Converging evidence: Bringing together experimental and corpus data on the association of verbs and constructions

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Abstract

Much recent work in Cognitive Linguistics and neighbouring disciplines has adopted a so-called usage-based perspective in which generalizations are based on the analysis of authentic usage data provided by computerized corpora. However, the analysis of such data does not always utilize methodological findings from other disciplines to avoid analytical pitfalls and, at the same time, generate robust results. A case in point is the strategy of using corpus frequencies. In this paper, we take up a recently much debated issue from construction grammar concerning the association between verbs and argument-structure constructions, and investigate a construction, the English as-*predicative, in order to test the predictive power of different kinds of frequency data against that of a recent, more refined corpus-based approach, the so-called collexeme analysis. To that end, the results of the application of these corpus-based approaches to an analysis of the* as-*predicative are compared with the results of a sentence-completion experiment. Concerning the topic under consideration, collexeme analysis is not only shown to be superior on a variety of theoretical and methodological grounds, it also significantly outperforms frequency as a predictor of subjects' production preferences. We conclude by pointing out some implications for usage-based approaches.*

Keywords: as-*predicative; argument-structure constructions; usage-based models; corpus data; collostructional analysis; sentence-completion task.*

1. Introduction

1.1. *General introduction*

It has repeatedly been argued that the constructs employed by linguists need to be validated on independent grounds—independent, that is, of

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the analyst's own intuitions (cf., e.g., Sandra and Rice 1995; Schönefeld 2001: 110–113). Analyses within the Cognitive-Linguistic framework in particular have been criticized for their post-hoc flavour and their lack of predictive force (cf. Gibbs 1995: 43). One step towards testing insights arising from the linguist's intuition and introspection is to relate them to an analysis of naturalistic usage data as provided by corpora (cf., e.g., papers in Barlow and Kemmer 2000; Boas 2003; Diessel 2004; Goldberg et al. 2004). Another step in this direction is the exploitation of data elicited in experimental settings (cf., e.g., Bencini et al. 2002; Hare and Goldberg 1999; Nordquist 2004; Tomasello 2000).

It is by now generally acknowledged in Cognitive Linguistics that, in accordance with its cognitive commitment, hypotheses and constructs should be backed up by converging evidence from multiple sources (for pertinent programmatic statements cf., e.g., Lakoff and Johnson 1999: 79–81, Langacker 1999b: 26) as well as firmly anchored to the empirically most adequate kinds of evidence. It is far from clear, however, what exactly is empirically most adequate. As will be demonstrated, not all kinds of corpus-based evidence are equally well-suited to the purposes to which they are commonly applied. Ideally, therefore, the results of different methodologies should be brought to bear on our claims and generalizations such that, for example, corpus-based results should be corroborated by experimenting (cf., e.g., Goldberg et al. 2004; Gries 2003; Nordquist 2004).

This paper is a case in point. It starts out from a more conceptually-oriented investigation of a partially-filled syntactic construction of English, the so-called *as*-predicative, exemplified by *He regarded him as stupid*. Most central to our concerns, however, is a methodological issue arising from the fact that many usage-based studies, which draw on corpus data, report frequency distributions of particular phenomena to support their claims without questioning the appropriateness of these data as evidence. In this paper, we will address the question of whether such data are really as immediately useful as they are generally purported to be. Section 1.2 introduces the *as*-predicative and justifies its characterization as a less-than-fully-predictable construction. Section 2 provides a corpus-based analysis of the *as*-predicative which goes beyond the use of mere frequency data in determining which verbs are most closely associated with the *as*-predicative, and which senses or sense extensions these reflect. More specifically, we contrast the verb ranking resulting from the frequency counts and percentages of all verbal items occurring in this construction with the rankings obtained from the application of one method of 'collostructional analysis', a more recently developed statistical procedure. Section 3 is then devoted to a sentence-completion task testing which of the two verb rankings more exactly predicts native speakers'

production preferences. Section 4 concludes with a general discussion of the implications for usage-based theorizing.

1.2. *The* as-*predicative as a construction*

Traditional accounts of English clause structure (Quirk et al. 1985: 53–56, 730–733) posit various 'complex-transitive' patterns, all containing in post-predicate position a direct object together with either an object-related adverbial, cf. (1), or an object-related complement, cf. (2).[1] The constructions usually discussed as 'caused-motion', 'resultative', and '*into*-causative' (cf., e.g., Goldberg 1995; Boas 2003; Stefanowitsch and Gries 2003) are subsets of the former.

(1) a. I *have* your name on a waiting list for a 4 day First Aid Course. / Police and customs *kept* the defiant under observations.
b. Why would they have *taken* me to a hall somewhere? / He will *guide* our new secretary into the contacts there. / He is in breach of the rules of the House and you should *bring* him to order.
c. The public has been *misled* therefore into thinking that embryo research will produce cures for diseases like Down's Syndrome.

(2) a. You *called* it a tantalizingly simple question. / I *found* him a truthful man. / Allied air power has only recently *made* such targets a high priority.
b. He *considered* his marriage indissoluble. / Although this definition is encompassing, it *leaves* much unsaid. / You don't *like* coffee particularly strong, do you? / *Keeping* the Computer happy. / We were advised to *have* our luggage ready. / It could *make* banking cheaper and safer.

We use the term as-*predicative* to refer to a specific complex-transitive argument-structure construction with object-related complements, namely the one where the object-related complement is formally marked by the insertion of the particle *as* immediately in front.[2]

(3) a. Does he *regard* that *as* a serious problem? / She *described* herself *as* the last surviving example of the Victorian professional aunt. / Someone has already *defined* the incident *as* a notifiable accident. / Adolescents should *have* their family *as* their centre of life. / There was a whole "spray-paint culture" with gangs *using* trains *as* "canvasses".
b. She *regards* her clients' business *as* confidential. / A lot of people *describe* people as jealous. / It is not possible for us to *see* this image *as* holy.

c. Uhm, does everyone *see* it *as* just being involved in dance? / We see the hard ecu *as* being extremely useful in the fight against inflation. / It is a matter for the jury to what extent they *regard* the revisions *as* fundamentally effecting a difference.
d. Prince Charles *regards* both what exists and what has been projected *as* entirely at odds with the historical character of the surroundings.

This range of structural configurations exceeds the range specified in (2) for complex-transitive structures with complements lacking the particle *as*. While the latter are usually realised as noun phrases (NP), cf. (2a), or adjectival phrases (AP), cf. (2b), complements in the *as*-predicative are—apart from occurring as NP or AP, cf. (3a,b)—frequently also realised by a non-finite clause with a present participle (NFC[-ing]), cf. (3c), and can additionally, although marginally, also appear as (non-literal) prepositional phrases (PP), cf. (3d). The latter is noteworthy because prepositional phrases are often used to denote states under the conceptual metaphor STATES ARE LOCATIONS, in which case they are functionally equivalent to adjectival phrases denoting states (cf. Quirk et al. 1985: 732–733):

(4) a. keep someone *in good health*, find someone *in tears*
b. keep someone *healthy*, find someone *tearful*/*sad*

As regards syntactic arrangement, there is considerable flexibility, allowing both for relatively long distances between the verb and *as*-phrase as in (5), and for immediately adjacent positions in cases where long, complex or informationally heavy object-NPs are shifted to final position as in (6).

(5) Prince Charles *regards* both what exists and what has been projected *as* entirely at odds with the historical character of the surroundings. / Father did not *consider* his visits to these areas, where rationing was almost unknown and bombs no more than a rumour, *as* a holiday from the trials and errors of London in wartime.

(6) … where we have *neglected as* an inessential complication effects due to the vector nature of E. / Representations in successful sciences get much of their power of compression by *using as* building blocks abstractions, which are not-necessarily-intuitive transformations of terms themselves accessible to (say) lower-division undergraduates studying those sciences.

Additionally, and as is usual for transitive argument-structure constructions, the construction can occur in both the active and the passive voice, with a clear preference for passives (cf. also Section 2.2 below).

(7) We would ask for Mostyn Road to *be categorized as* a local access road rather than *as* a distributor road. / Michelangelo *was hailed as* a genius at the moment of unveiling. / And one inch to one mile *was established as* a scale in general use.

We consider the frequently occurring pattern represented by the *as*-predicative as a *construction* on the basis of Langacker's understanding of a linguistic unit as a cognitive routine linking a phonological with a semantic structure (cf., e.g., Langacker 1999a: 98). In his view, any entrenched combination of the two poles in a symbolic unit is a part of our linguistic repertoire, from morphemes to complete clauses, at any level of generality. Consider, for example, the lexically filled expressions: *tooth, brush one's teeth, I'm fed up to the back teeth with that*. The units may also be of a more abstract kind, as schemata can be generalized on the basis of similarities between individual units from concrete usage events, so that also *brush* + *NP* or *V* + *NP* need to be listed as conventional linguistic units existing side by side, though on different levels of abstraction. In this sense, the *as*-predicative doubtlessly represents a conventional linguistic unit as part of the repertoire making up the grammar of the English language. As our data show (cf. [3]), the underlying schema for the *as*-predicative is *V* + *NP-obj* + *as* + *complement constituent* as given in schema (i) below. At a more specific, though still schematic, level the most general schema is instantiated as (ii) to (v). The case studies presented in this investigation, however, focus on the schema given as (i).[3]

(i)	**Verb + NP-obj + as + complement constituent**	
(ii)	Verb + NP-obj + as + NP	(cf. [3a])
(iii)	Verb + NP-obj + as + AP	(cf. [3b])
(iv)	Verb + NP-obj + as + NFC[-ing]	(cf. [3c])
(v)	Verb + NP-obj + as + $PP_{(metaph.)}$	(cf. [3d])

While the *as*-predicative is a construction in Langacker's sense of 'linguistic unit', it is worth asking whether it also fulfils the criteria for a Goldbergian construction. After all, for an expression to qualify as a construction, her definition requires that it cannot be compositionally derived in both *form* and/or *meaning* from other constructions available in the language (cf. Goldberg 1995: 4).[4]

As regards form, there is at least one aspect that cannot be compositionally derived. Though "*as*-phrases" are, in accordance with Quirk and his colleagues' (1985: 1200) classification, treated as PPs in the British component of the International Corpus of English (ICE-GB)[5] and the sampler edition of the British National Corpus (BNC),[6] the relatively wide variety of structural configurations represented by patterns (ii)–(v)

make it plain that the particle *as* cannot be described as a preposition—and that the entire sequence *as* + *complement* cannot be regarded as a PP either. More explicitly, there are no schemas of the type *P* + *AP* and *P* + *PP* that could be extracted from any other usage events than those presented by *as*-predicatives themselves. From this, it also follows that the whole construction cannot simply be analysed as a transitive prepositional verb ('type II', cf. Quirk et al. 1985: 1158), though both structures seem superficially alike (cf. [8a,b]):[7]

(8) a. Too great a tension will *place* excessive strain *upon* the water pump bearings. (prepositional verb).
    b. All governments want to *treat* arms sales *as* their own prerogative. (*as*-predicative).

Hence, within the construction-grammar framework adopted here, the formal features of the *as*-predicative cannot be seen to be predictable from its constituent parts. More generally, this also implies that a phrasal description of the sequence *as* + *complement* may not be justified. We provisionally suggest that, in this particular argument-structure construction, the complement phrase is overtly marked by the particle *as*. The only alternative to this line of reasoning would be provided by a classical derivational or transformational account deriving all structures following *as* from clauses (cf., e.g., Graustein 1980). If these clauses do not surface as non-finite clauses (NFC[-ing]), they appear as verbless clauses (VLC), i.e., can be realised by all phrase types listed above. Of course, in such an account, *as* is no preposition either, but clearly a subordinating conjunction. Adapting the basic insights behind this explanation to Langacker's non-derivational approach, one could posit the NFC[-ing] as the prototype of a network of related constructions, with the verbless variants instantiating the central schema in reduced form.

While these formal aspects alone suffice to show that the *as*-predicative meets the criteria set up for a construction in Goldberg's sense, the constructional semantics also merits some consideration. The major constructional meaning associated with the most inclusive/general schema of the *as*-predicative is represented by such verbs as *regard* or *describe* and expresses the subject's epistemic stance towards the (atemporal) relation between the entities referred to by the direct object, and the entities, properties or states-of-affairs referred to by the *as*-complement. The latter provides either a classification or a further specification of the object-referent depending on which of the subschemas is instantiated. Semantically, the particle *as* represents a comparative particle (like *than*), which formally reflects the comparisons and resulting similarity judgements on the basis of which the subject ascribes a property to or imposes a categorization

on the object referent. This formal indication of a comparative element leaves room for potential alternative categorizations/specifications and highlights the subject's mental activity itself, the result of which, i.e., the property ascription or categorization achieved, is thus rendered as made with some reservation, hence less than (very or absolutely) certain.

This dimension is not ruled out, but left entirely unprofiled (in Langacker's (1987) sense of the term 'profile') with regular unmarked object complements, which should make them semantically more versatile (cf. [2a,b]). It is therefore illuminating to check which of the expressions given in (2a,b) above can also take the particle *as*. The large number of highly doubtful or unacceptable expressions resulting from such an insertion exercise suggests that constructions with unmarked object complements can indeed realise a wider range of meanings than *as*-predicatives. This range does not only include the more typical and better known resultative meanings (cf., e.g., Goldberg 1995; Boas 2003), but also the main meaning of the *as*-predicative.[8] (9a,b) provide examples in which the latter is actually expressed by the construction with unmarked object complements. It is thus correct in principle to say that this meaning can be expressed by complex-transitive constructions with and without overtly marked object complements. Nevertheless, it is by no means the case that the relevant verb sets are identical for both constructions. In fact, only very few verbs, such as those given in (9a), can actually appear in both constructions. Usually (and unpredictably so), verbs typically occurring in the construction with unmarked object complements cannot appear with *as* (cf. (9b)); and vice versa: verbs typically occurring in the *as*-predicative cannot occur in the construction without the particle (cf. [9c]).

(9) a. In India, the rushed visit was *considered* (as) rather unseemly. / Once you are *declared* (as) fit, get started. / Miss Francois has *labelled* the pill (as) a human pesticide. / If you are *registered* (as) blind or partially sighted ...

b. She *found* the maths (*as) incredibly hard. / That was after what might be *called* (*as) a false start. / Do you think it (*as) well-performed?

c. *Wheelchairs can be *seen* obstacles. / *Pathological behaviours are *viewed* symptoms of a disease. / *The figures have been *described* alarmist.

In addition to its relatively generic central meaning, the *as*-predicative also has acquired various extended constructional meanings in which the element of epistemic stance is also present and even reinforced in various ways (for a more detailed discussion, see Section 2.3). Crucially (and

again unpredictably so), none of these senses can be coded by the construction without *as*.

(10) a. Refunded expenses are not *treated as* earnings. / *Use* your size *as* a weapon.
b. Can they *appoint* me *as* their agent? / And they *elect* someone else *as* the leader of the party. / The county was *established as* a unit of mapping.

In contrast, resultative uses of complex-transitive constructions with unmarked object-complements (cf. [11a]) focus on the subject's causation of a change in either the object-referent's class or its features, while the subject's epistemic stance does not play any role. Analogously and naturally, the same absence of epistemic stance is found in scenarios in which the subject does prevent any change in the object referent's class or feature(s), so that also verbs used for this force-dynamically related type of construal will not co-occur with *as* either (cf. [11b]). This is why verbs used for the verbalization of resultative construals do not usually co-occur with *as*, except in extremely rare cases where the change denoted is not intrinsic and presented as a classification of a temporary, or reversible nature (cf. [11c]).

(11) a. It could *make* banking (*as) cheaper and safer. / There is an echo in here that's going to *drive* me (*as) mad.
b. *Keeping* the computer (*as) happy.... it leaves much (*as) unsaid.
c. They have to be *made as* a coil. / Designed and *made as* a present from the emperor for his niece. (BNC) / Cockpit fittings, trim wheels, knobs and switches were all cleaned, re-painted and generally *made as* new. (BNC)

In sum, the comparative particle in the *as*-predicative profiles an element which constrains the potential relations holding between the object and object-complement, such that the construals that the *as*-predicative allows present only a subset of the construals allowed by complex-transitive constructions with unmarked object complements where the exact nature of this relation is left unspecified. In particular, the comparative meaning of the particle *as* may be seen to contribute directly to the exclusion of resultative readings—hence the incompatibility of *as* with object-complements specifying resultant states observed in (11a). Given this, the employment of *as* is so well motivated that it is tempting to treat the more restricted semantics of the *as*-predicative as an entirely compositional matter. What cannot be predicted from the semantics of *as* alone, however, is the construction's focus on the subject's epistemic stance or reservation with

regard to the relation between object referent and object complement. This can be demonstrated by the use of *as* in other constructions, cf. (12)–(14), where this dimension is missing. The use of the particle in the complex subordinator *as if*, cf. (14), does not present a counterexample to this observation, since there the epistemic stance is only created in conjunction with *if*.

(12) a. *As* soon *as* they got on to doing Phonetics, I left. / You can be *as* personal *as* you like.
b. We fully support the content *as well as* the style and tone of his statement.

(13) I wish I could feel relaxed about certain aspects of life, *such as* work and exams.

(14) But he was saying it *as if* it was my job to do it. / It is *as if* the man is giving up hope.

The same can be illustrated by the nominalizations in (15b), which contain the same *as*-phrases as the *as*-predicatives in (15a), but do no longer show this element of epistemic reservation. They thus make it obvious that this meaning can only be obtained (but not necessarily predicted) from the dynamic construal provided by the verb as a relational predicate (cf. Langacker 1987) together with the comparative particle *as* in a complex-transitive pattern.

(15) a. ... the Mexican government did not *view* rapid population growth *as* an obstacle to social and economic development. / Someone has already *defined* the incident *as* a notable accident.
b. ... their *view* of rapid population growth *as* an obstacle to social and economic development / the *definition* of the incident *as* a notable accident.

Given these distributional and semantic properties of the *as*-predicative, we submit that it constitutes both a Langackerian unit as well as a Goldbergian construction. The following section is concerned with the verbs occurring in this construction.

2. Case study 1: A collexeme analysis of the *as*-predicative

2.1. *Introduction: Collexeme analysis*

Collostructional analysis (a blend of *collocational* and *constructional*) as a cover term refers to a family of at present three corpus-based methods to

Table 1. *Input data for the collexeme analysis of word W_1 and construction C*

	construction C	¬ construction C	Row totals
word W_1	**a**	b	**a + b** (= overall lemma freq of W_1)
¬ word W_1	c	d	c + d
Column totals	**a + c** (= overall freq of C)	b + d	**(a + b) + (c + d) = N** (total number of argument-structure constructions in the corpus)

investigate the different kinds of association between words and constructions. Ultimately, these methods present an extension/refinement of previous methods of investigating collocations, going beyond these in a variety of ways. In this paper, we focus on one of these, *collexeme analysis*, which refers to measuring the association between a word and a given construction, the so-called collostruction strength (cf. Stefanowitsch and Gries 2003).[9]

Given the importance of methodological matters for our concerns, let us demonstrate how the collostruction strength of a word W to a construction C is computed, and—by way of doing so—elaborate on the differences between the use of frequency data and a collexeme analysis. To that end, consider Table 1, which schematically represents a table of co-occurrence frequencies for one word W_1 and one construction C; the variables in bold type are taken directly from the corpus under investigation while the others result from subtraction (cf. above).

Collexeme analysis proceeds as follows. First, one extracts all occurrences of the construction C from the corpus (i.e., the frequency a + c in Table 1). In contrast to much recent work in corpus linguistics and computational linguistics, this extraction process in collostructional analysis in general and collexeme analysis in particular has so far either relied on the manual correction of results obtained from corpora parsed for syntactic function (such as the British component of the International Corpus of English, ICE-GB), or has been done almost completely manually, by weeding out thousands of false hits resulting from a lexical search in a corpus (e.g., a search for *into* when looking at the *into*-causative, or for *as* when looking at the *as*-predicative). This way, however time-consuming, noise in the data set is minimized: with the exception of rare manual coding errors by the annotator(s), 'precision' (i.e., the percentage of *as*-predicatives out of all hits returned by the concordancer) and 'recall' (i.e., the percentage of *as*-predicatives retrieved out of all *as*-predicatives in the corpus) approximate the theoretical ideal of the gold standard, i.e., unity. Second, one identifies the frequency of each word (for example,

W_1) filling the constructional slot under investigation, in our case, of each verb (i.e., frequency a in Table 1). Third, one determines the frequency of each such word in the entire corpus (i.e., the frequency a + b for W_1 in Table 1).[10] Fourth, one estimates the number of constructions in the corpus (i.e., (a + b) + (c + d) = N). For the analysis of argument structure constructions we have adopted the strategy advocated in the first works on collostructional analysis, namely to approximate this frequency by using the token frequency of all verbs. As a result of these four steps, one obtains the frequencies in bold type in Table 1 so that the remaining frequencies can be computed by means of subtraction: b results from subtracting the frequency of the word in the construction (i.e., a) from the word's overall frequency (i.e., a + b); c can be computed by subtracting the frequency of the word in the construction (i.e., a again) from the construction's overall frequency (i.e., a + c); d, finally, is the number of argument structure constructions which are not C and do not contain W_1 and is determined by N − (a + b + c). The final step of analysis is to evaluate this table with some measure of association of, in this case, W_1 and C. These steps are then repeated for every word W_x occurring in the construction C within the corpus under investigation.

In much recent work within cognitive linguistics or usage-based models, the association of words and constructions is regularly investigated on the basis of either the raw frequency of a particular word in a construction (i.e., the figure a in Table 1) or on the basis of the relative frequency of a word within a construction, namely the percentage $\frac{a}{a+c}$, which is also often expressed as the conditional probability p(verb|construction). The latter option is mathematically identical to the former: Since a + c is the frequency of the construction in the corpus and is the same across all tables for all words W_x, it remains constant for all tables of one particular analysis. Goldberg's (1999: 204–5) investigation of the acquisition of argument-structure constructions, for example, makes use of relative frequencies from the CHILDES database. It does not make any difference, however, whether it is stated that *go* is the most frequent verb because it occurs 105 times in 195 instances of the intransitive-motion construction (while *fall* and *get* only occur 12 and 11 times, respectively)—providing the absolute/raw frequency a—or whether it is stated that *go*, *fall* and *get* account for 53.8 percent, 6.2 percent or 5.6 percent of the intransitive-motion construction—providing the relative frequency $\frac{a}{a+c}$. The term *frequency* in the remainder of our paper can thus be understood to refer equally to both a and $\frac{a}{a+c}$.

It is, however, received wisdom in corpus/computational linguistics that the strategy of using frequency data, i.e., of simply inspecting a or the ratio of $\frac{a}{a+c}$, is less than optimal because it fails to also take into

Table 2. *The frequencies of* fall *in the intransitive-motion construction (from Goldberg 1999: 204–205)*

	intransitive-motion construction	other constructions	Row totals
verb: *fall*	**12**	b	12 + b
other verbs	183 (= c)	d	183 + d
Column totals	**195**	b + d	N

Table 3. *The frequencies of* fall *in the intransitive-motion construction in two hypothetical corpora*

	intrans. mot. construction	other construction	Row totals
verb: *fall*	**12** (exp ≈ 24)	1,238	**1,250**
other verbs	183	8,567	8,750
Col. totals	**195**	9,805	**10,000**

	intrans. mot. construction	other construction	Row totals
verb: *fall*	**12** (exp ≈ 2.438)	113	**125**
other verbs	183	9,692	9,875
Col. totals	**195**	9,805	**10,000**

account the overall frequency of all W_x in all sorts of constructions, the overall amount of constructions as well as the ratio between these two in the corpus, i.e., the frequencies a + b, N, and the ratio $\frac{a+b}{N}$ (for a comprehensive overview, see, e.g., Manning and Schütze 2000: Chapter 5). To illustrate again, the data reported in Goldberg (1999: 204–5) are translated into a co-occurrence table (cf. Table 2).

In Table 3, the missing variables b and d have been supplied for two hypothetical corpora with different distributions. Note that both of these two tables are compatible with Goldberg's data on the intransitive-motion construction (viz. the left columns). However, in the upper part of Table 3, *fall* is significantly repelled by the intransitive-motion construction because it occurs in this construction less often than expected on the basis of pure chance: *fall* accounts for $\frac{12}{195}$ (i.e., ≈ 6.2 percent) of the occurrences of the intransitive-motion construction, which is smaller than the ratio of occurrences of *fall* in the corpus in general, namely $\frac{1,250}{10,000}$ (i.e., 12.5 percent). The observed frequency of 12 is thus smaller than the expected frequency of 24 as computed from the row and column totals ($\chi^2 = 7.32$; $df = 1$; $p < 0.01$). By contrast, in the lower part of Table 3,

fall is significantly attracted to the intransitive-motion construction because it occurs more often in it than expected by chance: its frequency of occurrence in the intransitive-motion construction, namely $\frac{12}{195}$ (i.e., ≈ 6.2 percent), is larger than that of *fall* in the corpus as a whole, namely $\frac{125}{10{,}000}$ (i.e., 1.25 percent). The observed frequency of 12 is thus larger than the expected frequency of approximately 2 as computed from the row and column totals ($\chi^2 = 38.74$; $df = 1$; $p < 0.001$). Expected frequencies are given in parenthesis in Table 3, while the figures in bold print are again those that could be gleaned directly from the corpora.

While this argumentation does not at all falsify Goldberg's claims concerning the importance of *go* to the intransitive-motion construction, it should caution us to accept frequencies prematurely since Table 3 shows how little frequencies can reveal about *fall*. Actually, in her discussion of the relation of *give* to the ditransitive, Goldberg (1995: 35–6) herself states that the strong association between *give* and the ditransitive "cannot be attributed simply to effects of general word frequency". Goldberg then explains this relation in terms of the frequency of *give* in the ditransitive, but our discussion above indicates that this may also be problematic since we show that reporting the frequency a or the percentage $\frac{a}{a+c}$ alone is not enough information to evaluate the importance of the occurrence of a word within a construction.

A large number of measures have therefore been proposed as more adequate means of measuring the association between W_1 and C (such as χ^2 in the above example). In principle, all association measures for 2×2 tables are applicable, but we follow the most precise strategy outlined in previous work on collostructional analysis and use the one-tailed p-value computed by the Fisher-Yates Exact test (cf. Fisher 1934, Yates 1934),[11] which is computed on the basis of the hypergeometric distribution; see the equation in (16).[12]

$$(16) \quad p_{\text{observed distribution}} = \frac{\binom{(a+c)}{a} \cdot \binom{(b+d)}{b}}{\binom{N}{(a+b)}} + \sum p_{\text{all more extreme distributions}}$$

Using as an example the lower side of Table 3, the Fisher-Yates Exact test addresses the following issue: Imagine you have a corpus which contains 195 intransitive-motion constructions and 9,805 other argument structure constructions (i.e., 10,000 argument-structure constructions altogether) and which, at the same time, contains 125 argument-structure constructions with the verb *fall* and 9,875 ones with other verbs. If you extract

all 125 argument-structure constructions with *fall* from the corpus, how likely is it that these 125 contain 12 (or even more) intransitive-motion constructions?

In previous studies, the p-value of the Fisher-Yates Exact test was used as the measure of the strength of the attraction/repulsion between the word and the construction—in this study, we use the negative logarithm to the base of ten of the p-value, i.e., -log(p-value$_{\text{Fisher-Exact}}$, 10).[13] The computation of such a log-transformed p-value is performed for each word W_x occurring in the construction C under investigation so that the words can be ranked: firstly, according to whether a word occurs in the construction more or less often than expected (i.e., whether the construction and the word attract or repel each other respectively), and secondly, according to the strength of attraction or repulsion (for the two hypothetical data sets provided in Table 3, by the way, the log-transformed values for the upper and the lower part would be 2.59 and 5.26 respectively).

In sum, the theoretical advantages of collexeme analysis over frequency-based approaches are that, unlike the latter, (i) collexeme analysis does not neglect the word's and the construction's overall frequencies, (ii) collexeme analysis allows for identifying cases where a construction and a word repel each other, and (iii) collexeme analysis allows for separating the wheat from the chaff by distinguishing significant from random co-occurrence.

In the following, we will present empirical evidence to support this assessment. To that end, the next section discusses how the method presented by collostruction analysis is applied to the *as*-predicative.

2.2. *Methods and results*

We first extracted the relevant data from the ICE-GB. As was indicated in Section 1.2 above, the *as*-predicative can take on a variety of structural configurations, which is why it was not possible to completely rely on the semi-automated and manually checked parse of the corpus sentences provided by the ICE-GB. So—in order to achieve the highest degree of precision and recall obtainable by still using the parse trees—we extracted all cases of the structural configuration [$_{\text{VP complex transitive}}$ V [$_{\text{PP}}$ *as*]], which is general enough to retrieve *as*-predicatives in both active and passive form as well as structures with intervening material of various sorts. As a result, we obtained 687 hits.[14] Following previous collexeme analyses of verb constructions, the second step was to lemmatize all the 107 verbs occurring in these 687 instances in order not to let individual verb forms bias the following computations; this also included the manual lemmatization of phrasal verbs as well as the correction for spelling variants such as *-ize* vs. *-ise*, etc. The third step consisted of determining the overall

Table 4. *Verbs most strongly attracted to the* as*-predicative (from the ICE-GB)*

Verb (N in construction)	Collostruction strength
regard (80)	166.476
describe (88)	134.87
see (111)	78.79
know (79)	42.796
treat (21)	28.224
define (18)	23.843
use (42)	21.425
view (12)	17.861
map (8)	12.796
recognise/-ize (12)	12.159
categorise/-ize (6)	11.525
perceive (6)	8.304
hail (3)	6.316
appoint (5)	6.073
interpret (5)	
class (3)	5.92
denounce (3)	5.379
dismiss (4)	5.158
consider (9)	5.079
accept (7)	4.467
name (4)	4.282
portray (3)	3.956
advert to (4)	3.835
diagnose (2)	3.44
think of (6)	3.209
depict (2)	3.172
cite (2)	3.064
rate (2)	
train (3)	2.981
cast (3)	2.95

frequencies of these verb lemmas in the corpus. Finally, we computed for each verb its collostruction strength to the *as*-predicative. Table 4 provides the 30 most strongly associated verbs.

A couple of remarks on these results are due: Firstly, as mentioned above, the collostruction strengths are given as log-transformed values: the difference of the first two values—$166.476 - 134.87 = 31.606$—represents a difference of approximately 32 orders of magnitude between the two p-values from the Fisher-Yates Exact tests for the two verbs. As has become customary in collostructional analysis (Stefanowitsch and Gries 2003; Gries and Stefanowitsch 2004a), however, we focus on the verb ranking itself, i.e., the ordinal information provided in Table 4. Secondly, the results of the collexeme analysis do not fully coincide with the

verb ranking obtained from the frequencies of the items occurring in this construction. For example, the fact that *see* is the most frequent verb lemma in the *as*-predicative does not suffice to make it the most strongly associated lexical item. This is simply because *see* is so frequent in general that it predominantly occurs in many other constructions and thus is not most distinctive for the *as*-predicative (for a more detailed discussion, see 2.3 below).

Furthermore, we suggested above that the *as*-predicative is preferred in the passive construction. This is borne out by our data as well: While the general percentages of actives and passives in the ICE-GB are 81.7 percent and 18.3 percent, respectively (cf. Gries and Stefanowitsch 2004a: 108–10), the ratio of actives to passives found for *as*-predicatives is markedly different. Only 303 out of 687 *as*-predicatives (= 44.1 percent) are in the active voice, while 384 *as*-predicatives are passives (= 55.9 percent). This difference is highly significant ($\chi^2 = 648.81$; $df = 1$; $p < 0.0001$).

2.3. *Discussion*

The collexeme ranking displayed in Table 4 provides the 30 lexical items most closely associated with the *as*-predicative and can be used to make the semantic description of the construction more precise and comprehensive. While the frequency ranking lists *see* in the first position, the collexeme analysis gives *regard* as the item most strongly attracted to the construction. As the former is highly polysemous, with each of the different senses even being associated with more than one construction (cf. [17]–[19]), the clue it provides for a description of the constructional meaning of the *as*-predicative is only vague; see below for relevant empirical evidence.

(17) a. You could *see* for miles. / I'll turn the light off there so you can *see* better. (perception sense: intransitive)
b. You *see* it on the side of the motorway. / Children will be able to *see* a barn owl, silent like a cloud. (perception sense: transitive)
c. Was it refreshing to hear the music itself there and *see* it staged? / ... the spectacle of *seeing* his older sister win a prize ... (perception sense: complex transitive)

(18) a. That's ideal, you *see*. (mental activity sense: intransitive)
b. I can't *see* other people's point of view./ I can't *see* much point in doing it. (mental activity sense: transitive)
c. Decisions were *seen* to imply major changes. (mental activity sense: complex transitive)

(19) a. I *saw* myself launching off into a philosophical treaty. ('imagine')
b. We *see* our city communities torn apart. ('experience')
c. I've got to go and *see* to the dinner in a minute. ('take care of')
d. This season I *see* new plays. ('attend to')

In other words, the verb *see* mainly—though not exclusively (cf., e.g., [19a–d])—denotes events of visual perception (cf. [17]) and, via the well-established metaphorical mapping KNOWING IS PERCEIVING/SEEING (cf. Lakoff and Johnson 1999: 238–240), very frequently also events of understanding (cf. [18]). Both of these senses are usually expressed by either intransitive (cf. [17a], [18a]), transitive (cf. [17b], [18b]), or complex-transitive (cf. [17c], [18c]) constructions. Other perception verbs which also have established senses in the domain of mental activities and are strongly associated with the *as*-predicative are *view* and *perceive*, both of which appear natural in the *as*-predicative due to the productivity of the conceptual metaphor.

When encountered in the *as*-predicative, *see* will thus not differ from other mental verbs occurring in various other constructions as well (cf. [20]) and will just as readily be understood.

(20) a. Oh yeah I *know*. / Oh, I'm still *thinking*. (intransitive)
b. You don't *know* the story. / She *thinks* you are cruel. (transitive)

All of these mental verbs instantiate (on a more specific level) a part of the constructional meaning since it is only a small step to extend from the sense of perceiving, knowing or understanding something to that of adding in what way this something is seen, known or understood.

The multiple uses that the verb *see* can be put to make this verb alone semantically non-specific with respect to the *as*-predicative or ambiguous, and it is plausible to assume that both adults and children associate it first with acts of seeing or understanding before they further extend it to its 'regard'-sense. Nevertheless, it may well be that, in the course of language acquisition, the child will understand and acquire the high-frequency item *see* in the *as*-predicative earlier than *regard* so that *see* could actually be a good start for the child to acquire the constructional meaning (though certainly only after having learned about seeing in its perceptual (literal) and perhaps also its metaphorically extended cognition sense); unfortunately, this must remain speculation at present since our search of children's utterances within the CHILDES corpus did not yield any *as*-predicatives. From the perspective of comprehension, one might also

add that the use of *see* in the *as*-predicative will immediately be disambiguated in accordance with the meaning of the construction.

It is worth noting, however, that, in addition to these more theoretical points, usage data about *see* in its various senses also provide fairly strong empirical evidence against attributing to *see* the most important role for the analysis of the *as*-predicative's semantics. For example in WordNet 2.0, the verb *see* is listed as having 24 different senses; of these the by far most frequent one is the perception sense mentioned above followed by the 'understand' sense, while the 'regard' sense we are concerned with is only the fifth most frequent sense; more specifically, the frequency of *see* in its perception sense is more than ten times as high as its frequency in the 'regard' sense. In addition, the frequency-based entry arrangement of the *Collins Cobuild English Language Dictionary* (CCELD) gives the 'regard' sense of *see* only in the 20th of 34 places. Finally, in the ICE-GB, *see* is not particularly 'faithful' to the *as*-predicative since only 5.6 percent of all occurrences of *see* do occur in the *as*-predicative (see Appendix 1 for all faithfulness values). Usage data about *regard* also strongly contrast with those just presented for *see*. WordNet 2.0, for example, lists *regard* as having three senses, the most frequent of which is the one we are concerned with here. In our own data, the main verb *regard*, however, is exclusively used as a mental verb, and exclusively occurs in complex-transitive constructions with complements, with occurrences in the *as*-predicative strongly predominating (about 81 percent of all uses of *regard* in the ICE-GB). It is thus a much more explicit and unambiguous clue to the *as*-predicative's semantics than *see*.

In the light of all this, it appears counterintuitive to base one's analysis of the *as*-predicative's semantics more on *see* than on *regard*. The attested usage of *regard* also implies that, once this verbal item is known, it will most strongly be associated with the *as*-predicative, representing, as it were, the compressed version of the construction's semantics. In this, it contrasts with *consider*, which—though semantically equivalent—occurs more typically in complex-transitive constructions without *as* (only 3.4 percent of its occurrences in the ICE-GB are in the *as*-predicative) and is thus far less distinctive for the *as*-predicative.[15] These observations are reflected most clearly in the collexeme ranking, which shows *consider* in position 19 (vs. *regard* in 1st position), but are downplayed in the frequency ranking (11th vs. 3rd position, see Appendix 1). Hence, we consider the collostruction-strength rankings to be more comprehensive and more precise than those based on frequency of occurrence: the collostruction strength between a verb and a construction takes into account the verb's use in other constructions as well as the construction's use with other verbs. In contrast, frequency data measure the occurrence of the verb in

the one construction under analysis only (e.g., *see* in the *as*-predicative). Though this may result in an (almost) identical ranking, especially in the higher ranks, the aforementioned details may go unnoticed, but exactly these need to be considered when one wants to identify the meaning of the construction.

We have suggested that, from a semantic perspective, *regard* stands out as well for providing a relatively generic meaning, which is variously elaborated, partly at a more specific level, by most of the lexical items attracted to the construction. The following verb clusters are presented in the order of the collostruction strength of the item most closely associated with the construction. The items in the first cluster are mental verbs roughly synonymous with *regard* and comprise *know*, *recognis|ze*, *consider* and *think of*, as well as the perception verbs *see*, *view* and *perceive* in their (non-literal) cognition readings. The speech-act verbs/verbs of saying in the second cluster of items, represented by *describe*, *define*, *portray*, *hail*, *denounce* and *depict*, elaborate the more generic meaning of the first cluster in that they—unlike those of the first cluster—present the relation between the object and its complement—in a more explicit and externalized, though still subjectively determined way. Next in collostructional prominence are items such as *categoris|ze*, *class*, *diagnose*, which go beyond the meaning of the first group in that the relation specified is explicitly classificational. In other words, the results of the respective activities denoted by the verbs of this group can be paraphrased by NP_{object} *is a member of category* $XP_{complement}$. The last group of items elaborating the 'regard' sense is presented by such verbs as *interpret* and *take*, which reinforce the subjective component rendering the subject's classification or property ascription particularly cautious, tentative, and questionable.

Other verb groups instantiate meanings which cannot as easily be subsumed under the 'regard' sense, though they are related to it. With these verb uses, this relation is induced by the most general constructional schema itself, while the verbal meanings in isolation are clearly distinct. One such group is represented by verbs like *use* and *treat* and related items from the respective semantic fields (cf. [10a] above), which require that the referents of the object and object-complement respectively are clearly kept distinct, with any classifications or property ascriptions being at best provisional, temporary and strongly situation-bound: Someone's using or treating X as Y does not amount to equating X with Y. Another group (cf. [10b] above) contains for example the verbs *appoint*, *nominate*, *adopt*, and *establish*, which refer to the ascription of a role or status.[16] Though the activities denoted by the verbs in both of these groups do not reduce to just mental ones, the element of the subject's epistemic

stance surfaces in different form as the subject's awareness of the object's provisional association with what is specified in the object complement. (cf. Gries, Hampe and Schönefeld 2004).

The following section investigates whether the collostructional preferences of the *as*-predicative are also reflected in a more controlled experimental setting.

3. Case study 2: An experimental test of the collexeme analysis

3.1. *Introduction*

The collexeme analysis has already provided a variety of interesting results, but a few open questions remain. One such question arises from the assumption that frequencies are sufficient to arrive at telling generalizations—and, as was mentioned above, indeed many scholars working within a usage-based framework, who invoke corpus-based results to provide *prima facie* support for their claims, simply report frequencies without reflecting or addressing the potential problems which may derive from this procedure and which were discussed above in Section 2.1 (cf. Hunston and Francis 2000; Boas 2003; Mukherjee 2003; Newman and Rice 2004; Davidse and Vanden Eynde 2004; etc.).

Let us take up one point of critique raised against collostructional analysis. Goldberg et al. (2004: 308–309, n. 2), for example, argue against collostructional analysis and in favour of an approach based on relative frequencies. In particular, in the context of first language acquisition, they argue

> Stefanowitsch and Gries suggest that the frequency with which a particular verb occurs in a construction is measured against the frequency with which the same verb occurs in other constructions. The hypothesis is that only if the verb is highly predictive of the construction does it become the prototype of the construction (Stefanowitsch and Gries [2003]). However, the fact that *go* is so highly frequent in the intransitive motion construction and also corresponds to the semantic prototype of the construction detracts from this argument since *go* occurs even more frequently as a future marker with a verbal complement. Thus, *go* is not particularly predictive of the intransitive motion construction and, yet, it still accounts for the preponderance of instances of the construction and also corresponds to its prototypical meaning.

Before we explore this issue empirically, three short comments on this criticism are in place. Firstly, neither Stefanowitsch and Gries (2003) nor we do explicitly argue against frequency information—in fact, we will see below that the frequency of a word W in construction C and the

collostruction strength of W to C are probabilistically strongly related. Rather, the argument has been that collostruction strength is more promising since it is better geared to separating frequent but random co-occurrence from frequent and meaningful co-occurrence.

Secondly, a mere frequency approach may also yield somewhat counterintuitive results. For another example, an analysis of the ditransitive construction in the ICE-GB which ranked the verbs occurring in the ditransitive according to their co-occurrence frequency rather than their collostruction strength would force the analyst to focus on the high-frequency verb *get*, which is more frequent in the ditransitive than many other verbs which are semantically much more closely associated with it: *bring*, *pay*, *hand* (instantiating the transfer sense), *permit*, *allow* (instantiating the 'enabling transfer' sense), *promise*, *guarantee*, *owe* (instantiating the ditransitive's satisfaction condition extension), etc.[17]

Thirdly, in the light of the argument presented above the assumption that *go* cannot be particularly predictive for the intransitive-motion construction (although this would be desirable given their acquisition data from the CHILDES corpus), only because it is more frequent as a future marker, also appears doubtful. Under the collostructional approach, the fact that *go* is more frequent in the *going-to* future than in the intransitive-motion construction may very well result in *go* having a higher collostruction strength to the intransitive-motion construction than to the *going-to* future. This possibility is actually much more likely than one may initially assume, as can easily be demonstrated. Consider Table 5 for an example based on data from the ICE-GB. The figures in bold are authentic figures, partially from the data discussed in Gries and Stefanowitsch (2004a), the others have been constructed to exemplify the argument.[18] Note that, just

Table 5. *Hypothetical frequencies of* going *in the intransitive-motion construction and the* going-to *future in the ICE-GB*

	intrans. mot. construction	future	Row totals
verb: *go*	641 (exp ≈ 750)	**980**	**1,621**
other verbs	3,359	**3,667**	7,026
Col. totals	4,000	**4,647**	8,647

	intrans. mot. construction	future	Row totals
verb: *go*	641 (exp ≈ 567)	**980**	**1,621**
other verbs	1,859	**3,667**	5,526
Col. totals	2,500	**4,647**	7,147

as Goldberg et al. claim, *going* tagged as a main verb in the ICE-GB is considerably less frequent than the *going-to* future, and will probably mostly instantiate the intransitive-motion construction.

Now, let us assume we searched the ICE-GB for all intransitive-motion constructions and found 4,000 instances (cf. the upper part of Table 5). On the basis of this figure, the other figures in the table can be computed by subtraction again. It can be easily computed even without specific software that this distribution is highly significant ($\chi^2 = 36.2$; $df = 1$; $p < 0.001$, collostruction strength = 9.03): *go* is strongly repelled by the intransitive-motion construction because we found 641 co-occurrences when 750 would have been expected. By contrast, let us now assume we searched the ICE-GB for all intransitive-motion constructions and found 2,500 instances as specified in the lower part of table 5 (with the remaining figures again computed by subtraction). This distribution is once more highly significant ($\chi^2 = 19.2$; $df = 1$; $p < 0.001$, collostruction strength = 5.12)—but this time in the opposite direction: *go* is significantly attracted by the intransitive-motion construction: we found (the same) 641 co-occurrences, but this time—given the different marginal frequencies—would have expected only 567.

That is to say, *go* can be more frequent as a future marker *and at the same time* be distinctive for the intransitive-motion construction … but it need not be: The issue of whether frequency or collostruction strength is (more) important here is an empirical, not a theoretical, question, which cannot be resolved as long as the number of all intransitive-motion constructions in the ICE-GB is unknown. Unfortunately, the number of intransitive VPs in the ICE-GB exceeds 33,000 and was thus too high to check in the context of a paper focussing on a different topic. Suffice it here to point out that unless all frequencies have been identified by manual identification of all intransitive-motion constructions—as simulated in Table 5—this issue cannot be decided.

In view of this, it is obvious that a comparison of the traditional frequency account (as exemplified by some of the above-mentioned studies) and the more refined approach of collostructional analysis is called for, especially since more researchers within cognitive linguistics use naturalistic corpus data. This paper's second case study to be subsequently presented is devoted to such a validation.

The above verb-rankings resulting from the raw-frequencies of the verbs occurring in the *as*-predicative and from the collexeme analysis of the *as*-predicative respectively allow for a relatively straightforward test of which method—raw frequencies vs. collostruction strength—is the more appropriate tool when it comes to identifying the associations of words and constructions. This is due to the fact that the results of the above

analysis provide all the information that is necessary for a validation experiment: we know how frequently verbs occur in the *as*-predicative and we know how strongly each verb is collostructionally associated with the *as*-predicative. We therefore decided to test both approaches by means of a sentence-completion experiment.

In this experiment, subjects completed sentence fragments containing verbs which systematically crossed high and low degrees of frequency of occurrence in the *as*-predicative with high and low degrees of collostruction strength to the *as*-predicative. The frequency hypothesis predicts that, on average, subjects should produce more *as*-predicatives after verbs that occur very frequently in the *as*-predicative, whereas the collostruction hypothesis predicts that, on average, subjects should produce more *as*-predicatives after verbs that are collostructionally strongly associated with the *as*-predicative. Also, no significant interaction of raw frequency and collostruction strength is to be expected since, of course, high/low collostruction strength and high/low frequency in the *as*-predicative should reinforce each other naturally, i.e., additively.

3.2. *Methods*

As was mentioned above in Section 1.2, we found 687 occurrences of the *as*-predicative in the ICE-GB, which comprised 107 different verb types (of which 93 were attracted to the *as*-predicative rather than repelled by it). In order to determine whether collostruction strength outweighs raw frequency as an indicator of association strength, we first plotted the ranks of the frequencies of all 107 verbs in the *as*-predicative against the ranks of their collostruction strength. Then, both the scalar variables FREQUENCY and collostruction strength (COLLSTRENGTH) were dichotomized into the levels *high* and *low* (disregarding the hapaxes) and combined such that we obtained four different combinations of variable levels. For each of these combinations, we then chose the sets of verbs represented in Table 6 for the experiment.[19]

Since the *as*-predicative also seems to be strongly associated with the passive voice, we additionally crossed the four combinations above with

Table 6. *Verbs used in the sentence completion experiment*

	FREQUENCY: *high*	FREQUENCY: *low*
COLLSTRENGTH: *high*	*define, describe, know, recognize, regard, see, use, view*	*acknowledge, class, conceive, denounce, depict, diagnose, hail, rate*
COLLSTRENGTH: *low*	*keep, leave, refer to, show*	*build, choose, claim, intend, offer, present, represent, suggest*

the variable VOICE so that, for each verb in Table 6, one active and one passive sentence fragment was generated; cf. (21) for the sentence fragments generated for *depict*.

(21) a. The biographer depicted the young philosopher
b. The young philosopher was depicted

Such pairs for all the verbs in Table 6 were added to the list of experimental items; in order to compensate for the smaller number of verbs in the FREQUENCY: *high* and COLLSTRENGTH: *low* condition, these items were added to the list twice. A variety of experimental controls were implemented to control for confounding factors: In addition to the experimental sentence fragments, we also generated 226 filler items to distract the subjects' attention from the construction under investigation. The filler fragments ended with intransitive, transitive, motion verbs and speech-act verbs to allow for many different possible continuations. Finally, all experimental fragments and filler items were sorted into questionnaires for subjects such that

– each subject was presented only one sentence fragment for each of the eight different experimental conditions (i.e., eight experimental sentence fragments);
– each subject's questionnaire included sixteen filler items;
– each subject received each verb in only one sentence fragment;
– the overall order of the stimuli was pseudo-randomized such that (i) no questionnaire started with an experimental sentence fragment and (ii) all experimental items were interrupted by filler items.

64 native speakers of English participated in the experiment; they were told that we were simply interested in the "kinds of English sentences people produce" and none was aware of the purpose of the experiment.

3.3. *Results and discussion*

The subjects provided 493 responses which could be unambiguously classified as to whether they constituted an *as*-predicative or not. The frequencies resulting from the subjects' responses were evaluated with an analysis of variance (ANOVA) with COLLSTRENGTH, FREQUENCY and VOICE as factors/independent variables; the dependent variable of the analysis was the percentage of *as*-predicatives produced in each experimental condition. While we were mainly interested in the predictive power of collostruction strength and frequency with respect to this variable, Table 7 presents the results for all factors and interactions.

Table 7. *Results of the ANOVA*

Factor/interaction	F	p	effect size: partial η^2
VOICE	0.952	0.33	0.002
COLLSTRENGTH	68.123	<1E-14	0.123
FREQUENCY	0.928	0.336	0.002
VOICE × COLLSTRENGTH	6.917	0.009	0.014
VOICE × FREQUENCY	0.378	0.539	0.001
COLLSTRENGTH × FREQUENCY	0.036	0.849	0
VOICE × COLLSTRENGTH × FREQUENCY	0.354	0.552	0.001

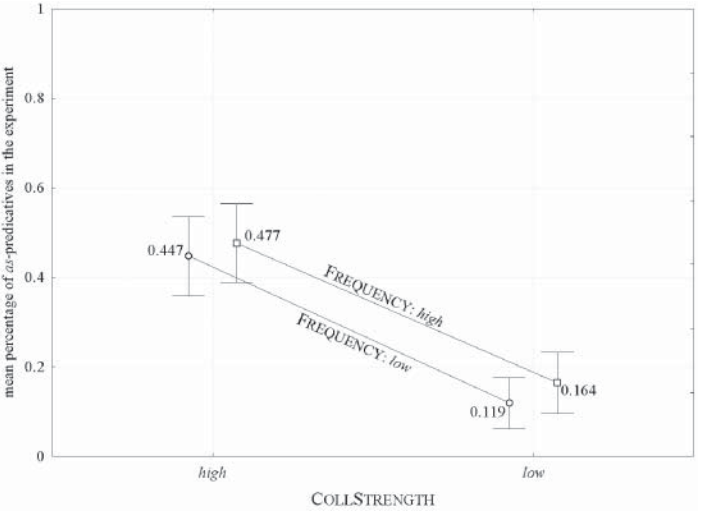

Figure 1. *The effects of* COLLSTRENGTH × FREQUENCY *on the relative frequencies of* as-*predicatives*

These results provide strong support for the collostructional hypothesis: COLLSTRENGTH is one out of only two significant factors/interactions and simultaneously the by far most influential variable, having the highest effect size. More precisely, the mean percentage of *as*-predicatives after verbs characterized as COLLSTRENGTH: *high* (0.462) is more than three times as large as the mean percentage of *as*-predicatives after verbs characterized as COLLSTRENGTH: *low* (0.141). Since no similar effect can be observed for FREQUENCY (cf. Figure 1), we interpret this as showing that a high frequency of a word W in a construction C alone need not be sufficient to result in a strong association between W and C—rather, what is needed is a high frequency of W in C *as compared to the overall*

frequencies of W and C as is done when measuring collostruction strength. Also, the interaction CollStrength × Frequency is insignificant, as expected at the end of Section 3.1.

It was pointed out to us by one of the anonymous reviewers that the results of the experiment may not be due to the collostruction strength values of particular verbs, but rather to their verb subcategorization preferences as measured in terms of subcategorization probabilities. More precisely, while we have discussed potential shortcomings of Frequency (i.e., a or $\frac{a}{a+c}$ or the conditional probability p (verb|construction)) in quite some detail above, we have not addressed the other conditional probability which can be computed from our co-occurrence table, namely the verb subcategorization conditional probability p (construction|verb). For example, *regard* has a very high conditional probability p (construction|verb), precisely $\frac{80}{99}$, and may thus be more likely to result in *as*-predicative completions than, say, *refer to*, which has a p (construction|verb) of $\frac{4}{141}$. For the sake of completeness, the table in Appendix 1 also provides all of these probabilities in the column labelled Faith. A few detailed comments are due with reference to this critique of our results. The first is that, just as we do not rule out frequency effects in general, we also would not want to rule out effects of verb-subcategorization probabilities/preferences (see Section 4 for more discussion). The second and more important one is that a further analysis of the experimental data shows that the verbs' Faith values do not yield results as good as those gained from a collexeme analysis. This assessment of ours can be substantiated in several ways. First, we did two additional analyses of the data in which we included the verbs' Faith as an independent variable. In the first of these analyses, Faith was entered as a factor with two levels (i.e., Faith: *high* vs. Faith: *low*), where the dichotomization was done as with the other variables, namely on the basis of a scatterplot. The results of this ANOVA are presented in Table 8; we restrict the output to all main effects and the significant interactions.

Table 8. *Results of the ANOVA with Faith as an additional predictor*

Factor/interaction	F	p	effect size: partial η^2
Voice	0.248	0.619	0.001
CollStrength	42.301	<2E-10	0.081
Frequency	1.303	0.254	0.003
Faith	2.433	0.119	0.005
Voice × CollStrength	9.911	0.002	0.020
Voice × Faith	4.655	0.031	0.010
Frequency × Faith	10.515	0.001	0.021

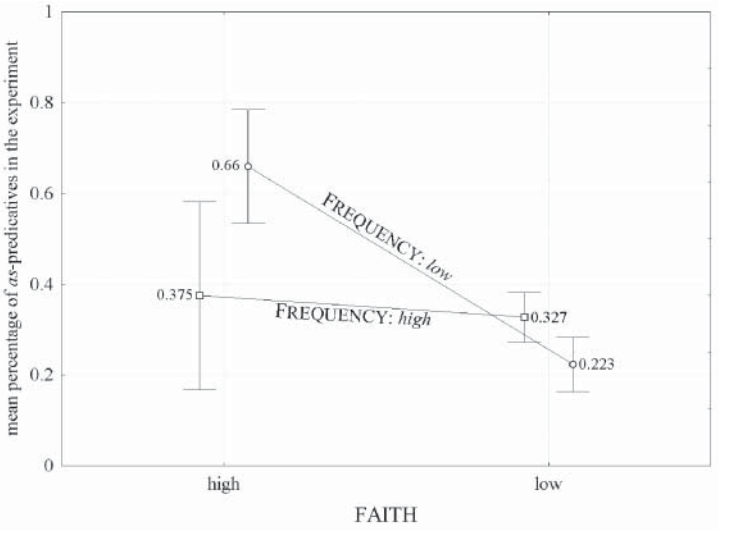

Figure 2. *The effects of* FAITH × FREQUENCY *on the relative frequencies of* as*-predicatives*

As it turns out, FAITH is much stronger than FREQUENCY (its effect size is nearly twice as high), but it does not reach standard levels of significance, whereas the effect size of COLLSTRENGTH has decreased compared to the first results discussed above, but it is still the strongest and most significant predictor. The reason for FAITH not being significant is obvious upon inspection of the significant interaction FREQUENCY × FAITH: the effect of FAITH is largely restricted to the verbs from the group FREQUENCY: *low* while that of COLLSTRENGTH is not (recall Figure 1 from above).

In addition to these statistical results,[20] there are also a few other reasons to prefer collostruction strength, which we will discuss briefly in what follows. For example, the ranking provided by FAITH is somewhat unintuitive. While we submit that the ranking provided by the collexeme analysis captures the *as*-predicative's semantics very well, the ranking provided by FAITH does not. (22) presents the first ten verbs in this list:

(22) *catapult* (one instance only: you're going to be catapulted into public life as Chief Rabbi; (ICE-GB: S1B-047), *re-elect* (one instance only: we have re-elected Denis as treasurer; ICE-GB S1B-078), *regard*, *hail*, *categoris|ze*, *class*, *advert to*, *prescribe for*, *tout*, *denounce*.

The shortcomings are obvious: Not only are the first two verbs determined by FAITH not at all typical of the *as*-predicative's semantics, they are also cases where FAITH is 1 just because the verbs occur only once in

Table 9. *FAITH values for the hypothetical co-occurrences of verbs X and Y and construction C*

	construction C	other constructions	Row totals
verb: *X*	**1**	0	**1**
other verbs	199	10,000	10,199
Col. totals	**200**	10,000	**10,200**

	construction C	other constructions	Row totals
verb: *Y*	**100**	0	**100**
other verbs	100	10,000	10,100
Col. totals	**200**	10,000	**10,200**

the corpus, namely in the *as*-predicative. Note that this points to a general shortcoming of FAITH: FAITH is extremely instable and sensitive—a *single* occurrence of a hapax verb in the construction suffices to raise a semantically unrevealing verb to the top of the list. By implication, FAITH does not make a difference between a verb X that occurs once in a corpus in a particular construction on the one hand and a verb Y that occurs 100 times in a corpus and always in the same construction. As is obvious from Table 9, FAITH is 1 in both parts for both verb X and verb Y $\left(\frac{1}{1} = \frac{100}{100} = 1\right)$.

By contrast, the computation of COLLSTRENGTH is such that more frequent co-occurrence is 'rewarded' so that Y would score high (collostruction strength for Y is 183.72)—which is what we would want—and X would not score high (collostruction strength for X is 1.71).

This ties in nicely with the relation between collostruction strength and the acquisition of (argument structure) constructions which previous works on collostruction strength have hinted at. In terms of numbers, it is intuitively much more plausible to assume that the child abstracts the meaning of the *as*-predicative from a verb Y than from verb X—i.e., from frequent co-occurrence rather than infrequent co-occurrence. In terms of specific verbs, the first three verbs in the COLLSTRENGTH ranking, *regard*, *describe* and *see*, give the exact meaning of the construction (*regard*), and its most prominent extensions on the basis of speech-act and perception verbs (the latter instantiating the most powerful and frequent metaphor in this construction). By contrast, the top ten instances of the FAITH list also contains *catapult*, *re-elect*, *advert to* and *tout*. True, the top ten of FAITH also contain the verbs *regard* and *categoris|ze*, but the PERCEIVING IS UNDERSTANDING metaphor does not figure among the

top ten while the relatively more marginal action verb *tout* does. Since the verbs on the CollStrength ranking are more frequent in and more distinctive for the construction (with collostruction strength being less sensitive to single occurrences), and since Faith is not able to distinguish between X and Y, we believe that the collostruction-strength ranking also fares better than Faith in this regard.

It is furthermore worth mentioning that Faith suffers from the same fundamental theoretical problem as Frequency: it only picks out two values from the whole table of co-occurrences shown as Table 1: While Frequency is based on a and a + c only and thus disregards a + b, N, and $\frac{a+b}{N}$—facing all the problems that follow from this strategy, Faith is similarly problematic since it only uses a and a + b, disregarding a + c, N and, most importantly, the ratio $\frac{a+c}{N}$. This, by the way, is of course the reason why Faith—just like Frequency—cannot identify repelled collexemes. On these theoretical grounds alone, which motivated the development of measures of association strength that take all figures of Table 1 into consideration, and which are independent of the research presented here, Faith is not the optimal choice. In sum, we claim that at least for our present analysis, CollStrength is superior to both Faith and Frequency.

A closer look at the data going beyond the main hypothesis to be investigated here yields some additional, interesting results. First, there is a significant interaction between Voice and CollStrength, which indicates that the influence of CollStrength differs across voices such that CollStrength makes more of a difference with actives than with passives. The effect size of this interaction, however, is fairly small and probably just reflects the above-mentioned fact that *as* predicates are frequently used in passives in general so that the lower baseline of *as*-predicatives in actives is more sensitive to collostruction effects.

Finally, while the above results are all based on means derived from collapsing responses across the four verb groups, it is also instructive to briefly inspect the results for the individual verbs. To that end, we tested whether the relative frequencies of *as*-predicatives produced across all verbs are more strongly correlated with the verbs' frequency in the *as*-predicative or with their collostruction strength to the *as*-predicative. The results are unambiguous: while the former correlation is small and only marginally significant ($\tau = 0.26$; $z = 1.944$; $p = 0.052$), the latter is much stronger and highly significant ($\tau = 0.52$; $z = 3.9$; $p < 0.001$). That is, the proportion of *as*-predicatives produced for each verb can be predicted much better on the basis of CollStrength than on the basis of either Frequency or Faith, which now provides even verb-specific support for the collostruction hypothesis.

4. Summary and conclusions

To recapitulate, there have been two major points on our agenda for this study, one of which presented by the close analysis of a construction in a usage-based framework. Crucially, this raised questions as to the methodological repertoire required to adequately deal with this.

Regarding the former, we have shown the English *as*-predicative to qualify as a construction in both a Langackerian and Goldbergian sense by identifying a number of its formal and semantic characteristics. Firstly, the formal flexibility in the realisation of the *as*-complement was found to be unpredictable from other constructions; secondly, the usage data represented by the most strongly attracted collexemes provided the basis of a detailed semantic description. They allowed us not only to identify several interrelated senses, but also to distinguish between the major constructional meaning and its various extensions.

With respect to the methodological part of this study, we have discussed what kinds of corpus data a constructional analysis, such as the one presented in Section 2, should be based on, i.e., what exactly constitutes the most appropriate type of corpus-based evidence. In addition to the verb ranking provided by the frequencies of the verbs occurring in this construction, a second ranking was obtained from a collexeme analysis. As the two rankings diverged considerably (cf. Section 2.3), additional evidence, elicited experimentally, was invoked to decide which of the rankings more adequately reflects actual usage. In particular, we asked which of the two makes the better predictions concerning native speakers' production preferences. In the sentence-completion experiment used to test this, collostruction strength strongly outperformed frequency. This effect was highly significant and robust for both means across experimentally defined verb groups and correlations across all verbs.

We wish to emphasize here again that we are fully aware of the fact that frequency, subcategorization probability and collostruction strength are intercorrelated. For example, the correlation between the observed frequency of all verbs in the *as*-predicative (i.e., all a-values in the tables) and the verbs' collostruction strengths is high and highly significant (adjusted $r^2 = 0.75$; $F_{1,105} = 327.2$; $p < 0.001$). We also find a significant, though much smaller, correlation between the verbs' subcategorization probabilities and their collostruction strengths (adjusted $r^2 = 0.1$; $F_{1,105} = 12.48$; $p < 0.001$). It does thus not come as a surprise that the predictions of the different measures are sometimes similar; and we do accord all these an important role in empirical linguistics.

However, the theoretical arguments and examples adduced in Sections 2.1 and 3.1 as well as the empirical results presented in Section 3.3

underline the superiority of collostruction strength as a measure of association between a lexical item W and a construction C. This became glaringly obvious in all cases where the different approaches made conflicting predictions. Concerning the advantages of collostructional analysis in general, we have firstly demonstrated in ample detail that it can identify co-occurrences which exceed chance levels specified by the analyst, while neither frequency nor subcategorization probabilities can do anything similar (and we indicated in our discussion of both hypothetical data sets and the present data that this can render analyses wanting). A second advantage of collostructional analysis is presented by the fact that it can not only identify words that are attracted to a construction, but also those repelled by it (see the appendix for repelled collexemes of the *as*-predicative, cf. also Stefanowitsch and Gries (2003) for more examples)—again, neither frequencies nor subcategorization probabilities can perform similar tasks. We furthermore argued that, thirdly, CollStrength provides a much more reasonable ranking of verbs than do either Faith or frequency. Fourthly and finally, CollStrength outperformed both Frequency and Faith when it came to predicting native speakers' sentence completions. Though the verb subcategorization probability Faith (i.e., p (construction|verb)) was still a significant predictor, CollStrength was stronger, with relative frequency (i.e., p (verb|construction))—the most widely used measure in contemporary cognitive linguistics (recall the discussion in Section 2.1)—being insignificant altogether.

In addition to the experimental work presented in this paper, we have just completed a series of reading-time experiments (cf. Gries, Hampe and Schönefeld, to appear) to explore in more detail the different predictions made by frequency approaches and collostructional approaches, respectively, and basically obtained the same tendency as the one reported here: collostruction strength is much more important in determining reading times of *as*-predicatives than the absolute frequency of verbs in the *as*-predicative.

While our findings may superficially appear trivial, we believe that their importance must not be underestimated. While much work in corpus linguistics and computational linguistics has recognized the problems of using frequency data, this is not universally so in the cognitive-linguistic community. We, therefore, wish to emphasize again that arguing and theorizing on the basis of mere frequency data alone runs a considerable risk of producing results which might not only be completely due to the random distribution of words [in a corpus], but which may also be much less usage-based than the analysis purports to be.

If cognitive linguists aim to be true to their tenet of providing a realistic usage-based picture, then their methods must be geared to their purposes.

As regards the use of corpus evidence, they firstly need to do justice to what usage data really look like quantitatively, and, secondly, should seek for additional validation of the results and methods employed by gathering evidence from other sources. It is our impression that such methodological combinations are in fact an indispensable tool to obtain really robust and reliable evidence. While collostructional analysis is of course by no means the only methodological tool to obtain empirically more reliable results from corpora, it is a method that can be adapted to many different phenomena within cognitive linguistics, it is easy to implement with a program available from the first author and it has proved useful for a variety of research purposes, including, of course, the investigation of constructions as defined in construction grammar (cf. the studies by Gries and Stefanowitsch mentioned above as well as Colleman 2004; Gilquin 2004; Hilpert 2004), but also syntactic priming within psycholinguistics (cf. Gries 2005), or the acquisition of foreign-language constructions (cf. Gries and Wulff 2005). We therefore hope that the present study will not only caution researchers to make sure that their methodological choices fit their objectives, but also motivate future empirical work along these lines.

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Appendix

Section 1. Corpus results

Table (a). *All collexemes of the* as-*predicative* (*[VP complex transitive V [PP* as*]]*) *in the ICE-GB*

Verb in the *as*-predicative	Freq of V in the ICE-GB	Obs. freq of V in the *as*-predicative	Exp. freq of V in the *as*-predicative	Faithfulness of V to the *as*-predicative	Relation between V and the *as*-predicative	Collostruction strength
regard	99	80	0.49	0.8081	attraction	166.476
describe	259	88	1.28	0.3398	attraction	134.87
see	1988	111	9.85	0.0558	attraction	78.79

Table (a). (*Continued*)

Verb in the *as*-predicative	Freq of V in the ICE-GB	Obs. freq of V in the *as*-predicative	Exp. freq of V in the *as*-predicative	Faithfulness of V to the *as*-predicative	Relation between V and the *as*-predicative	Collostruction strength
know	2120	79	10.5	0.0373	attraction	42.796
treat	92	21	0.46	0.2283	attraction	28.224
define	83	18	0.41	0.2169	attraction	23.843
use	1228	42	6.08	0.0342	attraction	21.425
view	41	12	0.2	0.2927	attraction	17.861
map	23	8	0.11	0.3478	attraction	12.796
recognis|ze	114	12	0.56	0.1053	attraction	12.159
categoris|ze	10	6	0.05	0.6	attraction	11.525
perceive	28	6	0.14	0.2143	attraction	8.304
hail	4	3	0.02	0.75	attraction	6.316
appoint	35	5	0.17	0.1429	attraction	6.073
interpret	35	5	0.17	0.1429	attraction	6.073
class	5	3	0.02	0.6	attraction	5.92
denounce	7	3	0.03	0.4286	attraction	5.379
dismiss	25	4	0.12	0.16	attraction	5.158
consider	264	9	1.31	0.0341	attraction	5.079
accept	178	7	0.88	0.0393	attraction	4.467
name	41	4	0.2	0.0976	attraction	4.282
portray	19	3	0.09	0.1579	attraction	3.956
advert to	4	2	0.02	0.5	attraction	3.835
diagnose	6	2	0.03	0.3333	attraction	3.44
think of	206	6	1.02	0.0291	attraction	3.209
depict	8	2	0.04	0.25	attraction	3.172
cite	9	2	0.04	0.2222	attraction	3.064
rate	9	2	0.04	0.2222	attraction	3.064
train	40	3	0.2	0.075	attraction	2.981
cast	41	3	0.2	0.0732	attraction	2.95
take	1653	18	8.19	0.0109	attraction	2.732
conceive	14	2	0.07	0.1429	attraction	2.669
display	62	3	0.31	0.0484	attraction	2.433
catapult	1	1	0	1	attraction	2.305
re-elect	1	1	0	1	attraction	2.305
refer to	141	4	0.7	0.0284	attraction	2.258
prescribe for	2	1	0.01	0.5	attraction	2.005
tout	2	1	0.01	0.5	attraction	2.005
acknowledge	31	2	0.15	0.0645	attraction	1.984
construe	3	1	0.01	0.3333	attraction	1.83
mark down	3	1	0.01	0.3333	attraction	1.83
visualis|ze	3	1	0.01	0.3333	attraction	1.83
present	103	3	0.51	0.0291	attraction	1.828
register	39	2	0.19	0.0513	attraction	1.793

Table (a). (*Continued*)

Verb in the *as*-predicative	Freq of V in the ICE-GB	Obs. freq of V in the *as*-predicative	Exp. freq of V in the *as*-predicative	Faithfulness of V to the *as*-predicative	Relation between V and the *as*-predicative	Collostruction strength
misread	4	1	0.02	0.25	attraction	1.706
conceive of	5	1	0.02	0.2	attraction	1.61
symbolis|ze	5	1	0.02	0.2	attraction	1.61
gloss	6	1	0.03	0.1667	attraction	1.532
claim	141	3	0.70	0.0213	attraction	1.475
designate	7	1	0.03	0.1429	attraction	1.466
adopt	62	2	0.31	0.0323	attraction	1.419
praise	8	1	0.04	0.125	attraction	1.409
show	639	7	3.17	0.011	attraction	1.379
credit	10	1	0.05	0.1	attraction	1.315
group	10	1	0.05	0.1	attraction	1.315
show up	10	1	0.05	0.1	attraction	1.315
translate	11	1	0.05	0.0909	attraction	1.274
intend	79	2	0.39	0.0253	attraction	1.231
classify	13	1	0.06	0.0769	attraction	1.204
characteris|ze	14	1	0.07	0.0714	attraction	1.173
label	14	1	0.07	0.0714	attraction	1.173
fancy	18	1	0.09	0.0556	attraction	1.068
term	21	1	0.1	0.0476	attraction	1.004
serve	114	2	0.56	0.0175	attraction	0.958
establish	124	2	0.61	0.0161	attraction	0.899
construct	30	1	0.15	0.0333	attraction	0.859
list	30	1	0.15	0.0333	attraction	0.859
choose	133	2	0.66	0.015	attraction	0.85
represent	134	2	0.66	0.0149	attraction	0.845
judge	32	1	0.16	0.0312	attraction	0.833
keep	412	4	2.04	0.0097	attraction	0.825
elect	34	1	0.17	0.0294	attraction	0.809
preserve	34	1	0.17	0.0294	attraction	0.809
count	43	1	0.21	0.0233	attraction	0.716
paint	52	1	0.26	0.0192	attraction	0.643
declare	54	1	0.27	0.0185	attraction	0.628
observe	55	1	0.27	0.0182	attraction	0.621
build	192	2	0.95	0.0104	attraction	0.609
offer	198	2	0.98	0.0101	attraction	0.59
attack	64	1	0.32	0.0156	attraction	0.565
date	65	1	0.32	0.0154	attraction	0.559
prepare	72	1	0.36	0.0139	attraction	0.522
leave	583	4	2.89	0.0069	attraction	0.485
express	81	1	0.4	0.0123	attraction	0.48
propose	81	1	0.4	0.0123	attraction	0.48

Table (a). (*Continued*)

Verb in the *as*-predicative	Freq of V in the ICE-GB	Obs. freq of V in the *as*-predicative	Exp. freq of V in the *as*-predicative	Faithfulness of V to the *as*-predicative	Relation between V and the *as*-predicative	Collostruction strength
suggest	259	2	1.28	0.0077	attraction	0.435
identify	99	1	0.49	0.0101	attraction	0.411
publish	105	1	0.52	0.0095	attraction	0.391
measure	114	1	0.56	0.0088	attraction	0.364
base	142	1	0.7	0.007	attraction	0.296
report	144	1	0.71	0.0069	attraction	0.292
have	4287	5	21.24	0.0012	repulsion	4.659
make	1951	1	9.67	0.0005	repulsion	3.203
put	1427	2	7.07	0.0014	repulsion	1.564
find	941	2	4.66	0.0021	repulsion	0.811
call	650	1	3.22	0.0015	repulsion	0.777
give	1160	3	5.75	0.0026	repulsion	0.761
read	609	1	3.02	0.0016	repulsion	0.71
look at	460	1	2.28	0.0022	repulsion	0.476
provide	380	1	1.88	0.0026	repulsion	0.359
write	589	2	2.92	0.0034	repulsion	0.356
remember	374	1	1.85	0.0027	repulsion	0.35
run	374	1	1.85	0.0027	repulsion	0.35
allow	331	1	1.64	0.003	repulsion	0.291
hold	309	1	1.53	0.0032	repulsion	0.262
agree	279	1	1.38	0.0036	repulsion	0.224
develop	233	1	1.15	0.0043	repulsion	0.168

Section 2. Experimental results

Table (b). *The frequency distribution of* as-*predicative continuations across all factor level combinations*

CollStrength	Frequency	Voice	¬ *as*-predicative	*as*-predicative	Totals
high	high	active	29	35	64
		passive	38	26	64
	low	active	30	32	62
		passive	38	23	61
low	high	active	49	9	58
		passive	48	10	58
	low	active	59	4	63
		passive	52	11	63
Totals			343	150	493

Table (c). *The frequency distribution of* as*-predicative continuations for all verbs*

Verb	¬ *as*-predicative	*as*-predicative	Totals
acknowledge	14	2	16
build	15	0	15
choose	15	0	15
claim	16	0	16
class	0	16	16
conceive	14	2	16
define	5	11	16
denounce	11	5	16
depict	5	11	16
describe	3	13	16
diagnose	13	3	16
hail	4	8	12
intend	15	1	16
keep	25	1	26
know	10	6	16
leave	26	0	26
offer	5	11	16
present	15	1	16
rate	7	8	15
recognis|ze	11	5	16
refer_to	15	17	32
regard	10	6	16
represent	16	0	16
see	3	13	16
show	31	1	32
suggest	14	2	16
use	14	2	16
view	11	5	16
Totals	343	150	493

Notes

* The order of authors is arbitrary. We thank James Bean, Volker Dellwo, Willem Hollman and Julian Preece for carrying out the sentence-completion experiment with students from UCL, University of Lancaster and University of Kent at Canterbury. In addition, we also thank the audience at the Third International Conference on Construction Grammar in Marseille, France, where a previous version of this paper was presented. Finally, a word of thanks is due to the editor of Cognitive Linguistics as well as to two anonymous reviewers for their feedback, which made it possible to improve the paper in a substantial number of respects. Any remaining insufficiencies are entirely our own. Authors' e-mail addresses: ⟨stgries@linguistics.ucsb.edu⟩, ⟨Beate.Hampe@rz.uni-jena.de⟩, ⟨doris.schoenefeld@ruhr-uni-bochum.de⟩.

1. All examples quoted in this article are taken (sometimes in a slightly abridged form) from the ICE-GB (1 mill words), except when quoted as citation forms. When explicitly

marked as being taken from the BNC, reference is made to the BNC sampler edition (two million words).

2. Just as other argument-structures with complements/predicatives come in both a subject- and an object-related variety (cf. Quirk et al. 1985: 56), there is also a subject-related *as*-predicative in English: *John works as a clerk. This came as a surprise.* This mono-transitive argument-structure construction is excluded from the investigation presented here, which concentrates on the complex-transitive pattern.
3. Though we specify the most frequent realization of the direct-object phrase as NP, the schema is not meant to exclude the marginal possibility of objects realized by nominal clauses.
4. We will leave aside here the question whether such an understanding does not reflect the list and rule fallacy commonly attributed to reductionist views on language in that it seems to follow the assumption that "particular statements (i.e., lists) must be excised from the grammar of a language if general statements (i.e., rules) that subsume them can be established" (Langacker 1987: 29).
5. For more details on the corpus, see: ⟨http://www.ucl.ac.uk/english-usage/ice-gb⟩.
6. For more details on the corpus, see: ⟨http://www.natcorp.ox.ac.uk/getting/sampler.html⟩.
7. However, prepositional verbs of both type I (*look upon X, talk about X, think of X*) and type II (*place value upon X*) as well as type II phrasal verbs (*write X down, mark X out, type X in*) can realise the verb slot in the *as*-predicative yielding the following attested expressions: *look upon X as Y, talk about X as Y, think of X as Y, place value upon X as Y, write down X as Y, mark out X as, type in X as Y*.
8. Hampe and Schönefeld (2003) provisionally termed these uses of complex-transitive complements without *as* (exemplified by *find the problem difficult*, *call it a simple question*, *fear a person dead*, etc.) 'attributive' in order to distinguish them from formally similar 'resultative' uses of the complex-transitive pattern with object complements.
9. Related methods are *distinctive collexeme analysis* referring to a method to identify those words which distinguish best between two different constructions (cf. Gries and Stefanowitsch 2004a), and *co-varying collexeme analysis* as a method to investigate how different slots of one construction are related (cf. Gries and Stefanowitsch 2004b).
10. Generally, collostruction analysis can be done on the basis of either the lemma-frequency (i.e., the frequency of all word forms of W_1 in the corpus), or on the basis of just the frequency of one particular word form. In this study, we opted for the former, but nothing relevant to our concerns hinges on this decision.
11. The adequacy of using the Fisher-Yates Exact test for collostructional analysis has been justified in detail elsewhere (cf. Stefanowitsch and Gries 2003; Gries and Stefanowitsch 2004a). See Evert (2004) for an overview of many further association measures. For many practical purposes, the results yielded by the Fisher-Yates Exact test are identical at least to those of Poisson, one-sided binomial, log-likelihood anyway (cf. Evert 2004: 96, passim).
12. Though the choice of the Fisher-Yates Exact test has been criticized for being computationally very expensive, which is doubtlessly true, (i) it is the researcher's decision whether s/he is willing to undertake this effort; and (ii) an interactive computer program written by the first author (cf. Gries 2004), which can perform all computations automatically once the data have been entered, is now available and has also been used for the calculations in this paper.
13. There is a multitude of reasons for using the negative log to the base of 10 (cf. also Evert 2004: 67). First, it is easier to understand than the regular E-120 notation, with

which not everybody is familiar. Second, it is mathematically derived from, and thus absolutely equivalent to, the p-value: whoever prefers p-values, can compute them from our figures. Third, taking the log has the advantage that one can use positive logs for attracted collexemes and negative logs for repelled collexemes: this is not possible with p-values which are unidirectional. Finally, using the log allows for comparing collostruction strength values to other interval-scaled data (e.g., frequencies) using linear correlation coefficients.

14. As regards consistency of the coding procedure, cases where one verb appeared with more than one *as*-predicative were only coded as one occurrence of the verb (e.g., *He sees doctrine as representing living power in the form of real ideas, as a description of our humanity, and therefore as a method of enlivening rather than fossilizing the intellect*). By contrast, appearances of more than one verb with one *as*-predicative were coded for each verb separately (e.g., *These are stored and used as the sole means for positioning the robot for subsequent milkings*). For a complete list of all collexemes with collostruction strengths and percentages of occurrence, cf. Section 1 of the appendix.

    Another comment is due concerning the choice of the corpus. While the ICE-GB is a relatively small corpus of approximately 1 m words only, it was a useful starting point: Given the large number of structural configurations the *as*-predicative can take on, being able to use a parsed and manually corrected corpus should result in quick and largely error-free retrieval (on the assumption that the parse is correct, that is; cf. Gries, Hampe and Schönefeld, to appear, for details).
15. Note in passing how the corpus-based evidence relates to less empirically-founded statements. As Manning (2003: 298–299) points out, Pollard and Sag (1994: 105–108) claim that *consider* does not subcategorise for *as*-complements. While Manning already provides a few counterexamples from the LDC newswire of the New York Times, indicating that this constraint may not hold, the present, more exhaustive analysis shows that—at least in British English—*consider* is in fact significantly attracted to the *as*-predicative, even though much less so than its near-synonym *regard*.
16. The scenarios denoted may implicate a partial change on the side of the object referent, and thus comprise a truly resultative dimension, which can be captured by paraphrases with 'make': 'make so. their agent', 'make so. the leader of the party', 'make the county a unit of mapping'. This resultative aspect, however, is downplayed by the verbs appearing in the *as*-predicative, which emphasize the partial and temporary nature of a change of role and status.
17. If one does not already know that the ditransitive is associated with a transfer meaning, *get* (having as many as 36 senses in WordNet 2.0) is less useful to an investigation of the ditransitive's semantics than other much less general verbs such as *hand* or *permit* (with only two or three senses in WordNet 2.0). Though *get* can of course be used in the ditransitive with a 'transfer' sense referring to a similar change of possession as *give* does (e.g., *It got us quite a good grade.*), *get* is much more strongly associated with another sense and construction likewise related to change of possession, namely the transitive construction with its different order of coarse semantic roles as in *I got some dried flowers in vases*, where the subject is the recipient and not the agent (for an exemplification of how important such orderings can be psycholinguistically, cf. Hare and Goldberg 1999). A look at WordNet 2.0 strongly supports this point: The transitive change-of-possession sense is by far the most frequent one of *get* while the ditransitive use is only the sixth most frequent one, with only 16 percent of the occurrences of the transitive one.
18. Note that this is an example of a distinctive collexeme analysis (cf. Gries and Stefanowitsch 2004a), not the regular collexeme analysis from above. In distinctive collexeme

analysis, the focus is not on quantifying the association between verbs and a single construction, but between a word (e.g., *go*) and two constructions (e.g., the intransitive-motion construction and the *going-to* future); therefore, the totals do not add up to all constructions in the corpus, but to the total number of the constructions involved in the comparison; cf. Gries and Stefanowitsch (2004a: Section 3) for case studies and detailed discussion.

19. Since collostruction strength is highly correlated to the frequency of some word in a construction (cf. Section 4), there were only four verbs characterized by a low collostruction strength and, at the same time, a high frequency of occurrence with the *as*-predicative. It is admittedly not an ideal situation that the dichotomization of the verbs resulted in assigning two verbs to different classes although their frequencies of occurrence in the *as*-predicative differed only by one. On the other hand, there is a variety of reasons to support our procedure: First, one has to draw a distinction somewhere and we decided to do it visually on the basis of the above-mentioned scatterplot. If, for example, we had decided to dichotomize the collostruction strengths on the basis of a partitioning cluster analysis, PAM (cf. Kaufman and Rousseeuw 1990: chapter 2), the resulting analysis would also have split up the verbs such that the least frequent verb in the group with high collostruction strength would have occurred only once more often in the *as*-predicative than the most frequent verb in the low-collostruction-strength group. Second, it is extremely unlikely that the data are as noisy or unsystematic: Not only did we get significant results, we also got exactly the ones that we predicted on the basis of theoretical arguments which are based on much previous work on association measures as well as our own empirical study. It is always possible to voice *post hoc* criticism concerning the data, but given the clarity of the results we submit that the burden of proof lies with those who formulate the criticism. Third, the significant difference between the correlations between the verbs' completion preferences on the one hand and their collostruction strengths and frequencies on the other hand also indicates that the distinction we have introduced yields the predicted result in spite of the closeness of the experimental verb groups. Finally, in the meantime, an additional experiment using reading times (Gries, Hampe and Schönefeld, to appear) has yielded very similar results when again comparing FREQUENCY and COLLSTRENGTH.
20. To be on the safe side, we also did a second analysis in which FAITH was not entered into the analysis as a factor with two levels but as a covariate on an interval scale. In this analysis, FAITH turned out to be a significant predictor ($p < 0.001$), but its effect size was 25 percent lower than that of COLLSTRENGTH.

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