cases did journalists verify or critically question their statistical sources. Instead, they seemed to engage with numbers in a reactive rather than proactive way. The data also showed that contrary to the common claims around time pressures upon journalists, they do have enough time to process the information. This data shows that they have an average of three months' time to analyse the statistical data before using it in their stories. This suggests that journalistic routines bear little on the ability to engage and use statistics.

Finally, regarding the Accessibility dimension, the data indicates an over-reliance on official statistics and government reports. Journalists prefer walking the safest route and deal with those sources that they are familiar with. There is very little cross-referencing of sources and very little comparison with other statistical sources. Moreover, 25% of the articles do not cite where the statistics come from. In addition, they do not cite the year of the statistical release in almost 40% of the stories, a worrying habit that might impact on the 'completeness of information' that journalists are committed to deliver.

Overall, this attitude towards numbers is a symptom of some journalistic shortfalls in terms of credibility and authority. What the data from this research shows is that the adoption of social sciences tools into the journalistic routine can be problematic and, contrary to the common assumption, comes into play at the expense of the notion of 'precision'.

This concept of 'precision' and of 'being precise' refers to the seminal work by Philip Meyer (Meyer, 2002, 2009) in this area. As explained earlier, Meyer took the key concepts and methods from the quantification approach to understanding social trends by merging journalism with social science methods. His point was driving journalism towards science where the term 'precision' refers to quantifiable facts measurable through statistical performance and data analysis. Nevertheless, the findings in this thesis show that this approach is not so straightforward and 'precise' as it might seem, but rather presents grey areas like those of the quality dimensions addressed in this thesis.

Broadly speaking, precision journalism is seen both as a theory of news and as a set of observation techniques focused on data-driven reporting and analytical skills. Meyer's goal was that of turning journalists into social scientists. However, there are significant differences between social scientists and journalists. The former writes scientific papers, the latter produce news stories. Journalists can borrow a great deal from social sciences to increase the quality, trustworthiness and authority of news reporting. However, as the study showed, even if it adopts a scientific aspiration, journalism is subject to internal and external interferences, which journalists are still not fully equipped to face.

In conclusion, it would seem plausible to interpret statistics in news as a legitimising tool that most journalists use but only in a few cases do they do so appropriately in accordance to the five quality dimensions. This lack of capability to engage critically with statistics is at the cornerstone of the issues around quality in the news. There is in fact an enormous need for mathematical skills and statistical knowledge in the delivery of crime and health news, for example. As seen in the findings, these topics need a vast improvement of the understanding, usage and articulation of statistics – from the ways in which journalists select statistical data, to the methodology and the way they present it to the readers, to the education on statistics and ways in which readers consume statistical information.

Changes in information dissemination through data commoditization and services availability, and consumption modalities through technological developments, seem to have greatly impacted on journalistic performance. This was blended in the *post-truth* world certified by the inclusion of this term in 2016 into the Oxford Dictionary. Such changes seem to have had a serious impact on the relevance of official statistics as trusted sources of information for society. Also, decentralised information of a variety of uncertified sources contributed to these changes in terms of quality and adherence to standard scientific statistical production methods. As Emanuele Baldacci, director of Methodology at Eurostat, puts it: “the key issue is how to be authoritative and to develop quality knowledge in the new and changing information market” (2017, p.5).

7.3 Future Research

This research is a step towards a better understanding of the articulation of statistics and quality information in the news. The study comprises an innovative body of data that can pave the way to several future research possibilities that are already part of my own research agenda. I have attempted to produce some crucial information in the hope of promoting a better insight into how numbers are articulated by journalists inside their newsrooms. Future research needs to explore: 1) the ethical implications of the usage and manipulation of statistics by

journalists and its relationship with quality; 2) production and consumption practices around visualisation and infographics; 3) the role of journalists in risk communication through the usage of numbers; and 4) the whole question of news audiences and their understanding of statistics, of which I have only started to scratch the surface.

This research can be taken forward in the direction of ‘information ethics’ through a deep discussion of what ‘data ethics’ means in the practice of statistically driven journalism. The online Dictionary for Library and Information Science defines this as “the branch of ethics that focuses on the relationship between the creation, organisation, dissemination, and use of information, and the ethical standards and moral codes governing human conduct in society” (Reitz, 2004). This area has been comprehensively explored both in theory (for example the Philosophy of Information) and in practice, for example the latest articles about the ethics in data-driven journalism (Seth C Lewis & Westlund, 2015) and on the ethics of web-scraping (Virgillito & Polidoro, 2017), but it needs further development.

What is missing here is a critical discussion about the use of statistics for the public good through news media within the framework of The National Statistician’s Data Ethics Advisory Committee (NSDEC). The NSDEC has been established to advise the National Statistician that “the access, use and sharing of public data, for research and statistical purposes, is ethical and for the public good” (www.statisticsauthority.gov.uk). It is thus necessary to conduct a deep reflection about the boundaries within which journalists can use numbers for the public good, and what this means when ethics leads to quality. Ethics and quality in fact share a common background and a common mission rooted in values and cultural contexts but often their meanings overlap in what can be called ‘ethics of quality’.

A second issue relates to content engagement through data visualisation. The literature on data visualisation and infographics is well established, as is its history (Cairo, 2012). However, a focus on the risks and limitations of statistical visualisations in their relationship with the quality dimensions has yet to be addressed. Nor have the connections between visualisation and scientific facts, or the level of readers’ engagement through the quality dimensions by means of visualisation. To push the argument further, it would be timely also to reflect on the role of immersive Virtual Reality in the communication of statistics through visualisation on one hand, and about the possibilities of multi-dimensional data analysis for the purpose of storytelling on the other. This issue poses urgent research questions about how journalists will engage both with VR and the communication of statistics; a point that could be linked to ethics and quality.

Thirdly, future research could build on the links between risk communication, statistics and journalism. There have been concerns about how journalists communicate statistics and risk, especially in the area of health (Bennett, 2010; Gigerenzer, 2008). Yet journalists and scientists often present risk and probabilities in ways that blur the intended message or the quality of the message. The translation of such a message to the readers is therefore a crucial task in terms of trust and authority. In particular, what needs to be addressed is how journalists make use of numbers by means of comparison, between absolute and relative risk for example, or between individual and population risk and how they translate these into a story through a process of sense-making. Research of this kind could be done through textual and rhetorical analysis that could open new ways about how this area can be analysed through new approaches and methodologies.

Fourth, the question of news audiences and the way they engage and use statistics to make sense of the world should be addressed. As the most neglected area of journalism studies research, the issue of how people actually read and interpret statistics when consuming news is literally an unexplored area. This is a topical and crucial area I intend to engage with in the near future. Indeed, I plan to incorporate the above-mentioned issues into my own research agenda for the years that will follow. During the writing-up, I have become increasingly aware of the urgency to produce knowledge around these topics. This urgency comes from the fact that rational and scientific knowledge is under threat, a phenomenon linked to the rise of anti-expertise sentiment and anti-intellectualism.

In the Post-Truth Era, where fake news is proliferating (Newman, Fletcher, Kalogeropoulos, Levy, & Nielsen, 2017), today more than ever academics need to address a crucial topic that prevents liberal democracies taking any further steps towards qualitative growth: the relationship between experts and citizens. Indeed, there are forces that promote, and even pretend, that any opinion can be equally valid, and this could inevitably lead to unforeseeable consequences. Nichols writes that: “when the democracy is understood as an indefinite request of ungrounded opinions, everything becomes possible, including the very end of democracy” (Nichols, 2017, p.72). Nichols emphasises the US perspective by also considering Alexis de Tocqueville, who had already explained (1982) that the distrust of intellectual authority is inherent in the egalitarian nature of overseas democracy. What has changed though, compared to the past, is not a reluctance to believe the official knowledge, but “the emergence of a positive hostility towards that knowledge” (Nichols, 2017, p.72). In other words, the new element here is a shameless celebration of ignorance that could arguably be most prominently manifest in the rise of Donald Trump.

The rise of Trump has been marked, from the very beginning, by a markedly anti-scientific position and contempt of experts, and it is my opinion that

this position has also been widely echoed around the Brexit referendum. Alongside this crisis of expertise, we are experiencing a trust deficit in governments at a global level. The Oxford Government Review released in 2016 urges a reassessment of the policies aimed at building greater trust and improving perceptions of the government among citizens. For this report, trust is a fundamental element for the quality of governance, thus the concept of quality is recurrent here also in the field of government management.

Nichols lists several stories that display a fair and virtuous view of ignorance as a key ingredient in fuelling the lack of confidence in expertise, and the Internet plays a fundamental role in exacerbating the situation. In the list, there is also the so-called Google effect – that is the illusion of becoming an expert with fast and superficial internet searches. This inevitably involves journalism at large, and the consequent decline of the traditional ways of doing journalism. The profession of journalism has been hit by fierce online competition on business models that make slow and costly investigative work more and more rare and conversely foster clickbait (Chen, Conroy, & Rubin, 2015) by disseminating fake news for the sole purpose of generating higher advertising revenue.

The pragmatic question therefore would be: is the communication of statistics affected by this scenario? I think that the most original part of the book by Nichols is the one in which the experts are to be blamed for the erosion of confidence in themselves. Mistakes, lies, fraud, arrogance, cynicism, half-truths, loss of contact with the real politics and with academic and intellectual elites are part of such distrust, and statistics are also partly in question. All these factors create a whirlwind of irrationality that I believe undermines one of the foundations on which democracy is founded: trust in certified knowledge. Is therefore the reportage of statistics a certified knowledge?

When citizens, as readers, come to distrust governments, democracy itself enters a deadly spiral that leads either to populism or to technocracy, which are ultimately the authoritarian outcomes of the collapse of the relationship between experts and non-experts. Therefore, is this also the end of a type of journalism that is data-driven? Will journalists with expertise in statistics be able to stop the spread of such distrust and firmly maintain their role of watchdogs and gatekeepers by means of numbers? The answer to these questions is not so straightforward, which is why our own reflection on this matter is urgent.

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Appendix 1 Focus Groups Newspaper articles

A) **Violent crime in England and Wales is up 24%, police figures show**

Murder rate rises 20%, knife crime 9% and gun crime 7% according to police recorded crime figures.

Violent crime in England and Wales has risen by 24%, including a 9% rise in knife crime and a 7% rise in gun crime in the 12 months to June, according to police recorded crime figures. The number of murders in England and Wales also jumped 20% to 681, a rise of 144 – the highest level for more than five years. The murder rate includes the 96 killed at Hillsborough in 1989 following the conclusion of the official inquests.

Police figures also show that the number of reported rapes and other sexual offences rose by 14%, reflecting a slowing of the recent increase in reporting rates for these types of crime.

The Office for National Statistics (ONS) said the 24% rise in violent crime was largely due to improvements in recording practices and increased coverage but did include “a small but genuine increase in some categories of violent crime”.

But the overall crime rate remained broadly flat as measured by the Crime Survey of England and Wales, which estimated that there were 6.5m crime incidents in the 12 months to June – a fall of 1% compared to the previous year.

The ONS also published its second ever estimate of online crime, which it put at 5.6m fraud and computer misuse offences, confirming its high volume on a level comparable with offline crime. The two sets of figures will be merged into the overall headline figure in January.

John Flatley of the ONS said: “Violent crime covers a wide spectrum from minor assaults, harassment and abuse that result in no physical harm to the victim through to incidents of wounding and murder. “The latest figures present a complex picture, with the crime survey for England and Wales estimating similar levels of violent crime to that seen in recent years, but the number of offences recorded by the police increasing. “We think the rise in the police figures is due to a combination of factors. First, the expansion of the police series to cover new harassment offences. Second, a greater proportion of incidents reported to the police being recorded as crimes. At the same time, the crime survey has shown a greater proportion of victims of violent crime

reporting to the police. Finally, it appears there has been a small but genuine increase in some categories of violent crime.”

B) Violent crime in England and Wales is rising, police reports

Murder rate rises as well as knife crime and gun crime according to police.

Violent crime in England and Wales has recently risen by a quarter including a roughly 17% rise in knife crime and in gun crime, according to the most recent police statistical release. The number of murders in England and Wales also jumped to the highest level for more than five years. The murder rate includes the 96 killed at Hillsborough in 1989 following the conclusion of the official inquests.

Police figures also show that the number of reported rapes and other sexual offences rose by roughly 15%, reflecting a slowing of the recent increase in reporting rates for these types of crime.

A national government body said that the rise in violent crime was largely due to improvements in recording practices and increased coverage but did include “a small but genuine increase in some categories of violent crime”.

But the overall crime rate remained broadly flat as measured by the Crime Survey of England and Wales, which estimated that there were thousands crime incidents in the last year.

The same government body also published its second ever estimate of online crime, which it put at about 6m fraud and computer misuse offences, confirming its high volume on a level comparable with offline crime.

Generally speaking, violent crime covers a wide spectrum from minor assaults, harassment and abuse that result in no physical harm to the victim through to incidents of wounding and murder.

We believe that the latest figures present a complex picture, with the crime survey for England and Wales estimating similar levels of violent crime to that seen in recent years, but the number of offences recorded by the police increasing.

A local authority said that: “The rise in the police figures is due to a combination of factors. First, the expansion of the police series to cover new harassment offences. Second, a greater proportion of incidents reported to the police being recorded as crimes. At the same time, the

crime survey has shown a greater proportion of victims of violent crime reporting to the police.” Finally, it seems there has been a small but genuine increase in some categories of violent crime.

C) Cancer rates up 12% in 20 years, say Cancer Research UK

Survival rates have also increased over past 40 years, but researchers emphasise that four in 10 cases could have been prevented by lifestyle changes

The number of people in the UK diagnosed with cancer has risen by 12% since the mid-90s, according to Cancer Research UK.

Between 2011 and 2013 there were an average of 603 cases per year diagnosed for every 100,000 people living in Britain – this compares to an annual average of 540 per 100,000 people between 1993 and 1995. But the charity said that even though the chances of getting cancer have increased, the chances of surviving the disease have also climbed.

Earlier diagnosis, screening programmes, better tests and treatments have all led to the chances of surviving cancer doubling over the last 40 years. Death rates, too have fallen by nearly 10% over 10 years.

“People are living longer so more people are getting cancer. But the good news is more people are surviving their cancer,” said Nick Ormiston-Smith, Cancer Research UK’s head of statistical information, “There’s still a huge variation in survival between different cancer types and there’s a lot of work to do to reach Cancer Research UK’s ambition for three in four patients to survive their disease by 2034.”

More than 352,000 people are diagnosed with one form of cancer each year. with 179,000 cases in men, compared with 173,000 women. Although population growth and population ageing are factors, there are other pressures responsible for the increase in rates, says Casey Dunlop, the charity’s health information officer.

“Obesity rates are increasing, people are drinking more over the last 50 years so that is going to be having an effect,” she said.

Lung, pancreatic and oesophageal cancer are examples where survival is still low - partly because they tend to be diagnosed at a later stage when they’re much harder to treat

Four in 10 cases of cancer could have been prevented by lifestyle changes, the researchers say. Peter Johnson, the charity's chief clinician, said cancer was not just a matter of genetic inheritance or chance. There were still things people could do to reduce risk.

"The most important is not to smoke. Most people know smoking causes lung cancer, but it's linked to at least 13 other types. We also know that maintaining a healthy bodyweight, exercising and eating a healthy balanced diet is important. There is no guarantee against cancer but there are things we can do to make us less likely to get it, and things that the government can do to help us make the right choices and protect future generations."

• This article was amended on 19 February 2016 to clarify that the figures referred to in the second paragraph are annual averages of the number of cases per 100,000 people in the two three-year periods mentioned.

D)

Cancer rates up in 20 years, say recent report

Survival rates have also increased, but researchers emphasise that only a few cases could have been prevented by lifestyle changes.

The number of people in the UK diagnosed with cancer has risen by 12% over the last twenty years, according to non-official statistics.

Only between 2011 and 2013 there were an average of nearly 1000 cases per year diagnosed for every 100,000 people living in Britain – this compares to an annual average of 540 per 100,000 people between 1993 and 1995.

But the charity said that even though the chances of getting cancer have increased, the chances of surviving the disease have also climbed.

Earlier diagnosis, screening programmes, better tests and treatments have all led to the chances of surviving cancer doubling over the last 50 years. Death rates, too have fallen by nearly 10% over 20 years.

"People are living longer so more people are getting cancer. But the good news is more people are surviving their cancer," said Mr. Campbell, surgeon at University College Hospital London, "There's still a huge variation in survival between different cancer types and there's a lot of work to do to reach Cancer Research UK's ambition for three in four patients to survive their disease by 2050."

Less than 400,000 people are diagnosed with one form of cancer each year. with nearly 200,000 cases in men, compared with less than 200,000 women. Although population growth and population ageing are factors, there are other pressures responsible for the increase in rates, says one health representative.

“Obesity rates are increasing, people are drinking more over the last 50 years so that is going to be having an effect,” she said.

Lung, pancreatic and oesophageal cancer are examples where survival is still low - partly because they tend to be diagnosed at a later stage when they're much harder to treat.

40 in 100 cases of cancer could have been prevented by lifestyle changes, the researchers say. In fact, cancer was not just a matter of genetic inheritance or chance. There were still things people could do to reduce risk.

Our recommendations are the following, the most important is not to smoke. Most people know smoking causes lung cancer, but it's linked to at least 13 other types. We also know that maintaining a healthy bodyweight, exercising and eating a healthy balanced diet is important. There is no guarantee against cancer but there are things we can do to make us less likely to get it, and things that the government can do to help us make the right choices and protect future generations.

Appendix 2 Q-test

1. The article is easily comprehensible
2. The article is not easily comprehensible
3. The data in the articles are easy to understand
4. The data in the articles are not easy to understand
5. There is no difference between A and B (health)
6. There is a remarkable difference between A and B (health)
7. There is no difference between A and B (crime)
8. There is a remarkable difference between A and B (crime)
9. The data in A is more accurate than in B
10. The data in B is more accurate than in A
11. In general, A is more trustworthy than B
12. In general, B is more trustworthy than A
13. The data in A is more timely than in B
14. The data in B is more timely than in A
15. I consider A more reliable than B
16. I consider B more reliable than A
17. I think the statistics in A miss the argument (health)
18. I think the statistics in A support the overall argumentation (health)
19. I think the statistics in A miss the argument (crime)
20. I think the statistics in A support the overall argumentation (crime)
21. I think the statistics in B miss the argument (health)
22. I think the statistics in B support the overall argumentation (health)
23. I think the statistics in B miss the argument (crime)
24. I think the statistics in B support the overall argumentation (crime)
25. In A statistics are appropriately presented
26. In B statistics are appropriately presented
27. In A statistics are not appropriately presented
28. In B statistics are not appropriately presented
29. I think the use of statistics used in these articles improves the information
30. I do not think the statistics used in these articles can improve the information

Appendix 3 Ethical Approval

Performance, Governance and Operations
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UNIVERSITY OF LEEDS

Alessandro Martinisi
 School of Media and Communication
 University of Leeds
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**PVAR Faculty Research Ethics Committee
 University of Leeds**

22 August 2018

Dear Alessandro

Title of study: **The usage of statistics in the articulation of quality news**
Ethics reference: **LTCOMM-029**

I am pleased to inform you that the above application for light touch ethical review has been reviewed by a School Ethics Representative of the PVAC and Arts (PVAR) joint Faculty Research Ethics Committee. I can confirm a favourable ethical opinion on the basis of the application form as of the date of this letter.

The following documentation was considered:

<i>Document</i>	<i>Version</i>	<i>Date</i>
LTCOMM-029 LightTouchEthicsFormMARTINISI.doc	2	20/07/16

Please notify the committee if you intend to make any amendments to the original research as submitted at date of this approval as all changes must receive ethical approval prior to implementation. The amendment form is available at <http://ris.leeds.ac.uk/EthicsAmendment>.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice period if your project is to be audited. There is a checklist listing examples of documents to be kept which is available at <http://ris.leeds.ac.uk/EthicsAudits>.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to ResearchEthics@leeds.ac.uk.

Yours sincerely

Jennifer Blaikie
Senior Research Ethics Administrator, Research & Innovation Service
On behalf of Dr Kevin Macnish, Chair, [PVAR FREC](#)

CC: Student's supervisor

Appendix 4 Codesheet for Content Analysis

Byline: _____

Headline: _____

1. JOURNONAME

Is the name of the journalist present?

1= yes 2= no

2. JOURNOGENDER

Gender of the journalist.

1= male 2= female 9= unknown

3. PAPER

Name of the newspaper.

1= The Guardian and The Observer
 2= The Times and The Sunday Times
 3= The Daily Mail and Mail on Sunday
 4= The Daily Mirror and The Sunday Mirror

4. DATE

Year of newspaper issue.

1= 2013 2= 2014 3= 2015 4= 2016

5. PERIODICITY

What is the period of the year where the statistics have been published?

1= first trimester (jan.-march) 2= second trimester (apr.-june) 3= third trimester (july-sept.) 4= fourth trimester (oct.-dec.)

6. LENGHT

Number of words in the article.

1= long story (>500 words) 2= short story (<500 words)

7. GENRE

Journalistic genre of the article.

1= hard news story 2= feature story 3= beat reportage

8. TOPIC

What is the main topic of the article?

1= medicine and health
 2= crime, law enforcement and corrections

9. CATEGORY

Under which of the following categories the topic fall?

- 11 = life expectancy
- 12 = food disorders
- 13 = deases and disorders
- 14 = public health (mental and sexual health)
- 15 = deaths and death rates
- 16 = epidemiology
- 21 = crime rates
- 22 = sex offences
- 23 = murders
- 24 = child abuse
- 25 = social justice
- 26 = property crimes
- 9= others

10. TYPESTATS

What type of statistics are present in the article?

- 1= descriptive 2= inferential

11. TYPEDATA

What type of data is present in the article?

- 1= numerical data 2= categorical data

12. VERIFICATION

Is there any mention of missing data/partial statistics?

- 1= yes 2= no

13. SOURCE1

What is the main source of statistics?

- 1= official statistics 2= non official statistics 9= unknown

14. SOURCE2

Source provenance.

- 1 = government reports
- 2 = international organisations (UN standard)
- 3 = NGOs
- 4 = academic independent
- 5 = private organisations
- 9 = not mentioned

15. SOURCE3

How many statistical sources are cited?

- 1 = one 2= two 3 = more than three

16. HUMANS

Do the statistics involve any human-interest topic?

- 1= yes 2= no

17. RELIABILITY

Are the statistics in the article reliable?

1= yes 2= no

18. VALIDITY

Is the usage of statistics coherent with the topic?

1= yes 2= no

19. ADDVALUE

Are the statistics managed/manipulated by the journalist?

1= yes 2= no

20. EVALUATION1

Does the article contain any type of comments to the statistics used?

1= yes 2= no

21. EVALUATION2

If yes, what type of comments?

1= positive 2= negative 9= no comments

22. CRITICALITY

Does the article contain any type of criticism?

1= yes 2= no

23. CRITICALITY2

If yes, what type of criticism?

1= factual 2= practical 3= scholarly 9= no criticism

24. STATSCLAIM

What is the statistical claim?

1= stand-alone statistics

2= simple comparison

3= standards of comparison

4= among candidates explanations

5= systematic vs. chance explanations

6= exaggeration of systematic factors

9= no clear claim

25. TIMELINESS

Time passed between the statistical release and the publication of the article

1= >3 months 2= <3 months 9= unknown

26. TIMELINESS2

Time passed between the research fieldwork and the statistical release

1= >3 months 2= <3 months 9= unknown

Appendix 5 Codebook for Content Analysis

Unit of analysis: newspaper

Unit of enumeration: article

1. Variable JOURNONAME	
Name	JOURNONAME
Type of data	Categorical
Label	Is the name of the journalist present?
Value Labels	1= Yes 2= No
<i>This variable helps to understand whether an article is signed up or not.</i>	

2. Variable JOURNOGENDER	
Name	JOURNOGENDER
Type of data	Categorical
Label	Gender of the journalist.
Value Labels	1= Male 2= Female 9= Unknown
<i>This variable aims at understanding the gender of the journalist.</i>	

3. Variable PAPER	
Name	PAPER
Type of data	Categorical
Label	Name of newspaper
Value Labels	1= The Guardian and The Observer 2= The Times and The Sunday Times 3= The Daily Mail and Mail on Sunday 4= The Daily Mirror and The Sunday Mirror
<i>This variable identifies different newspapers. That way, comparisons between different newspapers can be drawn.</i>	

4. Variable DATE	
Name	DATE
Type of data	Categorical
Label	Date of newspaper issue.
Value Labels	1= 2013 2= 2014 3= 2015 4= 2016
<i>This variable is used for time referencing.</i>	

5. Variable PERIODICTY	
Name	PERIODICTY
Type of data	Categorical
Label	The period of the year where the statistics have been published.
Value Labels	1= first trimester 2= second trimester 3= third trimester 4= fourth trimester
<i>This variable allows me to determine exactly in what trimester the statistics have been published.</i>	

6. Variable LENGTH	
Name	LENGTH
Type of data	Categorical
Label	Number of words in the article
Value Labels	1= long story (> 500 words) 2= short story (< 500 words)
Level of Measurement	Nominal
<i>This variable allows me to determine the length of the article.</i>	

7. Variable GENRE	
Name	GENRE
Type of data	Categorical
Label	Journalistic genre of the article

Value Labels	1 = Hard news story 2 = Feature story 3 = Beat reportage
Missing value	9 = unknown
<p><i>This variable indicates the genre of the article. According to the BBC we can generally identify three main news genre:</i></p> <ul style="list-style-type: none"> • Hard-news story: news perceived as urgent. It is a timely story about an issue, event, person or topic that many people are interested in. • Feature articles: these explore news stories in more depth. They may be triggered by a story that has been in the news for a while. The purpose of a feature is not just to tell you what has happened, but to explore or analyse the reasons why. • Beat reportage: it is a specialized, expert, form of journalism. 	

8. Variable TOPIC	
Name	TOPIC
Type of data	Categorical
Label	Main topic of the article
Value Labels	1 = Medicine and health 2 = Crime, law enforcement and corrections
<p><i>This variable indicates the main topic of the article according to the index in LexisNexis database.</i></p>	

9. Variable CATEGORY	
Name	TOPIC
Type of data	Categorical
Label	What is the main topic of the article?
Value Labels	11= life expectancy 12= food disorders 13= deases and disorders 14= public health (mental and sexual health) 15= deaths and death rates 21= crime rates 22= sex offences 23= murders 24= child abuse 25= social justice 26= property crimes 9= Unknown

This variable identifies the main topic of the article by measuring the dominant topic of an article according to LexisNexis database. If two or more topics are devoted to the same amount of coverage, then the emphasis of the headline determines the coding.

10. Variable TYPESTATS

Name	TYPESTATS
Type of data	Categorical
Label	What type of stats is present in the article?
Value Labels	1 = Descriptive 2 = Inferential
<p><i>This variable indicates the typology of statistics used in the article.</i></p> <ul style="list-style-type: none"> • Descriptive statistics uses the data to provide descriptions of the population, either through numerical calculations or graphs or tables. • Inferential statistics makes inferences and predictions about a population based on a sample of data taken from the population in question. 	

11. Variable TYPEDATA

Name	TYPEDATA
Type of data	Categorical
Label	What type of data is present in the article?
Value Labels	1 = Numerical data 2 = Categorical data
<p><i>This variable indicates the type of data used in the article.</i></p> <ul style="list-style-type: none"> • Numerical data. These data have meaning as a measurement, such as a person's height, weight, IQ, or blood pressure; or they are a count, such as the number of stock shares a person owns, how many teeth a dog has, or how many pages you can read of your favorite book before you fall asleep. (Statisticians also call numerical data quantitative data.) • Categorical data: Categorical data represent characteristics such as a person's gender, marital status, hometown, or the types of movies they like. Categorical data can take on numerical values (such as "1" indicating male and "2" indicating female), but those numbers don't have mathematical meaning. 	

12. Variable VERIFICATION

Name	VERIFICATION
Type of data	Categorical
Label	In the article is there any mention of missing data/partial statistics?
Value Labels	1 = Yes 2 = No

This variable indicates whether or not there is an evidence that a journalist/editor is able detect mistakes in the statistics used.

13. Variable SOURCE1	
Name	SOURCE1
Type of data	Categorical
Label	What is the main source of stats?
Value Labels	1 = Official statistics 2 = Non official statistics
Missing value	9 = unknown
<i>This variable indicates the type of statistical source mentioned in an article.</i>	

14. Variable SOURCE2	
Name	SOURCE2
Type of data	Categorical
Label	Source provenance
Value Labels	1 = government reports 2 = international organisations (UN standards) 3= NGOs 4= academic independent 5= private organisations 9= not mentioned
<i>This variable indicates the specific provenance of the statistics in an article.</i>	

13. Variable SOURCE3	
Name	SOURCE3
Type of data	Categorical
Label	How many statistical sources are cited?
Value Labels	1 = one 2 = two 3 = more than three
<i>This variable indicates the quantity of sources cited in an article.</i>	

16. Variable HUMANS	
Name	HUMANS
Type of data	Categorical

Label	Do the stats involve any human-interest topic?
Value Labels	1 = Yes 2 = No
<i>This variable indicates whether there are persons, people at the centre of the statistics.</i>	

17. Variable RELIABILITY	
Name	RELIABILITY
Type of data	Categorical
Label	Is the stats reliable?
Value Labels	1 = Yes 2 = No
<p><i>This variable indicates whether or not the statistics is reliable.</i></p> <ul style="list-style-type: none"> • Reliability is the overall consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions. For example, measurements of people's height and weight are often extremely reliable. 	

18. Variable VALIDITY	
Name	VALIDITY
Type of data	Categorical
Label	Is the usage of stats coherent with the topic?
Value Labels	1 = Yes 2 = No
<p><i>This variable indicates whether or not the statistics is valid.</i></p> <ul style="list-style-type: none"> • Validity is the extent to which a concept, conclusion or measurement is well-founded and corresponds accurately to the real world. The word "valid" is derived from the Latin validus which means strong. 	

19. Variable ADDVALUE	
Name	ADDVALUE
Type of data	Categorical
Label	Has the statistics been managed by the journalist?
Value Labels	1 = Yes 2 = No
<i>This variable indicates whether or not there is evidence of statistics manipulation/intervention by the journalist.</i>	

20. Variable EVALUATION1	
Name	EVALUATION1
Type of data	Categorical
Label	Does the article contain any type of comments towards the statistics used?
Value Labels	1 = Yes 2 = No
<i>This variable indicates whether there is an evidence or not of comments on the statistics.</i>	

21. Variable EVALUATION2	
Name	EVALUATION2
Type of data	Categorical
Label	If yes, what type of comments?
Value Labels	1= positive 2= Negative 9= no comments
<i>This variable indicates whether or not the journalist made positive or negative comments on the statistics. This variable is strictly linked to EVALUATION1.</i>	

22. Variable CRITICALITY	
Name	CRITICALITY
Type of data	Categorical
Label	Does article provide any type of criticism?
Value Labels	1 = Yes 2 = No
<i>This variable indicates whether or not the statistics have been criticised.</i>	

23. Variable CRITICALITY2	
Name	CRITICALITY2
Type of data	Categorical
Label	If yes, what type of criticism?
Value Labels	1= Factual 2= Practical 3= Scholarly 9= no criticism
<i>This variable indicates whether or not the statistics have been criticized according to the following type of criticism:</i>	
<ul style="list-style-type: none"> • Factual: using other data to raise objection towards the statistics. 	

- **Practical:** criticism towards the procedures of data collection.
- **Scholarly:** deep and argumentative critical reasoning towards the statistics.

24. STATISTICAL CLAIM	
Name	CLAIM
Type of data	Categorical
Label	What is the statistical claim?
Value Labels	1 = stand-alone statistics 2 = simple comparison 3 = standards of comparison 4 = among candidates explanations 5 = systematic vs chance explanations 6 = exaggeration of systematic factors 9 = no clear claim
<i>This variable indicates the type of statistical claim. (For a detailed definition of each labels please see paragraph 3.6)</i>	

25. Variable TIMELINESS	
Name	TIMELINESS
Type of data	Categorical
Label	Time passed between the statistical release and the publication of the article.
Value Labels	1= > 3 months 2= < 3 months 9= unknown
<i>This variable indicates the time length passed, if known, between the release of the statistical information and the publication of the article.</i>	

26. Variable TIMELINESS2	
Name	TIMELINESS2
Type of data	Categorical
Label	Time passed between the research fieldwork and the statistical release
Value Labels	1= > 3 months 2= < 3 months 9= unknown
<i>This variable attempts to indicate the time length passed, if known, between the research fieldwork and the statistical release.</i>	