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ARGUMENTATIVE DIALOGUE IN SCIENCE, PHILOSOPHY AND LITERATURE

"These data emphasize a role for Treg cells, but do not eliminate the possibility that…": A Textual Study of Connectives in Scientific Discourse

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1. *Introduction*

This paper arises from the spate of interest for the pragmatic and textual aspects of argumentation in the last few decades. In his accurate chronological reconstruction of post-World War II developments of argumentation studies, Plantin (2005: 15) talks about a *moment logico-linguistique* [logico-linguistic stage] in which scholars paid increasing attention to the cognitive mechanisms underlying argumentation (Grize 1990 and 1996) as well as to the discursive implementation of argumentative chains. In this respect, emphasis has been laid on key-constituents of argumentative discourse such as connectives.

These elements have been analysed from a wide range of perspectives. For instance, Ducrot (1980) and Maingueneau (2001) explore their polyphonic nature: thus, they observe that connectives like *mais* [but] and *d'ailleurs* [besides] may signal the interplay of the current speaker/writer's voice and other voices in the text. Furthermore, Anscombre & Ducrot (1983) and Plantin (1989 and 1990) point to the centrality of connectives in providing argumentative discourse with a distinct orientation (cf. Anscombre & Ducrot's [1983] example of *au moins* [at least]).

More recently, connectives have been discussed as members of the broader category of auxiliary argumentative lexis. Stati (1998 and 2002) elegantly argues that connectives act as effective argumentative operators shedding light on the argumentative roles – e.g. Explanation, Justification, Acknowledgment and Refutation – performed by speakers/writers in the articulation of argumentative textual sequences. In addition, connectives have been studied within specialised discourse: more specifically, Bondi (2004) carries out extensive surveys on the use of connectives in academic discourse. Her results show that these tools are central in marking textual cornerstones of disciplinary argumentation such as the interweaving of discourse and counter-discourse.

Studies like Bondi (2004) succeed in developing full-relief analyses of connectives in academic discourse by reason of their narrowly-focussed genre-based viewpoint. Genre is defined by Swales (1990: 58) as a class of communicative events exhibiting homogenous patterns in terms of communicative purpose, parent discourse community, content, structure, style and intended audience. Academic genres – most of all abstracts and research articles – have been thoroughly investigated by means of representative corpora, namely large collections of authentic data gathered in electronic form according to a specific set of criteria (Bowker & Pearson 2002; Hunston 2002).

By drawing on the rich mess of studies reviewed above, this paper aims to carry out a corpus-based study of connectives in scientific discourse. The investigation will focus on a single genre, notably research articles (RAs), in order to spell out the main textual and argumentative functions of connectives. Section 2 clarifies the criteria for corpus design and methodological choices, whereas Section 3 presents the main findings of the study: in particular, evidence will stress the significance of connectives in signalling the basic stages of the writer's argument, e.g. the presentation of findings and authorial evaluation at large. Reference is thus made to Hunston & Thompson's (2000: 5) notion of evaluation as the set of linguistic tools through which writers express their attitude towards or feelings about the entities they are writing about, mainly in terms of varying degrees of desirability (the good/bad axis). Finally, results are discussed in Section 4, where suggestions for further research are provided as well.

2. *Materials and methods*

The study is based on a small synchronic corpus of scientific research articles from ten specialised journals. These well-established publications were chosen by means of chiefly endogenous criteria, since they were recommended by the Staff of the Ph.D. School in Clinical and Experimental Medicine of the University of Modena and Reggio Emilia (Italy)[1]. The corpus is comprised of 140 texts, and it amounts to 510,253 words. Research articles cover a homogenous time span as they were all collected from the June-September 2007 issues of journals. In addition, the full running text of RAs was considered, with the exception of the following elements: author name/s, outline, images, notes, tables and graphs, captions, authors' contributions, acknowledgments, references and abbreviations.

As regards methodology, the paper combines quantitative and qualitative procedures. From a quantitative point of view, the linguistic software package *Wordsmith Tools 3.0* (Scott 1998) was used, in order to create a frequency wordlist for the reference corpus. The ten most frequent connectives were identified in the list: these elements served as the object of analysis and they were concordanced[2] in order to be qualitatively studied in context (Sinclair 1991 and 2003).

Connectives were thus investigated in order to find out their main textual and argumentative functions. In that regard, analysis availed itself of some key-tenets of Sinclair's

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[1] Selected publications include the following journals: *British Journal of Dermatology* (BJD); *Journal of the American Academy of Dermatology* (JAAD); *Nature Medicine* (NM); *Blood Cells, Molecules and Diseases* (BCMD); *Proceedings of the National Academy of Sciences of the United States* (PNAS); *Blood* (BL); *Cancer Research* (CR); *British Journal of Haematology* (BJH); *Artificial Organs* (AO); *Proteome Science* (PS); *Clinical Chemistry* (CC); *Journal of Pharmaceutical and Biomedical Analysis* (JPBA); *Science* (SC); *Current Opinion in Genetics and Development* (COGD).

[2] Concordance is also a computer-assisted tool provided by *Wordsmith Tools 3.0*. It enables researchers to enter a search word or phrase, which is automatically retrieved by the programme in all its corpus occurrences and displayed in context.

(1996 and 1998) studies on units of meaning, and in particular on the phraseological tendency of words to go together in order to create meaning. In the upcoming Section 3, therefore, recourse is made to the notions of collocation – i.e. the frequent co-occurrence of words – and colligation, intended as the regular co-occurrence of grammatical phenomena. In order to strengthen the qualitative component of analysis, finally, for all connectives whose frequency is >100, only a random sample of a hundred occurrences was taken into account.

3. *Results*

The quantitative survey of corpus data anticipated in Section 2 highlighted the following ten items as the most frequent connectives:

Table I: *Top-ten connectives and related raw frequency*

Connectives	Freq.	Connectives	Freq.
But	770	*Thus*	284
However	567	*Since*	105
Because	434	*Furthermore*	91
Although	374	*Moreover*	79
Therefore	284	*Yet*	32

At the outset, connectives listed in Table I[3] could be grouped into semantically homogeneous categories, e.g. *but* and *however* as adversative connectives, *although* as a concessive element, *therefore* and *thus* as inferential connectives. However, the corpus-based analysis of the ten elements above transcended the boundaries of these deterministic and *a priori* classifications, since it was aimed at disclosing the broader textual and argumentative functions of connectives in the scientific genre of interest here. In the upcoming sub-sections (3.1-3.4), these functions are reviewed and illustrated with examples, and connectives are grouped exclusively on the basis of the functional closeness revealed by corpus data. Findings are then discussed in Section 4.

3.1 *However*, *but* and *although*: connectives as a key to explanations, dialogic objection-responses and gaps in knowledge

The first function that may be associated with connectives is that of introducing explanatory remarks into research reports. This occurs when researchers observe findings that exhibit one

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[3] For the sake of clarity, it must be specified that for both *since* and *yet*, figures only refer to argumentative usages. Frequency counts do not include cases where the two elements occur as prepositions / temporal adverbials, since the analytical focus of the paper is on the argumentative role of connectives.

trend, while at the same time noting that under certain circumstances there are hints of opposing tendencies. This applies to 41 per cent of the attested occurrences of *however* and to 19 per cent of those of *but*. In this case, connectives are often followed by verbs such as *indicate*, *show*, *suggest*, *hypothesise* as well as nouns like *interpretation*, which all contribute to expressing the writer's explanation for the divergent paths evidence seems to take, as in (1) and (2) below[4]:

1) […] the MPP pool does not exhibit an age-related accumulation of T-compromised cells; **however**, aged MPPs give rise to fewer T progeny. *The simplest interpretation of these data is that* T-compromised HSCs do not transition to the downstream MPP pool, and the smaller burst size of T-competent HSCs is also reflected in their MPP progeny. (BL)

2) The patients presented in this study had mild to severe renal involvement with haematuria and glomerular thrombi. The mutagenesis study suggests that the mutation in patient 1 enabled synthesis of ADAMTS13 **but** secretion and activity were impaired […]. *We hypothesise that* the presence of ADAMTS13 in the glomeruli may be a protective mechanism against platelet plug formation under the high-shear conditions of the glomerular circulation, and lack of secreted ADAMTS13, as in certain TTP mutations, could thus promote formation of thrombi. (BJH)

At a deeper level, the clear dialogic connotation of *but* is indeed noteworthy. In 37 per cent of its occurrences, the connective is embedded in a pattern "P but Q" (cf. Maingueneau 2001: 58), where P and Q are two different, let alone competing voices the writer takes into account, in order to weigh up findings and underlying factors more effectively. This peculiarly dialogic use of *but* may be observed in (3) below:

3) […] we tested GA treatment in STAT6-deficient mice, which do not generate IL-4-secreting TH2 cells26. GA treatment reversed EAE and was associated with induction of Treg cells, but not TH2 cells (Fig. 6d). Like other results42, these data emphasize a role for Treg cells, **but** do not eliminate the possibility that both TH2 and Treg cells contribute substantially to the therapeutic effect of GA in EAE and MS. (NM)

The dialogic dimension enlightened by connectives is also confirmed in the stages of research articles, in which authors respond to potential objections. The author's counter-discourse is signalled by *but* and *however* in 13 and 7 per cent of the respective occurrences, whereas the other voice projected into text and eventually refuted by the writer is often indicated by the modal *may* acting as a "signal of dialogic text" (Thompson 2001: 65):

4) The retention times of d-limonene and IS were approximately 4.2 and 4.5 min, respectively. Naphthalane was selected as the internal standard for its similarity in the retention and extraction recovery to those of d-limonene. Other candidate compound (e.g. limonene-d2 that is much closer in struc-

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[4] In all examples reported in the paper, connectives are written in bold and underlined, whereas relevant collocational items are italicised and underlined.

ture to the analyte) *may* also be used as IS. **But** it is unstable and expensive.
(JPBA)

Authorial responses to arguments which may be addressed to the research reported, typically in critical terms, may also be foregrounded by *although*. This concerns 47 per cent of its entries. Interestingly, in 21/47 (i.e. 44.7 per cent), *although* is used in order to concede that the study suffers from limitations, since it may have over-simplified a problem (cf. 4 below) or by reason of downsides in the selection of patients serving as a sample (5). Nonetheless, this does not prevent the researcher from stressing the genuine contribution provided by the paper to knowledge in the field – see "it provides a reasonable starting point ..." (5) and "these results indicate that screening [...] may have clinical importance" (6):

5) The goal is to recover, given just the sequence of vowel tokens, the number of Gaussians, the parameters of each Gaussian and the respective mixing probabilities. **Although** this formulation simplifies the learning problem, *it provides a reasonable starting point* because the vowel spectra for a population of speakers tend to have Gaussian distributions when projected into a 2D space (29). (PNAS)

6) One additionally later developed myelodysplasia with monosomy 7; one third of SDS patients eventually develop chromosome 7 abnormalities during the course of their disease,1 and monosomy 7 also is the most common cytogenetic abnormality in patients with acquired AA.23 Two patients have died. **Although** the number of patients is small, *these results indicate that screening* patients with acquired AA, especially young patients, *may have clinical importance* to determine therapeutic options. (BL)

Finally, a major function ascribed to the first group of connectives considered so far is to indicate gaps in knowledge previous studies might have left open. In this respect, *however* and *but* mostly occur in introductory sections: in 33 and 8 per cent of their occurrences respectively, they are used for the purpose of establishing a niche (cf. Swales 1990 and 2004) in the relevant research territory. As this is the case, these connectives arguably act as lexical signals that transform RA introductions into the initiating stage of Problem-Solution patterns (Hoey 2001) unfolding in the rest of the article. The writer points to inadequacies of past research in order to motivate the publication of fresh and original results. The emergence of a gap in knowledge as the underlying factor of the current publication is well exemplified in an introductory fragment from the Journal of the American Academy of Dermatology reported in (7) below:

7) The development of cutaneous AS in the setting of radiation therapy has been well described in the literature.[5], [6], [7], [8], [20], [22], [23], [27], [28], [31], [32], [35], [39] and [42]. **However**, the natural history, potential precursor lesions, and definitive histologic and clinical features to differentiate AVL from well-differentiated AS *have yet to be fully elucidated*. (JAAD)

3.2 *Because* and *since*: connectives as a key to the discussion of results

The two inter-related connectives *because* and *since* are evenly distributed across the Results and the Discussion sections of research articles. They both appear to play a significant role in the presentation of findings as well as the related discussion. First of all, data show that *because* and *since* are involved in evaluative statements (Hunston & Thompson 2000) in 23.3 and 28.8 per cent of the respective corpus occurrences.

As a result, writers employ them in order to unveil cause-effect relations and to formulate more or less tentative interpretations about the empirical evidence they collected. In this respect, the researcher's cautious and circumspect attitude is testified by the colligation of connectives with hedgers (Hyland 1998 and 2005) – e.g. *possibly*, *probably* and *presumably* for *because* (13.3 per cent of its occurrences altogether), and *probably*, *appears to be ...*, *it is likely that ...* and *can be interpreted as ...* for *since* (28.8 per cent). Alternatively, *because* also colligates with verbs characterised by differing degrees of authorial self-assertion (*hypothesise*, *speculate*, *suggest*, *interpret*, *view* and *conclude*). In (8), (9) and (10) below, the collocational remarks discussed in the paragraph are shown at work:

8) Only during further evolution the patterning employing adjacent cells became more dominant, *possibly* **because** this enforces directly a mutual alignment of adjacent cells. (COGD)

9) The positive and significant D value *can be interpreted* as balancing selection (heterozygote advantage) [11] **since** in Southeast Asia there are common selective forces (malaria) increasing some pathologies such as hemoglobin E, a and ß thalassemia [16] or population subdivision [17] [...] (BCMD)

10) **Since** egl-20/Wnt mutants have the strongest HSN migration defect and **since** EGL-20 forms a posterior-to-anterior concentration gradient, EGL-20/Wnt *probably* acts as a repellent for the HSN neurons, with the other two posteriorly expressed Wnts, LIN-44 and CWN-1, contributing to this effect (Figure 3a). (COGD)

In second place, the evaluation of results may rely on larger patterns, the most prominent of which can be summarised as follows:

This/These + signalling noun (e.g. *property*, *feature*, *discrepancy*) + *because* ...

This phraseology occurs when the writer discusses results presented earlier on, by encapsulating them[5] through a signalling noun (Flowerdew 2003), an apparently empty signifier like *property* or, at a deeper evaluative level, *discrepancy*: this is in turn followed by the writer's

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[5] Sinclair (1993: 8) uses the term "encapsulation" in order to designate an anaphoric cohesive phenomenon which makes sure that the semantically relevant aspects of prior textual materials are retained and condensed into a single word or phrase of the upcoming sentence.

motivation/justification introduced with *because.* The pattern accounts for 10 per cent of the occurrences of *because*, and it is instantiated in (11) below:

11) Our most pertinent findings are presented in Figs. 1-5. In general, good concordance between KLK transcript and protein concentrations was observed; in some cases, however, [...]. *These discrepancies* are *most likely* due to degradation of KLK proteins, or **because** KLKs are secreted and therefore may not be present in high abundance in cytosols where their concentrations were measured. (CC)

Finally, connectives may back up an evaluation of empirical findings in terms of desirability (Hunston & Thompson 2000), i.e. by means of statements which develop along the good/bad axis, as it were. In (12) and (13) below, an example is reported of positive and negative evaluation respectively:

12) This interaction between de-aeration method and sampling device is only evident when the teflon coated paddle is used; if the solid teflon paddle is used f2 is higher for sampling device A regardless of which de-aeration method is employed. These marginally statistically significant results, however, are *of little practical consequence* **since** f2 values were >61 across all experimental conditions. (JPBA)

13) Occlusive dressing is one of the innovations in recent decades when treating chronic wounds instead of removing healthy granulation tissues by unnecessary frequent debridement and/or by cleansing.8 If we use a clear film for occlusive dressing, the wound bed condition can be more readily checked through it. *This is important* **since** aggressive debridement is not always effective to treat intractable wounds, especially when treating patients with pyoderma gangrenosum and CUA. (JAAD)

3.3 *Moreover* and *furthermore*: connectives in concluding remarks

The use of connectives in the discussion and overall evaluation of findings may be extended to two further elements, i.e. *moreover* and *furthermore*. In spite of the relative functional homogeneity one may note between the two and those discussed in 3.2 above – i.e. *because* and *since* – *moreover* and *furthermore* have been kept in a separate section above all for distributional reasons. In this respect, they were found to display a marked preference for the concluding section of research articles – namely Discussion or Discussion and Conclusion – where they occur in 65.8 (*moreover*) and 57.2 per cent (*furthermore*) respectively.

To begin with, the two connectives tend to share the same colligational company, as it were. They frequently co-occur with verbal forms characterised by increasing degrees of commitment to the proposition they govern – notably *would support the inference that ...*, *speculate*, *suggest*, *indicate*, *point to*, *show* and *demonstrate* for *moreover*; *leads us to hypothesise*, *propose*, *call for*, *suggest*, *argue*, *provide evidence for ...* and *demonstrate* for *furthermore*.

In addition, there is a high degree of colligational attraction between the connectives and evaluative adjectives / adverbials (*relevant*, *crucial*, *of interest*, *definitive [evidence]*, *reasonable* and *interestingly* for *moreover*; *of great benefit to the field*, *simple*, *attractive*, *important*, *reliable*, *fragile*, *time-consuming*, *significantly*, *undoubtedly*, *curiously*, *efficiently* for *furthermore*). As can be seen from the sequences, evaluative elements mainly describe different levels of desirability (positive v. negative) expressed by writers with respect to the results they are commenting.

On the whole, the colligational surroundings documented above show that *moreover* and *furthermore* predominantly occur in averrals where the writer restates significant results presented earlier on, thus preparing the ground for the discussion of their most relevant implications. This very often takes the form of highly reflexive statements[6] such as those in (14) and (15) below:

14) Physiologic role of p68/p72. The fact that p68 and p72 are involved in the regulation of oncogenes (c-Myc, cyclin D1, fra-1, and c-jun) suggested that they could affect cell proliferation. And indeed, down-regulating p68/p72 in RKO colon cancer cells severely compromised their ability to proliferate (Fig. 6A). **Moreover**, we found changes in cell morphology with the appearance of round bodies that may represent cell carcasses indicative of apoptosis (Fig. 6B). *These data strongly suggest* that p68 and p72 are required for efficient proliferation of colon cancer cells. (CR)

15) In functional concordance with hypermethylation, AKAP12 was transcriptionally silenced in Kasumi-1 and SKNO-1 myeloblasts. **Moreover**, AKAP12 expression was restored by treatment with a histone deacetylase inhibitor (MS275) alone or in combination with a DNMT inhibitor (zebularine), further supporting the importance of epigenetic modifications to transcriptional regulation at this locus. *The results* presented here *fit well with a widely accepted model of* epigenetic gene regulation (Cameron et al, 1999) in which CpG methylation and histone acetylation act as synergistic layers [...]. (BJH)

Reading through examples in more detail, the collocational regularities observed for the two connectives can give rise to the frequently reiterated pattern summarised below:

A. *Moreover/Furthermore*, B. [*Thus/Therefore*] *these data / results + indicate / provide definitive evidence / strongly suggest that ...*

In the pattern, A and B stand for highly-valued results authors want to stress in the final section of research articles. These results are joined by either *moreover* or *furthermore*, and then closely followed by the author's evaluative voice along the colligational guidelines clar-

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[6] Lucy (1993: 1) talks about the reflexive capacity of language in terms of the latter's capability "to represent its own structure and use, including the everyday meta-linguistic activities of reporting, characterizing, and commenting on speech". In the present case, reflexive statements are taken to be averrals through which writers reflect upon and evaluatively reconsider the results they are presenting.

ified above. A further example of the pattern at work is provided in (16) below for the reader's convenience:

> 16) [...] the HSN neurons migrate too far anteriorly in animals with a mutation in cam-1, which encodes an orthologue of the receptor tyrosine kinase Ror [...]. **Furthermore**, similar to mutation of egl-20/Wnt, overexpression of CAM-1 causes a premature stop of HSN migration [...]. _These results suggest an attractive model_ in which the posterior-to-anterior spreading of EGL-20 (and possibly other Wnt proteins such as CWN-1 and LIN-44) is counteracted by CAM-1, which may act as a sink for Wnt. (COGD)

3.4 _Thus_ and _therefore_: connectives as signals of inductive and deductive reasoning as well as RA structural recycling

Connectives are among the most typical textual devices that mark the unfolding of authorial reasoning, the step-by-step development of the researcher's line of argument. Even without establishing any systematic link between the use of connectives and peculiar argument forms, it is significant that _thus_ and _therefore_ often signal the writer's recourse to either inductive or deductive reasoning at large. From an inductive viewpoint, _thus_ marks the transition from specific quantitative data to broader generalisations in 67 per cent of its attested occurrences: as this happens, the author proceeds from the circumscribed case(s) to the generalisation in an overall cautious manner. This is corroborated by the collocation of the connective with hedgers such as _may_, _seem to_, _we hypothesised that ..._, _it is possible/likely that_, _appears to ..._, _the most likely explanation is that ...._ This aspect also applies to _therefore_ (36 per cent), and it is illustrated in (17) below:

> 17) MYC expression was relatively higher _(P < 0.1)_ in the FLT3/ITD-positive AML samples compared to non-mutant FLT3 AML (Fig 4A). CCND3 expression _was not significantly higher_ in the FLT3/ITD positive compared to non-mutant FLT3 samples (Fig 4B) [...] In addition, there is evidence for autocrine activation of wild-type FLT3 in many other cases of AML and ALL. **Thus**, improving our understanding of how FLT3 signals contribute to leukaemic transformation is important, as it will _probably_ reveal areas that can be therapeutically targeted. Several pathways have been shown to be activated by FLT3 including STAT5, PI3K/AKT and RAS/MAPK. (BJH)

Although considerably less frequent, traces of deductive reasoning associated with connectives may also be retrieved. The reverse case of authors moving from the elicitation of a general trend via factual premises asserted as true to a specific illustrative case is instantiated by the following pattern detected for 18 per cent of the occurrences of _therefore_:

> General rule highlighted by _therefore_ + _In other words, ... / Consider ... / For example, ..._

The deductive pattern schematised above is illustrated in (18):

> 18) The rate at which the helix aligns with the gradient direction is ||. **There-fore**, for almost all initial conditions, the system exhibits chemotaxis up-wards the gradient if > 0. This behavior is **therefore** robust and does not depend on fine-tuning of parameters. _Consider the case of_ a radial con-centration field c(x) = C(|x|)... (PNAS)

On a final note, _thus_ and _therefore_ are also interestingly used as cyclicity markers in the ac-tualisation of RA structure. In the prototypical RA structure (cf. Swales 1990; Swales & Feak 2004), we generally recognise the widely adopted progression from the Methodology to the Results section. In the presentation of results, however, writers may find it useful to go back to, and therefore recycle, the methodological premises introduced beforehand, in order to cast light on the concatenation of findings, their deeply-rooted methodological ra-tionale. The cyclic move from results back to the procedural apparatus of research is sig-nalled by _therefore_ and _thus_ in 21 and 5 per cent of the respective occurrences. In particular, _therefore_ is embedded in the following pattern commonly identified in Results sections:

> R1 → E1. _Therefore, to..., we_ + past tense verb / past tense verb in passive voice

The pattern reported above only considers a single hypothetical result (R1) followed by the related evaluation (E1), but it might well be reiterated for as many results as the writer wishes to include in the current research article. After a single result is presented and eval-uated, the writer precedes the next finding with a reader-oriented reminder of the proce-dural justification underlying and justifying it. The writer's step back, as it were, is both signalled by _therefore_ and substantiated by the choice of past tense and/or passive voice, two features Swales (1990) empirically relates with the methodological section of research arti-cles. The pattern summarised above is exemplified in (19) below:

> 19) The luciferase gene in this construct is fused to the mini-tau gene and is in-frame only when exon 10 is spliced out (Fig. 2C). This system provided a particularly attractive model for testing our results, as it has previously been shown that overexpression of splicing factors SRp20, SRp40, and SRp55 significantly increased the exclusion of exon 10 from the construct (16). **Therefore**, _to evaluate_ alternative splicing activity after DNA dam-age, _we transfected_ LucM14 into the U2OSAS, UOSE64b, HCT116, and HCT116 p53-/- cell lines. Transfected cells _were treated_ with mitomycin C, and luciferase activity in treated versus untreated cells was compared. (CR)

4. _Conclusions_

The findings in section 3 show that connectives act as pervasive linguistic tools in research articles, the genre that has the lion's share in specialised scientific communication (Swales

1990). The centrality of connectives is proved by their distribution across all RA sections – e.g. *however* in introductions (section 3.1) and *moreover* in Discussion and Conclusions (3.3) – but also by the rich repertoire of textual and argumentative functions they serve.

In this respect, the paper provided further textual basis to sound intuitions of linguistic research, i.e. the role of *therefore* as a signal of inferential reasoning, both inductive and deductive (section 3.4), and the dialogic function that *but* takes on in some of its occurrences (3.1). But most of all, analysis enlightened key-aspects of connectives that might be overlooked in less detailed surveys failing to rely on small yet representative corpora. For instance, it was interesting to draw the attention to the peculiar use of *moreover* and *furthermore* within phraseology through which the writer effectively prepares the way for a critical discussion and evaluation of findings (3.3). Furthermore, evidence pointed to *therefore* as a discursive signpost of cyclic moves from results back to methodological underpinnings discussed in 3.4.

Connectives were therefore observed to be outstanding textual cornerstones in two main respects. First of all, in their tendency to orient the intended readership through the author's scientific argument, thus making crucial argumentative passages clear and explicit. Secondly, by consequence, in their capability of providing research reports with a skilful argumentative construction in order to turn RAs into cunningly crafted rhetorical products.

This paper finally leaves room for potentially fruitful future research. At a more specific level, some of the recurrent patterns discussed above may be further investigated. For instance, This/These + signalling noun (e.g. *property*, *feature*, *discrepancy*) + *because* could be analysed in more detail within larger multi-disciplinary corpora, in order to find out how often the embedded signalling noun is an evaluative element expressing the writers' attitude in terms of desirability or modality (Hunston & Thompson 2000).

At a more general level, the analytical model proposed here for connectives could be extended to larger comparative studies, in either cross-linguistic or cross-disciplinary terms. From this point of view, cross-linguistic studies should ideally concern English and languages that still retain high academic credibility at least within their national contexts, e.g. French. On the other hand, cross-disciplinary examinations may keep a relatively homogeneous profile, by concentrating on similarities and contrasts in connective usage within the hard sciences (e.g. engineering v. computer technology, medicine v. biology, however fuzzy epistemological boundaries might sometimes seem). Such research undertakings would help refine our knowledge of connectives and other central discourse markers alike.

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