OF-CONSTRUCTIONS IN THE PREDICATE OF *DEMONSTRATE* AND *SHOW* IN ACADEMIC DISCOURSE

Liyin Chen & Siaw-Fong Chung

ABSTRACT

This study investigates *of*-constructions in the predicates of two reporting verbs, *demonstrate* and *show*, in academic discourse. A construction perspective is taken to examine how the two predicate constructions ([*demonstrate* N1 *of* N2] and [*show* N1 *of* N2]) would differ when the information-weighting of N1 and N2 are considered. The noun phrases are compared following Sinclair's (1991) conception of semantic headedness. He notes the peculiarity of *of* through the expression of double-headed constructions (i.e., considering both N1 and N2 as the semantic heads). This study adopts this framework and applies it to analyze the *of*-constructions of the two synonymous verbs. The results show that headedness of the *of*-constructions can be used to identify the subtle differences between the two synonyms. *Demonstrate* displays greater information weight predominated by double-headed constructions and tends to be associated with abstract conception for providing evaluative (e.g., *importance*, *limitation*) and modal (e.g., *possibility*, *ability*) functions. *Show* follows closely after *demonstrate* in the double-headed constructions, but further analysis reveals that *show* varies from *demonstrate* by displaying evidential functions through its co-occurrence with nouns denoting perspectives (e.g., *pattern*, *organization*), representations (e.g., *diagram*, *position*) and cause and effect (e.g., *results*, *impact*). It was also found that only *show* displays a propensity for N2-headed nouns as characterized by N1 measure nouns (e.g., *degree*, *level)* and evidential nouns (e.g., *sign*, *evidence*). Pedagogical implications are provided to indicate where *demonstrate* can replace *show* in academic writing.

Key Words: *of*-constructions, reporting verbs, academic discourse, synonym

The word *of*, along with other prepositions, plays a role in nominalization structure. Halliday and Martin (1993) examine scientific texts and show a high degree of nominalization in such texts.

Prepositional phrases are conventionally regarded as postmodifiers (e.g., *the overall enthalpy charge **for the conversion of graphite to carbon dioxide***) to provide additional semantic content in scientific texts. They also found that objectification (e.g., *diamond is energetically unstable* can be objectified into <u>*the energetic instability of diamond*</u>), or object-like status as a result of nominalization, allows the nominal group to be less negotiable, or, to put it differently, an increasing degree of abstraction. In addition, Halliday and Martin point out that an important function of nominalization is to structure scientific knowledge in a static, synoptic representation of reality to represent objectivity. However, In Sinclair's (1991) book chapter "The meeting of lexis and grammar", he underlines the encompassing roles of *of*. In particular, nominalization structures (e.g., <u>*the effectiveness*</u> *of* <u>*the telescope*</u>; <u>*the importance of symbolisation*</u>) have drawn much research attention (e.g., Halliday & Martin, 1993; Kreyer, 2003; Quirk, Greenbaum, Leech, & Svartvik, 1985). Quirk et al. (1985) discuss the substitutability of the genitive constructions (e.g., <u>*China's economy*</u>) with *of*-nominalization (e.g., *the economy <u>of China</u>*) and found that several restrictions comply. In a similar vein, Kreyer (2003) investigates corpus data which also allow for a possible alternation between genitive and *of*-construction (e.g., <u>*the committee's chairman*</u> and *the chairman of <u>the committee</u>*) and shows that processability and degree of human involvement are two crucial factors influencing speakers' selection of the constructions. Specifically, *of*-construction is more likely to be selected when the second noun phrase is pre-modified (e.g., <u>*the son*</u> *of **<u>the Royal Bucks secretary</u>***) and when the semantic relationship between the two noun phrases (i.e., N1 *of* N2) is more likely to be objective, or N2 as the object of a deverbal N1, (e.g., <u>*the support*</u> *of <u>the family</u>*), attributive, N1 as a characteristic of N2, (e.g., <u>*the beauty*</u> *of <u>a young girl</u>*), and partitive, N1 as a part of N2, (e.g., <u>*the tip*</u> *of <u>the iceberg</u>*). In comparison with genitive constructions, Kreyer found that *of*-constructions are less likely to be used when human factors are involved as exemplified in possessive (e.g., *Mrs. Smith's book*) and kinship relations (e.g., *John's father*).

While previous studies have established the functions of *of*-constructions like demonstrating objectivity or expressing attributive and partitive relations between the two noun phrases, few studies actually investigate if these functions would vary under different

linguistic contexts, contingent on neighboring words. To fill this research gap, we follow the co-occurrence approach (Gries & Otani, 2010) to examining the distributive characteristics of two reporting verbs, namely, *demonstrate* and *show*, in academic discourse. According to Gries and Otani, the co-occurrence approach takes the position that "the distributional characteristics of the use of an item reveal many of its semantic and functional properties and purposes (p. 122)". This approach follows researchers such as Firth (1957) and Bolinger (1968) who emphasize the dependence of lexical items on linguistic context. The underlying principles of the co-occurrence approach have been applied to a number of synonymy studies (e.g., Divjak, 2006; Gries & Otani, 2010; Liu, 2010). Both *demonstrate* and *show* have been considered to be in the same sub-class of reporting verbs that report research activities which have been accepted by the reporting writer (Thomas & Hawes, 1994). Although a large number of studies on reporting verbs have already been carried out, they mainly focus on citational functions (e.g., Hyland, 1999), evaluation of others' findings or stance-taking (e.g., Hunston & Thompson, 2000), and disciplinary variation (e.g., Hyland, 2000; Charles, 2006). To the best of our knowledge, the co-occurrence approach has rarely been applied to the research of reporting verbs in academic writing.

In brief, the purpose of this study is to identify if the semantic relations of the two noun phrases, N1 and N2, in *of*-constructions (i.e., [N1 *of* N2]) would vary when associated with different neighboring words and if such semantic relations can help us distinguish near-synonyms like *demonstrate* and *show*. In other words, we intend to compare the types of of-constructions predicated in [*demonstrate* N1 *of* N2] and [*show* N1 *of* N2]. We address the following two research questions:

(1) How do the [N1 *of* N2] predicates of *demonstrate* and *show* differ in terms of their distribution of N1-N2 semantic relations?
(2) What major functions can be found from the *of*-predicates that are associated with each verb?

To answer the research questions, we first briefly review a number of studies on the semantic analyses of *of*-constructions in the next section.

SEMANTIC ANALYSES OF OF-CONSTRUCTIONS

Different approaches have been taken to account for the semantic analysis of *of*-constructions. The following subsections briefly describe each.

A Conventional Account

The conventional approach treats *of*-N2 as a postmodifier (1a). Quirk et al. (1985), for example, take such a position by comparing *of*-construction with its equivalent genitive construction as illustrated in (1a) and (1b) (examples taken from Quirk et al., 1985, p. 1276, underlines added).

(1a)   *the population <u>of the city</u>*
(1b)   *<u>the city's</u> population*

Phrase (1a) can be paraphrased as (1b) to convey the same message. However, the genitive- *of*-construction alternation cannot be applied to all instances, as exemplified by (2) and (3) (taken from Quirk et al., 1985, pp. 1277-8).

(2a)   *<u>the family's</u> car*
(2b)   *?the car <u>of the family</u>*
(3a)   *a woman <u>of courage</u>*
(3b)   **<u>courage's</u> woman*

Example (2a) is a genitive construction but its equivalent *of*-construction (2b) is low in acceptability, and a reversed transformation from an *of*-construction (3a) to a genitive (3b) is essentially unacceptable. Previous work on genitive *of*-construction alternation has drawn much research interest and shed light on the complexity of underlying mechanisms; however, the alternation research only characterizes partial representation of the *of*-construction as recognized by Sinclair (1991) and Gries and Stefanowistch (2004). Sinclair points out that *of* is not limited to a post-modifying function as generally assumed in earlier research. The following discussion will focus on Sinclair's work on *of*-constructions.

Sinclair's (1991) Double-Headed Approach

A rather novel approach to the semantic analysis of *of*-construction is Sinclair's (1991) work, and later revised by Owen (2007). Sinclair posits that the preposition *of* behaves in a very different manner from most prepositions and demonstrates the peculiarity of *of*-construction by providing a systematic analysis on the categorization of [N1 *of* N2] construction based on the notion of semantic heads. According to Sinclair, a semantic head is "the only obligatory element in the group" (p.86) and "the principal reference point to the physical world" (p.87). In other words, we can interpret the head as an element containing the most important information content or to be heavier in information content and which cannot be easily left out.

Sinclair identifies three types of semantic heads in the [N1 of N2] construction: (1) N1 as the head, (2) N2 as the head, and (3) both N1 and N2 as the head or double heads (Table 1).

While the first head class follows the conventional perspective regarding *of* as a post-modifying preposition (e.g., ***mother*** of *the bride*), much of Sinclair's discussion focuses on the latter two. N2 heads (e.g., *the end* *of* ***the day***) cover three sub-categories, namely 'measure/quantifier', 'focus', and 'support' groups. These three sub-categories are classified and named according to their N1 types. First, 'measure/quantifier' N2 heads refer to their N1s (in bold and underlined) as belonging to either conventional measure (e.g., ***both*** of *them*) or less conventional measure with unclear boundaries (e.g., ***groups*** of *five*). 'Focus' N2 heads contain N1s that are what Sinclair refers to as "an extension of quantifier or partitive" (Sinclair, 1991, p. 87). There are three types: namely, focus on a part (e.g., ***the middle*** of *a sheet*), focus on a more specialized part (e.g., ***the first week*** of *the war*) and focus on a component, aspect or attribute (e.g., ***an arrangement*** of *familiar figures*). The last N2 head category refers to the instances where N1 serves as a support to N2. There are also three N1 types under this category: (1) reduced in meaning (e.g., ***the notion*** of *machine intelligence*); (2) an intention to be vague (e.g., ***a sort*** of *parody*); (3) additional grammatical support (e.g., ***a single act*** of *cheating*). In sum, Sinclair notes that when N1 is a measure/quantifier, focus, or support noun, N2 can be considered

as the head in the *of*-construction.

Table 1

Sinclair's (1991) Semantic Head Categorization of Of-constructions

Head types	categories	examples*
N1 head	N1 post-modified by *of*-N2	*a photograph of money* (The author refers to Owen in p. 8)
N2 head		
measure	N1 as measure/quantifier nouns:	
	conventional measure	*both of them; a couple of weeks;*
	less conventional measure	*a series of S-shaped curves; the bulk of their lives; groups of five*
focus	N1 as focus nouns:	
	focus on a part	*a series of S-shaped curves; the bulk of their lives; groups of five*
	focus on a more specialized part	*the evening of 5th August; the first week of the war; the point of denotation*
	focus on a component, aspect or attribute	*the whole hull of your boat; an arrangement of familiar figures*
support	N1 as support nouns:	
	reduced in meaning	*the notion of machine intelligence; various kinds of economic sanctions*
	an intention to be vague	*a sort of parody; the kind of thing that Balzac would have called*
	additional grammatical support	*a single act of cheating*
	metaphorical	*the juices of their imagination; the grasp of the undertow*
Double head		
modified N1	where N1 is premodified	*the technical resources of reconnaissance; a comprehensive selection of containers*
titles	titles of people and places	*the Duchess of Bedford; the new president of Zaire*
nominalization	a propositional relationship between N1 and N2: subject-verb	*the enthusiastic collaboration of auctioneers*
	object-verb	*the payment of Social Security*
	where N1 is derived from an adjective	*the shrewdness of the inventor*
loose association	references to common location, sponsorship, and representation	*the tea shops of Japan; the Mission to the UN of the PRC; the closed fist salute of ZANU-PF*

* All examples here are taken from Sinclair (1991) unless specified.

However, further complication arises when the above-mentioned three types of N1 are modified. The semantic head assignment would no longer be an N2 but shifts to a double head (e.g., *the **technical resources** of **reconnaissance**; **a comprehensive selection** of **containers***). In addition to the modified N1 cases described above, there are three major categories for double-headed *of*-constructions. The first includes titles of people or places (e.g., ***the Duchess** of **Bedford***). The second involves nominalizations or "where there is something approximating to a propositional relationship between the two nouns" (Sinclair, 1991, p. 91). One of the propositional relationships between the two nouns refers to 'verb-subject' or 'verb-object' (e.g., ***the payment** of **Social Security*** can be rephrased as 'x pays Social Security'; ***the enthusiastic collaboration** of **auctioneers*** can be rephrased as 'auctioneers collaborate enthusiastically'). The second propositional relationship is where N1 is a derivation of an adjective (e.g., ***the shrewdness** of **the inventor***). The last category is a loose association or reference to common location, sponsorship, and representation (e.g., ***the tea shops** of **Japan***).

Sinclair has provided us with a means of categorizing the *of*-constructions. His notion of semantic head is based on a comparative act weighting the two nominal groups in the construction. In this study, we elaborate on Sinclair's framework and apply it to naturally occurring discourse where *of*-constructions do not appear in isolation.

Owen's (2007) Gradience Approach

Owen (2007) revisits Sinclair's (1991) work and posits a gradience approach to the analysis of *of*-constructions. Table 2 presents his analysis which views semantic headedness of *of*-construction in a continuum.

Owen constructs an omissibility test (denoted as OT) based on the criterion which determines the degree of damage to the meaning of the whole expression if *of* and N2 are omitted. In other words, according to the OT, *of* and N2 are to be omitted before determining how well the message of the construction remains intact. Consider the N2 head example (*a lot of money*) from Table 2. If we omit *of-N2* (*of money*) from this *of*-construction, the remainder, N1 (*a lot*), does not appear to preserve much of the original message, thereby failing the OT. Consider the N1 head example (*a photograph of money*) at the other extreme of the continuum. The OT is passed, when *of* and N2 (*of money*) are

omitted from this example. This is mainly because *of money* serves to post-modify N1 (*photograph*), and regardless of the presence of the post-modifier, N1 remains the principal referent to the world, leaving the message of the original expression preserved.

Table 2

Owen's Gradience Analysis (2007, p. 213)

Head?	Expression	Comment	OT*
N2	*A lot of money*	Quantifier	Fail
N1?? + N2	*A load of money*	Measure	Fail
N1? + N2	*A bag of money*	Less conventional measure	Fail
N1?+ N2	*A history of money*	Focus on component, aspect or attribute	Fail
N1 + N2	*A hatred of money*	Propositional: x wastes money (fixed expression?)	Fail
N1? + N2?	*A bait of money*	a. Money laid as a bait b. Bait consisting of money	a. Fail b. Pass
N1 + N2?	*A reward of money*	*Of*-phrase seems to add secondary info., qualifying head	Pass
N1 + N2???	*A photograph of money*	Ditto, even more so.	Pass

*OT is the abbreviation for Omissibility Test.

Although Owen's analysis sets up a criterion for determining semantic heads through the OT, there are two potential problems when corpus data are to be applied. First, Owen does not consider pre-modified and post-modified cases. The gradience analysis does not consider pre-modified cases such as (4). According to the earlier Sinclair discussion, this example can be considered as a double-headed construction, since N1 (*history*) is pre-modified by *fascinating*.

(4)   *a **fascinating** history of the company* (HP41450)

In addition to pre-modification, post-modification (e.g., *the existence and persistence of inequalities **in health***) has also not been dealt with in the scheme. Kreyer (2003), in his consideration of 698 instances of transformable genitives and *of*-constructions, found that approximately a fifth of the data are post-modified and the most commonly found construction is a prepositional phrase as shown in (5).

(5)   *the spread of acid precipitation **in both Europe and eastern North America**.* (GU542)

However, an investigation on post-modification is complicated by the so-called prepositional phrase attachment problem, or a classic structural ambiguity problem (e.g., Frazier, 1979; Whittemore, Ferrara & Brunner, 1990), where the structure allows for more than one parsing path. In the case of *of*-construction, structural ambiguity arises because the post-modification could be either on one of the nominal groups (i.e., N1 or N2) or on both. To avoid this problem, we limited our scope to considering pre-modifiers only with the exception of *of*-post-modifiers (e.g., *the language of madness* in *a careful study of the language of madness*; H0U1386). The reason is that the second *of*-construction (*of madness*) only modifies N2 (*the language*). Therefore, we consider the complex as a modified N2 for further analysis.

In addition, to gain a more comprehensive knowledge of *of*-construction, the research in Natural Language Processing (NLP) is considered. Although the field of NLP has a rather different aim from that of linguistics, one of the ultimate goals of NLP is to provide automatic processing of language in a substantial quantity. In other words, the perspective taken in NLP studies needs to be inclusive to facilitate various possibilities of linguistic forms. In the next section, we consider an NLP study on *of*-constructions.

Mohanty, Samala, Almeida, and Bhattacharyya's (2004) Head Selection Approach

The field of NLP has also paid much attention to the analysis of *of*-constructions, as the *of*-construction poses a prepositional phrase attachment problem. For example, Mohanty, Samala, Almeida, and Bhattacharyya (2004) have designed an algorithm with 92% accuracy for

semantic head selection of either N1 or N2. The authors also point out that any *of*-phrase has a syntactic head (or N1) and a semantic head (N1 or N2), and these two heads may not be identical. They indicate that there are three types of *of*-constructions, namely, 'associative' where *of*-N2 is the argument of the deverbal N1 (e.g., *a donation of $50,000*), 'partitive' (e.g., *a bundle of rags*) and 'kind' (e.g., *a bird of that kind*) constructions. The 'associative' class appears to encompass what Sinclair (1991) refers to as propositional nominalization, treating the second noun phrase as an argument rather than as an adjunct. The 'partitive' class denotes categories including whole and fractional numbers (e.g., *1*, *one-third*), aggregate numbers (e.g., *hundreds*, *thousands*), dozen words (e.g., *dozen*, *ream*), quantitative determiners (e.g., *either*, *each*), container words (e.g., *can*, *bag*), collection words (e.g., *group*, *herd*), measure units (e.g., *gram*, *pound*) and indefinite amounts (e.g., *drop*, *pinch*). In other words, the 'partitive' class encompasses Sinclair's 'quantity/measure' and 'focus' noun groups. The last class, 'kind'-construction, consisting words like *kind, type, sort, variety,* and *species*, is special due to its flexibility that allows alternation of the order of both NPs (e.g., *a bird of that kind* and *that kind of bird*).

In general, Mohanty et al.'s (2004) consideration of *of*-constructions shed light on the wide range of 'quantity/measure' and 'partitive' *of*-constructions in English. The NLP researchers provide us with a means of categorizing *of*-constructions that shares common ground as well as exhibits differences with Sinclair's work. For instance, Mohanty et al.'s classification provides much categorical detail on the 'partitive' constructions while leaving the 'associative' class inferential. In contrast, Sinclair treats all three types of *of*-constructions in Mohanty et al.'s work equally with a fair amount of discussion. While both studies recognize N2 as on an equivalent status as N1 in the *of*-constructions, the extent of how N2 and double semantic heads exist in real data has not yet been empirically attested. In this study, we modify previous approaches and apply the semantic head analysis to the *of*-constructions at the object position of two synonymous verbs, namely, *demonstrate* and *show*, in academic discourse. We speculate that a renewed semantic head category and the distribution of each category would help differentiate the two verbs, serving as an additional means of analyzing words in the same synonymous set.

METHODOLOGY

Materials and Analysis Procedures

The data for this study were collected from the British National Corpus through the BNCweb platform (Hoffman, Evert, Smith, Lee, & Berglund Prytz, 2008) with selection restricted to the written academic prose which is comprised of 15,778,028 words in 497 files. A search string was applied to query for the target [V N1 *of* N2] construction, as illustrated in (6) for the verb *show*.

(6) {show}_V* (no)? (any)? (_{ART})? (_{A})* (_{N})* of

This string means that the verb show in all grammatical forms which precedes the preposition *of* and possibly interposed by words like *no* or *any*, or any article, adjective or adverb is queried for. The corpus results are summarized in Table 3.

Table 3

Summary of BNCWeb Research Results

	Verbs	
	demonstrate	*show*
Frequency (/million)	19.84	102.23
No. of texts	170	315
No. of hits	351	1613

As shown in Table 3, the verb *show* is far more prevalent with a frequency approximately five times higher than that of *demonstrate* and found in a much wider range of texts (315 versus 170). However, there are some undesirable instances in the search results. For example, fragmented sentences (e.g., *'showing the main activities of:'* B2M792) and irrelevant structures (e.g., *'show more of how the House works'* APE1330) were found. Because these instances do not conform to the target construction [V N1 *of* N2], they were categorized as irrelevant and were excluded. In the end, a total of 340 instances of *demonstrate* and 1,567 instances of *show* were analyzed further.

Categories of N1 Nominal Groups

To facilitate semantic head categorization, we first considered the nominal groups in the N1 position of the *of*-constructions. We categorized the N1 nominals into: 'act', 'causal', 'cognitive', 'evaluative', 'evidential', 'focus', 'measure', 'modal', 'person', 'perspective', 'process', 'representation', 'state', and 'support' groups, a modification based on Sinclair's (1991) categories. Table 4 presents a brief definition of each, followed by examples.

Table 4

Categories of Nominal Groups in the N1 Position

N1 types	Definitions	Examples
act	non-continuous, bounded action	*activities, reopening, avoidance*
causal	cause, effect and results	*effect, consequences, impact, results*
cognitive	human cognition and emotion	*acceptance, sense, awareness, recognition*
evaluative	attitudinal, emphasis and stress	*preponderance, importance, superiority, significance, value*
evidential	evidential, existential	*evidence, case, demonstration, sign, example, instances, presence*
focus	focus on a part, component, or attribute; partitive	*parts, structure, aspect, properties*
measure	measure, quantity, unit, group	*degree, level, intensity, duration, range*
modal	possibility, ability	*risk, certainty, possibility, potential, invisibility, compatibility*
person	a human referent; title	*the Prince of Wales, a child*
perspective	view, pattern, relation, organization	*direction, association, pattern, mixture, distribution, trend*
process	continuous, bounded action or phenomenon	*absorption, digestion, prognosis*
representation	objects; visual or graphical representation	*graph, picture, copies, diagram, plots, orbit, boundaries, outline*
state	continuous, unbounded situation	*constancy, independence, separation*
support	reduced in meaning; provide additional grammatical support	*act, kind, sort, account*

The categorization is important in determining the semantic head status, because two groups of N1 nominals can be identified: head nouns and non-head nouns. Following Sinclair's and Owen's work, the head nouns consist of non-omissible nouns that do not pass the OT (see earlier discussion), or would impair the original meaning if left out. The non-head nouns, in contrast, are omissible and able to pass the OT, or can be taken out without doing much damage to the original message. In the present study, ten out of the fourteen N1 types, including 'act', 'causal', 'cognitive', 'evaluative', 'modal', 'person', 'perspective', 'process', 'representation', and 'state', represent information content that is non-omissible and are referred to as the head nouns.

'Act' nouns consist of events and actions that are non-continuous and bounded. This class of nouns include a number of deverbal nouns such as *application* (7a), *behavior*, and *involvement*, as well as gerundive nouns such as *blurring* in (7b), *reopening*, and *timing*.

(7a) *Furthermore, the wrong reading responses with exception words should **demonstrate** <u>the application</u> of <u>rules</u> to these words, as in the print example.* (GVA1583)

(7b) *In this case the fluorescein angiogram **showed** <u>definite blurring of the disc margins</u> at 6.5 and seven minutes.* (FT41793)

'Causal' nouns refer to a small set of words such as *effect, consequences, results, impact, outcome* that describe a cause-effect relationship. As (8) illustrates, this small set of nouns is high in frequency in academic discourse.

(8) *Table IV **shows** <u>the result</u> of <u>staining</u> with anti-Lewis antibodies.* (HU27414)

'Cognitive' nouns include those involving human emotional (9a) and cognitive (9b) activities.

(9a) *The idea that punishment does and should **demonstrate** <u>society's abhorrence</u> of <u>the offence</u>, and that this in some way justifies punishment, is quite a popular one.* (FBC477)

(9b) *Participants in the conversation **show** <u>an awareness</u> of <u>the</u>*

difference between these two types of talk. (HXY1232)

'Evaluative' nouns include nouns expressing attitude, emphasis, and stress as exemplified in (10).

(10) *There is a certain amount of evidence to support this contention, which does, however, **show** the importance of glacial control in the later stages.* (GV0776)

'Modal' nouns are comprised of nouns mainly derived from lexical verbs that express the notion of modality including possibility, ability, necessity, prediction, intention or hypothesis (e.g., Declerck, 2011; Schmid, 2000). However, the majority of the corpus data show those expressing possibility and ability as illustrated in (11a) and (11b).

(11a) *Regardless of whether they include direct ancestors or not, the carpoids do serve to **demonstrate** the likelihood of evolutionary links between chordates -- including vertebrates -- and the echinoderms.* (AMM913)

(11b) *Secondly, and perhaps even more significantly, the studies have **demonstrated** the basic invisibility of women in a large proportion of published material.* (GUR1982)

The occurrence of 'person' nouns in the *of*-construction is scarce, limited to titles (e.g., *the Master of Animals* (CMP1013), *the Prince of Wales* (FA91678)) and person (e.g., *a child of three years of age* (A0T649)) only.

'Perspective' nouns denote view, pattern, relation, and organization as exemplified by (12a) and (12b).

(12a) *Analysis of the structure of households can provide indicators of shortage such as the number of families doubling up, and **show** changing patterns of housing needs.* (FP4506)

(12b) *She must also **show** the relationships of such a scale to the claims for detachment made within particular cultural conventions.* (EA3205)

'Process' nouns refer to a phenomenon or a process that takes place through some time and completes at the end. Most of the 'process' nouns are related to natural processes such as absorption, gene expression, hyperplasia, growth, digestion, and prognosis. 'Representation' nouns refer to a group of research entities including both physical objects illustrated in (13a) and mental products of visual representations like *graph, diagram, scheme, plots,* and *orbit* in (13b).

(13a) *Details of the batteurs (illus. 2 and 5b)* **show** <u>an end-held baton</u> *of* <u>no great length</u>. (J1A99)
(13b) *Fig 2* **shows** <u>a flow diagram</u> *of* <u>the database</u>. (K5T59)

'State' nouns differ from 'act' nouns in terms of their prolonged duration. This class consists of both morphologically derived and non-derived nouns (e.g., *balance*, *state*, and *strengths*) shown in (14a). The former includes a variety of deverbal nouns (e.g., *penetrance* and *expression*) and deadjectival nouns (e.g., *abnormalities, cleavage, legitimacy, dependence,* and *ordinariness*) in (14b).

(14a) *Gd-DTPA behaves in a manner similar to the iodinated contrast medium used in computed tomography, thus tumours in the brain show enhancement due to destruction of the blood/brain barrier and other organs in the body, such as the liver,* **show** <u>enhancement</u> *of* <u>normal parenchyma</u>. (HU25462)
(14b) *The idea was to* **demonstrate** <u>the solidarity</u> *of* <u>the NATO alliance</u> *with a view to ensuring that negotiations with the Eastern bloc would be from a position of strength.* (ASB1450)

In addition to the types of N1 head nouns, we include 'evidential' nouns together with 'measure', 'focus', and 'support' nouns (originally identified in Sinclair) as the omissible, non-head groups. The reason that evidential nouns are given a non-head status is because the present study inspects verbal phrases instead of prepositional phrases. For example, when we take into account the verbs preceding the *of*-constructions in (15) and (16), the evidential sense of *show* and *have demonstrated* is only complete through the use of the words *evidence* and *the presence* in the N1 position of the *of*-construction.

(15) *Both polar regions **show** <u>evidence</u> of <u>more extensive glaciation</u> in the recent past.* (G1E16)

(16) *In conclusion, we have **demonstrated** <u>the presence</u> of <u>M tuberculosis DNA</u> in sarcoid lung and lymph tissue and shown that archival specimens seem to be suitable for research based on polymerase chain reaction techniques.* (FT1435)

For these two cases, it is possible to omit the first nominal group (i.e., *evidence* and *the presence*) from the *of*-constructions without destroying the message to be conveyed, because the verbs *show* and *demonstrate* also deliver a sense of evidentiality which overlaps with that of nouns such as *examples*, *signs*, and *evidence*. The remaining three types of N1 nouns, namely, 'measure', 'focus', and 'support' nouns, are directly adopted from Sinclair's (1991) definitions (see discussion earlier).

Criterion of Headedness in [V N1 *of* N2]

For headedness of the of-construction, the criterion is established based on Sinclair's (1991) framework with minor modification to facilitate the categorizing procedure. In addition to the three major categories of semantic heads, namely, N1-, N2-, and double- head categories, we also included a new category, referred to as the modified double head (*mod-double*), covering those N1 non-head nouns that are pre-modified (e.g., <u>a suitable level</u> of <u>competence</u>). Sinclair considers such a shift of the non-head nouns (e.g., *number, incidence, range, features, mode, elements, nature*) to a head status possibly because pre-modifiers (e.g., *suitable, detectable, extensive, growing*) highlight certain aspects of the nouns and, thereby, render the message of modifier-noun complex non-omissible. Previous work has also shown that pre-modifiers often function to present a writer's evaluation (e.g., Giannoni, 2009). For example, consider two instances of modified double heads in (17) and (18).

(17) *Those aspiring to teach the [labouring class] would be required to **show** <u>evidence</u> of <u>academic ability</u> a little above the level of those they taught.* (GU5188)

(18) *Some bones from an Iron Age pit at Maiden Castle (Table 1.1) which **show** **<u>interesting evidence</u>** of <u>pedogenic or soil-induced</u>*

<u>*modification*</u> *are illustrated in Fig. 1.13.* (B2C406)

In both cases, the N1 noun *evidence* is an evidential non-head noun. If we apply the OT on the N1 in (17), the omission of *evidence* does not alter the message to be delivered from that of the original. In contrast, when the OT is applied to (18), the original message could no longer be preserved. This is because the modifier *interesting* in (18) projects the writer's evaluation on N2 and, simultaneously, serves as a kind of modifying function on N2. In this case, the writer wants to draw the audience's attention to the piece of evidence supporting the proposition *pedogenic or soil-induced modification.* Therefore, we consider evidential N1s as omissible nouns and their co-occurring N2 in the *of*-construction as the head.

With all of the four semantic head categories established, the semantic head categorization procedure can be divided into three steps as illustrated in a flowchart in Figure 1.
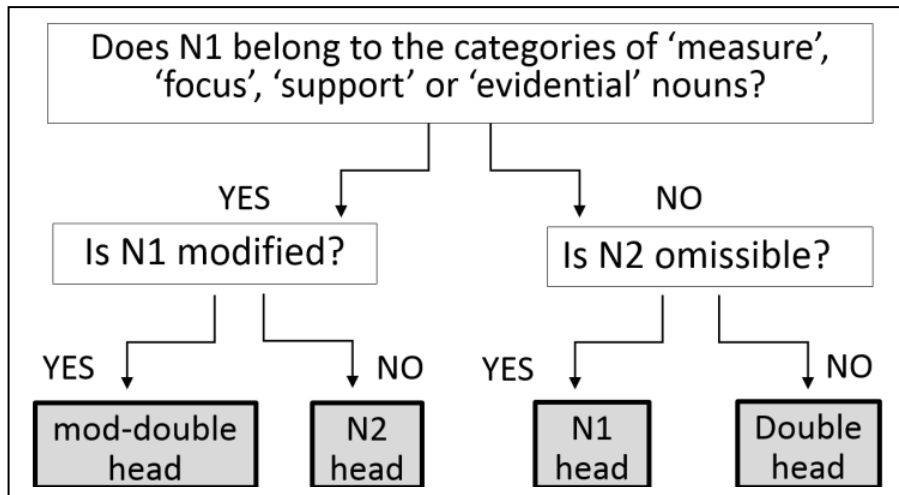

Figure 1. Flowchart to illustrate how semantic head categories are determined

The first step is to ask if an N1 belongs to the omissible categories of 'measure', 'support', 'focus' or 'evidential' nouns. If the answer is

affirmative, the utterance will be assigned as a double head on the condition that N1 is modified (denoted as *mod-double*). Since modifiers provide evaluative purposes, their presence render the omissible nouns important. Example (19) illustrates a typical *mod-double*.

(19)   *Thin sections **show** <u>a great variety</u> of <u>internal structures</u>*
<div align="center" style="font-size:smaller">head   head</div>
        important in accurate identification. (AMM565)

If N1 is not modified, we then assign to be an utterance an N2 head as shown in (20).

(20)   *Given the opportunity not to be continually wrapped in a nappy a 1-year-old child will **show** <u>a lot</u> of <u>interest in urination</u> and*
<div align="center" style="font-size:smaller">head</div>
        indicate what has happened. (CGT1568)

Moreover, this group of N2 heads can be further identified according to their N1 type (e.g., 'measure', 'focus', 'support' or 'evidential'). Example (21) is an instance of the 'measure' group where *a lot* (N1) denotes quantity.

In contrast, if N1 does not belong to any of the categories of 'measure', 'focus', 'support' or 'evidential' noun groups, we assign the utterance to the N1-head category on the condition that N2 is omissible (denoted as *N1*). This decision is made because N1 now belongs to one of the non-omissible types with a head status.

(21)   *…Fig. 6.20 **shows** <u>a histogram</u> of <u>records</u> divided into nine*
<div align="center" style="font-size:smaller">head</div>
        groups of equal numbers. (FPG654)

Example (22) represents an N1 head in which N1 denotes a visual representation that is post-modified by of N2. Furthermore, a double-head is assigned (denoted as *double*), if an N1 does not belong to any of the 'measure', 'focus', 'support' or 'evidential' groups and its N2 is not omissible as shown in (22).

(22)　*In both cases, extrinsic evidence could be introduced to **show***
　　　<u>a want</u> of <u>jurisdiction</u>. (GU61013)

　　　　　head　　　　　head

In addition to the above mentioned categories, modifications on the semantic head groups are also possible. However, because the modifications are on the head groups, there would be no effect on the assignment of the head categories. Sentence (23) exemplifies such a case.

(23)　*In R. v. Sang (H.L., 1979) it was said that evidence should not be*
　　　*excluded simply to **show** <u>disapproval</u> of <u>improper police conduct</u>.*
　　　(EVK1311)

In (23), N2 (*police conduct*) is pre-modified by the word *improper*, but this does not make a difference to its double-head status.

Following the categorization criterion, corpus data were analyzed and details are presented in the next sections.

Statistical Tests

After the semantic heads and N1 types of the corpus data were annotated in an Excel file, the coded data were saved in a text file and imported into the R program for further statistical analyses. To visualize the differences between the two verbs, association plots from the R package vcd (Meyer, Zeileis & Hornik, 2013) were used for types of semantic head and nominal groups in the N1 position. Association plots are derived from chi-square analysis and they provide a means for visualizing Pearson residuals for a contingency table (Friendly, 1992). Next, a multifactorial method, called hierarchical configural frequency analysis (HCFA), was used to test if the categorical data are significantly higher or lower than the expected frequency (Gries, 2004; Liu & Espino, 2012). Gries' (2004) HCFA 3.2 script for the R program was used (see Appendix for the significant results).

SEMANTIC HEADS IN THE [V N1 OF N2] CONSTRUCTIONS

The results will be presented at two levels. First, an overall sketch of the distributions of semantic head categories and N1 types will be presented. Then, a more detailed HCFA analysis of N1 types under each head category will be presented and illustrated with corpus examples.

A Comparison of the Distributions of Semantic Head Categories

The frequency distribution of semantic heads for both *demonstrate* and *show* with the HCFA results is presented in Table 5.

Table 5

Overall Distributions of Semantic Heads with HCFA Results

Semantic Heads	Verbs		
	demonstrate	*show*	**total**
double	245 (72.1%) T	710 (45.3%) A	710 (50.1%)
mod-double	30 (8.8%) A	341 (21.8%) T	371 (19.5%)
N1	1 (0.3%) A	89 (5.7%)	90 (4.7%)
N2	64 (18.8%) A	427 (27.2%)	491 (25.7%)
Total	340 (100%)	1567 (100%)	1907 (100%)

Note: Following Liu and Espino's (2012) convention, T denotes a Type representing a cell frequency that is significantly higher than expected, whereas A denotes an Antitype representing a frequency that is significantly lower than expected at p <.05.

The HCFA results are denoted either as a T for 'type' or A for 'antitype' (e.g., Liu & Espino, 2012) to designate the attainment of statistical significance, which measures the extent of difference between the research outcome (observed values) and a standard (expected values) provided by statistics. The discrepancy between a 'type' and an 'antitype' only lies in the direction of their measured differences. In other words, a 'type' designates the situation in which the observed data is much higher than the standard, whereas an 'antitype' designates the situation in which the observed data is much less than the standard.

Among the three types of semantic heads, the frequencies of N1-heads for both *demonstrate* and *show* (0.3% and 5.7%, respectively) are much lower than the other three categories, indicating its reduced importance in academic discourse. The predominance of double- and mod-double heads (added up to be 80.9% for *demonstrate* and 67.1% for *show*) can be attributed to the nature of the academic prose which tends to structure scientific knowledge with objectivity as previous work on nominalization have shown (*cf.* Halliday & Martin, 1993). The nature of the discourse could also account for the rarity of the N1 heads, but it is also possible that academic writers make use of the genitive alternatives to express the N1 heads. Further work is necessary to verify this point. In general, both verbs share a common distribution pattern of the heads. The statistical results could be visualized in an association plot (Figure 2).
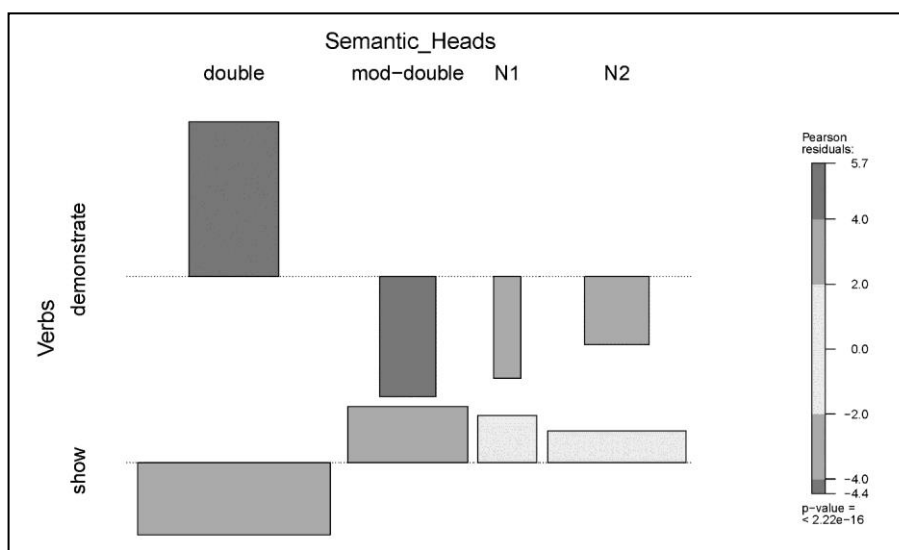

Figure 2.   Association plot of semantic head categories for *demonstrate* and *show*

The plot shows statistical significance in some variables based on Pearson residuals at p<.01. A Pearson residual (as represented by each column) measures the difference in observed and expected values for

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each cell in a contingency table. The shades correspond to the residual values. According to the scale at the right hand side of the plot, statistical significance is attained when the Pearson residual is greater than plus or minus two. As shown in Figure 2, statistical significance can be found for both verbs in all four semantic head categories. The two verbs diverge in an opposite trend. For example, in the double head category, only *demonstrate* preponderates, but a totally reversed situation can be observed for the other three head categories where *show* predominates but *demonstrate* does not. In summary, various N1-N2 semantic relations, as represented by the semantic categories, provide a sharp contrast between the two verbs.

A Comparison of the Distributions of N1 Types

To acquire the types of nominal groups predicated with each verb, N1 nominals were categorized as shown in Table 6.

As indicated by the HCFA analysis, only three types of N1, namely, 'evaluative', 'modal', and 'measure' nouns, attain statistical differences marked 'T' or 'A' in Table 6. For the former two N1 types, an opposite trend can be found: these nouns co-occur with *demonstrate* at a significantly higher rate (marked 'T') but with *show* at a much lower rate (marked 'A'). The association plot (Figure 3) illustrates similar patterns, and shows a much higher rate of 'measure' nouns with *show* but a much lower one with *demonstrate*. This indicates a stark contrast between the two verbs.

Table 6

Distributions of N1 Types with HCFA Results

N1 types	Verbs	
	demonstrate	*show*
act	35 (10.3%)	146 (9.3%)
causal	15 (4.4%)	105 (6.7%)
cognitive	19 (5.6%)	51 (3.3%)
evaluative	70 (20.6%) T	85 (5.4%) A
evidential	33 (9.7%)	251 (16.0%)
focus	24 (7.1%)	108 (6.9%)
measure	42 (12.4%) A	418 (26.7%)
modal	35 (10.3%) T	20 (1.3%) A
person	0 (0%)	5 (0.3%)
perspective	26 (7.6%)	154 (9.8%)
process	13 (3.8%)	69 (4.4%)
representation	0 (0%) A	69 (4.4%)
state	25 (7.4%)	69 (4.4%)
support	3 (0.9%)	17 (1.1%)
Total	340 (100%)	1567 (100%)

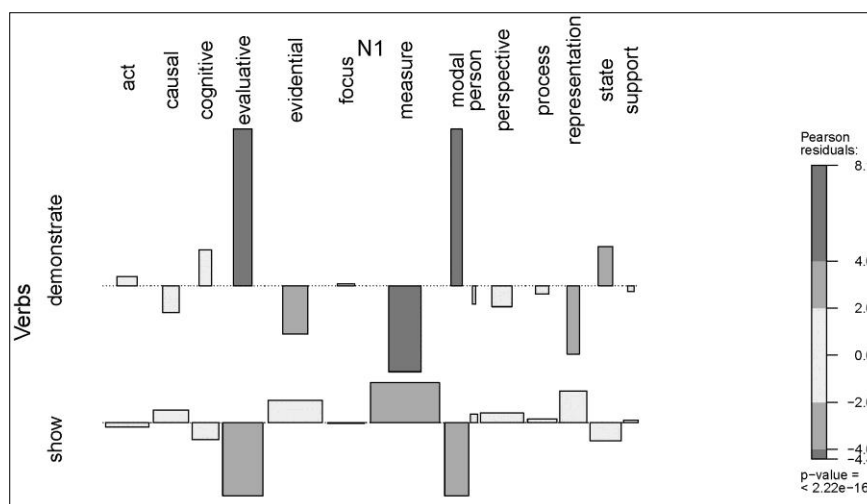Note: T denotes a type and A denotes an antitype at $p < .05$.

Figure 3. Association plot of N1 types for *demonstrate* and *show*

As mentioned earlier, a statistical significance is reached when the Pearson residual is greater than plus or minus two and we only consider those N1 types with a significant result. In addition to 'evaluative' and 'modal' nouns with the most striking differences between the two verbs, 'measure', 'evidential', and 'representation' nouns also display significance but reversed in order with higher occurrence in *show* and low in *demonstrate*. Although the association plot summarizes the differences between the two verbs for each N1 type, the details of the association of each N1 type under each semantic category will be discussed as follows.

Interaction of N1 Types with Semantic Head Categories

In addition to the distribution patterns of the semantic heads and N1 types, a more detailed analysis was carried out to compare each N1 type under various head categories. Table 7 presents a summary of HCFA results where the cell frequencies are significantly higher than the expected frequencies at p<.05. Each N1 type is followed by a raw score count in brackets.

Table 7

Significant HCFA Results of N1 Types Under Different Semantic Head Categories

	Verbs			
Semantic head categories	*demonstrate*		*show*	
double	evaluative (70) modal (34)	act (34) state (25) cognitive (19)	perspective (150) causal (103) process (60)	act (142) state (68) cognitive (50)
mod-double			measure (187)	evidential (112)
N1			representation (68)	
N2			measure (199) evidential (135)	support (14)

Note: Only those cell frequencies that are significantly higher than expected at p<.05 are considered here.

The following discussion will be devoted to each semantic head category.

Double heads. Double heads, or information-laden instances, for *demonstrate* and *show* actually vary quite extensively. Under this category, *show* displays preferences with 'perspective', 'causal', and 'process' N1 types. As mentioned, 'perspective' nouns include nouns with organizing functions that delineate patterns (*changing patterns of housing needs*, as given in example (12a) previously) and relations (*the relationships of such a scale*, in (12b)). Unlike other noun groups, 'causal' nouns in the double-head category are limited in word types and are exclusive to a small set of words like *cause, effect, consequences, influence, impact, results, response,* and *outcome*. Because both 'perspective' and 'causal' nouns are research-oriented, or terms used to describe research activities, it is conceivable that *show* is more commonly used here. *Demonstrate*, on the other hand, has a propensity for 'evaluative' and 'modal' nouns. 'Evaluative' nouns were found to express both positive and negative evaluations with words such as *validity, importance,* and *unattractiveness*, and 'modal' nouns, which mainly consist of nouns denoting possibility and ability, serve a speculative function. These two N1 types seem to involve higher-level

human cognition or abstraction, indicating a specificity of *demonstrate*. Pedagogical instructions may be given to second/foreign language learners on the propensity of *demonstrate* with 'evaluative' and 'modal' N1 nouns.

Table 7 shows that 'act', 'state' and 'cognitive' N1 types are the only ones common to both verbs. However, by a closer examination of all instances of 'act' nouns for both verbs, a discrepancy can be found where *show* is more likely to employ gerundive nouns (31 in 142 or 22%) such as *staining, binding,* and *blurring*, as compared to *demonstrate* (e.g., *interlocking*; 1 in 34 or 0.3%). Differences between the two verbs are not discernible for the rest of the nouns in these three N1 types. The verb *show* was found to associate with 'process' nouns but not *demonstrate*, although both verbs can describe processes of research entities (e.g., *demonstrate a process of reordering* (HXH765)).

Mod-double and N2 heads. In this section, we consider mod-double heads (e.g., *'a large majority of the population'* BMV344) and N2 heads (e.g., *'the details of morbidity'* HU33326) together, mainly because both categories consist of 'measure', 'focus', 'support', and 'evidential' N1 groups. The only difference is that mod-double heads carry modified N1s, thereby highlighting information conveyed by N1 (e.g., *'the practical nature of patent law* F9S544). While *demonstrate* does not show any propensity for categories other than double heads, only *show* will be discussed here. For both mod-double and N2 categories, the frequencies of 'measure' and 'evidential' N1 types are significantly higher. 'Measure' nouns consist of a wide range of nouns denoting quantity. As indicated by Sinclair (1991) and Owen (2007), there are conventional measure nouns (e.g., *percentage* and *numbers*) as well as less conventional ones (e.g., *degree* and *range*). In our academic corpus data, there are also words denoting both quantity and quality such as *frequencies, excesses, concentration, intensity,* and *prevalence*. These nouns are sometimes modified by adjectives of dimension such as *high, low, wide* and *broad* as exemplified in (24).

(24)   *Arctic soils **show** the <u>wider spectrum</u> of <u>maturity</u>; even in the most favoured conditions, few antarctic soils have passed beyond the ahumic stage.* (G1E531)

The word *spectrum* at the N1 position differs from those 'measure' nouns described by Sinclair and Owen in that it represents information more than measurement. When placed in the N1 position of an *of*-construction, nouns like *spectrum* also denote a sense of quality (in this case, one-by-one alignment of smaller units).

N1 heads. It came as a surprise that N1 heads (e.g., '*<u>a videotape</u> of <u>people</u>*' HWU1529) constitute the smallest proportion among the four head categories (Table 7). The majority of the N1 heads come from 'representation' N1s where visualizable, imagable research-related entities such as *photographs, position, borders, scheme, oscillograms,* and *diagram* are included. The *of*-N2 phrase functions to post-modify N1 as shown in (25).

(25) *An engraving, dating from 1493,* **showing** <u>*the cosmography*</u> *of* <u>*a geocentric world system*</u>. (EEM1085)

N1 'representation' nouns in our corpus data are exclusively associated with *show*, heightening a sharp contrast with *demonstrate*.

N1 heads also consist of a small proportion of non-conventional 'measure' nouns (e.g., *drop, fall, spread,* and *rise*) whose quantifying function is apparent when modified by a real number as shown in (26).

(26) *Print publishing over the past four years* **has shown** <u>*an annual growth*</u> *of* <u>*some 8%*</u> *but electronic (non-print) publishing over the same period has reached an annual growth rate of some 20%.* (CG951)

This group of non-conventional nouns provides a sense of directionality to the numeric value designated by N2. As shown in (28), the word *growth* describes an incremental process up to 8%.

In summary, all four head categories display varied interaction with the N1 nouns for both verbs. While *demonstrate* interacts with the N1 nouns exclusively in the double-head category, *show* interacts with different N1 types in all four categories. Semantic head categories can be viewed as providing different degrees of information weighting as addressed in Owen (2007). Double-headed *of*-constructions are heavier in information load than single-headed constructions. While there are

more information-laden instances associated with *demonstrate*, *show* has less. This is evident from the head categories commonly associated with each verb: while double heads is the most common category for both *demonstrate* (72.1%) and *show* (45.3%), the presence of *show* (21.8%) is significantly higher than *demonstrate* (8.8%) in the modified double head category. Differences between *demonstrate* and *show* can also be found in terms of distributions of nominal groups in N1. *Demonstrate* tends to be used more commonly to express evaluative and predictive functions, whereas *show* is frequently used to express quantifying and evidential functions. The discrepancies between the two reporting verbs could be captured by suggesting that *show* functions at the discursive level to mediate research activities by presenting information to the audience, whereas *demonstrate* functions at the knowledge-contribution level, presenting complex ideas and thoughts. Such a view could be accounted for with an iconic view linked to the gestural sense of the two verbs. The physical action of *demonstrate something*, according to the online Collins English dictionary, is to show people how something works or how to do it. In other words, *demonstrate* involves a procedure of steps, thereby conveying a sense of complexity. In contrast, the physical action of *show*, is much more straightforward. According to the same dictionary, *show something* to someone means to exhibit, to give or point to it, implying a one-step action. We, therefore, speculate that the discrepancies observed in the results reflect the differences in the physical action carried out by the verbs. Pedagogical consideration could be readily applied by first drawing on the differences in the physical senses of the two verbs and then going into the categorical variations identified with the collocates.

DISCUSSION

In this study, we have examined four types of semantic heads in two synonymous verbs. From the distribution of the head categories, we found a quite similar pattern for both verbs with an expected bias toward the double-headed constructions. However, by taking a closer examination of the head categories and N1 types, differences between the two verbs can be identified. A significant difference is the opposite trend found between double and mod-double heads: [*demonstrate* N1 *of*

N2] (e.g., *demonstrating the inevitability of conflict*) inclines towards the former and *show* the latter (e.g., *show the percentage of the seats*). This evidence provides an answer to our first research question on how the two verbs would differ in terms of N1-N2 semantic relations. Each semantic head category represents a type of N1-N2 semantic relation in terms of information weighting: double heads as the heaviest, followed by mod-double heads and then the two single heads. On this account, [*demonstrate* N1 *of* N2] was found to carry a heavier information load than the *show* construction.

The second research question asks for the functions associated with each verb, and the answer lies in the N1 types we investigated. Our statistical analyses illustrate three significant N1 types, namely, 'modal', 'evaluative', and 'measure'. *Demonstrate* tends to be highly associated with 'modal' and 'evaluative' N1s, whereas *show* is highly associated with 'measure' N1s. In addition, we found that *show* also has a propensity for 'perspective' N1s in the double head category, 'representation' N1s in the N1 head category, and evidential N1s in the N2 head category. From these results, it is clear that [*demonstrate* N1 *of* N2] is more likely to be used to perform a speculative function to express a writer's evaluation and prediction, whereas [*show* N1 *of* N2] is more likely to provide information on details of evidence or measurement. However, the results of this study do not imply that the two verbs are mutually exclusive in terms of these functions. We could only say that the verbs are more or less commonly associated with a semantic head structure or N1 type than the expected values. In fact, *show* encompasses all N1 types and all head categories, and *demonstrate* is more specific to a few N1 types and head categories. More discoveries could perhaps be obtained if lexical collocation patterns of the two verbs can be added for future research.

Pedagogical Implications

Some pedagogical implications may be considered by practitioners of English for academic purposes. From the last section, we identified that the two verbs, *demonstrate* and *show*, vary in terms of their collocating N1 groups in the [V N1 *of* N2] construction. We also found that the two verbs exhibit variations among the semantic head structures. By and large, reporting verbs have always drawn much research and

pedagogical attention due to their critical functions in academic discourse. In addition to citational functions (e.g., Charles, 2006), these verbs also provide evaluation (e.g., Thomas & Hawes, 1994) and contribute to disciplinary knowledge construction (e.g., Hyland, 1999). Due to the availability of a large number of reporting verbs, the majority of previous studies and resource books for academic purposes took a typological perspective to organize and structure the verbs according to functional sub-categories such as experimental, discourse, and cognition activities (e.g., Thomas & Hawes, 1994). Hinkel (2004), in her book chapter devoted entirely to lexical verbs in academic discourse, points out a few effective pedagogical approaches to teaching the verbs based on vocabulary research and one of them is to help "learners build semantic domains (or associative networks) of verbs that are synonyms or near synonyms and that can provide readily accessible contextual substitutions in discourse (p. 201)." In accordance with Hinkel, our study provides a systematic analysis on the collocational differences between *demonstrate* and *show* in the [V N1 *of* N2] construction. We suggest that the subtle variations between verbs under the same functional categories need to be systematically examined before their introduction into an academic writing class for second/foreign language students. While in the majority of the instances, *show* can substitute for *demonstrate*, the reversed substitution (i.e., substitute *demonstrate* with *show*) could sometimes result in incorrect usage. For pedagogical purposes, we need to design tasks that draw on the special uses of *demonstrate*. We suggest the following exercise designed to increase learners' mastery of the English reporting verbs *demonstrate* and *show* based on our results on the [V N1 *of* N2] construction. The exercise is particularly aimed at second/foreign language writers at the college and graduate levels.

(27)   Dictionary exploration

   Instructions: Look for the transitive meanings of *demonstrate* and *show* from a collegiate dictionary. Compare the two sets of meanings. Which ones overlap? Which ones are distinctive?

   The task in (27) aims to raise learners' awareness of near synonyms and how they share similarities as well as differences. Note that the meanings of *show* outnumber those of *demonstrate*, implying wider

usage of *show* and a higher rate of occurrence in natural data. To draw a stark contrast between the two verbs, it is important to direct learners' attention to the evaluative and complex notions of *demonstrate*.

A word replacement task like (28) can be designed to help learners differentiate the two verbs.

(28)   Word replacement

Instructions: The major differences between *demonstrate* and *show* can be found when they are followed by a binominal phrase, or Noun *of* Noun, as in *demonstrate the importance of the visual cortex* and *show the results of these experiments*. The verb *show* co-occurs with a wide range of words and is specific to nouns of measurement or quantity (e.g. *percentage, decline, fall, type, number, degree, range, levels*). On the other hand, *demonstrate* is specific to a few types of words including:

☐   Words that express writers' attitude (e.g., *importance, significance, superiority, strength, ineffectiveness, incompatibility*);

☐   Words that express writers' degree of confidence or ability (e.g., *truth, dangers, risk, certainty, possibility, potential, ability, invisibility, reducibility*);

☐   Words that express a state or a situation that is continuous and from which we cannot see the end (e.g., *aptness, solidarity, robustness, constancy, deficiency, independence*).

Read the following sentences and replace the verb *show* with *demonstrate* if relevant. (Not all instances require a replacement.)

(a)   *The Registrar-General's statistics showed a low point of 11.8 per cent of live births per 1,000 of the population in 1977.* (no replacement)

(b)   *Duke and Edgell (1981), in a study of two northern cities, show the importance of local political control with reference to spending cuts.* (replace with *demonstrate*)

(c)   *It was also important to show the ability of nuclear forces to ride out a surprise attack.* (replace with *demonstrate*)

(d)   *Defreyn et al. (1981) have shown a deficiency of platelet aggregation in platelets from a patient with a familial bleeding tendency.* (replace with *demonstrate*)

In this task, the *of*-construction in (28a) is specific only to *show*, because a specific value is involved (*a low point of 11.8 per cent*). The verb *show* in the other three cases can be replaced by *demonstrate* as they each express the writer's attitude (28b), the writer's ability (28c), and a state (28d). The following (29) is another task that taps further into learners' knowledge on the near synonyms in context.

(29)   Word selection
Instructions: Unlike the verb *show, demonstrate* is rarely found to precede words that designate pieces of evidence (e.g., *evidence, case, sign, example, symptom, traces*), but both can be found to precede words that express existence (e.g., *absence, presence, existence*). When it comes to reporting on real world objects (e.g., *videotape, nodules, baton, picture, map*), *show* seems to be the only choice. The main verb in the following sentences has been left out. Please fill in the blanks with the appropriate reporting verb(s).

(a)   *Histological examination of the biopsy specimens _____ a picture of chronic duodenitis. (show)*
(b)   *The people in those countries _____ little sign of believing in Marxism in the way that some Western intellectuals do. (show)*
(c)   *This clearly _____ the existence of a scalar curvature singularity on this hypersurface. (show/demonstrate)*
(d)   *Toxin characterization studies have _____ the absence of the structural gene for diphtheria toxin. (show/demonstrate)*

When it comes to describing a research entity or a real world object in (29a), *demonstrate*, implying a sense of complexity, is not likely to be used. The word *sign* (29b) was only found to collocate with *show,* possibly due to its other sense of denoting a physical object. We could also relate our findings to an iconic view transferring gestural action into verbal expression: where *show* involves simplistic actions and *demonstrate* complex actions is reflected in non-gestural senses. However, the distinction between the two verbs is not so clear when it comes to abstract notions in (29c, d). In summary, we have suggested a few points of task design for EAP practitioners to consider by incorporating a constructional perspective on the two reporting verbs.

Our major focus is on the contextual possibilities of replacing *demonstrate* with *show*, since the latter is a much more frequent near-synonym than the former.

CONCLUSION

In this study, we found a rather low percentage of N1 semantic heads (only 90 out of 1,907 relevant instances or approximately 5 percent) in the object position of *demonstrate* and *show* in academic discourse which is contrary to the conventional post-modifying view on *of*-nominals. The results of this study, therefore, support Sinclair's insight on the semantic role of N2 in *of*-constructions, particularly in academic discourse, which is to consider N2 as a semantic head that possibly co-exists with an N1 semantic head. In addition, we found that the framework of semantic headedness can be used to capture the subtle variation between near-synonyms. Significant differences were also found between [*demonstrate* N1 *of* N2] and [*show* N1 *of* N2] constructions: while double-head tops the head categories for both verbs, *show* is also high in proportion with modified N1 heads, indicating that *demonstrate* behaves differently from *show* although both are considered as near-synonymous. In sum, *demonstrate* is more likely to be used with information-heavy nominals and abstract notions like evaluative and modal functions. *Show* is more commonly used to present specific evidence because its co-occurring nouns in the N1 position often denote specificity with measurements or patterns. Rather than providing pieces of evidence in the object position, *demonstrate* is more often used to present a writer's thoughts. Finally, the results of our study can offer pedagogical support by informing academic second language writers when the reporting verb *demonstrate* can substitute for *show*. We designed the tasks for the purpose of identifying the appropriate context for a replacement to increase a learner's vocabulary choice. However, because the present work only provides preliminary results limited to two verbs, further work is necessary to support our findings with additional evidence such as including *of*-nominals in the subject or other positions, examining a wider range of verbs, or considering genral variation.

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Liyin Chen & Siaw-Fong Chung

CORRESPONDENCE

Liyin Chen, Department of English, National Chengchi University, Taiwan
E-mail address: 98551505@nccu.edu.tw

Siaw-Fong Chung, Department of English, National Chengchi University, Taiwan
E-mail address: sfchung@nccu.edu.tw

APPENDIX

All Significant Interactions from the HCFA Analysis

Heads	N1	Verbs	Freq	Exp	Cont.chisq	Obs-exp	P.adj.Holm	Dec	Q
double	measure	.	18	230.36	195.77	<	0.00000	***	0.127
double	evidential	.	9	142.22	124.79	<	0.00000	***	0.075
double	focus	.	2	66.10	62.16	<	0.00000	***	0.035
N2	perspective	.	0	46.35	46.35	<	0.00000	***	0.025
N2	act	.	2	46.60	42.69	<	0.00000	***	0.024
N2	evaluative	.	1	39.91	37.93	<	0.00000	***	0.021
mod-double	act	.	1	35.21	33.24	<	0.00000	***	0.018
double	representation	.	1	34.55	32.58	<	0.00000	***	0.018
N2	causal	.	0	30.90	30.90	<	0.00000	***	0.016
mod-double	evaluative	.	1	30.15	28.19	<	0.00000	***	0.016
N2	state	.	0	24.20	24.20	<	0.00000	***	0.013
mod-double	perspective	.	4	35.02	27.48	<	0.00000	***	0.017
N2	process	.	0	21.11	21.11	<	0.00000	***	0.011
mod-double	causal	.	1	23.35	21.39	<	0.00000	***	0.012
N2	representation	.	0	17.77	17.77	<	0.00000	***	0.009
mod-double	process	.	0	15.95	15.95	<	0.00000	***	0.008
mod-double	state	.	1	18.29	16.34	<	0.00001	***	0.009
N2	cognitive	.	1	18.02	16.08	<	0.00001	***	0.009
N2	modal	.	0	14.16	14.16	<	0.00002	***	0.007
mod-double	cognitive	.	0	13.62	13.62	<	0.00003	***	0.007
mod-double	representation	.	0	13.42	13.42	<	0.00003	***	0.007
N1	evidential	.	2	13.40	9.70	<	0.00304	**	0.006
N1	perspective	.	0	8.50	8.50	<	0.00381	**	0.004
mod-double	modal	.	1	10.70	8.79	<	0.00463	**	0.005
double	support	.	1	10.02	8.12	<	0.00819	**	0.005
N1	focus	.	0	6.23	6.23	<	0.02925	*	0.003
mod-double	.	demonstrate	30	66.15	19.75	<	0.00000	***	0.02
N1	.	demonstrate	1	16.05	14.11	<	0.00001	***	0.008
double	.	show	710	784.73	7.12	<	0.00130	**	0.067
N2	.	demonstrate	64	87.54	6.33	<	0.01745	*	0.013
.	measure	demonstrate	42	82.01	19.52	<	0.00001	***	0.022
.	representation	demonstrate	0	12.30	12.30	<	0.00011	***	0.006
.	modal	show	20	45.19	14.04	<	0.00043	***	0.014
.	evaluative	show	85	127.37	14.09	<	0.00058	***	0.024
double	measure	show	17	189.29	156.82	<	0.00000	***	0.1
double	evidential	show	2	116.87	112.90	<	0.00000	***	0.064
double	focus	show	2	54.32	50.39	<	0.00000	***	0.028
N2	perspective	show	0	38.08	38.08	<	0.00000	***	0.02
double	measure	demonstrate	1	41.07	39.10	<	0.00000	***	0.021
N2	act	show	2	38.29	34.40	<	0.00000	***	0.019
N2	evaluative	show	1	32.79	30.82	<	0.00000	***	0.017
mod-double	act	show	1	28.93	26.97	<	0.00000	***	0.015
N2	causal	show	0	25.39	25.39	<	0.00000	***	0.013

(continued)

double	representation	show	1	28.39	26.43	<	0.00000	*** 0.015
mod-double	evaluative	show	1	24.78	22.82	<	0.00000	*** 0.013
N2	state	show	0	19.89	19.89	<	0.00000	*** 0.011
mod-double	perspective	show	4	28.77	21.33	<	0.00000	*** 0.013
N2	process	show	0	17.35	17.35	<	0.00000	*** 0.009
mod-double	causal	show	1	19.18	17.24	<	0.00001	*** 0.01
N2	representation	show	0	14.60	14.60	<	0.00004	*** 0.008
mod-double	process	show	0	13.11	13.11	<	0.00016	*** 0.007
mod-double	state	show	1	15.03	13.09	<	0.00037	*** 0.007
N2	cognitive	show	1	14.81	12.88	<	0.00045	*** 0.007
double	focus	demonstrate	0	11.79	11.79	<	0.00059	*** 0.006
N2	modal	show	0	11.64	11.64	<	0.00067	*** 0.006
mod-double	cognitive	show	0	11.19	11.19	<	0.00103	** 0.006
mod-double	representation	show	0	11.03	11.03	<	0.00119	** 0.006
double	evidential	demonstrate	7	25.36	13.29	<	0.00121	** 0.01
mod-double	modal	show	0	8.79	8.79	<	0.01057	* 0.005
N2	act	demonstrate	0	8.31	8.31	<	0.01669	* 0.004
N2	perspective	demonstrate	0	8.26	8.26	<	0.01723	* 0.004
double	support	show	0	8.23	8.23	<	0.01754	* 0.004
mod-double	evidential	demonstrate	1	9.85	7.95	<	0.03697	* 0.005
N1	representation	.	68	3.26	1287.22	>	0.00000	*** 0.034
mod-double	measure	.	202	89.49	141.45	>	0.00000	*** 0.062
N2	measure	.	225	118.44	95.88	>	0.00000	*** 0.06
N2	evidential	.	160	73.12	103.22	>	0.00000	*** 0.047
double	perspective	.	176	90.14	81.78	>	0.00000	*** 0.047
double	act	.	176	90.64	80.38	>	0.00000	*** 0.047
double	evaluative	.	152	77.62	71.27	>	0.00000	*** 0.041
N2	focus	.	86	33.99	79.60	>	0.00000	*** 0.028
mod-double	evidential	.	113	55.25	60.36	>	0.00000	*** 0.031
double	causal	.	118	60.09	55.80	>	0.00000	*** 0.031
double	state	.	93	47.07	44.81	>	0.00000	*** 0.025
double	process	.	82	41.06	40.81	>	0.00000	*** 0.022
double	cognitive	.	69	35.06	32.87	>	0.00001	*** 0.018
double	modal	.	54	27.54	25.41	>	0.00010	*** 0.014
N2	support	.	16	5.15	22.86	>	0.00196	** 0.006
mod-double	focus	.	44	25.68	13.07	>	0.00918	** 0.01
double	.	demonstrate	245	170.27	32.80	>	0.00000	*** 0.043
mod-double	.	show	341	304.85	4.29	>	0.04162	* 0.023
.	evaluative	demonstrate	70	27.64	64.95	>	0.00000	*** 0.023
.	modal	demonstrate	35	9.81	64.73	>	0.00000	*** 0.013
N1	representation	show	68	2.68	1594.74	>	0.00000	*** 0.034
mod-double	measure	show	187	73.54	175.07	>	0.00000	*** 0.062
double	evaluative	demonstrate	70	13.84	227.90	>	0.00000	*** 0.03
N2	measure	show	199	97.32	106.23	>	0.00000	*** 0.056
double	modal	demonstrate	34	4.91	172.31	>	0.00000	*** 0.015
N2	evidential	show	135	60.09	93.40	>	0.00000	*** 0.041
mod-double	evidential	show	112	45.40	97.70	>	0.00000	*** 0.036
double	perspective	show	150	74.07	77.84	>	0.00000	*** 0.041
N2	focus	show	75	27.93	79.35	>	0.00000	*** 0.025

(continued)

double	act	show	142	74.48	61.21	>	0.00000	***	0.037
double	causal	show	103	49.38	58.22	>	0.00000	***	0.029
double	process	show	69	33.74	36.84	>	0.00000	***	0.019
double	state	demonstrate	25	8.39	32.86	>	0.00021	***	0.009
double	state	show	68	38.68	22.22	>	0.00079	***	0.016
double	cognitive	demonstrate	19	6.25	26.01	>	0.00215	**	0.007
double	act	demonstrate	34	16.16	19.69	>	0.00487	**	0.009
N2	support	show	14	4.23	22.55	>	0.00955	**	0.005
double	cognitive	show	50	28.81	15.60	>	0.01325	*	0.011

學術論文中引述動詞 *demonstrate* 和 *show* 之受詞 *of-*句式

陳立茵、鍾曉芳
國立政治大學

本文旨在比較學術論文中兩個動詞近義詞 *demonstrate* 及 *show* 之受詞中的 *of-*句式 ([*demonstrate* N1 *of* N2] 和 [*show* N1 *of* N2])，採用 Sinclair (1991) 的 semantic headedness 論點，以結構語法的角度來檢視這兩個句式中的名詞 N1 之間的差異。結果顯示這個方法可以成功的找出 *demonstrate* 和 *show* 之間的相異之處，我們發現 *demonstrate* 較常與語意內涵豐富的名詞組一起出現，並且較廣泛用於表達作者的評價 (例: *importance, limitation*) 及情態 (例: *possibility, ability*) 等功能。然而 *show* 較常與證據類詞一起出現，用於表達宏觀面貌 (例: *pattern, organization*)，表象 (例: *diagram, position*)，以及因果關係 (例: *results, impact*)，此外，我們也發現 *show* 常被用於表達測量單位詞 (例: *degree, level*) 和證據類詞 (例: *sign, evidence*)。最後，我們針對本研究結果設計了一些教學活動，為幫助學習者區別這兩個近義詞在學術論文中的用法。

關鍵詞：*of-*句式、引述動詞、學術論文、近義詞