

## How gradual change progresses: The interaction between convention and innovation

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### ABSTRACT

This paper hypothesizes that as an expression becomes more frequent in one grammatical context, its mental retrievability improves, which in turn makes it more easily available in different yet closely related (analogous) grammatical contexts. Such a mechanism can account for the progression of gradual change. The hypothesis generates two testable predictions. First, innovative constructions should be more likely to emerge if their analogical models are better entrenched. Second, an expression's retrievability can also be improved by priming, which in the short term should have a similar effect to entrenchment. These predictions are tested against the development of the noun *key* into an adjective (as in *a very key argument*). The change is gradual, starting with increased productivity of compounds with *key* as specifying element, leading later to debonded and clearly adjectival uses. The development of *key* is analyzed using data from the British Houses of Parliament. The effect of entrenchment is tested against individual variation. Next, situations are investigated where *key* has been primed, either by an earlier instance of *key* or by a collocate of *key*. The evidence supports the hypothesis. Innovative uses of *key* are favored under conditions that improve the retrievability of its more conventionalized uses.

One way or another, grammatical change is nearly always a stepwise process. Innovative forms spread gradually through the grammar of a language, occurring earlier or establishing themselves faster in some grammatical contexts than in others (Aitchison, 1991:85–88; Harris & Campbell, 1995:chap. 5). The literature abounds with examples of gradual change, particularly so the literature on grammaticalization (Bybee, Perkins, & Pagliuca, 1994; Hopper & Traugott,

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2003). A few examples should suffice here to make the point. Lee (2011) found that English *much* is developing from a predominantly positive polarity item into a strictly negative polarity item. She reported that the change takes place faster for adverbial uses of *much*, as in (1a), than for pronominal uses, as in (1b).

- (1) a. Mr. Bond did not worry *much* about Pat (1856, COHA)  
 b. “They didn’t bring *much*,” he said. (1875, COHA)

Chappell (2008) discussed the development of the verb *shuō* ‘say’ into a complementizer in Beijing Mandarin. She suggested that the complementizer use first combined with perception and speech act verbs and later also with cognition verbs, such as *juéde* ‘think, feel’ in (2) (cf. Güldemann, 2002).

- (2) wǒ zǒngshì juéde shuō, shēnghuó-lǐ; quē-le diǎnr shénme  
 I always feel say life-in miss-PFV little something  
 ‘I always feel that there is something a little lacking in my life.’ (quoted from Chappell, 2008:84)

De Smet and Van de Velde (2013) described the development of Dutch *wie weet* ‘who knows’ from a clausal matrix, as in (3a), into an epistemic adverb, meaning ‘maybe’. As an adverbial, *wie weet* first appeared in the clausal periphery, as in (3b), then in clause-initial position, as in (3c), and finally in other clause-internal positions, as in (3d).

- (3) a. ... en *wie weet* of hunne dikwijls herhaalde argumenten niet eenigen indruk op ’s Konings gemoed gemaakt hebben. (1841, CHK)  
 ‘... and who knows if their oft-repeated arguments have not left some impression on the King’s mind?’  
 b. Maar *wie weet!* De tyd vermag alles, en dien vooruit te loopen, zou alles bederven. (1874, CHK)  
 ‘But who knows! Time can do anything, and to run ahead of it would spoil everything.’  
 c. Enfin, *wie weet* gebeurt het nog eens. (1907, CHK)  
 ‘Anyway, maybe it comes to pass sometime.’  
 d. Ik knik, opgelucht dat hij iets van zichzelf laat zien, iets dat ik herken en op grond waarvan er *wie weet* nog iets als een band kan ontstaan. (2002, TNC)  
 ‘I nod, relieved that he reveals something of himself, something I recognize and on the basis of which something like a connection could perhaps still develop.’

In all of these cases, change seems to spread through the grammar of the language, affecting one context after another. Gradual changes can be thought of as a special manifestation of the “constraints problem” first described by Weinreich, Labov, and Herzog (1968:101). An understanding of language change presupposes an understanding of what are possible changes. This includes understanding the

conditions under which speakers can come up with innovative linguistic behavior. Taking the form of a sequence of successful innovations, the progression of gradual change suggests a mechanism by which different steps of change successively become possible. It is this mechanism that is the focus of the present paper.

So far, the gradualness of grammatical change has predominantly been interpreted in terms of a *reanalysis-and-actualization model* (Harris & Campbell, 1995; Langacker, 1977; Timberlake, 1977). That model holds that an expression is assigned a new underlying structure in ambiguous contexts (reanalysis), in response to which its grammatical surface behavior gradually changes (actualization). For example, on this view, Dutch *wie weet*, illustrated in (3), was first reanalyzed as an epistemic adverb in contexts that allowed the new analysis. Consequently, it picked up the full behavior expected of epistemic adverbs, spreading to new contexts incompatible with the old analysis. The model is problematic, however (De Smet, 2013a; Fischer, 2007; Haspelmath, 1998). Even though actualization is recognized as gradual, there is nothing in the reanalysis-and-actualization model to explain the gradualness. For example, if it is an epistemic adverb, then why does adverbial *wie weet* still resist clause-internal uses other than in clause-initial position? In fact, since the reanalysis-and-actualization model interprets reanalysis as abrupt, the gradualness of actualization is at odds with it.

An alternative model holds that the steps of change, rather than being independently caused by a prior reanalysis, are caused by one another. This line of thinking has its roots in modeling approaches to language change (e.g., Skousen, 1989; Tabor, 1994). I will here refer to this view on grammatical change as the *cascade model*. According to the cascade model, the likelihood of any given (step of) change is determined by the resemblance of its outcome to already established constructions (see also Denison, 1986; De Smet, 2012; Naro, 1981; Petré, 2012; Rosemeyer, 2014). This gives potential new steps of change different likelihoods, which explains why they do not occur all at the same time. The reason change can progress beyond the first most likely steps is that each step taken produces new analogical models to base subsequent changes on, thereby shifting the likelihoods for potential new steps.

The history of Dutch *wie weet*, as illustrated in (3), can be reinterpreted in terms of the cascade model. As a matrix clause, *wie weet* developed epistemic meaning. Its subsequent formal development was determined by the similarity relations *wie weet* maintained or newly entered into. At first, these included its formal similarity to other matrix clauses and its semantic resemblance to epistemic adverbs. The analogical pull exerted by those conflicting models explains why *wie weet* first extended to peripheral contexts, where it could pass both for an adverb and for an elliptical matrix clause. But once the peripheral uses were established, these became a bridgehead to the development of uses in other more strictly adverbial contexts. Consequently, *wie weet* spread to clause-initial position, syntactically behaving as an adverb, but in a position where it resembled its newly established clause-peripheral use and still looked somewhat like a clausal matrix. As the clause-initial use emerged, other clause-internal uses received additional analogical support and

eventually appeared too. As such, each step of the long-term development is a response to previous steps through local analogies operating over highly specific constructions.

The cascade model has important advantages over the reanalysis-and-actualization model. It does not have the teleological flaw inherent in the reanalysis-and-actualization model, it is compatible with gradualness and it can better predict the specific sequence of steps in a given gradual change (De Smet, 2012). Moreover, the cascade model can be extended to changes that do not involve syntactic category change, such as lexical diffusion (De Smet, 2013b; Rosemeyer, 2014).

Underlying the cascade model, there can be assumed a simple dynamic at work: shifts in what is conventional change also what is conceivable. By default, innovations are intrinsically unlikely. That is both because speakers avoid deviation from convention and because for the linguistic coding of experience they will automatically home in on conventional means first. What is conventional will be better entrenched and constitute a more or less automated mental routine (Langacker, 1987:57–59). In mental retrieval such routines will typically outcompete any less conventional means of expression (cf. Kapatsinski, 2009:168). Grammatical innovations can only happen when a speaker defeats the odds by retrieving and selecting an expression despite its being unconventional in a given grammatical context—what is called “partial sanction” in Langacker (1987:71). There are at least two factors that can shift the odds in favor of the unconventional. First, an unconventional expression will be likely if its deviation from convention is so minimal as to be (almost) undetectable—hence the role of analogy in gradual change. Second, this effect will be the stronger, the more accessible the analogically related conventional expressions are in mental retrieval. This will eventually depend on how well established they are. To stick with the example of adverbial *wie weet*, the more conventionalized the clause-initial use becomes, the stronger the analogical support it offers to other clause-internal uses.

Arguably, then, new and unconventional coding solutions can arise to the extent that speakers have easy mental access to any analogically related conventional coding solutions. Assuming a trade-off in language processing between storage and computation, one could say that the retrievability of associated stored patterns “saves” computational effort, which can be “spent” again in the creative assembly of a new unconventional pattern. This interaction between the conventional and unconventional should repeat itself with each step of a gradual change.

From this hypothesized dynamic, testable predictions can be derived. The dynamic predicts that the more readily retrievable a conventional use of an expression is, the better are its chances of being used also in similar but unconventional ways. If the hypothesis holds, new uses of an expression should show up under circumstances that facilitate the expression’s retrieval. As already hinted at, conventionalization links naturally to Langacker’s (1987) notion of entrenchment, which is associated with discourse frequency. At the same time, retrievability can also be temporarily boosted by priming, which is primarily associated with recency. So the general prediction can be split out into two more

specific ones. First, an innovation should become more likely as one of the patterns from which it receives analogical support becomes more firmly entrenched. This prediction will here be tested against individual variation, with frequency differences in the usage of individual speakers taken to reflect different degrees of entrenchment (cf. De Smet, *forthcoming*; Schmid & Mantlik, 2015). Second, an innovation should also be more likely when one of its analogical support patterns has recently been activated by priming. This prediction will here be tested against the effect of direct priming in discourse and indirect priming through collocational associations.

The change that is to be subjected to these predictions here is a relatively simple one, the development of English *key* from a noun into an adjective (Denison, 2001). In what follows, the development is examined in detail, drawing on a dataset collected from the Hansard Corpus (HC). Some necessary background is presented on the development of *key* into an adjective, and the corpus data are discussed. Next, the different procedures for testing the hypothesis and their results are described. The analysis of the data largely supports the predictions. Innovative uses of *key* are found to typically occur under conditions that improve the retrievability of already established uses of *key*. Innovations are more likely to occur in individual speakers who frequently rely on conventional uses of *key*. Innovations are also more likely to occur when conventional uses of *key* have been primed. This is consistent with the mechanism hypothesized to underlie gradual grammatical change, adding further support to the cascade model of change.

Note at the outset that this paper focuses exclusively on the language-internal side of change. If the cascade model presented here is correct, it still offers only a rough sketch that is blind to the social dimensions of change. The question that guides the present discussion is which language-internal conditions are to be met for speakers to produce innovative linguistic structures.

## BACKGROUND

The development of English *key* from a noun into an adjective has already received ample attention in the literature (Denison, 2001, *forthcoming*; De Smet, 2012; Van Goethem & De Smet, 2014; Vartiainen, 2013). The beginning of the change has been situated in the second half of the 20th century (Denison, 2001; De Smet, 2012; Vartiainen, 2013:175–176). The change is illustrated by the examples in (4). *Key* in (4a) functions as the first element of what is in all likelihood a noun-noun compound, *key phrases*. In other words, *key* is probably a noun here. In (4b), *key* is separated from *observations* by an intervening adjective, *experimental*. Because the English noun phrase normally has adjectival premodifiers placed before nominal premodifiers (Denison, 2001), the ordering in (4b) suggests that *key* is an adjective. It almost certainly is an adjective in (4c), where *key* is used with *very*, an intensifier typically found with adjectives. *Key* is also very likely to be an adjective in (4d), where it is used predicatively and without the determiner a count noun would normally require in this position.

- (4) a. The proposed wording of the possible agreement was given to Dr. Adenauer with certain *key* phrases in blank. (1952, quoted from De Smet, 2012: 623)  
 b. Therefore, we shall start our description of the behavior of electric charges in motion by summarizing the *key* experimental observations. (1961, *ibid.*)  
 c. He alienated a lot of very *key* political players in this town. (1991, *ibid.*)  
 d. Her confirmation was *key* because symptoms like the kind I had can be caused by other factors, too. (1991, *ibid.*)

The existing literature leaves little doubt that the development of *key* is a gradual process (see in particular Denison [2001] and De Smet [2012]). Although finer-grained distinctions are possible, for present purposes, three major stages will be distinguished. First, *key* became increasingly productive as the first element in noun-noun compounds. This stage will be referred to as the *compounding stage*. The compounding stage is illustrated in (5) (or (4a)). Note that *key*-compounds may consist of more than two nouns, as in (5b).

- (5) a. ... the Government's desperate desire to shield themselves from effective scrutiny in the first *key* hours. ... (1996, HC)  
 b. ... not a *key* election pledge, but an important pledge. (1999, HC)

Later, *key* began to appear in constructions that are not exclusively adjectival but much more strongly associated with adjectives than with nouns. While these constructions still marginally allow an analysis of *key* as a noun, their appearance indicates that the syntactic tie between *key* and its head is loosening. This stage will be referred to as the *debonding stage* (after the concept of "debonding" introduced by Norde [2009] and applied to noun-to-adjective shifts in Van Goethem & De Smet [2014]). Constructions characteristic of the debonding stage include *one*-substitution, as in (6a), and the use of *key* before a premodifying adjective, as in (6b) (or (4b)).

- (6) a. The year 1991 was the *key* one, when the modern scheme came into operation. (1996, HC)  
 b. ... access to most of the *key* official documents in the Sandline affair. (1999, HC)

Finally, *key* adopted behavior that is exclusively adjectival. This is the *adjective stage*. Constructions characteristic of the adjective stage include adverbial premodification, as in (7a) (or (4c)), coordination to other adjectives, as in (7b), predicative use, as in (7c) (or (4d)), or any combinations of these.

- (7) a. NATO ... is playing an equally *key* part in building the peace. (1998, HC)  
 b. It is true to say that we are setting some *key* and important issues on one side. (1995, HC)  
 c. When he elaborated on those special circumstances, one seemed to be *key*. (1997, HC)

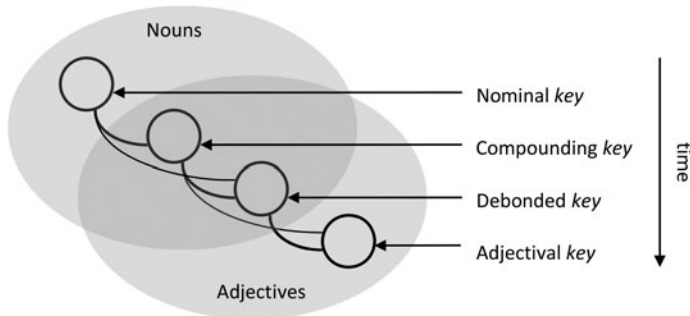


FIGURE 1. Analogical relations between the developmental stages of *key* and their place within the broader categories of nouns and adjectives.

As is typical of gradual change, the steps of change overlap. This holds also for the stages in the development of *key*. As will be shown, the increase in the productivity of *key*-compounding continues during the debonding and adjective stages. Likewise, debonded uses continue to grow in frequency during the adjective stage. That said, there is a clear temporal order in the onset of the steps. By way of summary, Figure 1 visualizes the different uses of *key*, as have been defined, highlighting the analogical relations holding between them and placing them in the larger constructional networks of noun phrases and adjective phrases under which they resort.

#### DATA

Data on the history of *key* were drawn from the Hansard Corpus. The corpus, compiled by Marc Alexander, is made up of material available from the online Hansard Archive.<sup>1</sup> It contains transcripts of the parliamentary debates that took place in the British Houses of Parliament, covering almost the entire 19th and 20th centuries. Data on *key* were collected from the transcripts dating from the 1970s, 1980s, and 1990s, which is the period that roughly coincides with the onset of the debonding and adjective stages in the history of *key*. More details on data extraction procedures are given in the following sections, as they differ from case study to case study.

The spoken data represented by the Hansard Corpus differ fundamentally from the speech language users produce in spontaneous conversation. Probably, many parliamentary interventions have been prepared in writing, perhaps sometimes by others than the speaker they are attributed to. It is also obvious that the transcripts of parliamentary debates have been heavily postedited. They lack the hesitations, false starts, inconsistencies, and repetitions that are characteristic of spontaneous speech and that are inevitable even in a well-prepared delivery. Nevertheless, there were at least two good reasons for using the Hansard Corpus here. One major advantage of the Hansard Corpus is that it allows tracking of

individual speakers over time, with very extensive amounts of data available for the more active members of parliament. This property of the corpus was exploited in the case studies addressing entrenchment effects. The other important advantage of the data is that parliamentary debates are organized into conversational turns. Members of parliament, when taking the floor, typically respond to a previous turn. It is this property of the corpus that was taken advantage of in the case study on priming effects.

## FINDINGS

The following sections apply the predictions made by the cascade model to the history of *key*, testing them on data drawn from the Hansard Corpus. The discussion starts by addressing the effects of entrenchment, and then moves on to priming effects.

### *Entrenchment*

The cascade model predicts that innovative patterns should benefit from the entrenchment of any similar-looking patterns. As *key*-compounds become better entrenched, the extension of *key* to debonded and adjectival uses is expected to become easier. Likewise, increased entrenchment of debonded uses should facilitate the emergence of adjectival uses. Taking discourse frequency as a proxy to entrenchment, these predictions are borne out by the long-term development of *key*, with its specific sequence of stages. Compounding uses appeared before debonded uses, which appeared before adjectival uses. However, because this sequence of change is derived from aggregate data, it generalizes over individuals. There is something of a logical leap in invoking a social phenomenon (the development of *key* in English) to support a psychological claim (entrenchment and analogy at work in individual speakers) (cf. Schmid & Mantlik, 2015). It is on such grounds that Bergs (2005:5) argued that:

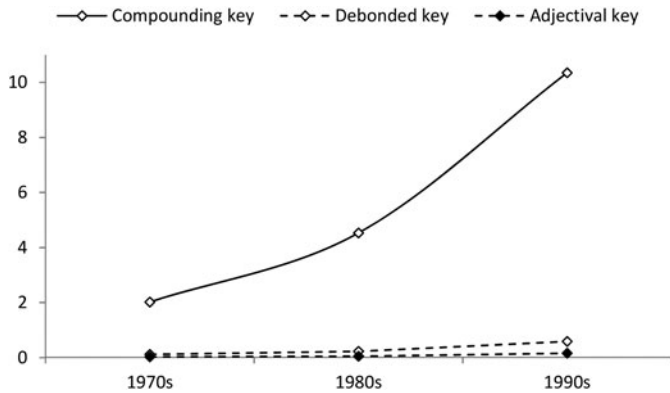
any claim about cognitive, universal or typological determinants of linguistic change need not only hold for the level of the speech community or its subgroups, but also for a substantial number of speakers in isolation, if it wants to reflect reality.

Therefore, more convincing evidence in support of the hypothesis would be obtained if the prediction also holds for individual variation. For example, speakers differ from each other in the extent to which they rely on *key*-compounding. That is straightforwardly reflected in their usage frequencies. Assuming again that those usage frequencies can serve as a proxy to entrenchment, they should predict which speakers are most likely to produce the more innovative debonding and adjectival uses. On this logic, synchronic variation across individuals is to respect the pattern of diachronic change observed in the overall population. More precisely, speakers' behavior should follow a probabilistic implicational hierarchy, such that behavior characteristic of



TABLE 1. *Division of data over speakers and decades*

Decade	Speakers	Word Count	Instances of <i>key</i>
1970s	85	36,239,761	1289
1980s	75	33,160,674	2163
1990s	53	22,016,482	3012

FIGURE 2. Normalized frequency of *key* in compounding, debonded, and adjectival use (frequencies per 100,000 words);  $n$  speakers = 169,  $n$  observations = 4826.

a diachronically later stage is most likely to be found in speakers displaying the behavior associated with diachronically earlier stages (cf. Paunonen, 1976). Indeed, a failure to confirm this could falsify the cascade model. If the steps of a gradual change truly follow from one another, it is expected that an individual should be less likely to adopt a (diachronically) later step if they have not yet adopted the earlier step, even when the later step is already available in the larger population.

In order to study the behavior of individual speakers, those speakers were selected from the Hansard Corpus who produced at least 300,000 words of running text over one decade (i.e., the 1970s, 1980s, or 1990s). Speakers were selected only from the House of Commons transcripts, where speakers are consistently identified by their full name. A total of 169 different speakers matched the criterion. Of these, 32 produced over 300,000 words of text in two consecutive decades and six did so in three consecutive decades. This gives us the split up of speakers over decades reproduced in Table 1, with accompanying total word counts per decade. The rightmost column provides the total number of instances of *key*, prior to manual exclusion of noise.

From the subcorpus described in Table 1, all instances of *key* were extracted and linked to the individual speakers who produced them. The examples were manually annotated, sifting out noise and distinguishing between nominal, compounding, debonded, and adjectival uses. Figure 2 gives the normalized frequencies of the

different uses of *key* centrally at issue here. In the aggregate data for the period, debonded and adjectival uses never rise above a frequency of 0.6 per 100,000 words. Compounding uses are much more frequent, on average about 18 times more frequent than debonded uses, which in turn are about 4 times more frequent than adjectival uses. This is in line with the diachronic sequence of stages. The frequencies justify treating the debonded and adjectival uses of *key* as (relatively) unconventional and innovative in the period under study, while the compounding uses are treated as (relatively) conventional and established.<sup>2</sup> Finally, it should be clear that even the large corpus used here contains rather few of the innovative debonded and adjectival uses. To compensate for that, the case studies in this and the following sections either collapse the distinction between debonded and adjectival uses, or else collapse that among the three subperiods.

Using the annotated dataset, a usage profile was determined for every speaker in the corpus. On this basis, it could be investigated whether individuals' synchronic

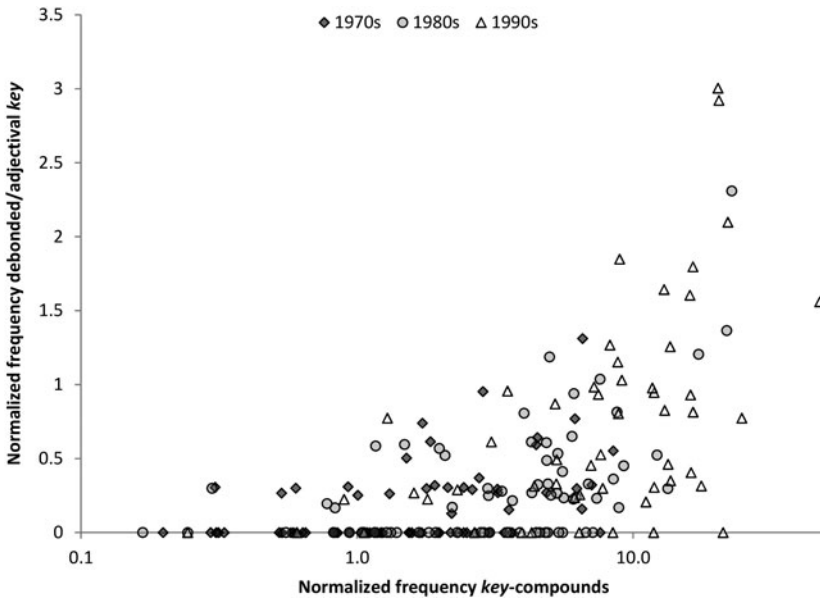


FIGURE 3. Speakers' use of debonded/adjectival *key* as a function of their use of *key*-compounding;  $n$  speakers = 169,  $n$  observations = 4826.

behavior reflects the diachronic trends in the population. Figure 3 plots individual speakers with respect to their advancement on the different stages of the historical development of *key*.<sup>3</sup> Specifically, their use of *key*-compounding ( $x$ -axis) is set out against their use of debonded and adjectival *key* ( $y$ -axis). It is found that individual speakers' usage profiles reflect the diachronic order of events. The likelihood for a speaker to use debonded or adjectival *key* increases with their

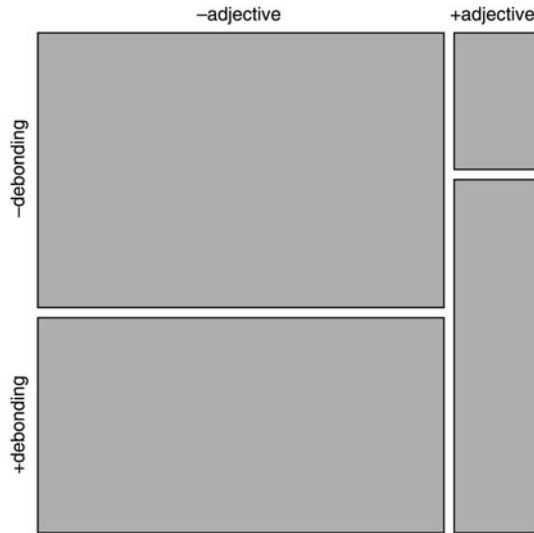


FIGURE 4. Distribution of speakers with and without debonded *key* (y-axis) and with and without adjectival *key* (x-axis);  $n$  speakers = 169,  $n$  observations = 311.

reliance on compounding *key*. The trend is seen in all three decades ( $R^2 = .26$  for the 1970s;  $R^2 = .52$  for the 1980s;  $R^2 = .27$  for the 1990s).<sup>4</sup> This confirms the idea that stronger entrenchment of *key*-compounding will make it easier for speakers to select *key* in the similar, but comparatively unconventional debonded and adjectival contexts. While correlation cannot prove causality, it is at least in line with the interdependence assumed to exist between the steps of a long-term development.

To corroborate this interpretation, a number of additional aspects of individual variation were investigated. First, there should also be a correlation between speakers' use of debonded *key* and their use of adjectival *key*. Because the incidence of those two constructions is much lower in the dataset, the different decades were collapsed. Next, simple distinctions were made (i) between speakers who do or do not display debonded *key* and (ii) between speakers who do and do not display adjectival *key*. This produces four speaker types, defined by the variables [ $\pm$  debonded *key*] and [ $\pm$  adjectival *key*]. The distribution of the four types in the dataset is visualized in the mosaic plot in Figure 4. Specifically, the relative share of the four speaker types in the sample is reflected in the size of the corresponding cells of the plot. The most common speaker type, [- adjectival *key*; - debonded *key*], is the one that shows none of the innovative constructions, which suggests that the new uses of *key* are not being adopted by all speakers yet (confirming their innovative status, cf. note 2). The least common speaker type, [+ adjectival *key*; - debonded *key*], is the one that shows evidence of adjectival *key* but not of debonded *key*. That is the speaker type whose behavior does not reflect the diachronic trend in the population. Most importantly, the plot shows that if speakers use debonded *key*, they are also more

likely to use adjectival *key* (Pearson's  $\chi^2$  9.49,  $p = .002$ ;  $\phi = .211$ ). This is consistent with the cascade model, which assumes that availability of the debonded use facilitates extension to the adjectival use.

Second, if the cascade model holds, new steps of a long-term development depend primarily on the immediately preceding step and less so on any earlier stages. In the cascade model, this is what accounts for the observed order of stages in a development. With respect to *key*, it can be expected that for debonded and adjectival uses to arise, the compounding uses were a necessary transitional step. In contrast, the free noun *key* would offer less or no analogical support to debonded and adjective uses. Individual variation is consistent with this. Instances of (nonliteral) free noun uses of *key*, as in (8), were counted per individual speaker and compared to the frequencies of *key*-compounds and debonded or adjectival *key*.

- (8) I start with a subject that I have often mentioned before because it is the *key*.  
(1977, HC)

It was found that, across individuals, the normalized frequency of the free noun *key* positively correlates with the normalized frequency of *key*-compounds ( $R^2 = .28$ ) but much less so with the normalized frequency of debonded and adjectival *key* ( $R^2 = .07$ ).<sup>5</sup> This supports the status of *key*-compounds as a transitional stage between the noun and the adjective *key*. Speakers who frequently use the free noun *key* are more likely to produce *key*-compounds. Speakers who frequently use *key*-compounds are more likely to produce debonded and adjectival *key*. But there is no direct connection between the noun *key* and debonded and adjectival *key*.

Third, the assumed interdependence of the steps of change should also be visible over speakers' lifetimes (cf. Petré & Van de Velde, 2014). As pointed out, for 38 speakers, the dataset contains observations over more than one decade. These speakers were divided into four types, depending on whether or not their use of *key*-compounding increased over their lifetimes and whether or not their use of debonded and adjectival *key* increased over their lifetimes.<sup>6</sup> The mosaic plot in Figure 5 shows how the four speaker types distribute. Again, cell sizes reflect the proportionate share of each speaker type in the sample. There is a strong correlation between increasing use of *key*-compounding and increasing use of debonded and adjectival *key* ( $p = .007$ , using a Fischer's exact test;  $\phi = .45$ ). That is, speakers whose use of *key*-compounds increases over time are also likely to show an increase in their use of debonded and adjectival *key*. Conversely, speakers whose use of *key*-compounds does not increase are unlikely to show an increase in their use of debonded and adjectival *key*. The speaker type whose behavior goes against the predictions of the cascade model (increasing use of debonded/adjectival *key*, despite decreasing use of *key*-compounding) is also the rarest.

In sum, variation both between and within individual speakers is consistent with the predictions of the cascade model. Speakers tend to adopt behavior belonging to the more advanced stages of change only to the extent that they display behavior

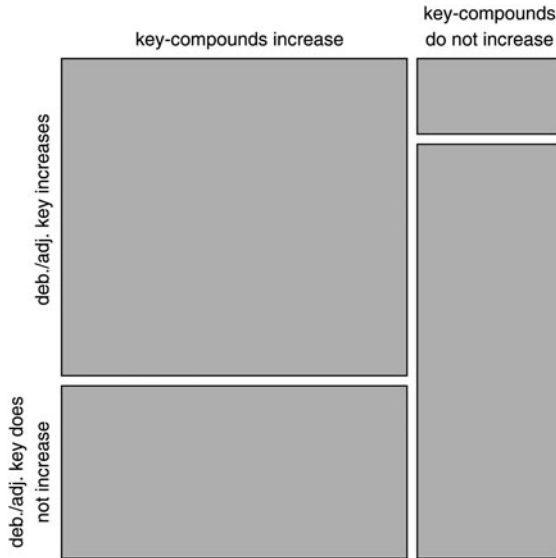


FIGURE 5. Distribution of speakers whose use of *key*-compounds does or does not increase (*x*-axis) and whose use of debonded/adjectival *key* does or does not increase (*y*-axis); *n* speakers = 38, *n* observations = 1936.

belonging to the (immediately) preceding stages. The interdependencies between steps of change revealed here do not prove causal relations, but they are consistent with the assumption of causality.

### *Priming*

An expression that is strongly entrenched enjoys easy retrievability on a more or less permanent basis. Priming, by contrast, causes a temporary surge in retrievability. The effect has been extremely well documented under experimental conditions. But in natural language use, too, there is good evidence that priming influences speakers' textual choices, for instance in the form of textual persistence (Szmrecsanyi, 2006; Torres Cacoullous, 2015; Weiner & Labov, 1983). In light of the research hypothesis, it is expected that priming also facilitates an expression's selection in unconventional contexts.

In the development of *key*, such priming effects may manifest themselves in different ways. Trivially, *key* is likely to prime itself. A speaker should more readily select *key* in their own discourse turn if a previous speaker did so in theirs. The more interesting question, however, is whether conventional uses of *key* prime innovative uses. If so, this would again support the link between increased retrievability and innovation. In what follows, tentative evidence is presented that prior occurrences of conventional *key* facilitate innovative uses of *key* further down in discourse. Next, another type of priming effect will be considered. It has been argued that expressions are primed by their collocates

(Hoey, 2005). The relation could also be couched in terms of “cotextual entrenchment” (Schmid & Mantlik, 2015). Although the link between collocational and priming relations still awaits more empirical evidence (Durrant & Doherty, 2010), it here provides another testable prediction. Specifically, it is expected that *key* is more likely to be used innovatively if it has been primed by other contextual elements it is collocationally associated with. Evidence to that effect is presented next.

*Priming across discourse turns.* To test whether priming facilitates innovation, the corpus data were manipulated to distinguish between a primed and nonprimed condition. For the primed condition, the Hansard Corpus (this time including also the material from the House of Lords) was searched for all instances in which *key* is used in two immediately consecutive turns. Priming could also have been investigated within the same speakers’ turn, but this could have confounded the priming effect with the entrenchment effect. The disadvantage of the across-turns approach taken here is that turns in parliamentary debates can be very long,<sup>7</sup> making for a considerable distance between the assumed prime and its target. For the 1970s, only 137 contexts were found with *key* in two consecutive turns, which was not enough to pursue the analysis. The datasets for the 1980s ( $n = 412$ ) and 1990s ( $n = 1082$ ), however, were manually analyzed to identify cases in which the first *key* was a *key*-compound. Within that subset, the second *key* in the adjacency pair was then analyzed to check the incidence of debonded or adjectival *key*. An example of a relevant adjacency pair is given in (9), with a *key* compound in the first turn (*a key element*) and another instance of *key* in the second—in this case, the second instance of *key* is an innovative adjectival use (*these key locally employed personnel*).

- (9) [Viscount Cranborne] My Lords, the locally enlisted military personnel serving with the Army and the Royal Navy in Hong Kong are a *key* element of the British garrison, as indeed are the locally employed civilian staff. Recruitment and retention are satisfactory and at present we have no plans to take any additional steps to retain their services between now and 1997.  
[Edward Shackleton] The noble Viscount visualises the locally employed personnel taking on some of the duties of the garrison, is he confident, although he has made no reference to it, that he will be able to retain these *key* locally employed personnel?  
(1990, HC)

For the nonprimed condition, control sets were collected for the 1980s and 1990s, each containing 1000 randomly selected instances of *key* not preceded by another instance of *key* within at least 20 turns. These, too, were manually analyzed. Recall here that the point is not to prove that there is priming in the data: in the “primed condition,” priming is plausible.<sup>8</sup> Rather, the question is whether *key*, when primed, behaves more innovatively.

Evidence that this is so is found for the 1980s, as shown in Figure 6. When preceded by a *key*-compound in the immediately preceding turn, *key* is about

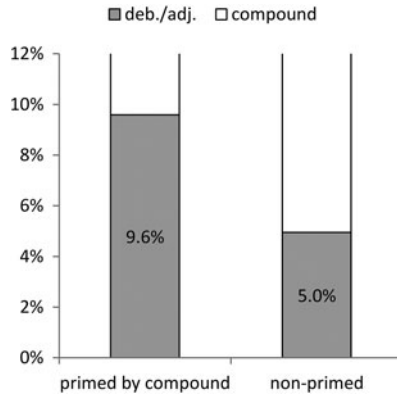


FIGURE 6. Incidence of debonded/adjectival *key* versus *key*-compounds following a *key*-compound in the previous turn (1980s);  $n$  “primed by compound” = 146,  $n$  “nonprimed” = 707.

twice as likely to be used in debonded or adjectival constructions compared to the control set. The effect is very small but it is significant ( $\chi^2 = 4.81$ ,  $p = .028$ ;  $\phi = .08$ ). The finding again supports the idea that innovations thrive under conditions improving the retrievability of their analogical model.

While this is in line with the hypothesis, the finding needs to be qualified in two ways. First, the finding is not confirmed for the 1990s ( $\chi^2 = .13$ ,  $p = .71$ ;  $\phi = .01$ ). It is possible that the effect disappeared over time. This might still be consistent with the hypothesis (albeit post hoc), because dependency on priming should be stronger the more innovative an expression is. But given that the effect in the 1980s is not very strong to begin with, either the observed effect or its absence may also simply be a fluke of the data. As such, the evidence here is encouraging but still tentative. Second, if the hypothesized priming effect exists, it should be clear that while it supports the hypothesis, it cannot be a major propagator of change in its own right, at least for relatively low-frequency expressions like *key*. In the corpus, the primed condition is so uncommon that the great majority of adjectival and debonded instances of *key* must occur outside primed contexts.<sup>9</sup>

*Collocational priming.* If collocational priming promotes innovations in the development of *key*, it is expected that new uses of *key* are more likely to surface when *key* has been primed by another contextually available lexical element. The more innovative the use, the stronger this effect should be. The prediction can be tested with some precision on the nonpredicative adjectival and debonded uses of *key*. Because in these uses *key* is always a premodifying element, it always patterns with a nominal head that associates with the form *key* to a greater or lesser degree. For example, it is intuitively clear that *role* in (10a), being the head of a frequent *key*-compound (*key role*), more strongly associates with *key* than *land* in (10b).

TABLE 2. *MI scores for attested combinations of key and its nominal head in debonded constructions*

Attested Example	MI key-head
“Russia and other <i>key</i> international <i>players</i> ”	9.6
“to fight for the <i>key</i> beneficial <i>elements</i> of”	8.7
“recent trends in <i>key</i> economic <i>indicators</i> ”	7.9
⋮	
“collaborated closely with <i>key</i> non-aligned <i>states</i> ”	−2.2
“the <i>key</i> ministerial <i>authority</i> lies with”	−2.4

TABLE 3. *MI scores for attested combinations of key and its nominal head in adjectival constructions*

Attested Example	MI key-head
“form a <i>key</i> and essential <i>element</i> of”	8.2
“as one of the <i>key</i> and crucial <i>features</i> of”	7.9
“playing an absolutely <i>key</i> <i>role</i> in”	7.6
⋮	
“a substantive, important and <i>key</i> <i>report</i> ”	−.5
“in a number of crucial and <i>key</i> <i>places</i> ”	−.6

- (10) a. That is a *key* and important role. (1988, HC)  
 b. The question of *key* industrial land bears directly on harbours. (1973, HC)

Intuitions about collocational association can be backed up by mutual information (MI) scores based on joint occurrence in the Hansard Corpus. As expected, *key role* is then found to be a strong collocation with a mutual information score of 7.6,<sup>10</sup> whereas *key land* is simply unattested. This means that, other things being equal, *key* is more likely to have been collocationally primed in (10a) than in (10b). Pursuing this logic, MI scores for *key* and its nominal head were calculated for all the attested debonded and adjectival uses of *key*. The attested instances were collected from the data used to analyze individual variation (cf. Figure 4). For debonded uses, there were 209 types (from 248 tokens), for adjectival uses, there were 37 types (from 63 tokens). MI scores were calculated on the basis of the complete 1970–1999 portion of the Hansard Corpus.<sup>11</sup> Tables 2 and 3 illustrate the procedure, by listing some attested instances of debonded and adjectival *key*, along with MI scores that measure the strength of the collocational tie between *key* and the nominal head it is attested with. The examples are ordered by their MI score, from highest to lowest.

If debonded and adjectival uses of *key* differ in their dependence on collocational priming, this should be visible from the MI scores collected. The results are summarized and visualized in Figure 7. The boxplots show the range



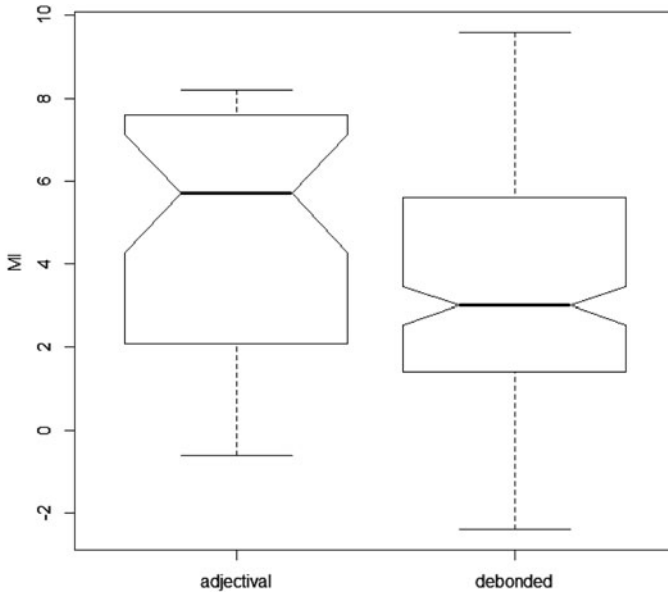


FIGURE 7. MI scores for *key* and its head in premodifying debonded and adjectival constructions in the Hansard Corpus.

and distribution of MI scores in both grammatical contexts. The waist of each of the boxplots marks the confidence interval (at  $p = .95$ ) for the median. It is found that adjectival uses of *key* tend more strongly to occur with established *key*-collocates than debonded uses. Paradoxically, then, the construction that is grammatically further removed from *key*-compounding is collocationally more like it. Yet, this is in line with the prediction. Grammatically, *key* is still the least conventionalized in purely adjectival contexts, but this is compensated for by the presence of a *key*-collocate. The most innovative uses of *key*, then, are also the ones most likely to be resorted to in contexts where *key* has been collocationally primed. Debonded uses of *key*, which are grammatically less deviant and are already better established, depend less heavily on the presence of a *key*-collocate. Still, taking an MI of 3 or more as the threshold for linguistic significance (Stubbs, 1995), even debonded uses are built on well-established *key*-compounds in about half of all cases (105 of 209, i.e., 50.2%).<sup>12</sup> All this fits in with the idea that innovations to an expression's use tend to occur under conditions that improve that expression's mental retrievability.

## CONCLUSIONS

The history of English *key* is a modest change, hardly complicated and with minimal impact on the structure of English. Nevertheless, from its development, a theoretical point can be made. The evidence presented here is largely

consistent with the predictions made by the cascade model. As the constructions resorting under an earlier stage of a change become better entrenched, they more easily spark off the innovations that constitute the following stage. This is visible in patterns of variation across individual speakers, as well as in the changes speakers undergo in the course of their lifetimes. Similarly, when earlier-stage constructions have been primed, the chances for innovative constructions to appear may improve. The priming effect is weakly evidenced in contexts involving direct priming from previous discourse. It is seen more convincingly in contexts involving indirect priming through the contextual presence of collocates.

From these findings we begin to glean a clearer picture of the language-internal factors that drive gradual change. Expressions expand their usage contexts along pathways determined by similarity relations, driven on by local analogies. However, each analogical extension is a little leap into the unconventional. Therefore, analogical extensions depend on facilitating factors. What ultimately triggers the observed chains of analogical extensions is the interaction between conventionalization (entrenchment) and linguistic creativity (innovation). Creativity and innovation are unlikely and costly, but given conventional, readily available source material to work from, it comes within the language user's reach. This way, it appears, expressions' usage can continually expand to the fringes of what is grammatically conceivable. And when the conceivable becomes fully acceptable and conventional, the edges of conceivability, in turn, expand outward.

#### NOTES

1. See <http://www.hansard-archive.parliament.uk/>.
2. Denison (2001), writing just after the period under study here, reported that (at least) adjectival uses are rejected as ungrammatical by some speakers. This further justifies their treatment as innovative in the 1970s to 1990s.
3. The *x*-axis of Figure 2 uses a logarithmic scale. Speakers who did not produce any *key*-compounds could therefore not be plotted. There are 12 such speakers. None of them produced an instance of debonded or adjectival *key*.
4. Respective confidence intervals for  $R^2$  (at  $p = .95$ ) are  $.11 < R^2 < .43$  for the 1970s,  $.35 < R^2 < .66$  for the 1980s, and  $.08 < R^2 < .48$  for the 1990s.
5. The respective confidence intervals (at  $p = .95$ ) are  $.18 < R^2 < .38$  for the correlation between noun-usage and compound-usage and  $.02 < R^2 < .15$  for the correlation between noun usage and adjective usage. The confidence intervals do not overlap, meaning that the difference between the two  $R^2$  values is significant.
6. The six speakers represented over all three decades were counted twice, once for the transition from the 1970s to 1980s, and once for the transition from the 1980 to the 1990s. Speakers whose usage frequencies remained level were counted as showing no increase.
7. The average turn length in the dataset is 207.2 words.
8. It is easy to demonstrate that the data show a persistence effect across turns. For example, in the parliamentary debates from the 1980s, *key* occurs at an average rate of about 1 hit per 81 turns. But in the turns that immediately follow an occurrence of *key* that rate goes up to 1 hit per 26 turns. It is reasonable to assume here that this persistence effect can indeed be interpreted as a priming effect. Note, incidentally, that one reviewer objected that members of parliament may not actually listen to each other's turns. While this is not inconceivable, paying conscious attention to a stimulus is not actually required for priming effects to occur—just hearing the stimulus suffices.
9. For example, the 412 instances in the primed condition found for the 1980s contrast with 5625 instances in the nonprimed condition (i.e., all instances of *key* at least 20 turns removed from the previous instance of *key*). At the rates of occurrence described in Figure 6, it can therefore be

estimated that for every debonded/adjectival instance of *key* in the primed condition, the corpus must contain about 14 in the nonprimed condition.

10. The MI score is calculated as  $\log [( \text{joint frequency} \times \text{corpus size} ) / ( \text{frequency node} \times \text{frequency collocates} )] / \log (2)$ . For *key role* over the entire 1970–1999 period, that is  $\log [(1,222 \times 500,149,721) / (38,010 \times 85,713)] / \log (2)$ .

11. Unattested combinations, such as *key land*, have been assigned an MI score of 0. For instances of *one*-substitution, the head has been restored from the context. For example, in *Targets will also need to be set—I have outlined some key ones today* (1998, HC) the (restored) head is *targets*.

12. That this proportion is higher in the 1970s (58.3%, 21 of 36) than in the 1980s (45.6%, 31 of 68) and 1990s (50.5%, 53 of 105) may suggest that debonded uses, too, used to be more dependent on existing *key*-collocations at earlier stages. However, the trend is not significant ( $\chi^2 = 1.14$ ,  $p = .28$ ;  $\phi = .07$ , comparing the 1970s to the 1980s–1990s).

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