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From *quick* to *quick-to*-INFINITIVAL: on what is lexeme specific across paradigmatic and syntagmatic distributions¹

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Adjectives are paradigmatically versatile: they combine with many different items in the same syntactic configuration. They are also syntagmatically versatile: they occur in many different syntactic configurations. Given this versatility, how and to what extent can lexeme-specific preferences and features of the adjectives be identified? With the adjective *quick* as its starting point, this article answers this question by using corpus data, contrasting the behavior of *quick* with that of its semantic neighbors. Case study 1 investigates *quick*'s attributive usage. It is shown that *quick* in its default usage combines with eventive heads, and that there are clear differences in combinatorial preferences across its semantic neighbors. Case study 2 investigates the *quick-to*-INFINITIVAL construction. Here, direct combination with eventive heads is impossible. It behaves differently from other *ADJ-to*-INFINITIVAL constructions as well as the competing *quickly* constructions. Comparison of the availability of this construction for *quick*'s semantic neighbors, and linking this to the results of study 1, shows a clear connection between paradigmatic and syntagmatic distributions.

Keywords: *ADJ-to*-INFINITIVAL construction, collocations, adverbs, adjectives

1 Introduction

As opposed to nouns and verbs, adjectives are not among the most fundamental lexical categories in English. When used attributively, they modify a noun head, when used predicatively, they complement a verb. This might suggest that their whole distribution is shaped by preferences of the respective heads that they combine with, and that adjectives come with fewer semantic and combinatorial preferences of their own. This article puts this view to the test: to what extent do the adjectives themselves shape their distributions? In other words, what can we learn about their lexical semantics and

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combinatorial preferences by carefully analyzing their distribution? Can we use their distribution to read off their default semantics? And to what extent are the distributions of adjectives linked across different constructions? To address these questions, this article focuses on the adjective *quick*, empirically exploring its distributional preferences within and across constructions, and within the set of its semantic neighbors. At the same time, by showing that the distribution of *quick* can be exploited to answer these questions, this article provides a blueprint for how these questions can be addressed for adjectives in general.

The adjective *quick* is paradigmatically versatile: it can combine with many different items in the same syntactic configuration. It is also syntagmatically versatile: it can be used in many different syntactic configurations. Attributive *quick* illustrates the former; it can be combined with heads from many different semantic categories, as in the examples from the *British National Corpus* (BNC 2007) in (1).²

- (1) (a) Either let your hair dry naturally or give it a **quick blast** with a diffuser/dryer.
- (b) Llewellyn was a **quick thinker**, and gave the Masonic sign of distress on the faint chance that the trooper was also a member of the order.
- (c) Perhaps a **quick cup** of coffee?
- (d) This may be because it was intended to be a **quick method** of banning undesirable consumer trade practices and in practice it turned out not to be very quick at all.

The denotations of the four head nouns clearly fall into different semantic categories: a blast is an event, a thinker is an animate physical object, a cup is an inanimate physical object, and a method is a non-physical object. At the same time, it has long been argued (see Pustejovsky 1995) that they are all similar. While (1a) explicitly refers to an event, the other examples require one to interpolate an event for successful interpretation: a quick thinker is somebody who thinks quickly, a quick cup is a cup that is drunk quickly, and a quick method is a method that allows one to do things quickly. That is, at the level of semantic interpretation, *quick* always relates to an event, even when syntactically combining with items with non-eventive denotations.

Quick's syntagmatic versatility is already evident from its ability to occur as a predicative adjective. Here, two patterns can be distinguished: the simple predicative pattern in (2) and the *quick-to*-INFINITIVE pattern in (3).

- (2) (a) Jane's appointment was **quick** and unceremonial.
- (b) The guy was **quick** on to the brakes, but not quick enough for poor old Pikey.
- (3) (a) Tom is **quick to insist** his discoveries have been purely incidental.
- (b) Darwin himself was **quick to appreciate** this.

In the simple predicative pattern, the subjects can refer to events, as in (2a), as well as other categories, as in (2b). For the *quick-to*-INFINITIVE pattern, the subjects typically refer to humans, that is, animate physical objects, as in (3), and never to events. Similar to the

² Unless otherwise indicated, all following examples are also from the BNC.

attributive patterns, *quick* needs to be related to an event for successful interpretation. For (2b), a plausible interpretation is that *quick* indicates that the time up until the braking event was short. For the two examples in (3), plausible interpretations similarly rely on *quick* indicating that the time up until the events denoted by the respective infinitival forms was short.

Quick's versatility is unexpected on theoretical accounts of *quick* and similar speed-related adjectives, which unanimously treat *quick* as an event predicate, each providing their own solutions to this combinatorial problem (see e.g. Pustejovsky 1995; Larson 1998; Bücking & Maienborn 2019).

Does a closer look at the empirical data support the intuitive categorization of *quick* as an event predicate? Further, is this versatility simply a feature of speed-related predicates in general, or does the *quick*-lexeme itself license this flexibility? Finally, how independent is a lexeme like *quick* from its syntagmatic context? That is, can we find features of *quick* that explain its overall syntagmatic distribution in contrast to that of other speed-related adjectives?

To address these questions, this article combines two case studies. Case study 1 compares the combinatorics of attributive *quick*, its most frequent usage, with that of its semantic neighbors. Case study 2 investigates the syntagmatic usage of *quick* that is qualitatively and distributionally most different from its attributive usage, its occurrence in the *quick-to-INFINITIVAL* construction. The rationale behind choosing these two constructions is that this will result in an comprehensive overview of what is typical and what is atypical for *quick*, and how much of its combinatorial behavior can be attributed either to it being a speed-related adjective, or to its occurrence in a specific syntactic environment, and how much of its behavior is specific to the lexeme *quick* itself.

The aim of this article is threefold. On the methodological side, it explores to what extent the combination of purely quantitative, semi-automatically extracted corpus-based data with qualitative analysis (a) is in line with intuition-based classifications and (b) allows one to better understand the consistency of lexemes across different syntagmatic usages.

On the descriptive level, it provides a corpus-based overview of *quick* and other speed-related adjectives in their different forms and usages. It investigates the competition between these lexemes, and shows how a corpus approach can be used to disentangle semantic details in their usages. To gain a fuller understanding of contributions specific to the adjectives, two case studies are presented, juxtaposing the attributive usages, the most frequent usage of *quick*, with the *ADJ-to-INFINITIVAL* construction, the usage of *quick* which is most dissimilar to all its other usages.

On the theoretical side, it explores the extent to which the results obtained with this methodology are in line with the theoretical assumptions, or offer new insights for the theoretical approaches, especially concerning the consistency across different syntagmatic usages of one lexeme. Further, this article investigates whether the assumption that *quick* is an event predicate can be linked to its distribution in language. This link is *quick*'s default usage, that is, its most frequent usage in its most

frequent construction. The corpus data also allow one to probe the richness of lexeme-level information by comparing *quick* in its default usage to the behavior of its semantic neighbors, and repeating this exercise with *quick*'s usage that is qualitatively most different from this default usage, its occurrence in the *quick-to-INFINITIVAL* construction. The findings are in line with the idea that the potential to force eventive readings in combination with non-eventive heads is a feature of *quick*, in contrast to other adjectives. The crucial role of lexical semantics in shaping the overall distribution is supported by the finding that even in the *quick-to-INFINITIVAL* construction, *quick* behaves more like adjectives that are also closer to it in its attributive usage. The findings support the assumption of a rich lexical entry for *quick* that already caters for the possibility of combining it attributively with non-eventive heads but also shapes its distribution across usages.

The starting point of this article is the different usages of *quick*. After this introduction, section 2 situates the aim of this contribution within previous research on the combinatorics of modifiers. Section 3 shows the usages to be considered and introduces the items used for paradigmatic comparison. Section 4 presents the first case study on the patterns found in *quick*+noun combinations, that is, in its attributive usages. Case study 2 in section 5 delves into the *quick-to-INFINITIVAL* construction. Section 6 takes stock and discusses to what extent the paradigmatic and syntagmatic distributions are connected. Section 7 concludes.

2 Previous accounts of the combinatorics of modifiers

For semantic accounts, the versatility of modifiers is seen as a challenge to semantic compositionality. Much-discussed examples include the attributive usage of *fast*, a near-synonym of *quick*; see the two examples in (4).

- (4) (a) a fast decision
(b) a fast typist

The combination in (4a) appears to be unproblematic: a decision is an event, and it seems plausible to assume that *fast* is a predicate that holds of events. What about *a fast typist*? Discussing this example within his Generative Lexicon framework, Pustejovsky (1995: 89) assumes that the adjective *fast* here is again an event predicate. This presents a combinatorial problem, as a typist refers to a physical object, not an event. To combine the two, the *qualia structure* of the noun, *typist*, comes into play. The qualia structure is 'the structured representation which gives the relational force of a lexical item' (Pustejovsky 1995: 76). One essential aspect of a word's qualia structure is the *telic aspect*, capturing the purpose and function of an object. The head noun is thus the key to the resolution of the combinatorial problem, whereas the adjective remains unchanged. For *typist*, an agentive nominal, 'the TELIC makes direct reference to the process-denoting verb from which the nominal is derived' (Pustejovsky 1995: 89). Via the verb, a typing event can be accessed, and *fast* predicates of this typing event. Due to the fact that *typist* is derived from *to type*, this

step seems straightforward. However, combinations of *fast* and a noun that refers to a physical object are not restricted to deverbal heads; see relevant examples in Pustejovsky (1995: 44–5): *fast boat, fast game, fast book, fast garage* etc.

Bücking & Maienborn (2019), making reference to Lascarides & Copestake (1998: 391–5), Egg (2003: 168–72) and Asher (2011), discuss a number of weaknesses of this approach, pointing out in particular that it is unclear how much and which parts of world knowledge are to be incorporated into a lexical entry. Further, as it stands, Pustejovsky also does not show how to account for all the different event readings of the same combination (e.g. *fast boat* as ‘a boat that is fast to assemble’ vs ‘a boat that can ride fast’ etc.). In its reliance on the telic aspect, Pustejovsky’s account also cannot explain how one arrives at the reading ‘dog that can run fast’ for the combination *fast dog*, since, according to Bücking & Maienborn (2019), it is clearly not the function of a dog to run.

Analyzing parallel data in German, Bücking & Maienborn (2019), building on Asher (2011), propose that the locus of possible adjustments, or interpolations, is the lexical entry of the adjective, not the head. They draw core support for their account from observations of the behavior of three German translation equivalents of *fast*, the three near-synonyms *schnell* ‘quick’, *flink* ‘nimble’ and *rasch* ‘rapid’. Their core observations are the following: (i) *schnell* ‘quick’ is the most liberal with regard to the semantic categories it combines with. However, semantically, it must always relate to events. If the head noun does not refer to an event, ‘the composition must facilitate the interpolation of an appropriate eventive entity’ (Bücking & Maienborn 2019: 6). Crucially, the event to be interpolated is underspecified. Thus, *eine schnelle Zigarette* ‘a quick cigarette’ can be interpreted as a cigarette that is smoked quickly or as a cigarette that is rolled quickly. (ii) *flink* ‘nimble’ is more restrictive in that it requires events that consist of small fast movements and cannot denote short running times of eventualities as wholes. When combined with a non-eventive head, *flink* is also more restrictive in that the interpolated events are events in which the head noun is a moving entity, usually the agent. (iii) *Rasch* ‘rapid’ is likewise more restrictive than *schnell*. However, the restrictions on *flink* and *rasch* differ, leading to a number of minimal pairs. Bücking & Maienborn (2019) present proposals for formal representations of the three adjectives that capture the difference in combinatorial behavior using an adaptation of Asher’s framework.

While Pustejovsky (1995) arrives at an event via the noun’s qualia structure and Bücking & Maienborn (2019) via interpolation, Larson (1998: 151–2) relates event variables to common nouns more directly, using relational evaluation predicates (see Larson & Segal 1995). For example, *dancer* applies to pairs of individuals, with one member of the pair being the agent, the other the event. This allows Larson to account for the analysis of *beautiful dancer* as either ‘person that is beautiful and a dancer’ or ‘person that dances beautifully’. Larson (1998: 159) notes that the nouns motivating his analysis either have a clear verbal counterpart or have a counterpart referring to a state or action (e.g. *cellist/cello-playing*). Whether or not a similar analysis is supportable for other cases, and here he mentions *fast plane* and *quick cup*, with both

speed-related adjectives taken to be event predicates only (in the terminology of his paper, nonintersective predicates), is left open. In fact, Larson (1998: 161) points out that ‘[t]his entire area evidently merits a thoroughgoing review, with very careful scrutiny of individual cases’.

Both Larson (1998) and Bücking & Maienborn (2019) note that for the readings that are of interest to them, the predicative usage shows interesting restrictions. Larson (1998) argues that (5a) only allows the intersective reading (= The person is a dancer and beautiful), while (5b) retains the event-related reading.

- (5) (a) That dancer is beautiful. (= 40a in Larson 1998)
 (b) That cup of coffee was quick. (= 40d in Larson 1998)

Bücking & Maienborn (2019) note that combinations that are possible attributively are deviant in the predicative construction: while *eine schnelle Zigarette* ‘a quick cigarette’ (see above) is fine, (6) is deviant and cannot mean that the cigarette was smoked/rolled quickly.

- (6) # Die Zigarette war schnell. (= 81b in Bücking & Maienborn 2019)
 the cigarette was quick

At the same time, there is no extended discussion of these deviations. Similarly, the finding that *quick*, assumed to be an event predicate, frequently occurs in the *quick to*-INFINITIVAL construction where the subject is never an event is not discussed anywhere.

This article remains in large parts agnostic as to the detailed spell-out of the formal approaches. Rather, it is concerned with issues underlying the formal approaches, and the extent to which they can be addressed by using a purely data-driven approach:

1. All theoretical accounts, Pustejovsky (1995), Larson (1998), as well as Bücking & Maienborn (2019), have to assume that *fast* or its German translation equivalents are event predicates. How can this assumption be justified without appealing to intuition? This article puts empirical flesh on the bones via a combination of quantitative and qualitative analyses, and argues that this assumption is in line with its results. The usage of *quick* as an event predicate is its default usage in the sense that it is its most frequent usage in its most frequent construction. That is, what is taken to be an intuitively plausible classification can be arrived at via statistical evidence of the distribution of *quick*.
2. Bücking & Maienborn (2019) (and also Pustejovsky 1995) assume a difference in the way the meanings of *schneller Griff* ‘quick grip’ and *schnelle Forelle* ‘quick trout [a trout that moves/is made quickly]’³ come about, namely one through direct intersection, the other through access to an associated or interpolated event.

³ One reviewer noted that only the movement interpretation seems grammatical to him. In fact, this variation in judgments supports the approach of this article: can we find methods that provide empirical evidence supporting analyses that are based on intuition?

However, both types of combinations are equally grammatical. Can we find evidence in corpora that this distinction can be made from looking at the distribution of the modifiers alone? This article argues again that the distributional evidence is in line with such a differentiation, using as evidence the paradigmatic comparison of attributive *quick* to its synonyms as well as the syntagmatic distribution of *quick*.

3. The focus of the theoretical approaches has been on the attributive usage, with just pointers to the limitations and peculiarities of predicative usages. This again raises the question to what extent the different usages for a given lexeme are interconnected, allowing one to address the question to what extent the behavior of *quick* is a function of the general versatility of modifiers, or of this lexeme in particular.

The answers to these questions are of more general importance, going beyond the individual lexical items discussed so far. At the most abstract level, this concerns the role of parts of speech typically seen as secondary to nouns and verbs in shaping their own distributions. At a lower level, it pertains to the feasibility of empirical validations of theoretical assumptions: the combinations motivating the discussion, adjective–noun strings and predicative constructions, all consist of content words. According to the approach taken by Pustejovsky and Larson as well as Bücking & Maienborn, similar fine-grained decisions with regard to their lexical entries have to be made for all other content words. This approach only becomes cognitively plausible if it can be shown that these categorizations can be read off from the distribution of the items.

The strategy of this article is to close in on the lexical specifics of *quick* and its kin by focusing on its most frequent usage, the attributive construction, and the usage most different from this usage, its occurrence in the *ADJ-TO-INFINITIVAL* construction. This allows one to determine the semantics of the default usages, as well as to explore the extent to which the lexeme *quick* behaves consistently across different syntagmatic usages. Before delving into the two case studies, the next section gives an overview of the overall distribution and usages of *quick* and its semantic neighbors.

3 *Quick's* usages and semantic neighbors

3.1 *The different usages of quick*

The string *quick* occurs 5,813 times in the *British National Corpus*. Within these occurrences, 5,545 are as adjectives, 233 as adverbs and 34 as nouns (the one missing occurrence is the first part of a self-corrected utterance).⁴

⁴ Here and throughout the article, I restricted my search to the base forms of the adjectives and adverbs, excluding comparatives and superlatives. The main reason for this is that it allowed for an overall cleaner search. For example, the comparative and superlative adjective forms are often also used for comparatives and superlatives of the *-ly* adverb, a problem that cannot easily be solved through lemmatization. I chose this approach since there is no reason to suppose that the target items of study 1 and study 2, that is, the semantic categories of the head nouns and the verbs occurring as *INFINITIVALS*, distribute differently for these forms than for their base forms.

As a noun, *quick* means ‘any area of sensitive flesh’, as in (7). According to the *Oxford English Dictionary* (1989), it is a cognate of adjectival *quick*. Nevertheless, due to its low frequency and its semantic opaqueness in relation to the adjectival use I will disregard it in the following.

(7) Rubberneck chewed his fingernails; they were long bony fingers, bitten to **the quick**.

The usages of *quick* as an adjective were already illustrated in (1)–(3): in its attributive and its simple predicative usage, it can occur with heads of different semantic categories, including events. In the *quick-to-INFINITIVAL* construction, events are excluded. When *quick* in its attributive usage combines with a head noun referring to an event, the exact relation of *quick* with regard to the event is variable. In order to understand this relation, distinctions made in discussing readings of *quickly* are very helpful (see Travis 1987; Tenny 2000). We can distinguish between inceptive, holistic and true rate usages of *quick*. An inceptive usage is one where *quick* indicates that the time up until an event is short, as in (8a), where the reply is expected after a short amount of time.

- (8) (a) I need a **quick reply**.
 (b) But there is no **quick solution** and good coaching demands plenty of your time and conscious effort, being constantly alert to coaching opportunities.
 (c) Tod’s heart cowers like an oyster at any **quick movement** from the other bodies in our car.

In its holistic usage, *quick* indicates that the whole event took only a short time, as in (8b), and finally, (8c) is an example of true rate modification: *quick* indicates that the speed of the movement itself is high.

Quick’s usage as an adverb is illustrated in (9).

- (9) (a) If I walk **quick** I don’t feel too cold.
 (b) ‘Tell me **quick** what to do before it starts falling out!’

That *quick* is not used very often as an adverb can perhaps partially be explained by the fact that it competes in many instances with *quickly* as a dedicated form for this usage, as in (10).

- (10) (a) Inevitably, a sort of bunker mentality **quickly** set in.
 (b) So much done so **quickly** and then nothing.

As mentioned above, the distinction between inceptive, holistic and rate of speed readings stems originally from discussions of usages of *quickly* in the literature. This article will come back to these usages when considering the occurrences of *quickly* in comparison to the *quick-to-INFINITIVAL* pattern. A comparison of these two patterns is intriguing, since they give rise to near-minimal pairs like (11) and (12).

- (11) ‘No, no,’ Sven Hjerson was **quick to reply**.
 (12) ‘Yes, that’s right,’ she **replied quickly**.

Comparing these two usages will lead to more insight into the characteristics of the *quick-to-INFINITIVAL* construction. In the BNC, *quickly* is far more frequent than *quick*, with 11,797 against 5,813 occurrences, and the adverbial usage of *quickly* is typically event-related. What this ratio tells us about *quick* depends on one's view regarding the relationship between the two. Standardly, it is seen as a derivational one, but see e.g. Giegerich (2012) for arguments in favor of an inflectional analysis. As this question is secondary to the aims of the article, I will not discuss it further.

3.2 *Quick and its semantic neighbors*

In order to extract the distributional peculiarities of *quick*, it is considered within the set of its semantic neighbors. The starting set of neighbors included the speed-related near-synonyms of *quick*, *fast*, *rapid*, *speedy*, *swift*, *fleet*, *express* and its antonym *slow*.⁵ An overview of their usages across the BNC is given in table 1.

Three things are noteworthy. First, there are huge differences in overall occurrences. *Fleet* occurs only 19 times across its different usages and will be excluded from further consideration. Second, there are huge differences in the ratio of adverbial usages, that is, adverbial usages of either the base or the *-ly* form (both tagged as adverbs in the BNC), to the non-adverbial usages (usages tagged as adjectives). *Fast*, *speedy*, *express* and *slow* occur less often as adverbials; *quick*, *rapid* and *swift* occur more often as adverbials. Third, there are huge differences in the ratio of attributive to predicative usages. Compare *quick*, *fast*, *slow* and *swift*, with ratios of 5:2, 5:2, 5:3 and 4:1, respectively, to *rapid*, *speedy* and *express*, with ratios of 13:1, 13:1 and 21:1, respectively.

To derive the lexical peculiarities of these items, paradigmatic as well as syntagmatic patterns can be used. Case study 1 will explore the paradigmatic patterns in the attributive construction, case study 2 will explore the patterns in the *ADJ-TO-INFINITIVAL* construction. Both studies together allow one to explore the extent to which the paradigmatic patterns found are consistent across usages.

4 Case study 1: the distributions in the attributive construction

4.1 *Methodology*

In order to see whether there are differences in the combinatorial potential of the different adjectives, I proceeded as follows:

1. For each adjective, I created a list of adjective–noun collocations in the BNC using Python scripts (Python 2019). To retrieve the collocations, only combinations of the target adjective and the immediately following noun were considered. The collocations were ranked according to log-likelihood, and only those collocations were considered that occurred at least three times. The rationale behind this decision

⁵ The list of synonyms corresponds to the first entry for the adjective *quick* in Kirkpatrick (1994: 662).

Table 1. *Usages of quick and its semantic neighbors across the BNC. The attributive usage is operationalized by using the pattern ADJECTIVE immediately followed by any noun, the predicative pattern by any form of be followed by ADJECTIVE, with an optional adverb between the two. The adverb numbers are all base forms tagged as adverbs, and the -ly forms all -ly forms*

Item	Attributive	Predicative	Adverb	-ly	Total
quick	2,705	1,097	71	11,797	15,670
fast	1,854	697	1,495	1	4,047
rapid	2,708	203	3	4,481	7,395
speedy	338	26	3	219	586
swift	454	112	23	1,169	1,758
fleet	12	6	0	1	19
express	547	26	0	599	1,172
slow	2,105	1,236	421	1,640	5,402
total	10,723	3,403	2,016	19,907	36,049

was to constrain the analysis to those items that most likely form the basis for generalizations over the observed patterns.

- In addition to the semantic neighbors, I added one further adjective, *wet*, in order to make sure that the observed distributions for the semantic neighbors are as a set different from an adjective that intuitively does not typically hold of events.⁶ With 1,750 attributive and 493 predicative occurrences, *wet* is frequency-wise relatively close to the four most frequent speed-related adjectives, *quick*, *fast*, *rapid* and *slow*.
- For each adjective, I selected only the top 120 collocates when there were more than 120 collocates overall. This was the case for *quick*, *rapid*, *slow* and *wet*. For all other adjectives, all collocations were considered.
- I classified the collocations according to the semantic category of the head. For this, I followed a simplified version of the ontology and the decision tree developed in Metzger *et al.* (2019), which in turn draws on the ontologies by Masolo *et al.* (2003), Niles & Pease (2001) and Pease (2006). The ontology was simplified in that I used only four larger categories: EVENT (comprising dynamic events, states and Kimian states), PHYSICAL OBJECT (comprising animate objects, natural objects and artifacts), NON-PHYSICAL OBJECT (comprising facts and propositional and non-propositional information objects, and differing from events in not having temporal parts) and a category OTHER, comprising properties, temporal entities and measures. See Metzger *et al.* (2019) for further discussion of these distinctions.
- In order to make this task manageable, classification of the head for collocations that occurred more than five times was based on a random selection of five items, for collocations that occurred less it was based on all items. If there were different

⁶ For the choice of *wet*, I am indebted to Edith Scheifele and Sarah Zobel.

usages, I took the majority usage. For example, in two out of three usages, *slow drip* refers to an event, but in one instance it refers to a natural object; see (13) for an illustration of this contrast.

(13) (a) *slow drip* [event]

She followed his leaping figure, half-dreading the moment when she [...] would hear, unnaturally loud, the suck of the canal against the paving stones and the **slow drip** of water from the low roof.

(b) *slow drip* [natural object]:

When it opened its mouth a **slow drip** of slime curled from the wet void; the mouth-tusks glistened.

Since the event reference occurs in the majority of usages of *slow drip*, the whole collocation is annotated as EVENT. If the majority use belonged to a non-target construction, the corresponding head was categorized as a misfind and not considered further. Any misfind item was replaced by the next item outside the original selected set of 120 top collocates. An example of a misfind is the string *fast day*, in which *fast* is tagged as an adjective when it should have been tagged as a noun (= ‘a period of fasting’).

4.2 Results

4.2.1 The quick-heads

For *quick*, this procedure results in the distribution displayed in table 2.

Two examples for the category EVENT are given in (14).

(14) Category EVENT: *blast, chat*

(a) Either let your hair dry naturally or give it a **quick blast** with a diffuser/dryer.

(b) Counselling is not a ‘chat’ let alone a **quick chat**.

In both (14a) and (14b) we find the holistic usage of *quick*, but we also find inceptive and true rate usages, as was illustrated above in (8a) and (8c).

Heads denoting physical objects are illustrated in (15).

(15) Category PHYSICAL OBJECT: *learner, thinker*

(a) She was strong, nimble, and a **quick learner**.

(b) Llewellyn was a **quick thinker**, and gave the Masonic sign of distress on the faint chance that the trooper was also a member of the order.

Table 2. *Distribution of the heads of quick-N sequences across semantic classes*

Semantic category	Raw count	Percentage
event	93	77.50
physical object	10	8.33
non-physical object	10	8.33
other	7	5.83

The two *-er* nominalizations exemplifying physical objects clearly point to the cognate events: a quick learner is somebody who learns quickly, likewise a quick thinker is somebody who thinks quickly. There is a third *-er* nominalization in this set, *quick bowler*, but the category is not restricted to *-er* nominalizations; see the heads in (16).

(16) *ball, buck, cup, drink, mind, prom, snack*

Of the collocates in (16), three, *drink, snack* and *cup*, come from the area of food consumption, with plausible interpretations involving either quick consumption or preparation, or both.

The interpretations of the other combinations from the category PHYSICAL OBJECT also appear to be very straightforward, perhaps with the exception of the football term *quick ball* and *quick prom*, which is a name of particular piece of computer interface.

The category of NON-PHYSICAL OBJECTS, illustrated in (17), on the face of it forms a very consistent group; see also (18).

(17) Category NON-PHYSICAL OBJECT: *note, summary*

- (a) One **quick note** for your personal organisers: the recorded Chamonix weather forecast is now available in English.
- (b) Here's a **quick summary** on how to use it: from the Program Manager pop down the File menu and choose New, Program Item, Browse.

(18) *answer, crossword, guide, memo, note, quiz, summary, survey, tip, word*

In the more detailed classification of Metzger *et al.* (2019), all of them (except for *answer*) refer to propositional information objects. Again, in all cases events are needed to interpret them in combination with *quick*. Plausible candidates are easily available, again with variation in the specific link between *quick* and the event accessed for successful interpretation: e.g. *a quick answer* as an answer that is given quickly (= inceptive), or one that only takes a short while to explain (=holistic).

The category OTHER, illustrated in (19), contains *profit, reference, reflex, temper, tempo, way* and *wit*.

(19) Category OTHER: *energy, wit*

- (a) She quivered, then his gaze travelled past her, and she was able to say with **quick energy**, 'Daddy'll climb right up again, he always does,
- (b) Alec has a **quick wit**.

Again, in interpreting these words in combination with *quick*, reference to events is needed. For example, a *quick profit* is a profit that is gained quickly.

Overall, this distribution shows that *quick* most often combines with eventive heads. At the same time, it also shows that cases with a non-eventive head are not rare. What is more, across all three non-event categories we can easily see that the composition of *quick* and the head noun can proceed via the interpolation of an event.

4.2.2 Comparison to slow and wet

The distribution of heads of *slow* over the four semantic categories is not significantly different from the distribution of heads observed for *quick* (Chi-square 5.20, $p = 0.16$). Just as for *quick*, eventive head nouns are the dominant category; see table 3.

The remaining distribution is a bit different, with more physical objects and just four non-physical objects as heads. Among the category PHYSICAL OBJECT, there are again some *-er* nominalizations, all of which (except for *left-armed*) are deverbal; see (20).

(20) *bowler, developer, grower, learner, left-armed, payer, reader, starter, walker*

Just as for *quick*, these nouns allow access to the events needed for interpretation, e.g. a slow developer is somebody who develops slowly and so on. The remainder of this category is a varied group, and retrieval of plausible events is likewise more varied.

(21) *bend, boat, fuse, lane, oven, puncture, tear, track, train*

The category NON-PHYSICAL OBJECT consists of *air, movement, music* and *word*. Both *air* and *movement* are music-related, the former referring to the type of composition, the latter referring to a part of a larger piece of music. All of them are played or performed slowly.

The category OTHER is comprised of the following items:

(22) *beat, bit, degree, second, section, side, speed, time, voice*

Before examining the behavior of *quick*'s synonyms, it is helpful to check in how far this distribution of heads is specific to speed-related adjectives or not. This can be done via comparison to an adjective like *wet*, which, intuitively, cannot be so easily related to an event and can therefore be hypothesized to co-occur with events less often if at all. The corresponding distribution is shown in table 4; figure 1 shows the three distributions side by side.

The distribution of the *wet* heads is significantly different to those of both *quick* and *slow* (pairwise Chi-squared values of 156.89 and 129.86, respectively, $p < 0.001$). As expected, we find predominantly physical objects and few events, all of them deverbal (*deposition, kiss, scrubbing, shave, sieving*). In contrast to *quick* and *slow*, it is not so much that the events themselves are wet but rather the entities participating in them. That is, a wet deposition is the deposition of chemicals when they are accumulated in wet objects.

Table 3. *Distribution of the heads of slow-N sequences across semantic classes*

Semantic category	Raw count	Percentage
event	89	74.17
physical object	18	15.00
non-physical object	4	3.33
other	9	7.50

Table 4. *Distribution of the heads of wet-N sequences across semantic classes*

Semantic category	Raw count	Percentage
event	5	4.17
physical object	90	75.00
non-physical object	2	1.67
other	23	19.17

The large category OTHER is driven by *wet weather* at specific times, ranging from seasons (*spring, summer, autumn, winter* and *season* itself) via *month* to days and parts thereof (*day* as well as *Monday, Wednesday, Friday, Sunday* and *weekend; morning, afternoon, evening* and *night*). This shows very clearly that the similarity in the patterns of *quick* and *slow* is not due to general distributional tendencies of adjective–noun combinations but is rather linked to the specific semantics of the modifiers, and, in consequence, to the specific set of heads they combine with.

4.2.3 *The quick synonyms*

Figure 2 shows the distribution of the heads following *quick* and the distribution of heads for its near-synonyms. They are all clearly different from *quick* (Chi-square values of 38.95, $p < 0.001$, for *quick* vs *fast*).

In the following, I will discuss these differences in some detail by looking at one adjective at a time, starting with *fast* and its distribution in table 5.

The clearest difference between *fast* and *quick* is the change in proportions between events and physical objects: 46 percent of the heads refer to physical objects.

Within this group, there is again a strong showing of *-er* nouns; see (23). Further examples for deverbal formations are *processor, operator* and *reactor*.

(23) *bowler, breeder, charger, grower, learner, reader, runner, worker*

Another pattern in the PHYSICAL OBJECT class is nouns describing means of transport:

(24) *boat, car, jet, launch, machine, train*

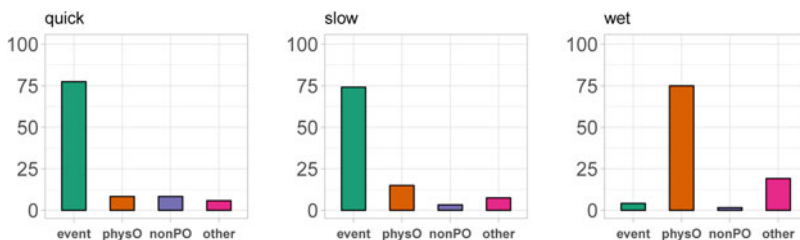


Figure 1. Distributions of the *quick/slow/wet* heads across semantic categories

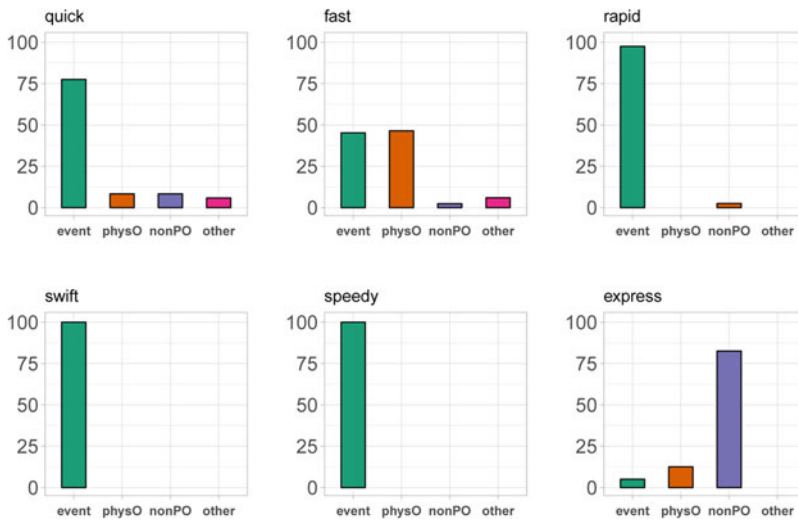


Figure 2. Distribution of categories over heads for *quick* and its synonyms

The category human consumption is represented only by *fast food*, and there are some combinations in which *fast* has different usages, e.g. ‘steadfast’ in *fast friends* or ‘flouting moral standards’ in *fast woman*. As these examples are few and the idea behind this article was to see how far one gets with a semi-automatic method, they were kept in the data.

No tables are needed for the patterns of *rapid*, *speedy* and *swift*, which are all very straightforward. *Rapid* occurs almost exclusively with eventive heads (117 out of 120). There are only three non-eventive heads, all non-physical objects: *French*, *Italian* and *method*. This predominance of the eventive heads along with the lack of any physical objects and the category OTHER makes the distribution very different from that of *quick* as well as that of *fast*. *Speedy* and *swift*, at 16 and 22 collocates, respectively, only occur with eventive heads.

The pattern observed for *express* + N combinations departs from all other patterns; see table 6.

While *express* differs from the other adjectives in not being gradable, the main reason for this distribution is a clear split in the meanings of *express* involved: The

Table 5. *Distribution of the heads of fast-N sequences across semantic classes*

Semantic category	Raw count	Percentage
event	38	45.24
physical object	39	46.43
non-physical object	2	2.38
other	5	5.95

Table 6. *Distribution of the heads of express-N sequences across semantic classes*

Semantic category	Raw count	Percentage
event	2	5.00
physical object	5	12.50
non-physical object	33	82.50

quick-synonym meaning only occurs with the seven heads from the EVENT and PHYSICAL OBJECT categories, given in (25).

- (25) (a) *delivery, transfer*
 (b) *coach, letter; lift, service, train*

The largest category of heads, the non-physical objects, are driven by the meaning ‘explicitly stated’, e.g. *agreement, condition, definition, request, statement* and *warranty*; see (26) for two examples in their sentential context.

- (26) (a) However, if an **express agreement** is required, how it is to be given must be determined.
 (b) The contract will generally contain an **express warranty** intended to be in substitution for a condition which would otherwise be imposed.

In contrast to the isolated cases with differing meanings for *fast*, this is a clear split between two meanings that are both very frequent.

4.3 Discussion

The distributions show a clear distinction between adjectives that collocate only or almost only with eventive heads (*speedy/swift* and *rapid*), and adjectives that collocate with all categories (*quick, slow* and *fast*). As noted, the non-degree adjective *express* has a somewhat special status due to its clear meaning split. The speed-related meaning combines only with heads that refer to events or physical objects. Importantly, recall that we are here interested only in collocations, that is, the point is not that it is impossible for e.g. *swift* to combine with non-eventive heads, nor that one would not be able to interpret the combination. The two important points from this case study are rather: (i) *quick* most frequently collocates with heads that refer to events and thus allow direct event predication. Given that the attributive construction is its most frequent usage, this supports the view that *quick* in its default usage is an event predicate. (ii) The extent to which combinations with non-eventive heads occur is not so much a function of the nouns, but rather a function of the adjectives which show different preferences. *Quick, slow* and *fast* frequently occur with non-eventive heads, the other adjectives not so much. That is, the core difference between *quick* and e.g. *rapid* that emerges from the results of study 1 is not that one is an event predicate and the other isn’t. Rather, both are by default event predicates; the differences lie in their finegrained combinatorial possibilities, resulting in distinct distributions of semantic

categories of the heads they combine with. If mental representations of words are based on statistical learning, we expect this to be reflected in the corresponding representations.

To enable exploration of patterns across constructions, case study 2 considers *quick* and its neighbors in the ADJ-*to*-INFINITIVAL construction.

5 Case study 2: *quick-to*-INFINITIVAL

For *quick*, the starting point of this whole article, the ADJ-*to*-INFINITIVAL construction is special for a number of reasons. First, it is a construction where the subject argument is never an event, a striking contrast to *quick* in its attributive usage, while it also differs from *quick*'s non-complement predicative usages, where events are possible (see (2a) in section 1). Second, comparing the attributive, the standard predicative and the *quick-to*-INFINITIVAL on distributional semantics measures, the latter is also the most dissimilar to the other. Third, this construction shows a completely different distribution across the speed-related neighbors of *quick*; see table 7, where the predicative usages are divided into those not followed by *to*-INFINITIVALS (= pred ex *to*), and their complement set, the adjectives followed by *to*-INFINITIVALS.

Fourth, while attributive and standard predicative usages of speed-related adjectives are also found in a related Germanic language like German, the *quick-to*-INFINITIVAL construction is special in this respect: there is no constructional equivalent (cf. German **Sie war schnell den Vorschlag abzulehnen*. 'She was quick to reject the proposal'). Translation equivalents have to resort to using either adverbials (*Sie hat den Vorschlag schnell abgelehnt*) or verbs like *sich beeilen* 'to make haste' (*Sie beeilte sich, den Vorschlag abzulehnen*).

But the *quick-to*-INFINITIVAL construction is not only special in contrast to attributive *quick*. It is also very different from all other ADJ-*to* INFINITIVAL constructions discussed

Table 7. *Usages of quick and its semantic neighbors across the BNC. The predicative pattern is operationalized by any form of be followed by an adjective, with an optional adverb between the two. ADJ-TO-INFINITIVALS were identified by searching for continuations with to and an immediately following verb*

Item	Pred ex <i>to</i>	Pred- <i>to</i> -INF	Predicative total
<i>quick</i>	609	488	1,097
<i>fast</i>	690	7	697
<i>rapid</i>	202	1	203
<i>speedy</i>	23	3	26
<i>swift</i>	89	23	112
<i>express</i>	26	0	26
<i>slow</i>	815	421	1,236
Total	2,454	943	3,397

in the literature (see section 5.2 for details). And finally, the construction is special in that it competes directly with *quickly* in its standard adverbial usage.

In order to understand the semantics of this construction, this section proceeds as follows: section 5.1 provides first insights into the construction by looking at its collocations. Section 5.2 shows that the construction is different from other instances of the ADJ-*to*-INFINITIVAL classes discussed in the literature. Section 5.3 compares the construction to usages of *quickly*. Section 5.4 discusses *quick*'s semantic neighbors in this construction.

5.1 Quick-to-INFINITIVAL collocations

The basis for the collocation search was again the BNC, with the general pattern limited to any form of BE, followed by an optional adverb, followed by *quick-to*. The collocates themselves had to occur at least three times as collocates (similar to the procedure used in case study 1 described in section 4). Examples for the top three collocates are given in (27).

- (27) (a) And he is **quick to point out** that it was a joint decision to make a serious bid.
 (b) The MP for the area, Peter Butler, was **quick to condemn** the attack.
 (c) Labour leaders were **quick to praise** Mr Kinnock's achievement in pulling the party back from the brink of disintegration in 1983, when it was almost beaten into third place.

Of these three, the first two, *quick to point out* and *quick to condemn*, are both very strong collocations, with log-likelihood values of 435.18 and 79.89, respectively. The top ten highest-ranked collocates are given in (28).

- (28) *point out, condemn, praise, scotch, defend, seize, respond, exploit, spot, prepare*

The top collocating verbs are noteworthy for three main reasons:

1. Within these ten, the top three, and also *defend* and *respond*, are verbs of communication.
2. In all cases, *quick* relates to the event denoted by the *to*-INFINITIVAL. In order to understand the exact relation, it is again necessary to distinguish between inceptive, holistic and true rate usages. The top ten *quick-to* INFINITIVAL collocates all give rise to either the inceptive or the holistic interpretation, not the true rate interpretation. The top three examples in (27) show a clear tendency for the inceptive interpretation: the *pointing out* event happened a short time after a given moment in time, the internal rate of the event unfolding is left unspecified. For (27b), the point in time is the attack, after which only a short time elapsed before the condemnation. The unfolding of the condemnation event itself is again left unspecified. Example (27c) works exactly in parallel. This tendency for inceptive and holistic readings is in line with the observation that although most of these verbs are activities, that is, they do not come with a natural culmination point, in this construction they seem to give rise to bounded interpretations.

3. In all cases, the subjects of the copula construction are intentionally acting human agents or institutions (with the single exception of *prepare* which represents a distinct pattern; see section 5.2.1).

This closer look at the *quick-to-INFINITIVAL* construction raises three questions: (i). What is the relationship between this constructions and other *ADJ-to-INFINITIVAL* constructions discussed in the literature? That is, is there something unique to how *quick* is used here or is it just a feature of the overall construction? (ii). If the interpretations of *quick* in this construction, especially in terms of its relation to the event denoted by the *to-INFINITIVAL*, can be described by using distinctions made for the readings of *quickly*, is there any difference between sentences with *quick-to-INFINITIVAL* as opposed to those with *quickly*? (iii). How does the behavior of *quick* in this construction compare to that of the other speed-related adjectives? These three questions will be discussed in turn.

5.2 *Quick-to-INFINITIVAL and other ADJ-to-INFINITIVAL constructions*

There is a long and venerable tradition of analyzing *ADJ-to-INFINITIVAL* constructions, with Lees (1960) already arguing that the surface structure as such is multiply ambiguous (he distinguishes four different syntactic structures). Lees (1960) does not discuss any speed-related adjective, but he discusses many adjectives that are then later discussed more extensively, be it in direct response to his work (see Quirk 1965), or in the context of the correct analysis and delimitation of the *tough*-construction (e.g. Lasnik & Fiengo 1974). Nevertheless, as far as I know the *quick-to-INFINITIVAL* has not been discussed before. This is surprising, because the ‘quick-to’ class presents a major subset of the predicative usages of *quick*, as the numbers for *quick to* (and similarly *slow to*) show. It is not a rare case. Further, the vast majority of its usages are clearly different from any example discussed in the literature known to me. My aim here is not to recap these analyses in full detail; rather, I want to show why *quick* is semantically clearly different from all of them.

To show this, I will first discuss four classes of adjectives that are differentiated in the literature on the *ADJ-to-INFINITIVAL* patterns (see Schachter 1981; Mair 1987; Hicks 2009; Oshima 2009). These four have been argued to fall into two larger classes: the *tough* and *pretty* classes, on the one hand, and the *wise* and *lucky* classes, on the other hand. At the end, I will address a few further cases.

5.2.1 *The tough and pretty classes*

At the descriptive level, the *tough* and *pretty* classes are special because the *INFINITIVALS* are not followed by anything; there is no object argument. This can be seen in (29) and (30).

(29) In bad weather even this route is **tough to follow**.

(30) And though the cottage was **pretty to look at**, it was rather poky inside with small, dark rooms and low ceilings.

What the two examples also show is that the missing object can be retrieved via the subjects of the two sentences. While there are further differences between the two

types of predicates (most notably in the ‘wider distributional range in MO [missing objects] and related constructions’, Schachter 1981: 446), they are often analyzed together in different frameworks (see Schachter 1981; Hicks 2009). Other adjectives in these classes are *easy*, *difficult*, *hard* and *beautiful*, *delightful*, *lovely*; see the listings in Huddleston & Pullum *et al.* (2002: 1246) for more examples.

The missing object is already a property not shared by the three examples of the *quick-to*-INFINITIVAL pattern in (27) nor by the first nine of the top ten collocates listed in (28). In all cases, *quick* contributes a predication over the main clause subject which is invariably the AGENT of the event expressed with the *to*-INFINITIVAL. Note, however, that there are also instances of *quick-to*-INFINITIVALS that show a similar pattern, for example with the sequence *quick to prepare* as in (31), all five of which concern food preparation.

(31) Pasta is **quick to prepare**, and provides a substantial, tasty meal without too much time and effort.

Among all the collocations, the *prepare* pattern is the clear exception, only supplemented by three occurrences of *quick to knit*; see (32) for an example.

(32) Although single-bed transferred lace might prove tedious, a small panel would be fairly **quick to knit**, so here is one to try out.

Together, they account for only eight out of 274 collocations (3%).

5.2.2 *The wise/lucky classes*

The large *wise* class (e.g. *brave*, *careful*, *clever*, *(un)kind*, *mean*, *nice* etc.; see (4) in Oshima 2009: 365 for more examples) and the small *lucky* class (e.g. *unlucky*, *(un)fortunate*) come closer to the target expression. In neither case are there missing objects as described for *tough* and *pretty* above. In both cases, the main clause subject is the subject of the *to*-INFINITIVAL; see (33) and (34) for an example of each class.

(33) Whether he was **wise to invoke** it is doubtful, however, as later events were to show.

(34) He was **lucky to have** a job like this.

These classes are of particular interest because of their similarity to expressions with cognate *-ly* adverbs, which has already been discussed. In particular, Oshima (2009: 364) notes that (35a) and (35b) are ‘roughly synonymous’ (see Oshima 2009 for earlier literature making this point). Similar pairs can be constructed for the *lucky* class, as in (36).

(35) (a) Wisely, John left early. (= 1a in Oshima 2009)

(b) John was wise to leave early. (= 1b in Oshima 2009)

(36) (a) Luckily, John passed the exam. (= 6a in Oshima 2009)

(b) John was lucky to pass the exam. (= 6b in Oshima 2009)

However, despite this surface similarity, there is a decisive difference between these classes and *quick* in that both adverbial correspondences are sentence adverbials:

wisely is a subject-oriented adverbial, *luckily* is a speech-act adverbial of the evaluative subclass (for this terminology, see Maienborn & Schäfer 2011; Schäfer 2013). That is, in (35b) John is judged as being wise based on the fact that he left early. And in (36b), the speaker considers the fact that John passed the exam as based on luck. These adverbial usages distinguish both the *wise*-class as well as the *lucky*-class from *quick*, which in terms of its adverbial correspondence is an event-external adverbial (Schäfer 2013: 104–17), that is, it provides a predication directly related to an event, not a property of a person nor an evaluation of a fact. This difference in corresponding adverbial usages also explains why the subtle presupposition vs assertion-based meaning difference between the pair in (35) (see Oshima 2009: 371–2) plays no role for *quickly* vs *quick-to*.

Given that both *wise* and *lucky* in these usages are not predicated of events, it is not surprising that both *wise* and *lucky* in their attributive usage are not restricted to eventive heads but occur with many different categories. Even when combined with eventive heads, as in *wise decision/move* or *lucky escape, lucky win*, the eventual interpretation of the combination is often still one where the adjective is related to a fact, not an event. That is, *wise move* is typically interpreted along the lines of ‘the fact that he made this move is judged to be wise’ etc.

5.2.3 Other adjectives occurring with to-INFINITIVALS

There are many other adjectives that take *to*-INFINITIVALS as complements, either obligatorily (e.g. *bound, liable*) or optionally (e.g. *confident* or *eager*). While these do not form a consistent group, they clearly differ from *quick* in their semantics and syntagmatic versatility. Thus, *bound* and *liable* both involve modality, and they are very restricted in their syntagmatic options (e.g. they are not able to occur attributively). Predicates that hold of volitional agents like *confident* and *eager* typically denote emotional attitudes. They differ for example in being typically able to also have full content clauses as complements, as in (37) (see also listing (31) in Huddleston & Pullum *et al.* 2002: 964 for more examples).

(37) The testator is **eager** that his wife should leave nothing to her brother.

This construction is not available to *quick*, nor for any of the other speed-related adjectives.

Overall, this section clearly established that the *quick-to* INFINITIVAL construction is very different from other ADJ-*to*-INFINITIVAL constructions discussed in the literature.

5.3 Quick-to vs quickly

One remaining question is the status of the *quick-to*-INFINITIVALS with regard to the usage of *quickly*. Some pairs clearly look very similar:

(38) ‘No, no,’ Sven Hjerson was **quick to reply**.

(39) ‘Yes, that’s right,’ she **replied quickly**.

Since in the literature a link has been made between different *quickly* interpretations and their syntactic position, similarities by position can help to clarify the interpretation of the *quick-to*-INFINITIVAL construction. The classic set of examples illustrating *quickly*'s sensitivity to syntactic position is reproduced in (40) (see (29) in Travis 1987).

- (40) (a) **Quickly** John will be arrested by the police.
 (b) John **quickly** will be arrested by the police.
 (c) John will be **quickly** arrested by the police.
 (d) John will be arrested **quickly** by the police.

Travis (1987) distinguishes between (40a,b) and (40c,d). In her words, in the first two positions, '*quickly* appears to be modifying the event of the arrest while in (29c,d)[(40c,d)] *quickly* modifies the process of the arrest. In other words, in (29a,b)[(40a,b)], the arrest will happen right away. In (29c,d), the manner of the arrest will be hurried' (underlining in the original changed to italics here). In the terms introduced in section 3.1, the first is an inceptive usage, the second either a holistic or a true rate modification, or a combination of the two (this particular example does not allow teasing them apart). Since *quickly* occurs only rarely sentence initially or directly before the auxiliary complex (188 and 91 instances, respectively), I will only consider the immediately preverbal and the postverbal positions in the following (3,285 and 578 instances, respectively).

To explore the similarity in usage between *quick-to* and *quickly* qualitatively, I will compare the top ten collocations of *quick-to* to the top ten verbal collocates of pre- and postverbal *quickly* (with the same settings as before: based on the BNC, and with at least three collocates). Table 8 shows the top ten collocations for all three constructions, according to their log-likelihood values.

Table 8. *Top ten collocates ranked by log-likelihood for the quick-to-INFINITIVAL construction and pre- and postverbal usages of quickly*

<i>quick to</i>	<i>quickly</i>	
	Preverbal	Postverbal
point out	become	move
condemn	learn	glance
praise	follow	recover
scotch	realise	react
defend	discover	heal
seize	establish	dry
respond	dispel	resolve
exploit	spot	pass
spot	turn	dress
prepare	say	sell

Table 8 shows the following:

1. Except for *say*, there is no verb of communication in the top collocates for pre- and postverbal *quickly*, contrasting with the five verbs of communication in the top collocates for *quick-to-INFINITIVAL*, which include the top three collocates.
2. The top two collocates in each category have clearly different preferences with regard to the three readings. While *quick-to* goes with the inceptive interpretation, preverbal *quickly* goes with the holistic interpretation, or a combination of the inceptive and holistic interpretation. Lastly, postverbal *quickly* goes with the true-rate interpretation. For *quick to point out* and *quick to condemn*, see examples (27a) and (27b) and their discussion in section 5.1. Examples for the top two collocates of preverbal and postverbal *quickly* are given in (41) and (42):
 - (41) (a) Hus **quickly** became a popular figure in Bohemia.
 - (b) Nonetheless Mrs Markus **quickly** learned the value of discretion.
 - (42) (a) He moved **quickly** and quietly.
 - (b) She glanced **quickly** from side to side.
3. Finally, there is no strict requirement for intentionally acting humans or institutions in subject position for the *quickly* verbs, again in contrast to the *quick-to-INFINITIVALS*; see the examples in (43) and (44) for preverbal and postverbal *quickly*, respectively.
 - (43) (a) The situation can **quickly** become desperate.
 - (b) TV shows and serials **quickly** followed.
 - (44) (a) In 1829 events moved **quickly**.
 - (b) When wet these trousers dry **quickly** in a warm room – quicker still if you're walking in a warm breeze.

As (43) shows, preverbal *quickly* can occur with an event or non-physical objects as subjects. (44) shows postverbal *quickly* with an event and an artifact in subject position.

5.4 Other speed-related adjectives in the *ADJ-TO-INFINITIVAL* construction

Recall that table 7 above showed that *slow*, and also *swift*, occur relatively often in this construction. *Express* does not occur in this construction, and *fast*, *rapid* and *speedy* occur very rarely. I will first discuss *slow* and *swift*, and then turn to the rare cases.

5.4.1 Slow-to-INFINITIVAL

If the attributive usage and the other usages are linked, then we can hypothesize that semantic neighbors with the same preferences also occur in the *ADJ-TO-INFINITIVAL* construction, and this is in fact exactly what we find for *slow*, the one neighbor not significantly different in the distribution of heads in its attributive usage. *Slow* frequently occurs in this construction, as in the examples in (45).

- (45) (a) The African press in Tanganyika was **slow to develop**.

- (b) As usual the sports firms were **slow to respond**, and even by the mid-Eighties you still couldn't buy good, exclusive trainers in most cities.
- (c) The British were **slow to catch on**.

Similar to *quick*, all three involve either holistic or inceptive interpretations. The same picture emerges if we again consider all top ten collocates, listed in (46).

(46) *develop, respond, catch on, mature, change, disappear, warm up, adapt, take off, materialise*

While *slow* in the ADJ-*to*-INFINITIVAL construction is similar to *quick* in preferring inceptive and holistic readings, not all verbs in the top ten collocates are restricted to volitional human agents or institutions acting as one. For example, *change* occurs also with abstract objects, as in (47).

- (47) (a) Such beliefs are **slow to change**, a fact which underlines that identifying the source is important in persuasive communication.
- (b) Education, on the other hand, is **slow to change**, discernible change being measurable in years, or even decades.
- (c) Social and trading links have been **slow to change**.

Just as for *quick*, it is instructive to compare the top ten collocates across the *slow-to*-INFINITIVAL construction and the pre- and postverbal occurrences of *slowly*, listed in table 9.

The table shows again clearly different preferences for verbs across the three constructions, but unlike what we found for *quick*, there is no preferred verb class in the top collocates of the *slow-to*-INFINITIVAL construction. However, there is again a clear preference in the readings of the top two collocates, with *develop* and *respond*

Table 9. *Top ten collocates ranked by log-likelihood for the slow-to-INFINITIVAL construction and pre- and postverbal usages of slowly*

<i>slow to</i>	<i>slowly</i>	
	Preverbal	Postverbal
develop	turn	walk
respond	sink	move
catch on	begin	straighten up
mature	fade	nod
change	lower	breathe out
disappear	move	drive
warm up	open	progress
adapt	raise	simmer
take off	rotate	speak
materialise	descend	creep

favoring holistic and inceptive interpretations, but *turn*, *sink*, *walk* and *move* all typically occurring with rate of speed interpretations.

5.4.2 *Swift-to-INFINITIVAL*

Swift occurs less frequently, with only 21 occurrences, spread across 20 types; see (48) for two examples (with *play down* being the verb that occurs twice).

- (48) (a) But Buckingham Palace was **swift to play down** any concerns over the health of the Queen Mother, who is 93 in August.
 (b) He was **swift to deny** that the Afrikaners were an official delegation from the Broederbond (Brotherhood), an influential secret society with close links to South Africa's ruling National Party.

A closer look reveals that 13 of the 20 verb types occurring in the *swift-to-INFINITIVAL* construction also occur in the corresponding *quick-to-INFINITIVAL* construction. This overlap is higher than the overlap between verb types in the *swift-to-INFINITIVAL* construction with verb types combining with pre- or postverbal *swiftly* (6/20 and 3/20, respectively).

5.4.3 *The rare cases*

While *express* does not occur in this construction at all, *fast*, *rapid* and *speedy* occur marginally. A disproportionate number of these rare hits is due to *too-ADJ-to*: the one hit for *rapid*, and 3 out of the 7 hits for *fast*. This construction comes with its own special semantics and is negligible for the frequently occurring adjectives (it does not occur with *swift*, and only 13 and 16 times with *quick* and *slow*, respectively).

Fast, attributively occurring with many physical object heads, occurs twice with the theme in subject position but never in the agentive construction; see (49).

- (49) (a) We'll chose [*sic*] a three-column grid because this is **fast to work with** while still allowing a good degree of flexibility.,
 (b) The product is **fast to set-up** and use, tasks being accomplished through pop-up windows and pull-down menus.

Speedy occurs in this construction, albeit only three times, twice following the agentive pattern, and once following the theme pattern; see the two examples in (50a) and (50b), respectively.

- (50) (a) 'Peggy' James, the proprietor, a heavily built man and had a wooden leg – hence his nickname – but he was remarkably **speedy to provide** quick service when cars drew up for petrol from his one, hand-operated pump.
 (b) Opposition Members are desperately struggling to find every conceivable thing to carp at, because they know that the scheme will be relatively **speedy to introduce** and that it will work effectively.

5.5 Discussion

The aim of this section was to explore the *quick-to*-INFINITIVAL pattern, which is the pattern within *quick*'s syntagmatic distribution that is least similar to the attributive usage of *quick*. At the same time, it appears to be very close to the adverbial semantics displayed by *quickly*. The top ten collocates show the pattern's penchant for verbs of communication. In addition, the pattern tends towards inceptive and holistic interpretations of *quick*, and requires the subject to be an intentional agent. These preferences are what sets apart the *quick-to*-INFINITIVAL pattern, on the one hand, and the pre- and postverbal usages of *quickly*, on the other hand.

Among the semantic neighbors of *quick*, only *slow*, and to a limited extent *swift*, occur regularly in this construction. While *slow* also exhibits preferences for inceptive and holistic reading in its top ten collocates, the verb types themselves are clearly different. In contrast, while *swift* occurs with only 20 different verb types, these overlap to a high degree with the verbs also found with *quick*.

6 Lexeme-specific effects across usages

6.1 Taking stock

Recall that already the raw occurrence counts for core usages of the set of speed-related adjectives presented in table 1 showed huge differences in the distributions. Using the distribution of *quick* as a starting point, the two case studies zoomed in on details of two constructions: the attributive construction and the predicative ADJ-*to*-INFINITIVALS. For *quick*, the first of these two constructions constitutes its most frequent usage, while the second constitutes the usage that is most sharply different from this default usage.

Case study 1 in section 4 showed that attributive *quick* and *slow* are indistinguishable with regard to the distribution of the semantic categories of the heads they combine with: both predominantly combine with eventive heads (78% and 74%), and both also combine, to much lower but comparable degrees, with heads from other categories. All other speed-related adjectives show a different distribution of heads. Only *fast* also occurs with heads of all four categories, but events and physical objects are similarly frequent. *Speedy* and *swift* only occur with eventive heads; *rapid* comes with eventive heads except for three collocates. Finally, *express*, in its speed-related meaning, also takes only eventive heads.

Case study 2 in section 5 investigated *quick* and its semantic neighbors in the ADJ-*to*-INFINITIVAL construction. Considering just the behavior of speed-related adjectives, it turned out that only *quick* and *slow* occur in this construction very frequently, with *swift* still occurring relatively frequently. Further core observations were that for both *quick* and *slow* there are clear differences in preferences for verb types and readings in comparison to the corresponding *-ly* constructions.

When looking at the two case studies side by side, it is also clear that the two constructions are very different, and that these constructions themselves, that is, the

attributive construction and the ADJ-*to*-INFINITIVAL construction, form large groups of interrelated constructions and usages, with complex relations within the larger group (recall the observations with regard to the similarity of the *quick-to*-INFINITIVAL to the behavior of the *wise/lucky* classes as opposed to the *tough/pretty* classes). The focus of the final section of this study, though, is not the similarities within these networks of constructions, but rather whether the fact that *quick*, *slow* and *swift* all occur in the ADJ-*to*-INFINITIVAL construction and the other speed-related adjectives do not, or only marginally, can be linked to any further commonality between the three adjectives that is already present in the attributive construction. In other words, how much consistency is there for these three adjectives across the two constructions?

6.2 Cross-usage consistency

As throughout the article, I will use *quick* as the point of departure, discussing first the similarities between *quick* and *slow* across the two constructions, then the similarities between *quick* and *swift*.

6.2.1 Quick and slow

If the attributive usage and the other usages are linked, then *quick* and *slow* patterning together is not surprising, since study 1 found that *slow* was the only semantic neighbor for which the distribution of heads in its attributive usage did not significantly differ from that of *quick*. What further similarities are there? Study 2 already mentioned that both *quick* and *slow* in the ADJ-*to*-INFINITIVAL construction pattern differently from the corresponding *-ly* adverbial usages. In particular, in both cases the true rate reading is dispreferred. However, the preferences for the verbs themselves are clearly different, not only in terms of lexical items but also in terms of preferred readings, with *quick* favoring inceptive readings, but *slow* equally allowing for inceptive and holistic readings or combinations thereof. As for study 1, recall that *fast* also occurs with all semantic categories attributively, but only occurs marginally in the ADJ-*to*-INFINITIVAL construction. That is, it is not simply the general versatility of *quick* and *slow* with regard to their heads that makes them suitable for the ADJ-*to*-INFINITIVAL construction. A closer look at the most common collocates for the three adjectives reveals an even starker difference between *quick* and *slow*, on the one hand, and *fast*, on the other hand: in the top ten collocates for attributive *quick* and *slow*, almost all are eventive heads (100% and 90%, respectively). For *fast*, the top seven highest collocates all refer to artifacts, and only two eventive heads are included in the top ten.

Another factor that might play a role is the distribution of inceptive, holistic and true rate readings of the eventive usages for *quick* and *fast*. While all three are possible with both adjectives, there is a tendency towards holistic readings for *quick* and true rate readings for *fast*. This is reflected in minimal pairs like *quick walk* vs *fast walk*. While *quick walk* almost always comes with the holistic reading (six out of seven times, with one

ambiguous example), *fast walk* always comes with the true rate reading (four out of four); see the pair in (51).

- (51) (a) Come now – get your hat and join us for a **quick walk**.
 (b) Urging her into a **fast walk**, he hurried her across a courtyard and into the craft shop.

These divergent tendencies towards holistic and true rate readings, respectively, are also reflected in many of the heads that occur in study 1 as collocates of *quick* and not of *fast* and vice versa, e.g. *call, kiss, divorce, smile* vs *acceleration, process, rate, speech*.

6.2.2 Quick and swift

Swift does not quite fit the story so far, as in study 1 it only occurred with eventive heads, similar to *speedy* and also *rapid*. But, as study 2 has shown, *swift* occurs relatively frequently in the *to*-INFINITIVAL construction. In contrast, *speedy* and *rapid* only occur in the *ADJ-to*-INFINITIVAL construction very marginally

I already noted in section 5.4.2 that there is a high overlap between the verb types occurring in the *swift-to*-INFINITIVAL construction and those in the *quick-to*-INFINITIVAL construction. That is, in contrast to *slow*, it seems as if *quick* is acting as an analogical target: whatever is fine with *quick* should also work with *swift*. If this is on the right track, we would expect that there are also more qualitative similarities between *quick* and *swift* in the attributive construction.

Further qualitative comparison of the attributive usages of *quick* and *swift* does in fact reveal further similarities: (i) As *swift* only combines with eventive heads, its top ten collocates also combine with eventive heads, and it is in this respect similar to *quick*, not to *fast*. (ii) Attributive *quick* and *swift* are also more similar to each other than to the other adjectives in the actual heads they combine with. That is, of all the noun lemmata following attributive *swift*, 47 percent also occur following *quick*. The overlap between the other adjectives and *quick* is lower, with 31 percent for *fast*, 28 percent for *rapid* and 39 percent for *speedy*. (iii) The similarity between *quick* and *swift* becomes more pronounced upon concentrating on the top ten collocates of all near-synonyms of *quick* in just the event category, and checking whether any of these also occur within the top 120 collocates of *quick* used in study 1. We find an almost complete overlap for *swift*: nine out of its top ten collocates are also collocates of *quick*. For *fast*, it is just four out of ten, for *rapid* three out of ten, and for *speedy* four out of ten.

6.2.3 Cross-usage consistency: conclusion

All in all, we saw that the distribution of the target adjectives in the *ADJ-to*-INFINITIVAL pattern is linked to their behavior in the attributive pattern, as shown by the similarity between *quick* and *slow* in this respect, and the dissimilarity between *quick* and *rapid, express* and *speedy*. On the other hand, we also saw that the exact connection between the two is somewhat more complicated, given that *swift* occurs often in this pattern, and overlaps to a large extent in the verb types used. Closer examination revealed that *swift* is more similar to *quick* than *fast, rapid* and *speedy* when one considers the overall number of shared heads, and the number of top ten eventive collocates also occurring with *quick*.

7 Conclusion

This article explored to what extent the combination of purely quantitative, semi-automatically extracted corpus-based data with qualitative analysis can be used to explore the lexical and combinatorial properties of adjectives. Focusing on *quick* within the set of its semantic neighbors, it investigated to what extent empirical data (i) is in line with intuition-based classifications and (ii) allows one to better understand the consistency of lexemes across different syntagmatic usages. In particular, the specific starting point of this investigation was intuitive judgements of *quick* and similar adjectives as event-related predicates, along with varying views on how combinations with non-eventive heads are explained, and the observation that predicative usages are somehow restricted.

Along with corpus-based overviews of the usages of *quick* and its semantic neighbors, I presented two case studies. Case study 1 investigated the most frequent usage of *quick*, its occurrence in the attributive position. Two core results come from study 1. First, *quick* combines with eventive heads in its default usage, that is, in 76 percent of the top collocations in its most frequent syntagmatic pattern, the attributive construction. This finding is in line with the intuitive classification of *quick* as an event predicate. Second, there are clear differences between *quick* and its speed-related semantic neighbors with regard to the semantic category of the head they combine with. Besides eventive heads, *quick* also allows other categories of heads, physical as well as non-physical objects. While patterning largely together with its antonym *slow*, it is distributionally clearly different from its near-synonyms, with *fast* allowing the same range of heads but with equal preference for eventive heads and physical objects as heads. *Rapid*, *swift* and *speedy* allow almost only eventive heads, and *express* is special due to its ambiguity. This variation cannot be explained by features of the words these adjectives combine with, but results from preferences for specific combinations by the adjectives themselves. This is in line with approaches such as the one by Bücking & Maienborn (2019), who assume rich lexical entries in order to differentiate near-synonymous adjectives. It is not clear how this can be explained in the accounts of Pustejovsky (1995) and Larson (1998), where the ultimate source for the eventive readings is the availability of an event via the head, be it through its conceptual structure, or through its argument structure.

Case study 2 investigated *quick* in the ADJ-*to*-INFINITIVAL construction. The results here are already surprising on the purely descriptive level: while being a highly frequent construction for *quick* and *slow*, this construction is unavailable or marginal for all other speed-related neighbors except *swift*. Further, it is also semantically clearly different from ADJ-*to*-INFINITIVAL constructions previously described, and shows clear differences in interpretational and combinatorial preferences from the corresponding adverbial constructions with *-ly*. While this study can ultimately only hypothesize on the reasons why this constructional possibility is available for these three adjectives only, the general observation is that similarity in attributive usage goes together with the availability of the ADJ-*to*-construction. The lexical semantics of the adjectives plays

a larger role in shaping their overall distribution even across constructions than standardly assumed: the distributions of adjectives in two very different constructions, the attributive construction and the ADJ-*to*-INFINITIVAL construction, pattern together.

The results of this article are not limited to a better understanding of *quick* and its semantic neighbors. Recall the two bigger issues that triggered the investigation reported here, namely (i) whether an adjective's distribution is determined by the combinatorial preferences of the heads it combines with or by the combinatorial preferences of the adjective itself, and (ii) what we can learn regarding this question by closely examining an adjective's distribution. Via careful corpus analyses, this investigation shows very clearly that the combinatorial preferences of the adjectives themselves play a major role in shaping their distribution. In particular, the approach presented here, that is, looking at the most frequent usage, and contrasting that usage with the adjective's most different usage, proved extremely fruitful. Hopefully, this approach can be used as a blueprint for further investigations into the lexical semantics of adjectives: instead of appealing to intuitive judgments about an adjective's lexical semantics, its distributional patterns are used to establish its default usage. This default usage, in turn, is used to explain the adjective's behavior in less central constructions. For example, in order to explain why adjectives like *tough* and *pretty*, on the one hand, and *wise* and *lucky*, on the other hand, share patterns in specific contexts, e.g. in the ADJ-*to*-INFINITIVAL construction, one can hypothesize that their distributional preferences in this very specific construction are similarly linked to patterns in their default usages, which, in all four cases, are not their usage in the ADJ-*to*-INFINITIVAL construction (for all four adjectives, these are already outnumbered by the respective attributive usages).

Overall, I have shown how an empirical, corpus-based approach can be used to address long-standing assumptions and questions in the literature, and how such an approach yields rich new findings.

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