Language and Cognition **7** (2015), 371–414. doi:10.1017/langcog.2014.34

Epistemic inclination and factualization: a synchronic and diachronic study on the semantic gradience of factuality*

VITTORIO TANTUCCI
Lancaster University

(*Received* 21 *April* 2014 – *Revised* 27 *August* 2014 – *Accepted* 15 *September* 2014 – *First published online* 10 *November* 2014)

ABSTRACT

This paper proposes a gradient redefinition of the notion of factuality, here intended as a dynamic continuum unfolding through several epistemic levels. In this respect, the speaker/writer's increasing certainty upon the realization of an event or situation is here as factualization. Factualization is a conceptual phenomenon determined by an embodied mechanism (Lakoff & Johnson, 1980, 1999; Lakoff, 1987, 2003; Grush, 2004; Gallese & Lakoff, 2005) of cyclic acquisition and control with respect to a new proposition P. Being a form of subjectification (Traugott, 1989, 1995, 2003, 2010, 2012; Traugott & Dasher, 2002), factualization occurs as the semasiological reanalysis of an epistemic construction. Drawing on Langacker's (1991, 2008, 2009) notion of the 'epistemic control cycle' (see also Kan, Teubner-Rhodes, Drummey, Nutile, Krupa, & Novick, 2013, on cognitive control), I claim and demonstrate that epistemic predicates originally conveying weak certainty towards a proposition P diachronically develop an increasingly factual meaning conveying more and more frequently a subjected form of certainty. This phenomenon is first shown through a qualitative and quantitative corpus analysis from the BNC,[1] which provides a measurable account of the various degrees of polysemy of the three epistemic predicates *I think*, *I believe*, and *I reckon*. In addition, I discuss the results of a diachronic corpus survey from the diaCoris on the factualization process of *(Io) penso* 'I think' in Modern Italian during the last 150 years, showing how the contemporary usage of *(Io) penso* is notably more oriented towards absolute factuality than it was 150 years earlier.

KEYWORDS: factuality, epistemic control cycle, epistemic inclination, subjectification, factualization.

[*] Department of English Language and Linguistics, Lancaster University, UK. e-mail: v.tantucci@lancs.ac.uk

[1] British National Corpus, online: <http://www.natcorp.ox.ac.uk> (last accessed 16 April 2014).

1. Introduction

In this paper I redefine the concept of factuality, elsewhere also called 'realis' (e.g., Mithun, 1999; Palmer, 2001), 'factivity', 'reality', 'actuality' (e.g., Kiparsky & Kiparsky, 1971; Chung & Timberlake, 1985; Papafragou 2000), or 'validity' (Kiefer, 1987; Dietrich, 1992). The term 'factuality' has been extensively discussed by Narrog (2002, 2005a, 2005b, 2009, 2012), who seeks to discriminate modally marked statements from unmarked ones. More specifically, in Narrog's account modality is the domain marking the non-factuality or 'undetermined-factuality' of an event, as opposed to non-modal statements, generally portraying a situation as a fact. The main aim of this work will be to redefine factuality as a gradient notion unfolding dynamically through several stages of certainty with respect to a proposition P. In this sense, I adopt the term 'factualization' so as to to describe the cognitive process that progressively – or abruptly – leads to a subjective belief towards a proposition P. I define factualization as a conceptual phenomenon determined by an embodied mechanism (Lakoff & Johnson, 1980, 1999; Lakoff, 1987, 2003; Grush, 2004; Gallese & Lakoff, 2005) of cyclic acquisition and control with respect to a new proposition P. Being a form of subjectification (Traugott, 1989, 1995, 2003, 2010, 2012; Traugott & Dasher, 2002), it occurs both on a synchronic and a diachronic level. The former occurs textually throughout the ongoing discourse, the latter is the result of the semasiological semantic reanalysis of an epistemic construction.

Drawing on Langacker's (1991, 2008, 2009) notion of the 'epistemic control cycle' (see also Kan et al., 2013, on cognitive control), I provide robust evidence to claim that epistemic predicates originally expressing weak certainty towards a proposition P diachronically acquire an increasingly factual meaning conveying more and more frequently a subjected form of certainty. I will show this through a synchronic quantitative analysis from the BNC of three polysemous epistemic predicates in ME[2] (*I think*, *I believe*, and *I reckon*), each potentially conveying different degrees of epistemic commitment towards P. This study will be carried out through a collostructional analysis (cf. Stefanowitsch & Gries, 2003; Schmid & Küchenhoff, 2013) so as to statistically measure the degree of attraction between a first person epistemic predicate and the type of epistemic adverbials co-occurring with it within a specific word-span scope.

In addition to that, I will further adopt a corpus-illustrated (Tummers, Heylen, & Geeraerts, 2005) qualitative method to identify the dynamic increasing of subjective commitment towards P of an epistemic predicate. Finally, I will provide a corpus survey from the diachronic corpus of written Italian (diaCORIS) on the factualization process of *(Io) penso* 'I think' in

[2] Modern English.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

Modern Italian during the last 150 years, demonstrating how the contemporary usage of *(Io) penso* is notably more oriented towards absolute factuality than it was 150 years earlier.

This paper is structured as follows. Section 1.1 gives a general overview of the notion of factuality in the literature and its relationship with modality. In Section 2, I introduce the notion of the epistemic control cycle (ECC) (Langacker, 1991, 2008, 2009), which will constitute a theoretical basis for further discussions and analyses on the gradience of factuality. In Section 3, I present the concept of factualization, which I discuss both on a conceptual and on a linguistic level. In the latter case, I describe factualization as a form of subjectification (Traugott, 1989, 1995, 2003, 2010, 2012; Traugott & Dasher, 2002). More specifically, I discuss the notion of factualization as a SP/W's[3] oriented semantic reanalysis of a construction which diachronically acquires an increasingly factual meaning. In Section 4, I provide a quantitative study from the BNC, where I analyse three polysemous epistemic verbs in ME: *I think*, *I reckon*, and *I believe*. In the same section, I will provide an operational methodology to differentiate the dynamic increasing of epistemic commitment towards P. Finally, in Section 5, I provide a corpus survey on the diaCORIS (a diachronic balanced corpus of written Italian) demonstrating the diachronic factualization process of the predicate *(Io) penso* 'I think' in Modern Italian during the last 150 years.

1.1. ON FACTUALITY AND FACTUAL STATEMENTS

This section aims at providing a brief overview of the notion of FACTUALITY, crucial for a better understanding of the concepts of epistemic inclination and factualization.

Intuitively, factuality refers to the state of affairs of a proposition P posed as a fact, or in other words as something that truly happened in the real world. In the literature, the same concept has been labelled in different ways: terms such as 'realis' (e.g., Mithun, 1999; Palmer, 2001), 'factuality', 'factivity', 'reality', 'actuality' (e.g., Kiparsky & Kiparsky, 1971; Chung & Timberlake, 1985; Papafragou, 2000; Narrog, 2002, 2005a, 2005b, 2009, 2012; Squartini, 2009), or 'validity' (Kiefer, 1987; Dietrich, 1992), all in a way or another refer to the same idea.

The present study is theoretically grounded in Narrog's understanding of factuality, which in his framework represents a fundamental concept for defining modality and (secondarily) evidentiality. To explain, Narrog (2005a, 2005b, 2009, 2012) defines modality as the domain marking the non-factuality or 'undetermined-factuality' of an event. Modal propositions are thus opposed

[3] Speaker/writer.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

to non-modal statements, which generally portray a situation as a fact. Consider the minimal pair below (Narrog, 2005b, p. 187):

(1) Mary is at home now.
(2) Mary may be at home now.

According to Narrog, as (1) is not modally marked, it is portrayed as a "factual, actualised event" (p. 187). In contrast, *may be* in (2) portrays the situation purely within the realm of thought, as indeterminate with respect to its factuality. Given that factuality in language is a way for the SP/W to express his/her certainty about the state of affairs of a situation,[4] factual statements can be pragmatically paraphrased as *As (I am sure that) P is true, P*. This is the reason why (1a) is logically inconsistent, whereas (2a) is perfectly acceptable:

(1) a. *Mary is at home now, **(although) I am not sure.**
(2) a. Mary may be at home now, **(although) I'm not sure.**

A non-factual statement – as (2a) above – is semantically open to challenge. In Narrog's account, the reason for this is that the SP/W overtly marks the possible non-occurrence of the event. Conversely, a factual assertion as in (1a) covertly entails the SP/W's subjective certainty about the actualization of the event in the real world. It follows from this that an assertion is pragmatically and logically factual as long as it is not marked by constructions encoding epistemic uncertainty. Conversely, modally marked propositions are logically consistent with constructions expressing doubtfulness or hesitancy on an epistemic level.

2. The control cycle

In this section and in Section 2.1, I will introduce to the reader to the notion of epistemic control cycle proposed by Langacker (1991, 2008, 2009). Starting from Section 2.2, I will then draw on this to discuss the semasiological process of factualization.

Adopting an 'embodied' (for the notion of embodiment see Lakoff & Johnson, 1980, 1999; Lakoff, 1987, 2003; Grush, 2004; Gallese & Lakoff, 2005) approach to cognition and knowledge, Langacker (1991, 2008, 2009) proposes a conceptual model to represent the scalar gradience of epistemic reasoning. With the term CONTROL CYCLE (2009, p. 130) he refers to a dynamic phenomenon unfolding at any level, be it physical, perceptual, mental, or social. For instance, in terms of bodily functions, feeling hungry and noticing an apple can form a state of tension, which can be resolved by

[4] The two notions of factuality and certainty will be considered operationally interchangeable in the present account.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

taking it and finally eating it. The result would be a new state of relaxation corresponding to the cessation of hunger. Similarly, on a more social plane we encounter and get to know new individuals, achieving a form of control by establishing relationships with definite expectations and obligations, which essentially – in Langacker's words – is a way to incorporate and situate individuals in our 'social dominion' (2009, p. 259). Finally, and most interestingly, the control cycle often occurs at the cognitive level: we entertain or get to know new ideas and information, and assess them for their possible validity, before resolving this tension of uncertainty by believing them to be either true or false. In other words, the tension of uncertainty between a subject and the information s/he takes into account must be resolved in some way. S/he must thus decide whether to believe that a proposition P is true or false so that s/he can 'exert epistemic control' over that particular piece of knowledge. Langacker's notion of the control cycle seems to be in line with the most influential works in psychology concerning 'conflict monitoring theory' and perceptual/informational 'cognitive control' (cf. Norman & Shallice, 1986; Desimone & Duncan, 1995; Botvinick, Braver, Barch, Carter, & Cohen, 2001; Miller & Cohen, 2001; Schlaghecken & Martini 2012; see also Kan et al., 2013).

As shown in Figure 1, the control cycle (Langacker 1990a, 2008, 2009) includes four stages: a baseline, a potential, an action, and a result stage. In the initial 'baseline phase' an ACTOR (A) has a multiplicity of entities (represented by small circles) under his/her control, which together constitute his/her DOMINION (D). In the next stage, some TARGET (T) enters the actor's FIELD (F), which corresponds to A's scope of potential interaction. At this point a state of tension between the actor and the target has already been created and A must now start to deal with T in some manner. This tension is typically resolved with A exerting some force over T (the double arrow) in the action phase, before incorporating it under its dominion in the result phase.

To clarify Figure 1, Langacker provides a sort of metalanguage of the control cycle, showing how the lexical meaning of a verbal construction can actually profile one (or two) of the stages described above. As shown in Figure 2, telic verbs such as *catch* or *get*, profile the action together with the result phase of the cycle. On the other hand, absolute states like *see* or *have* in (b) or transitory states like *hold and keep* in (c) encode the resulting stage of the cycle. Finally, predicates such as *reach for* or *look for* only profile the potential phase where some tension between the actor and the target has recently been established (see Croft, 2012, for a detailed account of the geometrical representation of aspectual construing). In a strictly embodied sense, "some predicates profile bounded actions in which the actor establishes control over the target. Others profile stable situations which result from such actions. Other predicates designate the activity of maintaining control once it has been achieved" (Langacker, 2009, p. 131).

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

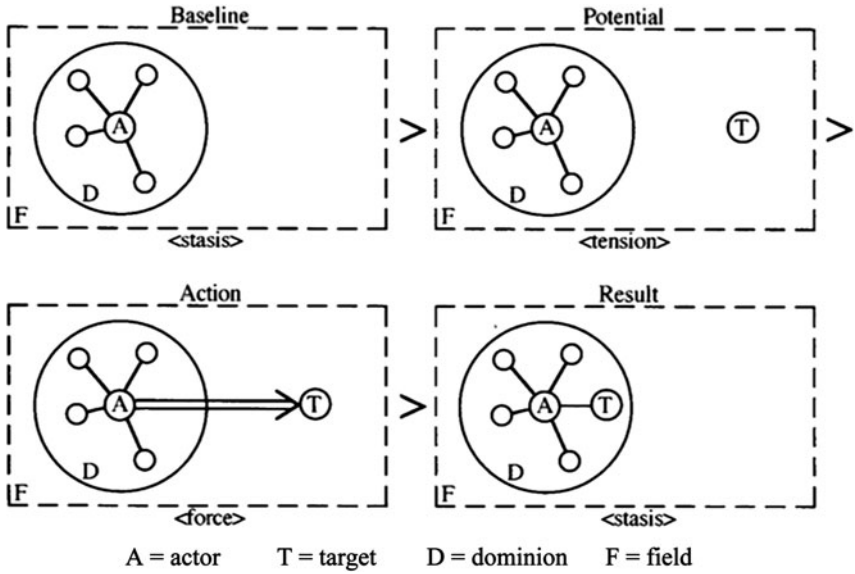

Fig. 1. The control cycle (Langacker, 2009, p. 131).

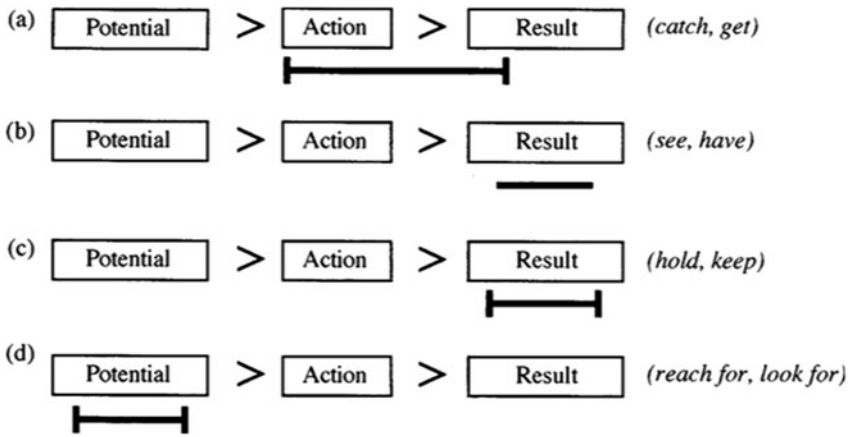

Fig. 2. The metalanguage of the control cycle (Langacker, 2009, p. 131).

As can be noted, all the predicates mentioned above mainly pertain to the physical domain. However, as I have already suggested, Langacker goes beyond this by mapping the control cycle model onto a more conceptual scope. The next section will provide a general semantic account of the relationship between epistemic reasoning (the act of engaging in a certain form of belief) and the control cycle.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

2.1. THE EPISTEMIC CONTROL CYCLE

As previously mentioned, the control cycle determines various forms of 'acquisition', both at the physical and at the conceptual level. In the latter case, it occurs when an actor (A) is called to add a particular idea or piece of information to his/her current view of reality. As already pointed out, the phase where a new target enters the actor's field is called the potential stage. Concerning epistemic judgements of any sort, what was previously defined as an actor is reformulated by Langacker as a CONCEPTUALIZER C; his/her target is now a PROPOSITION P; and his/her dominion in this case corresponds to his/her view of reality or EPISTEMIC DOMINION D. Drawing on Sumnicht (2001,) the potential phase of the epistemic control cycle is broken down by Langacker into three successive substages called FORMULATION, ASSESSMENT, and INCLINATION.

> We can speak of **formulation** when a proposition merely enters the conceptualizer's field of awareness as something that cannot be rejected outright, and thus has to be dealt with in some fashion. This can lead to active **assessment**, signalled grammatically by the use of *whether* in the subordinate clause. Assessment may lead to some preliminary **inclination** to accept the proposition (or else to reject it).[5] (Langacker, 2009, p. 133)

FORMULATION consists in the introduction of a new proposition P in a discourse without any commitment to it. This stage may lead to ASSESSMENT, where the SP/W takes into consideration the possibility for P to be true, yet without implying the intention to believe it. Assessment is generally uttered as an indirect question, and is always characterized by the use of *whether* or *if* in the subordinate clause. Subsequently, assessment can become INCLINATION, which represents the SP/W's first active step towards belief. It is at this point that SP/W expresses to the AD/R[6] his/her intention to possibly believe P to be true. Langacker considers assessment and action as rather transitory states leading quite naturally to adjacent ones. In this sense, as represented more schematically in Figure 3,

[5] Langacker's approach may be considered to be tainted by an absolute symmetry between the cognitive scenarios evoked by the interlocutors. As Verhagen (2005) points out, every linguistic utterance is determined by construals of inter-subjectivity to some degree. Nonetheless, as also emphasized by Traugott (2003, 2012), a SP/W conceptually and linguistically may profile a more specific awareness of him/herself – more subjective– rather than the one of the addressee – comparatively more intersubjective. The present paper will be focused on specific constructions (i.e., first person epistemic predicates) which, on a gradient scale, profile a comparatively more subjective form of epistemic construing.

[6] Addressee/reader.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

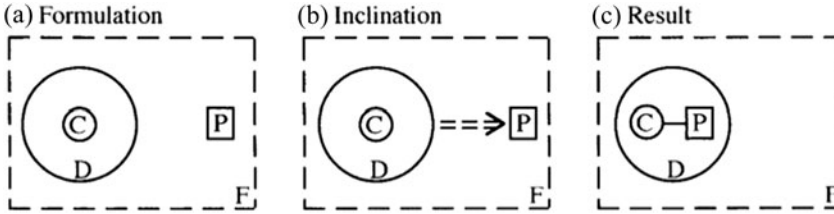

Fig. 3. Formulation – inclination – result (Langacker, 2009, p. 133).

the three cardinal phases of the ECC can be considered the ones of formulation, inclination, and result.

Among them, inclination ideally corresponds to the moment when the conceptualizer C assesses his/her intention to believe P (as represented by the dotted arrow). In the result stage, this new piece of knowledge has become part of C's epistemic domain D. All the phases of the epistemic control cycle can be profiled by different verbal constructions. They are exemplified in Figure 4.

As can be noted, mental state predicates of various sorts profile different stages of the ECC. To be more specific, consider the corresponding five types of predicates provided below (Langacker, 2009, p. 132):

(3) a. **Result**: *He {knows / believes / thinks / realizes / accepts / is sure / is certain / is convinced} that Bush is a pacifist.*

b. **Action**: *She {learned / discovered / decided / concluded / realized / determined/ found out / figured out} that his whole story was a pack of lies.*

c. **Formulation**: *It is {possible / conceivable / plausible / feasible / imaginable} that they could be of some use to us.*

d. **Assessment**: *He {wondered / considered / asked / was unsure / was undecided / was unclear} whether the effort was worth the bother.*

e. **Inclination**: *I {suspect / believe / suppose / think / figure / reckon} they won't agree to my offer.*[7]

The metalanguage provided by Langacker is useful to describe semantically what can be seen as a conceptual gradience of believing. The dynamic process by which a conceptualizer 'decides' to incorporate a proposition into his/her view of reality – hence to believe it to be true – can be schematically divided

[7] Originally Langacker rendered (3e) as *they will never agree to my offer*. According to the criteria I will give in the next sections *will never* constitutes a proper factual assertion, arguably epistemically too strong to convey inclination.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

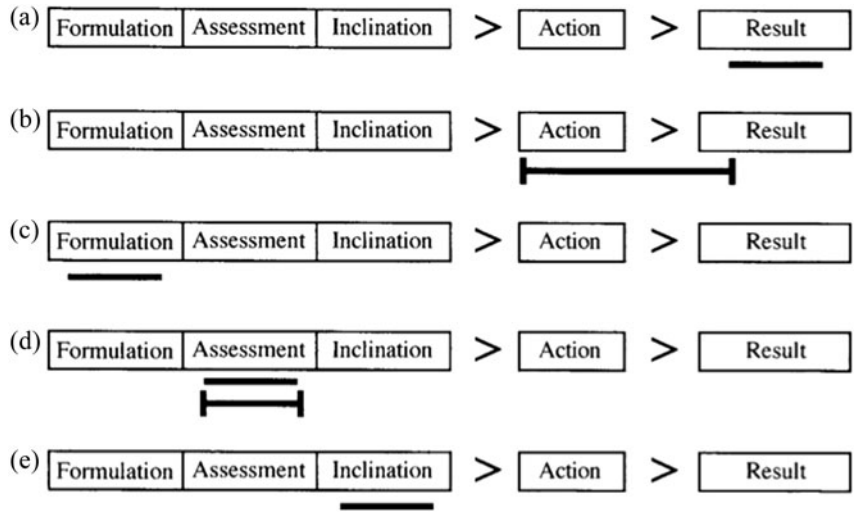

Fig. 4. The epistemic control cycle (Langacker, 2009, p. 132).

into several stages of acquisition or REAL-ization (cf. Langacker, 2009, p. 306). From a different perspective, Nuyts (2001, p. 111) argues that epistemic mental state predicates are generally quite vague regarding the strength of the qualification expressed. In Nuyts' words, they simply indicate a positioning on the positive side of the scale. Although this might be true for predicates in isolation, it must be also observed that the gradience of the ECC is undeniable for more complex verbal constructions (cf. Goldberg, 1995, 2006). As an illustration, the initial formulation phase (3c) is always marked by the impersonal pronoun *it* or by indirect evidential constructions (cf. Tantucci, 2013, on the relationship between evidentiality and interpersonal/intersubjective semantics). At this initial stage the SP/W has no intention to express any personal epistemic commitment towards P. Similarly, as we noted previously, the assessment phase (3d) is characterized by constructions involving the connectives *whether* or *if* in the subordinate clause, hence posing the proposition in the form of an indirect question. On the other hand, the action phase (3b) is often marked perfectively – often encoded in the simple past or in the perfect form together with perfective adverbials – so as to indicate the aspectual completion of the process of believing P. Similarly, the result stage (3a) is generally expressed imperfectively – usually in the present tense – in order to indicate the relaxed state of certainty achieved by the SP/W.

Throughout the whole ECC process, the crucial gradient stage from possibility towards belief is the one of EPISTEMIC INCLINATION in (3e).

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

At this point a proposition P starts to be more oriented towards factuality, which means that although P is still not posed as absolutely true, nonetheless SP/W expresses to AD/R a subjective intention to consider it as a fact.

2.2. THE 'INCLINATION TEST'

To better comprehend the semantics of epistemic inclination, consider the semantic test (still referring to the examples in (3)) I propose in Table 1. The set of propositions in Table 1 has been marked by the final epistemic statement *and it might be true*. None of the propositions from (a) to (d) are semantically acceptable, whereas the statements expressing an epistemic inclination in (e) are the only logically consistent ones. The reason is that the epistemic expression *it might be true* is itself a function of epistemic inclination: on one hand it conveys that P is not yet seen as factual, on the other it marks the SP/W's subjective intention to believe it. The semantic compatibility between P and the final epistemic expression in (e) is in fact due to the positive inclination of the SP/W to incorporate P in his/her view of reality.

To be more specific, we can now look at the pragmatics of each stage of the cycle provided in Table 1:

[Result]
(4) a. A: I know that Bush is a pacifist.
B*: **Might that be true,** in your view?

The logical incongruence of the question in (4a *B) is due to the incompatibility between INCLINATION and RESULT. The result stage expressed by A in (4a) corresponds to the final factual phase of the cycle, that is, the SP/W is here dealing with a piece of information that is already part of his/her epistemic dominion or view of reality. From SP/W's perspective, the fact that *Bush is a pacifist* is already a true fact, thus it would not make sense for him/her to express the inclination to believe it.

[Action]
(4) b. A: I have learned that his whole story is a pack of lies.
B*: **Might that be true**, in your view?

Similarly, the proposition uttered by A in (4b) corresponds to the ACTION stage. Here, the SP/W has just reached the certainty that P is real or true. Intuitively, from the SP/W's perspective it is not logically consistent to express a subjective intention to believe P, as s/he has already reached the conclusion that P is true.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 1. *Epistemic inclination test*

a	*I {know / believe / think / realize / accept / am sure / am certain / am convinced} that Bush is a pacifist,*	*and it might be true.
b	*I have {learned / discovered / decided / concluded / realized / determined / found out / figured out} that his whole story is a pack of lies,*	*and it might be true.
c	*It is {possible / conceivable / plausible / feasible / imaginable} that they could be of some use to us,*	*and it might be true.
d	*I {wonder / consider / am asking / am unsure / am undecided / am unclear} whether the effort is worth the bother,*	*and it might be true.
e	*I {suspect / believe / suppose / think / figure / reckon} they won't agree to my offer,*	and it might be true.

[Formulation]

(4) c. A: It is possible that they could be of some use to us.
B: **Might that be true**, in your view?
A´*: **Personally**, it is possible.

In (4c) above, we are back at the beginning of the cycle, which is the first of the three epistemic substages of the potential phase: the FORMULATION. Again, the question asked by B requires an inclinational commitment on behalf of A´. At this point, there is no marked intention to subjectively believe P. In other words, A is not trying to convey any epistemic inclination towards the factuality of P. The co-occurrence of inclinational element *might be true* and the subjective epistemic adverbial *personally* require the SP/W's personal commitment to a 'likely' truth which is semantically never encoded in a formulation statement. If A´ wanted to convey inclination, s/he should then abandon the neutrality of his/her original formulation for an inclinational proposition *(personally) I think P*. Consider now the following assessment stage:

[Assessment]

(4) d. A: I wonder whether the effort is worth the bother.
B: **Might that be true**, in your view?
A´*: **Personally** I wonder that/so.

Along a gradient scale of personal commitment to the truth, the SP/W in the ASSESSMENT stage is taking into consideration the possibility to believe P. Nonetheless, s/he has not moved a single step towards that direction yet, as s/he is just wondering whether to do it or not. The incompatibility with the inclinational *might that be true* is then easily explained in terms of a mismatch between the mental state of wondering and the one of expressing the subjective intention to believe P. Below in (4e A) I finally provide an inclinational proposition.

[Inclination]

(4) e. A: I suspect they won't agree to my offer.
B: **Might that be true**, in your view?
A´: **Personally**, I suspect so.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

In (4e) the question asked by B is pragmatically plausible. In this case, with the epistemic predicate *to suspect*, the SP/W moves to the INCLINATIONAL stage of the cycle, namely the one where the SP/W is expressing his/her intention to believe P. This is the reason why, when asked to confirm his/her inclination towards P, A´ can consistently reaffirm his/her intentional belief.

As the test above might be flawed by personal judgements of logical and/or pragmatic acceptability, a questionnaire with the five dialogues above was given to forty English native speaker graduates. The participants were simply requested to judge with a positive/negative answer whether any of the dialogues was unacceptable on a either semantic/logical or a grammatical level.[8] The results confirmed my speculations: 33/40 (82.5%) of the students marked (4e) as the only acceptable dialogue, 4/40 (10%) of them marked both (4e) and (4c) as acceptable, while the last two (5%) considered (4b–4c–4e) all plausible. As this preliminary test suggests, the semantic and pragmatic incompatibility among the different epistemic phases of the ECC can be identified and analyzed empirically.

To conclude, I have argued in this section that epistemic modality – and epistemicity in general – is a gradient domain, where the commitment to the truth of the SP/W can vary along a continuum. In other words, we do not simply imply whether we believe a certain proposition or not, we rather mark whether we came to the conclusion that P is true (action phase) or we rather express to an AD/H the intention to believe it to be true (inclinational phase), and so on. Belief is a dynamic process along which the crucial phase where a conceptualizer subjectively decides to consider a piece of knowledge as (likely) true is constituted by the epistemic inclination stage. This notion conceptually corresponds to a proper psychological decision (or quasi-decision) made by a subject and will constitute a fundamental concept for my next discussion on factualization.

3. Factualization

In this section I will argue that the ECC is a dynamic process unfolding both synchronically and diachronically. I will argue that the continuity among the different stages of the cycle historically triggers epistemic polysemies in predicates with an inclinational meaning, such as *to think*, *to reckon*, and others. Concerning this point, Simon-Vandenbergen (1996, pp. 405–406) points out that *I think* in different contexts can express lack of commitment as well as certainty. Similarly, Holmes (1990, p. 187) distinguishes between a tentative and a deliberative function of *I think*, the former indicating a limited

[8] Answers were also provided for (4a) and (4b).

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

commitment to the truth, the latter conveying confidence and certainty (cf. also Holmes, 1984, p. 354). Traugott (1995, p. 38) argues that – especially in the form of a parenthetical construction – *I think* developed a more subjectified meaning conveying a speaker's epistemic attitude. Nuyts (2001, p. 113) argues that the verb *to think* can express either epistemic possibility or certainty.

More specifically, my claim is that *to think* and similar polysemous epistemic verbs can express in different contexts either inclination, action, or result. This is due to a dynamic gradience among the last three stages of the cycle. In other words, according to the embodied idea of the ECC, the conceptualizer is often 'inclined' to exert some control over a particular piece of knowledge: s/he wants to reach the certainty according to which P is ultimately true or not. Interestingly, it is quite common to encounter inclinational verbs covering all the last three epistemic stages of the cycle (inclination, action, and result). However, the same cannot be said for the two initial ones (formulation and assessment). To explain, verbs originally only conveying inclination, diachronically acquire new meanings corresponding to the right end of the cycle. They thus progressively shift towards factuality, as they move from inclination to action and finally result.[9] On the other hand, we apparently have no examples of inclinational predicates which historically moved in the opposite direction, towards the left end of the scale. That is to say, it is hard to find any example of inclinational predicates which developed through time new meanings of assessment or formulation.

The reason is that the inclinational stage conceptually entails action and then result. When a subject is 'inclined' to believe P (P being either a positive or a negative proposition), it is more likely for him/her to finally decide to accept it without reserve rather than questioning 'ex novo' its truthfulness. Therefore, the main argument of this paper – and a crucial complement to Langacker's framework – is that epistemic inclination both synchronically and diachronically triggers FACTUALIZATION, which is here defined as the SP/W's increasing certainty about the realization of an event or situation. More schematically, factualization is the progressive or abrupt shift from the inclinational to the actional and resultative stage of the cycle. Adopting Langacker's ECC model, I represent in Figure 5 the three phases of the factualization process.

As can be seen from Figure 5, the process of factualization involves three stages: inclination, action, and result. The dotted arrow in the inclination

[9] For an alternative discussion on mental state predicates and epistemicity see Nuyts (2001, pp. 115–117) and Aijmer (1997, pp. 10ff.).

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

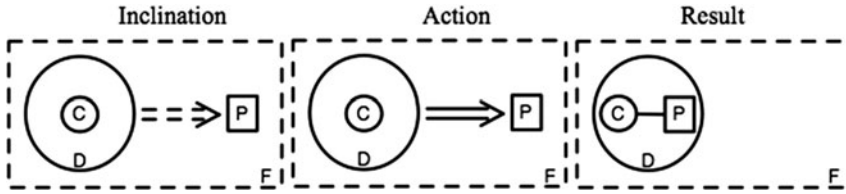

Fig. 5. Epistemic factualization.

stage represents the likely factual (or not-yet-factual[10]) state of a proposition P. At this point the conceptualizer C considers positively the possibility of believing P (and to communicate his/her epistemic inclination to the AD/H). In the action stage the act of believing has just been realized, P has just become factual, and the inclination – previously expressed by a dotted arrow – has become acceptance, now marked by a full arrow. In the result stage P has been incorporated into C's epistemic dominion D, which stands for his/her view of the world.

As we have already mentioned, the gap between action and result can often be expressed aspectually: the former is generally encoded by perfective constructions and/or telic situation types, the latter imperfectively and/or by more continuous situation types. However, as the corpus data I analyzed will suggest, aspect cannot be considered the only criterion to differentiate them.

3.1. FACTUALIZATION IS A FORM OF SUBJECTIFICATION

The present description of factualization is in line with the conceptual mechanism triggering language change known as 'subjectification' (Traugott, 1989, 1995, 2003, 2010, 2012; Traugott & Dasher, 2002; Langacker, 1985, 1987, 1990a, 1990b, 1991, 2006, 2008, 2009). Traugott's and Langacker's accounts of subjectification present some important differences, the former being more centred on a SP/W's pragmatic attitude towards P, the latter being more concerned with the deictic construal of a conceptualizer C with respect to an event imagined or experienced. As the present discussion will address subjectification from a diachronic perspective, I will thus pay greater attention to Traugott's definition, which is more focused on the semasiological reanalysis of a construction or a lexeme L through time (cf. Traugott & Dasher, 2002, p. 25). In so doing, I will test in Section 5 the ECC as a method of enquiry for diachronic phenomena of language change and pragmatic–semantic reanalysis. As Traugott points out:

[10] In Section 3.2 a more specific explanation of not-yet-factuality is provided.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

> Subjectification is the semasiological process whereby linguistic expressions acquire subjective meaning. In particular, it refers to the tendency whereby lexical material tend[s] to become increasingly based in the SP/W's subjective belief state or attitude to what is being said and how it is being said. (Traugott, 2003, p. 125; see also 1989, p. 35, 1995, p. 47)

Notably, a crucial shift taking place in the subjectification process is the one from a 'syntactic subject'/'sujet d'énoncé' to a 'speaking subject'/'sujet d'énonciation' (Benveniste, 1971 [1958]; Lyons, 1982; Langacker, 1985, 1990a. 1990b). More specifically, one important point emphasized by Traugott is that subjectification involves "strengthening of focus on knowledge, belief and speaker's attitude towards the proposition" (Traugott, 1989, p. 49). In this respect she first notices that many speech act verbs in present day English can have assertive meaning, "in the sense that they express belief about the truth of the proposition" (p. 43). She points out how in present-day English verbs such as *to assume*, *to observe*, *to insist*, and others can express a non-speech act meaning as well as more subjectified speech-act meanings, the latter conveying the SP/W's belief towards P. For instance, *insist* is first attested in the 1590s in the original Latin meaning 'stand on, dwell at length on, persevere'. Sometime later in the sevemteenth century it starts to convey a new deontic meaning 'demand that' (p. 45):

(5) We **insisted** that when we struck and saluted them, the Frigot should hang out either the French or the English Colours.
(OED: 1676 tr. Guillatiere's Voy. Athens 17)

A century it is finally attested with the epistemic facet of 'maintain that' (p. 45):

(6) I begged a thousand pardons, but **insisted** it was no more than an ejaculation.
(OED: 1768 Sterne, Sent.later Journ., Case of Delicacy 252)

According to Traugott's analysis, in (6) the continuative meaning originally conveyed by *insist* has been subjectified into an epistemic expression. Here the SP/W describes what s/he believes rather than what s/he physically is doing. In other words, according to Traugott, the predicate in (6) no more conveys the physical scenario of someone insisting throughout a discussion, but rather the SP/W's epistemic attitude towards P (alternatively paraphrasable as *I pointed out / emphasized / stressed that it was no more than an ejaculation*). At this point, it is clear that, in the epistemic domain, factualization and subjectification are two indicators of the same conceptual phenomenon of embodied control.

The diachronic continuity from the deontic to the epistemic domain for modals and speech act verbs is due to a shift from a 'physical' to an 'epistemic'

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

scope of the control cycle (see Sections 2–2.1). Deontics typically involve "language as action" (Palmer, 2001, p. 121). The conceptual source of obligation/permission in prototypical deontics is human: "[t]here is some force that is characterised by an 'element of will'" (Jespersen, 1924, pp. 320–321). Sweetser (1990, p. 52) also proposes that the epistemic domain should be understood in terms of a metaphorical mapping from the socio-physical world of obligation (the 'root' / deontic domain) to the world of reasoning (the epistemic domain).[11] As Figure 1 will remind us, the real trigger of deontic modality and epistemicity is the actor A's impulse to exert a control – be it physical or conceptual – over a target T. In this sense, the subjectification of *must* can be quite revealing. Consider the following couple of examples (Sweetser, 1990, p. 61):

(7) a. You **must** be at home by ten. (Mom said so.)
[deontic]
b. You **must** have been home last night.
[epistemic]

As Sweetser points out, in the deontic usage of *must* "the direct force of mom's authority compels you to come home by ten" (1990, p. 61). The SP/W in (7a) is exerting physical control over the AD/H as s/he is trying to affect directly the state of affairs of a target T in the external world. On the other hand, in (7b) *must* is more subjectified as the SP/W exerting epistemic control over a proposition P. In this latter case, the SP/W is seeking certainty about a proposition P, or to put it differently, is conveying an epistemic inclination towards P. Accordingly, Traugott (1989, p. 43) argues that some modals in English not only show a diachronic shift from non-epistemic to epistemic, but also from relatively 'weak' to 'strong' epistemicity. Drawing on Visser (1963–73, p. 1700), she crucially notes that epistemic modals such as *must* or *will* in English did not acquire a strong epistemic meaning before the eighteenth and the twentieth century, respectively.

What Traugott defines as a shift from weak to strong epistemicity along the subjectification cline is consistent with my more fine-grained notion of epistemic factualization. This seems to confirm important findings in cognitive psychology regarding perceptual and linguistic cognitive control

[11] It is worth acknowledging that Narrog (2005b, 2009) points out that diachronic relationship and semantic polysemies between the deontic and the epistemic modal domain are largely limited to Germanic languages. However, this claim can be challenged by the deontic-epistemic modal polysemy of *dovere* 'must' in Italian and other Romance languages (cf. Bascelli & Barbieri, 2002, p. 87; Pietrandrea, 2005), the one of 应该 *yīnggāi* 'must' in Mandarin (cf. Peng & Liu, 2007; Ming, 2013), the Haka obligation particle *ding* (Reichle, 1981, pp. 59–67; Bybee, Perkins, & Pagliuca, 1994, p. 203), or the Baluchi prefix *by* (Barker & Mengal, 1969, pp. 179–185), to cite a few.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 2. *Factual gradience*

Formulation	Assessment	Inclination	Action	Result
suspended-factuality	questioned factuality	not-yet-factuality	just-then-factuality	absolute factuality

and 'conflict monitoring theory' (cf. Norman & Shallice, 1986; Desimone & Duncan, 1995; Botvinick et al., 2001; Miller & Cohen, 2001; Schlaghecken & Martini 2012), according to which "experiencing [perceptual or linguistic] ambiguity appears sufficient to yield conflict adaptation" (Kan et al., 2013, p. 647). In the epistemic domain, uncertainty is itself a form of conflict between two propositions: *P is true* vs. *P is false*. In this respect, my claim is that epistemic inclination and factualization correspond to a general embodied impulse to resolve epistemic conflicts in favour either of the former (*P is true*) or the latter (*P is false*). In the next sections I will study empirically the diachronic unfolding of factualization and its semasiological effects on epistemic predicates.

3.2. FACTUALITY IS A GRADIENT NOTION

As the term 'factualization' suggests, factuality is not a dual category opposing a positive pole to a negative one. Factuality is a gradient concept which is often modified by a conceptualizer C's epistemic attitude towards P. It might then be useful to adopt a specific terminology so as to give an account of the different epistemic polysemies along the ECC and their degree of factuality. More specifically, in the rest of the paper I will use notions such as SUSPENDED-FACTUALITY, QUESTIONED FACTUALITY, NOT-YET-FACTUALITY, JUST-THEN-FACTUALITY, and ABSOLUTE FACTUALITY. In Table 2 they correspond to the five stages of the ECC. As can be easily inferred from Table 2, factuality is encoded differently in every stage of the cycle.

Formulation – generally expressed by impersonal or indirect evidential constructions – conveys SUSPENDED-FACTUALITY. At this stage, the SP/W is merely introducing a new proposition P as external information and s/he is not expressing any commitment regarding the factuality of P. At a subsequent stage, assessment corresponds to a way of first considering factuality as a relevant aspect of P. For this reason, it is always expressed in the form of a direct or indirect question and is here labelled as a QUESTIONED FACTUAL. Inclination, on the other hand, corresponds to the SP/W's communicated intention to believe P. At this point, P is likely to be soon subjectively factualized, and can thus be marked as a NOT-YET-FACTUAL. Action then indicates that the SP/W (has) realized that P is true; it hence

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

expresses what I call JUST-THEN-FACTUALITY. Result, finally, refers to the SP/W's absolute belief towards P and it is here labelled as ABSOLUTE FACTUALITY.

4. From inclination to result: a method of inquiry

In this section I will provide a quantitative and qualitative synchronic methodology useful to determine and quantify the polysemy of an inclinational predicate in a target language.

4.1. THE POLYSEMY OF INCLINATIONAL VERBS: A QUANTITATIVE ANALYSIS OF *I THINK*

As discussed in Section 3, mental verbs such as *to think*, *to believe*, and *to reckon* are epistemically polysemous as they can convey in different contexts either inclination, action, or result. In this subsection I will consider a set of examples from the BNC, giving a quantitative and qualitative account of the epistemic polysemy of *I think*. From a constructional point of view, *I think* can alternatively occur with adverbials of inclination, result, or action. This is significant as the polysemy of inclinational verbs is most affected by the presence of adverbials of inclination/action/result. To explain, the occurrence of inclinational adverbs such as *perhaps* or *maybe* can neutralize the result meaning that futuroids like *will* or *shall* might confer to an inclinational verb. Consider the example below:

(8) a. I think the ladies **will** like it.
b. I think the ladies **maybe will** like it.

(BNC A0D 2676[12])

As can be observed, the result meaning potentially conveyed by (8a) is completely turned into an inclinational one by the adverbial *maybe*, added in (8b). This can be tested by adding an additional result element *I'm sure*:

(9) a. I think the ladies will like it, **I am sure.**
b. ?I think the ladies maybe will like it, **I am sure.**

While in the case of (9a) the result meaning conveyed by *I am sure* is semantically compatible with the previous predicate, in the case of (9b), *I am sure* is not semantically consistent with the preceding predicate.[13] On the

[12] The original example from BNC is (8a) to which *maybe* has been added in (8b).
[13] It would be plausible only as a result of an afterthought, partly contradicting the inclinational stance conveyed through the adverbial *maybe*. Clearly, contexts of this kind are to be considered as exceptional rather than the norm and cannot represent a significant figure on a large scale.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

There are 2260 different types in your collocation database for "([word="really"%c] | [word="actually"%c] | [word="fairly"%c] | [word="absolutely"%c] | [word="definitely"%c] | [word="certainly"%c] | [word="frankly"%c] | [word="extremely"%c] | [word="genuinely"%c] | [word="perfectly"%c] | [word="obviously"%c] | [word="exactly"%c] | [word="truly"%c] | [word="seriously"%c] | [word="completely"%c] | [word="surely"%c] | [word="indeed"%c] | [word="undoubtedly"%c] | [word="ultimately"%c])". (Your query "(really|actually|fairly|absolutely|definitely|certainly|frankly|extremely|genuinely|perfectly|obviously|exactly|truly|seriously|completely|surely|indeed|undoubtedly|ultimately)" returned 185985 hits in 3852 different texts, collocating with *I* with tag restriction *any pronoun* (19284 hits), collocating with *think* with tag restriction *any verb* (1929 hits))

No.	Word	Total No. in whole BNC	Expected collocate frequency	Observed collocate frequency	In No. of texts	Log-likelihood value
1	ca	30,333	3.262	23	18	50.4157
2	'd	33,173	3.567	21	16	39.6231
3	should	108,970	11.718	38	26	36.91
4	would	245,349	26.384	60	46	31.4576
5	ought	5,826	0.627	7	6	21.0525
6	'll	69,148	7.436	21	18	16.4943
7	might	59,026	6.347	18	13	14.2321
8	can	231,445	24.889	38	34	5.9536
9	shall	19,505	2.097	6	4	4.8093
10	could	159,818	17.186	23	21	1.7793
11	must	69,752	7.501	11	10	1.4262
12	may	112,397	12.087	8	7	-1.5722
13	will	243,821	26.219	19	16	-2.205

Fig. 6. Modal auxiliaries, result adverbials, and *I think* as main predicate.

other hand, the inclinational meaning of epistemic modal auxiliaries like *might* or *could* is not so clearly neutralized by result adverbials:

(10) a. After all that exercise **she might** sleep too long.
b. After all that exercise **she might certainly** sleep too long.
(BNC A0R 2196[14])

Interestingly, as shown in (10b), result adverbials such as *certainly* or *definitely* cannot turn the inclinational meaning of *might* into an absolute factual statement:[15]

(11) a. *After all that exercise **she might** sleep too long, **I am sure (she will).**
b. ?After all that exercise **she might definitely** sleep too long, **I am sure (she will).**

That being said, in the whole BNC inclinational auxiliaries such as *might*, *could*, *ought*, *would*, *should*, *may* and the reduced form *'d* co-occur quite rarely together with result adverbials and predicates of inclination in a sentence. The screenshot in Figure 6 is taken from the CQPweb version of the BNC and shows all the verb auxiliaries co-occurring with result adverbs (*really*, *actually*, *absolutely*, *definitely*, *certainly*, *frankly*, *extremely*, *genuinely*, *perfectly*, *obviously*, *exactly*, *truly*, *fairly*, *seriously*, *completely*, *surely*, *indeed*, *undoubtedly*, *ultimately*) within a contextual space of one collocate to the left (1L) and five to the right (5R) with respect to the main predicate *I think*. The adverbs

[14] The original example from BNC is (10a) to which it has been added *certainly* in (10b).
[15] Absolute factuality is explained in Section 3.2.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

included in the query correspond to all the possible result adverbs co-occurring with *I think* within a contextual space of one collocate to the left and five to the right (I obtained them from a separate query[16]).

As can be seen, *I think* collocates 175 times with an inclinational auxiliary (i.e., *might*, *would*, *could*, etc.) and a result adverbial within a contextual space of L1 and 5R.[17] This number corresponds to 9.072% out of a total of 1,929, as the latter indicates all the co-occurrences of *I think* together with the same result adverbials within the same contextual space (L1, 5R).

To clarify, what these numbers tell us is that in the whole BNC *I think* statistically conveys result almost 91% of the times it occurs with a result adverbial. Conversely – as shown in (10a–b) and (11a–b) above – it semantically always conveys inclination when it occurs with an inclinational adverbial. For this reason, from a quantitative point of view, the polysemy of epistemic predicates can be most significantly tested by looking at their statistical co-occurence with various types of epistemic adverbs rather than modal auxiliaries. With this in mind, we can now look at Table 3, which is also drawn from the BNC and shows the nine highest log-likelihood[18] values of *I think/thought* when co-occurring with any epistemic adverbial within the same contextual space (1L, 5R) within a sentence boundary.[19]

In Table 3 we have a list including inclinational epistemic adverbials such as *probably, better*, *perhaps*, and *maybe*, result adverbs like *really*, *actually*, *definitely*, and *absolutely*, and the adverb of action *now*. On the basis of their statistical attraction to *I think*, it is possible to first observe that:

a. *I think* is epistemically polysemous.
b. *I think* prototypically conveys inclination.

These two conclusions can be better understood by looking at the graph in Figure 7, which represents the sum of the likelihood values of the adverbials of inclination, action, and result appearing in Table 3.

As shown in the graph in Figure 7, the epistemic polysemy of *think* is disambiguated most significantly with adverbs of inclination, followed by

[16] From a separate query I selected all the result adverbs among all the adverbs co-occurring with *I think* within a contextual space of one collocate to the left and five to the right.

[17] I excluded from the addition all the auxiliaries with a result meaning, such as the futuroids *will*, *shall*, and others (see (8a–b) at the beginning of this section for more information about the result meaning of modal auxiliaries).

[18] The log-likelihood is a test for statistical significance used to compare the observed and expected values for two datasets (Baker, Hardie, & McEnery, 2006, pp. 109–110). In our case it has been used to measure the constructional attraction between *I think* and the epistemic adverbials occurring in its surrounding context.

[19] I provided the first nine values as the ideal distribution of meanings should be three per each category (inclination, action, result). That is, in the ideal case of a perfectly balanced polysemy – which is indeed an abstract possibility – we would have three equal values per each epistemic category: inclination, action, and result.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 3. *Log-likelihood value of* I think *with epistemic adverbials collocates*

Epistemic adverbials	Epistemic meaning	Log-likelihood value
probably	*inclination*	1630.8165
better	*inclination*	1260.401
really	*result*	743.0106
actually	*result*	637.3015
perhaps	*inclination*	552.8467
maybe	*inclination*	485.7898
now	*action*	123.256
definitely	*result*	104.7944
absolutely	*result*	81.9118

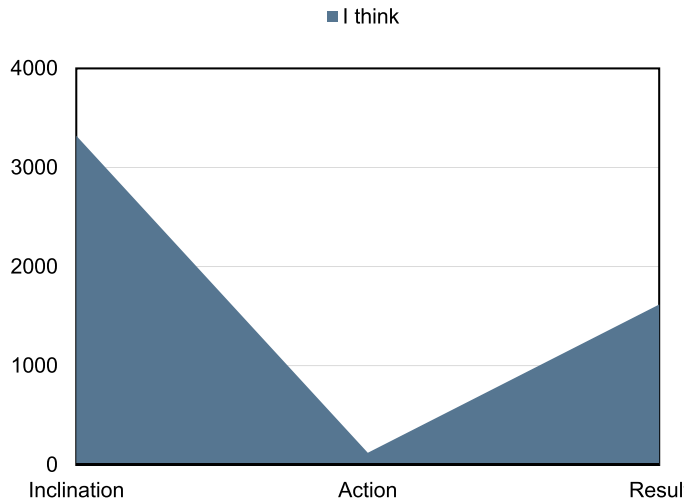

Fig. 7. Log-likelihood value of the co-occurrence of *I think* with epistemic adverbials.

adverbs of result and finally by action adverbs. However, Figure 7 still needs to be taken cautiously, as the log-likelihood coefficient relies on the chi-square distribution for significance testing and is sometimes considered unreliable by some scholars, given the kind of sparse data often encountered in corpus-linguistics tasks (cf. Manning & Schütze, 2000, p. 175; Weeber, Baayen, & Vos, 2000; Stefanowitsch & Gries, 2003). For this reason, I additionally adopted a collostructional approach (cf. Stefanowitsch & Gries, 2003; Schmid & Küchenhoff, 2013) so as to further investigate the constructional attraction between *I think* and its co-occurring epistemic adverbials. In particular, their constructional co-occurrence can be most revealing for two reasons:

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

a. It can give a descriptive (non-inferential) statistical account of the polysemy of *I think* or other inclinational predicates.
b. It can show on a quantitative level that the factualizing stages of inclination, action, and result can vary along a semantic continuum within a construction.

Briefly, a collostructional analysis always starts with a particular construction and investigates which lexemes are strongly attracted or repelled by a particular slot in the construction (i.e., occur more frequently or less frequently than expected). Lexemes that are attracted to a particular construction are referred to as COLLEXEMES of this construction; conversely, a construction associated with a particular lexeme may be referred to as a COLLOSTRUCT; the combination of a collexeme and a collostruct is then intended as a COLLOSTRUCTION (Stefanowitsch & Gries, 2003, p. 214).

The collostructional strength between a lexeme L and a construction C is generally obtained with Fisher's exact test (cf. Pedersen, 1996) and is based on four frequencies: the frequency of L in C, the frequency of L in all other constructions, the frequency of C with lexemes other than L, and the frequency of all other constructions with lexemes other than L. These values can then be entered in a 4×4 table and submitted to Fisher's exact test (or any other distributional statistic) as exemplified n Table 4.

In our case, L corresponds to the predicate *I think/thought*, and C refers to an eight collocates slot[20] (1L, 5R) including a first person predicate and one of the inclinational adverbs *probably*, *better*, and *perhaps*. These three were chosen as they show the highest log-likelihood value as inclinational collocates of *I think/thought* within the eight-words slot considered (this is shown in Table 5). Finally, the frequency of the d cell was calculated by counting the total number of verb tags in the BNC – as we are dealing with a clause-level construction centred around the verb *think* (cf. Stefanowitsch & Gries, 2003, p. 218) – to which I subtracted the total number of (a+b). As a result, it was possible to measure statistically the two-sided collostructional strength between *I think/thought* and its most significant adverbial constructions of inclination. The same calculation was also made for the three most significant adverbs of action and result, although in this case it was necessary to subtract all the inclinational auxiliaries both from the frequency of L in C (Table 4, cell a) and from the frequency of C with other than L (Table 4, cell c). The results of this analysis are summarized in Table 5.

[20] This choice was made since epistemic adverbs often occur before the main predicate. This corresponds to the same slot considered for the survey reported in Table 5: namely 1L and 5R with respect to the main predicate in the first person I _{V}.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 4. *Collostructional analysis*

a. Frequency of L in C	c. Frequency of C with other than L
b. Frequency of L in all other constructions in the corpus	d. Frequency of all other constructions with lexemes other than L

TABLE 5. I think *and adverbial collostructs of inclination/action/result*

	Collexeme frequency	Collostructional strength
inclination	2216	3.654E-320
result	1537	5.604E-320
action	900	6.918E-320

NOTE: Probabilities dropped below 1E-324; reported values are an upper bound of the true values.

The most significant *p*-value from Table 5 is 3.654E-320,[21] indicating that, as would be expected, the 'real' (non-inferential) association between *I think/thought* and adverbial constructions of inclination is extremely strong (cf. Whitley & Ball, 2002, Loughin, 2004, for some specific discussions about the comparability of *p*-values and other means of proportions). Nonetheless, the epistemic polysemy of *I think/thought* is unquestionable, as its collostructional attraction to adverbial constructions of result and action is also remarkably high. This result will appear most revealing in comparison with later analyses. As we will see, while the polysemy of *I think* shows a fairly balanced proportion with respect to the three epistemic functions of inclination, action, and result, in the case of other epistemic predicates such as *I believe* or *I reckon* we will see a more uneven distribution of usages.

In this section I have provided a demonstration of how to carry out a corpus-driven quantitative analysis to look at the polysemy of an epistemic predicate. In the next section I will provide a 'corpus-illustrated' (cf. Tummers et al., 2005, p. 234) qualitative methodology to test the polysemy of *I think* within specific epistemic constructions.

4.2. THE POLYSEMY OF EPISTEMIC VERBS: A CORPUS ILLUSTRATED QUALITATIVE ANALYSIS OF *I THINK*

The qualitative methodology I will provide in this section will serve as a complement to the quantitative study given in Section 4.1 As discussed so far, *I think* is epistemically polysemous as it can alternatively convey

[21] Following Stefanowitsch and Gries (2003), the *p*-value corresponds to the exact value, represented using scientific notation, also known as 'exponential notation'. For instance, 3.654E-07 would be the same as 0.0000003654.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

inclination, action, or result. Consider the first inclinational usage below from the BNC:

[Inclination]

(12) I was amazed! It all happened so quickly – sometimes **I think it may have been** too quickly. The only other experience I had was playing Essie in Shaw's play The Devil's Disciple at Leeds …

(BNC A06 1681)

In (12) the co-occurrence of *I think* and the modal *may* suggests an inclinational stance conveyed by the SP/W. The not-yet-factuality[22] of P can be confirmed by adding an element conveying epistemic result:

(12) a. *I was amazed! It all happened so quickly – **I think it may have been** too quickly, **(and) I'm certain of it.** The only other experience I had was playing Essie in Shaw's play The Devil's Disciple at Leeds …

The semantic inconsistency of (12a) is due to a mismatch between inclination and result along the ECC. *May* in (12a) is an inclinational epistemic expressing not-yet-factuality; it hence cannot be coordinated with a construction conveying absolute factuality such as *I'm certain of it*. The latter is an epistemic result construction, indicating that P has been completely incorporated in the SP/W's view of the world. The non-acceptability of (12a) constitutes good evidence to consider (12) an epistemic inclinational statement. Concerning this point, it is worth mentioning that in the whole BNC the chunk *I think it may* never occurs in coordination with a result predicate such as *I'm certain* appearing in (12a). We can now look at usage of *think* conveying epistemic action:

[Action]

(13) **Then I thought that** he wasn't **really** there at all, and he wasn't God but my father, who also wasn't there.

(BNC G06 1383)

In (13) above the verb *to think* conveys action as it collocates with the adverbial *then* – marking the beginning of a new event – and the simple past, which in this construction acquires a perfective reading. More specifically, the SP/W describes the moment s/he realised that P was true, or in other words the moment when P had become a just-then-factual. Consider now the test in (13a) below:

(13) a. **Then I thought that** he wasn't **really** there at all, and he wasn't God but my father, who also wasn't there. **I was certain of it.**

[22] See section 3.2.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

Here *I was certain of it* is perfectly acceptable due to the fact that the action phase conveyed in (13a) is compatible with result predicates such as *I know*, *I am sure*, *I am certain*, etc. Differently put, along the ECC action directly entails result; iconically one is a continuation of the other. For this reason the just-factuality conveyed by *then I thought that … really* can easily shift to absolute factuality in *I was certain of it*. Action chunks such as *when I thought / then I thought* are found to be followed by predicates of result such as *I was certain* above. We now look at a result usage of *I think*:

[Result]

(14) A: I wonder how he would have done in today's game, do you think there would have been room for him today?
B: Yes, **absolutely** <pause> **I think so** Mr Cameron.
(BNC HM5 333)

In (14) *to think* conveys result. This can be concluded from the use of the adverb *absolutely* conveying epistemic certainty, entailing that the SP/W is convinced of the factuality of P. The absolute-factuality of (14 B) can be easily demonstrated. Semantically, any inclinational statement can always be mitigated by adding a not-yet-factual element such as *but I am not sure*:

(14) a. A: I wonder how he would have done in today's game, do you think there would have been room for him today?
B: *Yes, **absolutely** <pause> **I think so** Mr Cameron, **(although) I'm not sure.**

The logical inconsistency of B in (14a) is due to a mismatch between inclination and result. If an inclinational interpretation were plausible in (14a B), it should then logically co-exist with the mitigator *although I'm not sure*. However, the incompatibility of the two indicates that (14 B) is an epistemic result statement.

To conclude, we considered in (13a) how action can directly trigger result. However, the same cannot be said for result and inclination: (14a B) shows how the absolute-factuality of result cannot lead back to the not-yet-factuality of inclination. In Figure 8 I provide a symbolic representation of the iconic and temporal continuity between action and result.

Along a conceptual timeline t, a conceptualizer C accepts the factual status of P (just-then-factuality) in the action stage at a certain moment in time t^1. Subsequently, in the result stage, at a new point in time t^2, P becomes part of his/her epistemic dominion D. Intuitively, action iconically conveys result as t^1 and t^2 are linked by temporal and logical contiguity as exemplified in example (13a). Consider now Figure 9.

As already explained, through the process of factualization, inclination may lead progressively or abruptly either to action or result, but it cannot

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

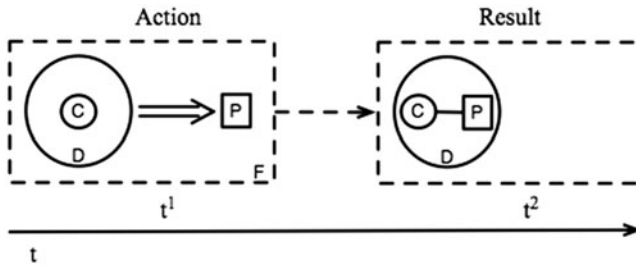

Fig. 8. From action to result.

be the other way round. In other words, an inclinational proposition P can throughout the discourse become action or result. However, a result proposition P cannot be reformulated as an inclinational one. This is not to say that te SP/W will never change his/her mind about a result proposition P. When the SP/W changes his/her mind, s/he starts a new ECC on a new proposition P′ that will take the place of the original P (or even co-exist with it). P′ will then progressively or abruptly factualize running from the left to the right end of the cycle.[23]

Moving back to the unidirectionality of the ECC, Figure 9 represents the incongruity of an inclinational P after a result one. When a conceptualizer C at a certain point in time t^3 has the absolute certainty that P is true (the right-hand side of Figure 9), it is then not logically – nor conceptually – consistent for him/her to rephrase P as an inclinational statement. Result at t^3 is the temporal and logic endpoint of the ECC; it is conceptually prompted by inclination (t^1) first and action (t^2) then. In Figure 9, the dotted line running backwards from result to inclination is marked with an 'x' so as to indicate the conceptual inconsistency of this passage. Figure 9 is the schematic representation of the semantic incongruity in (14a в*).

4.2.1. *Only factualized predicates are epistemically polysemous*

The epistemic polysemy of *I think* or other similar inclinational predicates is due to factualization: a process of semasiological reanalysis of an original inclinational meaning towards action and result (see Sections 3 and 5). While inclinational predicates tend to become polysemous to different degrees, constructions of formulation and assessment are not characterized by such semantic ambiguity. This is easily clarified if we look at the constructional

[23] This perspective (a former proposition P partially co-existing with a latter opposite P′) is theoretically compatible with recent studies on the 'Modularity of Mind' (Fodor, 1983; Kurzban 2012).

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

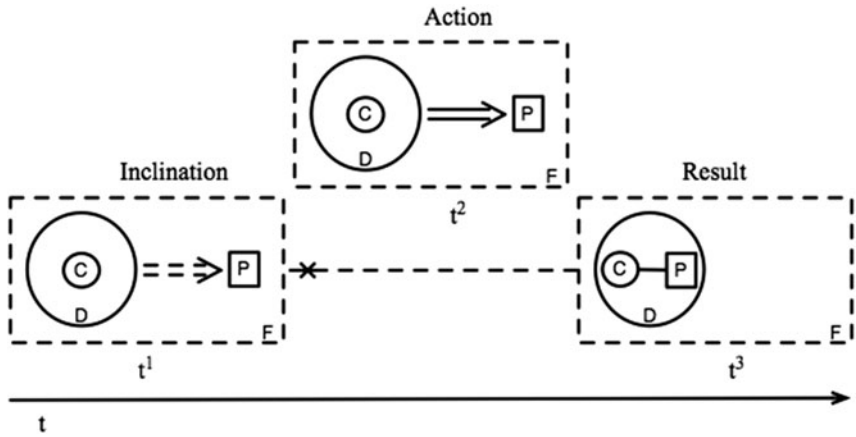

Fig. 9. From result to inclination?

interplay of epistemic adverbials together with verbs or chunks of formulation or assessment. Consider for instance the usage of *I wonder* from the BNC below:

(15) a. **I wonder** if she wants to be out of bed this morning, talking to a couple of lunatics, or not.
b. **I wonder** if she **really** wants to be out of bed this morning, talking to a couple of lunatics, or not.
c. I **really wonder** if she wants to be out of bed this morning, talking to a couple of lunatics, or not.

(BNC G27 683[24])

As already pointed out in Section 2.2, according to Langacker's account (2009, p. 132) *I wonder* prototypically conveys assessment. This is evident in (15a) where *I wonder* appears without any additional epistemic element. That being said, the result adverb *really* can appear in the complementing clause after the main predicate in (15b) and before *I wonder* in (15c). Interestingly, in both cases, the assessment expressed by *I wonder* is not affected by the presence of the result adverbial *really*. That is, the assessment construction in (15a), is still an assessment construction in (15b–c).

This is a fundamental difference between inclinational predicates like *I think* or *I reckon* and formulation or assessment constructions such as *it is possible* or *I wonder*. To explain this in more detail – as discussed in Sections

[24] The original example from the BNC is (14b), from which I eliminated *really* in (14a) and moved it before the subject in (14c).

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

4.1 and 4.2 – the epistemic commitment of an inclinational predicate can often be easily identified by the occurrence of specific epistemic adverbials (from inclination, to action and even result). In contrast, as shown in (15b–c) the meaning of formulation and assessment constructions remains constant even in the presence of epistemic adverbials of any sort. This semantic phenomenon can be easily interpreted conceptually: in the first two stages of formulation and assessment, the SP/W has not yet decided to express a subjective intention to believe P, thus epistemic elements from the surrounding contexts will not affect the factuality of P whatsoever. On the other hand, things change once the SP/W adopts an inclinational stance: it is at this point that contextual elements like modal auxiliaries or epistemic adverbials can determine semantically the affect of the SP/W's epistemic commitment towards P, and thus determine whether a construction conveys inclination, action, or result.

4.3. THE POLYSEMY OF EPISTEMIC VERBS: *I BELIEVE*

Adopting the same quantitative method proposed in Section 4.1, we can now look at the polysemy of the epistemic predicate *I believe*.[25] Correspondingly, the data from the BNC in Table 6 below indicate the log-likelihood value concerning the co-occurrence of *I believe(d)* and epistemic adverbials within the contextual space of five collocates to the right and one to the left:[26]

From Table 6 we can first observe three important phenomena:

a. *I believe* is epistemically polysemous.
b. *I believe* most prototypically seems to be an action predicate in its co-occurrence with epistemic adverbials.

[25] As shown in (8a) from Section 2.1, *I believe*, like *I think*, is considered by Langacker both a predicate of inclination and result.

[26] It needs to be pointed out that adverbials occurring at the left of the syntactic subject should not considered methodologically problematic in the present survey. To explain, epistemic adverbials become through time epistemic linkers (Traugott, 2012, p. 19). In other words, when an epistemic adverbial is moved to a clause-periphery position it generally already acquired a DM/epistemic linker function profiling the speaking subject rather than the syntactic subject (cf. Benveniste, 1971 [1958]; Langacker, 1990a, 1990b, 1991, 2009; Traugott, 2003; about the diachronic shift from syntactic subject to speaking subject in subjectification processes). For this reason, concerning the cases where inclinational adverbials such as *probably* or *maybe* and others occur at the left clause periphery with respect to a first person epistemic predicate, there is a strong – if not absolute – tendency to encode the SP/W's stance towards P, rather than referring literally to the syntactic subject of the clause. In other words, it is statistically very rare to encounter contexts where the SP/W is literally questioning him/herself about whether s/he believes P or not, as in: *Am I believing P? Probably I am believing P*. To give an example, *probably* does not occur at the left of *I believe(d)* in the whole BNC. Things may vary with second and thirrd person predicates, although this was not at issue in the present survey.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 6. *Log-likelihood value of the co-occurrence of* I believe *with epistemic adverbials*

Epistemic adverbials	Epistemic meaning	Log-likelihood value
now	*action*	42.8803
strongly	*result*	20.0304
already	*action*	14.0788
actually	*result*	7.8554
serioulsy	*result*	6.9086
increasingly	*inclination*	5.6632
certainly	*result*	2.1674
indeed	*result*	2.0636
probably	*inclination*	0.3511

c. The overall log-likelihood value of epistemic adverbials co-occurring with *I believe* (102) is far lower than the one of *I think* (~5063). The reason might be that the epistemic meaning of *I believe* in isolation is less ambiguous than the one of *I think*. The former in fact occurs almost ten times more frequently in the BNC (41,268 > 4,138). Most likely *I think* is comparatively more subjectified and hence semasiologically more prone to polysemies (see Bybee 2003, 2007, 2010, on the importance of frequency in diachronic change and phenomena of chunking).

The sum of the likelihood values from Table 6 with respect to the epistemic functions of inclination, action, and result is given in Figure 10.

As shown in Figure 10, differently from what we observed for *I think*, *I believe* appears to be most prototypically marked adverbially with an action meaning, indicating that the SP/W has decided to incorporate P into his/her epistemic dominion. We can verify this result by looking at the collostructional strength between *I believe(d)* and its most significant collostructs of inclination, action, and result, given in Table 7.[27]

Slightly differently from what emerged in Figure 10, the collostructional analysis shows that *I believe(d)* is most significantly attracted to constructions of result, giving good reason to consider it a more prototypical result predicate rather than an inclinational or an action one. Nonetheless, *I believe* still appears to be a polysemous epistemic verb as the *p*-value relative to action and secondly inclination is still significant (albeit less evenly distributed than the one of *I think*). We can now test the epistemic polysemy of *I believe* by first analyzing an inclinational usage from the BNC:

[27] The analysis in Table 7 is based on the same methodology given in Section 4.1.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

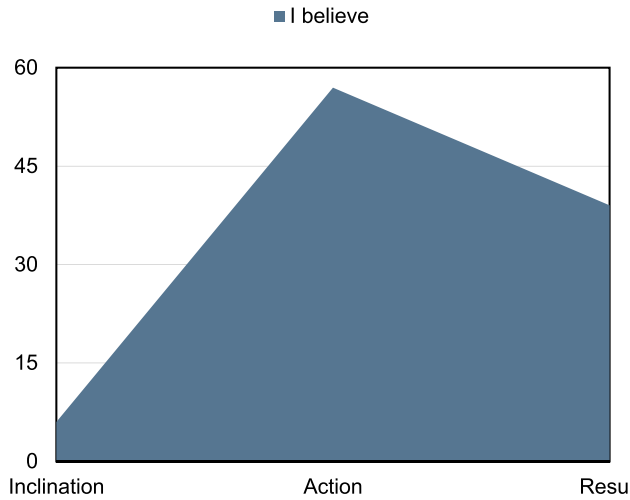

Fig. 10. Log-likelihood value of the co-occurrence of *I believe* with epistemic adverbials.

TABLE 7. I believe *and adverbial collostructs of inclination/action/result*

	Collexeme frequency	Collostructional strength
result	76	5.254E-118
action	105	7.248E-97
inclination	19	1.326E-17

[Inclination]

(16) […] don't know that I know just the whisky barrels they were, **a little I believe** there was **maybe** a name for them.

(BNC G62 701)

Despite the absence of any epistemic modal verb, from a constructional point of view (16) above still conveys inclination. This can be seen from the presence of the minimizer *a little* and the inclinational adverb *maybe*. The 'epistemic-mismatch test' (the same we used in Section 4.2) can demonstrate this point:

(16) a. * […] don't know that I know just the whisky barrels they were, **a little I believe** there was **maybe** a name for them, **(and) I'm sure of it.**

Again, (16a) is semantically inconsistent due to the presence of inclination and result elements coordinated in the same statement. Below I provide an action usage of *I believe*:

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

[Action]
(17) **I now believe that** she will give me a lift this evening, and this belief is justified.

(BNC F9K 449)

(17) conveys epistemic action, the adverbial *now* marks aspectually the act of believing as a new state of mind that the SP/W has just reached. (17) conveys just-then-factuality and as such can lead to a prototypical result predicate:

(17) a. **I now believe that** she will give me a lift this evening, and this belief is justified. **I'm sure of it.**

The result element *I'm sure of it* constitutes the iconic continuation of the previous action statement. After s/he realizes that P is true, the SP/W assesses his/her absolute certainty about P. Finally, we can focus on a result usage of *I believe*:

[Result]
(18) […] 'I **firmly believe that** the brother countries and parties will unite again.'

(BNC FAN 1846)

As *firmly* is an absolute-factual adverbial,[28] it therefore conveys epistemic result and is semantically compatible with *I believe* in (18) above. As we did for *I think* in Section 4.2, in (18a) below we can test a result construction's incompatibility with the following inclinational mitigator *I'm not sure*:

(18) a. [...] *'I **firmly believe that** the brother countries and parties will unite again, **although I am not sure.**'

The logical inconsistency of (18a) shows that *I believe* in this context unequivocally conveys epistemic result.

4.4 THE POLYSEMY OF EPISTEMIC VERBS: *I RECKON*

The third polysemous predicate I will focus on is *I reckon*. Adopting the same methodology given in Sections 4.1 and 4.3, I provide in Table 8 a first quantitative account of its statistical attraction to epistemic adverbials.

As can be seen, *I reckon* does not present a rich variety of co-occurring epistemic adverbs. In Figure 11 we can observe the graph summarizing the data in Table 8.

Notably, the polysemy of *I reckon* appears to be extremely unbalanced in comparison with *I believe* and especially with *I think*. That is to say, *I reckon*

[28] See Section 3.2 regarding the notion of absolute factuality.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 8. *Log-likelihood value of* I reckon *with epistemic adverbial collocates*

Epistemic adverbials	Epistemic meaning	Log-likelihood value
probably	*inclination*	51.6824
better	*inclination*	41.3204
really	*result*	17.6381
now	*action*	1.4488

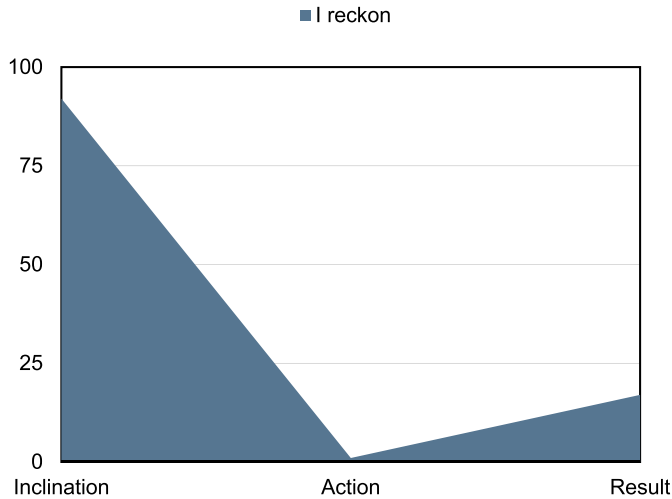

Fig. 11. Log-likelihood value of the co-occurrence of *I reckon* with epistemic adverbials.

seems to be most prototypically an inclinational predicate, with weak semantic connotations of action and result. The collostructional analysis in Table 9 might confirm this result.

As can be noted, there is a marked discrepancy between the most significant *p*-value of inclination (5.440E-62) and the other two of result and action. From this we can understand that *I reckon* is most prototypically an inclinational predicate as it still shows a weak polysemy towards the right end of the ECC. If we compare the quantitative distribution of the meaning of *I reckon* with that of *I think*, we can observe that the epistemic polysemy of the latter is far more balanced and evenly distributed along the right end of the ECC. One reason for that might be that *I think* has diachronically factualized towards absolute factuality to a higher degree with respect to *I reckon*. This speculation is also supported by the remarkably higher frequency of *I think* in comparison with *I reckon*, as we should not forget the strong role played by frequency of use in grammaticalization and semantic

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 9. I reckon *and adverbial collostructs of inclination/action/result*

	Collexeme frequency	Collostructional strength
inclination	37	5.440E-62
result	11	2.015E-10
action	9	5.642E-9

reanalysis (cf. Bybee, 2007, 2010). That being said, *I reckon* to a lower degree is still an epistemically polysemous predicate. In (19) below I provided a first inclinational usage:

[Inclination]
(19) **I reckon** Crilly **might** have a better chance.

(BNC HGL 950)

(19) above is an inclinational proposition, overtly marked by the epistemic modal *might*. This is exposed in (19a) below, where I provide an 'epistemic-mismatch test':

(19) a. ***I reckon** Crilly **might** have a better chance, **(and) I am sure of it.**
b. **I reckon** Crilly **might** have a better chance, **(although) I am not sure of it.**

(19a) is not logically consistent as *I am sure of it* is a result construction which is not felicitously coordinated with the inclinational statement appearing before.[29] Conversely, (19b) is perfectly acceptable, due to the inclinational compatibility with the mitigator *I am not sure of it*. This is confirmed by the frequent co-occurrence of the chunk *but/although I am not sure of it* with immediately preceding inclinational constructions (cf. BNC HGE 1746, BNC K4T 9299, and others). In (20) below, *I reckon* conveys action:

[Action]
(20) But by **then I truly reckoned** enough was enough.

(BNC H07 781)

The co-occurring of adverbial *then* and the predicate *I reckoned* conveys action, marking aspectually the moment when the SP/W reached the subjective conclusion that P was true. The just-then-factuality of (20) can hence also co-exist with a result construction.

(20) a. But by **then I truly reckoned** enough was enough, **(and) I was sure of it.**

[29] See Figures 8 and 9 in Section 4.2 for symbolic description of this phenomenon.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

Different from (19a) where we observed an epistemic mismatch between result and inclination, the iconic continuity from action to result in (20a) above is semantically consistent. Finally in (21) below, we can look at a comparatively less frequent result reading of *I reckon*.

[Result]
(21) I **reckon** he's <pause> **absolutely** fantastic […].
(BNC KE3 9030)

Due to the appearance of the absolute-factual adverbial *absolutely*, one may conclude that the predicate *I reckon* in (21) conveys epistemic result. This is shown in (21a) below.

(21) a. *I **reckon** he's <pause> absolutely fantastic, **(although) I am not sure.**

The absolute-factual proposition in (21a) cannot be followed by the mitigating not-yet-factual construction *although I am not sure*. Once again, the epistemic mismatch between result and inclination is easily tested on a semantic–pragmatic level. In addition, on a more quantitative level, the chunk *I am not sure* never occurs in a sentence following a predicate marked by *absolutely* in the whole BNC.

In this whole Section 4, I have provided a demonstration of how one might carry out a quantitative and qualitative method to measure and analyze the (possible) polysemies of epistemic predicates along the factualizing right end of the ECC. From what we observed, we can conclude that *I believe* seems to be most prototypically a result predicate with a quite strong alternative action meaning and slightly weaker inclinational connotation. *I reckon* appears to be the least polysemous among the predicates I analyzed, as it presents an extremely marked inclinational meaning and quite weak action and result usages. Most significantly, *I think* appears to be the most polysemous predicate among the ones we observed as it shows a remarkably balanced distribution of usages along the last three stages of the ECC. In the next section, I will argue that the 'balanced polysemy' of *I think* is the result of a unidirectional diachronic process of factualization where, using data from Italian, I discuss a progressive (and still ongoing) shift in meaning from the middle stage (inclination) to the right end of the ECC (result).

5. Diachronic factualization: the italian predicate *(Io) penso* 'I think'

In this section I will provide a corpus survey on the factualization process of the predicate *(Io) penso* 'I think' in Modern Italian over the last 150 years. The main aim of this study is to show a progressive diachronic shift from

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

not-yet-factuality to absolute factuality among the usages of *(Io) penso*. As I mentioned in Sections 3 and 3.1, epistemic predicates in English are amply discussed in the literature from both a synchronic and a diachronic perspective (Visser, 1963, Traugott, 1989, 1995, 2002, 2003, 2010; Holmes, 1995; Aijmer, 1997; Nuyts, 2001, and others). On the other hand, not much has been done for many other of the languages of Europe, especially from a diachronic point of view. For this reason, and in order to demonstrate that factualization is a phenomenon which can be compared cross-linguistically, this survey will be focused on the recent history of the epistemic predicate *(Io) penso* in Modern Italian. As pointed out by Beckner and Bybee (2009, p. 28; see also Bybee 2010), diachronic reanalysis of a construction can be gradual and not necessarily abrupt, as held by other scholars (see, for instance, Lightfoot, 1979; Roberts & Roussou, 2003). *(Io) penso* will be here intended as a construction which is gradually undergoing a semasiological process of reanalysis from a prototypical function of epistemic inclination to the one of result. This survey will give an empirical account of the semasiological development of new epistemic polysemies towards factuality of an inclinational predicate.

5.1. THE DIACHRONIC FACTUALIZATION OF *(IO) PENSO*

For this survey I consulted the diaCORIS, a balanced diachronic corpus of written Italian texts produced between 1861 and 2001[30] (Onelli, Proietti, Seidenari, & Tamburini, 2006). The corpus includes the five subgenres of *press*, *fiction*, *essayistic prose*, *legal-administrative prose*, and *miscellanea*.

There are many caveats to consider in using written data as an account of diachronic change in spoken language (cf. Herring, van Reenen, & Schøsler, 2000). Nonetheless, as Traugott and Dasher (2002, p. 46) point out, written language can still constitute an important window to investigate language change. In fact, while innovation is generally a product of online spoken language (cf. Croft 2007, 2010), nonetheless "text provides a mode of speech" (Olson, 1994, p. xviii), and histories of words and constructions in the development of languages have well-attested [gradient] reflexes in contemporary spoken data, with a definite connection between written and spoken varieties (Biber, 1988). Although the selection of specific text-types is one of the advantages of diachronic surveys on written language (cf. Rissanen, 1986; Traugott & Dasher, 2002, p. 47), in the present survey I decided to include all the five subgenres present in the diaCORIS. The reason

[30] Although the original project was limited to the period between 1861 and 1945, diaCORIS has been extended to contemporary Italian covering the two time spans 1945–1967 and 1968–2001.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

is that the main aim of this study is to capture a tendency of change, not its origin. More specifically, I was not interested in discovering when *Io penso* was first used epistemically in the history of written Italian, nor in spotting the text-type that may have prompted such a semantic reanalysis (see Traugott & Dasher, 2002). Conversely, my goal was to demonstrate that factualization is a conceptual ongoing process occurring in any phase of the semasiological change of an epistemic construction.

Adopting some of the criteria I provided in the previous sections (summarized in Table 10), I grouped the usages of the two collocates *penso* 'I think' and *ho pensato* 'I thought' into three main categories corresponding to the last three stages of the ECC: inclination, action, and result. All the older non-subjectified usages of the two chunks have been dropped into the 'non-epistemic' box, which stands for processual, intentional, and idiomatic functions. These all correspond to non-epistemic meanings describing more objectively the act of thinking, respectively *I am thinking about P*, *I think I will do P*, and the more idiomatic *I will think of a solution about P*. In addition I provided an 'incl-rec?' box, referring to all the usages where either an inclinational or a result interpretation were plausible.

The set of criteria in Table 10 were applied to 100 random occurrences (cf. Hoffmann, Evert, Smith, Lee, & Berglund-Prytz, 2008, on randomizing samples from a corpus) in three different time spans: 1861–1900, 1923–1945, and 1968–2001. As I pointed out previously, the present survey is centred on the employment of *(Io) penso* in the written language. The criteria I provide in Table 10 might be enriched if a similar study was carried out for spoken registers. In fact, marked inclinational usages of *(Io) penso* might be observed when the verb is accented (rather than the pronoun) or when an unstressed sequence is used as a pre-head in with a discoursal hedge function (cf. Dehé & Wichman, 2010, pp. 62–63, for a detailed account of the prosody of *I think* and *I believe* in spoken language).

Table 11 summarizes the results of the survey of *(Io) penso* in written Italian. The two main points of interest for this study were to see if the non-epistemic usages of *(Io) penso* would decrease (being replaced by more subjectified constructions) and – more importantly – if a factualization process has been actually occurring during the last 150 years. Figure 12 gives a more visual idea of these two phenomena.

The *y*-axis in Figure 12 refers to the frequency of the collocates, whereas the *x*-axis shows the three time spans considered in the survey. The five columns appear from left to right in each time span and stand for the five categories already mentioned in Table 11: non-epistemic, inclination, action, result, and 'incl-rec?'.

The first important tendency that can be noted is the significant decrease of the non-epistemic usages of *(Io) penso*: in the first time span they are 59,

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

TABLE 10. *Criteria for the study on the diachronic factualization of* (Io) penso

non-epistemic	- Non-epistemic (less-subjectified) meanings of Io penso: *I am thinking about P, I think I will do P* and the more idiomatic *I will think of a solution about P.*
inclination	- Co-occurrence with inclinational auxiliaries and/or adverbials of inclination. - Inclinational morphology: subjunctive/conditional mood. - Epistemic mismatch test.
action	- Non co-occurrence with inclinational auxiliaries. - Non-inclinational morphology. - Co-occurring with adverbials of action. - Epistemic mismatch test.
result	- Non co-occurrence with inclinational auxiliaries. - Non-inclinational morphology. - Co-occurrence with inclinational auxiliaries and/or adverbials of result. - Result morphology: future tense, indicative mood. - Epistemic mismatch test.
incl-res?	- Constructions which are not disambiguated morphologically, adverbially nor contextually.

TABLE 11. *The diachronic factualization of* (Io) penso

	1861-1900	1923-1945	1968-2001
non-epistemic	59	40	29
inclination	21	28	29
action	4	8	4
result	11	20	37
incl-res?	5	4	1

successively they drop to 40 and finally to only 29. The log-likelihood value for the whole period for this category is 10.44 ($p < .01$). This gives reason to conclude that *Io penso* has been notably subjectified (or de-objectified) during the last 150 years in Modern Italian. Regarding the three epistemic functions of inclination, action, and result, we can see that the first two do not show a significant change over the whole period: inclination slightly increases from 21 in the first time span to 28 and finally to 29 (with a log-likelihood value of 1.29), whereas action fluctuates at a very low frequency from 4 to 8 to 4. That being said, most intriguing is the considerable increase of the black column representing the result functions of *(Io) penso*: from 11 in the first period, to 20 in the second and even to 37 in the last time span, with an overall log-likelihood value of 14.7 ($p < .001$). This figure gives us reason to conclude that *(Io) penso* has progressively factualized over the last 150 years in Modern Italian. This claim can be better comprehended if we look at the two functions of inclination and result isolated in Figure 13.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

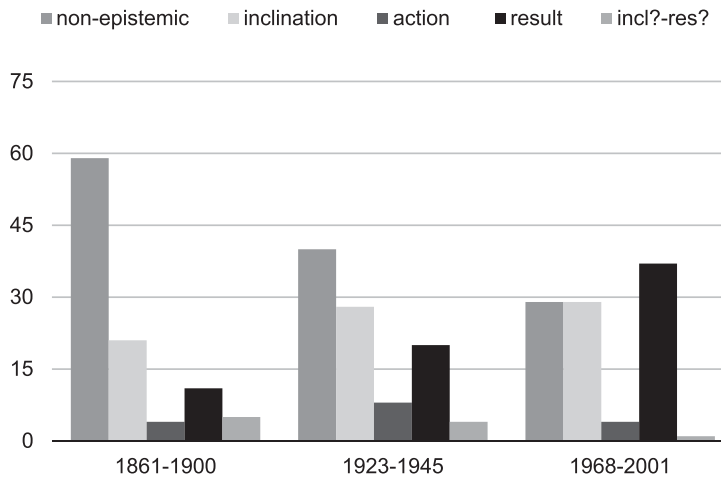

Fig. 12. The diachronic factualization of *(Io) penso* in the diaCORIS.

Figure 13 shows that inclination was the most frequent epistemic usage in both the earlier periods 1861–1900 and 1923–1945. However, in the last time-span from 1968 to 2001 result has become the main epistemic function of *(Io) penso* as it finally becomes slightly more frequent than inclination. Examples (22) and (23) below give an idea of a prototypical inclinational usage in the time span 1861–1900 and a result one in the last period 1968–2001, respectively:

(22) Nel tempo in cui l' imperatore Enrico soggiogò la Sicilia, era nella Chiesa di Palermo un decano, di nazione, secondo ch '**io penso** tedesco.
'At the time when the emperor Enrico subjugated Sicily, in the Church of Palermo there was a dean, his nationality was, *I think,* German.'
(diaCORIS – Saggistica – *Miti, Leggende e superst. del Medio Evo* – Graf Arturo 1892)

(23) Francamente **penso** che la democrazia deve ora fare il massimo sforzo revisionistico ed evolutivo (a sinistra) …
'Frankly, *I think* democracy has now to make a greatest revisionist and evolutionary effort (to the left) …'
(diaCORIS – Miscellanea – *Una scelta di vita* – Amendola Giorgio 1976)

In (22) *io penso* is used as an inclinational construction conveying a positive attitude towards the factuality of P (not-yet-factuality), but not an absolute certainty. This can be proved by adding an additional inclinational mitigator such as *anche se non ne sono sicuro* 'although I'm not sure'. Conversely (23) is a result statement conveying absolute factuality. In this case an inclinational

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

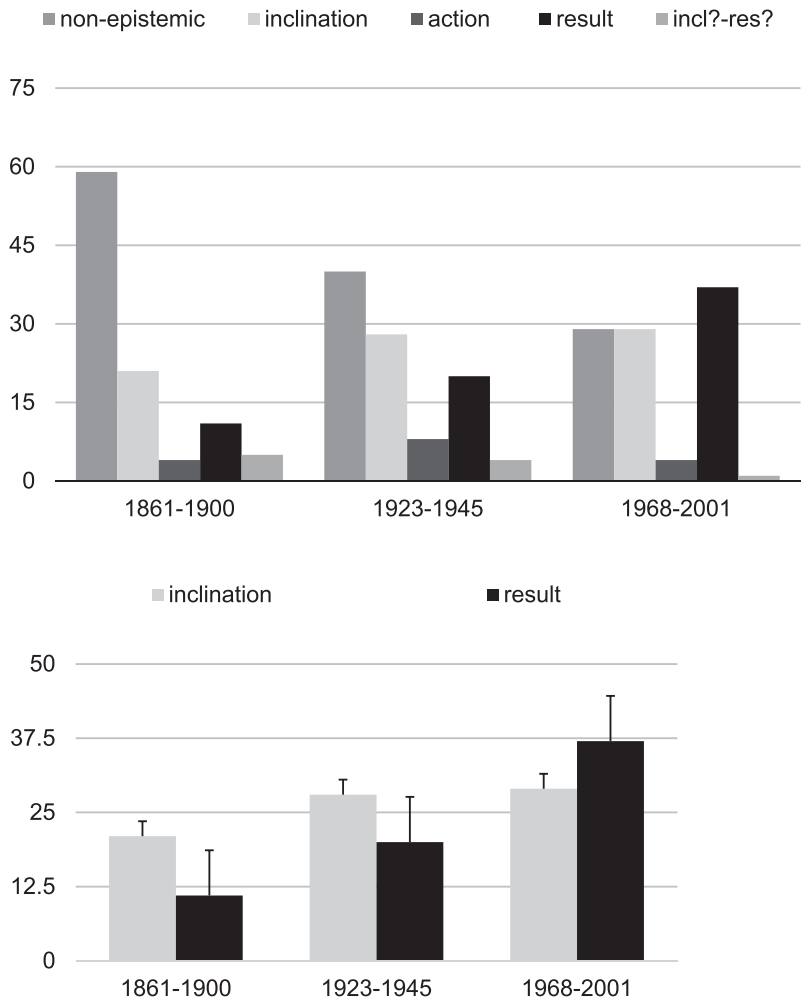

Fig. 13. Inclination vs. result in the diaCORIS.
NOTE: Error bars represent standard errors of the mean.

element like *anche se non ne sono sicuro* 'although I'm not sure' would be logically and semantically inconsistent. Consider the test below:

(22) a. Nel tempo in cui l' imperatore Enrico soggiogò la Sicilia, era nella Chiesa di Palermo un decano, di nazione, secondo ch ' **io penso** tedesco, **anche se non ne sono sicuro.**
'At the time when the emperor Enrico subjugated Sicily, in the Church of Palermo there was a dean, his nationality was, *I think,* German, *although I am not sure.*'

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

(23) a. *Francamente **penso** che la democrazia deve ora fare il massimo sforzo revisionistico ed evolutivo (a sinistra), **anche se non ne sono sicuro.**
'Honestly, *I think* democracy now has to make a greatest revisionist and evolutionary effort (to the left), *although I'm not sure*.'[31]

Finally, the low fluctuating frequency of the action column may also have a reasonable explanation. Notably, action is a useful category to express metalinguistically when a SP/W subjectively realizes that P is true. That is, action – intended as a conceptual state of mind – can be marked linguistically, either as a perfective or in co-occurrence with adverbials marking a new epistemic state of affairs such as *now* or *finally* as we discussed throughout Section 4. That said, in spoken language action can be also felicitously conveyed through prosody or can be directly substituted by result constructions. This implies that, diachronically action is not a half-way stage between inclination and result. Action is beyond doubt a conceptual mid-point between the two. However, the present data suggest that it does not constitute a bridging function between inclination and result historically. In the final analysis, this survey from the diaCORIS shows two related trends:

a. *(Io) penso* has consistently subjectified over the last 150 years in Modern Italian.
b. *(Io) penso* has increasingly factualized towards result and absolute factuality.

6. Conclusion

In this paper I have argued that factuality should be redefined as a gradient notion unfolding dynamically through several stages of epistemic commitment towards a proposition P. Drawing on Langacker's (1991, 2008, 2009; cf. also Kan et al., 2013) general notion of the 'epistemic control cycle' (ECC), I specifically claimed that epistemic predicates originally conveying weak certainty towards a proposition P diachronically develop an increasingly factual meaning, conveying more and more frequently a subjectified form of certainty. More specifically, I adopted the term 'factualization' to describe the cognitive and semasiological process that progressively – or abruptly – leads to a subjective certainty towards a proposition P. Factualization is here intended as a form of subjectification (Traugott 1989, 1995, 2003, 2010, 2012;

[31] The presence of the indicative form (conveying factuality) instead of the expected subjunctive one (the grammatical mood expressing irreality in Italian) after mental state predicates or 'verba dicendi' is also the result of a grammatical reanalysis due to a process of factualization.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

Traugott & Dasher, 2002), and it can occur both synchronically and diachronically. The former can develop textually (throughout the ongoing discourse), the latter constitutes the semantic–pragmatic and/or grammatical reanalysis of an epistemic construction. I supported this claim through a collostructional (cf. Stefanowitsch & Gries, 2003; Schmid & Küchenhoff 2013) and a qualitative analysis from the BNC on the epistemic polysemy of three mental predicates: *I think*, *I believe*, and *I reckon*. From this study, *I think* emerges as the predicate with the most balanced distribution of epistemic polysemies along the ECC, giving good reason to hypothesize a factualization process from an original 'inclinational' meaning to a more subjectified 'result' one.[32] This hypothesis was supported by a corpus survey from the diaCoris on the factualization process of *(Io) penso* 'I think' in Modern Italian during the last 150 years. The results of this study show that the contemporary usage of *(Io) penso* is notably more oriented towards factuality than what it was 150 years ago.

The theoretical implications of a unidirectional theory on factualization towards belief and certainty are profound. From a methodological point of view, based on Stefanowitsch and Gries' (2003) collostructional framework, this paper provides a new quantitative and qualitative approach to measure the degree of factuality of an epistemic construction in a corpus on both a synchronic and a diachronic level. To conclude, as these findings are the result of a corpus-based approach to language change on a large scale, further online experimental research on factualization phenomena and more diachronic evidence from other languages would constitute an interesting complement to the present framework.

REFERENCES

Aijmer, K. (1997). I think: An English modal particle. In T. Swan & O. J. Westvik (Eds.), *Modality in Germanic languages: historical and comparative perspectives* (pp. 1–47). Berlin: De Gruyter.

Baker, P., Hardie, A., & McEnery, T. (2006). *A glossary of corpus linguistics*. Edinburgh: Edinburgh University Press.

Barker, M. A.-a.-R., & Mengal, A. K. (1969). *A course in Baluchi* (Vol. 1). Montreal: Institute of Islamic Studies, McGill University.

Bascelli, E., & Barbieri, M. S. (2002). Italian children's understanding of the epistemic and deontic modal verbs *dovere* (must) and *potere* (may). *Journal of Child Language*, **29**(1), 87–107.

Beckner, C., & Bybee, J. (2009). A usage-based account of constituency and reanalysis. In N. C. Ellis & D. Larsen-Freeman (Eds.), *Language as a complex adaptive system* (Vol. 3) (pp. 27–46). Chichester: John Wiley & Sons.

Benveniste, E. (1971 [1958]). Subjectivity in language (M. E. Meek, trans.). In *Problems in general linguistics* (pp. 223–230). Coral Gables: University of Miami Press.

Biber, D. (1988). *Variation across speech and writing*. Cambridge: Cambridge University Press.

[32] See Section 2.1 for a detailed explanation of this terminology.

https://doi.org/10.1017/langcog.2014.34 Published online by Cambridge University Press

Botvinick, M. M., Braver, T. S., Barch, D. M., Carter, C. S., & Cohen, J. D. (2001). Conflict monitoring and cognitive control. *Psychological Review*, **108**(3), 642–652.
Bybee, J. (2003). Mechanisms of change in grammaticization: the role of frequency. In B. D. Joseph & J. Janda (Eds.), *The handbook of historical linguistics* (pp. 602–623). Oxford: Blackwell.
Bybee, J. (2007). Diachronic linguistics. In D. G. a. H. Cuyckens (Ed.), *The Oxford handbook of cognitive linguistics* (pp. 945–987). Oxford: Oxford University Press.
Bybee, J. (2010). *Language, usage and cognition*. Cambridge: Cambridge University Press.
Bybee, J., Perkins, R., & Pagliuca, W. (1994). *The evolution of grammar: tense, aspect, and modality in the languages of the world*. Chicago: University of Chicago Press.
Chung, S., & Timberlake, A. (1985). Tense, aspect and mood. In S. Timothy (Ed.), *Language typology and syntactic description* (Vol. 3) (pp. 202–258). Cambridge: Cambridge University Press.
Croft, W. (2010). The origins of grammaticalization in the verbalization of experience. *Linguistics*, **48**(1), 1–48.
Croft, W. (2012). *Verbs: aspect and causal structure*. Oxford: Oxford University Press.
Dehé, N., & Wichmann, A. (2010). Sentence-initial *I think (that)* and *I believe (that)*: prosodic evidence for use as main clause, comment clause and discourse marker. *Studies in Language*, **34**(1), 36–74.
Desimone, R., & Duncan, J. (1995). Neural mechanisms of selective visual attention. *Annual Review of Neuroscience*, **18**(1), 193–222.
Dietrich, R. (1992). *Modalität im Deutschen*. Opladen: Westdeutscher Verlag.
Fodor, J. A. (1983). *Modularity of mind: an essay on faculty psychology*. Cambridge, MA: MIT Press.
Gallese, V. & Lakoff, G. (2005). The brain's concepts: the role of the sensory-motor system in conceptual knowledge. *Cognitive Neuropsychology*, **22**(3/4), 455–479.
Goldberg, A. E. (1995). *Constructions: a Construction Grammar approach to argument structure*. Chicago: University of Chicago Press.
Goldberg, A. E. (2006). *Constructions at work: the nature of generalization in language*. Oxford: Oxford University Press.
Grush, R. (2004). The emulation theory of representation: motor control, imagery, and perception. *Behavioral and Brain Sciences*, **27**, 377–442.
Herring, S. C., van Reenen, Pieter, & Schøsler, Pieter (Eds.) (2000). *Textual parameters in older languages*. Amsterdam: Benjamins.
Hoffmann, S., Evert, S., Smith, N., Lee, D., & Berglund-Prytz, Y. (2008). *Corpus linguistics with BNCweb: a practical guide* (Vol. 6). Frankfurt: Peter Lang.
Holmes, J. (1984). Modifying illocutionary force. *Journal of Pragmatics*, **8**, 345–365.
Holmes, J. (1990). Hedges and boosters in women's and men's speech. *Language & Communication*, **10**(3), 185–205.
Holmes, J. (1995). *Women, men, and politeness*. London: Longman.
Jespersen, O. (1924). *The philosophy of grammar*. London: Allen and Unwin.
Kan, I. P., Teubner-Rhodes, S., Drummey, A. B., Nutile, L., Krupa, L., & Novick, J. M. (2013). To adapt or not to adapt: the question of domain-general cognitive control. *Cognition*, **129**(3), 637–651.
Kiefer, F. (1987). On defining modality. *Folia Linguistica*, **21**(1), 67–94.
Kiparsky, P., & Kiparsky, C. (1971). Fact. In M. Bierwisch & K. Heidolph (Eds.), *Progress in linguistics* (pp. 143–173). The Hague: Mouton de Gruyter.
Kurzban, R. (2012). *Why everyone (else) is a hypocrite: evolution and the modular mind*. Princeton: Princeton University Press.
Lakoff, G. (1987). *Women, fire, and dangerous things: what categories reveal about the mind*. Chicago: University of Chicago Press.
Lakoff, G. (2003). The embodied mind, and how to live with one. In A. J. Sanford & P. N. Johnson-Laird (Eds.), *The nature and limits of human understanding* (pp. 47–74). New York & London: T & T Clark.
Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.

Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: the embodied mind and its challenge to western thought*. New York: Basic books.
Langacker, R. W. (1985). Observations and speculations on subjectivity. In J. Haiman (Ed.), *Iconicity in syntax* (pp. 109–150). Amsterdam & Philadelphia: John Benjamins.
Langacker, R. W. (1987). *Foundations of cognitive grammar: theoretical prerequisites* (Vol. I). Stanford, CA: Stanford University Press.
Langacker, R. W. (1990a). *Concept, image, and symbol: the cognitive basis of grammar*. Berlin & New York: Mouton de Gruyter.
Langacker, R. W. (1990b). Subjectification. *Cognitive Linguistics*, **1**(1), 5–38.
Langacker, R. W. (1991). *Foundations of cognitive grammar: descriptive application* (Vol. II). Standford: Stanford University Press.
Langacker, R. W. (2006). Subjectification, grammaticization, and conceptual archetypes. In A. Athanasiadou, C. Canakis, & B. Cornillie (Eds.), *Subjectification: various paths to subjectivity* (pp. 17–40). Berlin & New York: Mouton de Gruyter.
Langacker, R. W. (2008). *Cognitive grammar: a basic introduction*. Oxford: Oxford University Press.
Langacker, R. W. (2009). *Investigations in cognitive grammar* (Vol. 42). Berlin: Walter de Gruyter.
Lightfoot, D. W. (1979). *Principles of diachronic syntax*. Cambridge: Cambridge University Press.
Loughin, T. M. (2004). A systematic comparison of methods for combining *p*-values from independent tests. *Computational Statistics & Data Analysis*, **47**(3), 467–485.
Lyons, J. (1982). Deixis and subjectivity: Loquor, ergo sum? In R. J. Jarvella & W. Klein (Eds.), *Speech, place, and action: studies in deixis and related topics* (pp. 101–124). New York: Wiley.
Manning, C. D., & Schütze, H. (2000). *Foundations of statistical natural language processing*. Cambridge, MA: MIT Press.
Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, **24**(1), 167–202.
Ming, X. (2013). Qingtai dongci 'gai' yu 'yinggai' tongyi qianxi [A detailed study of the similarities and differences between the modal verbs 'gai' and 'yinggai']. *Yuyan Yanjiu* [*Studies in Language and Linguistics*], 169–172.
Mithun, M. (1999). *The languages of native North America*. Cambridge: Cambridge University Press.
Narrog, H. (2002). Polysemy and indeterminacy in modal markers–the case of Japanese beshi. *Journal of East Asian Linguistics*, **11**(2), 123–167.
Narrog, H. (2005a). Modality, mood, and change of modal meanings: a new perspective. *Cognitive Linguistics*, **16**(4), 677–731.
Narrog, H. (2005b). On defining modality again. *Language Sciences*, **27**(2), 165–192.
Narrog, H. (2009). *Modality in Japanese: the layered structure of the clause and hierarchies of functional categories* (Vol. 109). Amsterdam: Benjamins.
Narrog, H. (2012). *Modality, subjectivity, and semantic change: a cross-linguistic perspective*. Oxford: Oxford University Press.
Norman, D., & Shallice, T. (1986). Attention to Action. In R. J. Davidson, G. E. Schwartz, & D. Shapiro (Eds.), *Consciousness and self-regulation* (pp. 1–18). New York: Springer.
Nuyts, J. (2001). *Epistemic modality, language, and conceptualization: a cognitive–pragmatic perspective*. Amsterdam: John Benjamins.
Olson, D. R. (1994). *The world on paper: the conceptual and cognitive implications of reading and writing*. Cambridge: Cambridge University Press.
Onelli, C., Proietti, D., Seidenari, C., & Tamburini, F. (2006). *The DiaCORIS project: a diachronic corpus of written Italian*. Paper presented at the LREC-2006, the Fifth International Conference on Language Resources and Evaluation.
Palmer, F. R. (2001). *Mood and modality*. Cambridge: Cambridge University Press.
Papafragou, A. (2000). *Modality: issues in the semantics–pragmatics interface*. Oxford: Elsevier.
Pedersen, T. (1996). *Fishing for exactness*. Paper presented at the SCSUG 96, Austin, TX.

Peng, L. Z., & Liu, Y. B. (2007). Lun 'iinggai' de liang zhong qingtai yu ti de tongxian xianzhi [A discussion about two types of aspectual and modal limitations in co-occurrence with yinggai]. *Yuyan Jaoxue Yu Yanjiu [Language Teaching and Linguistic Studies]*, **6**, 30–37.
Pietrandrea, P. (2005). *Epistemic modality: functional properties and the Italian system* (Vol. 74). Amsterdam: John Benjamins.
Reichle, V. (1981). *Bawm language and lore*. Bern: Peter Lang.
Rissanen, M. (1986). Variation and the study of English historical syntax. In D. Sankoff (Ed.), *Diversity and diachrony* (pp. 97–109). Amsterdam: Benjamins.
Roberts, I., & Roussou, A. (2003). *Syntactic change: a Minimalist approach to grammaticalization*. Cambridge: Cambridge University Press.
Schlaghecken, F., & Martini, P. (2012). Context, not conflict, drives cognitive control. *Journal of Experimental Psychology: Human Perception and Performance*, **38**(2), 705–731.
Schmid, H.-J., & Küchenhoff, H. (2013). Collostructional analysis and other ways of measuring lexicogrammatical attraction: theoretical premises, practical problems and cognitive underpinnings. *Cognitive Linguistics*, **3**, 531–577.
Simon-Vandenbergen, A. M. (1996). Image-building through modality: the case of political interviews. *Discourse & Society*, **7**(3), 389–415.
Squartini, M. (2009). Evidentiality, epistemicity, and their diachronic connections to non-factuality. In M.-B. M. Hansen & J. Visconti (Eds.), *Current trends in diachronic semantics and pragmatics* (pp. 211–277). Bingley: Emerald Group Publishing Limited.
Stefanowitsch, A., & Gries, S. T. (2003). Collostructions: investigating the interaction of words and constructions. *International Journal of Corpus Linguistics*, **8**(2), 209–243.
Sumnicht, A. (2001). *A cognitive approach to negative raising*. Paper presented at the Seventh International Cognitive Linguistics Conference, Santa Barbara.
Sweetser, E. (1990). *From etymology to pragmatics: metaphorical and cultural aspects of semantic structure*. Cambridge: Cambridge University Press.
Sweetser, E. (2012). Introduction: viewpoint and perspective in language and gesture, from the Ground down. In B. Dancygier & E. Sweetser (Eds.), *Viewpoint in language: a multimodal perspective* (pp. 1–22). Cambridge: Cambridge University Press.
Tantucci, V. (2013). Interpersonal evidentiality: the Mandarin V-过 guo construction and other evidential systems beyond the 'source of information'. *Journal of Pragmatics*, **57**, 210–230.
Traugott, E. C. (1989). On the rise of epistemic meanings in English: an example of subjectification in semantic change. *Language*, **65**(1), 31–55.
Traugott, E. C. (1995). Subjectification in grammaticalisation. In D. Stein & S. Wright (Eds.), *Subjectivity and subjectivisation* (pp. 31–54). Cambridge: Cambridge University Press.
Traugott, E. C. (2003). From subjectification to intersubjectification. In R. Hickey (Ed.), *Motives for language change* (pp. 124–139). Cambridge: Cambridge University Press.
Traugott, E. C. (2010). Revisiting subjectification and intersubjectification. In K. Davidse & L. Vandelanotte (Eds.), *Subjectification, intersubjectification and grammaticalization* (pp. 29–70). Berlin: Mouton De Gruyter.
Traugott, E. C. (2012). Intersubjectification and clause periphery. *English Text Construction*, **5**(1), 7–28.
Traugott, E. C., & Dasher, R. B. (2002). *Regularity in semantic change*. Cambridge: Cambridge University Press.
Tummers, J., Heylen, K., & Geeraerts, D. (2005). Usage-based approaches in cognitive linguistics: a technical state of the art. *Corpus Linguistics and Linguistic Theory*, **1**(2), 225–261.
Verhagen, A. (2005). *Constructions of intersubjectivity: discourse, syntax and cognition*. Oxford: Oxford University Press.
Visser, F. T. (1963–73). *An historical syntax of the English language* (Vol. 3). Leiden: Brill.
Weeber, M., Baayen, R. H., & Vos, R. (2000). Extracting the lowest-frequency words: pitfalls and possibilities. *Computational Linguistics*, **26**(3), 301–317.
Whitley, E., & Ball, J. (2002). Statistics review 3: hypothesis testing and P values. *Critical Care*, **6**(3), 222–225.