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**From the Humour of Science
to (pedagogical uses for) the Science of Humour**

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Abstract

Science is generally seen as a serious subject, yet scientific discoveries may sometimes have humorous aspects. Joking about science is often used as a coping strategy by the general public, as a means of dealing with feelings of inadequacy about the relentlessness of scientific progress. Several recent newspaper articles bear witness to this tendency. Humour may also be used by scientists, with the aim of making science seem less threatening, or to make science more accessible to the layperson, particularly in the form of popular science, from books to keynote speeches. The etymology of the words “humour and “science”, and any changes in their frequency of use over time, will be examined through dictionaries, and corpus data. This paper will then explore in greater depth the many parallels between science and humour, with examples drawn from several fields, including Geology, the science of the Earth, and Linguistics, the science of language. Although no firm answers can yet be provided, the following questions will be discussed: i) Can moments of paradigm shift be

identified in scientific articles by analysing their use of humour? and ii) Can humour be used pedagogically, to teach science more effectively?

Résumé en français

La science est généralement considérée comme un sujet sérieux, mais les découvertes scientifiques peuvent parfois avoir des aspects humoristiques. Faire de l'humour à propos de la science est une stratégie d'adaptation souvent utilisée par le grand public, pour faire face au sentiment d'impuissance lorsque l'on est confronté à l'inévitabilité des progrès scientifiques. Plusieurs articles de journaux récents témoignent de cette tendance. L'humour peut également être utilisé par les scientifiques, pour que la science semble moins menaçante, ou pour rendre la science plus accessible au profane, en particulier sous la forme de science populaire, que ce soit par des livres ou par des présentations orales. L'étymologie de ces deux mots ainsi que tout changement dans leur fréquence d'utilisation au cours du temps seront examinés à l'aide de dictionnaires et de corpus. Cet article étudiera plus en profondeur les nombreux parallèles entre la science et l'humour, avec des exemples tirés de plusieurs domaines, notamment la géologie, la science de la Terre, et la linguistique, la science du langage. Bien qu'aucune réponse définitive ne peut encore être apportée, les questions suivantes seront abordées : i) Les changements de paradigme peuvent-ils être identifiés dans les articles scientifiques par l'analyse de leur utilisation de l'humour ? et iii) l'humour peut-il être utilisé de manière pédagogique, pour enseigner la science de manière plus efficace ?

Keywords

Corpus Linguistics, Earth Sciences, Humour, OED, *SketchEngine*, BYU corpora

1. Introduction

Science is generally perceived to be a serious, fact-based domain, while the arts and humanities are often considered to be less rigorous, more personal, individualistic or even impressionistic, and therefore more difficult to evaluate and assess. If it is indeed true that there is “a long research tradition associating humour with creativity” (Holmes, 2007: 518), it is equally possible to consider science as an endless quest, which “progresses by hunch, vision, and intuition” (Gould, 1981: 21). If both science and the humanities are domains where creativity and intuition are prized, then perhaps humour can be used as a tool to unite the two, as a certain literary talent will be useful when recording and reporting science, while studies in the humanities should always be based on valid data, selected according to scientific principles.

In the study presented here, the first step will be an investigation into the origins of the words “science” and “humour”, based on data from the *Oxford English Dictionary* (OED), *A Dictionary of Modern English Usage* (Fowler, 1926) and the *Macmillan Dictionary* (2009-2015), followed by an exploration of past and present use of the two terms in combination, with data from diachronic corpora, including magazine and newspaper archives, which allow changes in meaning to be mapped over time. The use of humour at times of paradigm shifts in science will be explored, in the context of Earth Science and also in Linguistics. The final section will present examples of humour used as a strategy to teach science.

2. Documentary evidence of “humour” and “science” in dictionaries

Corpus linguistics seeks to discover meaning in use. Dictionaries generally provide definitions of meaning, and may also give examples of use. Scientific publications serve as a repository of new developments, and also document changes in use linked to changes in

scientific theories, which may in turn imply changes in worldview (*Weltansicht*). Glossaries often provide a better record of such changes than can be found in a dictionary, while comparing different editions of the same glossary may provide further evidence of changes in scientific paradigms. This question is explored with relation to continental drift and plate tectonics, in Chateau Smith (2012).

2.1 Dictionary evidence for the etymology and use of “*humour*” and “*science*”

Etymology provides us with word origins and the history of any changes in meaning. The website <www.etymologyonline.com> provides the following information about the origin of the two words (Figure 1). As can be seen from the description, the original meaning of “*humour*” i.e. “*body fluid*” was associated with the medical science of the time, so links between the two words can be established from these earliest senses, as “*science*” is originally the ability to cut or divide, “to separate one thing from another”, a vital skill in relation to the four “*humours*” propounded by Galen: red blood, white phlegm, yellow bile (choler) and black bile (melancholy).

science (n.) mid-14c., "what is known, knowledge (of something) acquired by study; information;" also "assurance of knowledge, certitude, certainty," from Old French science "knowledge, learning, application; corpus of human knowledge" (12c.), from Latin scientia "knowledge, a knowing; expertness," from sciens (genitive scientis) "intelligent, skilled," present participle of scire "to know," probably originally "to separate one thing from another, to distinguish," related to scindere "to cut, divide," from PIE root *skei- "to cut, to split" (cognates: Greek skhizein "to split, rend, cleave," Gothic skaidan, Old English sceadan "to divide, separate").

humour/humor (n.) mid-14c., "fluid or juice of an animal or plant," from Old North French humour (Old French humor; Modern French humeur), from Latin umor "body fluid" (also humor, by false association with humus "earth"); related to umere "be wet, moist," and to uvescere "become wet," from PIE *wegw- "wet." In ancient and medieval physiology, "any of the four body fluids" (blood, phlegm, choler, and melancholy or black bile) whose relative proportions were thought to determine state of mind. This led to a sense of "mood, temporary state of mind" (first recorded 1520s); the sense of "amusing quality, funniness" is first recorded 1680s, probably via sense of "whim, caprice" (1560s), which also produced the verb sense of "indulge," first attested 1580s.

Figure 1: Etymology of “*science*”, “*humour*” from <www.etymonline.com>

The *Oxford English Dictionary* (OED), first published in 1928 as *A New English Dictionary on Historical Principles*, is a recognised authority on the etymology of words in English, which includes both British and American spellings. (In this article, British spelling, e.g. “humour” will be used throughout, except in direct quotations using American spelling e.g. “humor”). Entries in the OED record word senses in historical order, allowing changes in meaning to be mapped over time. The following table (Table 1) provides comparative data from the second edition of the dictionary (OED2, published in 1989), and from the third edition, available online (OED3, updated 2014), for the words “science” (updated in March 2014) and “humour” (updated in June 2014). Both are among the earliest 7% of words recorded in the dictionary. The table provides information about the number of word senses, and also about the number of occurrences of the words in the full text of the dictionary, in the quotations section, and in the text of the quotations (quotes).

OED2	word count	word senses	full text	quotations	quotes
humour (n) or humor	2649	7	1662	1665	1601
humour (v) or humor	460	5			
science	4141	7	4832	5341	3066
OED3	word count	word senses	full text	quotations	quotes
humour (n) or humor	6684	9	3150	2936	2066
humour (v) or humor	884	2			
science	8102	10	23135	22335	3676

Table 1: Comparative data from OED2 and OED3, for “humour” n & v, and “science”

As Table 1 shows, in both OED 2 and OED3, the word “humour” has two entries, as a noun and as a verb. In both editions, the definition of “humour” as a noun is much longer than the definition for the verb, but the list of forms and the basic etymology are not repeated, thus reducing the difference to just over 5,000 words in OED3. This difference is also reflected in the number of senses for each grammatical category: in both editions, the noun has more senses than the verb, but in OED3, the number of noun senses has increased, from seven to nine, while the number of verb senses has decreased, from five down to only two.

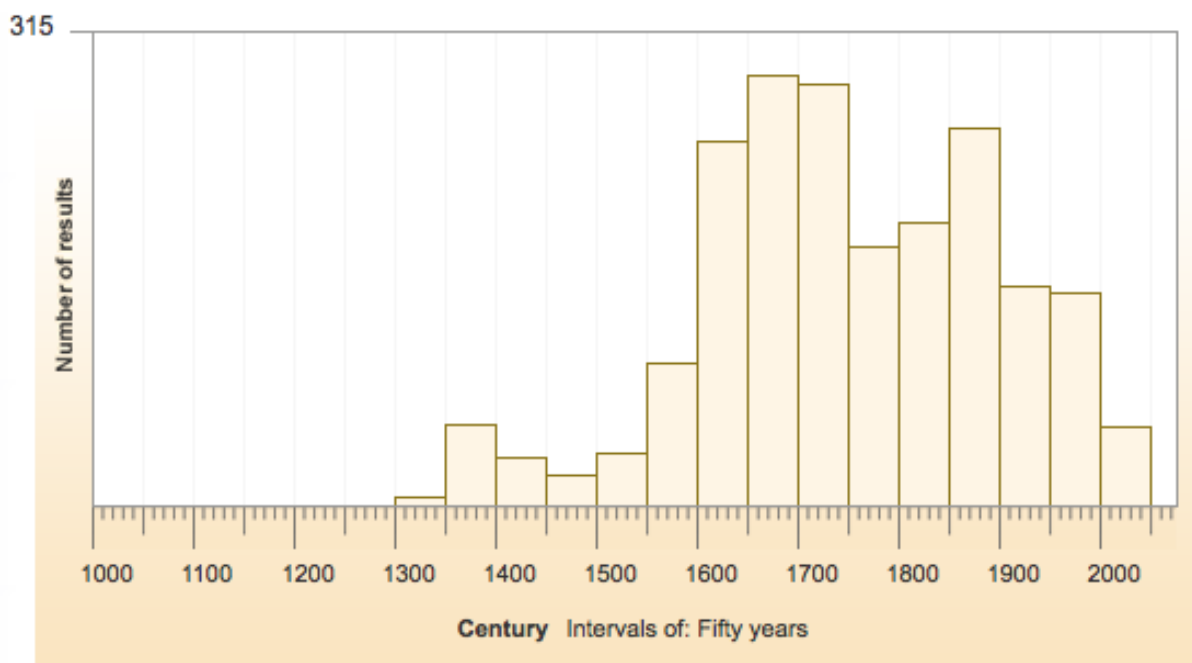


Figure 2a: OED3 timeline for “humour”

The timeline of the use of “humour” in quotations produces the graph shown in Figure 2a, while closer examination of the data confirms that from around 1600 to 1750, the word sense (WS) most frequent in quotations is that of the four “humours” (blood, phlegm, choler and melancholy or black bile, WS1 in OED3), whereas the word sense most frequently used in twentieth century quotations is that associated with “wit” (WS9 in OED3).

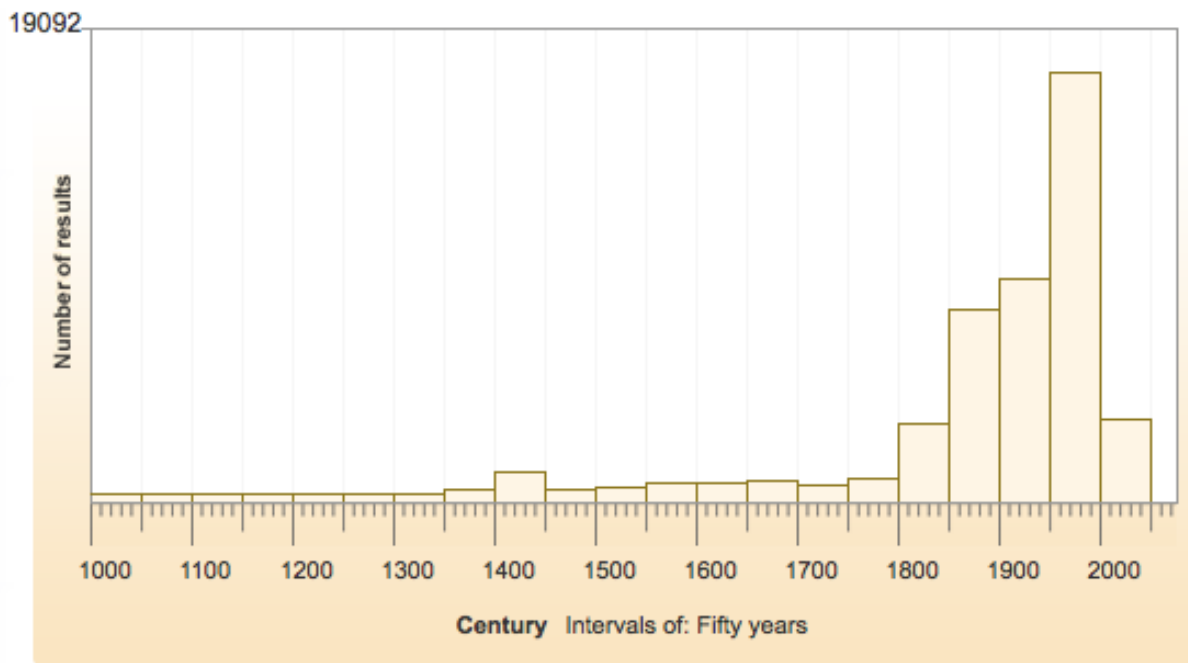


Figure 2b: OED3 timeline for “science”

In contrast, the timeline graph of “science” from OED3 (Figure 2b) shows a marked increase in the use of the word from 1800 onwards, with a peak in the latter half of the twentieth century. This is partly due to a change in the types of sources cited for quotations, with scientific journals, which often contain the word “science” in their title, being increasingly cited as references for specific types of use. Among the 1,000 most frequently quoted sources are to be found ten titles containing the word “science”, representing a total of 17,012 quotations, with 15,549 of them dated after the year 1800. In contrast, the word “humour” is present in none of the most frequent source titles. Examining a random sample of 100 quotations containing the word “science” confirmed that, for 60% of these quotations, the word was present only in the title of the source, e.g. the *American Journal of Science*. Does this change in frequency, even if it is simply the result of a change in the type of sources cited, mean that the OED has become more scientific over time? Or is such a change merely a

reflection of how society has become increasingly more concerned with science over time? Is this change one of ideology (Weltanschauung) or of worldview (Weltansicht)?

2.2 Defining “*humour*” over time

2.2.1 As defined in the OED

In the second edition of the OED (OED2), the core meaning of “*humour*” as it is generally understood today is given in seventh and final place, with the following definition:

7. a. That quality of action, speech, or writing, which excites amusement; oddity, jocularity, facetiousness, comicality, fun.
 - b. The faculty of perceiving what is ludicrous or amusing, or of expressing it in speech, writing, or other composition; jocose imagination or treatment of a subject.
- Distinguished from *wit* as being less purely intellectual, and as having a sympathetic quality in virtue of which it often becomes allied to pathos. (OED2, 1989: VII, 486).

In OED3, this meaning has moved to ninth and final place, and is as follows:

9. a. The ability of a person to appreciate or express what is funny or comical; a sense of what is amusing or ludicrous. See also *sense of humour* n. at Phrases 3.
- N.E.D.* (1899) comments: ‘distinguished from *wit* as being less purely intellectual, and as having a sympathetic quality in virtue of which it often becomes allied to pathos’.
- b. With reference to action, speech, writing, etc.: the quality of being amusing, the capacity to elicit laughter or amusement. Also: comical or amusing writing, performance, etc. *black humour*, *gallows-humour*, *schoolboy humour*, *toilet humour*, etc.: see the first element.

The third edition also provides provisionally dated evidence (shown by the question mark preceding the quotation) of the earliest use of the word in this sense.

?1663 T. Jordan *Tricks of Youth* Ep. Ded. sig. A2, This Play consists of Humour, Tricks of Youth, Done by known Persons, Fancy mixt with Truth.

In both OED2 and OED3, the first confirmed use of this particular meaning of “*humour*” dates from 1682, yet the example quoted reveals no sympathetic quality, but rather a sense of mockery, with the General laughing unkindly at the soldiers of misfortune, pressed into service in the Mughal army:

1682 tr. *Glanius' Voy. Bengala* 142 The Cup was so closed, that 'twas a difficult matter for us to open it, and therefore the General gave it us on purpose, to divert himself with the humour of it. (OED2, 1989: VII, 486).

The authenticity of the text quoted in the OED remains somewhat questionable, according to Lach and Van Kley (1998: 586), who describe it as the work of a “translator-pirate” (Glanius), which is “not a very reliable translation” of the first voyage of Jan Janszoon Struys. As the document authored by W. Glanius is written as a first person narrative, without any reference to the original author, J.J. Struys, it seems almost certainly to be an early case of plagiarism and misrepresentation.

2.2.2 As defined by Fowler

The complete OED definition of the word “humour” is too long to show here, but a much shorter single-volume version of that dictionary was published in 1911, the *Concise Oxford Dictionary* (COD), the work of Henry Watson Fowler and his younger brother, Francis George. Although considerably shortened, their definition identifies eight separate meanings (one more than OED2, but one less than OED3), with “facetiousness, comicality” (OED2 7a) now listed in third place, after “state of mind, mood”, and “inclination”, while the “faculty of perceiving” humour (OED2 7b) is now placed fourth. The more scientific meaning of “humour” as a bodily fluid is now placed afterwards, in final position.

hu'mour " (or u-), n. State of mind, mood; inclination, as in the h. for fighting; facetiousness, comicality; faculty of perceiving this jocose imagination (less intellectual & more sympathetic than wit), whence hu'mourLESS a.; out of h., displeased; good, ill, h. (temper), whence -humouRED 2 a.; cardinal hh., (hist.) four chief fluids of the body (blood, phlegm, choler, melancholy), determining person's physical & mental qualities: aqueous, vitreous, h., transparent fluid parts of the eye. [AF, f. L (h)umorem moisture (as humid, see -OR 1)]
hu'mour2, v.t. Gratify, indulge, (person, taste, temper, &c); adapt oneself to, make concessions to. [f. prec.] (COD, 1911)

The full OED2 definition for WS7 could almost be read as a thesaurus entry listing synonyms for “humour”, and the seven elements mentioned there (oddity, jocularity, facetiousness, comicality, fun, together with what is ludicrous or amusing) may be

compared and contrasted with the seven other types of humour (wit, satire, sarcasm, invective, irony, cynicism, and the sardonic) described in Table 2, taken from the first edition of another, more famous book by H.W. Fowler, *A Dictionary of Modern English Usage* (1926: 241), which are all somewhat less than positive than “humour”, with the single exception of “wit”.

Type	Motive or Aim	Province	Method or Means	Audience
humour	discovery	human nature	observation	the sympathetic
wit	throwing light	words and ideas	surprise	the intelligent
satire	amendment	morals and manners	accentuation	the self-satisfied
sarcasm	inflicting pain	faults and foibles	inversion	victim/bystander
invective	discredit	misconduct	direct statement	the public
irony	exclusiveness	statement of facts	mystification	an inner circle
cynicism	self-justification	morals	exposure of nakedness	the respectable
the sardonic	self-relief	adversity	pessimism	self

Table 2: Types of “humour” in Fowler’s *Dictionary of Modern English Usage* (1926)

2.2.3 As defined in the Macmillan dictionary

The Macmillan dictionary (2009–2015, available online), which is also a thesaurus, provides real-life examples of use drawn from corpora, and classifies words according to frequency. The 7,500 most frequent words in the English language are given one, two or three stars, based on corpus frequency. The word “humour” is classed as a two-star word, and its meaning is narrowed down to three basic senses, as follows:

1. the quality that makes a situation or entertainment funny
2. the ability to know when something is funny, and to laugh at funny situations
3. someone’s mood (classified as *formal*)

Somewhat surprisingly, the examples drawn from the corpus tend towards the negative, e.g.:

1a. something said or done that is funny: “He made a hopeless attempt at humour.”

Perhaps even a hopeless attempt at humour can be considered funny, depending on context. The Macmillan thesaurus entry classifies “humour” under the category “The quality of being funny and funny situations”. This list of ten items mentions “humour” three times, with the first two senses given in the definition quoted above, plus the expression “gallows humour”. The other items are irony, wit, slapstick, ribaldry, hilarity, levity, and comedy of errors. The only items that are also listed in Fowler’s table are “humour”, “wit”, and “irony”. The expression “gallows-humour” (with a hyphen) is found in the OED3, while only “wit” and “humour” are found in all five of the dictionaries (COD, Fowler, OED2, OED3 and Macmillan).

3. Newspaper articles, “humour” and “science”

Dictionaries represent the best efforts of lexicographers to document language in use (descriptive), or language as it has been used (historical), or language as it should be used (prescriptive). The OED is a historical dictionary, based on a vast collection of quotations, fragments that document language use over time, often culled from the general public, and painstakingly compiled by lexicographers. The Macmillan is a corpus-based dictionary (Kilgarriff, 2008), providing definitions and real-life examples for the most frequent words in the corpora consulted by the lexicographers. Although the term “prescriptive” is used by Crystal (Fowler, 2009) eleven times in his introduction to the facsimile edition of Fowler’s original dictionary (first published in 1926), the term “descriptive” is also used eight times, with six of those occurrences being for the modern, positive word-sense. An earlier book by

the Fowler brothers, *The King's English* (1906), provides ample evidence that their views on language abuse based on examples drawn from published documents, while often prescriptive, were nonetheless presented with a great deal of wit and humour.

Corpus linguists have often used newspapers as a source of corpus data. Bednarek (2006) used a 70,000-word corpus of a hundred newspaper articles to analyse evaluation in media discourse. Baroni et al. (2004) developed the *La Repubblica* corpus, a 380-million-word corpus of newspaper Italian. Partington (2009) studied punning in “a considerable number of naturally occurring instances of wordplay collected from a corpus of newspaper texts”. In this third example, the objective was not to study newspaper text as a genre, but rather as a text type where punning is frequently found. In an earlier study, Partington (1998) had already argued that, if different types of articles are included in a newspaper corpus, then such a corpus may well serve as a valid proxy to represent “general English”. For all these reasons, this study considers diachronic corpora, including newspaper and magazine archives, to be representative sources of information about the relationship between “science” and “humour” in general English or American, over time.

Figure 3 is a graph of the occurrence of “science” and “humour” in American newspapers, from 1700 to 2000. The number of occurrences rises slowly during the eighteenth century, but then peaks sharply in the early nineteenth century, probably in relation to the Industrial Revolution, but also undoubtedly linked to the growing number of newspapers printed. There is a slight decline around 1840, but a second, higher peak is reached in 1860. This is followed by a second decline around 1880, and then the apogee is reached in 1900. After a sharp fall in 1920, figures stagnate until 1980, when they begin to rise again.

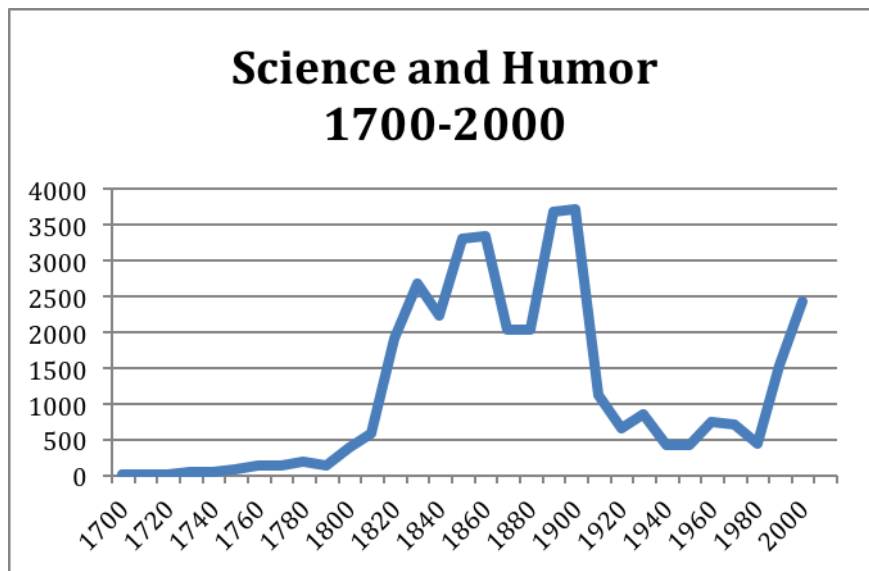


Figure 3: Newspapers containing “Science” and “Humor” over time
Data from <<http://www.newspaperarchive.com>>

In order to examine the relationship between the two words in more depth, it is useful to examine actual occurrences in corpus data. The OED has been considered by some to function as a diachronous corpus of quotations (Hoffmann, 2004). However, of the fifteen co-occurrences of “science” and “humour” in OED3 (within a fifteen-word window), only two concern the quasi-synonym of wit, and only one is a true co-occurrence, within the same phrase: the entry for “humorology”, which is defined as “the study or science of humour”. This result tends to confirm Sinclair’s remarks on Deprecated Terms (1996): “*Citations* are individual instances of words in use and collections of these also have no claims to be corpora”.

The Times Magazine Corpus (Davies, 2007), with data from 1923 to 2006, contains a mere five co-occurrences of “science” and “humour”. Yet each quote encapsulates a certain vision of the relationship between science and humour, as investigation of the broader context confirms. The overarching theme is that of education, from school, to college and university,

but also through academic conferences, tennis college, and teaching computers to play chess (or write poetry).

The first quote comes from an article discussing The Hill, a private school in Pennsylvania which proposed (in 1929, the year of the Wall Street crash) a new way of identifying boys who should go on to college, by asking them questions of the following type:

Underline the type of book you read for pleasure most frequently: **humor**, **science**, detective stories, novels, poetry, philosophy, biography. (*Time Magazine*, February 11, 1929).

Clearly, the order of words on the list cannot be random, yet the logic behind the order of the words is difficult to identify. Young men who went to college in the fall of 1929 would probably have a difficult time ahead of them, as the Stock Market Crash began on October 24th.

The second text is the obituary of a professor who retired from McGill University in 1936, but chose to stay in Canada rather than returning to his native England. Apparently, the author of the article feels that being an economist is barely compatible with having a sense of humour. The date of the article explains its title “Canada at war: Good night—Forever”.

Stephen Butler Leacock had several distinctions: he was one of the very few contemporary Canadians well-known outside of Canada; he was an economist who had a sense of **humor**; he taught economics and political **science** at McGill for 33 years; and he pleased readers throughout the world with his 30 books of light, tolerant satire. (*Time Magazine*, April 10, 1944).

The third text shows the humorous relationship between science and humour, in the world of academia, where the strangest ideas may be put forward. Here, the reporter is showing the readers how weird academics can be, as they advocate the use of psychedelic drugs to connect with the past. The title of the article “Tripping History” is in itself an attempt at humour.

The week between Christmas and New Year’s is a perennial gathering time for the academic clans, who convene in hotel ballrooms around the land to discuss the use of dependent clauses in Hamlet or the number of DNA molecules that can fit on the head of a pin. These occasions usually range from the merely boring to the achingly tedious. Sometimes there are exceptions, provoked by hostility or **humor**

(see **SCIENCE**). Last week, at the American Historical Association meetings in New York City, Professor James Parsons of the University of California's Riverside campus proposed that his colleagues use psychedelic drugs to expand their understanding of the past. (*Time Magazine*, January 10, 1972).

The fourth article focuses on tennis college, where humour is combined with science to teach people (who have to be reasonably at ease financially) how to play tennis.

Laughter, in fact, is an essential part of the curriculum at the tennis college, where every year several thousand adults take three-to- five-day courses that cost \$100 daily. It erupts regularly from the classroom during Braden's unique lectures, which combine show biz, **science**, **humor** and psychology. (*Time Magazine*, October 16, 1989).

The final quote comes from the Letters section of the magazine, and suggests that science, in this case equated with the computer, cannot be human.

The computer should compete with Seamus Heaney, the Nobel laureate poet, not with a chess master like Kasparov. This doesn't mean that Heaney has a " soul " and the machine does not. It means that nature's thinkers -- humans, with their art, **humor** and compassion -- can be mimicked by **science** but never matched. (*Time Magazine*, April 15, 1996).

4. Scientific articles, paradigm shifts, and humour

The term "paradigm shift" was first used by Thomas S. Kuhn in 1962, to describe a specific type of scientific progress. In this section, the use of humour in scientific articles will be investigated, through two separate examples of paradigm shifts, in Earth Science and in Linguistics. The first section explores the use of humour in article titles, while the relative success of articles is investigated in sections 4.2 and 4.3. Section 4.4 discusses the use of humour as a weapon during scientific debate between conflicting theories.

4.1 Is using humour in the title of an article a good strategy?

A recent article on heat pumps in Denmark bore the extended title “From ugly duckling to white swan” (Nyborg & Røpke, 2015). This image, from the tale by H. C. Andersen, as the Danes know him, has in fact been used several times in recent articles about Denmark, probably because of its clearly humorous effect. The following table (Table 3) contains a list of similar references, in chronological order. It is fairly obvious that swans and ducklings are unlikely key words in the context of heat pumps or environmental policy, and it is therefore logical to wonder whether a non-Anglophone scientist should really be required to spend time looking up such words in the dictionary.

<p>Pietras-Jensen, V. (2005). Developing social and environmental practice in Denmark: From many small (and not so ugly) ducklings towards that elusive swan? 1. <i>Social and Environmental Accountability Journal</i>, 25(1), 3-6.</p> <p>Jorgensen, H. (2009). From a beautiful swan to an ugly duckling: The renewal of Danish activation policy since 2003. <i>Eur. J. Soc. Sec.</i>, 11, 337.</p> <p>Larsen, L. L., Rosenberg, T. S., & Lisby, K. H. (2010). 185 Poster Turning an ugly duckling into a swan. <i>European Journal of Cardiovascular Nursing</i>, 9(1 suppl), S41-S41.</p> <p>Liburd, J. J., & Saabye, P. (2014). Tourism in Denmark: From Ugly Duckling to Our Journey. <i>European Tourism Planning and Organisation Systems: The EU Member States</i>, 61, 13.</p> <p>Nyborg, S., & Røpke, I. (2015). Heat pumps in Denmark—From ugly duckling to white swan. <i>Energy Research & Social Science</i>, 9, 166-177.</p>
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Table 3: Titles of articles containing the words “ugly duckling” and “swan”

Is the use of a humorous title a valid strategy for a scientific article? Will it catch the eye of the reader? Is such an article more likely to be read? In an article comparing the effect of “humour”, “warmth” and “eroticism” as advertising stimuli, Pelsmacker and Geuens (1996) found that: “For the ads of alcoholic beverages studied, humour outperforms the other stimuli in all instances.” However, disseminating science is not the same as selling alcohol, leading Sagi and Yechiam (2008) to the following conclusion:

Although the reasons for the negative association between the use of amusing titles and subsequent citations are not entirely clear, the findings do suggest that authors should be cautious about including humorous contents in article titles. (Sagi & Yechiam, 2008: 686)

One possible explanation is that humorous titles tend to be longer and more complicated, relying on cultural knowledge that is not necessarily universal. A more recent study found a correlation between title length and number of citations, and hypothesised that “papers with shorter titles may be easier to understand” (Letchford et al., 2015).

4.2 Paradigm shifts and the “sleeping beauty” effect

Some scientific articles are immediately of interest to the community and are abundantly read and cited. In contrast, others, classified as “unpopular papers” (Redner, 2005: 51), may never be cited at all. A study investigating ways to quantify the long-term impact of scientific articles echoed Redner’s finding, stating that “paradigm-changing discoveries have notoriously limited impact” (Wang, D. et al., 2013: 127). Such studies may simply be too far ahead of their time, outside the paradigm of “normal science” (Kuhn, 1970: 10), or may become relevant to another community, much later, with the advance of technology. These late developers were initially described as “sleeping beauties” (Van Raan, 2004), while a more recent study has confirmed that there are “many examples of papers achieving delayed yet exceptional importance in disciplines different from those where they were originally published” (Ke et al., 2015: 7426), thus adding a new, more technological dimension to Kuhn’s initial hypothesis that paradigm shifts were often brought about by outsiders:

Almost always the men who achieve these fundamental inventions of a new paradigm have been either very young or very new to the field whose paradigm they change. (Kuhn, 1970: 90)

4.3 Paradigm shifts and negative citations

In the world of science, a great deal of value is attached to publication, rated by the impact factor of the journal in which it is published, and also by the number of citations a work receives. However, some citations are not positive, but rather negative evaluations of the work cited. A recent study somewhat surprisingly found that “negative citations concerned higher-quality papers” (Catalini et al., 2015: 1). However, in the methods section, the authors define negative citations as “references that pointed to the inability to replicate past results, disagreement, or inconsistencies with past results, theory, and literature” (Catalini et al., 2015: 4). At times of paradigm shift, this negativity can increase dramatically, with some papers showing overt hostility to the scientist and not merely to the science. Humour in such cases is used as a weapon to attack opposing theories and methods, or even the scientists themselves.

4.4 Examples of contestation by humour

Fowler’s table of different types of humour (Table 2, Fowler, 1926: 241) shows several types of negative behaviour. Sarcasm seeks to inflict pain, and invective to discredit, while irony appeals to an inner circle, and cynicism exposes nakedness for self-justification. Scientists may be justified in correcting errors in previous studies, but the use of humour can often reveal a sense of hurt and the need to justify one’s work at all costs.

4.4.1 Humour that backfires immediately

The WSB model, proposed by Dashun Wang and co-workers as a method of quantifying long-term scientific impact (Wang D. et al., 2013), was rapidly contested by Jian Wang and co-workers, although they too agreed that the impact of paradigm shifts is more difficult to quantify, as “high-impact outliers...represent the greatest discoveries” (Wang, J. et al., 2014: 149b). The speedy response to this criticism of the WSB model ended with the following

remark: “judging our results on the quality of the implementation is like judging the laws of thermodynamics on the performance of the cars a particular company can build” (Wang D. et al., 2014: 149c), which seems to indicate a rather inflated view of their own article’s importance.

4.4.2 Contestation through humour in corpus linguistics

A similar minor conflict occurred in the field of corpus linguistics, notably expressed in two articles that both drew their titles from humorous beer ads. As mentioned earlier, humour has been shown to be the most effective stimulus for advertising alcoholic beverages (Pelsmacker and Geuens, 1996). Like Dashun Wang and co-workers, the author of the first article, Charles Owen, underlines the innate difficulty of separating theory from practice: “it is quite difficult to separate analysis of this approach as a principle from evaluation of the application of that principle to teaching.” (Owen, 1993: 168). According to Google Scholar, “Corpus-Based Grammar and the Heineken Effect: Lexico-grammatical Description for Language Learners” (Owen, 1993) has been cited far more frequently (52 citations to 37) than the reply “I bet he drinks Carling Black Label!: a riposte to Owen on corpus grammar” (Francis and Sinclair, 1994). Web of Science data, in contrast, indicate only seven citations for each article. Strangely, the Google results seem to be more accurate, as there are indeed links to 52 articles purporting to cite Owen 1993, including Francis and Sinclair’s reply. The references to Owen’s paper seem to be fairly equally divided between agreement, neutrality and disagreement, although none actually points out that Owen misquotes the Heineken ad by using the word “lagers”, when in fact the slogan in all of the ads was “Heineken refreshes the parts other **beers** cannot reach” (Emphasis added). As the commercial objective of these ads

was to convince “bitter-drinking Britons” (Arnold, 2009) to adopt Dutch lager, such an elementary mistake rather diminishes the effect of Owen’s arguments.

4.4.3 Hindsight, humour and paradigm shifts

During “battles over paradigm change” (Kuhn, 1970: 153), in particular, scientists tend to become more aggressive in defence of the status quo, as this sarcastic remark shows: “If we are to believe Wegener’s hypothesis we must forget everything which has been learned in the last 70 years and start all over again.” (Chamberlin, 1928: 87). The delayed humour lies in the fact that this is exactly what the geological community had to do, no more than forty years after that statement was first published.

The paradigm shift in Earth Sciences referred to in this sentence is the concept of “continental drift”, which was eventually accepted under the name “plate tectonics”, used for the first time in 1969, according to OED3. Anthony Brook (2011) provides further details of this first usage, with the relevant quotation in full, encapsulating all the key vocabulary of the time.

If one considers the mountain-trend configurations of the Scotia Arc and the Antarctic Peninsula in relation to ocean-floor spreading (7) and considers continental drift in the light of plate tectonics (8), displacement of the Ellsworth Mountains can readily be explained. (Schopf, 1969: 64)

The “Antedating of Plate Tectonics” was also discussed on *LinguistList* (Baker, 2005), but his suggestion that the references cited by Schopf in (8) might contain the term “plate tectonics” proved unfounded: all four of the articles cited still refer to the concept as “continental drift”. Both the title and content of the fourth article, “Static or mobile earth: the current scientific revolution” (Wilson, 1968), provide ample food for thought in the context of paradigm shifts. Further discussion of this topic can be found in Chateau Smith (2012), but overt, deliberate humour is generally conspicuous by its absence, except in an article by Dietz, discussed in Chateau (2014).

5. Humour in science, for pedagogical purposes

Although using humour in serious scientific articles cannot be recommended (Sagi and Yechiam, 2008), it is often considered to be a valid strategy for teaching. It has been recommended for medical education (Ziegler, 1998; Bennett, 2003), as a form of therapy for art teachers (Evans-Palmer, 2010), and in the second-language classroom (Chiasson, 2002). Children can be taught science through humorous cartoons (Rule & Auge, 2005; Weitkamp & Burnet, 2007), but humour may be more difficult to use with older students.

Combining second-language instruction with science at university level often involves teaching students to write English well enough to be published in scientific journals. Using humour to achieve this goal can often be successful. Several parodies of scientific articles have been produced, the best of which can be used to teach students about writing science. One such text is to be found in *Zero Gravity: The Lighter Side of Science*, a section of American Physical Society (APS) News. The illustration in Figure 4 shows one of the most popular humorous images in science, that of Newton and the apple.



Figure 4: On the Impact of a 0.12 kg Apple with the Head (Torres, 2009)

The mock article, a mere two pages long when reprinted, provides an excellent, humorous, and satisfyingly brief example of how to write a scientific paper. A footnote on the webpage

(<<http://www.aps.org/publications/apsnews/200908/zerogravity.cfm>>) indicates that “APS encourages the redistribution of the materials included in this newspaper provided that attribution to the source is noted and the materials are not truncated or changed.”

Some authors, however, frown upon levity, including Robert Burchfield, the editor of the revised third edition of *The New Fowler's Modern English Usage*, who felt it necessary to point out that: “Perhaps as a hangover from Fowler's days as a schoolmaster, his scholarship needed to be enlivened by a veneer of idiosyncrasy and humour.” (Fowler & Burchfield, 1998, p. viii). Although Fowler’s “amusing headwords” were no longer thought to be useful at the end of the twentieth century, their removal was probably one of the reasons that led to the publication of a facsimile “classic” first edition, in 2009.

The appropriateness of using humour in science depends perhaps on the media of expression. Popular science books do not conform to the same rules as scientific journal articles. A book on Modern English Usage obviously walks a tightrope between prescriptive and descriptive behaviour, and this same dichotomy often creates an uneasy relationship between teacher and student. Exploring corpora can help the teacher to provide the student with evidence of language in use, enabling students to decide on correct usage for themselves, provided that the notions of genre and register are taken into account.

Many types of science today find expression on websites, and a new genre, the weblog or blog, is becoming more and more popular. Based on data from the ScienceBlog corpus (Minocha, 2014), available with *SketchEngine* (Kilgarriff et al., 2004), the word-sketch for “humour” as a noun (Figure 4) shows association mainly with negative adjectives: “black”, “gallows”, and “dark”, but also “unintentional” and “dry”, leading to “dry British humour”, or

“pithy British humour” or, even worse, “British culinary humour”. The occurrences of “good humour” represent a different word sense, but “the best humour” (the data are lemmatised) is either “involuntary” or “half pointed and half pointless”.

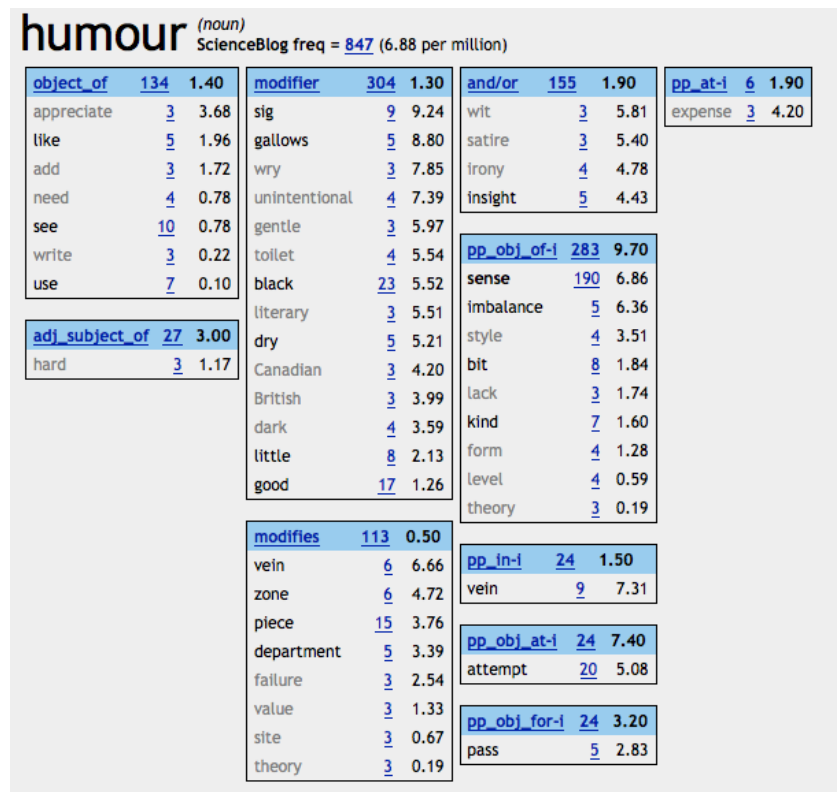


Figure 4: Word-sketch of “humour” in the *ScienceBlog* corpus

Humour oscillates between the positive and the negative, with the latter often providing a form of release from the unbearable events that sometimes happen, but more as catharsis than as schadenfreude. A recent study found that time tended to heal and that there was a cline in the acceptable use of humour, concluding that:

...temporal distance creates a comedic sweet spot. A tragic event is difficult to joke about at first, but the passage of time initially increases humor as the event become less threatening. Eventually, however, distance decreases humor by making the event seem completely benign. (McGraw et al. 2014: 570)

Conclusion

This exploration of “science and “humour” has shown that there are certain links between the two, notably in the field of pedagogical applications. In science itself, humour is sometimes used as a weapon, but can often become a double-edged sword. The use of humour in the classroom should always focus on the positive forms of wit and humour, for the purposes of discovery and enlightenment, as Fowler proposed in 1926.

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