

Clauses, Propositions, and Phases

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The Minimalist Program of Chomsky, (2000a, 2001) conceives the human grammatical faculty as an austere computational device (C_{HL}) spanning articulatory–perceptual (π) and conceptual–intentional (λ) systems, with properties largely determined by this architecture:

$$\pi \leftarrow C_{HL} \rightarrow \lambda$$

Specifically, π and λ are taken impose legibility requirements on C_{HL} insofar as only certain kinds of objects can be “read” at the interface. C_{HL} representations are assumed to be wholly characterized by these interface constraints: they are all and only what they need to be in order to be read by π and λ . Conceptually, therefore, C_{HL} constitutes something like the minimal bridge between π and λ .

The Minimalist view carries with it the clear expectation that one will find significant properties of linguistic representations, and perhaps of the architecture itself, that can be traced back to π or λ . In this chapter, I suggest that semantic intensionality and its representation in syntax are a promising place to seek such properties. More precisely, I argue the following three central points.

- Natural language seems to project the semantic property of **intensionality** uniquely into the syntactic domain of **clausal complement**, although this can be concealed by grammatical phenomena to some extent.
- Children’s mastery of intensionality appears to be crucially tied to mastery of clausal complementation, which also correlates with the development of the child’s theory of mind (de Villiers (1995a, b).

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- The correlation between intensionality and clausal complementation (“sententialism”) plausibly reflects an interface constraint: roughly, that λ inputs propositions from C_{HL} only when these presented in appropriate form.

As I show, these results suggest an attractive view of the current syntactic notion of “phase” quite different from the current one in terms of grammar-extrinsic notions like memory and processing load. Phases can be seen as the point where the language faculty computes propositions for the psychological faculty. I begin by considering some basic points about intensionality and its expression in grammar.

16.1 Intensionality and Grammar

Typical transitive sentences are well known to manifest the following semantic properties: (i) substitution of identically referring object DPs preserves truth; thus if Max met Boris Karloff then it follows that he met William Pratt, given these names refer to the same individual (1a);¹ (ii) presence of a non-referring/non-denoting object yields falsity—thus (1b) must be false given that there are no unicorns; and finally, (iii) indefinite objects must be understood “specifically:” if Max met someone, there must be someone that Max met (1c).

- (1) a. i. Max met [_{DP} Boris Karloff].
 ii. Max met [_{DP} William Pratt].
 b. Max met [_{DP} a unicorn].
 c. Max met [_{DP} someone].

The same observations apply to typical intransitives, ditransitives and PP-complement predicates as well (2a–c):

- (2) a. [_{DP} Boris Karloff]/[_{DP} William Pratt] sneezed/arrived.
 b. Max gave [_{DP} a unicorn] to Mary.
 c. Max talked to [_{DP} someone].

By contrast, as Frege (1893) famously observed, in clausal complement constructions these properties are all suspended. Substitution of co-referring DPs in the complement need not preserve truth (3a); presence of a non-referring/non-denoting term need not induce falsity (3b); and indefinites can be understood “non-specifically”: Max can believe that someone is

¹ “Boris Karloff” is the stage name taken by Mr. William Pratt, who starred in a number of well-known horror films from the 1930s including *Frankenstein*, *The Mummy*, and *The Black Cat*.

approaching without there being a particular person about whom Max has a belief (3c).

- (3) a. i. Max believed [_{CP} that [_{DP} Boris Karloff] was approaching]].
 ii. Max believed [_{CP} that [_{DP} William Pratt] was approaching]].
 b. Max believed [_{CP} that [_{DP} a unicorn] was approaching]].
 c. Max believed [_{CP} that [_{DP} someone] was approaching]].

These properties are manifest not only with verbs like *believe*, but in fact across the whole range of predicates selecting a cognitive agent and a complement clause, including adjectives, as in (4):

- (4) a. It was apparent/desirable to Max [_{CP}that[_{DP}BK]/[_{DP}WP] was approaching]].
 b. It was apparent/desirable to Max [_{CP}that[_{DP}a unicorn] was approaching]].
 c. It was apparent/desirable to Max [_{CP}that[_{DP}someone] was approaching]].

These results give rise to an interesting hypothesis about intensionality and its expression in grammar, namely that semantic intensionality arises exactly in the context of clausal complementation:

Sententialist Hypothesis:

Semantic intensionality ↔ Clausal complementation

This correlation seems natural from a general point of view. Intuitively, in examples like (3) and (4), our explanation for why substitution can fail, why non-denoting terms need not induce falsity, and why indefinites can be read nonspecifically, turns on how individuals represent the world to themselves. In explaining how (3a.i) and (3a.ii) might have different truth-conditions, for example, we might appeal to the fact that Max knows the individual in question only under the name *Boris Karloff*, not *William Pratt*. Hence representing his belief with a clause involving *William Pratt* gets something wrong: it presents the world in a way that Max would not represent it to himself, etc. The category that represents states of the world, either truly or falsely, is uncontroversially the clause. Hence intensionality has its natural home in the clause.

As attractive as this correlation may appear to be between semantics (intensionality) and grammar (clausal status), it nonetheless appears vulnerable to a range of counterexamples. Specifically there are predicates like *want*, *need*, *imagine*, *expect*, and *look for*, which resemble transitives in their surface grammar, but nonetheless show all the earmarks of intensionality:

- (5) a. Max wanted/imagined/needed/looked-for [DPBK]/[DPWP].
 b. Max wanted/imagined/needed/looked-for [DPA unicorn]/[DP an assistant].

Thus it seems that Max can want Boris Karloff without wanting William Pratt. It seems he can need a unicorn, even if there are none to be had. And it seems that he can look for an assistant, without there be any particular individual that he is seeking. Because of their combination of properties, predicates like these are often referred to as Intensional Transitive Verbs (ITVs).

Interestingly, beginning with McCawley (1974) and Ross (1976), a number of authors have argued that in examples like (5a, b) appearances are deceiving—that the latter are in fact covert clausal complement constructions despite their superficial transitive syntax. Suggestive evidence for this view, coming from temporal modification, was observed by Kajita (cited in Ross 1976). Note first that in clausal complement constructions like (6), the sentence-final temporal adverb *next week* is ambiguous depending on whether it is understood as modifying *need/want* or *have*. This ambiguity can be understood as a structural one, reflecting whether the adverb is attached in the matrix clause (7a), or the embedded clause (7b):²

- (6) Max will need/want to have a bicycle **next week**. (ambiguous)
 (7) a. Max will need/want [PRO to have a bicycle] next week
 b. Max will need/want [PRO to have a bicycle next week]

Observe now that the intensional transitive counterpart of (6), namely (8), shows the very same ambiguity:

- (8) Max will need/want a bicycle next week. (ambiguous)

Given the parallel ambiguity in (6) and (8), it is sensible to propose a parallel structural analysis. Thus (8) should involve a covert clausal complement, with a silent version of the verb *have*, again affording two possible structural attachment sites for the adverb (9a, b). Note carefully that the ambiguity in question is not one generally available with transitives. The example in (10) shows no such ambiguity, for instance.

² Here PRO is a silent (unpronounced) pronoun with the approximate content of *himself* (cf. *Max wants himself to have a bicycle next week*).

- (9) a. [Max will need/want [_{CP} PRO HAVE a bicycle tomorrow]].
b. [Max will need/want [_{CP} PRO HAVE a bicycle] tomorrow]].
- (10) Max will ride/repair a bicycle tomorrow. (unambiguous)

Accordingly, it seems reasonable to attribute the possibility of ambiguity with *want/need* to a special structural possibility open to so-called intensional transitive verbs—one associated with clausal complementation.

16.2 Cross-Linguistic Expression of Intensionality

The Sententialist Hypothesis, coupled with the possibility of covert clausal complementation, suggests an interesting general prediction, namely, that the superficial objects of ITVs should not pattern like the objects of ordinary TVs. We should find differences suggesting a hidden clause. More specifically, we should find that patterns observed with ITVs should correlate with the possibilities for covert clausal complementation in a given language. Below I consider a number of brief case studies suggesting that this prediction may be on the right track.

16.2.1 Case study: *Want and verbs of volition*

On the view suggested above, the analysis of (11a) is as in (11b), with elliptical subject and null V:

- (11) a. Polly wants a cracker.
b. Polly wants [PRO TO HAVE a cracker].

On this analysis, *want* is strictly clause-taking. Surface transitivity arises through null *HAVE*, which takes the surface object as its object. This proposal makes two interesting predictions:

- (11b) will be able to appear as (11a) only in languages allowing null *HAVE*.
- (11b) will surface as (11a) only if the expression of possession follows the pattern of *have*.

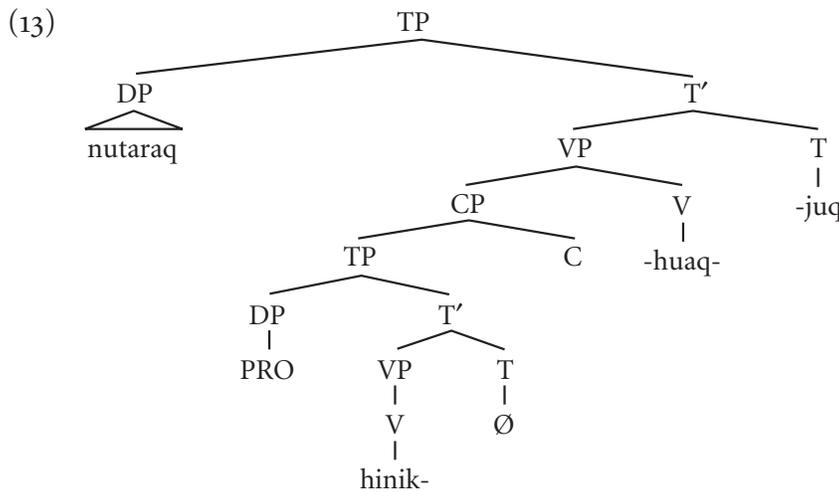
Let us consider these predictions in the light of facts from Eskimo and Japanese.

16.2.1.1 *Affixal want in Inuktitut (Johns 1999)*. Languages of the Inuit family are polysynthetic: predicates of complex clauses collapse together into a single

word-like element. Thus in (12) the concept of “want-to-sleep” is expressed with a complex lexical form.

- (12) a. Labrador Inuit
sugusik sini-guma-juk.
 child(ABS) sleep-want-INTR.PART.3S
 ‘The child wants to sleep.’
- b. Quainirmiut Inuit
nutaraq hini-guaq-tuq.
 child(ABS) sleep-want-INTR.PART.3S
 ‘The child wants to sleep.’

According to Woodbury (1977), Smith (1982), and Baker (1988) (among others), such sentences are underlyingly bi-clausal, bound morphemes occupying the head positions occupied in non-polysynthetic languages; for example (12b) would be as in (13):



The polysynthetic character of these languages appears to follow (at least in part) from the status of elements like *-guma-* and *-huaq-* as affixes/clitics, that is, as phonologically dependent elements that must be supported by some non-null V form, similarly to the behavior of tense in English (see Baker 1996).

Now, interestingly, although Inuit allows (the equivalent of) “want to have DP” (14a, b), it does not allow (the equivalent of) “want DP”:

- (14) a. Labrador
savi-t-guma-vunga.
 knife-get-want-INTR.INDIC.1S
 ‘I want to get a knife.’

- b. Quainirmiut
 pana-**taa-ruaq**-tunga.
 knife-get-want-INTR.PART.1S
 ‘I WANT TO GET A KNIFE.’
- (15) a. Labrador
 *savi-**guma**-vunga.
 knife-get-want-INTR.INDIC.1S
 ‘I want a knife.’
- b. Quainirmiut
 *pana-**ruaq**-tunga.
 knife-get-want-INTR.PART.1S
 ‘I want a knife.’

Why this restriction? Why should Inuit be restricted in this way? Under the Sententialist Hypothesis, the polysynthetic nature of the languages suggests a clue. Suppose the affixes *-guma-* and *-huaq-* mean ‘want’, and as such are strictly clause-taking. To derive the equivalent of *want*-DP, they would need to affix to null *HAVE*. But as affixes, *-guma-* and *-huaq-* require non-null phonological support; bound elements cannot be supported by a null stem (Lasnik 1981). It would follow, then, that the only way to express ‘want to have’ would be via an overt lexical V affix as in (14a, b); (15a, b) would be disallowed. This is exactly what we observe.

16.2.1.2 *Volitional Vs in Japanese* The usual case-marking pattern in Japanese is that subjects are marked with *-ga*, and objects are marked with *-o* (16). However, with Japanese volitional Vs, subjects are marked with *-ga*, and the object is *ga*-marked too. *O*-marking is disfavored (17):

- (16) Japanese
 Taroo-**ga** pizza-**o** tabetta.
 Taroo-NOM pizza-ACC ate
 ‘Taroo ate a/the pizza.’
- (17) a. Taroo-**ga** **okane -ga/*?-o** hoshii.
 Taroo-NOM money -NOM/-ACC want
 ‘Taroo wants money.’
- b. Taroo-**ga** **konpyuutaa -ga /*?-o** hitsuyoo-da.
 Taroo-NOM computer -NOM/-ACC need-COP
 ‘Taroo needs a/the computer.’

Why this case pattern? Why do objects of verbs counterpart to *want* and *need* show with nominative marking? Endo, Kitagawa, and Yoon (1999) make the

interesting proposal that the data in (17) reflect the case pattern of a hidden clause.

The languages of the world standardly express possession through two basic patterns (Benveniste 1960; Freeze 1992). One is a transitive *have*-type construction. English and German exemplify this pattern; see (18). The second, and typologically more common, pattern is an intransitive, copular *be*-type construction; Hungarian and a minority dialect of German exemplify this possibility; see (19):

(18) Transitive *have*-type construction

- a. John has a hat
- b. German
 Ich habe einen Hut.
 I(NOM) have a(ACC) hat
 ‘I have a hat.’

(19) Copular *be*-type construction

- a. Hungarian
 Péter-nek van egy ernyő-je.
 Peter-DAT be an umbrella-3s
 ‘Peter has/owns an umbrella.’
- b. Péter-nél van egy ernyő.
 Peter-LOC be an umbrella
 ‘Peter has an umbrella with him.’
- c. German
 Mir ist der Hut.
 I(DAT) be the(NOM) hat
 ‘I have a hat.’

The two patterns for expressing possession differ not only in choice of main verb (*have* vs. *be*) but also in case-marking. The *have*-type construction marks the possessor with nominative and the possessed with accusative as in (20a), whereas in the *be*-construction, the possessor shows up as a PP or in an oblique case, while the possessed is marked with nominative (20b). The two different structures for possession admit two possibilities for a bi-clausal construction expressing “want-to-have”; see (21):

- (20) a. *Have*-type: DP-NOM *have* DP-ACC
- b. *Be*-type DP-OBL *be* DP-NOM

- (21) a. DP *wants* [PRO-NOM *to have* DP-ACC] (*have*-type)

- b. DP *wants* [PRO-OBL *to be* DP-NOM] (*be*-type)

Observe now that if *be* can be covert, just like *have*, the result will surface as an apparent transitive construction with nominative case-marking on the object:

DP *wants* [PRO-OBL TO BE DP-NOM]

Japanese, like German, has both a *have*-type possession construction (*motteiru*) and a *be*-type (*aru*) (22a, b). And both possession constructions can appear overtly under *hoshii* ‘want’ and *hitsuyoo* ‘need’ (23a, b):

- (22) a. Taroo-wa konpyuutaa-**o** motteiru. (*have*-type)
 Taroo-TOP computer-ACC have
 ‘Taroo has a computer.’
 b. Taroo-**ni**-wa konpyuutaa-**ga** aru. (*be*-type)
 Taroo-DAT-TOP computer-ACC be
 ‘Taroo has a computer.’
- (23) a. Watashi-ga Taroo-ga konpyuutaa *-**ga**/**-o** motte hoshii.
 I-NOM Taroo-NOM computer -NOM/-ACC have want
 ‘I want Taroo to have a computer.’
 b. Watashi-ga Taroo-ni konpyuutaa -**ga**/*-**o** atte hoshii.
 I-NOM Taroo-DAT computer -NOM/-ACC be want
 ‘I want Taroo to have a computer.’

Endo et al. (1999) propose that the Japanese case pattern in (17a, b) (repeated below as (24a, b)) reflects a silent version of the *be* possession-type:

- (24) a. Taroo-ga [PRO-DAT **okane-ga** ARU] hoshii.
 Taroo-NOM PRO-DAT money-NOM be want
 ‘Taroo wants money.’
 b. Taroo-ga [PRO-DAT **konpyuutaa-ga** ARU] hitsuyoo-da.
 Taroo-NOM PRO-DAT computer-NOM be need-COP
 ‘Taroo needs a/the computer.’

Thus if they are correct, case-marking with Japanese volitional verbs provides evidence for hidden clausal complementation.

16.2.2 Case study: fear and psych-verbs

In the case of English volitional verbs like *want* and *need*, the hidden-clause analyzes the surface object as the underlying object of an embedded verb *HAVE* (25a, b).

- (25) a. John needs **a vampire**.

- b. John needs [PRO TO HAVE **a vampire**].

Consider now so-called psychological (or psych-)predicates such as *fear*, *admire*, and *love*. These also show familiar intensionality effects in examples like (26); thus (26a) can apparently differ in truth conditions depending on choice of name; likewise (26b) can be true despite there being no vampires. Nonetheless, an analysis of the surface object as an underlying object does not seem correct. We would be much more inclined to understand (27a), for example, along lines like (27b), where the surface object is an underlying subject of some implicit action predicate (*attack*, *bite*, etc.):

- (26) a. Mary fears [_{DP} **Boris Karloff**]/[_{DP} **William Pratt**].
 b. Mary fears [_{DP} **vampires**].
- (27) a. Mary fears sharks.
 b. Mary fears [that sharks will attack her/bite her/do something to her].

This point leads to the general expectation that when we have a surface transitive construction involving a psych-V ($\Psi - V$) (see 28a), the surface object (DP₂) should be the underlying subject of a covert predicate (PRED), as in (28b):

- (28) a. DP₁ $\Psi - V$ DP₂
 b. DP₁ $\Psi - V$ [DP₂ PRED]

Thus the “object” in construction (28a) might betray its embedded status by showing unexpected subject properties. There is interesting evidence from Chinese that appears to illustrate this case.

Chinese has psych-verbs like English *fear*, which show an equivalent surface transitive structure (29).

- (29) Zhangsan **haipa** Lisi.
 Zhangsan fear Lisi
 ‘Zhangsan fears Lisi.’

But these constructions show an interesting peculiarity. As Cheung and Larson (2006, 2007) observe, both English and Chinese freely passivize normal transitive verbs, for example, canonical verbs of contact (30a, b). However, whereas English *fear* undergoes passive (31a), Chinese *haipa* does not (31b). This result is in fact quite general for Chinese psych-verbs of the *fear*-class; these verbs do not passivize.

- (30) a. Chinese
 Lisi da-le Zhangsan.
 Lisi hit-ASP Zhangsan
 'Lisi hit Zhangsan.'
- b. Zhangsan bei Lisi da-le
 Zhangsan BEI Lisi hit-ASP
 'Zhangsan was hit by Lisi.'
- (31) a. Lisa is feared by John.
 b. *Lisi bei Zhangsan haipa.
 Lisi BEI Zhangsan fear
 'Lisi is feared by Zhangsan.'

These facts raise a very simple question: why do Chinese and English differ in this way? Why do Chinese *fear*-type psych-verbs resist passive? Interestingly, Huang (1999) has argued that the operation of passive in Chinese involves a very different structure than that of English. Briefly, English passives raise a DP directly to subject position. Thus in (32a) the underlying object *John* is raised to surface subject position. By contrast, Chinese passives involve a construction in which the subject is base-generated in object position and an empty operator raises from the position of the passivized DP and establishes a predication relation with the subject. Thus in (32b) *Zhangsan* is base-generated in subject position and an operator raises from the object position of *da-le* 'hit'. A predication relation is subsequently established between *Zhangsan* and *OP*, linking them. This analysis of Chinese passive is thus analogous to the standard account of English constructions involving *tough* and *easy*, which also involve a gap bound to an empty operator (32c):

- (32) a. John was hit ___ by Mary

- b. Zhangsan bei OP Lisi da-le ___

- c. John is tough/easy OP for Mary to hit ___


In effect, Chinese passives involve a *tough*-predicate, *bei*, that is devoid of independent meaning.

This difference in passivization strategies is significant because the movement of empty-operators in *tough*-constructions (*tough*-movement) is well

known to be more sensitive than passive (Cinque 1990). For example, subjects of reduced clauses are passivizable in English, but are not as readily *tough*-moveable (33)–(35). Chinese shows similar restrictions on *bei*-passivization with subjects of reduced clauses (36) and (37):

- (33) a. Mary believes/considers John to be intelligent.
 b. John is believed/considered __ to be intelligent.
 c. *?John is tough/easy to believe/consider __ to be intelligent.
- (34) a. Mary saw John talking to Alice.
 b. John was seen __ talking to Alice.
 c. *John was tough/easy to see __ talking to Alice.
- (35) a. Mary made John wear a tux.
 b. John was made __ to wear a tux.
 c. *John is tough/easy to make __ to wear a tux.
- (36) a. Lisi kanjian [Zhangsan jin-le najia canguanr].
 Lisi saw Zhangsan enter-ASP that restaurant
 'Zhangsan saw Lisi entering the restaurant.'
 b. *Zhangsan bei Lisi kanjian [__ jin-le najia canguanr].
 Zhangsan BEI Lisi see enter-ASP that restaurant
 'Zhangsan was seen by Lisi entering the restaurant.'
- (37) a. Zhangsan rang [Lisi likai].
 Zhangsan let Lisi leave
 'Zhangsan let Lisi leave.'
 b. *Zhangsan bei Lisi rang [__ likai].
 Zhangsan BEI Lisi let leave
 'Zhangsan was allowed by Lisi to leave.'

Cheung and Larson (2006, 2007) further observe that Chinese psych-verbs of the *fear*-class uniformly permit a reduced clause complement (38). In this respect they differ from other psych-verbs—for example, those of the *frighten*-class (39):

- (38) a. Zhangsan haipa [Lisi da ta].
 Zhangsan fear Lisi hit he
 'Zhangsan feared that Lisi would hit him.'
 b. Pingping haipa [nazhi gou yao ta].
 Pingping fear that dog bite her
 'Pingping feared that the dog would bite her/him.'

- (39) a. Zhangsan gandong Lisi.
 Zhangsan touch Lisi
 ‘Zhangsan touched/moved Lisi.’
- b. *Zhangsan gandong [Lisi ku]
 Zhangsan touch Lisi cry
 ‘Zhangsan was touched that Lisi cried.’/‘Zhangsan moved Lisi to tears.’

The hypothesis that Cheung and Larson (2006, 2007) offer is the following: Chinese psych-verbs resist passivization because they are underlyingly reduced clausal structures, even in their surface “transitive” form. The ill-formedness in (40a) and (41a) thus has the same source, namely, (40b) and (41b):

- (40) a. *Lisi bei Zhangsan haipa da ta].
 Lisi BEI Zhangsan fear hit him
 ‘Zhangsan fears that Lisi will bite him.’
- b. *Lisi bei [OP Zhangsan haipa [__ da ta]
 ↑
- (41) a. *Lisi bei Zhangsan haipa.
 Lisi BEI Zhangsan fear
 ‘Lisi is feared by Zhangsan.’
- b. *Lisi bei [OP Zhangsan haipa [__ PRED]
 ↑

If Cheung and Larson (2006, 2007) are correct, these cases thus illustrate the situation of the surface object of an intensional transitive verb showing unexpected “subject properties”—in this case with respect to extraction under passive.

16.2.3 *Case study: believe-in and existence*

As a final case study in concealed complementation, consider verbs of belief. English exhibits two forms of *believe* in which the verbal complement is apparently non-clausal. One is a simple transitive construction (42a); the second is a PP-complement structure involving the preposition *in* (43a). The difference in syntactic structure, though apparently small, carries a substantial difference in meaning. The simple transitive (42a) is extensional, and when it appears with a human object, its semantics involves deferred reference to some speech

act (cf. (42b)).³ By contrast, the verb–preposition combination *believe-in* is intensional (43a), with a semantics notionally similar to a clausal counterpart expressing an existence-belief (43b).

- (42) a. Gwen **believes** the tooth fairy. (false; there is no such being!)
 b. Gwen **believes** what the tooth fairy says/said.
- (43) a. Gwen **believes in** the tooth fairy.
 b. Gwen **believes** that the tooth fairy **exists**.

The presence of *in* in (43a) and its correlation with an understood “exists” appears to be non-accidental. It is a remarkable fact that many other world languages appear to use a specifically locative element (P or case-marker) for the equivalent of the *believe-in*. Thus Hungarian uses the locative postposition *-ben* ‘in’ in exactly the same context (44a). German employs the locative preposition *an* ‘at’. Russian uses the locative element *v* (44c). And Korean uses a postposition containing a form *-ey* that was historically a locative (44d).

- (44) a. Hungarian
 Péter hisz Isten-**ben**.
 Peter believe God-in(LOC)
 ‘Peter believes in God.’
- b. German
 Max glaubt **an** Gott
 Max believes at(LOC) God
 ‘Max believes in God.’
- c. Russian
 Olga verit **v** Deda-Moroza.
 Olga believes in (LOC)
 ‘Olga believes in Santa Claus.’
- d. Korean
 Nay-ka Jesus-**eytayhay** mit-nun-ta.
 I-NOM Jesus-about believe-PRES-DECL
 ‘I believe in Jesus.’ (*ey* in *eytayhay* is originally a locative)

Hungarian displays the link between locativity and existence in an even more revealing way. Hungarian finite clausal complements to *believe* expressing existence claims are introduced by a special complementizer *abban* that includes

³ Transitive *believe* seems to select nominals denoting speech events or parts of them:

- (i) John believed **those words/Mary’s words/Jim’s allegations/Bill’s claims**. Thus in the case where the object is a person, the latter is understood in terms of something they said, claimed, alleged, etc.

a locative element. This is not the case with the non-existential complement (45b).

(45) a. Hungarian

Péter hisz **abban** hogy Isten létezik.
Peter believe in-that COMP God exists
'Peter believes that God exists.'

b. Péter hiszi hogy Petra okos.

Peter believe COMP Petra smart
'Peter believes that Petra is smart.'

Again, these simple facts raise some equally simple, but intriguing questions. Intensionality with *believe* appears to be tied to existence propositions; how and why is correlated with the appearance of locative elements—prepositions, postpositions, complementizers, and particles? What is the link among these things?

In fact, it is a familiar typological generalization that existential and locative constructions consistently pattern alike across the world's languages. The Hindi example in (46) is typical. The locative construction (46a) and the existential (46b) are distinguished only by word order.⁴

(46) a. mai bhaarat-mee thaa.

I India-in COP-SG.MASC.PAST
'I was in India.'

b. kamree-mee aadmii hai.

room-in man COP-SG.MASC.PRES
'There is a man in the room.'

Generative semanticists argued that existential sentences derived from locatives (Fillmore 1968; Lyons 1967), and indeed the existential *be* copula does not normally occur in English without a locative or temporal complement (cf. *John is *(in Rome)*). Attention to such facts has regularly led to the proposal that existentials are underlyingly a form of locative.⁵

Suppose this basic viewpoint is correct: that existentials are a form of locative. Then a tempting hypothesis is that the locative element in (43a), (44a–d) and (45) is a grammatical reflex of the status of these constructions as existentials, whether covert or explicit. More specifically, observe that the preposition *in* occurs in a nominalized version of existential sentences (47a,

⁴ These examples are drawn from Freeze (1992).

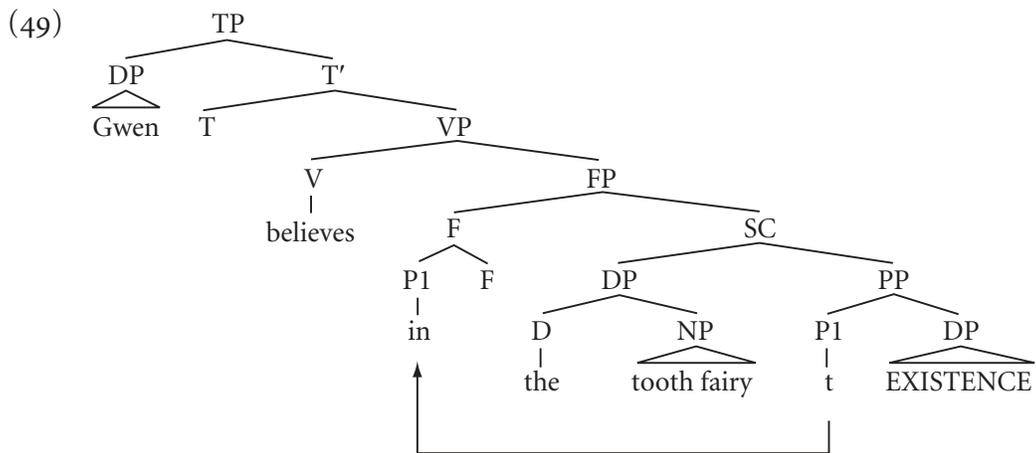
⁵ Kahn (1966) argues that location in space is in fact the basic picture of existence for Greek philosophy: "whatever is, is somewhere; whatever is nowhere, is nothing (p. 258)."

b); the verbal form *exist* is matched by the nominalized form *be-in-existence*. This possibility is also observed with *believe*, as shown in (48):

- (47) a. i. Three copies of this manuscript **exist**.
 ii. There **exist** three copies of this manuscript..
 b. i. Three copies of this manuscript **are in existence**.
 ii. There **are** three copies of this manuscript **in existence**.

- (48) a. Gwen **believes in** the tooth fairy.
 b. Gwen **believes** the tooth fairy to **exist**.
 c. Gwen **believes** the tooth fairy (to be) **in existence**.

Then one concrete idea might be to analyze the *in* of (48a) as the *in* of (48c), dislocated by movement; in other words, to derive (48a) from (48c) by raising of *in* to a functional position F. On this picture, PP-complement *believe* would take as its complement an existential “small clause” containing *in*. Along with covert *BE*, we would thus also have its null nominal counterpart *EXISTENCE* (49):



This proposal is simply one (very tentative) execution of an analysis relating (43a) to (43b). But it is sufficient to illustrate how such an account might go, which takes the PP-complement form of *believe* to conceal a clausal complement structure.

16.3 Development of Intensionality⁶

The facts surveyed above suggest that intensionality is tied to clausal complementation insofar as where we find the first we find the second. There is interesting evidence from developmental psychology which

⁶ I am particularly indebted in this section to the illuminating discussion in Segal (1998).

seems to show a version of this correlation in the opposite direction as well—specifically that a child’s grasp of intensionality is part of the general development of its “theory of mind,” and that the latter in turn hinges on the development of linguistic structures associated with clausal complementation.

One apparent milestone in children’s cognitive development is the point at which they grasp that other humans have minds capable of entertaining thoughts different than their own, including false thoughts (Perner 1991; Wellman 1990). This capacity typically appears around age 3–4, as revealed by performance on so-called false-belief tests. In a typical test paradigm, a child is told a story and given accompanying questions like the following:

(50) Jill puts her doll in a drawer, and goes out to play. While Jill is outside, and cannot see, Jack comes in and moves the doll to a box.

- Questions:* (i) Where does Jill think her doll is?
(ii) Where will Jill look first?

Before 3–4 years of age, children identify the box—the doll’s genuine location—as the place that Jill will look. They apparently fail to separate Jill’s beliefs from their own, and hence answer that Jill will look where they know the doll to be. By contrast, after 3–4 years, they identify the drawer, the site where Jill left it, as the place she will look. They have apparently grasped that Jill may have a false representation, which is different from their own correct understanding of the situation. This cognitive achievement appears to be part of a broader transition involving the understanding of misrepresentation, including pictures that represent falsely, etc.

De Villiers and Fitneva (1996) offer interesting evidence that development of intensionality in children is tied to understanding of false belief. They record experiments in which preschoolers were presented stories and accompanying test questions like this:

(51) Mother put candy in a silver box as a birthday present for her daughter Sarah. Mother placed the box on the table. Sarah walked into the room and saw the silver box. She thought: “I wonder what that silver box is?”

- Questions:* (i) Does Sarah know the silver box is on the table?
(ii) Does Sarah know the candy is on the table?

De Villiers and Fitneva (1996) report that children who fail the false-belief test also permit substitution and treat *know* as transparent. In other words, they answer “yes” to both of the test questions, allowing free substitution of

the co-referring terms *the silver box* and *the candy*. By contrast, children who pass the false-belief test disallow substitution and treat *know* as referentially opaque. That is, they answer “yes” to the first question (since the little girl sees the box and observes that it is silver), but “no” to the second question (since the little girl does not know the silver box is also the candy). Tager-Flusberg (2000) conducted a similar experiment with autistic and mentally retarded subjects and obtained similar results: those subjects who failed false belief tests also treated propositional attitude verb contexts as transparent/nonintentional.

Intriguingly, children who fail false belief tests also seem to show a weak grasp of clausal complement grammar, appearing to treat complement questions as if unembedded. Thus de Villiers, Roeper, and Vainikka (1990), Roeper and de Villiers (1994), and de Villiers (1998) report that children in this stage very typically respond to questions like (52a) as if the question being posed were the unembedded (52b). More exactly, in a situation where the things that Mary bought and the things she said they bought are different, they answer with the things actually purchased:

- (52) a. What did Mary say she bought?
 b. What did Mary buy?

A similar result is reported by Tager-Flusberg (1997) in reference to the false-belief story and question shown in (53):

- (53) Mommy told Johnny that she would make hamburgers for dinner. Johnny goes out to play. Mommy changes the menu and cooks spaghetti instead.
Question: Does Johnny know what Mommy made for dinner?

Tager-Flusberg (1997) reports that five of eight children who failed the false-belief test answered “spaghetti” to the test question. In other words, they appeared to treat the latter as if it contained the unembedded, independent interrogative *What did Mommy make for dinner?*

These results suggest a correlation between mastery of clausal complement grammar and development of “theory of mind” as revealed by false-belief test results. Nonetheless, in and of themselves they do not show a direct dependence between the phenomena. They are, for example, compatible with a maturationalist view in which general cognitive development, unfolding at the appropriate time, separately underwrites both of these achievements: understanding of embedding grammar and understanding of other minds.

Interestingly, there is evidence to suggest this broad maturationalist view, however natural, is not correct, and that linguistic development is in some way the key factor responsible for “triggering” theory of mind. Gale et al. (1996), Tager-Flusberg (2000), and de Villiers (2000) investigate the development of theory of mind in oral deaf children of average-to-high intelligence, exhibiting normal social function. By standard tests, these subjects were at the normal stage of cognitive development for their age; however, due to their profound deafness, their language development was severely delayed (2–3 yrs). Gale et al. and de Villiers found that their subjects’ theory of mind development, as measured by performance on false belief tests, was correspondingly delayed. Apparently, the connection between linguistic development and theory of mind is more direct than a general, maturational view would suggest.

Summarizing our results in this section, the following broad picture emerges. At approximately 3 years of age, children do not grasp sentence embedding, they do not pass false-belief tests, and they do not show knowledge of referential opacity/intensionality. At 3–4 years, embedding of clausal complements develops and theory of mind also appears; children can now ascribe false or incomplete beliefs to others, and they understand opacity in complements of attitude Vs. The linguistic development seems to constitute a precondition of the theory of mind development; if the former is delayed, including by factors specifically involving language development, the latter is delayed correspondingly.

These results strongly suggest that grammar—specifically clausal complementation—is in some way “enabling” children’s theory of mind. An attractive proposal, due to Segal (1998), is that it does so by providing the psychological faculty (the “ Ψ faculty”) with an appropriate kind of representation to compute with—a representation for propositions that is “legible” at the interface between grammar and cognition, and which was previously unavailable. Note that if this suggestion is on the right track, then we seem to be on our way toward a general explanation for sententialism. If what is solved by the child’s mastery of clausal complementation is the problem of providing legible representations for propositions, and propositional representation is itself required for theory of mind and understanding of intensionality/referential opacity, then sententialism will nearly follow. The key question will simply be whether the Ψ faculty can acquire propositional representations only this way, through calculation on clausal input, or whether other means are available. It seems to me that, to a large extent, the answer to this question depends on one’s theory of propositions—the objects denoted by clauses embedded under propositional

attitude predicates. In the final section I sketch a theory of propositions that I believe fits well into the sententialist picture and the general minimalist picture of grammar.

16.4 Interpreted Logical Forms and Phases

The semantics of propositional-attitude constructions is an extremely rich and complex area, with a variety of competing theories. Following initial proposals by Higginbotham (1986) and Segal (1989), Larson and Ludlow (1993) argue that to accommodate the full range of opacity/intensionality effects observed in propositional-attitude report sentences, semantics must deploy structured objects which encode the full space of linguistic features of a clause—phonological, syntactic, and semantic.

16.4.1 *Interpreted Logical Forms*

It is a fact familiar since Frege (1893) that substitution of distinct co-referring proper names in a clausal embedding context can fail to preserve truth; see (54). However, Larson and Ludlow (1993) point out that this is really just the tip of an iceberg. The same result holds true with what would be typically regarded as a single lexical item pronounced with different regional accents; see (55). The truth of propositional-attitude reports is thus sensitive to phonological variation at the sub-lexical level:

- (54) a. Kelly believes [**Judy Garland** sang *Somewhere over the Rainbow*].
 b. Kelly believes [**Frances Gumm** sang *Somewhere over the Rainbow*].
- (55) a. Jack believes [**Harvard** is a fine school].
 b. Jack believes [[harvərd] is a fine school].
 c. Jack believes [[ha:vad] is a fine school].

A similar observation can be made regarding sensitivity to syntactic structure in propositional attitude reports. Evidently, gross differences in constituency can produce truth-conditional differences. The truth conditions of (56a) can diverge according to whether the embedded VP is understood with *the whole year* as the object of *study* (56b), or as a modifier of an intransitive version of the verb, as in (56c):

- (56) a. Kathy believes [Max **studied the whole year**].
b. Kathy believes [Max [_{VP} [_{VP} studied][the whole year]]].
c. Kathy believes [Max [_{VP} studied [the whole year]]].

However, sensitivity to syntactic constituent structure extends down further, to the structure of morphemes. Thus the truth conditions of (57a) can differ according to whether *unlockable* is parsed as (57b) or (57c). In the first case Alice believes that the door cannot be locked; in the second, she believes that it can be unlocked (57c):

- (57) a. Alice believes [that door is **unlockable**].
b. Alice believes [that door is [un-[lockable]]].
c. Alice believes [that door is [[unlock]-able]].

Likewise, representational distinctions encoding so-called binding relations appear relevant. The truth conditions of (58a) can differ according to whether Mary believes John is the only individual who loves John's mother, or the only individual who loves his/her own mother, see (58b). These differences are typically encoded with numerical indices:

- (58) a. Mary believes [**only John** loves **his** mother].
b. Mary believes [[only John_i]_j t_j loves his_i mother].
c. Mary believes [[only John_I]_j t_j loves his_j mother].

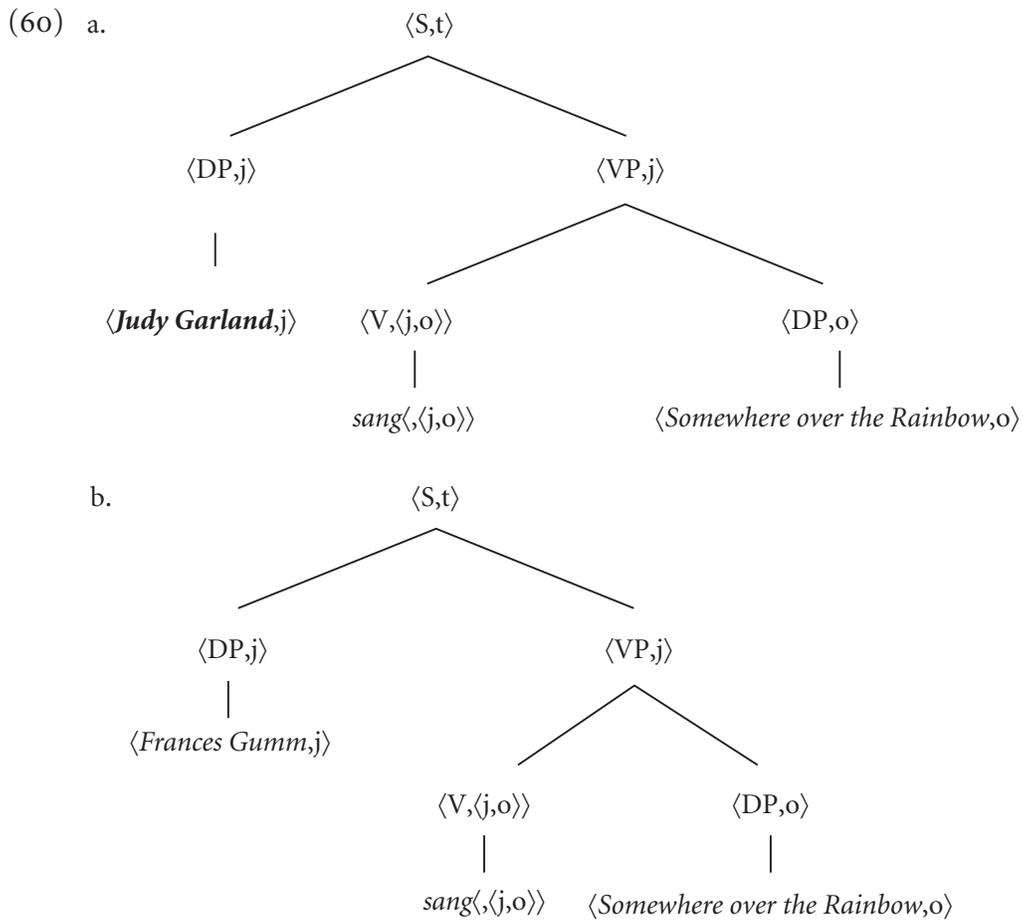
Finally, attitude report semantics appear to be sensitive to semantics, including the real reference of terms. The truth of (59a) can plainly depend on whom the pronoun *she* refers to:

- (59) a. Kelly believes that [**she** sang *Somewhere over the Rainbow*].
b. Context: *she* refers Judy Garland.
c. Context: *she* refers Patti Page.

Standard theories of pronominal interpretation associate pronouns with a referent in a context, and within a given context, a given pronoun (however indexed) can refer to any individual. On this view, the relevant truth conditions for (59a) cannot be made in terms of syntactic distinctions in the complement clause. Arguably, what is needed to distinguish the two cases for (59a) is the reference of the pronoun itself: *she* interpreted as Judy Garland vs. *she* interpreted as Patti Page. If so, then semantic features are relevant as well.

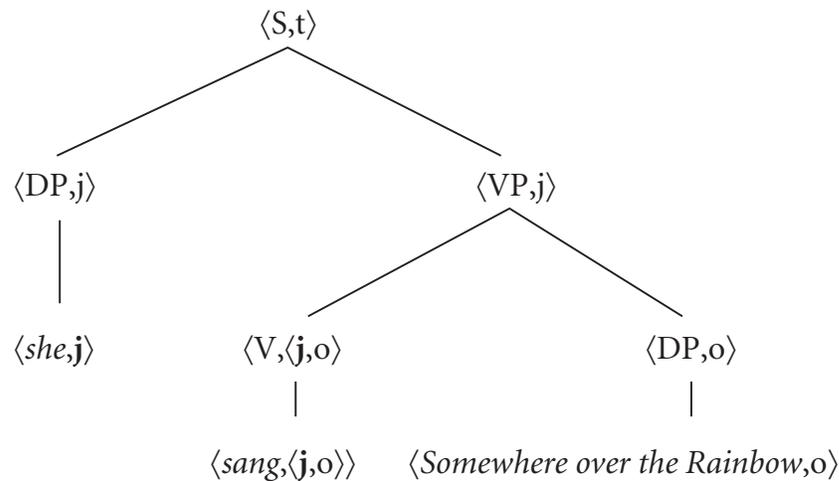
Larson and Ludlow (1993) propose to capture these points within a formal theory in which the objects denoted by embedded clauses are interpreted

Logical Forms (ILFs): phrase markers annotated with semantic values, whose nodes (including lexical items) bear the full set of phonological (segmental and prosodic), syntactic, and semantic features assigned to them by the grammar. Structures (60a) and (60b) are (simplified versions of) the ILFs for the embedded clauses in (54a, b). Here each node of the syntactic representation is associated with the value it receives under a standard truth theory. Note that although the semantic value of the subject expressions is identical (both refer to the individual Judy Garland, denoted by the constant *j*), the names differ. Accordingly, these constitute distinct ILFs—distinct propositional objects—and standing in the belief relation to one is different from standing in the belief relation to the other.

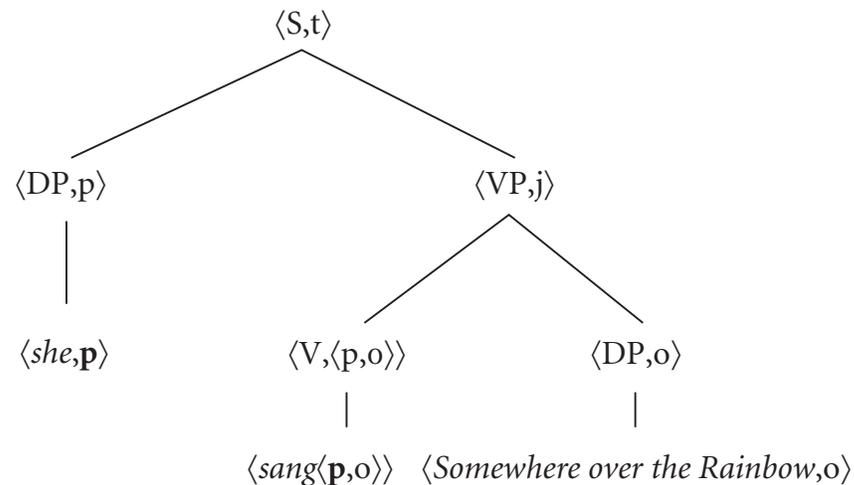


Similarly, (60a, b) are ILFs for the embedded clause in (59a). Here the syntactic form of the subject expressions is identical (*she*), but the referent differs (Judy Garland vs. Patti Page), hence these also constitute distinct ILFs and distinct propositional objects:

(61) a.



b.



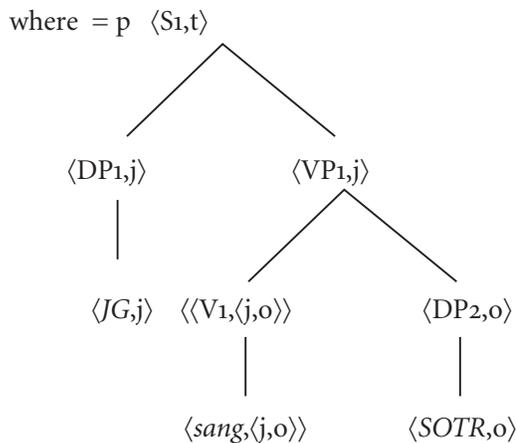
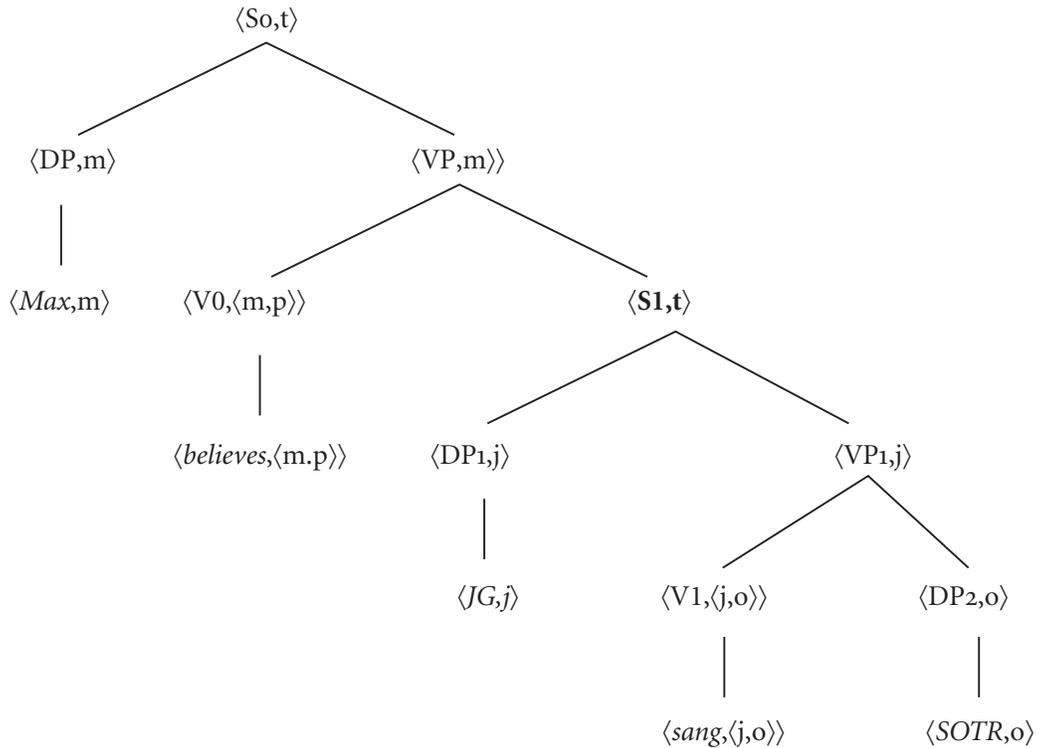
The ILF theory thus accounts for the range of distinctions that propositional attitude semantics appears to demand, by making every feature of the linguistic expression part of the propositional representation itself.

16.4.2 Phases

In Larson and Ludlow (1993), ILFs are computed at truth-value denoting nodes (CP and VP) in the complement of propositional-attitude predicates, a move largely dictated by technical considerations. ILFs are deployed as part of the general project of constructing a truth theory for natural language, and a truth theory assigns only truth conditions to sentences. Expressions receive definite values only in the context of their occurring in a sentence that is assumed to be true. It follows that an algorithm for constructing ILFs, which associates expressions with definite values, naturally begins at nodes that are truth-value denoting.

The computation has an additional property worth drawing attention to. Consider the truth conditions assigned to an iterated attitude report—one with more than one level of clausal embedding; see (62).

(62) *Bill thinks Max believes Judy Garland sang Somewhere over the Rainbow is true iff Bill thinks*



Under the Larson and Ludlow (1993) algorithm, the ILF for the most deeply embedded clause (*Judy Garland sang Somewhere over the Rainbow*) becomes the value (p) for the most deeply embedded attitude verb (*believes*). Although

this lowest portion of structure also figures in the calculation of the ILF for the larger embedded clause (*Max believes Judy Garland sang Somewhere over the Rainbow*), the individual ILF corresponding to it has essentially been collected up and stored in the value of the second argument of *believes*. The nodes for all the embedded clauses in the tree get collected up and stored in this way, as values for higher predicates.

Strikingly, current syntactic theory offers a picture of syntactic computation that is highly reminiscent of the one just given. Chomsky (2000a, 2001) proposes that the human language computational device (C_{HL}) constructs syntactic representations in stages, or *phases*, defined as points in syntactic computation where structure-building is obliged to interact with the two interfaces: π (articulatory–perceptual) and λ (conceptual–intentional). Specifically, the syntactic heads C and v (described as “propositional nodes”) are identified as phase points. When these nodes are reached, their complements are said to be “sent to the interfaces” for interpretation. After interpretation this complement material is treated as stored and unavailable for further syntactic computation—it becomes “impenetrable.”

In the Minimalist picture, the specific properties of phases do not actually follow conceptually from the architecture of grammar $\pi \leftarrow C_{HL} \rightarrow \lambda$, and are in fact simply stipulated. No reason is offered for why CP and vP should be phases—there is no conceptual reason given for why propositional nodes should be accorded special computational status. Indeed the existence of phases themselves does not follow from anything conceptual insofar as no grammar-internal reasons drive the derivation to interact with π and λ at pre-final stages of computation. Motivation for phases is standardly ascribed to grammar-external processing requirements, including memory limitations, and ease-of-computation, etc. (see Chomsky 2000a, 2001). As an alternative proposal, consider a view that connects phases integrally to the $\pi \leftarrow C_{HL} \rightarrow \lambda$ architecture. Specifically:

Phases constitute the point where C_{HL} computes potential “propositions” (understood as ILFs) for the Ψ faculty, a part of λ .

Presumably on any acquisition theory within the Minimalist picture, mastery of clausal complementation will involve the child dealing with phase architecture. We have seen that grasp of theory of mind and intensionality seems to attend the successful negotiation of this stage: that once children have the former, they appear to have the latter as well. It is attractive, from the standpoint of ILF theory and the remarks made above, to attempt to relate these things. We might thus propose that the general phasal architecture identified by the Minimalist program emerges as part of how complementation is integrated

into the linguistic system. Specifically children interpret clausal complements by building ILFs for them, and π and λ are accessed as part of building a representation that encodes the full PF/LF properties of a proposition. In effect, if computation must build propositional objects for λ , then the latter must access interpretation to get the full range of features such objects demand. Furthermore π and λ must be accessed at nodes where all features can be assigned to expressions: propositional nodes.

16.5 Summary

To summarize our results, we have seen that in natural language the presence of semantic intensionality appears to be associated with presence of a clausal complement, whether the latter is overt or covert. We have also seen that the development of semantic intensionality appears to correlate with development of clausal complementation, insofar as the latter appears to trigger or enable the child's theory of mind, which itself seems to be necessary for grasp of intensionality/referential opacity. The hypothesis we explored (due to Segal 1998) is that clausal complementation enables the theory of mind by providing the representations with which the Ψ faculty computes. In addition, we explored a particular theory of such representations, namely, Interpreted Logical Form—linguistically structured representations that are computed at propositional nodes. Under this picture, Sententialism can plausibly be seen to reflect an interface constraint: once enabled, the Ψ faculty requires propositional representations as input. And propositional representations are computed at clausal nodes, since they are the point where ILFs can be defined. As we saw, this proposal suggests an alternative view of phases as points in derivation where potential propositions are computed for the Ψ faculty.

This general picture, if correct, would lend strong general support to Sententialism, and make the connection between intensionality and clausal complementation a principled one. Intensionality would arise with clausal complementation, not simply as an empirical fact (which seems to be true in any case), but from the very way the architecture of C_{HL} is designed.