Abstracts of poster presentations:

A diachronic analysis (1980-2010)

Stefania M. Maci

Lancaster University

Abstract

Poster presentations have become a major format for scientific communication at conferences and other scientific meetings (Matthews & Matthews, 1996, p. 97). While posters have a research value because their purpose is to share recent research findings with peers (Demarteau et al., 2007), their academic worth has been reconsidered because their abstract, if published in major medical journals, could enhance academic career.

Studies on medical abstracts have been focused on their genre (Samraj, 2005, Salager-Meyer, 1990), on the use of metaphorical strategies (Hidalgo Downing, 2009; Méndez-Cendón, 2003), and on cross-cultural analyses (Bellés-Fortuño, 2010; Bielski, 2008; López Arroyo, 2007; Fernández Antolín, 2006; Martin-Martin & Burgess, 2006). Yet, to the best of my knowledge, there seems to be no investigation about the way in which medical abstracts have evolved. This paper therefore aims to examine the diachronic evolution of medical abstracts of posters presented at medical conferences.

The diachronic investigation of abstract lexico-grammar seems to suggest that a development has occurred toward interdiscursive patterns by means of which hybrid generic frameworks are created by appropriating established conventions associated with other genres and professional practices (Bhatia, 2007).

1. Introduction

Traditionally, medical communication takes the form of research articles,[39] a trend apparently confirmed by the proliferation of new specialised medical journals (in 2010, MEDLINE[40] counted over 11,700 indexed medical journals). However, since scientific progress has to circulate (and be published) as quickly as possible, a suitable way to keep up with it is through poster presentations at conferences.[41] As explained to me (telephone conversation on 5 October, 2009) by the Head of the Publishing Unit of the Istituto Superiore di Sanità, the National Health Institute of Italy (www.iss.it), the medical community has been exploiting medical-poster presentations for several reasons,[42] the most important being that the abstract of a poster can be published in major medical journals – which makes poster abstracts a convenient means for furthering medical careers.

According to Maugh (1974), poster sessions were pioneered in Europe and made their first appearance in the US at the 1974 Biochemistry/Biophysics Meeting. Since then posters have rapidly become a major format for scientific communication at conferences and other scientific meetings (Matthews & Matthews, 1996, p. 97). While posters have a research value because their purpose is to share recent research findings with peers (Demarteau et al., 2007), their academic worth has been reconsidered because their abstract, if published in major medical journals, could enhance academic career.

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[39] Members of the medical community have carried out analysis regarding medical discourse. Noteworthy are the ANSI/NISO *Guidelines for Abstracts* (1997), the *Uniform Requirements* by the International Committee of Medical Journal Editors (2010), and the various *technical* guidelines for written medical texts (Skelton and Edwards, 2000; Signorino and Fiaschi, 2003; Paraiti and Valentini, 2005; Walker, 2005).

[40] Available at: http://www.nlm.nih.gov/tsd/serials/lsiou.html (retrieved 25 November 2011).

[41] From a linguistic perspective, attention has been paid to posters as a hybrid genre, falling between "elements of the research paper and conference visuals or handouts" (Swales, 2004, p. 21; cf. also Swales and Feak, 2000, and Burgess and Fagan, 2004), which indeed make them "visual units" (MacIntosh-Murray, 2007, p. 352).

[42] Amongst others, poster presentations are considered a necessity because lack of time forces the conference committee to require more poster presentations than papers. Secondly, posters facilitate scientific support and communication exchange concerning interesting research questions. Thirdly, posters offer new research projects which may result in future journal publication.

Studies on medical abstracts have been focused on their genre (Samraj, 2005, Salager-Meyer, 1990), on the use of metaphorical strategies (Hidalgo Downing, 2009; Méndez-Cendón, 2003), and on cross-cultural analyses (Bellés-Fortuño, 2010; Bielski, 2008; López Arroyo, 2007; Fernández Antolín, 2006; Martín-Martín & Burgess, 2006). Yet, to the best of my knowledge, there seems to be no investigation about the way in which medical abstracts have evolved. It is therefore the aim of this paper to examine the diachronic evolution of medical abstracts with particular regard to abstracts of posters presented at medical conferences. Since the main purpose of abstracts seems to be that of attracting potential readers, there might be some persuasive features which exploit evaluative language in use. Therefore, I will carry out a corpus-based analysis, examining the keyword lists and the relative collocation patterns generated by a corpus of medical abstracts of poster presentations covering the decades 1980s, 1990s and 2000s, in order to answer the following research questions:

a) what type of lexical features are employed?
b) what direction have these taken across time?

A diachronic investigation based on a corpus linguistic approach will be carried out in order to detect the processes undergoing the development of medical discourse and the extent to which traits pertaining to other domains have contaminated contemporary discourse in the medical academic community. Although the most evident *marketized* element of posters is its visual component (Maci, 2011), for the purpose of this paper attention will be paid only to the linguistic features that present traits pertaining to medical argumentation and persuasion. Since persuasion exploits evaluative language in use, I will analyze the keyword lists and the relative collocation patterns generated by two sub-corpora of abstracts of medical posters covering the decades 1980s, 1990s and 2000s. The discussion of the relative results will be carried out in the following paragraphs.

2. Corpus Collection and Methodological Approach

The main problem I encountered in carrying out my research was related to the selection of posters. The Internet offers a myriad of websites regarding scientific poster publication. Indeed, a search by Google using the expression “medical poster

publication" yielded 7,270,000 hits with topics ranging from tips and techniques, to discussions of how to use posters as a tool for professional development in the workplace as well as examples of posters themselves. The large number of Web sites about posters indicates the widespread role posters have in the dissemination of academic medical knowledge, but at the same time such an overdose of information implies that reliability must be the main parameter in poster selection and corpus collection. I therefore checked via the *Journal of Citation Reports* (available at http://thomsonreuters.com/products_services/science/science_products/a-z/journal_citation_reports) all medical journals, ranked according to their Impact Factor (henceforth IF),[43] which were then browsed in order to find publications concerning poster sessions presented at medical conferences, starting my search from 1975, the year after which poster session news was first published. The journal which first started the publication of the abstract of poster sessions during the 1980s was specialized in the epidemiological field (though it stopped publication of poster abstracts in 1994); I therefore decided to concentrate on epidemiology, collecting 2,638 abstracts of posters, that is all the available abstracts related to congress posters published in major journals concerned with epidemiology or dealing with epidemiological issues,[44] forming a corpus of 1,410,058 words. All the abstracts were then grouped into two sub-corpora according to the year of publication, i.e. 1980-1994, 1995-2009, as shown in table 1 below:

Table 1. breakdown of corpus collection.

1980-1994		1995-2009	
# of abstracts	# of words	# of abstracts	# of words
574	174,164	2,064	1,235,894

[43] The IF is a quantitative tool used for ranking, evaluating, categorizing, and comparing journals. It is a measure of the frequency with which the *average* article in a journal has been cited in a particular year or period. This means that the higher the IF, the more prestigious the journal is regarded to be by the academic community. More information about the IF is available at http://thomsonreuters.com/products_services/science/free/essays/impact_factor/.

[44] Permission to collect and investigate posters has been granted by the press houses publishing the journals I selected. When an abstract of a poster is quoted, it will be indicated as PA1, PA2, PA2… etc., according to the chronological order of downloading, followed by the year of publication. The detailed list of journals from which poster abstracts have been collected is in the appendix.

The corpus has been split into two sub-corpora on a chronological basis rather than on a size basis: since there was a dramatic increase in publication of poster abstracts as from 1995, my assumption is that medical abstracts have begun to acquire an academic value which was worth publication in major journals since 1995 – indeed abstracts rather than papers have begun to be indexed in such medical online databases as PubMed and MEDLINE, which were established in 1995 (Pritchard and Weightman, 2005; Canese, 2006). The difference in size of the two subcorpora may pose some problems as to the corpus-based investigation of lexical keyness. Creating two subcorpora of relatively equal size would have doubtlessly been less problematic but would have meant an alteration of any interpretation of my corpus-based approach if I had not taken into consideration 1995 as the turning-point year signalling the academic *worthiness* of medical abstracts. As my research questions tend to point to the linguistic features affecting medical abstracts across time, I think that in order to see such developments I need to take into consideration any lexical variation occurring before and after 1995.

By exploiting the corpus linguistics approach (Hunston, 2002; Baker, 2006), I will try to illustrate the developments that seem to have determined variation in the genre of the medical abstract published in major medical journals. The investigation, based on the analysis of the keywords present in two subcorpora of medical abstracts covering the 1980-2009 time span, has been carried out with Wordsmith Tools (Scott, 2004). In addition, all abstracts have been read in order to better contextualize the quantitative interpretation of the collected data.[45] The resulting data, presented in normalized figures, will be interpreted with the aim of better contextualizing language use in medical discourse. They seem to indicate that a kind of language process has been occurring in medical discourse, but, given the fact these are the abstracts of a genre in an on-going evolution (the congress poster), the present investigation can be regarded as a pilot study, necessary to gather information prior to a more complete study, in order to improve its quality and efficiency and, eventually, reveal any deficiencies in my design.

[45] Given the fact that medical journals publish only the abstracts of posters, the multimodal analysis of the collected abstracts following Kress and van Leeuwen (1996) cannot be taken into consideration here.

Although the two sub-corpora are of a different size, which may affect the type of keywords to be generated, they are large enough to each create a 500-keyword list. After producing a wordlist for each subcorpora with Wordsmith Tools, I generated the 1980-1994 and the 1995-2009 keyword lists by comparing the two subcorpora, so as to detect any differences across both corpora. The keyness or *saliency* of each corpora has been statistically computed via the log-likelihood test set by default in Wordsmith Tools. Tables 2 and 3 below contain the first 25 keywords out of the 500 keywords generated for each subcorpus.

Table 2. 1980-1994 Keyword list.

N	*Key word*	*Freq.*	*%*	*RC. Freq.*	*RC. %*	*Keyness*
1	AUTHORS	275	0.15	35		753.57
2	WOMEN	732	0.40	1197	0.14	451.82
3	RELATIVE	242	0.13	153	0.02	375.08
4	WHITE	163	0.09	69		312.28
5	INTERVAL	183	0.10	100	0.01	308.73
6	BODY	236	0.13	194	0.02	305.29
7	CI	491	0.27	808	0.09	299.94
8	RACE	103	0.06	10		295.26
9	AGE	752	0.41	1631	0.19	277.74
10	EXPOSURE	240	0.13	231	0.03	272.69
11	ODDS	201	0.11	160	0.02	266.40
12	CONFIDENCE	178	0.10	120	0.01	264.86
13	FAT	136	0.07	77		224.93
14	PREGNANCY	167	0.09	143	0.02	209.22
15	YEARS	706	0.38	1736	0.20	192.15
16	WEIGHT	241	0.13	327	0.04	191.53
17	CASE	238	0.13	320	0.04	191.27
18	WHITES	65	0.04	6		187.72
19	BLACKS	70	0.04	10		187.53
20	BLACK	81	0.04	21		186.66
21	SEX	222	0.12	305	0.04	173.72
22	CAROTENE	52	0.03	2		164.89
23	AGED	256	0.14	414	0.05	160.43
24	INTAKE	150	0.08	157	0.02	157.80
25	IDDM	45	0.02	0		156.83

In order to investigate if and to what extent the priority assigned to a certain item reflects a trend in medical discourse and how such priorities have changed over a thirty-year time span, I have decided to consider only lexical items that do not pertain to the medical field. My analysis has required a cross-check of each word with its

collocation pattern in order to decide whether the word was intended with a medical connotation or not. All domain-specific words have been deleted. The resulting keyword lists therefore comprised words carrying a neutral, non-medical meaning.

Table 3. 1995-2009 Keyword list

N	*Key word*	*Freq.*	*%*	*RC. Freq.*	*RC. %*	*Keyness*
1	CONCLUSIONS	1204	0.14	22	0.01	319.91
2	METHODS	1793	0.21	89	0.05	283.90
3	BACKGROUND	946	0.11	23	0.01	226.95
4	AIM	731	0.08	10		210.38
5	UNIVERSITY	1633	0.19	116	0.06	179.54
6	INTRODUCTION	630	0.07	9		179.36
7	RESULTS	2643	0.30	257	0.14	177.35
8	CONCLUSION	644	0.07	16		153.10
9	DETAILS	565	0.07	10		151.55
10	QUALITY	650	0.07	22	0.01	133.24
11	CONTACT	635	0.07	21	0.01	131.82
12	SOCIO	369	0.04	1		131.74
13	ECONOMIC	466	0.05	9		121.58
14	COUNTRIES	458	0.05	9		118.80
15	BEHAVIOUR	324	0.04	2		107.36
16	APACHE	273	0.03	0		105.11
17	SHOCK	333	0.04	3		104.38
18	#	78561	9.05	15317	8.31	103.31
19	ORG	263	0.03	0		101.26
20	INTENSIVE	322	0.04	3		100.35
21	DOWNLOADED	243	0.03	0		93.56
22	EURPUB	241	0.03	0		92.79
23	OXFORDJOURNALS	241	0.03	0		92.79
24	VOL	241	0.03	0		92.79
25	ILL	293	0.03	3		89.74

3. Results and Discussion

Medical discourse is presented to readers in a highly codified structure that transcends national cultures (Dahl, 2004, p. 1822). Indeed, such a structure has a set of constraints that are set out in the *Uniform requirements for the manuscripts submitted to biomedical journals* realized in 1978. These are commonly known as the *Vancouver Style*, published 1991 in the *British Journal of Medicine* (*BJM*) by the International Committee of Medical Journal Editors (ICMJE), whose updated version (April 2010) may be downloaded from http://www.icmje.org/urm_main.html [25/11/2011]. Medical abstracts follow the

same organizational conventions as other scientific writing, with an *Introduction* (and *Objectives*), *Method*, *Results*, and *Discussion* (which is sometimes called *Conclusions*). It is the latter of these sections that is traditonally regarded as the most relevant in medical discourse by the scientific community, as it is here where the paper "is sold" (Docherty and Smith, 1999, p. 1221) and where communication seems to acquire traits belonging to promotional language.

Table 4. Keyword lists of poster sub-corpora.

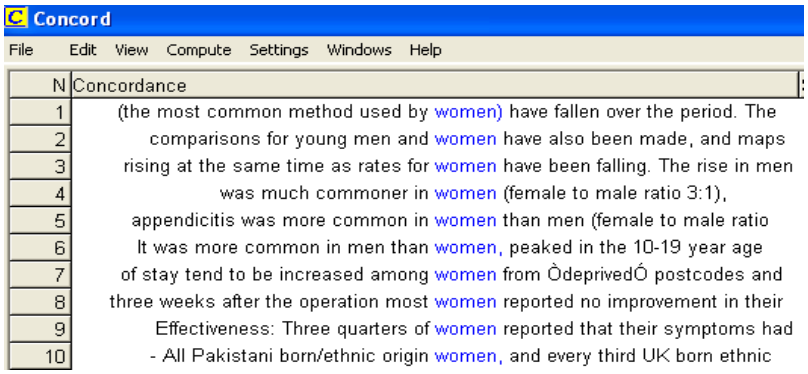
1980-1994 keyword list								
N	Key word	Freq.	%	RC. Freq.	RC. %	Keyness	P	
1	AUTHORS	275	0.15	35		753.57	0.0000000000	
2	WOMEN	732	0.40	1,197	0.14	451.82	0.0000000000	
3	RELATIVE	242	0.13	153	0.02	375.08	0.0000000000	
4	WHITE		163	0.09	69		312.28	0.0000000000
5	INTERVAL	183	0.10	100	0.01	308.73	0.0000000000	
6	BODY	236	0.13	194	0.02	305.29	0.0000000000	
7	CI	491	0.27	808	0.09	299.94	0.0000000000	
8	RACE	103	0.06	10		295.26	0.0000000000	
9	AGE	752	0.41	1,631	0.19	277.74	0.0000000000	
10	EXPOSURE	240	0.13	231	0.03	272.69	0.0000000000	
11	ODDS	201	0.11	160	0.02	266.40	0.0000000000	
12	CONFIDENCE	178	0.10	120	0.01	264.86	0.0000000000	
13	FAT	136	0.07	77		224.93	0.0000000000	
14	PREGNANCY	167	0.09	143	0.02	209.22	0.0000000000	
15	YEARS	706	0.38	1,736	0.20	192.15	0.0000000000	
1995-2009 keyword list								
N	Key word	Freq.	%	RC. Freq.	RC. %	Keyness	P	
1	CONCLUSIONS		1,204	0.14	22	0.01	319.91	0.0000000000
2	METHODS	1,793	0.21	89	0.05	283.90	0.0000000000	
3	BACKGROUND		946	0.11	23	0.01	226.95	0.0000000000
4	AIM	731	0.08	10		210.38	0.0000000000	
5	UNIVERSITY	1,633	0.19	116	0.06	179.54	0.0000000000	
6	INTRODUCTION	630	0.07	9		179.36	0.0000000000	
7	RESULTS	2,643	0.30	257	0.14	177.35	0.0000000000	
8	CONCLUSION	644	0.07	16		153.10	0.0000000000	
9	DETAILS	565	0.07	10		151.55	0.0000000000	
10	QUALITY	650	0.07	22	0.01	133.24	0.0000000000	
11	CONTACT	635	0.07	21	0.01	131.82	0.0000000000	
12	SOCIO	369	0.04	1		131.74	0.0000000000	
13	ECONOMIC	466	0.05	9		121.58	0.0000000000	
14	COUNTRIES	458	0.05	9		118.80	0.0000000000	
15	BEHAVIOUR	324	0.04	2		107.36	0.0000000000	

It is here that the author's research is advertised and it is here that the reader is persuaded. The Discussion section testifies to the manipulation of language in order to convince the reader of the likely truth of a result (Horton, 1995, p. 310). In abstracts, however, space constraints do not facilitate the exploitation of rhetorical devices used to emphasize one viewpoint rather than another in order to to highlight the quality and limitations of the methods, the clinical importance of the research, speculations about the meaning of the results, the directions for future research, as well as claims about the success of the original purpose of the study (Horton, 1995). Abstracts, therefore, follow a well-defined structure with persuasion being realized by different strategies rather than traditional rhetorical tools. My first assumption is therefore that a lack of discursive persuasiveness must be compensated for by lexical items carrying evaluative weight. Such lexical items might have a special position within the elaboration of medical discourse. Table 4 offers the first 15 keywords for both sub-corpora containing non-domain-specific lexical items, which have been selected after a concordance analysis of each word contained in the two keyword lists I spoke of above.

As we can see from the two lists, there seems to be some variation in keyness. The list offers two ranks which apparently suggest a different perspective, as there are no lexical items common to the two sub-corpora.

3.1. The 1980-1994 sub-corpus.

In the 1980-1994 sub-corpus attention seems to be focused on medical investigation based on categorised factors such as *sex* (*women*), *ethnicity* (*white*, *race*) and *age*, as, for instance, the concordance list of *women* below reports:


Concord

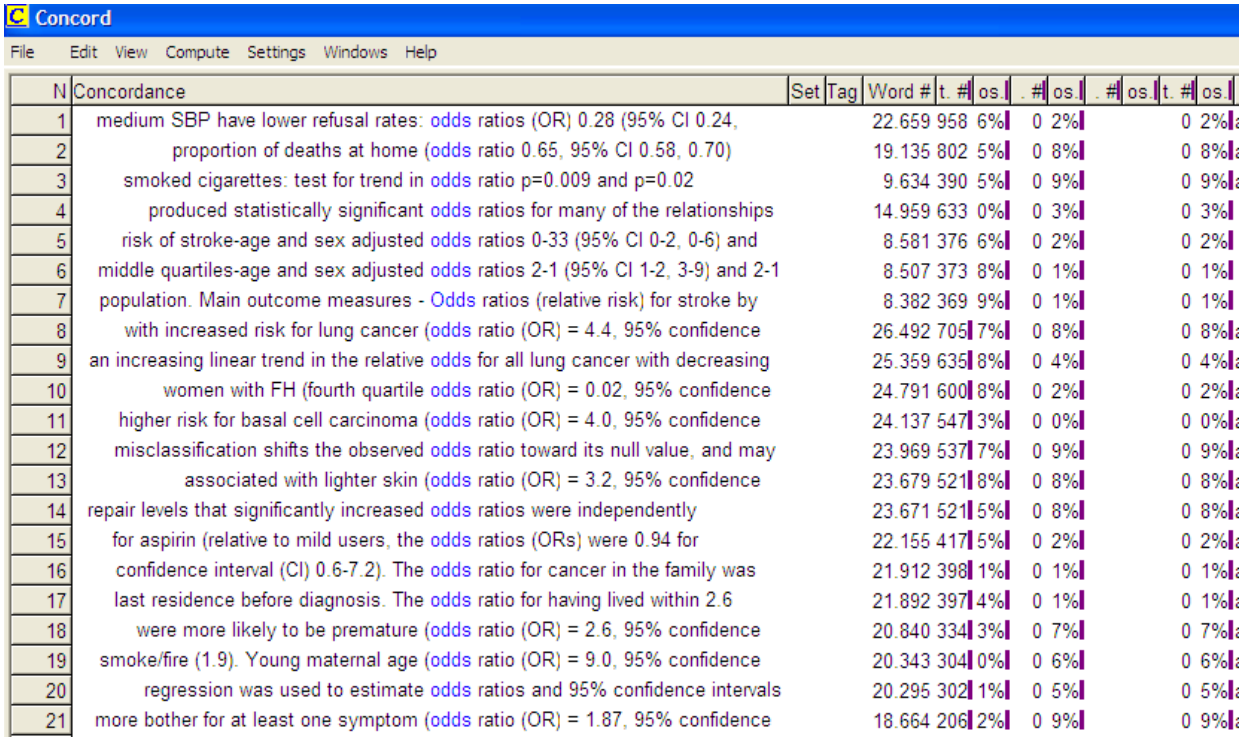
File Edit View Compute Settings Windows Help

N	Concordance
1	(the most common method used by women) have fallen over the period. The
2	comparisons for young men and women have also been made, and maps
3	rising at the same time as rates for women have been falling. The rise in men
4	was much commoner in women (female to male ratio 3:1),
5	appendicitis was more common in women than men (female to male ratio
6	It was more common in men than women, peaked in the 10-19 year age
7	of stay tend to be increased among women from ÔdeprivedÓ postcodes and
8	three weeks after the operation most women reported no improvement in their
9	Effectiveness: Three quarters of women reported that their symptoms had
10	- All Pakistani born/ethnic origin women, and every third UK born ethnic

Figure 1. First ten collocates in the concordance list of women

Attention is also paid to objective *exposure* to diseases and to *body* (which collocates with *mass*) and *fat*, the latter indicating an interest in aesthetic factors. There is also the presence of the term *pregnancy*, which collocates with *interruption*: concern is apparently centred around abortion rather than motherhood. The concordance list of *relevance* reveals that the term is used as a synonym of *importance*, which is used less than the former, which is probably conventionally associated to medical discourse, though not domain-specific.

Usually, the medical studies carried out in this period of time (1980-1994) pay particular attention to the statistical analysis which supports the investigation. This is indeed confirmed by such keywords as *CI*,[46] *confidence*, *interval*, and *odds*, as its concordance list reveals (see Figure 2 below):


Concord

File Edit View Compute Settings Windows Help

N	Concordance	Set	Tag	Word #	t. #	os.	. #	os.	. #	os.	t. #	os.
1	medium SBP have lower refusal rates: odds ratios (OR) 0.28 (95% CI 0.24,			22.659	958	6%	0	2%			0	2%
2	proportion of deaths at home (odds ratio 0.65, 95% CI 0.58, 0.70)			19.135	802	5%	0	8%			0	8%
3	smoked cigarettes: test for trend in odds ratio p=0.009 and p=0.02			9.634	390	5%	0	9%			0	9%
4	produced statistically significant odds ratios for many of the relationships			14.959	633	0%	0	3%			0	3%
5	risk of stroke-age and sex adjusted odds ratios 0-33 (95% CI 0-2, 0-6) and			8.581	376	6%	0	2%			0	2%
6	middle quartiles-age and sex adjusted odds ratios 2-1 (95% CI 1-2, 3-9) and 2-1			8.507	373	8%	0	1%			0	1%
7	population. Main outcome measures - Odds ratios (relative risk) for stroke by			8.382	369	9%	0	1%			0	1%
8	with increased risk for lung cancer (odds ratio (OR) = 4.4, 95% confidence			26.492	705	7%	0	8%			0	8%
9	an increasing linear trend in the relative odds for all lung cancer with decreasing			25.359	635	8%	0	4%			0	4%
10	women with FH (fourth quartile odds ratio (OR) = 0.02, 95% confidence			24.791	600	8%	0	2%			0	2%
11	higher risk for basal cell carcinoma (odds ratio (OR) = 4.0, 95% confidence			24.137	547	3%	0	0%			0	0%
12	misclassification shifts the observed odds ratio toward its null value, and may			23.969	537	7%	0	9%			0	9%
13	associated with lighter skin (odds ratio (OR) = 3.2, 95% confidence			23.679	521	8%	0	8%			0	8%
14	repair levels that significantly increased odds ratios were independently			23.671	521	5%	0	8%			0	8%
15	for aspirin (relative to mild users, the odds ratios (ORs) were 0.94 for			22.155	417	5%	0	2%			0	2%
16	confidence interval (CI) 0.6-7.2). The odds ratio for cancer in the family was			21.912	398	1%	0	1%			0	1%
17	last residence before diagnosis. The odds ratio for having lived within 2.6			21.892	397	4%	0	1%			0	1%
18	were more likely to be premature (odds ratio (OR) = 2.6, 95% confidence			20.840	334	3%	0	7%			0	7%
19	smoke/fire (1.9). Young maternal age (odds ratio (OR) = 9.0, 95% confidence			20.343	304	0%	0	6%			0	6%
20	regression was used to estimate odds ratios and 95% confidence intervals			20.295	302	1%	0	5%			0	5%
21	more bother for at least one symptom (odds ratio (OR) = 1.87, 95% confidence			18.664	206	2%	0	9%			0	9%

Figure 2. concordance list of odds.

In the 1980-1994 subcorpus, the word with the highest keyness is *authors*. A concordance list of *authors* (275 hits, TTR 15.78) has revealed that such a term is used

[46] In statistics, *CI* is the confidence interval within which the estimate parameter taken into consideration and applied to a population sample seems reliable.

with a metadiscursive function, as confirmed by the clusters shown in Table 5, which guides the reader along the poster research path:

Table 5. Common clusters occurring with *author* (1 word on the right)

N	*Cluster*	*Freq.*	*Length*	
1	THE **AUTHORS** EXAMINED	23	3	
2	THE **AUTHORS** CONDUCTED		18	3
3	THE **AUTHORS** CONDUCTED A	17	3	
4	THE **AUTHORS** CONCLUDE	16	3	
5	THE **AUTHORS** HAVE		14	3
6	THE **AUTHORS** FOUND	14	3	
7	THE **AUTHORS** CONCLUDE	14	3	
8	THE **AUTHORS** USED		13	3
9	THE **AUTHORS** EXAMINED	13	3	
10	THE **AUTHORS** COMPARED	12	3	
11	THE **AUTHORS** STUDIED	11	3	
12	THE **AUTHORS** ANALYZED	11	3	
13	STUDY TO THE **AUTHORS**	10	3	
14	THE **AUTHORS** KNOWLEDGE		8	3
15	THE **AUTHORS**	8	3	
16	THE **AUTHORS** IDENTIFIED		6	3
17	THE **AUTHORS** FOUND THAT		6	3

Since the collocation of *authors* reveals that the *authors* referred to are the authors of the poster beig summarized in the abstract taken in consideration, the cluster table offers interesting insights, as it reveals a type of highly impersonal language where the authors' voice is identified with the third person pronoun plural. As we will see in the following paragraphs, this stylistic approach contrasts with the one adopted in the 1995-2009 corpus, where, despite the apparent tendency to systematize scientific research in a highly codified format, and where data are expressed through well-defined and precise medical discourse, there seems to be a less impersonal type of register.

3.2. The 1995-2009 sub-corpus.

The keyword list of the 1995-2009 sub-corpus indicates that it is in this time span that the lexical items *introduction*, *methods, results* and *discussion/conclusion** (IMRD) begin to formally acquire the role of formal section markers within the poster presentation, alongside *aim* and *backgrounds* which are meaningful, as they indicate a new trend not

only in posters, but in medical discourse in general.[47] The generic constraints required by the ICMJE since 1993 have clearly influenced the linguistic pattern of abstracts which ever since 1995 have presented the typical IMRD sections, which is confirmed by the data shown in table 4 below, thus conveying the idea of a pattern as rigidly-organized as the one traditionally found in scientific research articles. What is noteworthy is the fact that the new keywords characterizing such a sub-corpus seem to have the highest keyness, since they are found at the top of the keyword list.

Table 6. Breakdown of the of the IMRD pattern among the two subcorpora

		Introduction	***Objectives / Aims***	***Methods***	***Results***	***Discussion / Conclusion****
1980-1994	*Frequency*	9	30 / 10	19	62	13 / 10
	TTR	0.51	1.51 / 0.57	1.09	3.55	0.74 / 0.57
1995-2009	*Frequency*	563	207 / 36	1543	210	15 / 644
	TTR	4.55	1.67 / 0.29	12.48	1.69	0.12 / 5.21

The table above shows the frequency of the terms indicating the different sections of posters according to ICMJE requirements. Given the difference in size between the two subcorpora, the raw figures have been normalized in order not to present biased data. In addition, all terms have been extracted manually in order to check whether the word was intended as a metadiscursive marker. Interestingly, the TTR indicates a massive presence of the terms indicating the *Introduction, Methods,* and *Conclusion** sections of the poster in the 1995-2009 subcorpus, which seems to suggest a lesser importance attributed to the *Objective*, *Aims* and *Discussion* sections when compared to the 1980-1994 subcorpus. As argued by myself at the International Conference *Genre(s) on the Move*,[48] the diminishing relevance of the other sections is only apparent, as they are substituted by the presence of tables and graphs, which visually explain the *Objectives* or *Aims* and the *Results* of research literally illustrated in the poster.

In the 1995-2009 sub-corpus, particularly interesting is the presence of *university* as a new keyword revealing the institutionalized framework within which research

[47] This is one of the conclusions I reached in the genre analysis of medical posters (Maci, 2011).

[48] Held in Naples, 9-11 December 2009.

summarized by posters is carried out. Indeed, all posters belonging to this time span have an exact indication as to the author's position and affiliation, which is a clear expression of institutional identity and authorial credibility:

(1) A. Alonso[1], E. Ferndndez-Jarne,[2] C. Fuente,[1] R. M. Pajares,[1] A. Sanchez Villegas,[3] M. A. Martinez-Gonzalez.[1] [1]University of Navarra, Department of Epidemiology and Public Health, Pamplona, Spain; [2]University of Navarra, Department of Cardiology, University Clinic, Pamplona, Spain; [3]University of Las Palmas, Division of Preventive Medicine and Public Health, Las Palmas de Gran Canaria, Spain (PA31_2004)

and which seems to be completely lacking in the 1980-1994 sub-corpus:

(2) H. Gruchow,* B. Bailey and R. Downer (The Medical College of Wisconsin, Milwaukee, WI 53226) (PA1_1983)

Apparently, then, the impersonal approach characterizing the 1980-1994 corpus seems to be lacking in the 1995-2009 corpus, despite the presence of the rigid layout following the IMRD pattern and the massive presence of authors' credentials offered by stating the authors' institutional identity. Indeed, as indicated by the keyword list of table 2 above, all posters offer authors' contact details: the lexical item *contact* occurs 635 times and mainly collocates with *details* (545 hits), as shown by the concordance list below:

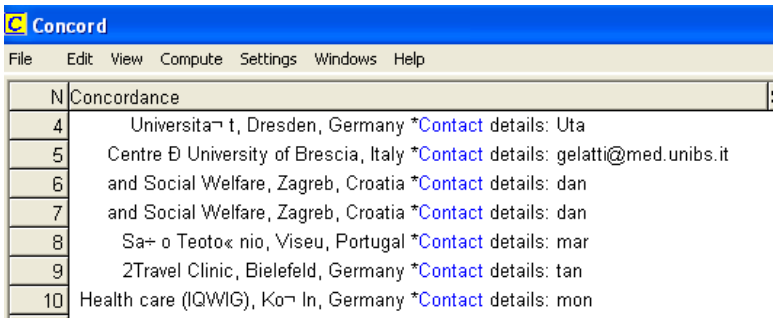


Figure 3. first ten collocates of contact.

Apparently, the analysis of keywords seems to indicate that a shift in medical perspectives and discourse has occurred. This tends towards greater discursive inflexibility in the 1994-2009 sub-corpus than the other one, due to the generic constraints established with the *Vancouver Style*. Yet the reading of all the posters has allowed the identification of a more narrative style in the 1980-1994 sub-corpus and a more disjunctive-like style (cf Leech, 1966) in the 1995-2009 sub-corpus:

(3) On January 31, 1981, the Centers for Disease Control (CDC) announced that toxic-shock syndrome (TSS) had steadily declined during 9/80-12/80. A review of TSS reporting in Wisconsin was therefore initiated. (PA1_1981)

(4) This case-control study was designed to re-evaluate the association of the morphology of breast tissue seen in mammograms with breast cancer risk and to assess the relation of diet, especially intake of fat and vitamin A, to the high-risk mammographic images. (PA1_1988)

(5) To evaluate the risk of hospitalization for peptic ulcer disease associated with the use of non-steroidal anti-inflammatory drugs (NSAIDs), the authors conducted a nested case-control study in the Tennessee Medicaid population, aged 65 years and older, from 1984 through 1986. (PA1_1990)

(6) From September 1993, LML also shows occupation of deceased, informant's name, address and relationship to deceased, and deceased's maiden name or alias. (PA1_ 1994)

(7) Pancreatic adenocarcinoma is an important cause of death from cancer throughout the world. Aim: To determine the epidemiological characteristics of pancreatic cancer (PA2_1998)

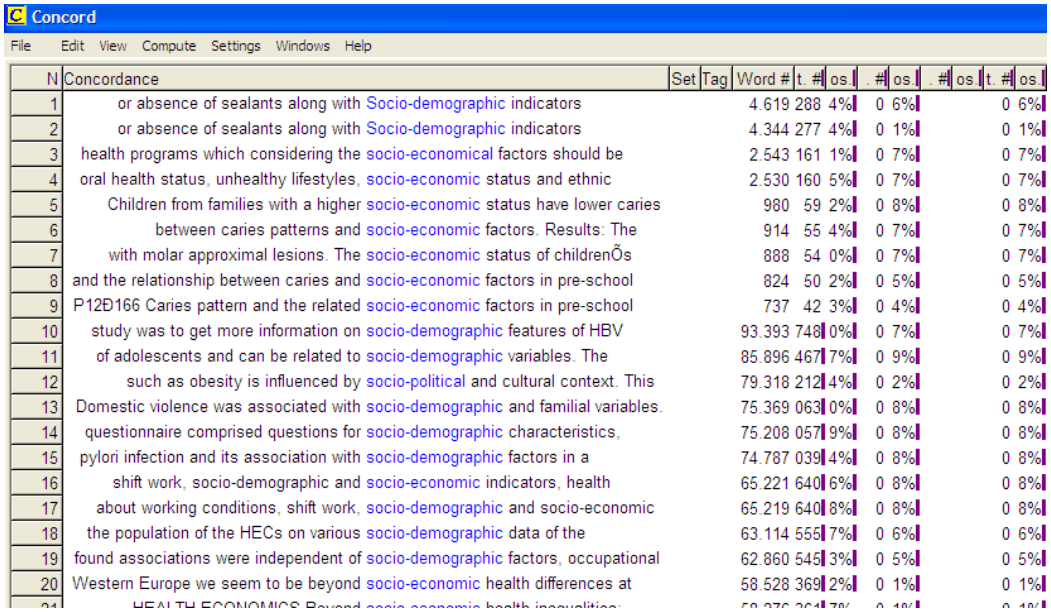
(8) Objectives. To validate a simple questionnaire in Portuguese, for primary migraine diagnosis in epidemiological research. (PA2_2001)

(9) Objective To examine the effects of short-term cyclic stretch on apoptosis in [...] (PA1_2006)

(10) Introduction: the prevalence of ECC (Early Childhood Caries) has been a significant public health issue. (PA1_2009)

Scientific discourse is the representation of knowledge constructed through the text in terms of *problematization,* i.e., through the authorial expression of progressive and alternative positions by acknowledging, disclaiming and proclaiming, by means of which the prevailing assumption is presented as needing re-examination, re-conceptualization and/or re-evaluation "in order to provide a ground for the more specific purpose, thesis, point, or argument of an essay" (Barton, 1993, p. 48). In the 1980-1994 sub-corpus, problematization seems to acquire argumentative features granted by the much more narrative style. We can see, however, that starting from 1998 the syntactic structures used in abstracts is reminiscent of a syntactic structure where problematization is apparently realized through bulleted sentences. The syntactic aspects of the abstracts belonging to the 1994-2009 sub-corpus has revealed a frequent use of bulleted sentences similar to expressions of disjunctive grammar based on non-finite verbal groups, which can occur both in the *objective* and in the *conclusion* sections.

The 1995-2009 sub-corpus is characterized by the presence of *socio* as a keyword which clearly belongs to other domains, as Figure 4 below shows:



Concord

File Edit View Compute Settings Windows Help

N	Concordance	Set	Tag	Word #	t. #	os.	. #	os.	. #	os.	t. #	os.
1	or absence of sealants along with Socio-demographic indicators			4.619	288	4%	0	6%			0	6%
2	or absence of sealants along with Socio-demographic indicators			4.344	277	4%	0	1%			0	1%
3	health programs which considering the socio-economical factors should be			2.543	161	1%	0	7%			0	7%
4	oral health status, unhealthy lifestyles, socio-economic status and ethnic			2.530	160	5%	0	7%			0	7%
5	Children from families with a higher socio-economic status have lower caries			980	59	2%	0	8%			0	8%
6	between caries patterns and socio-economic factors. Results: The			914	55	4%	0	7%			0	7%
7	with molar approximal lesions. The socio-economic status of childrenÕs			888	54	0%	0	7%			0	7%
8	and the relationship between caries and socio-economic factors in pre-school			824	50	2%	0	5%			0	5%
9	P12Ð166 Caries pattern and the related socio-economic factors in pre-school			737	42	3%	0	4%			0	4%
10	study was to get more information on socio-demographic features of HBV			93.393	748	0%	0	7%			0	7%
11	of adolescents and can be related to socio-demographic variables. The			85.896	467	7%	0	9%			0	9%
12	such as obesity is influenced by socio-political and cultural context. This			79.318	212	4%	0	2%			0	2%
13	Domestic violence was associated with socio-demographic and familial variables.			75.369	063	0%	0	8%			0	8%
14	questionnaire comprised questions for socio-demographic characteristics,			75.208	057	9%	0	8%			0	8%
15	pylori infection and its association with socio-demographic factors in a			74.787	039	4%	0	8%			0	8%
16	shift work, socio-demographic and socio-economic indicators, health			65.221	640	6%	0	8%			0	8%
17	about working conditions, shift work, socio-demographic and socio-economic			65.219	640	8%	0	8%			0	8%
18	the population of the HECs on various socio-demographic data of the			63.114	555	7%	0	6%			0	6%
19	found associations were independent of socio-demographic factors, occupational			62.860	545	3%	0	5%			0	5%
20	Western Europe we seem to be beyond socio-economic health differences at			58.528	369	2%	0	1%			0	1%
21	HEALTH ECONOMICS Beyond socio-economic health inequalities:			58.276	364	7%	0	1%			0	1%

Figure 4. Concordance list of socio*

An extraction of the concordance pattern has revealed that *socio** mainly occurs in combination with *economic* (281 hits; TTR 2.27), particularly in the cluster *socio economic status*, and in 62 cases (TTR 0.50) with *demographic*, in the cluster *socio demographic factors*. A concordance list of the cluster *socio economic status* reveals that it is regarded by the medical community as a factor linked to children and to ethnicity as far as individual and institutional medical care is concerned. The concordance list of *socio demographic factors* has similarly revealed a trend by the medical community to regard *socio demography* as a factor contributing to the spread of infections. The dispersion plots of both clusters indicate that they are employed in particular in the first and last years of the 1995-2009 subcorpus, probably indicating a renewed interest in such issues from a medical viewpoint.

The frequency list generated has revealed the presence of the adjective *economic* (466 hits, TTR 3.77) which has not been found in the 1980-1994 subcorpus:

Figure 5. Concordance list of economic.

The adjective *economic* collocates in particular with *socio**, as we have seen above, but also with the following:

Table 7. Collocates with *economic* in the 2000-2009 subcorpus.

L1	*centre*	*L2*	*hits*
Socio	**economic**		281
	economic	Status	70
	economic	Differences	27
	economic	Factors	21
	economic	Inequalities	21
	economic	Conditions	19
	economic	Groups	13
	economic	indicator/s	3/13
	economic	Position	11
	economic	Mortality	9
	economic	Strain	8
	economic	Evaluation	6
	economic	Development	5
	economic	Transition	5
	economic	Circumstances	5
	economic	Deprivation	5
	economic	Gradients	4
Perceived	**economic**		4
	economic	Level	4
	economic	Characteristics	3
	economic	analysis	3
Political	**economic**		3
	economic	rates	3
	economic	variables	2
	economic	area	1

While the syntactical construction is in line with medical discourse, as it is generally characterised by an information-packaging framework with high lexical density, the adjective seems to assume a meaningful role in medical discourse, mainly associated with head nouns referring to negative or transitional aspects of society, as excerpt (11) below seems to suggest:

(11) [...] age population accelerates, chronic diseases become an even more important health and economic problem [...] (PA66_2002)

What seems to result from the analysis of *economic* is that the medical community acquires a critical role in the discussion regarding social problem-related aspects, also confirmed by the presence of terms such as *countries* and *behaviour* in the keyword lists which underline the societal aspects of the disease under investigation. In this discussion researchers pose themselves as expert members of the medical social practice subject to global development. Thus, they confirm their active position within society.

Although these adjectives, i.e. *socioeconomic* and *sociodemographic*, do not occur consistently in my corpus, they nevertheless seem indicative of a change of perspective in medical discourse: since they do not pertain to the medical field, they probably reflect a profound change in medical society.[49] Their presence apparently confirms what has been pointed out by academic research (Bhatia, 2004; Fairclough, 2007): not only are global dynamics and universal regulations mediated and translated by the local configurations of resources and ideas which are context-dependent, but such dynamics also give rise to a complex blending of professional cultures when applied to professional practices. The result of these social/professional practices in discursive terms, i.e. the genre, maintains the formality and constraints imposed by the professional community. Yet such a result is represented through a text in which social variations and tensions coexist. The attention posed on social matters within medicine seems to exploit the strategies of prestige advertising, which is used by corporations to emphasize their more prestigious and favorable status than others. In medicine, a field

[49] Any social change can be seen as a crisis. Indeed the *Oxford English Dictionary* (OED) defines *crisis* as "a vitally important or decisive stage in the progress of anything; a turning-point; also, a state of affairs in which a decisive change for better or worse is imminent; now applied especially to times of difficulty, insecurity, and suspense in politics or commerce".

where separation from trade is codified by ethics, pointing to socio-economic, and socio-demographic factors may seem an indication of self-promotion.

4. Conclusion

In trying to identify the elements in medical discourse which may be seen as a form of marketization, the diachronic investigation of abstracts has revealed that:

(i) The type of language of medical abstracts has gone from narration to disjunctive mode, the latter resembling bulleted sentences used because of the necessity to follow the IMRD pattern of scientific discourse;

(ii) Space constraints and the disjunctive mode have probably required a change in the type of lexical items employed in abstracts;

(iii) The keyword lists generated from my two subcorpora seem to indicate that attention is focused on statistical and empirical analysis in the years 1980-1994 vs a more precise indication of credentials and a particular attention to *socio-economic* issues such as fundamental factors in health care in the 1995-2009 decade;

(iv) The particular use of the adjective *economic* in the 1995-2009 sub-corpus seems to suggest an *eco-sensitive* medical community in which the researcher has a role in favouring positive changes.

Although medical abstracts seem to maintain their integrity when analysed as a multimodal communicative event, the diachronic investigation of abstract lexical items has revealed a development toward interdiscursive patterns by means of which hybrid generic frameworks are created by appropriating established conventions associated with other genres and professional practices (Bhatia, 2007, pp. 393). In medical abstracts, interdiscursivity may result from the application of rhetoric in bulleted sentences to scientific discourse. This requires new forms of communicative interaction, i.e., new forms of dialogue representing relations between genres (Fairclough, 2005), and is realized as an expression of *participating democracy* (Fairclough, 2005; 2007) through which the entire medical community within the academic world substantiates its active role in the social world by offering strategic plans for social change. Discourse seems therefore endowed with performative power (Fairclough, 2007, pp. 10-14) because by describing a reality which requires social actions, it realizes that very action

in self-promoting forms. The only problematic issue here is that epidemiology is a medical field which has to do with social behavior and the medical approach to the disease *is* social. Therefore, there is the necessity to further investigate across medical fields in order to detect whether the lexical peculiarities observed here are real societal changes reflected in discourse or whether they are just appropriate to the medical field they belong to.

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APPENDIX

YEAR	Posters	IF	*JOURNAL TITLE*	ISSUE	PAGES
1980	PA1-PA21	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	112 (3)	446-452
1981	PA1-PA20	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	113 (3)	445-450
1982	PA1-PA14	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	116 (3)	580-584
1983	PA1-PA24	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	118 (3)	443-449
1984	PA1-PA27	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	120 (3)	492-499
1985	PA1-PA25	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	122 (3)	540-546
1986	PA1-PA30	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	124 (3)	531-539
1987	PA1-PA44	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	126 (4)	767-776
1988	PA1-PA97	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	128 (4)	918-943
1989	PA1-PA48	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	130 (4)	839-852
1990	PA1-PA113	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	132 (4)	792-822
1993	PA1-PA102	5.454	*AMERICAN JOURNAL OF EPIDEMIOLOGY*	138 (8)	644-671
1993-1	PA103-PA157	3.186	*JOURNAL OF EPIDEMIOLOGY & COMMUNITY HEALTH*	47	412-426
1994	PA1-PA66	3.186	*JOURNAL OF EPIDEMIOLOGY & COMMUNITY HEALTH*	48	509-525
1995	PA1-PA3	3.186	*JOURNAL OF EPIDEMIOLOGY & COMMUNITY HEALTH*	49 (suppl.)	S78-S80
1998	PA1-PA172	1.77	*DIGESTION*	59 (3)	213-265
2001	PA1-PA2	3.68	*CEPHALALGIA*	21 (4)	303-312
2002	PA1-PA242	2.76	*EUROPEAN JOURNAL OF PUBLIC HEALTH*	12 (1)	35
2003	PA1-PA151	2.76	*EUROPEAN JOURNAL OF PUBLIC HEALTH*	13(2)	91
2004	PA1-PA209	3.186	*JOURNAL OF EPIDEMIOLOGY & COMMUNITY HEALTH*	58 (suppl.1)	A64-A125
2005	PA1-PA122	4.93	*CRITICAL CARE*	9 (suppl. 2)	S1-S97
2006	PA1-PA424	4.93	*CRITICAL CARE*	10 (suppl. 1)	S1-S194
2007	PA1-PA12	1.07	*INTERVENTION CARDIOLOGICAL ELECTROPHYSIOLOGY*	18	99-105
2007-1	PA13-PA292	2.76	*JOURNAL OF EPIDEMIOLOGY & PUBLIC HEALTH*	17	136-240
2008	PA1-PA233	2.76	*JOURNAL OF EPIDEMIOLOGY & PUBLIC HEALTH*	18 (1)	130
2009	PA1-PA215	1.07	*INTERNATIONAL JOURNAL OF PAEDIATRIC DENTISTRY*	19 (suppl.1)	66-170