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AN IMPLICATIONAL UNIVERSAL IN COMPLEMENTATION—THEORETICAL INSIGHTS AND EMPIRICAL PROGRESS
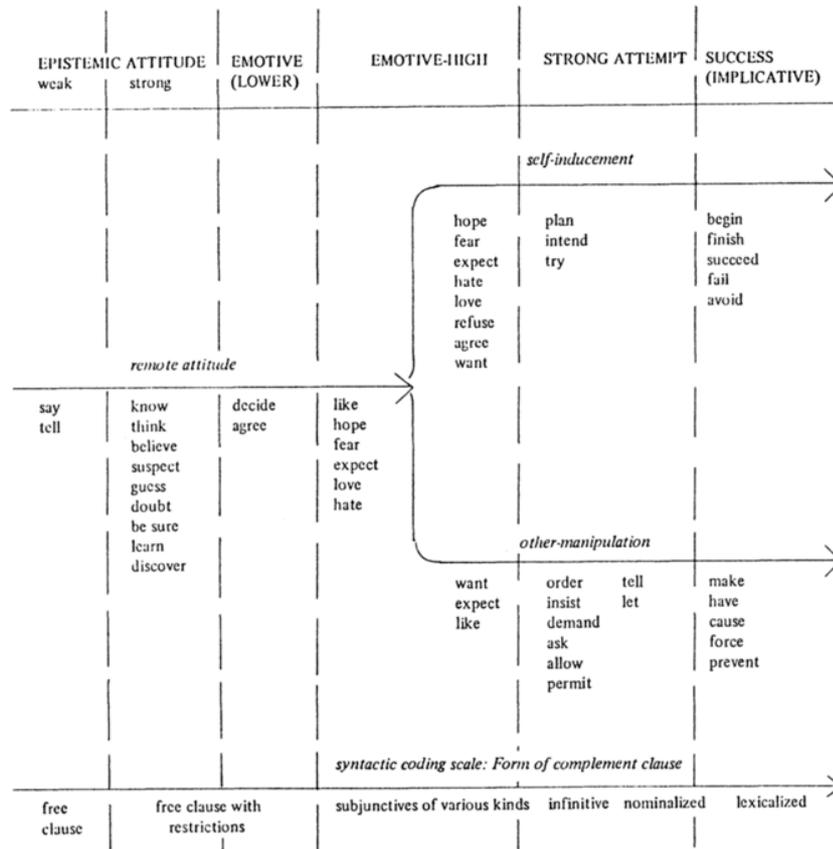
1. Introduction

Clauses selected by a verb (henceforth argument or complement clauses) have been divided into different classes based on the selecting verb's semantic requirements (e.g., interrogative, propositional attitude, modal), the morphosyntactic coding of the embedded clause (e.g., infinitive, subjunctive, nominalization), and the properties of the embedded subject (e.g., exceptional case marking [ECM], different types of control). Based on these properties, different degrees of integration and dependence on the matrix clause exist—for instance, a control clause, which requires a dependency between the embedded subject and a matrix argument, is less independent and more integrated into the main clause than finite embedded clauses with no subject restrictions. Similarly, different degrees of morphological, syntactic, and/or semantic complexity have been observed, exemplified, for instance, by the presence vs. absence of tense (morphology, projection, interpretation), agreement, an embedded subject, and other elements. Depending on which aspects of these classifications studies focus on, the resulting classifications are often not uniform. Nevertheless, abstracting away from certain details, a uniform picture has arisen, most notably demonstrated in Givón 1980, where a large correspondence has crystallized between, on the one hand, the semantic function of the selecting verb and embedded clause, and, on the other hand, the syntactic coding, as well as the independence and integration of the embedded clause.

In his influential typological study of complementation, Givón 1980 proposes the Binding Hierarchy in (1), which leads to the distribution of complements in (2) (note that the Binding Hierarchy is the upper forked ark, and 'high' refers to the right of the scale).

(1)   Binding Hierarchy
       The stronger the influence exerted over the agent of the complement clause by the agent of the main-clause verb, by whatever means, the higher is the main-clause verb on the binding scale.

[Givón 1980: 335, (5i)]

(2)

EPISTEMIC ATTITUDE | EMOTIVE | EMOTIVE-HIGH | STRONG ATTEMPT | SUCCESS
weak   strong   (LOWER)   (IMPLICATIVE)

self-inducement

hope	plan	begin
fear	intend	finish
expect	try	succeed
hate		fail
love		avoid
refuse		
agree		
want		

remote attitude

say	know	decide	like
tell	think	agree	hope
	believe		fear
	suspect		expect
	guess		love
	doubt		hate
	be sure		
	learn		
	discover		

other-manipulation

want	order	tell	make
expect	insist	let	have
like	demand		cause
	ask		force
	allow		prevent
	permit		

syntactic coding scale: Form of complement clause

| free | free clause with | subjunctives of various kinds | infinitive | nominalized | lexicalized |
| clause | restrictions | | | | |

[Givón 1980: 369]

There are two major conclusions reached in this work: i) the semantic hierarchy derived from the Binding Hierarchy systematically correlates with the morphosyntactic properties of complement clauses; ii) the hierarchy is *implicational* in that any property present in a language shows the same directionality on the scale. The correlation between syntax and semantics is formulated as the Syntactic Coding Hierarchy in (3), with some common parameters in (4).

(3) The higher a verb is on the binding scale, the less would its complement tend to be syntactically coded as an independent/main clause.

[Givón 1980: 337, (11)]

(4) a. The higher a verb is on the binding scale, the less is the agent in its complement/embedded clause likely to exhibit the case- marking characteristic of main-clause subjects/agents/topics.

b. The higher a verb is on the binding scale, the less is the verb of its complement clause likely to exhibit the tense-aspect-modality markings characteristic of main clauses.

c. The higher a verb is on the binding scale, the more is the verb in its complement clause likely to be predicate-raised, i.e. lexicalized as one word with the main verb.

[Givón 1980: 338, (12)]

It is important to note that, while the hierarchies in (2) are proposed to be universal, the exact mapping of the two can show variation, as long as the internal ordering of the hierarchies are respected. Single languages typically do not show all coding properties given, but whenever coding distinctions are made within a language, the cutting points for the distinctions follow the hierarchy. For instance, if a language realizes the complement of a particular class only as an infinitive, all classes to the right of that class will not be realizable as free independent clauses, but only as infinitives, nominalizations or lexicalizations.

Strictly speaking, the Binding Hierarchy is defined for the 'other-manipulation' branch in (2)—for instance, to force someone to do something means that the agent of the *force* clause exerts control and influence over the subject of the complement clause. However, Givón 1980 notes that it extends to the other classes, if 'influence' is understood as "strength of the agent's purpose to affect the accomplishment of the proposition in the embedded clause" (p. 342). In this paper we will not engage in the 'exerting influence' aspect of the Binding Hierarchy, but look at the (broad) semantic groupings from a different perspective. We do not intend to replace Givón's Binding Hierarchy, which is likely at play in deriving the detailed sub-distinctions among the larger groups we will arrive at. We mainly wish to show that cross-linguistically, typically only up to three types of complements are distinguished, and that these three classes can be defined semantically as supersets of Givón's classes. Based on the specific semantic properties we will develop, we will then suggest a syntax-semantics mapping which will lead to an implicational 'clausehood' hierarchy of complements with different semantic and structural complexities:

| MOST CLAUSAL ← | Class 1 ≫ Class 2 ≫ Class 3 | → LEAST CLAUSAL |

Clausehood will be represented through criteria of independence, transparency, integration, and complexity (Table 1), and the implicational nature of the hierarchy is observed, as in Givón's hierarchies, in that Class 3 can never be more independent, more complex, less transparent and less integrated than Class 2; and Class 2 can never be more independent, more complex, less transparent and less integrated than Class 1.

MOST INDEPENDENT		LEAST INDEPENDENT
LEAST TRANSPARENT	**Class 1 ≫ Class 2 ≫ Class 3**	MOST TRANSPARENT
LEAST INTEGRATED		MOST INTEGRATED
MOST COMPLEX		LEAST COMPLEX

Table 1 Implicational clausehood hierarchy

Although a language may not distinguish between some or all of the three classes regarding certain morphological or syntactic properties, (e.g., in Greek or Bulgarian, all complement clauses are finite, thus no finiteness distinctions exist among the three classes), the hierarchy nevertheless manifests itself, we hypothesize universally, following Givón, in that no language or property can go against the hierarchy. In other words, while certain effects may be neutralized in a language, no language or property shows higher independence/complexity or less transparency/integration for a class than for classes to its left.

In this paper we will provide a definition of the three broad classes of complementation, illustrate the clausehood hierarchy via a range of properties, and suggest a way of implementing the hierarchy structurally.

2. The implicational complementation hierarchy (ICH)

2.1. Narrowing down to three types of complementation

While Givón's hierarchies are observable through a wide range of properties cross-linguistically, single languages typically do not make as many distinctions as given in the hierarchy. Instead, some of the classes are collapsed and behave uniformly regarding a range of distributional properties. The hypothesis we put forward in this paper, which we will substantiate with several pieces of evidence in the following sections, is that the three broad classes we can observe via various morphosyntactic tests are defined semantically as follows: **i)** cognition and utterance complements (weak and strong epistemic attitudes in (2)), which we will refer to as the *Attitude* class; **ii)** modal, future, irrealis complements (emotives and some strong attempt verbs (2)), which we

will refer to as *Irrealis*; and **iii)** modals, implicatives, aspectuals, and some strong attempt verbs ('success' in (2)), which we will refer to as the *Tenseless* class. The need for a three-way split will be motivated in detail in the following sub-sections. In the remainder of this section, we lay out the defining characteristics of the three classes. In section 3, we then address the question of why it is these semantic classes that are ordered hierarchically and we provide a direction for how the implicational relations in Table 2 can be derived.

MOST INDEPENDENT		LEAST INDEPENDENT
LEAST TRANSPARENT	**Attitude ≫ Irrealis ≫ Tenseless**	MOST TRANSPARENT
LEAST INTEGRATED		MOST INTEGRATED
MOST COMPLEX		LEAST COMPLEX

Table 2 Implicational complementation hierarchy (ICH)

The split between *Attitude* and *Irrealis* complements has been made in many syntactic works, originally based on the distribution of control vs. ECM in English infinitives (see Stowell 1982, Pesetsky 1992, among many others). While these English-specific aspects will be set aside here (see Wurmbrand 2014b, Wurmbrand To appear), the distinction has turned out to be essential regarding many properties cross-linguistically. Pesetsky 1992 defines the *Attitude* class (in his terminology "propositional" verbs) as verbs selecting a proposition (see (5a) for some verbs in English), where nothing is asserted or presupposed about the truth of the complement. Irrealis complements, on the other hand, are selected by verbs such as those in (5b), and they refer to eventualities that can be unrealized at the time of the matrix clause.

(5)   a.   *Attitude*: admit, affirm, announce, assume, believe, claim, consider, discover, figure, find, forget (factive), imagine, know (factive), observe, say, suppose, tell (speech), wager

       b.   *Irrealis*: agree, ask, choose, decide, demand, desire, know (modal), need, plan, promise, refuse, tell (imperative), want, wish

One diagnostic given in Pesetsky 1992 is the (im)possibility to predicate truth or falsity of the embedded proposition. As shown in (6), *Attitude* complements allow truth/falsity predication of the complement, which is supported by the fact that one can add „which is true/false" to those complements (i.e., in (6a) the meaning can be that it is true that Bill reads books). In contrast, *Irrealis* complements as in (7) do not allow truth/falsity predication, since the truth of the complement is unspecified at the time of the utterance (the "which is true"

statement can only refer to the matrix clause in these cases, e.g, in (7a) to the wanting event, but not the reading event).

(6)   a.   *Mary believes [Bill to read books, which is true].*
       b.   *Bill considered [Mary to have gone to school, which is false].*
       c.   *Bill claimed [to be the king of France, which was true].*
                               [Pesetsky 1992: 27-28, a-b:102a,d; c: 108a]

(7)   a.   **Mary wanted [to read a book, which was true].*
       b.   **Mary demanded [to leave the room, which is false].*
       c.   **Mary agreed [to read a book, which was true].*
                               [Pesetsky 1992: 27, 105a,j,f]

A further difference between the *Attitude* and *Irrealis* classes concerns the temporal and aspectual interpretation. *Irrealis* complements are interpreted as unrealized, typically in the future with respect to the time of the matrix predicate. As shown in (8a,b), the embedded complement can be modified by future adverbials, and even when the complement is finite as in (8c), the future orientation must be observed and a past interpretation is impossible (unless the meaning of *decide* is coerced into a different interpretation).

(8)   a.   *Clara decided to fly to Paris next week.*
       b.   *Clara decided that she will/would fly to Paris next week.*
       c.   **Clara decided that she flew to Paris last year.*

In *Attitude* contexts the tense dependency is different in that no specific temporal orientation of the complement is selected, but the embedded clause is tied to the matrix clause through the "NOW" of the propositional attitude holder which has to act as the reference time of the embedded predicate (cf. Wurmbrand 2014b for detailed evidence). *Attitude* complements can therefore be interpreted as occurring simultaneously with the matrix event as in (9a) or the time can be shifted to the past when the perfect auxiliary *have* is used as in (9b) (in finite contexts, a future interpretation is possible as well). Importantly, *Attitude* infinitives behave like finite clauses with present tense, in that they cannot occur in the non-progressive form when referring to a non-generic episodic event, as shown in (9a,c).

(9)   a.   *Clara claims to be eating/*to eat salad right now.*
       b.   *Clara believes Danny to have eaten salad.*
       c.   *Clara claims/believes that she is eating/*eats salad right now.*

The latter restriction is part of a general restriction on aspect in *Attitude* contexts (see Wurmbrand 2014b, Todorović 2015), which prohibits perfective aspect in contexts in which the event time cannot be included in the reference time (because the latter is too short). As shown in (10a) and (11a), *Attitude* complements cannot occur in perfective aspect in Serbian, Croatian, and Greek, whereas *Irrealis* complements can (cf. (10b), (11b); in Croatian, (10b) could only involve a non-finite complement, but the aspect properties are the same as in Serbian; I. Kovač, p.c.). Since the reference time of *Irrealis* complements is a possibly infinite future interval, the embedded event interval can be contained in it, thus allowing perfective. In *Attitude* complements, on the other hand, the reference time is a very short interval (the attitude holder's NOW) and the embedded event interval cannot be contained in it, preventing perfective. Furthermore, (11c) shows that the effect is also observable in complements with an embedded past: while the imperfective statement allows two interpretations—a shifted past (the *solving* occurs before the *claiming*) and a simultaneous interpretation (the *solving* occurs at the same time as the *claiming*)—the perfective form only allows a shifted past interpretation. Since the past reference time in (11c) is restricted to a very short interval (the time of the *knocking*), under a simultaneous interpretation, the event interval could not be contained in it, hence prohibiting perfective under this interpretation. This perfective restriction in the past supports the relevance of the reference/event time ordering for perfective (rather than a specific restriction on present tense), and thus indirectly the existence of a short reference time interval in *Attitude* complements.

(10) a. *Jovan   je   tvrdio   da čita*   /
          Jovan   AUX   claimed   DA read.3.SG.PRS.IPFV   /
          *pročita   knjigu.
          *read.3.SG.PRS.PFV   book
          'Jovan claimed to be reading the book.'

      b. *Jovan   je   odlučio   da čita*   /
          Jovan   AUX   decided   DA read.3.SG.PRS.IPFV   /
          pročita   knjigu.
          read.3.SG.PRS.PFV   book
          'Jovan decided to read the (entire) book.'

                                              [Serbian: Todorović 2015]

(11) a. *isxirizete   oti   lii*   /
          claim.IPFV.PRS.3SG   that solve.IPFV.PRS.3SG   /

*lisi		*to provlima*			
*solve.PFV.PRS.3SG		the problem			
(, *me*	*to*	*na*	*to*	*aɣnoi*	)
(, with	the	NA	it	ignore.IPFV.PRS.3SG	)

'He claims to be solving the problem (by ignoring it).'

b. *apofasisen* *na* *lisi* *to provlima.*
    decide.PFV.PST.3SG NA solve.PFV.PRS.3SG the problem

'He decided to solve the problem.'

c. *isxiristiken* *oti* *elien* /
    claim.PFV.PST.3SG that solve.IPFV.PST.3SG /
    elisen *to provlima* (, *otan*
    solve.PFV.PST.3SG the problem (, when
    extipisen *i porta)*
    hit.PFV.PST.3SG the door)

'He claimed that he solved/was solving the problem (when there was a knock at the door).'

<div align="right">[Cypriot Greek: C. Christopoulos, p.c.]</div>

The third class of complements we will distinguish includes verbs such as the ones in (12a).[1] The main semantic characteristic of this class is that the time of the embedded event has to be simultaneous with the time of the matrix event and neither a future, (12b), nor a past interpretation, (12c), is possible, thus our term *Tenseless* class. As we will see in section 2.3, these complements cannot be finite in English, but the tense restrictions can also be seen in languages that only have finite complementation, such as Greek in (13).

(12) a. *Tenseless*: avoid (implicative), begin, can, continue, fail, finish, forget (implicative), manage, may, must, start, stop, succeed, try
      b. *Clara tried to eat the salad (*tomorrow).*
      c. **Clara tried to have eaten the salad yesterday.*

(13) a. **simmera eprospaθisen* *na lisi* *to* *provliman*
          today try.PFV.PST.3SG NA solve.PFV.PRS.3.SG the problem
          avrio.
          tomorrow
          Lit. 'He tried today to solve the problem tomorrow.'

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[1] We have included modals among the *Tenseless* class, as they form the least clausal contexts in most languages, possibly because modals are of a different category (e.g., functional heads) than main verbs (see also fn. 11). Whatever the ultimate definition of modals is, we follow the general conclusion that modal statements constitute (the most) mono-clausal configurations.

b. *prospaθo   na   εfεvɣan.   / εfiɣan.
   try.1SG   NA   leave.IPFV.PST.3PL / leave.PFV.PST.3PL
   Lit. 'I try for them to have been leaving/to have left.'
                                    [(Cypriot) Greek: C. Christopoulos, p.c.]

Furthermore, as shown in (12b), in contrast to *Attitude* complements, a non-progressive embedded predicate is possible, and so is perfective in (Cypriot) Greek, (14a) and Serbian, (14b).

(14) a. *eprospaθisen*   na   *lisi*   *to provlima.*
          try.PFV.PST.3SG   NA   solve.PFV.PRS.3SG   the problem
          'He tried to solve the problem.'   [C. Christopoulos, p.c.]
      b. *Jovan   je   pokušao   da   pročita*   *knjigu.*
          Jovan   AUX   tried   DA   read.3.SG.PRS.PFV book
          'Jovan tried to read the (entire) book.'   [N. Todorović, p.c.]

While implicative and aspectual contexts are typically non-irrealis and non-future, verbs like *try* pose an interesting in-between case. While, as we have just seen, a future interpretation is not possible, *try* complements also involve an irrealis aspect since the embedded event cannot be realized (i.e. completed) yet in a trying situation. Since *try* usually patterns with *Tenseless* verbs, we have included it among this class, but we wish to note that it is a clear border-case (see also Givón's (2)), which may also show properties of the *Irrealis* class.[2]

   Lastly, as has been discussed extensively in the works on control, the *Attitude* and *Irrealis* classes differ from the *Tenseless* class in the 'strength' of the control requirement. As shown in (15), while *Tenseless* complements typically require full identity between the matrix controller and the embedded subject, *Irrealis* complements often allow a relaxed form of control, partial control, where the referent of the matrix argument merely has to be included among the referents of the embedded subject (see Landau 2000 for extensive discussion).

(15) Intended: the chair plus his associates would gather in the castle
      a. *The chair tried to gather in the castle.*
      b. *The chair decided to gather in the castle.*

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[2] Another aspect of the mixed behavior of *try* is suggested in Sharvit 2003 where it is shown that *try* contexts display some parallels with progressive in that they involve both an intensional and an extensional component.

Furthermore, for languages like Greek, it has been noted that *Tenseless* complements tend to involve obligatory control, (16a), whereas *Irrealis*, (16b), and *Attitude* complements, (16c), allow free reference.[3] Many authors have therefore postulated a PRO subject like in infinitives for the obligatory coreference configurations, whereas the free reference contexts involve an embedded *pro* subject (see, among many others, Iatridou 1988, Varlokosta 1993, Terzi 1992, 1997, and Landau 2004 for a summary).

(16)   a.   *Ta pedhja   arxisan   na   trexun   / *trexi.*
            the children began.3PL   NA   run.3PL   / *run.3SG
            'The children began to run.'   [Roussou 2009: 1816, (11)]
       b.   *Ipa   ston Kosta   na   figi   o   yios tou.*
            told.1.SG to   Kosta   NA   leave.3SG the   son   his
            'I asked Kosta for his son to leave.'   [Terzi 1997: 340, (25)]
       c.   *I Maria   ipe   oti   egrapsan   ena piima.*
            the Mary said.3.SG   that   wrote.3.PL one poem
            'Mary said that they wrote a poem.'   [Terzi 1997: 338, (11)]

In sum, we suggest the semantically based three-way split in Table 3, which represents an implicational hierarchy from most clausal on the left to least clausal on the right (to be motivated below). We want to emphasize again that this grouping of complement clauses in three broad groups does not mean that the detailed hierarchical distinctions noted in Givón 1980 are not relevant as well. For instance, the *Attitude* class shows variation in the distribution of shifted indexicals (Sundaresan 2012, 2018) and ECM (Christopoulos and Wurmbrand To appear, Wurmbrand To appear), which reflects a more fine-grained internal hierarchy of that class exactly along the scale in (2) (see also Krifka 2018/this volume). However, we will show in the next section that for many distributional properties, a collapsed grouping as in Table 3 is necessary as the basic classification of complements.

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[3] The distribution of control shows some variation, in particular in the *Tenseless* class. While Terzi 1997 considers control obligatory with verbs like *try*, Roussou 2009 allows non-coreference as well. The variation is, however, systematic and falls along the Givón scale: aspectuals and modals, are the most likely to trigger obligatory control, followed by implicative verbs. Clear future contexts are the least likely to require coreference. If what matters for control is a combination of tense and mood, the in-between nature of *try* may be expected, since, as noted above, it is both irrealis but also tenseless, and hence could alter between the two classes.

Temporal properties	*Attitude*	*Irrealis*	*Tenseless*
Interpretation	not pre-specified	future	simultaneous
Episodic perfective, non-progressive	✗	✓	✓
Type of control	partial control possible	partial control possible	exhaustive control
Temporal element	attitude holder's NOW	modal (WOLL)	—

Table 3 Semantic classification

2.2. The ICH Signature

That complement clauses fall into three broad classes can be illustrated by properties which show different values for the three classes or combinations of properties which together single out three types of complements. A case of the first type of property are clause introducers in Bulgarian and Greek, both languages without infinitives. Declarative complement clauses are introduced by either *če* or *da* in Bulgarian and *oti* or *na* in Greek. As shown in (17a) and (18a), *Attitude* complements are obligatorily introduced by *če* and *oti*, which are typically seen as regular complementizers corresponding to *that. Tenseless* complements, on the other hand, are obligatorily introduced by *da* and *na*, as in (17c) and (18c). Lastly, *Irrealis* complements can go with either clause introducer, as in (17b) and (18b).

(17) a. *Lea   tvărdi   {če   /   *da } čete   kniga.*
          Lea   claim.PRF.3SG {that /   *DA } read.PRS.3SG book
          'Lea claimed that she read a book.'

  b. *Lea   reši   {če   /   da   } čete   kniga.*
          Lea   decide.PRF.3SG {that /   DA   } read.PRS.3SG book
          'Lea decided to read a book.'

  c. *Lea   se   opitvaše   {*če   /   da   } čete   kniga.*
          Lea   REFL try.PRF.3SG   {*that /   DA   } read.PRS.3SG book
          'Lea tried to read a book.'

                                        [Bulgarian: Marchela Oleinikova, p.c.]

(18) a. *isxiristiken   { oti / *na} elisen   to provlima.*
          claim.PFV.PST.3SG   { that / *NA   } solve.PFV.PST.3SG the problem
          'He claimed to have solved/that he solved the problem.'

b. *apofasisen* { *oti enna / na* } *lisi*
decide.PFV.PST.3SG { that FUT / NA } solve.PFV.PRS.3SG
to provlima.
the problem
'He decided that he will solve/to solve the problem.'

c. *eprospaθisen* { **oti / na* } *lisi to provlima.*
try.PFV.PST.3SG { *that / NA } solve.PFV.PRS.3SG the problem
'He tried to solve the problem'

[Cypriot Greek: Christos Christopoulos, p.c.]

The distribution is summarized in Table 4 and represents what we call the *Implicational Complementation Hierarchy (ICH) Signature*—when a property distinguishes between different types of complements, *Attitude* and *Tenseless* complements show the opposite values, and *Irrealis* complements either allow both values or 'side' with one or the other. The importance of ICH Signature effects, which many previous accounts of complementation cannot derive, is the systematicity: it is no coincidence, we argue, that *Attitude* and *Tenseless* complements show the opposite values, as they are at the opposite ends of the ICH. Similarly, the ambivalent nature of *Irrealis* complements is expected since they occupy a position between *Attitude* and *Tenseless* complements on the hierarchy.

Clause introducers	*Attitude*	*Irrealis*	*Tenseless*
Bulgarian	*če, *da*	*če, da*	**če, da*
Greek	*oti *na*	*oti na*	**oti na*
ICH Signature	+P	±P ∣ +P ∣ −P	−P

Table 4 The ICH Signature

Note that for these and the other complementation properties to follow, the classes are defined semantically and not necessarily via specific verbs. As listed in (5), certain verbs may belong to two classes. Our main hypothesis is that, depending on which interpretation is chosen in any given statement, the distributional properties may change and must follow the properties of the semantic class the verb belongs to under that interpretation. Some specific cases at hand are verbs like *know, forget*, or *tell*. [4] The verbs *know, forget* belong

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[4] Another verb that is notoriously ambiguous is the verb *expect*, which allows various *Irrealis* interpretations as well as a *believe*-type *Attitude* interpretation (see Bresnan 1972, Pesetsky 1992). In Wurmbrand 2014b, it is shown that the aspectual properties change as expected according to which type of verb is chosen.

to the *Attitude* class when factive but to the *Tenseless* class when modal (*know*) or implicative (*forget*). The verb *tell* belongs to the *Attitude* class when used as a speech verb, but to the *Irrealis* class when used as a command verb. Strikingly, the clause introducers change exactly as predicted in Table 4. The *oti* complements in (19)/(20) can only have the factive interpretations, whereas the *na* complements can only have the modal/implicative interpretations. In other words, only *oti* is possible under the factive interpretation, and only *na* under the modal/implicative interpretations.[5] Similarly, the complement of *tell* acts as an *Attitude* complement under the speech interpretation in (21a) where it can only occur with *oti*, whereas it is an *Irrealis* complement under the command interpretation in (21b), in which case it can occur with *na*.[6]

(19) a. *Kseri*   *oti*   *odhiji*
          know.3SG   that   drive.3SG
          'He knows that she drives.'
          *'He knows (how) to drive.'   [Roussou 2009: 1814, (7c)]

      b. *Kseri*   *na*   *odhiji*
          know.3SG   NA   drive.3SG
          *'He knows that she drives.'
          'He knows (how) to drive.'   [Roussou 2009: 1814, (7c)]

(20) a. *eksixasen*   *oti enna lisi*   *to provlima*
          forget.PFV.PST.3SG   that FUT   solve.PFV.PST.3SG the problem
          'He forgot that he will solve the problem.'
          *'He forgot to solve the problem.'   [C. Christopoulos, p.c.]

      b. *eksixasen*   *na   lisi*   *to provlima.*
          forget.PFV.PST.3SG   NA   solve.PFV.PST.3SG   the problem
          *'He forgot that he will solve the problem.'
          'He forgot to solve the problem.'   [C. Christopoulos, p.c.]

(21) a. *Tu   ipa   oti   efije.*
          Him told.1.SG that left.3SG
          'I told him that she had left.'
          *'I told him to leave.'   [Roussou 2009: 1814, (7b)]

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[5] The verb *know* may also combine with a *na* clause when it is accompanied by negation or a question, in which case the interpretation involves an epistemic modal reading like "according to what I believe/think it must/cannot be the case that…" (Roussou 2009: 1814), which we assume is responsible for the switch of classes.

[6] The command interpretation can also be expressed with an *oti* clause if an overt modal (*prepi* 'must/should') is used.

b.   *Tu   ipa   na   fiji.*
     Him told.1.SG NA   leave.3SG
     *'I told him that she had left.'
     'I told him to leave.'   [Roussou 2009: 1814, (7b)]

Theoretically, the distribution of *oti/če* and *na/da* raises many interesting questions. One much-debated issue is how to delineate and define when *na/da* is possible, in other words, the question of what unifies the *Irrealis* and *Tenseless* classes (to the exclusion of the *Attitude* class). Traditionally, the difference between *oti/če* and *na/da* has been described along the lines of the indicative vs. subjunctive distinction (Joseph 1983, Terzi 1992), in which case the distribution of clause introducers—the ICH Signature effect—follows straightforwardly Givón's coding hierarchy. However, the notion of "subjunctive" has also been questioned for *na/da* since a uniform semantic characterization of all *na/da* contexts does not appear to be possible. Most accounts readily cover the *Irrealis* class, but they usually do not extend to the *Tenseless* class, in particular the non-modal implicative (e.g., *manage*) and aspectual predicates (e.g., *begin*) in that class.[7]

A different direction has been taken in Roussou 2009 where it is suggested that *na* is a nominal element similar to a locative pronoun. Support for this claim could come from the fact that *na*, but not *oti,* can introduce a nominalization without an additional overt determiner (Agouraki 1991). This could be taken to suggest that *na* complements are more nominal than *oti* complements, which again would follow Givón's coding hierarchy.

In addition to the characterization of *na/da*, the ICH Signature effect poses two other questions, which are often ignored. First, why is it the *Irrealis* class that shows optionality between *oti/če* and *na/da* (and not either of the other classes); and second, why are *oti/če* statements not possible with *Tenseless* complements. It is not obvious that previous accounts have answers to these questions. We submit that these questions lie at the heart of the ICH, and we will return to them in section 3.2. For now, let us conclude with the

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[7] Although some implicative verbs involve a goal, desire, or task component (see Roussou 2009 for some suggestions), this does not seem to be part of the lexical meaning but rather arise as a pragmatic implicature. For instance, *manage to do something* may often imply that achieving the event corresponding to the infinitive is desired by the subject. However, this is not necessarily the case, as can be seen in statements like *He managed to kill all of his plants within a month.* This is can be used (and frequently is) in a situation where the subject would clearly like his plants to survive, but lacks the talent or dedication to take care of them properly. Thus attributing a (lexical) goal/desire modality to *manage* seems to be at odds with such usages, and instead, we suggest, only arises pragmatically in certain contexts, which, as the example above shows, interacts with other pragmatic concepts such as irony.

general characterization in Table 5: since *Attitude* and *Tenseless* complements are at the opposite ends of the independence scale for the embedded tense and subject interpretations (see section 2.1), we can note that the *oti/če* vs. *na/da* distinction systematically aligns with this scale—the more independent a complement is, the more likely it is to be introduced with *če/oti*; the less independently the complement is, the more likely is *da/na*.

MOST CLAUSAL/INDEPENDENT	**če/oti ≫ da/na**	LEAST CLAUSAL/INDEPENDENT

Table 5 Bulgarian and Greek clause introducers

A second way in which ICH Signature effects are revealed is by the combination of two properties, which each have only two values. We illustrate this with the distribution of infinitives and overt subjects in Serbian. In Serbian, like in Greek and Bulgarian, all three types of complement clauses can be realized as finite complements, cf. (22). However, Serbian is different from Greek and Bulgarian in also having infinitives. Importantly, as shown in (22), *Irrealis* and *Tenseless* complements can be realized as non-finite clauses, but *Attitude* complements cannot.

(22) a.   *Tvrdim*   {*da*   *čitam*   / **čitati*   } *ovu knjigu.*
         claim.1SG   {DA read.1SG / *read.INF   } this book
         'I claim to be reading this book.'   [Vrzić 1996: 305, (22a,b)]

       b.   *Odlučila*   *sam*   {*da*   *čitam*   / *čitati*   } *ovu knjigu.*
         decide.SG.FEM AUX.1SG {DA read.1SG / read.INF } this book
         'I decided to read this book.'   [N. Todorović, p.c.]

       c.   *Pokušala*   *sam*   {*da*   *čitam*   / *čitati*   } *ovu knjigu.*
         tried.SG.FEM AUX.1SG {DA read.1SG / read.INF } this book
         'I tried to read this book.'   [N. Todorović, p.c.]

Although Serbian allows finite complements for all three classes of complementation, overt subjects are not possible in all of them. As shown in (23a,b) finite *Attitude* and *Irrealis* complements allow i) a control-like interpretation (i.e., the embedded clause can contain an empty element coreferent with the matrix subject), ii) an embedded subject that is different from the matrix subject, or iii) an embedded pronominal subject, which could be, but does not have to be, coindexed with the matrix subject. The situation is different in *Tenseless* complements. We have seen above already that *Tenseless* complements tend to trigger obligatory control. This is also the case in Serbian. What is striking, however, is that in the *Tenseless* class no overt subject is possible,

not even a pronoun coreferent with the matrix subject (which would satisfy the semantic control requirement). Since a finite complement is nevertheless possible in these cases, it is surprising that subjects are entirely excluded.

(23) a.   *Jovan   je   tvrdio   da   je   __ / Petar / on   otišao*
             Jovan AUX claimed da AUX __ / Peter / he   left
             pre Marije.
             before Mary
             'Jovan claimed to have left before Mary.'
             'Jovan claimed that Peter/he has left before Mary.'

      b.   *Jovan je   odlučio   da   __ / Petar / on ode.*
             Jovan AUX decided DA   __ / Peter / he leaves
             'Jovan decided to leave-'
             'Jovan decided that Peter/he would leave.'

      c.   *Jovan je   pokušao da   __ / *Petar / *on ode.*
             Jovan AUX tried   DA   __ / *Peter / *he leaves
             'Jovan tried to leave.'

                                                [Serbian: N. Todorović, p.c.]

Put together, as shown in Table 6, infinitives and overt subjects show a ICH Signature effect in Serbian: *Attitude* and *Tenseless* complements show the opposite values whereas *Irrealis* complements are in-between. Once again, this distribution is not surprising in light of the ICH. Overt subjects are a property of independence, hence least available in the most dependent *Tenseless* class. Infinitives are a dependent property, hence least available in the *Attitude* class.

Serbian	Attitude	Irrealis	Tenseless
Infinitival complement	*	✓	✓
Overt subject	✓	✓	*

Table 6 ICH Signature effect in Serbian

In the next section, we will look more closely at the distribution of infinitives vs. finite clauses in several languages and show that finiteness is not a defining property of clause size or syntactic complexity, but rather a property that operates on the semantically defined scale of the ICH.

2.3. Implicational finiteness universal

From an English perspective, the complexity of an embedded configuration is typically taken to be the result of its syntactic coding. Sentences with a main

verb plus one or more auxiliaries are seen as the least complex configurations since they form a single clausal domain. Sentences containing a finite or non-finite complement clause (typically) instantiate bi-clausal configurations, with infinitives often being treated as "less" clausal than finite clauses, since the former allow dependencies such as control and A-movement across them whereas the latter are often only transparent for A'-phenomena.[8]

LEAST CLAUSAL ←	auxiliary ≫ infinitive ≫ finite	→ MOST CLAUSAL

While the above scale matches Givón's coding hierarchy and can be observed widely, there are several reasons to reject a definition of clausehood based on coding properties, instead of, as suggested in Givón 1980 and our approach here, a semantically defined hierarchy which morphosyntactic coding operates on. That morphosyntactic coding is a consequence of the ICH and not a defining characteristic of clausehood has already been seen in the distribution of clause introducers in Bulgarian and Greek. Since these languages lack infinitives, yet still show ICH effects, coding cannot be the source of the differences.

A similar point can be made for Serbian. In addition to the ICH Signature properties mentioned in Table 6, there are several other syntactic properties which distinguish the three classes of complements, despite all of them occurring as finite complements (see Progovac 1993a, b, 1994, 1996, Stjepanović 2004). These authors note, for instance, that clitic climbing is possible out of *Tenseless da*-complements, and marginally also out of *Irrealis* complements. Since Serbian still also allows infinitives, an infinitival complement is usually preferred by speakers when clitic climbing takes place. However, in a recent corpus study conducted by Jurkiewicz-Rohrbacher et al. 2017 it is confirmed that, despite being marginal, clitic climbing does indeed exist across finite *da*-complements. That study also provides the relative frequency of clitic climbing from different types of complements, and the scale given shows that clitic climbing is most frequent with the (*Tenseless*) verbs *stop, start, try, can*, and least frequent with *Irrealis* verbs such as *order, force, ask*. Furthermore, Todorović and Wurmbrand To appear discuss the ordering of *da* and embedded adverbials, and as shown in Table 7, adverbs have to follow *da* in *Attitude* complements but precede *da* in *Tenseless* complements; once again *Irrealis* complements allow either ordering.

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[8] The claim that finite clauses do not allow A-dependencies across them has been shown to not be tenable cross-linguistically (see Wurmbrand To appear for a summary of cross-clausal A-phenomena in a range of languages, and the consequences these pose for clausehood).

Serbian	*Attitude*	*Irrealis*	*Tenseless*
Infinitival complement	*	✓	✓
Overt subject in *da* complement	✓	✓	*
Clitic climbing	*	marginal	✓
Adverb positions	{*da*} ADV {**da*}	{*da*} ADV {*da*}	{?-**da*} ADV {*da*}

Table 7 ICH differences in Serbian

These properties thus show that clausehood cannot be defined via finiteness, but that an independent semantic definition is necessary to delineate the different types of complements. The fact that the syntactic properties align, in the predicted way, with the three semantic classes we defined suggests that the ICH is a deep property of grammar.

An ICH effect that goes beyond (non)finiteness can also be observed in English. As shown in (24), all three types of complements can occur as infinitives, but finite complements are only possible for *Attitude* and *Irrealis* complements, but not for *Tenseless* complements. Together with the finiteness restriction in Serbian, which disallows infinitives in *Attitude* complements, an ICH Signature effect arises as in Table 8. We thus conclude that (non-)finiteness operates on the independently existing semantic ICH.

(24)   a.   *Clara claimed to have left/that he left.*
       b.   *Clara decided to leave/that he would leave.*
       c.   *Clara tried/to win/??that she would win.*

Finiteness	*Attitude*	*Irrealis*	*Tenseless*
Serbian: Infinitival complement	*	✓	✓
English: Finite complement	✓	✓	*

Table 8 ICH Signature effect English & Serbian

Looking at the distribution of (non-)finiteness in other languages, we find further evidence for our claim that coding operates on ICH. As is well known, the South Slavic languages (Cr[oatian], Bo[snian], Bu[lgarian], Ma[cedonian], Se[rbian], Sl[ovenian]) differ regarding the availability of infinitives:[9]

NO INFINITIVES ←	Bu/Ma ≫ Se ≫ Bo/Sl ≫ Cr	→ FREQUENT INFINITIVES

[9] This part is developed in collaboration with Iva Kovač, Caroline Pajančič, and Neda Todorović.

Although the distribution of (non-)finite complements across these languages is largely dependent on geography and language contact, the distribution *within* each language shows a grammatical pattern which follows, we suggest, an implicational finiteness universal.

Bulgarian and Macedonian, like Greek, do not allow infinitives in any context. As for the other South Slavic languages, as shown in (25a), they are uniform in not allowing infinitival complements to *Attitude* verbs, thus the property noted above for Serbian in fact holds for all South Slavic languages. Differences arise regarding *Irrealis* and *Tenseless* complements in (25b,c). Serbian allows (and prefers) finite complements for all three types of complements.[10] Bosnian and Slovenian allow finite *Irrealis* complements but not finite *Tenseless* complements (or at least show a very strong preference for infinitives in the latter). Finally, Croatian is the most restricted in strongly preferring non-finite complements for both the *Irrealis* and the *Tenseless* classes. Due to the contact situation of these languages and the strong bilingualism of speakers in these areas, categorical judgments are often difficult and the marks should thus be understood as preferences.

(25)   a.   *Tvrdim* { *da čitam* / *čitati* } *ovu knjigu.*
claim.1SG { DA read.1SG / read.INF.IPFV } this book
✓Se,✓Bo,✓Sl,✓Cr   *Se,*Bo,*Sl,*Cr
'I claim that I am reading this book.'

   b.   *Odlučila sam* { *da ću čitati* / *čitati* }
decide.SG.FEM AUX.1SG { DA will.1SG read.INF / READ.INF.IPFV }
✓Se,✓Bo,✓Sl,*Cr   ✓Se,✓Bo,✓Sl,✓Cr
ovu knjigu.
this book
'I decided to read this book.'   * = disprefered

   c.   *Pokušala sam* { *da čitam* / *čitati* }
tried.SG.FEM AUX.1SG { DA read.1SG / read.INF.IPFV }
✓Se,*Bo,*Sl,*Cr   ✓Se,✓Bo,✓Sl,✓Cr
ovu knjigu.
this book
'I tried to read this book.   * = disprefered

---

[10] Serbian also allows a simple morphological finite present tense (*da čitam* 'DA reads') in *Irrealis* contexts—i.e., the overt future auxiliary is not necessary to express a future interpretation (see Todorović and Wurmbrand To appear).

Cross-linguistically, as summarized in Table 9, there is an implicational relation in that *Irrealis* complements (as a class) are never 'less' finite than *Tenseless* complements, and *Attitude* complements never 'less' finite than *Irrealis* (and *Tenseless*) complements. For instance, if a language requires finite complements in the *Tenseless* class, it also requires them in the other classes. If a language has the option between finite or non-finite complements in the *Tenseless* class, it also allows finite complements in the other classes (it may require them in the other classes). Thus there is no language where, for instance, *Irrealis* complements show an option between finite and non-finite complements, but *Tenseless* complements must be obligatorily finite (see the last two rows of the table for unattested cases). We formulate this implicational relation as the finiteness universal in (26).

Language	*Attitude*	*Irrealis*	*Tenseless*
Bulgarian, Greek	+finite	+finite	+finite
Romanian, Akan	+finite	+finite	±finite
English	±finite	±finite	−finite
Serbian	+finite	±finite	±finite
Bosnian, Slovenian	+finite	±finite	−finite
Croatian	+finite	−finite	−finite
Unattested		−finite	+/±finite
		±/−finite	+finite
	−finite	+/±finite	
	±/−finite	+finite	

Table 9 Finiteness preferences across languages

(26)   If a language {allows/requires} finiteness in a type of complement, all types of complements further to the <u>left</u> on ICH also {allow/require} finiteness.

The finiteness universal thus provides further evidence for a semantically determined ICH, which aligns with coding via language-specific cut off points for finiteness, following the universal in (26).

2.4. Transparency and integration

The last area we discuss here as motivation for the existence of ICH are phenomena of *clause union, restructuring,* or *complex predicate* formation (we will

use the term *restructuring* here). In Wurmbrand 2001, it is shown that restructuring is a multi-layered phenomenon, involving different types and degrees of restructuring. For instance, so-called *lexical* restructuring (i.e., restructuring with thematic lexical verbs such as *try*) has to be distinguished from *functional* restructuring (i.e., mono-predicate configurations with non-thematic auxiliary-like verbs).[11] Functional restructuring, which involves affixal configurations in many languages, can be seen as the most integrated form of complementation—there is no 'embedded' predicate, but the two verbal elements are part of a single clausal domain throughout the derivation.

A common characteristic of restructuring is clitic climbing—i.e., the placement of a clitic (or weak pronoun) associated with an embedded argument in the matrix clause. As shown in (27a,b), in languages like Italian (see Wurmbrand 2014a, 2015b for other languages), clitic climbing is possible from a *Tenseless* complement but not an *Irrealis* complement. Languages, like Czech, on the other hand, allow clitic climbing from both types of complements (cf. (27c)). Clitic climbing from *Attitude* complements is generally not possible. Lastly, as shown in (27d), there are also languages, such as Brazilian Portuguese, which do not allow clitic climbing from any type of complement.

(27)   a.   *Piero* **ti**   *verrà*   *a parlare   di parapsicologia*
             Piero **to.you** will.come   to speak   about parapsychology
             'Piero will come to speak to you about parapsychology.'
                                                   [Italian: Rizzi 1982: 1, (1a,b)]
       b.   *Piero **ti**   *deciderà*   *di parlare   di parapsicologia*
             Piero **to.you** will.decide to speak   about parapsychology
             'Piero will come to speak to you about parapsychology.'
                                                   [Italian: Rizzi 1982: 1, (1c,d)]
       c.   *Místo*   *toho* *se* **ho**   *rozhodl* *na moment*   *ignorovat*
             instead   of.it SE **him.ACC** decided far moment   ignore.INF
             'He decided instead to ignore him for a moment.'
                                             [Czech: Lenertová 2004: 157, (43); from ČNK)]

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[11] There are attempts to unify these phenomena (see Cinque 2001, Grano 2012), but as far as we can see, these accounts i) do not cover all differences between the two broad types of restructuring (as discussed in Wurmbrand 2001, 2004, there are various syntactic differences regarding extraposition, verb clusters, or whether independent event structures are involved, which would be unexpected if all restructuring is functional); ii) do not extend to all lexical restructuring contexts (e.g., unaccusative restructuring verbs with a dative controller like *gelingen* 'manage' in German); iii) do not cover the scale of restructuring; and iv) cannot predict the implicational relations we find for clitic climbing. These accounts also cannot be extended to ICH signature effects that are not obviously related to restructuring.

d.   *João*   *{*me}*   *tentou*   *{me}*   *ver*
    João   {*me}   tried   {me}   see.INF
    'João tried to see me.' [Brazilian Portuguese: Cyrino 2010: 9, (38)]

While the cross-linguistic distribution of clitic climbing is subject to variation, Table 10 shows that there is nevertheless an implicational relation: if a language allows clitic climbing from a type of complement, it also allows it from complements further on the right of the ICH scale.

Language	*Attitude*	*Irrealis*	*Tenseless*
Brazilian Portuguese	*	*	*
Italian	*	*	✓
Czech	*	✓	✓

Table 10 Implicational hierarchy of clitic climbing

Traditionally, the absence of clitic climbing in a language has often been treated as the absence of restructuring—e.g., the absence of clause unification or reduced complements. Such an approach is problematic, however, when other properties are considered. In Brazilian Portuguese, for instance, licensing of elements such as *nunca* requires clausemate negation. As shown in (28a-d), matrix negation cannot license an embedded *nunca* in *Attitude* and *Irrealis* contexts; only embedded negation can do so. The situation is different for *Tenseless* complements—as shown in (28e,f), matrix negation can license an embedded *nunca*.

(28)   a.   **A Lina*   *(não)*   *afirmou*   [*ter*   *casado*   *nunca*].
        the Lina   (not)   claimed   [have.INF   married   never]
        'Lina didn't claim to have never married.' [OK if *nunca* is in matrix: Lina never claimed ....]

    b.   *A Lina*   *afirmou*   *não*   *ter*   *casado*   *nunca*.
        the Lina   claimed   not   have.INF   married   never
        'Lina claimed to have never married.'

    c.   **A Lina*   *(não)*   *decidiu*   *sair*   *nunca*   *(mais)*
        the Lina   (not)   decided   leave.INF   never   (more)
        'Lina decided/didn't decide never to leave.'

    d.   *A Lina*   *decidiu*   *não*   *sair*   *nunca*   *(mais)*
        the Lina   decided   not   leave.INF   never   (more)
        'Lina decided never to leave.'

e. *A Lina   não   tenta   ajudar   nunca   à sua mãe*
    the Lina   not   tries   help.INF never   to her mother
    'Lina never tries to help her mother.'

f. *A Lina   não   começa   a estudar   nunca*
    the Lina   not   start   PREP study.INF   never
    'Lina never starts to study.'
                [Brazilian Portuguese: Modesto 2013: 14, R. Lacerda, p.c.]

The difference between (28a,b) and (28e,f) would be surprising if all clause types are the same. Under our approach, this is not coincidental but a simple ICH effect—*Tenseless* complements are transparent for negative licensing in Brazilian Portuguese but *Irrealis* and *Attitude* complements are not.

If, as we submit, the ICH is a deep universal property of languages, the differences in clitic climbing in Table 10 are not the result of varying complementation strategies in the different languages, but the result of different properties of clitic climbing. Following Wurmbrand 2014a, 2015b, this can, for instance, be handled via different landing sites of clitics (see below), which we summarize in section 3.2. Before turning to our account of how all ICH effects discussed so far hang together, we summarize the complementation options in Buryat, which will further support the three-way split we suggested.

2.5 Complementation in Buryat[12]

In Buryat, a Mongolian language spoken in the Russian Federation, complement clauses occur in three different syntactic configurations: converb constructions, clausal nominalizations, and full CPs. The converb construction shows the hallmark *Tenseless* restructuring properties (Bondarenko 2018a): they combine with matrix predicates like *begin, try, manage*; do not allow an embedded temporal orientation different from the matrix tense, (29a); no embedded subject is possible, (29b); negation cannot occur in the embedded predicate, (29c); and matrix negation licenses embedded negative elements, (29d).

(29) a. **üsəgəldər   badmə   üglödər   namɛjə   zurə-žə*
          yesterday   Badma.NOM   tomorrow   1.SG.ACC   draw-CONV
          ɜxil-ɜ
          begin-PST

'Yesterday Badma began to draw me tomorrow.'

<div align="right">[T. Bondarenko, p.c.]</div>

b. *bagšə   Ø / *badm-in   / *badm-ijə   / *badmə*
   teacherᵢ Øᵢ / *Badma-GEN / *Badma-ACC / *Badma.NOM
   honin   ju:mə   xö:rə-žə   ürd-jə
   interesting thing   tell-CONV   manage-PST
   'The teacher managed to tell an interesting story.'
   *'The teacher managed to do so that Badma/someone told an inter-
   esting story.'   [Bondarenko 2018a: 44-45, (25-26)]

c. *badmə   ju:-šjə   bзšə-güj-žə   / bзšə-žə-güj*
   Badma.NOM what-PTCL write-NEG-CONV / write-CONV-NEG
   зxil-з
   begin-PST
   Intended: 'Badma began to not write anything.'   [ibid.: 46, (ii)]

d. *badmə   ju:-šjə   bзšə-žə   зxil-з-güj*
   Badma.NOM   what-PTCL   write-CONV   begin-PST-NEG
   'Badma didn't begin to write anything.'   [ibid.: 46, (i)]

The second type of embedding configurations are clausal nominalizations which are found with verbs like *want, hear, see, be.happy, be.shy, envy, know, remember, regret, wait, allow, recommend, promise, decide*, and others. Clausal nominalizations are formed with participles and display nominal inflection (possessive agreement and case). The internal structure of nominalizations shows some properties of a tense-modal-aspect (TMA) domain—aspectual elements such as potential, perfect, or habitual are possible, (30a). Nominalizations have their own temporal orientation, as is shown in (30b) where a mismatch between the matrix and embedded tenses is possible. Nominalizations, in contrast to *Tenseless* converb constructions, allow embedded negation, (30c), and matrix negation cannot license embedded negative elements, (30d). Lastly, nominalizations can contain an embedded subject, (30e). Importantly, the subject can only occur with genitive, the typical case within nominalizations, or accusative, which is assigned by the matrix predicate via ECM—nominative, which is the case for subjects in independent clauses, is excluded.

(30) a. *lenə   lizə-də* [*üšö   nзgə konfətə зdi-x-ijə-n'*   ]
   Lena   Liza-DAT [more one   sweet   eat-FUT-ACC-3]
   zübšö-gö
   allow-PST
   'Lena allowed Liza to eat one more sweet.'

b.   *üglödər*   *badm-in*   *xaršə*   *šɜrdə-x-ijə-n'*
tomorrow   Badma-GEN   fence   paint-FUT-ACC-3SG
üstər   *dugər*   *mɜd-ɜ*
yesterday   Dugar.NOM   know-PST
'Yesterday Dugar found out that Badma will paint the fence tomorrow.'

c.   *badm-in*   *xaršə*   *šɜrdə-xə-güj-ə-n'*   *dugər*
Bandma-GEN   fence   paint-FUT-**NEG**-ACC-3SG   Dugar.NOM
mɜd-ɜ
know-PST
'Dugar found out that Badma won't paint the fence.'

d.   *badm-in*   *ju:-šjə*   *šɜrdə-x-ijə-n'*   *dugər*
Badma-GEN   what-PTCL   paint-FUT-ACC-3SG   Dugar.NOM
mɜd-ɜ-güj
 know-PST-NEG
i. *'Dugar didn't find out that Badma will paint something.'
ii. 'Dugar didn't find out what exactly Badma will paint.'

e.   *bi*   **sajənə*   / *sajən-in* / *sajən-ijə*   *du:*   *du:lə-žə*
1SG   *Sajana.NOM   / S-GEN   / S-ACC   song   sing-CONV
bɛ:-x-ijə   *šagən-a-b*
be-FUT-ACC   hear-PST1-1SG
'I heard that/how Sajana sang a song.'

                                       [T. Bondarenko, p.c.]

The last complementation type are CP complements which occur with verbs like *believe, see, hear, be.surprised, know, forget, say, think, be.sorry, be.frightened, wait, endure, boast, ask, promise, decide,* and others. CP complements, like main clauses, involve full-fledged clausal domains displaying all clausal and temporal functions (complementizer, tense, negation, subject). As shown in (31a), the embedded clause can involve tense marking different from the matrix clause and a nominative subject. One property that sharply distinguishes CP complements from the other two types of complementation is the possibility of indexical shift. Indexical shift refers to the phenomenon that 1st and 2nd person agreement and pronouns receive an interpretation relative to the embedding context and not the actual speech context. That is, 1st and 2nd person are interpreted as the matrix speaker and addressee, respectively, but not the speaker or addressee of the actual context. This is illustrated in (31b): the embedded 1st person subject *bi* (see also the agreement on the embedded verb) can be interpreted as the speaker or be 'shifted' to the matrix subject.

(31) a. *üglödər   badmə   xaršə šɜrdə-xə   gɜžə*
        tomorrow   Badma-NOM fence paint-FUT COMP
        üstər   dugər   mɜd-ɜ
        yesterday Dugar.NOM know-PST
        'Yesterday Dugar found out that Badma will paint the fence tomorrow.'

   b. *sajənə bi   tɜrgə ɜmdəl-ɜ-b   gɜžə   mɜd-ɜ*
      Sajana 1SG.NOM cart   break-PST-1SG COMP   know-PST
      i. 'Sajana_i found out that she_i broke the cart.'
      ii. 'Sajana found out that I broke the cart.'
                    [Bondarenko 2017 : 19, (83), T. Bondarenko, p.c.]

The complementation options in Buryat are summarized in Table 11 which highlights the three-way split and implicational hierarchy of dependence and, as we will suggest below, complexity.

Buryat	CP complement	Nominalization	Tenseless
Embedded subject	✓	✓	*
Embedded negation	✓	✓	*
Embedded TMA elements	✓	limited	*
Embedded NOM	✓	*	*
Shifted indexicals	✓	*	*

Table 11 Complementation in Buryat

As we have seen, indexical shift is only possible in CP complements. This is in line with many current theories of indexical shift which treat the phenomenon as a property of the CP (see, among others, Anand and Nevins 2004, Anand 2006, Sudo 2012, Sundaresan 2012, 2018, Podobryaev 2014, Shklovsky and Sudo 2014, Messick 2016, Deal 2017). Since shifting is subject to syntactic restrictions (e.g., the case of the phrase containing the indexical and the syntactic domain), one approach has been to invoke a context-shifter (either a quantifier or operator), often referred to as *monster*, in the CP-domain. The obligatory lack of shifted indexicals in converb constructions and clausal nominalizations (even if the same matrix verb is used as in CP-complementation) then provides evidence for structures lacking (the relevant part of) the CP-domain in these configurations in Buryat.

There is one further property in Buryat which we have not mentioned yet—long passive. As shown in (32a), converb constructions allow a configuration in which the matrix verb is passivized (but not the embedded verb) and as a result, the embedded object is promoted to matrix subject. This property is a common restructuring property cross-linguistically (see Wurmbrand 2015a, Wurmbrand and Shimamura 2017), and only possible in highly reduced complements, namely, complements which lack embedded CP and IP domains and have no or only an underspecified *v*P domain. As shown in (32b,c), long passive is not possible in clausal nominalizations and CP-complements.

(32)   a.   *bɜšəg   tumən-ɜr   bɜšə-žə   ɜxilə-gd-ɜ*
             letter.NOM   Tumen-INSTR   write-CONV   begin-PASS-PST
             Lit. 'The letter was begun to write by Tumen.'
             'Tumen began to write the letter.'

       b.   **bi   sajən-ar   badm-in   xarə-h-ijə(-n')*   *mɜdə-gd-ɜ-b*
             1SG   S-INSTR   B-GEN   see.PFCT-ACC(-3SG)   know-PASS-PST-1SG
             Lit. 'I was known by Sajana that Badma saw (me).'
             Intended: 'Sajana found out that Badma saw me.'

       c.   **bi   sajən-ar   badmə   xar-a   gɜžə   mɜdə-gd-ɜ-b*
             1SG   S-INSTR   Badma.NOM   see.PST   COMP   know-PASS-PST-1SG
             Lit. 'I was known by Sajana that Badma had seen (me).'
             Intended: 'Sajana found out that Badma had seen me.'

                                                                        [T. Bondarenko, p.c.]

The combination of the two properties (shifted indexicals and long passive) constitutes again an ICH Signature effect (cf. Table 12). Moreover, it tells us something about the structural configurations of the three types of complements. Clausal nominalizations cannot involve a CP (otherwise indexical shift should be possible), but they contain their own functional object case and have some properties of the TMA domain. As suggested in Bondarenko 2018b, they are thus a type of TP/IP. *Tenseless* complements, on the other hand, lack both—the CP-domain and the TMA domain.

Buryat	CP complement	Nominalization	Tenseless
Long passive	*	*	✓
Shifted indexicals	✓	*	*
Structure	CP domain	TMA domain	Θ domain

Table 12 ICH Signature in Buryat

As shown in Table 12, the structural composition of complement clauses in Buryat shows a scale of complexity which is implicational, given the general view that clause-building follows functional sequencing: higher domains can only be built if lower domains are present. For instance, to add a CP domain, a TMA domain must be built first (note that we are not making claims about specific projections, just broad clausal domains; see also below). In the next section, we will suggest that this is what underlies the ICH in general.

One issue remaining for Buryat is the semantic delineation of CP complements and nominalizations. While the class of *Tenseless* complements is clearly formed semantically along our definitions, CP complements and nominalizations seem to alternate quite freely. This shows that the semantic class of *Irrealis* complements can also syntactically project to a full CP (but the two configuration types do not mix and match—if the nominalization strategy is used, no CP is possible). Thus, syntax and semantics lead independent lives *to some extent* which we return to in section 3.2. Crucially, the main conclusion still holds that the hierarchy is respected whenever there are differences.

3. Theoretical implementation of ICH

In the previous section, we have seen that there are three supersets of complements which stand in an implicational relation. The hierarchy is defined semantically, and morphosyntactic properties are aligned along it. This section addresses the question of why the hierarchy is the way it is and provides a possible implementation. Table 2, repeated here as Table 13, gives several dimensions which have been relevant for the calculation of clausehood.

MOST INDEPENDENT		LEAST INDEPENDENT
LEAST TRANSPARENT	**Attitude ≫ Irrealis ≫ Tenseless**	MOST TRANSPARENT
LEAST INTEGRATED		MOST INTEGRATED
MOST COMPLEX		LEAST COMPLEX

Table 13 Implicational complementation hierarchy (ICH) (repeated)

Dependence differences can be seen for the temporal and subject properties: *Attitude* complements are temporally independent and typically have no subject restrictions, *Irrealis* complements are somewhat dependent in requiring a future orientation and have some subject restrictions, and *Tenseless* complements are fully dependent on the matrix tense and matrix subject. Transparency and integration effects are directly reflected in phenomena relating to restructuring. In this section, we will build on the observation from Buryat

and add the dimension of complexity. Our main hypothesis is that these dimensions are tied together via the syntactic structure, which is (in part) predictable from the meaning of a complement, and jointly create an implicational scale of clausehood.

3.1 Complexity and containment

Our main proposal is that the conclusions about structural complexity in Table 12 are not just a property of Buryat but in fact the source of ICH Signature effects in general (we return to specific ICH Signature effects in the next section). Table 14 summarizes what domains are necessary in the three different types of complements if the semantic properties we noted have a structural correspondence (we do not refer to specific projections, but to broad clausal domains). *Attitude* complements involve their own reference time, an embedded context identifying speaker and addressee (possibly other common ground properties), logophoric operators, binding operators, and, if the language allows it, context shifters (see Sundaresan 2012, 2018 for evidence that indexical shift is restricted to verbs of the *Attitude* class). All of these properties have been linked to elements and positions in the clausal operator domain (CP), and hence, assuming a direct structure-meaning correspondence, *Attitude* complements contain (aspects of) the highest clausal domain. *Irrealis* complements involve a future orientation which is structurally linked to the TMA domain (we can leave open here whether future corresponds to a tense, modal, or combination thereof). Lastly *Tenseless* complements have no operator nor TMA properties and can thus be the most minimal complement consisting of just the thematic domain of the verb (e.g., *v*P, VP, VoiceP).

Necessary properties	*Attitude*	*Irrealis*	*Tenseless*
CP properties	✓		
TMA properties	✓	✓	
Minimal structure	Operator domain	TMA domain	Θ domain

Table 14 ICH Signature and minimal complementation structures

That clauses consist of three general building blocks is common to many syntactic approaches (see e.g., Grohmann 2003's prolific domains) and motivated by a range of distributional, semantic, and syntactic properties. The operator domain, typically the A'-domain of a clause, is the locus of clausal operators (e.g., *wh, monsters*), context variables, and temporal operators such as the utterance time. The TMA domain is typically an A-domain and besides the TMA properties also associated with case and agreement. Lastly, the Θ domain is

the domain where the argument structure of the main predicate is realized. All of these domains may have detailed substructures, which could give rise to further hierarchical effects (e.g., the indexical shift hierarchies arising within the operator domain).

(33)   Operator domain

            TMA domain

                Θ domain
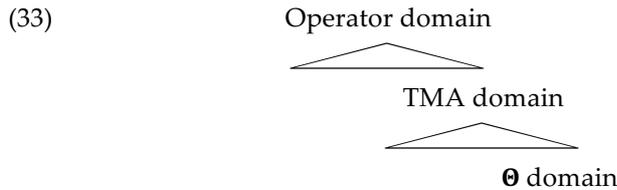
Our main claim is that the containment properties in (33), which are given by functional sequencing, together with the observations in Table 14 derive the ICH: the minimum configuration of an *Attitude* complement, (34a), is necessarily more complex than that of an *Irrealis* complement, (34b), which in turn is more complex than the minimum size of a *Tenseless* complement, (34c). Note that our hypothesis refers to the *minimum* complexity of a complement. Languages may not always realize complements as in (34), but may project larger structures, thus eliminating or masking certain differences (see the next section). But we do maintain that whenever complements show differences of dependence, transparency, integration, or complexity, these differences follow from the containment differences in (33) as predicted in Table 14.

(34)   Minimal structures
      a.   *Attitude*   b.   *Irrealis*   c.   *Tenseless*

    believe   Op   *decide*   TMA   *try*   Θ
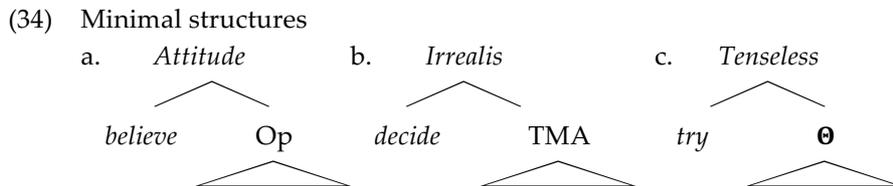
The last point to make here concerns the relation between a matrix verb and its complement. We suggest that this is a mutual compatibility relation, rather than the traditional process of *selection*. If an *Attitude* verb combines with a complement lacking the operator domain, the structure will either not be interpretable (hence ungrammatical) or the verb may change its interpretation, if this option is available for a verb. We have already seen such examples for the verb *know*, which can either involve a factive or modal interpretation in Greek, and many other languages. Another example is given in (35) for the verb *decide*. If *decide* combines with a *na* complement, the future interpretation arises in the same way as in infinitives in other languages—via an embedded

future element (Wurmbrand 2014b, Todorović 2015). In *oti* clauses, like in finite clauses in English, for instance, a future interpretation must be overtly marked with the future element *enna* (cf. *I decided that I *(will) solve the problem tomorrow*). If this element is omitted, the configuration cannot be interpreted like an *Irrealis* context, but is instead shifted to an *Attitude* context with the interpretation 'come to the realization'.

(35)   *Apofasisen*   *na* / *oti*   / *oti enna lii*
         decide.PFV.PST.3SG NA / that / that FUT   solve.IPFV.PRS.3SG
         kathe   mera   enan   provlima
         every   day   one   problem
         na, oti enna: 'He decided to solve/that he will solve one problem every day.'
         oti (no *enna*): 'He came to the realization that he solves one problem every day.'

                                                            [Cypriot Greek: C. Christopoulos, p.c.]

Several conclusions arise from this distribution. First, the future interpretation cannot just be built into the meaning of the matrix verb but has to have some structural correspondence (see also Wurmbrand 2014b for further arguments for this conclusion). If the future were to come solely from the matrix verb, why would the simple *oti* statement (without *enna*) not allow the same interpretation as the *na* or *oti enna* contexts? Second, the *oti enna* statement is unambiguous, only yielding the *Irrealis* interpretation and not the 'come to the realization' interpretation. One way to understand this is that the *Irrealis* meaning is the basic meaning of *decide*, and the switch to the *Attitude* interpretation only happens as a last resort. In an *oti* statement without *enna*, the combination of *decide* plus a future-less CP would not be interpretable, hence, the meaning of *decide* is adjusted. If, on the other hand, the complement involves a future element (either a covert modal in the *na* clause, or an overt *enna* in the *oti* clause), the complement combines smoothly with *decide* and no adjustment is needed, hence impossible. Lastly, the fact that a covert future modal is only possible in a *na* clause could be seen as evidence for a tight connection between *na* and the covert future element. Since not all *na* complements trigger a modal or future interpretation (see section 2.1), building the modality/future directly into the meaning of *na* would be problematic unless two different *na*'s are assumed. Instead one could follow the approach in Todorović and Wurmbrand To appear, where covert modals must be licensed by an irrealis verb or other irrealis element (which would also then extend to root clauses with *na*, which are possible in certain contexts).

To sum up, we have suggested that there is a *synthesis* relation between verbs and complements—complements are freely built in different ways, as long as the result leads to a well-formed semantic construct.

3.2. Putting everything together

Having set up the basic framework, we now return to the specific cases we discussed so far. The following questions need to be addressed:

(36) i.   Clitic climbing: Why does clitic climbing show ICH effects? Why, for instance, is there no language that allows clitic climbing from *Irrealis* complements but not *Tenseless* complements?
      ii.   Finiteness: Why does finiteness show ICH effects? Why, for instance, is there no language that allows finite *Tenseless* complements but not finite *Irrealis* complements?
      iii. Greek, Bulgarian clause introducers: Why is it the *Irrealis* class that shows optionality between *oti/če* and *na/da* (and not either of the other classes)? Why are *oti/če* statements not possible with *Tenseless* complements?

As for clitic climbing, we follow Wurmbrand 2015b where it is suggested that clitic positions are freezing positions from which no further movement is possible. Furthermore, languages differ regarding the location of clitic positions or phrases. For our purposes it suffices again to consider only the three broad clausal domains and not settle on specific projections. In languages like Brazilian Portuguese the clitic position is in the Θ domain, which is present in all types of complements and hence clitics are bound to the embedded predicate. In languages like Italian, clitics can (also) occur in the TMA domain, which is present in *Irrealis* and *Attitude* complements, but can be absent in *Tenseless* complements. Thus, clitics can escape a *Tenseless* complement but not the other types of complements. Lastly, in languages like Czech, clitics can target the operator domain which can be absent in *Irrealis* and *Tenseless* complements, allowing clitics to cross such complements, but must be present in *Attitude* complements which therefore prohibit clitic climbing. The implicational nature is a direct result of the containment relation in (33)—to allow clitic climbing from *Irrealis* complements, the clitic position must be in the operator domain, which means that the clitic position can always be absent in *Tenseless* complements when it can be absent in *Irrealis* complements (since the former are either the same or less complex than the latter). Put differently, to block

clitic climbing from *Tenseless* infinitives, the clitic position must be in the **Θ** domain, which means that it will necessarily be present in all types of complements. Thus there is no way to derive a language where clitic climbing is possible from *Irrealis* complements but not *Tenseless* complements.

The finiteness hierarchy we observed poses a challenge for views that locate finiteness (solely) in the CP domain. To derive the implicational hierarchy, we make two assumptions: i) finiteness is the realization of agreement (possibly in conjunction with tense); and ii), following Todorović and Wurmbrand To appear, finiteness can be 'spread' across all clausal domains in that the agreement projection or feature (AGR.FIN) can be inserted at different points in the derivation. To see how these assumptions derive the possible but not the impossible types of languages, let's consider the settings for Greek and Bulgarian. In these languages, a AGR.FIN is inserted obligatorily in the **Θ** domain, thus even the smallest size complements would be realized as finite. Since there is no tense in this domain (and these languages have no infinitives), a default present tense is used.[13] Due to the containment relation in (33), AGR.FIN will be present in all types of complements in these languages (exactly like the **Θ** domain is present in every clause), and hence a language with obligatory finite *Tenseless* complements but non-finite or only optionally finite *Irrealis* or *Attitude* complements cannot be derived.

In Serbian, AGR.FIN can also be inserted in the lowest clausal domain, however, this is optional. If it is inserted in this domain, *Tenseless* (and all other types of) complements are realized as finite, otherwise as infinitives. Similarly, AGR.FIN is optional in the TMA domain (though preferred by many Serbian speakers), thus *Irrealis* complements can also be realized as finite or non-finite (the latter only if AGR.FIN is not inserted in either domain). AGR.FIN is obligatory, however, in the operator domain, and therefore *Attitude* complements are always realized as finite. Although there is optionality, the implicational relation still holds. It is possible in this language for a speaker to use a finite *Tenseless* complement and a non-finite *Irrealis* complement at different occasions (the speaker simply makes use of the different options available in the language). But what is not possible is for speakers to allow finite *Tenseless* complements but to generally disallow finite *Irrealis* complements. The full distribution of the languages we investigated is given in Table 15.

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[13] If a language has inflected infinitives, such as Brazilian Portuguese, AGR can also be realized without tense. Interestingly, the distribution of inflected infinitives in Brazilian Portuguese follows the ICH: *Tenseless* complements cannot be inflected, whereas *Irrealis* and *Attitude* complements can (see Modesto 2016).

Language	Operator domain	TMA domain	Θ domain
Bulgarian, Greek			+AGR.FIN
Romanian, Akan		+AGR.FIN	±AGR.FIN
English	±AGR.FIN	±AGR.FIN	
Serbian	+AGR.FIN	±AGR.FIN	±AGR.FIN
Bosnian, Slovenian	+AGR.FIN	±AGR.FIN	
Croatian	+AGR.FIN		

Table 15 Finiteness distribution via AGR.FIN

To account for the distribution of Greek and Bulgarian clause introducers we will make two assumptions, which are both independently motivated. The first assumption is that *oti/če* are elements of the operator domain, (37a), whereas *na/da* are elements of a lower domain.

(37) a.   Op   b.   TMA

      oti/če   TMA   *na/da*
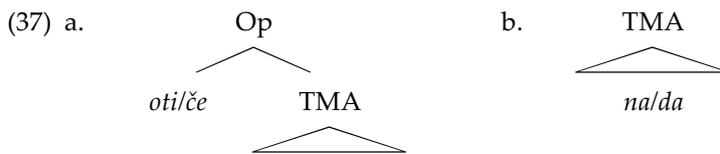
While the exact location and function of *na/da* is somewhat controversial, many tests have pointed to *na/da* being (or at least originating) lower in the structure than *oti/če.* A summary of the distributional properties of *oti* vs. *na* in Greek is given in (38).[14] *Na*, but not *oti,* can co-occur with C-elements such as *wh*-words and relative pronouns (Agouraki 1991, Philippaki-Warburton 1994) as well complementizer-like elements such as *ja* 'for' (Giannakidou 2009); *na*, but not *oti,* is incompatible with the future marker *θa* ((Roussou 2000, 2009); and lastly, the subject can appear between *oti* and the verb but not between *na* and the verb (Terzi 1992). While we cannot provide a detailed account of all these properties, the overall differences in the distribution of *oti* vs. *na* as summarized in (38), makes the view that the two elements introduce clauses of different sizes as in (37) at least very plausible.[15]

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[14] We thank Christos Christopoulos for providing this summary.

[15] One complication is that although *na* and *θa* compete with each other, they are ordered differently with respect to negation. The grouping of *na* and *θa* thus has to be more complex. One option, inspired by a suggestion made by C. Christopoulos, would be to treat the overt future element as being composed of two parts (which has been suggested for future in general) and pronounced as *θa* in the lower position (i.e., *na/θa*-part 1 ≫ negation ≫ *θa*-part 2). To be realized

(38)   {*wh/rel pron/ja/oti*} ≫ {*na/θa*} ≫ verb

The assumption in (37) directly derives the impossibility of *na/da* in *Attitude* complements: since *Attitude* complements require the operator domain (see Table 14), the only clause introducers in these contexts are *oti/če*.

   The second assumption we make is that tense and/or subject identification dependencies are blocked by an operator domain. Recall that *Attitude* complements are temporally independent, they have their own reference time, as well as an independent subject. *Tenseless* complements, on the other hand, by definition, lack tense, they are fully dependent on the matrix tense and require subject identification. We leave open here how these identifications are formally implemented—e.g., via the lack of tense and subject in the complement, via some (feature) transfer mechanism, or via an binding-like dependency. Whatever these identification dependencies are in (39a), we propose, that they are impossible across an operator domain as in (39b). This can be seen as a form of locality (e.g., CPs are phases and TP/*v*P are too far away to be accessible) or a form of minimality (the operator domain contains material, such as temporal and speaker/addressee operators which intervene in the tense/subject relation between the matrix and embedded tense/subject).

(39)   Tense, subject dependencies

a.

b.

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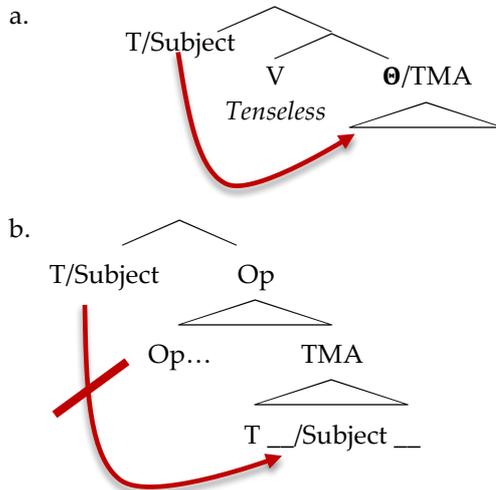
as *θa*, both parts are necessary, which is only possible when *na* is not present (since *na* and *θa*-part 1 compete for the same position). However, *na* is compatible with part 2 of the future element, which we suggest is the element WOLL we find in *Irrealis* complements.

Returning to Greek, Bulgarian clause introducers, the question of why *oti/če* statements are not possible with *Tenseless* complements now receives a straightforward answer. The clause introducer *oti/če* are elements of the operator domain, hence would entail the structure in (37a). However, since tense/subject identification as in (39b) is blocked, this structure could only come with independent tense and subject specifications, which is not compatible with the requirements of *Tenseless* verbs (i.e., the meaning of these verbs does not support independent subject and tense values; unless the verb can be shifted to an *Attitude* interpretation as in (19) or (20)).

The incompatibility of *Tenseless* complements and an operator domain is found cross-linguistically. For instance, in Polish, as shown in Citko 2012, the complementizer *żeby* cannot occur in *Tenseless* infinitives (such as the complements of *zdołać* 'manage', *mieć zamiar* 'intend', *zacząć* 'start', *musieć* 'must'), whereas it is optional in Irrealis infinitives (e.g., *postanowić* 'decide'). The complementizer also occurs in certain Attitude complements (e.g., *poinformować* 'inform'), in which case it is obligatory. Although there are additional semantic factors at work for *żeby*, the overall distribution shows a clear ICH signature effect, which can be derived in the same way as our account of *oti/če*.

The last question regarding Greek and Bulgarian clause introducers is why the *Irrealis* class shows optionality between *oti/če* and *na/da*. As we laid out in (34), *Irrealis* complements minimally involve a TMA domain, which, if chosen, yields the clause introducers *na/da* (cf. (37b). Our system, however, also allows for larger structures of *Irrealis* complements. For *Tenseless* complements, a full clause structure with an operator domain was excluded since it either leads to a clause with independent tense and subject values, which *Tenseless* verbs cannot combine with, or a failed identification dependency, (39b), where the embedded tense and subject values would not be licensed. The difference between *Tenseless* and *Irrealis* complements is the different degree of independence—*Irrealis* complements are not tense and subject dependent on the matrix clause. Thus, a licensing dependency as in (39a) is not required. All that is required is that the complement and matrix verb combine successfully. For an *Irrealis* verb this means that it can only combine with a complement that expresses an irrealis/future interpretation (recall that we do not assume selection of tense values, but only a synthesis relation between verbs and complements). Such interpretation can be achieved in two ways— a TMA complement with the covert modal WOLL, (40b) (see also fn. 15) , or a full CP structure with an embedded overt future, (40a).

(40) a.   *Irrealis* CP   b.   *Irrealis* TMA

         decide   Op   decide   TMA

               oti   TMA   na WOLL

                   FUT (θa, enna)
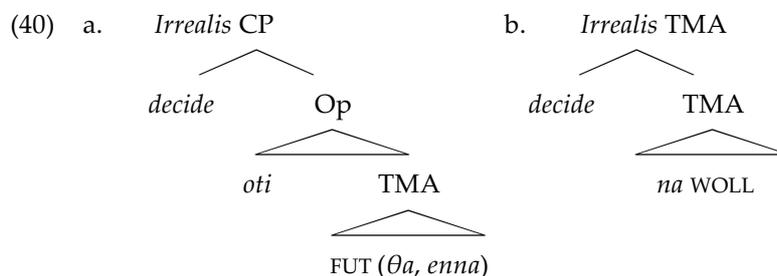
The optionality observed for *Irrealis* complements thus essentially arises since, although the minimal structure would be the reduced TMA complement in (40b), an operator domain would also not do any harm, and hence be possible since it is not excluded by anything.

This leads us to some general concluding comments about optionality. Although differences between the three classes of complements can be observed cross-linguistically and ICH Signature effects are not hard to come across, it is also the case that complements can often be larger than what a simple syntax-semantics match (as in Table 14) would impose. In particular, Irrealis complements growing larger, as we have seen for Greek and Bulgarian (cf. (40)), is not uncommon, pointing to an approach such as our synthesis view (instead of a traditional selectional view). Tenseless complements, on the other hand, tend to be more restricted. We have seen a number of cases where Tenseless complements cannot be extended to a larger configuration, not even optionally, but show different patterns from the Irrealis and Attitude classes: in Polish, Tenseless complements cannot occur with the complementizer *żeby*; in Buryat, clausal nominalizations and CP configurations are impossible with this class; in English, Bosnian and Slovenian, finite Tenseless complements are marked; in Greek and Bulgarian, *oti/če* are impossible; in Buryat and Serbian, overt subjects are excluded in Tenseless complements; and cross-linguistically, Tenseless complements resist partial control. This confirms that *Tenseless* verbs generally cannot combine with complements with independent subject and/or tense interpretations and suggests that a restriction such as the one we noted in (39) is in effect cross-linguistically.[16]

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[16] A remaining question would be how tense and subject dependencies are achieved in contexts where *Tenseless* complements (appear to) project to full clauses (as has been suggested for certain configurations in German and Dutch). Possible directions are that such CPs are deficient, that 'accidental' tense and subject matching is sufficient to meet the matrix verb's semantic requirements, or that there are other factors that yield the (apparent) clausal behavior of such complements. Since these cases seem to be exceptional in light of the cross-linguistic distribution, we leave the details aside here.

4. Conclusion

In this paper, we have summarized the distribution of several properties that indicate (in)dependence of a complement clause (see (41); dependence properties are then defined as the lack of these properties).

(41)   Independence properties:
        nominative case, structural object case, overt subject, independent subject interpretation, agreement, tense marking, finiteness, independent temporal interpretation, negation, syntactic domain effects, lack of transparency, indexical shift, clausal operators, lack of morphosyntactic integration of the embedded verb into the matrix predicate (e.g, incorporation, verb cluster, complex predicate formation)

Each of these properties has its own distribution, but what we can observe is that they always operate along the scale in Table 16, in that independence properties occur on the left of the scale, whereas dependence properties occur on the right of the scale.

MOST INDEPENDENT		LEAST INDEPENDENT
LEAST TRANSPARENT	**Attitude ≫ Irrealis ≫ Tenseless**	MOST TRANSPARENT
LEAST INTEGRATED		MOST INTEGRATED
MOST COMPLEX		LEAST COMPLEX

Table 16 Implicational complementation hierarchy (ICH) (repeated)

We have provided several ICH Signature effects that i) motivate a widely observed (possibly universal) three-way split of complements; ii) demonstrate that the basic grouping of complements is determined semantically (not by morphosyntactic coding); iii) show the implicational ordering of *Attitude, Irrealis,* and *Tenseless* complements; and iv) indicate that morphosyntactic properties operate along the ICH.

Furthermore, we have suggested that the composition and ordering of the scale is not accidental but reflects different semantic and syntactic complexities of complements which stand in a containment relation: the clausal domain needed in a *Tenseless* complement (to allow proper matching between the matrix verb and complement) is contained in the domains needed in *Irrealis* and *Attitude* complements; the clausal domains needed in an *Irrealis* complement are contained in the domains needed in *Attitude* complements. These containment relations derive the implicational nature of the ICH.

Lastly, we have suggested a synthesis model of complementation, where complements are not syntactically selected (e.g., there is no category or size selection), but freely built in different forms, with the only restriction that the resulting structures need to match with the semantic requirements of the matrix verbs. This view allows flexibility (e.g., meaning shifts of matrix verbs, in particular in the 'border' areas of the scale; see also Givón 1980) and optionality in complementation, exactly as needed to handle the variation found within and across languages. While there is a significant amount of variability cross-linguistically, we have shown that the overall distribution is nevertheless systematic and (for most parts) predictable.

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