

An analysis of citation forms in health science journals

Marie Clugston

Learning Centre, Faculty of Health Sciences, University of Sydney, PO Box 170, Lidcombe, NSW, 1825.

Email: m.clugston@usyd.edu.au

(Received 1 May 2008; Published online 15 September 2008)

Proper citation is a concern for most university students, not least those who are submitting articles for publication. This paper reports on an investigation into the ways in which authors refer to the work of others in research journals to which postgraduate students in the field of health science would be likely to submit articles. The use of integral and non-integral structures and the choice of reporting verbs are quantified in an entire issue of 11 journals in the broad health sciences areas, comprising 93 separate research articles. A general pattern can be discerned, in line with Hyland's finding (1999), chiefly that biological subjects such as physiology and radiology are more likely to use non-integral referencing than behavioural sciences, although there are important exceptions. Denotive forms of reporting verbs are far more common than evaluative. The main conclusion, however, is that forms of attribution vary from author to author. Research students writing for any of the journals would therefore be able to use any citation form to articulate their own authorial "voice".

Key Words: citation forms, reporting verbs, health science journals

1. Introduction

This paper has grown out of an attempt to help students who are required to write journal articles, especially during the writing of "theses including publication", which is an increasingly common feature of Doctoral and even Honours studies. Ignorance and confusion exist even among postgraduate students with regard to the correct way to cite the work of other authors. Chanock (2007) suggests that poor writing is often the result of trying to conform to rules that are "but dimly understood" (p. 5), and this is as true of referencing as any other skill. In fact, Pecorari (2006) sees citation as an area of occlusion (genres that students do not often see modelled), and suggests that novice writers spend time and energy in meeting only those needs that they can see (pp. 26-27).

It is my experience that, having mastered the mechanics of the referencing convention, and so eliminated the great bogey of plagiarism, research students are more concerned about varying their expressions than signalling their engagement with the discourse community. In other words, it is more important to them to avoid repetition in indicating their sources than in cultivating their own authorial "voice". This is an area in which learning skills advisors might be able to make a contribution. We can alert students not only to the various ways in which experienced writers cite others, but also to the distinction in meaning that these structures convey. If they are aware of the different ways in which researchers in their own particular discipline acknowledge previous research and signal their stance in relation to it, they should be confident to make their own unique contribution to the world of scholarship by embedding it in the most appropriate way.

2. Literature review

As illustrated in Table 1, the chief indications of the contextualisation of new work within the existing literature are the position of the cited author's name and the reporting verb used. We are indebted to John Swales (1990, p. 148) for the distinction between integral and non-integral citation forms. According to his definition, an integral citation is one in which the name of the researcher appears in the actual citing sentence; by contrast, a non-integral citation is one where the name of the researcher appears either in parenthesis or in a reference list indicated by a superscript number. Integral structures indicate that the researcher is the focus; non-integral citations suggest that information is the main consideration.

Table 1. Examples of citation structures (reporting verbs underlined).

1. Non-integral

- a. Single: *The cochlear nerve originates in fibres in the hair cells of Corti* (Stone et al., 1998).
 b. Multiple: *Compulsive hoarding is associated with poor treatment response* (Schwarz & Farr 2003; Black et al., 2002; Winberg et al., 1999).

2. Integral

Shin et al. (2000) reported a case of malignant transformation 6 years post surgery.

3. Noun group + reporting verb

Several studies have found a neural base for hoarding (Saxena et al., 2004; Anderson et al., 2005; Frost & Hart, 2005).

4. 'It' as subject of impersonal verb

It has been reported that compulsive hoarding is associated with poor treatment response (Schwarz & Farr, 2003; Black et al., 2002; Winberg et al., 1999).

A number of studies have explored this twofold distinction in various texts, both published articles in diverse journals and students' dissertations, but few have examined both citation types and reporting verbs. One who has done so within published articles is Hyland (1999), who investigated the pattern of author attribution in 80 randomly selected articles – one from each of 10 leading journals in 8 disciplines. Using Swales's (1990) distinction between integral and non-integral citation structures, as defined above, Hyland found that the so-called "hard disciplines" (e.g., engineering, physics) tended to use non-integral citation, whereas the "soft disciplines" (e.g., sociology, philosophy) tended to use integral referencing more frequently. He suggested that this was due to a belief in the importance of the impersonality of empirical science.

Other research has examined reporting verbs used in integral citation within published texts. Thompson and Ye (1991) for example, categorised 400 reporting verbs (of which *show* was the most common) in the introductions of 100 papers in journals in various fields, in terms of *denotation* (with no writer interpretation) and *evaluation* (conveying the writer's view of the material in the text). Within the denotive category, they identified further sub-divisions: "author acts", for which the cited author is responsible (textual – *state/point out*; mental – *believe/prefer*; research – *calculate/find*) and "writer acts", in which the writer of the paper uses the citation itself to make a point for which the writer is responsible (comparing/theorizing). They argued that evaluation contains three separate factors: author's stance; writer's stance; and writer's interpretation.

Several studies have explored reporting verb types in specific disciplines. Thomas and Hawes (1994) for example, analysed 11 research articles from 8 issues of one medical journal, to build a network of options from the general patterns observed. They followed Thompson and Ye (1991) to some extent in their categorisation of verb types. They used three main categories: experimental (corresponding to Thompson and Ye's *textual*); discourse (*mental*) and cognitive (*research*). Unlike Thompson and Ye, they looked at the whole of the article excluding Methods sections. They concluded that there was a correlation between the choice of verb type and the function of the research report, whether statements of specific results or generalised statements

and conclusions (p. 147). Pickard (1995) likewise examined published texts, in this case a corpus of applied linguistic articles, and explored only integral citations, which she categorised in four ways: the name of the researcher as subject of the sentence, as agent, as possessive noun phrase, and in other positions, such as in the phrase, “*According to A...*” She found that the applied linguistics writers overwhelmingly preferred the name of the researcher in the subject position. The most commonly used reporting verbs were *argue*, *suggest*, *report*, *point out*, and *call* (p. 94).

Several studies have also compared citation patterns in published articles with student writing. Buckingham and Nevile (1997) for example, compared political science texts of experienced academic writers and first year students, combining Hyland’s (1999) schema with Thompson and Ye’s (1991) to identify a number of citation options, ranging from: no recognition of the colloquy, to recognising the colloquy, to engaging with the colloquy, and finally, affecting the colloquy. They concluded that students’ texts, compared to those of experienced writers, “seem intertextually confused” (p. 105). In contrast, Thompson (2005) did not find a great difference between academic and student writing at the doctoral level. In an examination of different sections (Introduction, Methods and Results, Discussion) of three PhD theses in Agricultural Botany, Thompson found the densest citation pattern in Introduction and Discussion sections and the most infrequent in Methods and Results sections. Non-integral citations predominated, with emphasis on content rather than the researchers, and hence these are of the Source (non-integral) rather than Identification (integral) type. Thompson concluded that patterns of citation in the doctoral students were very similar to those of published experimental research articles.

A recent study has in addition analysed the use of reporting verbs within student work in two disciplines. Charles (2006) analysed the theses by native English speakers, eight from politics and eight from material sciences, exploring one pattern in referencing verbs [*X argues/it is argued that ...*] and associated phraseology. She used four distinctions in verb types (*argue*, *think*, *show*, *find*) but correlated them with Thompson and Ye’s (1991) three categories: discourse (*argue*), mental (*think*, *show*), and research (*find*). Charles found that, unlike Hyland (1999) but like Thompson and Ye (1991), integral referencing was quite common in both corpora; *argue* was the most common class of verb. Her conclusion was that “citational patterns ... can be linked to genre and/or disciplinary purposes” (p. 326).

Most of the analysis in the papers reviewed above is of more interest to academics: the network of options is too complex for students, who are often under pressure to write up their research in a short timeframe. A grasp of the concept of integral and non-integral citation, and the categories of denotation and evaluation in reporting verbs is, in the author’s experience, the most that should reasonably be expected of health science students. For the purposes of student learning, this should be sufficient to illustrate that there are many ways in which a writer can commit to the colloquy.

3. Methods

The research consisted of an examination of author attribution in a corpus of health science journals, comprising research articles from a single issue of those journals in which academic staff or students from the author’s university campus have recently (i.e., since 2000) been published. The aim was to determine, first, whether there was a citation pattern within each of the journals, or whether it was dependent on the individual writer, and, secondly, whether there was a trend in citation pattern among the journals. The 11 journals examined were:

- *Australian Journal of Physiotherapy* (AJP)
- *Spine**
- *Australian Occupational Therapy Journal* (AOTJ)
- *Australasian Radiology* (AR)*
- *International Journal of Medical Informatics* (IJMI)*
- *Health Information Management Journal* (HIMJ)

- *Journal of Speech, Language and Hearing* (JSLHR)
- *Aphasiology* (Aph)
- *Comparative Psychiatry* (CP)*
- *Clinical and Experimental Ophthalmology* (CEO)
- *Health Sociology* (HS)

* Journal uses the superscript numbering form of referencing.

Because *HIMJ* typically contains fewer and briefer articles than other journals, two consecutive issues were examined. A total of 93 articles were examined. Several journals used superscript numbering and these are indicated above, and in Table 2, by an asterisk.

The analysis of author attribution was partially based on that of Hyland (1999), and also that of Thompson and Ye (1991). The incidence of integral and non-integral was calculated from print-outs of electronic journal articles. Expressions such as, “According to A” and “As A notes,” were recorded, because they include the name of the researcher in the citing sentence. The ratio of non-integral to integral references within each journal was then calculated to highlight the similarities and differences both within and between journals and disciplines. The length of the articles was also noted, to indicate the density of citations within each article. A cursory examination disclosed that the vast bulk of citations was located, as Thomas and Hawes (1994) also found, in Introduction and Discussion sections. As in Thompson’s (2005) survey, no methodological references (authors of models, tests, etc.) were included. Within the non-integral category, single and multiple references were distinguished, since the former tended to be found more often in Introductions, and the latter in Discussion sections.

Reporting verbs were categorised into the broad division of denotive and evaluative, following Thompson and Ye (1991). A list of the most frequently used referencing verbs was compiled (incidentally, denotive in every article), as well as *all* evaluative verb groups since there were very few.

The frequency of the “noun group + reporting verb” form of citation was also identified, because a distinction may be made between it and non-integral reference. An expression such as “A previous study reported that ...” seems to be a category halfway between non-integral citations for basic statements of fact which give no hint of research (such as might be found in a text-book), and integral citations which acknowledge the researcher in the citing sentence. Expressions using “it” as the subject of an impersonal verb were also included in the “noun group” category, because such expressions include a reporting verb. (See Table 1 above, for an example of each of these structures.)

Analysis of the frequency of self-citation, expressions of comparison, and direct quotations was also undertaken. Hyland (1999) dismisses self-citation as far less central to academic discourse. However, learning how published authors refer to their previous work may be helpful to those students whose dissertations consist of a series of interlocking papers. Comparing the writers’ results with the literature reviewed is another important issue, and the various ways in which this was done has been noted. Hyland (1999) found that direct quotations were minimal and did not occur at all in the science papers he analysed. They may have a place, however, in social sciences where policy documents and legislation are sometimes discussed.

The hypothesis was that the findings would be similar to Hyland (1999), in other words, that the “hard” disciplines (in this case, physiotherapy, medical radiation sciences and ophthalmology) would use non-integral referencing and the “soft” disciplines (behavioural sciences such as sociology and psychology) would tend to use integral citation more often. The areas of Occupational Therapy and Health Informatics might be considered to be at a midpoint between these two extremes, and therefore both integral and non-integral citation structures might be expected to occur in significant numbers. Because speech science has an additional language component (grammar and morphology are important areas of research), it might be expected to use integral citation rather more, as research by Pickard (1995) indicated. Where non-integral referencing was used, the hypothesis was that there would be more multiple non-integral

references in the Introductions and more single non-integral citation in the Discussion sections of the articles.

4. Results

4.1. Non-integral versus integral citation

As shown in Table 2, non-integral references were found to dominate in the two physiological journals (*AJP*, *Spine*) and the journals concerned with radiology and ophthalmology. Health Informatics journals, however, provided conflicting results. *HIMJ* was fairly consistent in preferring non-integral over integral citations (with a ratio of almost 5:1), but another journal from the same broad discipline, *IJMI*, had a much more balanced result (a ratio of 2:1). *HS*, a journal of a soft science, has a similar ratio to *Spine*; in fact, its articles contain an extremely high number of non-integral references. Occupational Therapy, which is a mixture of soft and harder sciences, seemed to favour non-integral citation. In *AOTJ*, the ratio of non-integral to integral citations was about 2:1, but, if one long article with 35 non-integral references were discounted, the balance would be a great deal more even. On the other hand, the hypothesis that integral citation is more common in the soft sciences was upheld with regard to the speech sciences: the two journals, *JSLHR* and *Aph*, were found to contain many more integral citations than the other journals, but there was much internal variation: integral references in *JSLHR* articles ranged from 28 instances to 1, and in *Aph* from 47 to 2.

Table 2. Analysis of citation structures.

Journal Title	Article no./length	Non-integral references (single/multiple)	Integral references	Ratio of non-integral to integral refs	Noun-group + reporting verb
<i>Australian Journal of Physiotherapy</i> , Vol. 53 (2), 2007.	1. 8 pp	13 (9/4)	1	> 12:1	1
	2. 8 pp	10 (7/3)	2		8
	3. 6 pp	12 (6/6)	3		5
	4. 7 pp	11 (7/4)	2		3
	5. 8 pp	17 (11/6)	0		4
	6. 8 pp	8 (6/2)	2		5
	7. 7 pp	39 (20/19)	0		0
	8. 2 pp	11 (11/0)	1		1
	9. 2 pp	7 (4/3)	0		0
		Total: 128 (81/47)	Total: 11		Total: 27
* <i>Spine</i> , Vol. 33 (6), 2008.	1. 7 pp	17 (16/11)	9	4:1	7
	2. 9 pp	14 (6/8)	0		4
	3. 10 pp	10 (4/6)	0		13
	4. 5 pp	1 (1/0)	0		6
	5. 7 pp	11 (2/9)	1		2
	6. 8 pp	10 (1/9)	1		6
	7. 10 pp	12 (5/7)	3		6
	8. 8 pp	13 (8/5)	3		7
	9. 7 pp	13 (0/13)	5		2
	10. 6 pp	12 (11/1)	7		10
		Total: 113 (54/59)	Total: 29		Total: 63

Table 2 cont'd

Journal Title	Article no./length	Non-integral references (single/multiple)	Integral references	Ratio of non-integral to integral refs	Noun-group + reporting verb
<i>*Australasian Radiology</i> , Vol. 51, bonus issue, 2007.	1. 4 pp	9 (7/2)	3	< 5:1	1
	2. 3 pp	7 (5/2)	0		0
	3. 4 pp	9 (3/6)	0		0
	4. 3 pp	10 (5/5)	0		0
	5. 6 pp	17 (9/8)	8		3
	6. 4 pp	12 (7/5)	4		2
	7. 3 pp	11 (9/2)	0		0
	8. 3 pp	23 (11/5)	0		0
	9. 3 pp	8 (7/1)	3		0
	10. 5 pp	19 (16/3)	6		6
	11. 4 pp	5 (3/2)	0		0
		Total: 123 (82/41)	Total: 24		Total: 12
<i>Australian Occupational Therapy Journal</i> , Vol. 55 (1), 2008.	1. 10 pp	2 (1/1)	10	2.5:1	6
	2. 10 pp	15 (8/7)	7		8
	3. 8 pp	15 (14/1)	0		7
	4. 7 pp	10 (8/2)	0		7
	5. 4 pp	6 (6/0)	6		0
	6. 10 pp	16 (14/2)	9		8
	7. 8 pp	13 (8/5)	4		3
	8. 15 pp	35 (25/10)	10		5
		Total: 112 (84/28)	Total: 46		Total: 44
<i>Clinical and Experimental Ophthalmology</i> , Vol. 36 (2), 2008.	1. 6 pp	7 (4/3)	0	> 4:1	2
	2. 6 pp	4 (2/2)	1		4
	3. 7 pp	9 (4/5)	0		11
	4. 6 pp	16 (11/5)	2		11
	5. 6 pp	9 (4/5)	5		5
	6. 6 pp	11 (5/6)	1		7
	7. 8 pp	7 (2/5)	13		5
	8. 3 pp	7 (5/2)	1		5
	9. 3 pp	5 (4/1)	1		0
	10. 6 pp	7 (5/2)	1		0
	11. 5 pp	11 (8/3)	1		4
	12. 3 pp	8 (6/2)	1		1
		Total: 101 (60/41)	Total: 27		Total: 55

Table 2 cont'd

Journal Title	Article no./length	Non-integral references (single/multiple)	Integral references	Ratio of non-integral to integral refs	Noun-group + reporting verb
* <i>International Journal of Medical Informatics</i> , Vol. 77 (1), 2008.	1. 13 pp 2. 7 pp 3. 9 pp 4. 8 pp 5. 9 pp 6. 8 pp 7. 10 pp	7 (4/3) 40 (27/13) 25 (15/10) 8 (5/3) 5 (4/1) 3 (3/0) 3 (3/0) Total: 91 (61/30)	14 2 14 5 5 5 3 Total: 48	< 2:1	0 2 9 6 10 5 3 Total: 41
<i>Health Information Management Journal</i> , Vols. 36 (3) and 37 (1), 2007/2008.	1. 15 pp 2. 10 pp 3. 6 pp 4. 6 pp 5. 16 pp 6. 21 pp 7. 10 pp 8. 2 pp	7 (7/0) 41 (25/16) 10 (5/5) 10 (10/0) 7 (6/1) 28 (22/6) 5 (5/0) 4 (4/0) Total: 112 (84/28)	6 7 5 6 0 0 3 0 Total: 27	> 4:1	1 0 4 2 0 0 0 0 Total: 7
<i>Journal of Speech, Language and Hearing</i> , Vol 51. (1), 2008.	1. 13 pp 2. 19 pp 3. 14 pp 4. 21 pp 5. 14 pp 6. 13 pp	38 (13/25) 17 (10/7) 5 (5/0) 18 (10/8) 17 (10/7) 14 (6/8) Total: 109 (54/55)	17 28 15 1 13 6 Total: 80	4:5	16 25 10 4 16 10 Total: 81
<i>Aphasiology</i> , Vol. 22 (3), 2008.	1. 23 pp 2. 23 pp 3. 24 pp 4. 16 pp 5. 16 pp	35 (20/15) 14 (11/3) 20 (1/19) 4 (3/1) 18 (11/7) Total: 91 (46/45)	47 2 2 8 10 Total: 69	9:7	9 0 4 4 3 Total: 20
* <i>Comprehensive Psychiatry</i> , Vol. 49 (2), 2008.	1. 4 pp 2. 4 pp 3. 4 pp 4. 7 pp 5. 10 pp 6. 8 pp 7. 10 pp	23 (12/11) 12 (9/3) 1 (1/0) 8 (7/1) 12 (9/3) 12 (9/3) 16 (13/3)	7 7 5 1 29 1 2	< 2:1	2 2 1 16 3 6 3

Table 2 cont'd

Journal Title	Article no./ length	Non-integral references (single/multiple)	Integral references	Ratio of non-integral to integral refs	Noun-group + reporting verb
* <i>Comprehensive Psychiatry</i> , Vol. 49 (2), 2008. cont'd	8. 4 pp	8 (3/5)	6		0
	9. 7 pp	21 (16/5)	0		10
		Total: 113 (79/34)	Total: 58		Total: 43
<i>Health Sociology</i> , Vol. 16 (2), 2007.	1. 15 pp	36 (21/15)	0	4:1	2
	2. 10 pp	1 (1/0)	0		3
	3. 9 pp	7 (6/1)	0		0
	4. 14 pp	24 (18/6)	10		2
	5. 16 pp	17 (10/7)	10		2
	6. 15 pp	69 (57/12)	10		5
	7. 10 pp	13 (12/ 1)	12		9
	Total: 167 (125/42)	Total: 42		Total: 23	

* This journal uses the superscript numbering form of referencing

The type of author attribution used varied considerably from article to article within a journal issue; averages therefore are not very useful and they were not calculated. Even those journals which had a preponderance of non-integral citations may have a maverick article; for example, *CEO* had one article with 13 integral references although the average was only slightly above one per article. The length of an article did not always correspond to the number of references. For example, a 3 page case study in *AR* contained 23 citations. The range of integral references was consistent only in *AJP* (from 3 references to 0), but at the same time the range of non-integral citations fluctuated from 39 to 8; the article with 39 references may be compared to one of a similar length which had 11. *Spine*, which covers similar topics to *AJP*, had the same ratio of integral to non-integral references, but the range of integral citation was 9-0; the range of non-integral citations, however, was more consistent than in *AJP*, being 17-10, if one excludes a single short article with only one reference.

4.2. Single and multiple citations

It would appear that single and multiple citations were, in general, used in different sections of the research paper. Multiple citations were more common in literature reviews; on the other hand, single work references were likely to be found supporting background information in the Introduction sections, and to a lesser extent in Discussion sections, where current research was compared to individual studies. In a few instances, multiple non-integral references outnumbered single (3 articles in *Spine*), or were roughly equal.

4.3. Noun group + reporting verb

The “noun group + reporting verb” form was found to be very common in Discussion sections and sometimes had a very large number of multiple references within a single set of brackets. The following examples were noteworthy – in *Aph*: “Previous studies have demonstrated ... (15 sources)”; in *AJP*: “Previous studies have pointed towards ... (7 sources)”; in *AJOT*: “Research over 30 years has found ... (7 sources)”. The noun group form of citation was sometimes combined with an integral reference (e.g., “A recent study by A ...”). In this case, the citation was considered to be integral and the noun group used was recorded in the “noun group” column of Table 2. *Study* (or *studies*) was by far the most frequently used noun in this category.

4.4. Denotive versus evaluative verb use

Throughout all the articles, the most common denotive verbs were the textual type: *report*, *find*, *show* and *argue*. There were a number of mental and research verbs such as *attributed*, *investigated*, *compared*, *recommends*, but they were not nearly as common as the textual form. Very few evaluative verbs were found in the corpus and all are recorded in Table 3, with their respective journals. *JSLHR* had the greatest variety of reporting verbs, using more “author acts” type verbs, such as “*A interviewed / provided evidence / investigated*”. Unusual reporting verbs were found in some articles: *posit that (IJMI)*; *opine (Aph)*; *illuminate that (JSLHR)*, *purport that (JSLHR)*. The use of the neutral verbs *say* and *state* were found twice in both *HIMJ* and *Aph*.

Table 3. Analysis of reporting verbs.

Journal	Common reporting verbs	Common noun groups	All evaluative expressions	Self-reference/comparison
<i>AJP</i>	report find describe	previous studies/work many authors our findings		Our results support ... Our findings are consistent with ...
<i>Spine</i>	report suggest	a recent study previous/other studies		A’s observations are opposite to our findings but in agreement with ...
<i>AR</i>	report describe	similar cases findings		
<i>CEO</i>	report show	previous / recent / similar studies findings	Some controversy exists concerning ... Encouraging results have been achieved ... R’s two studies are contradictory.	Our findings are in accordance with other studies ... Our study is in agreement with previously published data.
<i>AJOT</i>	identify describe	recent discussion various articles recent studies	A did not provide details of ...	
<i>IJMI</i>	show find	many/various/prior studies survey results	A did not recognise the role of ...	Our findings are in keeping with those of A.
<i>HIMJ</i>	state report	some researchers the literature	A & A provide a good summary Some findings by A are disconcerting	
<i>JSLHR</i>	find suggest	study previous research	Researchers fail to isolate ... Those who ascribe to this conceptualisation do not consider ...	Our findings complement those of A / are consistent with ... We found similar results to A. Our findings contradict / add to well established research / are more in line with the work of ...
<i>Aph</i>	find suggest	previous/recent studies further evidence		
<i>CP</i>	report examine	several/previous/series of studies another report		We reported elsewhere ... We followed A in assessing ... We have argued elsewhere ... Our findings were in consonance with ...
<i>HS</i>	suggest define show	previous research other/several studies		A’s findings depart from ours ... I have argued elsewhere that ...

4.5. Self-citation

Self-citation was found in two scenarios: when the author referred to earlier research on a topic similar to hers/his, and when the author was comparing the current research with other studies. In most cases, the first person plural was used, but the first personal singular was used once. A number of expressions were used to compare the authors' findings with those of others; no single expression stands out, although "in consonance with" was quite common in *CP* and "consistent with" in *AJP*.

4.6. Direct quotations

Direct quotations were very sparse: 13 in *HS* (11 from one article which was concerned with policy); 9 in *IJMI* (4 from one article); 8 in *AOTJ* (from 2 articles); 2 in *HIMJ*; 2 in *CP*; and 1 each in *Spine*, *CEO*, *AR*, and *Aph*. Most of these were definitions and many were non-integral references. Most journal articles, however, had no direct quotations.

5. Discussion

Hyland's (1999) categorisation of author attribution incidence into hard and soft disciplines was borne out to some extent. The journals with a physiological and radiological focus tended to have a predominance of non-integral references while some of the social science journals tended to have more integral citations. There were notable exceptions, however. *HS*, in particular, emerged with a predominance of non-integral citation, against expectations. Even in those journals where non-integral references were a great deal more common, there was still the occasional article where integral citations were more frequent than non-integral citations. This suggests that there is no "hard and fast rule".

Non-integral references seem to be preferred in the introductory sections for "telling a story"; it could perhaps be said that integral references interrupt the flow. Single references tended to be used for cataloguing/background (e.g., physiology of the body or a medical condition); multiple non-integral references indicated more synthesis or general paraphrase. The noun group + reporting verb form was used more than integral references for the differentiation of findings, usually in comparison with the current study on which the author was reporting.

The incidence of denotive reporting verbs in all articles was overwhelming. This may be due to the preference of the health sciences for prioritising objectivity; the reader is allowed to draw their own conclusions. As Table 3 shows, the same reporting verbs occur in all journals and the most common ones are similar to those found by Thompson and Ye (1991), Pickard (1995), and Charles (2006). Table 3 does not indicate the use of "author act" type verbs as they often occurred only once across all articles. The evaluative verb groups tended to be used sparingly. The use of more unusual verbs such as *posit* and *opine* was probably an attempt for variety, but only had the effect of sounding pedantic. On the other hand, the occurrence of basic verbs such as *say* and *state* perhaps indicated an indifference to style.

The use of self-reference indicated that the first person can sometimes be used in science journals. In the corpus, first person plural was often used in comparisons of the present study with the literature, or to refer to previous work by the authors (often part of a series of studies on a research topic, such as is found in doctoral "theses including publications"). There were quite a few instances of "we/our" but only one "I", probably because the articles were collaborative efforts. Expressions like "the present study" or "the authors" were very infrequently used.

The expressions used for comparisons in the Discussion sections were similar across the corpus, although a list of idiosyncratic ones, in Table 3, may provide students with an awareness of the variety of expressions that can be used. It was in comparisons that most self-reference occurred, although some authors did not indicate that the works to which they referred were their own, letting the reference in parenthesis suffice.

The findings from this study also bear out Charles's (2006) research which contradicted Swales's (1990) contention that the numerical referencing convention leads to more use of non-

integral references. This can be clearly seen in comparing *AJP* with *Spine*; the latter had the numerical superscript type of referencing, yet had twice as many integral citations as *AJP*. The two Health Informatics journals, *HIMJ* and *IJMI*, followed a similar pattern (see Table 2).

Direct quotations, as one would expect in health science texts, were quite sparse except when policy and legal documents are being discussed. There were a few examples which were quite non-analytical, but in most cases the authors went on to critique the passages that they had quoted. This supports Hyland's (1999) contention that direct quotations are minimal in scientific texts.

6. Conclusion

A general pattern of author attribution can be discerned, in line with Hyland's (1999) finding, chiefly that biological disciplines are more likely to use non-integral referencing than are behavioural ones, although there were important exceptions, notably *HS*. In addition, denotive reporting verbs occurred a great deal more frequently than evaluative in the health science journals examined.

The main conclusion, however, is that forms of citation vary from author to author. No journal uses one form exclusively. For example, integral references were found in the journal which had the highest percentage of non-integral citation (*AJP*), and non-integral references predominated even in the two journals which had the highest ratio of integral to non-integral citation (*JSLHR* and *Aph*).

Presenting students with the alternative citation forms identified in this study might lessen students' inappropriate use of reporting verbs such as *depict that*, *illustrate that*, *espouse that*. They might also be encouraged to use mental and research verbs as well as textual verbs. The overriding conclusion is that writers are able to use any form that best suits their purpose, irrespective of discipline and genre, and thereby find their own authorial voice.

As a logical follow-on from this overview, future research will examine more closely the use of citation structures (following Swales's (1990) analysis) and of reporting verbs (using Thompson and Ye's (1991) categorisation) in a representative research article from several of the journals investigated here. The aim will be to see if there is a correlation between citation form, verb type, and the function of the research report.

References

- Buckingham, J., & Nevile, M. (1997). Comparing the citation choices of experienced academic writers and first year students. In Z. Golebiowski (Ed.). *Policy and Practice of Tertiary Literacy: Selected Proceedings of the First National Conference on Tertiary Literacy Research & Practice 1996*, Vol I (pp. 96-107). Melbourne: Victoria University of Technology.
- Chanock, K. (2000). Valuing individual consultations as input into other modes of teaching. *Journal of Academic Language & Learning*, 1(1), A1-A9.
- Charles, M. (2006). Phraseological patterns in reporting clauses used in citation: A corpus-based study of theses in two disciplines. *English for Specific Purposes*, 25(3), 310-331.
- Hyland, K. (1999). Academic attribution: citation and the construction of disciplinary knowledge. *Applied Linguistics*, 23(3), 341-367.
- Pecorari, D. (2006). Visible and occluded citation features in postgraduate second-language writing. *English for Specific Purposes*, 25(1), 4-29.
- Pickard, V. (1995). Citing previous writers: What can we say instead of "Say"? *Hong Kong Papers in Linguistics and Language Teaching*, 18, 89-102.
- Swales, J. (1990). *Genre analysis: English in academic and research settings*. Cambridge: Cambridge University Press.

- Thomas, S., & Hawes, T. P. (1994). Reporting Verbs in Medical Journal Articles. *English for Specific Purposes*, 13(2), 129-148.
- Thompson, G., & Ye, Y. (1991). Evaluation in the reporting verbs used in academic papers. *Applied Linguistics*, 12(4), 365-382.
- Thompson, P. (2005). Points of focus and position: Intertextual reference in PhD theses. *Journal of English for Academic Purpose*, 4(4), 307-323.