A Dynamic Semantic Account of Causative Psych Verb Constructions*

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1. Introduction

In this paper, I will propose a lexical-syntactic account of the causative psych verb construction (CPVC) within the framework of Dynamic Semantics. I will first show that a number of recalcitrant properties attributed to the construction receive a natural explanation within this framework. Then, I will concentrate on the most notorious property exhibited by causative psych verbs (CPVs), backward binding, and claim that the relevant phenomenon is best accounted for, on this approach, by the post-Spell-Out insertion at LF of the semantic primitive I will call SENSE to assign the Experiencer role to the direct object of the construction. One of the theoretical implications of the proposed approach is that the performative analysis of the kind entertained in the heyday of generative semantics by Ross (1970) is, in fact, essentially correct, thereby providing a strong rationale for the recent partial resurrection of generative semantic insights in the context of the Minimalist Program (cf. Chomsky (1995)).

2. Psychological Issues

It has been noticed in the literature that CPVs such as frighten and please exhibit a lot of recalcitrant but very intriguing properties essentially because they behave in striking disharmony with regularities that typically hold for other normal transitive verbs like hit and kill. This section briefly reviews a number of peculiar characteristics of the CPVC.
The most notorious puzzle raised by the CPV is its anomalous behavior with respect to binding theory: the Experiencer in object position can bind an anaphor within the subject, in apparent violation of the usual c-command requirement on the antecedent-anaphor relation. The relevant examples from English (Pesetsky (1995)) and Japanese (Akatsuka (1976)) are given in (1) and (2). Also important is the observation by Pesetsky (1995) and Fujita (1993, 1994, 1996) that when volitionality is forced on the part of the Causer subject, the examples become unacceptable as shown in (3) and (4).

(1) Pictures of himself worry John.

(2) Zibun-ga gan kamo shirenai koto-ga Hiroshi-o
    self-NOM cancer may fact-NOM Hiroshi-ACC
    nayam-ase-ta
    be annoyed-CAUSE-past
    “The fact that self may have cancer worried Hiroshi.”

(3) *Friends of each other intentionally pleased John and Mary.

(4) *Zibun-no furyoo-gakusei-ga Yamada-sensei-o
    self’s-GEN bad-students-NOM Yamada-teacher-ACC
    wazata shinpais-ase-ta
    intentionally be worried-CAUSE-past
    “Self’s bad students intentionally worried Professor Yamada.”

This distinctive characteristic in CPVs is so intricate that I will postpone the detailed discussion of this characteristic until sections 4-6, merely noting here that backward binding is not observed in normal transitive clauses as shown by the unacceptability of *Each other’s stories hit John and Mary.

The object of the CPVC has also been regarded as a “trouble-maker”, thus contributing to the uniqueness of the psych verb class: as first noted in Spanish by
Belletti and Rizzi (1988), the object Experiencer argument constitutes an extraction barrier, again not a property of ordinary transitive verbs, as evidenced by (5b) in English.

(5) a. *Who did the news surprise a daughter of?  
    b. Who did you see a daughter of?

(6) *La campagnia di cui questo spaventa il presidente.  
    the company of which this frightens the president

The third property of CPVs is easier to tame than the above-mentioned characteristics: they are stage-level predicates. This property is highly predictable since causative verbs in general involve a change of state, which in turn implies the temporal attribution to some entity. In fact, Endo and Zushi (1993) argue, with ample syntactic and semantic evidence, that CPVs like *frighten are stage-level predicates. Let me repeat here one of their arguments for their claim. The stage-level vs. individual-level distinction advanced in Kratzer (1995) explains the following contrast with respect to location adverbial modification.

(7) a. The boy was drunk in my room.  
    b. *The boy was smart in my room.

The stage-level predicate *drunk in (7a), as opposed to the individual-level predicate smart in (7b), expresses a transient state of the subject entity and thus is consistent with the semantic requirement of the locative phrase in my room, which generally expresses a temporal location of some object. Then, Endo and Zushi proceed to show that the same semantic dichotomy also accounts for the contrast between CPVs like *frighten and non-causative ordinary psych verbs like fear.
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(8) a. Those pictures of himself always frighten John in the dark room.
   b. John always fears those pictures of himself in the dark room.

The locative phrase *in the dark room* can modify the event of those pictures’ frightening John in (8a) but the same locative expression only modifies the nominal *those pictures of himself* in (8b). Thus, CPVs are stage-level predicates.

Fourth, CPVs allow the object to bind the subject, once again a property not shared by ordinary transitive verbs as witnessed in (9c) and (10c). Compare (9a, b) and (10a,b) with (9c) and (10c). Crucially, volitionality on the part of the Causer subject makes impossible the intended variable binding in (10d) in Japanese (see Fujita (1993)).

(9) a. His promotion pleases everyone.
   b. His photograph pleased everyone.
   c. *His father hit everyone.

(10) a. Sono hito-no uwasa-ga daremo-o nayam-ase-ta.
   The person-GEN rumor-NOM everyone-ACC be annoyed-CAUSE-past
   “The person’s rumor annoyed everyone.”
   b. Soitu-no shippai-ga daremo-o nayam-ase-ta.
   That guy-GEN failure-NO everyone-ACC be annoyed-CAUSE-past
   “The guy’s failure made everyone retire.”
   c. *Sono hito-no hahaoya-ga daremo-o nagut-ta.
   The person-GEN mother-NOM everyone-ACC hit-Past
   “The person’s mother hit everyone.”
   d. *Soitu-no musuko-ga wazato daremo-o nayam-ase-ta.
   That guy-GEN son-NOM intentionally everyone-ACC be annoyed-CAUSE-past
   “The guy’s son intentionally annoyed everyone.”
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The final property of CPVs is that they exhibit scope interaction between the Causer subject and the Experiencer object. (11a, b) are ambiguous between the “what>every” and “every>what” interpretations. Crucially, once what is replaced by who, the scope interaction disappears: The only reading available in (12) is that in which who takes scope over what. The Japanese data in (13) also pattern with (11-12) with respect to scope (non-) ambiguity.

(11) a. What worried everyone? (Kim and Larson (1989))
    b. What was worrying everyone? (Kuno et al (1999))

(12) a. Who bothered everyone? (Kuno and Takami (1993))
    b. Who was worrying everyone?

(13) a. Nani-ga  minna-o  shinpais-ase-ta  no?
    what-NOM  everyone-ACC  be worried-CAUSE-past  Q
    “What worried everyone?”
    b. Dare-ga  minna-o  shinpais-ase  te-iru  no?
    who-NOM  everyone-ACC  be-worried-CAUSE  PROG  Q
    “Who is worrying everyone?”

We have reviewed so far a total of five major properties of CPVs, summarized in (14). The order of the properties is changed for purposes pertaining to the remainder of this paper.¹ ²

(14) Properties of Causative Psych Verbs
    a. They are stage-level predicates.
    b. The Experiencer object of the verbs is an extraction barrier.
    c. They permit backward binding
    d. They allow the object to bind the subject.
    e. They exhibit scope interaction between the subject and object.
It is obvious now that CPVs, with these peculiar properties, have been regarded as evidence that any principled generative attempt has the apparent impression of being doomed to fail in this particular domain of psych verbs, and that these properties are simply a matter of lexical idiosyncrasy. At the same time, these challenging peculiarities have also stimulated many scholars to make various proposals, whether syntactic or lexical semantic or even pragmatic. However, none of the previous approaches have succeeded in giving a principled explanation for the major properties of the CPVC. I will argue that the theory of Dynamic Semantics to be developed below offers a natural explanation for the relevant properties, thereby dispelling the notion that this construction is idiosyncratic.

3. Dynamic Semantics

Dynamic Semantics is one of the approaches to the lexical semantics-syntax interface which maintains that lexical semantics is not interpretive but dynamic in that basic semantic structures (i.e., the so-called LCS of a verb) are generated on the basis of a finite set of semantic primitives such as CAUSE, BECOME and BE by the general syntactic operations Move and Merge (see Nakamura (1995, 1997a, 1997b)). The derivational model in (15) adopts two theses currently entertained in the Minimalist Program (Chomsky (1995)) and Distributed Morphology (Halle and Marantz (1993) and Marantz (1997)). First, the model adopts the thesis of Multiple Spell-Out proposed by Epstein et al (1998). Second, the model holds that the Lexicon must be disintegrated into three components: Narrow Lexicon, Vocabulary and Encyclopedia. The Narrow Lexicon provides the lexical-syntactic features that the syntactic operations (Merge and Move) manipulate. The Vocabulary provides the phonological content to the terminal nodes after the application of all syntactic operations, while the Encyclopedia stores the set of special meanings such as idioms and is responsible for pragmatic
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We adopt the view that the features or primitives in the Narrow Lexicon are further divided into two categories: Functional Semantic Categories (FSCs) and Non-Functional Semantic Categories (NFSCs) (see Nakamura (1995, 1997a, 1997b)). FSCs are a finite set of primitives that serve to identify a linguistically significant class of verbs whereas NFSCs consist of variables and constants. Following Nakamura (1995, 1997a, 1997b), I hold that FSCs are endowed with their own idiosyncratic selectional restrictions like (16), which any lexical semantic theory must stipulate in some form and which are probably universal.

(15) The Derivational Model of Dynamic Semantics

![Diagram of the Derivational Model of Dynamic Semantics]

(16) Selectional Restrictions of FSCs

a. DO: [_____ACTION]
b. CAUSE: [_____EVENT]
c. CONTROL: [_____EVENT]
d. BECOME: [_____STAGE]

The FSCs listed here have been widely assumed by generative semanticists (e.g., McCawley (1973)) and Dowty (1979), among others. The predicate DO is a semantic element shared by all action verbs such as jump, run, and walk and
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which takes an agentive argument as its Spec. The predicate CAUSE is a semantic element covering causative verbs like break, amuse, and render and which takes a non-volitional Causer argument as its Spec, while CONTROL is its agentive counterpart. BECOME is a predicate denoting the change of state of some entity and which takes a Theme argument as its Spec.

Now that we have introduced the theoretical assumptions of Dynamic Semantics, let us consider, for example, how the intransitive use of break as in The vase broke is generated in this framework. A set of concatenations of FSCs and NFSCs in accordance with the selectional restrictions of the former will yield the following lexical-syntactic structure (see Nakamura (1995, 1997a, 1997b)).

(17) BECOME’
   X=The vase
   BECOME
   BROKEN

This structure is transferred to PF, where predicate raising moves BROKEN to BECOME. The resulting semantic complex is assigned the phonological feature /breik/ at PF in consultation with Vocabulary. To the LF side, however, the structure in (17) is directly transferred and assigned the correct semantic interpretation [THE VASE BECOME BROKEN]. Thus, on this approach, there is not a traditional category of verb at LF: in other words, the notational category of verb is nothing but a PF morphophonological translation of the semantic amalgam constructed by predicate raising.

4. A Dynamic Semantic Explanation

I would like to propose here a lexical-syntactic explanation of the properties
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of CPVs, repeated here as (18), within the framework of Dynamic Semantics.

(18) Properties of Causative Psych Verbs
   a. They are stage-level predicates.
   b. The Experiencer object of the verbs is an extraction barrier.
   c. They permit backward binding
   d. They allow the object to bind the subject.
   e. They exhibit scope interaction between the subject and object.

4.1. Deriving the Properties of Stage-Level Predicates and Extraction Barriers

Let us first deal with the property in (18a): the CPV is a stage-level predicate. A common opinion about CPVs is that they belong to the class of change of state verbs such as *break*. So I assume the following semantic structure in (19) for the sentence *The news amused Mary*.

(19)  \[
  \text{CAUSE} \\
  \text{The news} \\
  \text{CAUSE} \\
  \text{CAUSE} \\
  \text{BECOME}\text{'} \\
  \text{Mary} \\
  \text{BECOME}\text{'} \\
  \text{BECOME} \text{ AMUSED}
\]

AMUSED can be reasonably assumed to be a stage-level constant, the property consistent with the selectional restriction of BECOME. It is also plausible to
assume that BECOME and CAUSE are also stage-level in nature as BECOME
and CAUSE are both spontaneous. Thus, the whole semantic conglomerate
constructed by predicate raising, i.e., the CPV, must be a stage-level predicate.

Let us consider the property in (18b): the Experiencer object of the CPVC is
an extraction barrier. The relevant examples are repeated below.

(20) a. *Who did the news surprise a daughter of?
   b. Who did you see a daughter of?
(21) *La campagnia di cui questo spaventa il presidente.
    the company of which this frightens the president

Again, this property is naturally accounted for. Take (20a) for example. The
relevant part of the lexical-syntactic structure for (20a) is shown in (22) below,
where the Experiencer object of the CPV surprise is located in the “subject”
position of the BECOME projection. Thus, the ungrammaticality of (20a) is
ultimately reduced to the Subject Condition, on a par with the examples in (23).
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(23) a. *I wonder what a book about it, appeared last year.
   b. *What, did your interest in it, surprise John?

4.2. Deriving the Properties of Backward Binding, Variable Binding and Scope Interaction

Let us now turn to the rest of the properties of the CPV, repeated here.

(18) c. They permit backward binding
d. They allow the object to bind the subject.
e. They exhibit scope interaction between the subject and object.

First of all, the generalization concerning (18c) in section 2 was that only if the subject is a non-volitional Causer subject, CPVs allow backward binding, as shown in the examples in (1-4), repeated here as (24-27).

(24) Pictures of himself worry John.
(25) Zibun-ga gan kamo shirenai koto-ga Hiroshi-o
   self's-NOM cancer may fact-NOM Hiroshi-ACC
   nayam-ase-ta
   be annoyed-CAUSE-past
   “The fact that himself may have cancer worried Hiroshi.”
(26) * Friends of each other intentionally pleased John and Mary.
(27) * Zibun-no furyoo-gakusei-ga Yamada-sensei-o
   self's-GEN bad-students-NOM Yamada-teacher-ACC
   wazata shinpais-ase-ta
   intentionally be worried-CAUSE-past
   “Self’s bad students intentionally worried Professor Yamada.”
In the same section, we also noted that, surprisingly, (18d) too is determined by volitionality on the part of the non-volitional Causer subject, as shown by the following examples. The well-formed cases of variable binding involve non-volitional Causer subjects.

(28) a. His promotion pleases everyone.
   b. *His father hit everyone.

(29) a. Sono hito-no uwasa-ga daremo-o nayam-ase-ta.
    The person-GEN rumor-NOM everyone-ACC be annoyed-CAUSE-past
    “The person’s rumor annoyed everyone.”
   b. *Soitu-no musuko-ga wazato daremo-o nayam-ase-ta.
    That guy-GEN son-NOM intentionally everyone-ACC be annoyed-CAUSE-past
    “The guy’s son intentionally annoyed everyone.”

We also pointed out that, even more surprisingly, the presence or absence of volitionality on the subject of a CPVC also determines scope relations between the subject and object, as evidenced in (30-32) below.

   b. What was worrying everyone?  (Kuno et al (1999))

(31) a. Who bothered everyone?       (Kuno and Takami (1993))
   b. Who was worrying everyone?

(32) a. Nani-ga minna-o shinpai-sase-ta no?
    what-NOM everyone-ACC be worried-CAUSE-past Q
    “What worried everyone?”
   b. Dare-ga minna-o shinpai-sase-te iru no?
    who-NOM everyone-ACC be worried-CAUSE-past Q
    “Who is worrying everyone?”
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Now that three of the properties of CPVs are all sensitive to the same lexical-semantic criterion of volitionality on the part of the Causer subject, the question we must answer can be reformulated as follows.

(33) When CPVs involve a non-volitional Causer subject, why do CPVs exhibit the following set of properties?
   i) backward binding
   ii) scope interaction between the subject and the object
   iii) variable binding of the subject by the object

I argue that these properties are best accounted for by the post-Spell-Out insertion at LF of the primitive I will call SENSE to assign the Experiencer role to the direct object of an CPVC. SENSE is a primitive predicate present in the semantic structure of predicates denoting mental activities such as see, hear, touch, understand, think, believe, and so on. This semantic primitive is “superimposed” onto the structure sent to LF. Thus, the structure for (34a) must be as in (34b) at the time of Spell-Out. SENSE is then covertly merged on top of (34b) as in (34c).

(34) a. Pictures of himself pleased John.
   b. pictures of
      himself
         CAUSE
         CAUSE
         BECOME’
         John
         BECOME AMUSED
Now, the answer to the question concerning backward binding is obvious: the covert Experiencer John in [Spec, SENSE] binds the NP pictures of himself.\(^6\)

Let us consider in more detail the mechanism of the covert insertion of SENSE on top of the generated structure as in (34c).\(^7\) We have assumed, in the previous section, that the spec position of BECOME is occupied by a Theme argument. However, it has been unanimously agreed in the literature that the direct object of a CPV is an Experiencer, and this role must be assigned correctly to the object until LF; otherwise, the derivation would crash if \(\theta\)-roles are considered to be syntactic features (See Hornstein (1999)). Thus, I will assume here that SENSE covertly attracts the Theme argument into its Spec to assign it the Experiencer \(\theta\)-role, the nearest NP compatible with that semantic role. In other words, the Causer subject pictures of himself cannot count as the nearest argument able to receive the relevant role.

This analysis predicts that only the Experiencer arguments should be
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attracted covertly to the spec of SENSE to covertly bind the Causer. This prediction is in fact borne out in the contrast between (35a) and (36a), on the one hand, and (35b) and (36b), on the other. Notice, crucially, that the (a) examples involve sentient direct objects which, combined with emotive adjectives (*happy* and *embarrassing*), qualify as bearing the Experiencer role, whereas the (b) examples involve Theme direct objects which do not. Therefore, the proposed covert insertion of SENSE is motivated. See also the discussion in sections 5 and 6 for more data illustrating the importance of experiencerhood of the object for backward binding.

(35) a. Pictures of herself made Ruth happy.
   b. *Pictures of herself made Ruth famous.       (Rizzi (1993))

(36) a. That book about herself struck Mary as embarrassing
   b. *That book about herself struck Mary on the head.
   (Bouchard (1995))

Two questions, however, arise at this point: i) What is the evidence supporting the covert insertion of SENSE and ii) why do we not obtain the backward binding effect when CPVs involve volitional Causers or Agents. The first important clue to the first question is provided by the following contrast in pragmatic (un-) acceptability originally attributed to Akatsuka (1973).

(37) a. *The color of the lump amused the blind man.
   b. The shape of the lump amused the blind man.

Our real-world knowledge tells us that the blind man cannot see the color of the lump, which leads to the unacceptability of (37a). Thus, a necessary condition on the use of *amuse* must be that the person involved has the capacity to perceive the
The object denoted by the subject of the sentence. In fact, once the object is turned
into one that even a blind person can perceive, the sentence becomes felicitous; in
(37b), the person, though he/she cannot see, nevertheless can perceive the shape
of the lump. On the basis of these observations, the pragmatic contrast between
(37a) and (37b) is best accounted for by the insertion of SENSE.

The claim that SENSE is superimposed on the lexical-syntactic structure
after Spell-Out is also supported by Croft (1993). He convincingly argues, from
the cognitive perspective, that mental interaction does not represent a one-way
relation from humans to objects but a bilateral relation between the two: the
relation presupposes the perception of the object (signal/stimulus) by the human
being although this perception is not expressed linguistically. This insight is most
plausibly captured by the covert insertion of SENSE. Thus, the proposed analysis
is corroborated from a cognitive perspective by Croft’s (1993) observation.

Third, Fillmore (1972) suggests that the adverb personally is typically
associated with Experiencer subjects, and this suggestion is validated by the
following data.

(38) a. Personally, I hated him.
   b. *Personally, I killed him.
(39) a. Personally, I don’t like roses.
   b. *Personally, I hit you.
   c. Personally, your proposal doesn’t interest me.

In (38), for example, personally can be associated with I in the first sentence but
not in the second sentence and this seems to correlate with the fact that I is an
Experiencer subject in (38a) but not in (38b). The same story is true for (39a, b)
as well. Thus, the generalization that the adverb personally must be associated
with an Experiencer subject. With this generalization in mind, the grammaticality
of (39c) strongly suggests that there must be some covert Experiencer subject. The most plausible interpretation of the acceptability of (39c) is that the covert subject of SENSE serves as the desired Experiencer subject. On the basis of these three considerations, we can conclude that the covert insertion of SENSE is justified.

Let us now turn to the second empirical question of why we do not obtain the backward binding effect when CPVs involve volitional Causers or Agents. One possible answer to this question is to say that the Experiencer and the volitional Causer (Agent) are in complementary distribution. Fujita (1994) argues that both the Agent and the Experiencer arguments appear in the same position of [Spec, VP1] in his revised extended IP structure, on the assumption that V1 is responsible for volition. And this is hardly surprising as the two roles both involve animate entities. From this, it follows that whenever an Agent fills the subject position, the Experiencer is excluded from the position and vice versa.

Another possible solution equally worth pursuing is that some form of minimality prevents the overt Agent and the covert Experiencer from appearing in the same structure. The LF structure for (40a), for example, must be as in (40b), where the underlined part is phonologically empty.

(40) a. *Friends of each other intentionally pleased John and Mary.
   
   b. [John and Mary SENSE [Friends of each other CAUSE [John and Mary BECOME PLEASED]]]

The structure in (40b) is similar to the structures of ungrammatical cases of local binding such as (41) below, where the agentive arguments, Mary and no one, intervene between the antecedents and the anaphors. ((41a) is due to Jacobson and Neubauer (1976), and (41b,c) to Asudeh (1999).) Thus, it is quite reasonable to hypothesize that (40a) is ruled out by an intervention effect on a par with (41)
even though the insertion of SENSE is executed covertly.

(41) a. *John, thought that Mary took a picture of himself.
    b. *John, didn’t know that Mary took that picture of himself.
    c. *Bill, thought that no one could make a picture of himself, in the Times acceptable to Sandy.

With these considerations, I contend that the insertion of SENSE does not have the desired effect of providing an appropriate antecedent for the direct object reflexive at LF when the subject assumes the volitional Causer role.

Now, the dynamic semantic explanation for the properties in (18d, e) is also obvious. First, CPVs allow the object to bind the subject only when the subject is non-volitional Causer ((18d)) since otherwise the SENSE insertion would not play the relevant role of providing a quantifier for the bound pronoun due to the intervention of an Agent. Second, sentences based on CPVs exhibit scope interaction between the subject and object only when the subject is non-volitional Causer ((18e)) because it is only in this environment that SENSE can be inserted to provide the surface direct object of a CPVC with an Experiencer role. Thus, the Experiencer in [Spec, SENSE] covertly c-commands the Causer, which leads to scope ambiguity.

5. Exploring A Mystery: More on Backward Binding

We have argued in the previous section that all the properties exhibited by the CPVC receive a natural explanation on the Dynamic Semantics approach. In this section, we will again focus on backward binding effects in CPVCs. Although Fujita (1996) and Pesetsky (1995) proposed syntactic generalizations on backward binding which have so far been widely adopted, I will argue that their generalizations are factually incorrect. I will propose then an alternative semantic
Fujita (1996) and Pesetsky (1995) both note that backward binding is in fact commonly observed in a far wider range of environments than psych verbs, contra Belletti and Rizzi (1988). On the basis of the examples in (42-44), Fujita and Pesetsky propose the generalizations in (45) and (46), respectively.

(42) Syntactic Causatives
   a. Each other’s remarks made John and Mary angry.
   b. Pictures of each other make us happy.

(43) Lexical Causatives
   a. ?Each other’s stupid remarks eventually killed John and Mary.
   b. ?Those pictures of himself ultimately destroyed Bill.

(44) Ditransitive Verbs
   a. Those books about himself taught Bill, the meaning of caution.
   b. Pictures of himself give John the creeps.

(45) A Causer argument of a predicate \( \pi \) may behave as if c-commanded by an argumental DP governed by \( \pi \).

(46) At the relevant level (=LF), the Causer subject, but not the Agent subject, of a causative predicate is c-commanded by the Causee subject.

We will limit ourselves here to a critical examination of Fujita (1993, 1996). Fujita (1993,1996) carefully explores the binding-theoretic consequences of Chomsky’s (1995) Agr-based Case Theory, according to which objects as well as subjects are subject to Case checking via Spec-Head Agreement with an Agr. Chomsky (1995) argues that in languages like English, objects move to [Spec, AgrOP] only at LF while subjects move to [Spec, AgrSP] in overt syntax. When combined with the VP-internal subject hypothesis, this Case theory predicts that at LF the object c-commands the trace of the subject inside VP, as in (47).
However, Fujita’s (1993, 1996) analysis is faced with the following empirical problems. First, his syntactic account cannot distinguish the grammatical (a) examples and the ungrammatical (b) examples in (48-50): they all involve causative verbs with non-volitional Causers, thereby conforming to the generalization in (46).

(48) a. Pictures of herself made Ruth happy.
    b. *Pictures of herself made Ruth famous. (Rizzi (1993))

(49) a. That book about herself struck Mary as embarrassing.
    b. *That book about herself struck Mary on the head.
       (Bouchard (1995))

(50) a. Jibun-ga jitsuwa shushou-no kakushigo datta
    self-NOM in fact prime minister-GEN love child was
    koto-ga Keiji-o hukouni-shita.
    fact-NOM Keiji-ACC unhappy-made
    “The fact that self was in fact a love child of the prime minister made Keiji unhappy.
    b. ?? Jibun-ga jitsuwa shushou-no kakushigo datta
    self-NOM in fact prime minister-GEN love child was
    koto-ga Keiji-o yuumeini-shita.
    fact-NOM Keiji-ACC famous-made
    “The fact that self was in fact a love child of the prime minister made Keiji famous.”
Second, his syntactic analysis predicts the examples in (51) to be ungrammatical, because even after the direct object has moved into [Spec, AgrOP], it cannot bind the trace of the Causer subject.

(51) a. The picture of himself in *Newsweek* dominated John’s thoughts.
    b. The picture of himself in *Newsweek* shattered the peace of mind that John spent the last six months trying to restore.
    c. The picture of himself in *Newsweek* made John’s day.

(Pollard and Sag (1992))

Third, counterexamples to his analysis abound in those idioms denoting psychological states undergone by some sentient entity or what I call psych idioms elsewhere (see Sato (2002)). In many languages, certain body-part expressions behave like the Experiencer of otherwise non-psychological verbs, forming almost idiomatic psych phrases or psych-idioms. The relevant examples are given in (52-54) below. ((52-53) are from Pesetsky (1990).) Notice again that in these examples as well, the object cannot bind the Causer subject even though the former has undergone LF object shift into [Spec, AgrOP], so these examples should be ungrammatical, contrary to fact.

(52) a. These rumors about himself caught John’s attention.
    b. The jokes about herself got Mary’s goat.
    c. Each other’s nasty remarks really ruffled John and Mary’s goats.

(53) a. The photos of himself made John’s face turn red.
    b. The rumors about herself made Mary’s hair stand up.
    c. Each other’s threats made John and Bill’s skins crawl.
(54) a. Jibun-ga hontowa gan de aru kamoshireinai toiu
self-NOM really cancer have may
huan-ga Taro-no kokoro-o midashi-ta.
anxiety-NOM Taro-GEN heart-ACC disturb-past
“The anxiety that self may have cancer disturbed Taro’s heart.”

b. Jibun-ga hisokani koui-o motteita musume-no yasashii
self-NOM secretly favor-ACC had girl-GEN gentle
hohoemi-ga Taroo-no mune-o odor-ase-ta.
smile-NOM Taro’s chest-ACC dance-CAUSE-past
“The gentle smile of the girl with whom self had been secretly in love
made Tsuyoshi’s chest dance.”

Finally, Fujita’s analysis incorrectly predicts that (55), in which the vase
moves to [Spec, AgrOP] at LF and binds the trace of the subject itself, should be
grammatical, contrary to fact.

(55) *Pictures of itself broke the vase.

Based on the counterexamples above, we conclude that Fujita’s (1993,1996)
minimalist account, as well as his generalization in (46), cannot be correct. (The
same counterargument holds for Pesetsky’s (1995) account of backward binding.)

Now, let us consider how the examples above are accounted for on the
proposed post-Spell-Out insertion of SENSE approach. Since we have already
accounted for (48-50), we will deal with the examples from (51) through (54)
here. The only potential problem here is to move the sentient entity denoted by
the direct object to [Spec, SENSE] at LF, as extraction of the Experiencer
argument violates the Left Branch Condition proposed by Ross (1967). I will
propose that movement of an Experiencer from a pronominal genitive position is
permitted in this case, though this is not a generally available option for English (see also Campbell and Martin (1989) for a related proposal.) Baker (1988b) argues on the basis of possessor-raising facts in several languages that if the head noun is incorporated into the governing verb, the position occupied by the possessor is lexically governed by the verb, as a result of his Government Transparency Corollary (GTC). With this in mind, consider now (52b), for example, repeated here as (56a). According to the proposed framework, (56a) should have the structure in (56b).

(56) a. The jokes about herself got Mary’s goat.
    b. "HAVE"
       / 
      /   
the jokes about HAVE’
       /     
      /      
      herself HAVE (get) Mary’s goat

In this structure, the NP *Mary’s goat* is assigned the Theme role, but the possessor *Mary* must be assigned the Experiencer as *Mary* can be construed as an Experiencer in this example. This is achieved by moving *Mary* into the spec of SENSE, which provides the covertly raised NP with the Experienceer role. The phrase *get one’s goat* is an idiom roughly meaning *anger*. I will hold that the interpretation of an idiom requires the idiom chunks to be grouped together under one single node: since the meaning of the idiom is *anger*, the Encyclopedia, the locus of special meanings, replaces the idiom (*get one’s goat*) with the semantically corresponding verb (*anger*) when the idiom has to be interpreted at LF. This argument gains strong support from the assumption in the GB era that an idiom was assumed to be converted into a derived lexical item by certain idiom rules and to behave as a single verb, as shown in (57), where the derived lexical
item \( \nu \) take advantage of assigns the Theme role to \textit{John} as if it were an ordinary single transitive verb (see Chomsky (1981)).

(57) John, was taken advantage of t.

Now, idiom interpretation is achieved by moving \textit{goat} to the head of its governing verb \textit{get}. Then, thanks to the GTC, the possessor \textit{Mary} can successfully move covertly to the spec position of SENSE to receive the Experiencer role without violating the Left Branch Condition. The other examples in (51) through (54) are amenable to the same analysis since their VPs are interpreted as “psych idioms” whose \( \theta \)-grids invariably include the Experiencer role.

Therefore, a new generalization emerges for backward binding.

(58) A New Generalization on Backward Binding (Preliminary Version)

\textit{All and only verbs of mental causation and VPs semantically convertible as such in the Encyclopedia permit backward binding.}

By \textit{verbs of mental causation} I mean the now familiar class of non-volitional causative verbs. The phrase “VPs semantically convertible as such in the Encyclopedia” refers to those verbs that, combined with other fragments of a sentence, gain a mental causation interpretation, the typical cases of which are psych idiom interpretations.

To recapitulate this section, we first showed that Fujita’s minimalist analysis of backward binding yields incorrect results in certain cases involving backward binding, casting serious doubt on the validity of his generalization in (46) as well as his minimalist account of the backward binding effect in (47). Then, I proposed an alternative generalization and accounted for the counterexamples to Fujita’s analysis according to the proposed framework and based on Baker’s (1988b)
6. An Extension of the Proposed Account for Backward Binding

In this section we point out that backward binding effects are also observable in middle constructions and tough-constructions as well. The middle construction is exemplified in (59).

(59) Russian novels read easily.

A yet unsettled issue about this construction is the status of for PP in (60a): Agent or Experiencer. I simply assume that this phrase should be regarded as an Experiencer, since, if it were an Agent, it would surface in the form of a by-phrase as in ordinary passives but this is not possible in middle constructions.

(60) a. This book reads easily for John.
    b. Mary was kissed by John.

Of great importance here are the middle construction examples in (61), which exhibit backward binding.

(61) a. Books about herself read quickly for Mary.
    b. *Books about oneself read quickly for Mary. (Stroik(1992))

On the assumption that the only mechanism to license reflexives like herself in this case is local binding by a proper antecedent, the post-Spell-Out insertion of SENSE approach readily accounts for the contrast between (61a) and (61b): (61a) allows Mary in [Spec, SENSE], which is superimposed on top of the structure, to
covertly bind the reflexive *herself*, while (61b) is ungrammatical since *Mary* cannot serve as a proper antecedent for the reflexive *onself* due to \( \Box \)-feature mismatch. If this account is correct, the middle construction provides further support for the proposed approach.

Interestingly, the so-called *tough*-construction also exhibits backward binding effects. The analysis of (61) above is also extended to these cases as well (The data in (62) are from Pesetsky (1987) and Fujita (1996).)

(62) a. Books about herself have become easy for Mary.
    b. Pictures of each other were not hard for us to draw.

We have observed so far that backward binding effects are observable not only in the causative psych verb construction but also in the middle construction and the *tough*-construction. One thing to be noted about these three constructions is that a surface non-subject argument invariantly bears the Experiencer role. Then, how can we ultimately connect this fact to the proposed covert insertion of SENSE analysis? Although I do not have any definite answer to this, there are some plausible answers, only one of which I will outline here. A thought or feeling conveyed by the linguistic expression uttered by a speaker exists only in the internal subjective cognitive world of the speaker. So, when one utters a sentence which denotes his/her mental evaluation of an event, the covert phrase “I think” or “I feel”, though linguistically absent, must be necessarily attached to the sentence initial position: In other words, the overt part of the linguistic expression is structurally dominated by these covert phrases. Since the mental reaction verbally conveyed by an utterance must necessarily belong to the speaker of that utterance, it is to be expected that a sentence uttered with the intention of expressing the mental reaction of a particular person is deviant when expressed in the utterance by another person who does not undergo the mental states. This
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prediction is borne out by the following examples.

(63) a. *You feel hungry.
    b. *You are hungry.
    c. *It is evident/fortunate/surprising to you that John has failed in the exam.

Now, if we are to capture this aspect of mental evaluation in generative linguistic terms, the most natural way I can think of is to insert SENSE covertly on top of a syntactic structure which involves a mental reaction and internal subjective evaluation of an event by the speaker/utterer. If this conceptual story is on the right track, it provides a rationale for the proposed “performative” analysis of backward binding (See also section 7). Based on these arguments, I will also revise (58) (repeated here as (64)) as in (65).

(64) A New Generalization on Backward Binding (Preliminary Version)

    All and only verbs of mental causation and VPs semantically convertible as such in the Encyclopedia permit backward binding.

(65) A New Generalization on Backward Binding (Final Version)

    All and only verbs denoting the mental subjective evaluation of an event by a speaker permit backward binding.

7. A Support for Generative Semanticists

I have claimed that backward binding is best accounted for by the post-Spell-Out insertion of SENSE on top of a generated structure, in consultation with the Encyclopedia. This analysis strongly reminds us of the performative analysis entertained in the heyday of generative semantics by Ross (1970). It will be helpful here to quickly review his analysis.
According to Ross (1970), all sentences are analyzed as having the underlying structure in (66), where TELL, ORDER, and ASK, each a theoretical construct, represent the declarative, imperative, and interrogative performative verbs, respectively. The bracked part in (66) is called the performative clause. This part does not surface linguistically.

\[(66) \ [I + \text{present} + \text{TELL/ORDER/ASK} + \text{you}] + S\]

Ross adduces the following empirical evidence in (67) for his analysis in (66).

\[(67)\]

a. That article was written by Bill and myself/*himself/*themselves.
   b. People like *herself/yourself are rare.
   c. Frankly, that museum is wonderful.

The reflexives \textit{himself} and \textit{themselves} cannot appear in (67a), as opposed to \textit{myself}, which means that \textit{himself} and \textit{themselves}, but not \textit{myself}, lack proper antecedents. This contrast strongly supports the covert presence of the proper antecedent \textit{I} in the form of (68a), where the performative clause is later deleted.

\[(68)\]

a. \textbf{I TELL YOU} [that article was written by Bill and myself/*himself]
   b. \textbf{I TELL YOU} [people like *herself/yourself are rare]
   c. \textbf{I TELL YOU} [Frankly, that museum is wonderful]

(67b, c) also support the performative analysis. First, the acceptability of (67b) is again accounted for by assuming that the object \textit{you} in the performative clause functions as an antecedent for the reflexive, as in (68b). Second, on the assumption that adverbs like \textit{frankly} serve as sentential modifiers of communicative verbs, the grammaticality of (67c) is accounted for if the adverb
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modifies the covert performative verb TELL in the performative clause in (68c).

It is now obvious that Ross’s (1970) performative analysis bears a striking resemblance to my post-Spell-Out insertion of SENSE. In fact, the only difference between Ross (1970) and my analysis is that what was deleted by the performative deletion in Ross (1970) is covertly merged in my account. Thus, if the proposed analysis of backward binding is correct, it provides strong theoretical support for the performative analysis.

8. Conclusion

To conclude, I have first shown in this paper that a number of peculiar properties of the causative psych verb construction receive a natural explanation within the framework of Dynamic Semantics. Then, I specifically focused on the most notorious property exhibited by CPVs, that is, backward binding. I demonstrated that this phenomenon is best accounted for on this approach by the post-Spell-Out insertion at LF of SENSE, which is superimposed on top of a lexical-syntactic structure. I have also pointed out several empirical problems concerning the generalizations on and approaches to backward binding proposed by Fujita (1993, 1996) and Pesetsky (1995), and argued for an alternative generalization on backward binding, also taking into considerations other non-psych contexts involving backward binding such as the middle construction and the tough-constructions. I have also pointed out the striking resemblance between my analysis and Ross’s (1970) performative analysis, which, if real, constitutes a strong rationale for the partial ressurection of the generative semantic insights in the context of the Minimalist Program (cf. Chomsky (1995).)

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Notes

1) The list of properties of the CPV in (14) may include the T/SM restriction which says that there are no simplex predicates which simultaneously realize the Causer argument and the Target or Subject Matter argument, as evidenced by the ungrammaticality of (i).

   (i) *The articles in the Times angered Bill at the government. (Pesetsky (1995))

However, the restriction is not the correct constraint for causative psych verbs for two reasons. First, sentences such as (i) based on verbs of inspiring and discouraging or verbs of accustoming and alienation are all acceptable in spite of the fact that they seem to violate this restriction.

   (ii) a. Sue’s remarks aroused her to action.

   b. ?The passage of time accustomed the Berliners to their walls. (Pesetsky (1995))

Second, the examples supposed to be ruled out by the restriction are equally ruled out for independent reasons. Hiromi Matsumura (p.c.) points out that the two thematic roles Causer and Target of Emotion/Subject Matter are in fact the same thematic role in a linguistically relevant sense, so (i) is rendered unacceptable by some sort of redundancy. Exactly along this line, Baker (1988a) claims that in the lexical representation of frighten
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in (iii) the object *at death* is identified with the Causer subject *ghosts* as in (iv), and only one of them can be projected to the initial syntactic structure.

(iii) Ghosts frighten John (*at death)

(iv) \texttt{frighten}: \texttt{CAUSE (x, GO_{PSYCH} (y, TO(FEAR-OF (x))))}

This line of account is in fact also suggested by Pesetsky himself. He hints that the restriction might be a consequence of a broader constraint on lexical entries which he calls the Thematic Diversity formulated as in (v). See Pesetsky (1995) for details.

(v) If $\alpha$ and $\beta$ are distinct arguments of a predicate $P$, the thematic role assigned to $\alpha$ must be distinct from the thematic role assigned to $\beta$.

2) The list may also include the idiosyncratic property concerning linking peculiarities. (ia) and (ib) seem to be simple transitive structures with an apparent inversion in the assignment of thematic roles. This linking pattern violates the Uniformity of Theta Assignment Hypothesis proposed by Baker (1988b).

(i) a. John fears thunder.


However, Pesetsky (1995) argues that the purported Theme in the subject position of Experiencer object psych verbs is a Causer, and the NP in the object position of stative psych verbs is the Target of Emotion/Subject Matter (see also note 1). Then, the linking paradox is solved by postulating the following thematic hierarchy. As the linking peculiarities in (i) are no longer a problem, I will exclude them from the list in (14).

(ii) Causer$\rightarrow$Experiencer$\rightarrow$Target/Subject Matter
3) The theory presented here should not be confused with formal semantic approaches such as Chierchia’s (1995). The name of the proposed framework is borrowed from Nakamura (2000).

4) I will omit the purely syntactic structure above BECOME. I will also ignore the syntactic properties of Case and agreement throughout the following discussion.

5) To the best of my knowledge, Akatsuka (1973) was the first to propose the semantic primitive SENSE, although she does not give an explicit definition for it.

6) It has been well-known that the Japanese reflexive jibun is a subject-oriented anaphor. The fact that the Experiencer argument in a CPVC can antecede the reflexive provides another strong support for the structure in (33c). Thanks to Nobuhiro Miyosi (personal communication) for pointing this out.

7) For some theoretical argument for the covert insertion of SENSE, see section 6.

8) Thanks to Masaru Nakamura (personal communication) for pointing this out.

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