A COMPUTATIONAL STUDY OF TRANSITIVITY

A THESIS SUBMITTED TO THE UNIVERSITY OF HYDERABAD
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
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D E C L A R A T I O N

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This is to certify that I, Tanmoy Bhattacharya, have carried out the research embodied in the present thesis for the full period prescribed under Ph.D. ordinances of the University.

I declare to the best of my knowledge that no part of this thesis was earlier submitted for the award of research degree to any university.

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C E R T I F I C A T E

      This is to certify that Tanmoy Bhattacharya worked under my supervision for the Ph.D. degree in Applied Linguistics. His thesis entitled *A Computational Study of Transitivity* represents his own independent work at the University of Hyderabad. This work has not been submitted to any other institution for the award of any other degree.

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CONTENTS

INTRODUCTiON

1.0 **Where** Clause **Meets Film** Theory

Béla Balazs, the **Hungarian-born film** theorist, put forward in the early 1930s , a rather strong hypothesis regarding subjective **identification** — a notoriously difficult theme in film theory, and art theory in general:

> In the cineaa, the camera carries the spectator into the film picture itself. We are seeing everything from the inside as **it** were ...

Thus the spectating activity itself involves a process of identi-fication with, **among** other **things,** the camera -- a process producing a coincidence of the gaze of the spectator with that of the camera.

Within the context of films, Balazs[1] theory **actually** runs into problems since it presupposes a consistent   and uncontra-dicted use of the subjective camera. It suits our purpose, howev-er, to use a **film-theoretic** concept such as Balazs' initially as

1.But it was published only in 1972

a metaphor, to take an exploratory look at the ways a clause unfolds itself as a microcosm of the totality of the linguistic experience of the speaker/spectator.

Very soon, however, we abandon the **mere metaphoric** use of the concept of the camera and we launch the **camera** angle view as a theoretical construct in Chapter II where we also explore the crucial concept of the field of view of a sentence as it figures within the context of discourse. The image of a field seems to lend itself better to the entirety of the **organizational** logic of the kind of theory we advance.

For certain realist film theorists (Bazin (1967), **Kracauer** (1979) et al), the screen wa3 taken to be a window through which one could see **reality.** Later versions of their paradigm, more focused on form, took it as a frame which organizes the visual space and within which the spectator's attention is directed to certain areas of this two-dimensional surface.

What we gain from interfacing with this version of screen **identification** is our discovery and (later) use of the notion of **staging/dramatization** involved in such a framing. Suspending the implicit politics (crucial to film theory people) of staging associated with such **presentations,** we obtain a crucial hold on

the interplay between the structure of a clause and its pragmatic underpinnings by the introduction of a concept of staging in linguistic theorization.

Lacanian theorists use the mirror as a metaphor for the proper characterization of the screen and suggest that identification with the camera be called primary (in contrast with the secondary identification with person-figures). For most French theorists this camera identification was central and thus the spectator identifies less with what is represented than with what stages the spectacle, brings it to visibility (Baudry 1986). In spite of the demetaphorization of the camera that we attempt later, it is still a far cry from a Lacanian concept of spectating where the spectator is supposed to identify him/herself on the screen. The dose of film theory we import into our attempt to understand the interplay of syntax and pragmatics in the context of a clause stops at the formalist tradition. We, however, appropriate the French theorists' emphasis on the centrality of the primary identification to the extent that we use staging as a conceptual tool for clausal analysis.

1.1 Tracking a Shifting Scene

Our understanding of major themes like transitivity (Chapter II), agreement (Chapter III) and classification (Chapter IV) that we take up in this study, needs to remain in touch throughout

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with the specific task of the clause — which 'stages' events and, as a special case thereof, actions. The fundamental problem of this thesis is, therefore, to track a shifting scene down the lanes of a discourse so that connections available in the tacit knowledge of language users can be made explicit.

As we shall outline in detail in Chapter II, computational work on transitivity in effect involves looking at the ups and downs of "saliency" in a clause. There are both soft and hard options of evaluating saliency and the. eby laying bare the anatomy of transitivity. Saliency shapes our route to the heart of the problem of clause structure. The problem as we pose it bears on the familiar issue of anaphoric search/ referential tracking. Our issue therefore becomes a subproblem of an item on the mainstream agenda.

Vhen focusing on the recalcitrant core of this problem of anaphora resolution we see that anaphors send us back to potential antecedents exhibiting weaker or stronger degrees of resolution (in a what is nearly a visual sense of the term). The only efficient way to study strongly resolved and thus exactly defined vs. weakly resolved and thus diffuse nominal entities is to begin with a study of various formal asymmetries that give grammatical shape to saliency differentials. These themes converge

finally on a crucial opposition of natural language, that is of the new versus old information — the single most important concept that drives the present work. The new/old distinction operates in various guises throughout the body of this dissertation, one of which is the Novelty Familiarity Condition of **Heim** (1982) — discussed in connection with anaphora resolution within the context of a version of File-change semantics in Chapter II. The Novelty Condition in its barest **form** (which **applies** specifically to indefinites) looks like the following:

(1) <u>Novelty Condition</u>

An indefinite NP must not have the same referential index as any NP to its left

(1) implies that an indefinite must always carry a **new** referential index. The condition applies regardless of the distance between the two NPs as long as they occur in the same text/ discourse session. The Novelty Condition, for example, rules out a coindexation of the definite with the indefinite in (2) but does not apply in (3).

(2) *He likes <u>the **cat**</u>$_i$ and she hates <u>a cat</u>$_i$

(3) He likes **a** <u>cat</u>$_i$ and she hates <u>the cat</u>$_i$

(**Heim** 1982)

This is because an anaphoric reading of the definite is acceptable. We discuss the generalities of the new/old opposition in

section 1.2.

A quick glance through the following section will clarify
our preoccupation with the investigation of a series of asymmet-
ric dyads like Topic/Focus, Subject/Object etc. collectively
under the rubric of a basic Trajector/Landmark distinction.
Implicit in such a strategy is that it obtains for us, with
growing efficiency, a program for tracking a shifting scene
within the discursive context. These asymmetries, we hope to
show, advance our understanding of the new/old distinction at
each level in the life-span of a clause in a discourse. The
new/old opposition, therefore, is for us a tool for tracking down
the modalities/behaviour of a scene.

NP to NP connections, as an unrevised Novelty Condition
might suggest, however, are not an efficient way to do the track-
ing. Many of the NPs such a procedure would need are not avail-
able in the text. Why should NP to NP tracking not be the game
to pursue? We believe that the answer lies in the way linkages
between sentences are established. A linking of, for example,
S1, S2, S3, ... Sn is established by the clumping together of
situations. For example, in (4) below *such gestures* is a clump
expression which refers to all of the previous sentence and not

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just a part of it.

(4) John welcomed the cat back home, <u>such gestures</u> will make
    Felix happy

There is no way of telling by looking just at the NP *such ges-tures* that it encodes within its meaning the whole of the preced-ing sentence. In case of deictic pronouns also it is not just one NP that is hidden somewhere in the earlier text, rather, a general clumping takes place.

1.2 New versus Old Information

We mentioned in the previous section that a proper under-standing of the new/old opposition through various asymmetries (reflexive of resolution differentials) is the major underlying objective of this study. In fact, the computational claims of this dissertation become valid in light of the present attempt to clearly state the status of new/old information within the over-all structuring of scenes in a discourse.

Mainstream linguistics has for most part refused this topic a theoretical status save some salient exceptions like Vilem Mathesius and Jan Firbas . Researchers in the field of AI on the other hand have picked it up in a big way to explain a number of

1.Firbas (1966) and Mathesius (1967) as quoted in Chafe (1970)

important linguistic facts.

In any speaker/hearer exchange there are regularly some items of information which are new — information exchanged between the speaker/hearer pair for the first time. It is also the case that some of the information is typically old ; shared information -- either already uttered or of common knowledge about the world. Consider the following:

(5)a. The blouse is red
   b. The blouse was red

(5a) might be used in a context of having encountered a blouse where the new information that the blouse is red is added. In (5b), primarily because of the tense, it is likely that the blouse was, in some past time, already an established object of which a new information that it was red is being communicated at the time of the utterance of (5b). In a model like that of Chafe's (1970) where sentences are a complex configuration of semantic units, we note that a repetition is hereby committed in stating that *red* is now in both a and b. A suitably modified Novelty Condition which includes generic indefinites in its range can give a straightforward analysis in terms of the new/old dyad

1. In connection with the Prague School theory of markedness it is often stated that no more than 17% new information should be encoded for communication to succeed.

in addition to the fact that definite **always** encodes old **informa-tion**.

As we mentioned earlier, **this** new/old distinction underlies most of the other dyads we investigate **like Topic/Comment**, Subject/Object, etc. For Chafe (1970) **new** is a **specification** added to a particular semantic unit within a verb or a noun, not to the whole verb or noun. This also provides a way of **distinguishing** certain **mechanisms** that have to do with new/old **information**. In English one often encounters an intonation where a reasonably flat conto r generally carries the old information and items carrying any new information are **generally** spoken with higher pitch. A higher pitch and amplitude are tools used for high-lighting. **We** make use of this phonological concept later in section 1.3.2.3 to **theoretically** construct the property of dou-ble-strike related to focus **constructions**. In (5), the new information is given the highest pitch. The correspondence, however, should be thought of only as approximate.

Our contention that asymmetries only serve to obtain for us a pattern of distribution of new/old information, becomes firmer when we see that in (6) below the asymmetry within VP that we point out in section 1.3.4 is exhibited in terms of the fact that in (at least) marked sentences only the verb contains new infor-

mat ion.

> (6)a. It is raining
>
>   b. The glass broke
>
>   c. The child cried

In all these sentences the verb marks the new information, the
single noun, wherever present (b,c), carries old information.

> With more than one noun per sentence, the situation, howev-
er, changes:

> (7)a. The blouse is in the closet
>
>   b. Floyd broke the glass

In (7), new information is associated with the final noun which
also carries the highest pitch. Chafe (1970) points out that to
understand the meanings of these sentences fully would imply
ascribing newness to the verbs as well although the latter are
not given high pitch. From this, he constructs a hierarchy for
the assignment of a feature like new, consisting of location,
patient, beneficiary, and agent. There will be only one noun per
sentence which is *not* new and this noun will be (looking at the
hierarchy from the other side):

> - the agent if there is one
> - the beneficiary if there is one without an agent

- the **patient** if there is one **without** either an agent or **a**
  benef iciary

- the **patient** if there is also **a** location

Given the word order in English, Chafe derives a left/right
asymmetry from this where it can be seen that new information is
on the left whereas the old information is contained only within
the one noun which is farthest to the right.

An alternate space where the new/old distinction is of
equally crucial importance is in the realm of the pragmatic/
semantic conditions that determine the choice between a definite
and an indefinite NP. Chr istopherson (1939) identified **the**
function of definiteness as the signaling of an NP with which the
audience is already familiar at the current stage of the conver-
sation. An indefinite NP is used to signal a unfamiliar or **novel**
referent. Familiarity theories of definiteness staged revivals
in various forms in linguistics and Artificial Intelligence
research but the interest diminished when the thesis of reference
as a basic function was questioned. Karttunen (1968) proposed
his "discourse referents" (further details provided in Chapter
II) to be the bearers of novelty/familiarity properties and thus
succeeded in disengaging familiarity from reference. Heim (1982)
introduced the construct of "file cards" which achieved a similar
dissociation between familiarity and reference.

The Novelty Condition as stated in (1) is different from traditional familiarity theories of definiteness in the sense that **indefiniteness** is a sufficient condition for novelty, but is not a necessary one. A deictic use of a pronoun, for example, is a case of a novel definite. **Heim** (1982) revises (1) to make indefinites necessary as well when conversation is viewed as a file-keeping activity. In her file-change semantics, the Novelty Condition translates into the following:

> (8) For every indefinite, start a new card; for every defi-
>   nite, update a suitable old card

Let us see what (8) exactly means in **Heim's** theory and how it relates to novelty versus familiarity with respect to the logical **form** .

Heim defines truth of a file in terms of a recursive as-signment of satisfaction conditions to formulas based on a Tarski notation. Satisfaction is a relation between an infinite se-quence of individuals on the one hand and **formulas** on the other and is always relative to a model. A model for English is a pair

1. LF for Heim is a **disambiguated** extensional representation which resembles LF of REST as **wel** as the analysis trees in Mon-tague grammar.

<A,Ext> **where** **A is** a **Bet** of **individuals and Ext is a function**
which assigns an extension to any predicate of **English** so **that,**
if $\&$ is an **n-place** predicate, then $\text{Ext}(\delta)\subseteq A_1 \times A_2 \ldots \times_n'$.

We **want** the rules of semantic interpretation to **assign**
satisfaction conditions to formulas of **LF**. For a given formula δ
the rules should tell us which sequences satisfy i with respect
to a particular model. That is, rules of **interpretation** should
define the relation x $\underline{\text{sat}}_{A\ Ext}$ y to be read as "x satisfies y **wrt**
<A,Ext>."

Once files are defined in terms of satisfaction sets, it is
rather difficult to know either the actuality or the quantity of
the cards they contain. For this reason **Heim** defines the *domain*
of a file. But first, to determine the truth of a file, we need
to find a set of individuals that satisfies it. A sequence fits
if the first member fits Card 1 and so on. For example for the
conversations in (9), in file F there are two cards with the
entries as in (10).

(9)a. A woman was bitten by a dog

   b. She hit him with a paddle

   c. It broke in half

   d. The dog ran away

(10) Card 1 : "is a woman", "was bitten by 2"

Card 2 : "is a dog". **"bit** 1*

Now consider the sequence a_N with the following members:

(11) a_1 : is a woman
      a_2 : is a dog
      a_2 bit a,

a_N as a set satisfies F.   Any segment whose first member   is
not   a woman or whose second member is not a dog or whose   second
member   did not bite the first member, would fail to   satisfy   F.
At   least   one segment has to be consistent for the   file   to   be
true.

Various stages of the conversation are as follows:

(12) F_0: before anything has been said
     F.: after (9a) is uttered

     F_4: after (9d) is uttered

Notice   that F_0 - F. **are** different files. Satisfaction   sets
of segments for each of these files are as follows;

(13) F_0: A (set of all segments whatsoever)
     F. : {a_N: a_1 is a woman, a_2 is a dog, and a_2 bit a_1}
     F_2: {a_N: a_1 is a woman, a_2 is a dog, a_3 is a paddle,
            a_2 bit a_1, and a_1 hit a_2 with a_3}

Heim   (1982)   **calls** the sets (on   the   right)   "satisfaction
sets' and indicates them as $Sat(F_0)$, $Sat(F_1)$, $Sat(F_2)$,etc.

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The LF corresponding to (9) is as follows:

(14)

```
                    T¹
                   / \____
                 2       \
        ∃ 1,2,3           \
                       T_____
                      /\_____    ____
                   Sᵃ    \      \      \
                  / \     \     Sᶜ     Sᵈ
                NP1  S     \___  :       \
                 :  / \       \  it₃ broke \___
        a woman NP2  S        Sᵇ  in half    :
                :    :        / \         the dog₂
           a dog  e₁ was    NP3  S        ran away
               bitten by    :    \
                 e₂       a paddle \
                                  /\
                              she₁ hit
                              him₂ with
                               e₃
```
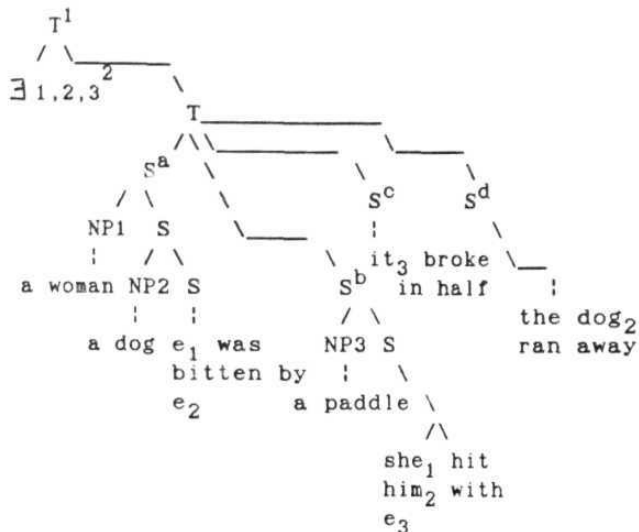
(Heim 1982: 279)

S in (14) here is the LF of (9b); we can calculate the satisfaction condition as follows;

(15) a_N <u>Sat</u> S iff a_3 is a paddle and a_1 hit a_2 with

With this, the change from F_1 to F_2 is stated as:

1. In order to include intersentential anaphoric resolution, Heim considers expressions larger than sentences, namely, texts and a rule of Text Formulation says:
   Attach a sequence of S^S under a T-node

2. A rule of existential closure adjoins a quantifier to the nuclear scope of every quantifier and indefinites are quantified expressions for Heim. The indices indicate binding possibilities.

(16) Sat (F_2) = Sat (F_1) ∩ {a_N: a_N <u>Sat</u> S^b}

In general, a satisfaction condition relates to **file-changes** as **follows**:

(17) S (F') = Sat (F) ∩ {a_N: a_N <u>Sat</u> 4}

where & is the LF of S and F/F' are files that obtain before and after a **par** icular utterance.

Now, the **inability** to identify and determine the **number** of cards in a particular satisfaction set of a file prompts **Heim** to propose the notion of the *domain* of a file. The domain of F, **Dom(F)**, is the set that contains every number which is the number of some card in F. For example, in relation to (9), the follow- ing are the domains of files F_1 and F_2.

(18) Dom (F_1) = {1,2}

     Dom (F_2) = {1,2,3}

Addition of a new card (as mentioned in (8)) can now be stated as **follows**:

(19) The change from F to F' involves the addition of a card number i iff i E Dom (F) and i E Dom **(F')**.

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Now novelty/functionality is defined as follows:

(20) **An NP** is *novel* with respect to a file if its index i ∉Dom (F) and is *familiar* with respect to F if i E **DOB** (F).

Let us now see how deixis interacts with familiarity. Neither a deictic use nor an anaphoric use is possible with indefinites. That is, both deictic and anaphoric references are familiar to the audience. In terms of the file this is taken care of by some already existing file card. But what about familiarity due to contextual salience? Heim assumes that even such NPs are represented by a file-card. This implies that a file must be able to add a new card without anything being altered. For us this means what is contextually salient must be somehow reflected computationally. The algorithm designed should be able to be sensitive to any changes in the context of a conversation.

Heim's example is that of a dog walking in the Diddle of a conversation. The state till then is F and suppose 7 is the index of the dog such that 7EDom(F). Then **F'**, the new file, will be: Dom(F') = Dom(F) U {7}. Suppose now at F' one of the participants, say A, says *It is going to bite.* *It* here will then carry the referential index 7 . **F' will** then become F" where the satisfaction set is:

Sat $(F'') = \{$ a_N: a_N E Sat (F') and a_7 is going to bite$)$

The reference of *it* therefore, is deictically determined and represents the contextually salient dog.

This prompts Heim to conclude that an NP can be novel with respect to the LF and yet be familiar with respect to the file. This leads her to propose the revised Novelty Condition as a Novelty-Familiarity-Condition:

(21) Suppose something is uttered under the reading represented by *i,* and the file prior to the utterance is F. Then for every NP_i in σ, it must be he case that: $iEDom$ (F) if NP_i is definite, and $iEDom(F)$ if NP_i is indefinite. Otherwise, the utterance is not felicitous under this reading.

As we show in Chapter II, it is possible to integrate this aspect of contextual saliency in a Kamp/Heim model effectively by introducing the theoretical construct of a *field* (of vision) which is based on our film theoretic import into linguistics of a camera angle view. With such a move, we will note that it is possible then to record (in a photographic sense) the world of a sentence before its utterance based on the context of the conversation till then or in other words, the current states of the file.

1.3 Asymmetries

We mentioned in section 1.2 that the new/old opposition approximately derives a left/right asymmetry for the trajector/

landmark dyads under scrutiny. For & distinction like Topic/ Focus, we expect that salience (which **motivates** the study of transitivity) would play a role in terms of redefining or rein- terpreting various interactions between the Topic/Focus opposi- tion and salience since both are, to **some** extent, matters of pragmatic functioning . For an opposition like subject/object one would not expect such interactions to take place. That is, we would expect that **subject/object** should work **independently.** But this is not the case; subject/object reorient themselves in a fashion **similar** to the other dyads and participate in a right grammar versus left grammar opposition to the same extent. Externality of subject is a major force in such **participation.** More importantly, this alignment of the **subject/object** opposition with the Topic/Focus opposition unwinds the basic A/A' distinc- tion that forms the basis of much **preminimalism** work. Whether this is desirable is not very clear at this stage but as we note in Chapter III, it is, **nevertheless,** possible to derive a typolo- gy of positions (in terms of actually-L-related positions) if we adopt a version of the checking theory which stands to gain from a **computational** approach to the study of gaps and **fillers.**

We mentioned earlier that if our goal is to track a shifting scene down the lanes of discourse, the nearest station for us is one at which a coarticulation of the various asymmetries that a clause display both within and outside the clause becomes possi-

ble. In short, asymmetries serve to create *fluorescent* zones for the tracking of a scene to proceed efficiently.

A crucial claim of this chapter is that the asymmetry displayed at the Topic/Focus opposition leaves its shadow all over the clause. In other words, the basic asymmetric pattern is maintained throughout the body of the clause. In fact, only through such repetitive patterns can an efficient tracking take place. We will see later how this asymmetry becomes important for staging to occur. Tracking also makes use of, as we stated earlier, a strong/weak distinction of resolution valency in terns of increasing/decreasing salience. This will result from a better understanding of the asymmetric system around the clause.

In this connection, let us consider the Larsonian asymmetry that works in terms of pervasive one-way c-command. Larson (1988) showed that the underlined NPs in the following double object constructions are in the domain of the first NP but not vice-versa:

(22) John sent Mary <u>a</u> <u>letter</u>

(23) I promised Felix a <u>new</u> <u>set</u> <u>of golf</u> clubs

(Larson 1988)

Barss and Lasnik (1986) (as cited in Larson 1988) point out the

problems with available structure for the double object construc-
tion.   The Chomsky (1981) structure is as follows:

    (24)a.

```
            VP
          / ⋮ \
          V  NP1 NP2
```

Between NP1 and NP2 in (24a). there is no formal asymmetry   here;
thus   this   structure foes against the spirit   of   double   object
construction   phenomena.   In   (24b) below,   on   the   other   hand,
although   there exists an asymmetry between the two   NPs   whereby
NP1   is in the domain of NP2 (and not vice-versa),   the picture   is
still   al   cross-purposes   with   facts.

    (24)b.

```
                VP
              / \
            V'   NP2
           / \    ⌐
          V  NP1 <─┘
```
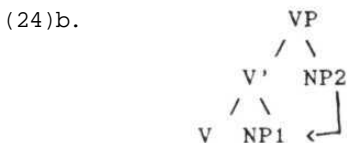
Larson suggests the following derivation for (23):

    (25)a. John [$_{VP}$ a letter [$_{V'}$ sent to **Mary**]]

        b. John sent [$_{VP}$ a letter [$_{V'}$ t to Mary]]

In (25) the indirect object *Mary* becomes the derived VP "subject"
and the direct object a *letter* receives an adjunct status   within
V.   Larson's **position,**   therefore,   is that for a VP with   V-NP-NP
structure,   the first NP c-commands the second NP but   not   vice-

versa.   Larson (1988) would posit (26b) as the structure fcr   the sentence in (26a).

(26)a. John gave a book to Mary

(26)b.

```
            VP
           / \
         DP   V'
         :   / \
       John V_i VP
            :  / \
          gave DP  V'
              :   / \
           a book V    PP
                  :    /\
                 t_i to Mary
```
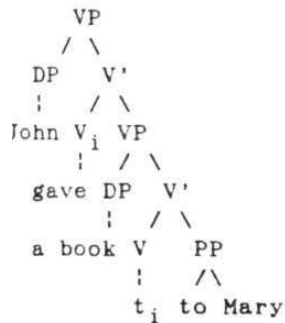

Although   Larson's   proposal   makes   VP-recursion   possible   as   a result of asymmetric c-command, it nonetheless relaxes the condi-tion for the erternality of the subject.

This is the essence of asymmetric c-command. We can extend this notion to state that there are an infinite number of Vs with two NPs asymmetrically c-commanding each other.   This also shows, for us,   that the subject/object asymmetry pervades all   others like Topic/Focus etc.

Conceptually asymmetry makes room **for** the appearance **of** recursive   strings.   Recursion **for our purposes,** as **we   shall**

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demonstrate later, is a matter of discovering of the embedding of scenes within scenes. Only verbs, we will see, can perform this stitching or at least, the crucial or important stitches. Recursion in Chomsky is through a rule schema like XP——> XP S where X=N,P,A but not V. Dasgupta (p.c.) as part of the lexology enterprise[1] suggests that in fact, VP——>V S is the prototypical device for recursion. Only Vs, in their typical function as predicate builders, in any case, can indefinitely extend a sentence structure and underwrite the infinity of sentences.

One motivation for the asymmetries that we discuss — all asymmetries — comes from Kayne's (1994) version of the arrow of time concept. Kayne shows that asymmetric c-command is similar to the dominance relation since both are locally linear. He attempts a closer parallel between the two by assuming an abstract root node A that asymmetrically c-commands every other node like a real root node which dominates all other nodes. Kayne shows that the terminal a associated with A is the abstract initial terminal and consequently a pair like <x,y> would mean 'x precedes y'. Such a reading of <x,y> implies specifier-head-complement word ordering. The string of terminals in Kayne is are thought of as associated with a string of time slots. This,

---

1. For a very first introduction see Dasgupta (forthcoming) in *L inguistic Analysis.*

by itself, does not induce **asymmetry**. **Kayne**, therefore, claims that what is paired with each **time** slot is the substring produced till that time. That is, a set of terminals like *abcdz* is **mapped** to a set of substrings as follows:

(27) a, ab, **abc, abcd, abcdz**

(27) above begins to show the roots of the **asymmetry**. Elaborating further, let us consider t_a, t_b, t_c, t_d, and t_z as the time slots associated with each of the terminals. The assumption in (27) would then result in the following:

(28) t_a = a, t_b = ab, t_c = abc, t_d = abcd, t_z = abcdz

or

$t_n = S(P_n)n$

where S(P) is a set of terminals preceding n.

Note that in (28) from t_a to t_z, the set of strings expands and becomes more and **more** inclusive. In other words, $t_{n-1} < t_n$ or by (28), $S(P_{n-1})n-1 < S(P_n)n$. A little reflection here would suggest that $S(P_n)n$ is a bigger "space" than $S(P_{n-1})n-1$. That is, the coverage increases as time progresses. With this, we think the well-known asymmetry between time and space can be approached. Given that both space and time are essential categories of our experience and cognition, an expression of space is optional but it is unavoidable in case of time. This asymmetry

takes a specific shape in Kayne's approach to time and word order. The word order of spec-head-comp is a fallout of the "x precedes y" reading of <x,y> which in turn is a result of the asymmetry in time.

Conceptually, the very nature of time (its property of progression) imposes the asymmetry — it is inherently asymmetrical. Approximating a simplification, this would mean for current time t_n there is no way to control or manipulate a chunk of time prior to t_n, namely, the set $t_1 \ldots t_{n-1}$. The fundamental spirit of Kayne's LCA, we think, is that this sequence is equivalent to the set $S = s(P_1)1 + s(P_2)2 + \ldots s(P_{n-1})n-1$. That is, a sequence of temporality relates to a sequence of spatiality (word order). For our purpose, we conclude from this that the motivation of all asymmetries may well be time given that the latter (unlike nearly all other categories) is asymmetric by definition.

1.3.1 Trajector/ Landmark

We start our discussion with the trajector/landmark distinction since we make use of these functional terms as archi-concepts which underwrite all the major asymmetries to be found in a clause.

Langacker (1983) in his elaboration of space grammar makes

use of certain **dichotomies** like figure versus ground and trajector versus landmark to account for the cognitive **system** we arrive at as we try to understand natural language. Although it is **beyond** the scope of the present work to explicate the Motivation for his Cognitive Grammar **implementation** of such a programme, it is nonetheless useful for us to investigate how such notions in general, and a modified form of the **trajector/landmark** dichotomy in particular, may be bent to serve our ends in the context of a **juxtaposition** of the dichotomy between Topic and Focus on the one hand and that between Subject and Object on the other.

We begin, of course, by situating the terms in their Cognitive Grammar habitat. Langacker proposes that meaning and grammar involve elaborate hierarchies of **figure/ground relationships.** The **profile/base**, **subject/object**, and **head/modifier** distinctions are treated as **instantiating** a **figure/ground** distinction. The figure within a scene (scene being **Langacker**'s **term** for a situation, in terms of images created to structure a conceived situation — the key to the meaning of an expression in Langacker's theory) is a substructure perceived as standing out from the rest, which is the ground, and is given special salience as the crucial entity around which the scene is organized and for which it provides a setting. The predicate for Langacker is the semantic pole of a morpheme and acts as the basic building block of cognitive functioning.

The grammatical category that most closely Batches Langacker's semantic characteristic of "thing" is the noun. "Relation" is a basic semantic property which describes the grammatical categories of verbs, adjectives, adverbs and prepositions. There are two sorts of basic relations — (i) processes (verbs), which potentially or actually trace the evolution of a process through time, and (ii) stative relations (adjectives, adverbs, and prepositions) which do not.

The trajector/landmark distinction is a fundamental organizing principle for relational predicates and underlies the subject/object distinction. The trajector is the figure within a relational profile . It suggests motion although it applies with equal appropriateness in the case of stative predicates as well. The landmark is the point of reference for locating the trajector the most salient entity other than the trajector itself. According to Langacker, and crucially for us, the location of a relationship reduces to the location of its participants. In our scheme of things, in relation to the discussion in Chapters I and

1.Profile/Base is another dichotomy crucially employed in Cognitive Grammar where the Base for a semantic predication is its necessary context and the profile is that substructure within the Base that the predication designates. The semantic value of an expression is a relation between the two.

II, this would translate into the location of transitivity (a
relation) involving the location of the various participants in
that relation — most crucially, subjects and objects. This
locating activity is **morpho-syntactically** registered by the
devices of agreement — the topic chapter III.

The participants in a relation are **all** profiled. Consider
the following for this purpose:

(29)
```
  ____                    ____
 | e1 |------------| e2 |
 |____|       e3        |____|
```

In (29) el and e2 are two entities and e3 is the **interconnection**
between them. For (29) to be seen as a relation, the partici-
pants get "**profiled**" as follows:

(30)
```
  ----                    ----
 | e1 |------------| e2 |
 |____|       e3        |____|
```

Note: Profile is indicated by boldface in (30) and elsewhere

In case it is perceived as a "thing", e3 is not important which
then approximates to zero and only el and e2 are profiled "col-
lectively" to indicate the unitariness of a **nominal** predication.
This is shown in (31). Notice that the **interconnection** in a
nominal predicate diminishes both in terms of magnitude (it

approaches zero) and **prominence or** salience (its non-profiled status).

(31)

```
       /----------------------------------------------\
      /:     ----              ----                  :
      ::   : e1 :------------: e2 :                 :
      ::   :___:      e3      :___:                 :
       \----------------------------------------------/
```
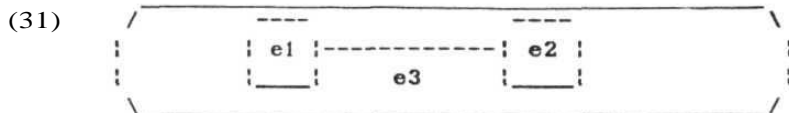
A relational predication focuses on **interconnections** and profiles the cognitive events in which the **conceptualization** of these **interconnections** resides. The prominence of these events requires giving prominence to the **entities** involved in the rela- tion. A relational predicate therefore profiles two or more entities in addition to the operation connecting them.

For our purposes, we note that **trajector/landmark** is a spe- cial case of the **figure/ground** relation and subject/object is a **special** case of the **trajector/landmark** distinction. Trajector/ landmark gives us a conceptually satisfactory tool to relate the subject/ object distinction to other dichotomies.

1.3.2 Topic/ Focus

We stated earlier that the specific task of a clause is to present actions and events. One place where this becomes gram- matically significant is the position of the clausal topic. The Topic position **traditionally** is even more external than the

29

subject, in a sense that one cannot express in **terns** of notions operative in any serious theory *cf* grammar. This is because there is **discontinuity** between the **L-related** positions of (inner) object and (outer) subject and the **non-L-related** position of (very very outer) Topic. In other words, there is no **formulable** continuum of inner-outer on which Topics are outermost, objects innermost, and subjects in between. Rather, the foil to Topic is the notion of Focus, which too involves a non-L-related position. Their non-L-related nature is responsible for lack of a flow of energy between these two (unlike in case **subject/object)** and the lack of interaction with aspect.

In spite of these differences, there are connections between what we might tentatively — and without attaching significance to these descriptive labels — **call** subjectology and topicology. For it is clear, from earlier literature, that topics too like subjects have comments predicated of them. Elements in Topic positions **like** wh constituents in Bavarian display an agreement triggering capability . For such cases, Shlonsky (1991) suggested that CP be split between two functional positions: CP and AgrCP. The latter is an agreement projection belonging to the CP system. This splitting follows **from** Rizzi (1990) where certain

1.Consequently we discuss this **in** further **detail** in Chapter III

complementizers like *qui* are endowed with agreement features. Shlonsky's is a structural implementation of the same idea. Specifically the structure that he proposes is the following:

(32)
```
        CP
        /\
         /\
       C AgrCP
          /\
           /\
        AgrC
```

AgrC in (32) may contain agreement features or certain types of complementizers as in the case of Palestinian Arabic *illi* 'who' which captures the fact that *illi* occurs only in RCs:

(33) I-bint   illi Mona   saafat-*(-a)
     the-girl that Mona   saw-(her)
     'the girl that Mona saw'

Spec-CP in (32) is an A' position that operators move to whereas Spec-AgrCP may be an A (when AgrC has agreement features) or an A' position. From this we can conjecture that every XP has an overt/covert) AgrXP which in collusion with the former obtains all the agreement facts at XP. Our contention is that topics are similar to subjects in this connection.

Further evidence for the thematic connections between sub-jectology and topicology comes from the fact that only the lexical head exhibiting transitivity, namely V, can support the paraphernalia enabling topics and foci to appear. They cannot,

for example, occur on the periphery of a small clause built around an AP. Finite INFL allows a Topic sore easily than a nonfinite one. There is obviously then some connection between a strong INFL and the appearance of topic. Let us look at the process of topical izat ion to understand this better.

1.3.2.1 Topicalization

Chomsky (1977) points out a parallelism between a topicalization and a left dislocation construction:

(34)a. John, I like t

   b. John, I like him

The topic in both a. and b. therefore, he proposes, is base-generated in Topic position under S' :

(35)
```
            S"
           / \
         TOP  S'
```

The difference between (34a) and (34b) is accounted for by showing that whereas (34a) involves movement of a VH-operator to COMP (later deleted), (34b) involves no such movement. Chomsky further suggests the rules in (37) based on embedded topical ization examples like (36).

(36) I think that the house, you should see t

Here the topic follows the COMP of the embedded clause and conse-
quently we have (37a) revised in (37b) based on Chomsky **(1986a)**.

(37)a. S'--> COMP S"

b. **C'--›** COMP TOPP

Combining (35) and (37), Chomsky suggests that what undergoes
movement is an empty operator. The structure of (36) would there-
fore be:

(38) [$_{IP}$ I think [$_{CP}$ that [$_{TOPP}$ this house [$_{CP}$(VH) [$_{IP}$ you
should see t]]]]]

However, Baltin (1982) (as cited in Lasnik and Saito (1992))
pointed out cases of embedded **topicalization** where embedded left
dislocation is not possible:

(39)a. the man to whom liberty we could never grant

b.* the man to whom **liberty**, we could never grant it

Baltin proposes that (39b) involves a base-generated topic where-
as **topicalization** as in (39a) involves adjunction to S. Lasnik
and Saito (1992) show that embedded topicalization necessarily
involves IP-adjunction and that matrix **topicalization** can involve
either movement to Spec, CP (as in Chomsky) or **IP-adjunction.** We

note, however, that C carries finiteness features and therefore
topicalization as a movement to Spec,CP can establish the link
between finiteness and topicalization that we observed earlier.
This, we believe, is true for at least the matrix topicalization
cases.

Watanabe (1993), however, demonstrates that the topicaliza-
tion in English is movement to Spec,CP, including embedded topi-
calization cases. He looks at the interaction of CP recursion
with factive predicates and argues for a Larsonian analysis of CP
recursion. He claims that CP recursion is created by substitution
movement of C .

We already have a case of CP recursion in (38) as also in
the following:

(40) John said [$_{CP}$ that [$_{CP}$ this book,[$_{AgrsP}$ Mary should have
read]]]

(Watanabe 1993:121)

An adjunction analysis, as is Baltin (1982) or Lasnik and
Saito (1992), or even a modified one in Pesetesky (1989) (cited
in Watanabe 1993), is problematic under a checking theory. The
checking relation between AgrS and Topic is not clear since AgrS
is already responsible for checking off Nominative Case features.

There is no such problem in the CP substitution analypis. Topical ization results if an additional CP, whose head has a feature to be matched with a Topic, is also present.

The CP substitution analysis is motivated in **Watanabe** (1993) by this notion of clause types:

(41) Clause Types
There are only two types of clauses to be selected by a V,namely, **wh-clauses** and **non-wh-clauses**. The former are **characterized** by the presence of a wh-phrase in Spec of the topmost CP. The latter are **characterized** by empty Spec of the topmost **CP**.

(Vatanabe 1993: 130)

By (41) factive complements **like** (42) will have a structure like (43).

(42) John regrets that he fired Mary

(43) John regrets $[_{CP}$ that $[_{CP}$ Op $[_{Agr-sP}$ he fired Mary $]]]$

The **topmost Spec,CP** is empty since factives are non-wh clauses. Accordingly the inability of factive complements to undergo topical ization is explained.

To **link** (41) to the proposal in minimalism that a strong Operator feature in C prompts overt raising, we need only add that not only a **wh-clause** has a wh-phrase in its topmost **Spec,CP,** it must also have a strong Op feature in the C head.

We conclude from this section that topical ization therefore

is a case of movement to Spec, CP which is expected given the **link** between topical ization and **finiteness that we** pointed out earlier.

1.3.2.2 The **Pragmatics** of Topic/Focus

Ve stated earlier that **nonfinite** clauses do not undergo **topicalization**. Focus, however, can **appear** with nonfinites. The foil of Topic is Focus which appears only with verbs. For exam- ple, PPs do not carry focus. Focus has theta-properties and is related to the NP bearing the theme role of the clause. **Theme/patient** is somehow connected with action. The **initiator/agent** looks **like** an element slightly outside what one needs to know in trying to understand an action.

Although the position of Focus in a clause is not clearly understood, preverbal positioning of it seems to be able to explain a range of facts (like the stress on wh-words in most languages of India). Schaufele's (199C) preverbal focus sits at the (finite) Tense node. Schaufele challenges the Principles and Parameters approach of treating topical ization as a case of **movement** of an XP category. He shows that in Vedic Sanskrit lexical **topicalization** takes place prompting **a** bar-0 A' node called TOPIC to the **left** of S. The **structure** of (44) is as in (45).

(44) **manah**$_i$ ha vai devaah I$_{VP}$ [$_{NP}$ **manuSyaasya e**$_i$]
      mind-A **Prtcl** gods-N   man-gen

     aa-jaananti]
       know-3p pres
     'The gods knew the minds of **man**'

                   (Schaufele 1990)

(45)

```
                            X
                          /  \
                      Topic   S
                        :    /  \
             mánah  -ha-vai  NP  VP
                  i          :   / \
                        devaah NP   V
                              / \   :
                            NP  N  aa-jaananti
                            :   :
                      manuSyàsya  e
                                   i
```
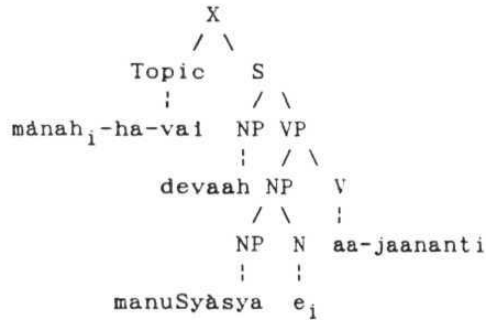
He also suggests that TOPIC be treated as a **quasi-comp** node
having its own spec position to allow for whole phrase **topicali**-
zat**ion.**

     Schäufele's (1990) **contributions** to the understanding of the
pragmatic aspects of topical izat ion is noteworthy. The pragmatic
connotations of the process lead Schaunfele to consider **topicali**-
zation as taking place at LF as well since that is where pragmat-
ic **interpretations** might be thought of as taking place. In Vedic
Sanskrit, topical izat ion **generally** performs the task of high-
lighting as in the following:

(46) RSibhyah   ca eva enam   etat devabhyah ca
     Rishi-Dual ?I Prtcl 3scl-A so gods-Dual and

     ni-vedayah
     introduce-3s pres
     'So he introduces him to the RSiis and to the gods

Schaufele   identifies the following **pragmatic** functions of

topicalization:

(1) **Stage-setting**: This is surprisingly similar to our proposal
            (to   be   elaborated later in section 1.4) of staging
            that   we   claim acts as the site where the pragmatic
            range (including deixis) of the clause is decided.

(2) Central concept: Another   function of topicalization is   to
            restate a concept that has already been identified   as
            central   to the discussion.   A subtype of this func-
            tion,   as Schaufele states, is the fronting of a   word
            co-referential or otherwise related to the one in   the
            immediately   preceding   clause   that   identifies   the
            central concept.

(3) Focusing: This is identified as the third important function
            of topicalization.   It takes the form of   highlighting
            of new information.   This is important for our purpose
            since   it   relates to our concerns   regarding new/old
            information.   It also underpins a certain construal of
            the   status   of Focus in relation to the   Topic   in   a
            clause.   Schaufele drawing on his earlier work pro-
            poses the preverbal positioning of Focus.

All   these functions listed above are useful handles for   us

to   build   our thesis of Staging/Scening/Event   in   section   1.4.

Repetition/recall of the central concept as a function of   topi-

calization coupled with Focus as new information leads   naturally

into   our   hypothesis of "double strike" that we develop   in   the

next section.

1.3.2.3 "Double Strike"

We elaborate the issue of FOCUS as it relates to our proposal of double strike. In our discussion of asymmetry in section 1.3 we claimed that the basic asymmetrical relation is preserved throughout the clausal structure which leads to the identification of new/old information. The Topic/Focus asymmetry is the biggest of the clause-structural asymmetries. However, the Topic/Focus asymmetry is a relatively free agent in the sense that there is no independent demarcation involving Case (as in the case of AgrS/AgrO) or theta roles (as in the case of the VP-internal asymmetry) imposing a specific shape on the asymmetry. Topic and Focus, we observe, count as the two ends of the functional foliage (as opposed to the VP trunk) of the sentence and thus encode the distribution of new/old information. One of the functions of topicalization is rephrasing, as we saw in the previous section, of information already known, while focusing is a matter of emphasizing new information. We shall sharpen these functions as follows. Topic, for us, is a point at which the clause weakly re-emphasizes old knowledge, while focus emphatically presents new material. Our theory of double strike is based on the role of emphasis and reemphasis in the making of Topic/Focus. We propose to formalize this role in terms of a

copy relation, in the spirit of other elements of the minimalism package.

Jayaseelan (forthcoming) situates the focus functional head F below AgroP and above VP; end thus an empirical argument in favour of this specific position for FOCUS is made available for the first time. He suggests that F assigns phonological prominence and other semantic (focal) characteristics to its specifier. Dasgupta (p.c., in consultation with Jayaseelan) builds upon this to further suggest that for Gricean reasons , we can limit the work of F to the assignment of just prominence to its specifier, leaving it to Gricean pragmatics to let the semantics follow from such phonology. Dasgupta adds (p.c.) a suggestion, which we adopt, that F does the syntactic job of the matching of its specifier Spec,F and some segment of the VP, and that its phonological job (assigning prominence, as Jayaseelan) can be seen as manifesting this. Specifically we claim that Spec,F contains a copy of the relevant segment of the VP, and the VP copy moves to and merges with the Spec.F copy, producing a merged, doubled, emphatic constituent the way the computer printer's double strike device produces boldface output. Following Dasgupta (p.c), we adopt this metaphor and speak of Spec,F as a

1. For example, normal volume assumptions lead loudness to be heard as encoding emphasis

site where such a double strike is requi~es by F — as the formal property defiring its F-ness.

Spec,TOP as we understand it represents some context whether it is (in the manner of Spec,F) mimicking (and thus double striking) some segment or not is left open. In *JOHN I like* it assigns stress to *John* and thus, in this case, double strikes a segment of the VP. Therefore, in this instance, the topic site resembles FOCUS in its function.

In Gueron (1984) something similar is worked out. She pro-poses a decomposition analysis of topicalized constituents at LF to account for the coreference in structures containing topical-ized elements like the following:

(47)a. Near him, John saw a snake

b.*Near John, he saw a snake

(Lakoff 1968 cited in Gueron 1988)

In her earlier works, Gueron had suggested a reconstruction at LF which brings back a moved constituent to its trace position. Preposed constituents were analyzed as in LF as either Focus or Topic of S. A Focus constituent is reconstructed in the position of its trace by rule (48)

(48) FOCUS rule : In the structure X," $[_c ...e_i...]$, move X_i'
to the position of its trace at LF

If reconstruction does not take place, the fronted constituent is interpreted as a Topic of S.

(49) TOPIC rule : In the configuration X" $[_S$ N?. ...] , X" is Topic of S.

But such a solution is problematic because it assumes that subcategorized constituents count as FOCUS when preposed, while non-subcategorized constituents count as TOPIC. This does not hold for (50), where the fronted constituent is subcategorized yet by the TOPIC rule (49) it is to be counted as TOPIC.

(50) The article John just wrote, he thinks Mary likes.

Fourier (1980) (cited in Guéron 1984) suggested a decomposition of preposed wh-constituents into restrictive (wh; NP or PP complements of X) and non-restrictive (lexical elements, S' complements of X) and proposed that only the restrictive part of the preposed element be subjected to the c-command rule. This is also shown to be problematic for some cases.

Guéron's 1984 proposal retains the idea that the Focus of S is needed for coreference in general and in topicalized structures in particular. Preposed constituents are divided into two parts where one part is identified as a Focus of S and the re-

mainder is the Top c. She also assumes that the Focus constitu-
ent contains the head of the topicalized phrase. Therefore, the
Focus constituent is the one which undergoes reconstruction at
LF.

Following Chomsky (1976) Focus is defined to be a syntactic
constituent which is interpreted as an iota operator at the level
of LF; it picks out one element from a background set. This is
shown in (51).

(51)a. John$_i$ e$_i$ I like e.

   b. John = x   x E {M}   I like x (where M is the set of
      humans)

<div align="right">(Gu6ron 1984:152)</div>

The focus operator is marked by prominent stress. She suggests
that in English, a topicalized constituent is construed both as
a Topic and Focus of S. Then Topic fills a double semantic func-
tion. Since the rule of predication applies, Topic must denote
an individual. The F operator selects one individual/entity from
a background set of appropriate elements. There is no contradic-
tion therefore if Focus selects the same individual for promi-
nence as did in the Topic.

The double semantic function of the topmost constituent is
explicated as follows. Following Chomsky (1977) Gu6ron assumes
that the Top is coindexed with an empty element in COMP. Guéron

identifies thiB **empty element** as a Focus operator. The predica-
tion rule coindexes the Topic and the operator which infuses
lexical content to the operator so that now it can be seen as an
argument. The topical **ization** now nondistinct from the operator is
recons⁺ructed at LF. The steps in the derivation are illustrated
be **low:**

(52)a. John we like

b. S-structure:

John $_i$ e $_i$ we 1 ike **e** $_:$

TOPIC FOCUS

c. Output of predication rule:

John $_i$ **e** $_:$ we 1 ike e •

TOPIC FOCUS

d. Output of **reconstruction:**

John: **e** $_:$ we **like John** $_i$

This sense of similarity of Topic/Focus as in (52c) above is
incorporated in our double strike hypothesis.

In Gueron (1984) something **like** this is worked out, ie,
there **are** contexts where **TOPIC=FOCUS.** But in Gueron a **position**
for FOCUS is not worked out **or,** to be precise, her account does
not need a position.

The F project: on therefore reduces to hosting a copy of part o. the VP. In the case of the Topic, we might, for all practical purposes (modulo the detail that if C and TOP are separate then C is higher up and consequently Spec,TOP is not the leftmost), consider its Spec as the leftmost. And TOP, as we said represents part of the context — where context is a term broad enough to allow for the possibility of occasionally being a part of the VP also. In other words, TOP leaves us free to pick up an item from the previous context or a part of the VP. Importing the pragmatics of the FOCUS operation, we might then say that, in such instances, the Spec,TOP also undergoes double strike. Spec,F, as we noted earlier, is always a double strike position. From this we conclude that the property that Gueron talked is best formalized in our account as the property of double strike.

We see, then, that a formalism for double strike is worth developing; the notion that an emphasized item is present in two locations is thematically well-founded and deserves to be turned into an operationally explicit account. Now, Minimalism is all set for such a venture, being a framework that uses the exact duplicate mechanism for various (especially movement created A-bar) dependencies.

The contextuality of the copy story can be seen from the

fcrmulation of the copying theory of recoi ruction that •animal-
ism ronstructs, where syntax can be thought of as keeping n. track
of what is happening in the body of the sentence through these
copies.

With the assumption of copy theory of movement (Chomsky
1995), a two-element chain is a pair <a, fi> where a = 6. Consider
the following derivation:

(53)a.   β   b.   β

           / \   / \

        β   a   a   β

                                 / \

                            β   a
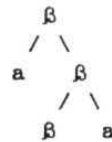
If **K,** L are sets denoting objects in (a) and (b) respectively
then **K** = {β, {β, a } } and L = {β, {a, **K** } }. Let us consider
two of the terms of L t_1 and t_2 where t_1 is the term of L such
that L = {β, {t_1, **K** } } and t_2 is the term of L such that K = {β,
{β, t_2} }. Here, r_1 = r_2= a. We obtain the pair <t_1, t_2> =
<a,a> which is the chain CH = <a, trace (a)>. A copy theory of
movement therefore determines a chain unambiguously. In short,
the copy relation is significant.

To sum up, the Jayaseelan proposal as amplified by Dasgupta
concludes that Spec,F always is and Spec,TOP may be a copy of the

VP.

There is one formal problem with this mechanism. In fact, this is one of the main problems that has precluded the deve'op-ment of a precise account of TOPIC/FOCUS grammar in earlier work. The theory presented so far warrants not only both of the follow-ing:

(54) John, I like (TOPIC construction)

(55) I like PIZZA (FOCUS construction)

but also, overgenerously,

(56)*To JOHN, I give the PIZZA[1]

both positions in (56) being effectively available for FOCUS. But as we see, such double focal pointing is in fact not allowed. A straightforward reason could be pragmatic. If the TOPIC/FOCUS strategy is believed to result in a presentation of unique infor-mation, then two-site focusing is pragmatically incoherent. To see it more clearly, consider (57):

(57) JOHN, I like

The problem seems to be a clash of the positional/functional

___

1. Notice that we are not discussing here the notion of contras-tive stress/Focus.

propertie⸱. *John* is an old (topical) position but constitutes a new (focal) point of the message. For our purpose, we can describe the double strike property, wherever it may occur, as FOCUS and the position just-before VP as F(ocus).

1.3.3 AgrS/ AgrO Asymmetry

The basic asymmetry, as we have repeatedly pointed out, is preserved throughout. This is true of the subject/object asymmetry as well. It is this asymmetry which keeps the flow/transfer of syntactic energy from the subject to the object going. In the clause structure this is reflected to some extent in terms of the AgrS/AgrO asymmetry. We can call this AgrS/AgrO asymmetry an intermediate asymmetry which is visible in terms of Case marking activities that AgrS/AgrO partake in.

A lot of the empirical interest of the findings of the parametric tradition in the period of its classical successes lay in the discovery of the novel phenomenon of subject-object asymmetry. It was quickly shown that this asymmetry in general was best handled as a special case of a more general complement-noncomplement asymmetry. Such an inclusion implies that subjects count as elements that are arguments in the sense of receiving a theta-role from the verbal complex but are noncomplements in the sense that the verb does not, by Case marking or other means, morphologically license their appearing where they do at S-struc-

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ture. In short, a **subject** is an *external* argument. Ve discuss the notion further in section 1.3.4.1 in detail. Most of **the** discussion here will also carry over to section 1.3.4 where we discuss an asymmetry deeper inside the clause.

Accounts that make too much of the NP-VP isomorphism push the burden of responsibility for these differences onto the shoulders of one of the following:

(i) a process of predication occurring only in clauses and effec-
tively making the clausal subject obligatory

(ii) the specific nature of the functional head (call it AgrS) of
the shell housing the subject of the clause, in contrast to
a functional head of the D type

(iii) specific nature of the lexical head V which, by virtue of
its transitivity borne directly by V or indirectly by some
functional head (call it, following Murasugi's implementa-
tion outlined in Chapter 2, Tr for Transitivity) that
mediates, ends up associated with effects like Predication,
AgrS, or whatever makes the clausal subject tick.

These ways of spelling out the agenda correspond to issues of transitivity and agreement. Ve take predication to be a part of agreement in as much as it underwrites the AgrS-AgrO (subject-object) asymmetry, to which we now turn.

1.3.3.1 **Predication**

The externality of the subject is a requirement **for** predica-
tion to take place. This is achieved by closing syntactic predi-

cates off by linking to an appropriate syntactic argument. This appropriate argument for Rothstein vl985) is the formal subject. The rule of predicate linking is a condition on the well-formedness of syntactic strings and, therefore, is a formal requirement of the externality hypothesis. Both the clausal (58a) and the nonclausal (58b) predicates in the following are linked to subjects.

(58)a.   Mary *saw John*

b.   Mary ate the carrot *raw*

(Rothstein 1985)

A sentence is, therefore, a clausal predication relation. A particular XP becomes a predicate only if it can be closed off by an external argument. So the subject of an XP must be external to that XP. An external argument is an argument not c-commanded by the head of the XP. APs, VPs, and PPs must always be predicated of an argument, whereas an NP may be predicated of an argument, but it must be closed internally. NPs, therefore, can act as both arguments as well as predicates in this system.

As in Frege, Rothstein's predication is also a function, but different since it is devoid of any semantic import. According to Frege, a grammatical predication is a function expression denoting a function and it has certain properties common to all such expressions. In Fregean terms, a function is open or unsat-

urated which requires the empty place to be filled by an argument to be saturated. For example, in $2x^3$ the variable marks the place where the name of a number will be inserted to complete the expression. In (58a) above the VP predicate *saw Mary* requires an argument *John* to complete it. This is the case for syntactic predicates which are always monadic functions. Frege's **grammatical predicates** can be polyadic. In generative syntax, the counterpart to this type of predicate is the lexical head. Consequently, the **theta-role** information for such heads is deciphered from their lexical entries such as the following:

(59) put$_{Prep}$: agent patient location

The structure of a syntactic predicate is determined by the formal rules of syntax. The following are examples of different lexical categories as predicates:

(60)a. John [gave Mary the **book**]$_{VP}$

    b. Bill feats carrots [**raw**]$_{AP}$]$_{VP}$

    c. He [drinks tea [with sugar]pp]yp

    d. She [thinks him [a **fool**]$_{NP}$]$_{VP}$

                    (Rothstein 1985)

In (b-d) each of the embedded categories is itself predicated of an NP also within the VP. In (b,c) although the embedded **XPs** must have a structural subject they do not form a constituent unlike (a,d). The latter are called for this reason secondary predicates

(or small clauses) and the relation between them and their sub-jects, according to Rothstein, secondary predication.

As far as he building of a syntactic tree is concerned, however, the Fregean notion of Predication has been standardly assumed to be the operative one. In our discussion of the inter-action of subjectology and topicology below, we will assume that the Fregean notion of Predication to be relevant in constructing predicational pairs of staging/ event and event/ focus. For Chomsky (1977) a preposed X" phrase is base-generated in TOPIC position and linked to S' by a rule of predication. As we devel-op our concerns we will say that the TOPIC position is one of the sites for "Staging" to take place. Staging, therefore, will be assumed to involve an implicit predicational relation.

1.3.4 VP Asymmetry

The subject/ object asymmetry manifested at the AgrS/AgrO dyad is associated with a further asymmetry within the VP. This is the innermost asymmetry. Both the AgrS/AgrO asymmetry and the intra-VP asymmetry act out the transitivity of a clause. We conjecture here that the SIH (Split-INFL Hypothesis) is an encoding of the subject/ object asymmetry which gives rise to the AgrS/AgrO dyad. Similarly the Split-VP-Hypothesis of Koizumi (1993) that we report and use for our analysis in Chapter III is, we claim, a result of the recognition of the asymmetry within the

VP.

As we stated in the previous section the subject/object asymmetry as manifested in terms of the AgrS/AgrO asymmetry shows itself as patterns of Case marking. In the case of the intra-VP asymmetry, it is captured through a split in theta-roles. This is the externality of subject hypothesis; that we will shortly look at. We may note here that the AgrS/AgrO asymmetry and the one inside VP overlap to a large extent. An intra-VP asymmetry appears in all versions of the VP-internal subject hypothesis, where a VP must find niches for all the arguments of the verb. This we saw to some extent in discussing the Larsonian recursive shell in section 1.3. The AgrS/AgrO asymmetry is therefore a result of the way movements out of the inner VP that occur for case reasons preserve the intra-VP asymmetry. With the advent of a checking theory of Case, the status of the intermediate asymmetry (AgrS/AgrO) has become important. What we are trying to say here is that most of the discussion found in section 1.3.3 is also valid for the present discussion.

1.3.4.1 Subject as an External Argument

The notion of "external" argument deserves attention. The Extended Projection Principle of Chomsky (1981) requires an NP in the [SPEC, IP] position. But the proponents of the VP-internal

subject hypothesis like Kuroda (1986), Kitagawa (1986) and others shift the crucial position (where an NP is required for EPP) to [SPEC,VP]. Borer (1986) (further discussion can be found in Chapter III), on the other hand, proposes that there is no one subject position. According to her, an IP must contain an NP coindexed with INFL called the "I-subject". The distinction that these two hypotheses emphasize does not obtain in a sentence like the following:

(61) Rohan saw Runu

In (61) the structural subject and the "I-subject" are identical. This identity is extended to cases of expletive subjects which are assumed to be in the Spec-IP position receiving Nominative from the INFL and forming a chain with an NP (the postverbal NP) to which it ends up transmitting the Case. Such a reading treats (61) and (62) alike in terms of both EPP and the I-subject hypothesis.

(62) There is a rabbit in the box

However, the externality of the subject is not just a matter of occurring outside the VP *in sensu stricto* at S-structure if minimalism turns S-structure into an intermediate station without significance, and if even objects must nove to [SPEC,AGRo] to get licensed at LF for what are taken to be Case-theoretic reasons. The standard picture says that, in the VP-internal subject hy-

pothesis, the object is generated inside, as the closest sister of the V, while the subject is in the outer layer, serving in some theories as a Spec of VP. This picture has the virtue of handling well the ways in which the VP is like the NP, which too displays subject-object asymmetry. It has the drawback of Baking the clause look too much like the nominal.

As shown in LGB, there are some important empirical differences between the optional subject of a nominal and the mysteriously obligatory subject of a clause. In deciding between the following two possibilities for an S-rule, Chomsky (1981) shows that it is <63ii) that needs to be specified as the correct S-expansion rule for English.

(63)i . S —> NP Tense VP
            (NP) to VP

   ii . S —> NP INFL VP

The obligatoriness of the subject position in a clause in English is evidenced by sentences of the following type:

   (64) *there* is a good reason for his refusal

The expletive *there* in (64) cannot be missing. Chomsky (1981) points out that the theory of government prohibits the occurrence of a PRO in this position. For some reason these sentences require a phonologically overt structural subject. This require-

ment does not derive from theta theory since *there* in < 64 > does not bear any **theta-role**. The verbB in such **constructions** also cannot be said to subcategorize for subjects. T e **obligatory** presence of the subject seems to be a purely structural necessity that certain **configurations** — infinitives and gerunds — must have a **subject**. This requirement, Chomsky points out, **falls** out naturally if we assume the S rule in (63ii) above.

In the case of subjects bearing a theta-role, the Projection Principle derives the requirement but it leaves **it** open **us** to whether non-theta positions also must be represented at each level. The **obl**igatoriness of the subject is determined in English by the Projection Principle given that a particular subject position is a **theta-position** but some other principles determine whether or not any given subject does indeed occupy a **theta-posi-** tion. Therefore, the fact that clauses with certain VPs (like *persuade John to leave*) must contain a subject at LF is a **theta-** theoretical requirement.

The picture however changes for non-clausal **NPs** l**ike** the **following:**

    (65)a. My belief that there will be a good reason for his
            refusal

      b. The belief that there **will** be a good reason for his
            refusal

                                                    (Chomsky 1981)

Chomsky points out a fundamental difference between N' and VP. The former does not obligatorily theta-mark even when its head noun is lexically specified as one capable of indirectly theta-marking a subject, whereas the VP does obligatorily theta-mark if its head has this property. Therefore, it is not entirely correct to say that the Projection Principle entails the presence of subjects where the head of the construction indirectly theta-marks a subject. Obligatory positions in this system are those determined either by the subcategorization frames of lexical items or by rule (63ii) above. If the VP has appropriate properties in these cases then the subject will be obligatorily theta-marked.

In case of NPs the subject may or may not be present. If the N has the property of indirectly theta-marking the subject then if an argument is present in the subject position at D-structure, then that argument is theta-marked at every syntactic level. If no subject argument appears, then no theta-marking takes place. This convention, according to Chomsky (1981), gives the required distinction, while permitting NP movement to S-structure subject position of an NP, not a theta-position, without violation of the theta-criterion. Whereas if we adopt a structural rule where the subject NP is optional, the required distinction is lost.

The importance of studying the intra-VP asymmetry is that internal V correlates with external T just as the intra-VP asymmetry matches the AgrS/AgrO dyad. It is in this context that the fundamental categorial difference between verbs and nouns/adjectives becomes apparent. The latter categories nourish only one Agr whereas verb is unique in always supporting two Agrs. This defines the verb and assumes that only a verb can directly construct a scene.

1.4 Time and Staging, Scening, Event

In this section we hope to provide an overall picture of the notion of clause that we have in mind. This notion obtains as a result of the interaction between the asymmetric dyads which provide the bones and the concepts of Staging, Scening and event which lend thematic flesh to the clause. The asymmetries serve to provide, as we mentioned earlier, fluorescent highlights for staging etc. to take place.

This fleshing out of a clause in a process that runs parallel to the temporal drama that unfolds as we move deeper into the clause from Tense to Aspect to Aktionsart. This sequence then stretches from a deictic notion (Tns) to a specific property of the lexical item (Akt). That is, if the Tense is deictic then aspect can associate a specific picture with a (lexically) given

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Akt ionsart.

1.4.1 Tense, Aspect, **Aktionsart**

Conventionally temporality is exhibited in three different

ways (Klein 1994).

    (i) the time of some event, action, process etc. which is
        related to some other **time** interval (Temporal reference
        or Tense)

    (ii) the temporal course of an event, action, process etc.
         which is viewed/ presented in different ways (Aspect)

    (iii) verbs classified according to their inherent temporal
         features (Aktionsart)

Tense relates to some time span, especially to the time of utter-

ance. Some event, for example, temporally precedes the time of

utterance (past) or it **follows** the time of utterance (future), or

it overlaps the time of utterance (present). Tns as **well** as

adverbials **may** be used to express temporal reference. Tns is

always deictic.

Aspect deals with different perspectives which a speaker can

take with regard to the temporal course of some event, action,

process etc. That is, the speaker may consider it as completed,

on-going etc. This view is independent of the time on the time

axis. Originally aspect was tied to a morphological difference

between perfective and imperfective forms in Slavonic languages (Klein 1994). The later, more generalized content of aspectual notions has lent itself to many uses. For our purposes, we note one point from aspect theory — the point that an action starts at the subject and ends at the object. This is where aspect theory intersects with the thematic or pretheoretical concepts that we begin to sharpen in this section.

To start with we note that there are various factors that interweave at aspect. We may consider a two point scale covering certain properties of aspect: compact and diffuse. Compact aspect will handle telic objects, especially a definite object, whereas diffuse aspect obtains when there is no object present or only an irresolute one. In the latter case the transitivity becomes low (detailed discussion can be found in Chapter II on the theme of calculating transitivity).

Compact and diffuse aspect so distinguished, we note, inter-acts with our construct of Scening. One may speculate that the proper embedding of compact versus diffuse aspect within a scene is a matter of economy. The relevant notion of economy may be expected to develop as the study of degrees of resolution of scene components progresses beyond its present programmatic phase.

Also note that a strong aspect supports an unmarked or typical overt object — as in the case of compact aspect — and provides the usual cornerstones for our prototypical transitive clause nucleus. The strength of aspect is determined by presumably many dimensions of aspect resolution one of which s the telic/nontelic distinction. Aspect strength is also a pragmatic/discourse criterion for calculating the transitivity of a clause along the Hopper and Thompson (1980) scale of pragmatic parameters. This is discussed in detail in Chapter II.

The temporal properties of the lexical contents of verbs differ in terms of durativity, inchoativity, iterativity and stativity etc. (Klein 1994). Verbs can, therefore, be grouped into classes whose members denote events, actions, processes, states etc. The membership of a verb in such classes is commonly called its Aktionsart.

1.4.2 Staging

From the discussion so far, it is clear that temporality can not be ignored and therefore we need an anchorage in time. We take it that Tense carries out such anchoring. As we stated earlier, Tense is deictic at the clausal level. To say that what the clause presents "has taken place before" is to indicate or refer to a previous time. Tense, we therefore claim, does the

job of referring to time.

We further claim that tense is present at two places in the clause: COMP and T(ense), the heads of the maximal projections CP and TP respectively. This gives us the following:

(66)
$$
\begin{array}{c}
C' \\
/ \quad \backslash \\
COMP \quad TP \\
! \qquad A \\
T_{illo} \quad /\backslash \\
T_{stru}
\end{array}
$$
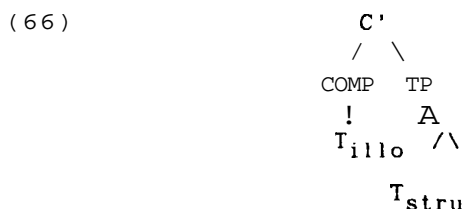
The T in Comp is illocutionary (and therefore T_{illo}) and the T in the head of TP is structural (so T_{stru}). T in Comp handles what we propose to call staging. The highest Comp of a sentence provides "absolute" deictic properties for the sentence as an illocution proper. Staging is a way of putting the clause in some picture — that is, to sponsor it vis-a-vis some audience for which it can perform, and this is done by setting up the deixis of the sentence through the T in Comp. Every non-root Comp provides "relative" deixis at its T, reaching the external world via all the upstairs Comps, which are so many pictures the clause must perform within. At the root T-in-Comp, "all the world's a stage". Our notion of "staging" is thus neutral be- tween root and non-root Comps. We are also using illocution" in a way that treats an embedded Comp as a relativized illocution site.

The illocutionary T in **Comp** which stages the clause, then, also communicates with the structural T located at the head of TP in order to construct properly the illocutionary stage for the clause. Staging proper is a matter of root illocution but it remains active throughout the body of the clause. Further down, at the location of the **AgrS\AgrO asymmetric** zone, transitivity shows up, we claim, as an effect of a weaker counterpart of staging that is active in the **AgrS/T/AgrO** area. This view sup- ports our earlier contention that the asymmetries define the route through which staging etc. can initiate and travel down the clause. These illuminated islands manifesting a transmission of asymmetry provide a route down which the shadows of staging can be pursued. One function of the asymmetries, we mentioned earlier, is to facilitate staging. Transmitted asymmetry serves also as the observation arena where the increase/decrease in **salience** is determined which interacts with staging to yield the forces of **deixis** (and **transitivity**) active in the clause.

If topicalization is a movement to **Spec,CP** and if staging is at C, then topics cannot be independent of the act of staging. This is exactly what is borne out as one of the typical functions of a topicalized element. We claim that illocutionary T in Comp which drives the staging, controls the degree of resolution of the topic in **Spec,CP**. **Pretheoretically**, only a strong T in C

seems to support a topic at all. We shall take the position that a strong (finite indicative) T in C alone has the option of supporting an overt topic; otherwise we get Huang's covert topic or the ubiquitous trivial null topic. The topic-comment asymmetry is the fundamental stage prop; it reflects the work of staging as a matter of bringing the new (Comment) to bear on the given (previous text or context) via the mediation at the topic site. And a strong C can afford the occasional luxury of a high-resolution version of this asymmetry by opting for an overt, distinct topic.

1.4.3 Scening

Scening, we claim, is an entity different from staging both in terms of its function as well as location. We propose that NP slots are organized as roles in scenes nucleated at verbs[12] . Scening, therefore, continuing the work of staging, reaches down the illuminated highway of asymmetries to the verb where weakly and strongly resolved NPs are situated. Notice that this is another motivation for studying transitivity. If transitivity is

1. This is what we suggested earlier by saying that only verbs can construct a scene.

2. This also bears upon the Lexology project of Dasgupta (forth-coming), in the sense that this establishes the quintessential lexologic tenet: sentences are new, words are old. Verbs, note, are the crucial device in the business of building new sentences from old words.

defined in terms of staging, scening and event then a study of the phenomenon would lead to a better understanding of these fundamental concepts which seem to be the crucial forces behind a clause. Scenes, as we said, are constructed with NP roles and exhibit a particular distribution of high/low resolution. This is achieved by a hierarchy within the typology of possible scen- ings. Therefore, we claim that scening can be strong or weak. Strong scening results in an independent scene. Weak scening, we claim, results in dependent scenes. Through the latter one fills out the picture. It is as if that part of the clause (or discourse) where dependent scenes are born, is saying "embed me in another sentence (or scene)". Strong scening, however, is pragmatically responsible. In other words, it can stand all by itself as a separate speech act. A strong scening accepts full responsibility for answering queries on how the given/new deal is negotiated or implemented.

In order to now decide on the syntactic location of scening, we invoke the clause structure proposed by Polllock (1993). He claims, gathering evidence from historical facts, that the loss of overt main verb raising to the pre-Neg functional position in English is a consequence of the loss of morphologically manifest- ed mood distinctions between the indicative and the subjunctive. Based on such historical facts he suggests a projection MoodP

above the TP projection for English and French as follows:

(67)

```
                    MOODP
                     /\
                      /\
                    MOOD \
                          /\
                   (Neg)  TP
                           /\
                            /\
                          T  AgrP
                               /\
                                /\
                              Agr  VP
```
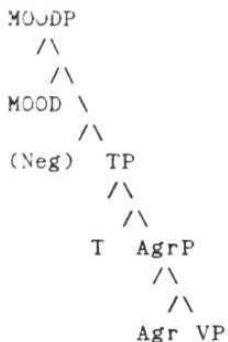
In the synchronic grammar of English we find evidence for this proposal from Laka (1990). We note with him, that Mood distinctions are also expressed in English through modal auxiliaries like *will*, *way, can*, etc. Keeping this in mind we represent **Pollock's** MoodP as ModP -- a move made in Roy (1995) for an analysis of Bangla negation. Laka points out the following paradigm for a variety of Southern American English:

(68) Can you do that
     'You can do that'

According to Laka, **NPIs** in this variety can be licensed at the subject position -- a possibility not realized in standard English — only if negation cliticizes on the **modal**:

(69) Can't anybody do that
     'Nobody can do that'

For his purpose, Lu ka assumes a position higher than the Comp for modals. This variety of English, therefore is another evidence for a topmost projection of ModP in English.

The clause structure proposed by Pollock (1993) implies that the modal system is somewhere outside the prototypical clause structure, that is, outside the IP structure. This is borne out by the fact that when a language chooses to reduce its tense distinctions the system shrinks into the non-future subsystem, that is, the future is separate from the other tenses and moods in the tense system of a language. Let us say, the future does not fully participate in the tense system. Now consider the fact that imperative and subjunctive mood constructions resist topicalization. The situation is somewhat as follows:

(70)	Mood	Overt Topic Possible
	Indicative	YES
	Subjunctive	NO
	Imperative	
	Infinitive	OF COURSE NOT

Also notice the fact that even in richly inflected languages imperatives (like the pragmatically parallel vocatives) resist inflection as well. We conjecture that imperative's very weak inflection or subjunctive's weak inflection needs to establish Mood-to-staging contact to get its bearings straight — a contact

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that can **not take place across a topic.** This results in the
above categorization (70). Infinitives are then just an extreme
case of **dependent scenehood.**

We suggest from this that it is at M(ood/ode) where the
actual decision regarding the strength/weakness of scening takes
place. The topic/focus possibilities open up whenever the M
(itself) is strong. In the case of both subjunctive/imperative
and infinitives, any weakness in M results in the lack of Topic,
hence the hierarchy in (70). This strong/weak distinction of M
reflected in strong/weak scening since the former decides the
ofientization possibilities.

In short, what we have suggested so far, reduces to the
following:

(71) **Staging decides the scene to scene** constructions/
connections through an illuminated highway of
asymmetries and **scening decides the modalities** of
each individual scene already structured at COMP
through **staging.**

Event

Event is the last of the tools to drive down such a highway
he one depicted in (71) in order to understand the clause/

discourse-structure better through an inspection of **transitivity.**
It is thanks to the parametric revolution of Pollock (19e9) and
others leading to the **Split-INFL** hypothesis and then to **minimal-**
ism, that we can make better sense of the **INFL** system both empiri-
ically (Pollock/ Chomsky/ **Mahajan)** and conceptually (Higginbo-
tham on **Infl/** Davidson on event linkage). Owing to earlier formal
semantic work, we can deal with the event system, that is, with
clauses more efficiently/ fruitfully than we can with the scen-
ings associated at the Mood level.

 Davidson (1967) suggests that in all action sentences — at
least all the indicative ones -- there is a **quantification** over
events. Consider (72) below:

 (72)   John kicked Sam
Kick in (72) is not a two-place predicate but a three place
relation between *John, Sam* and an *event.* The semantic represen-
tation of (72) above is (73).

 (73) [∃x : x is an event) kicked (John, Sam, x)

In **Higginbotham** (1985) the thematic grid of a verb like see is
shown **as:**

 (74) see, +V **-N,** <1 ,2,E>
In (74) the position E corresponds to the "hidden" argument place
for events.   Higginbotham extends this essential Davidsonian

concept vo slatives as well and pragmatically, E in Higginbotham,
corresponds to a bundle of objects called "situations". He
locates E at Infl.

The proposal of relating verbs to events and states is not
new in philosophy. It is found in Port-Royal Logic. It receded
somewhat in the background after Frege and Russell who considered
it secondary. In Parsons (1990), verbs are taken to be more like
common nouns (kinds) than proper nouns. The theory he proposes
combines Panini and Davidson. The basic assumption is that
sentences like (75) say something like (76).

    (75) Caesar died.

    (76) For some event e
            e is a dying, and
            the object of e is Caesar, anJ
            e culminates before now
                                            (Parsons 1990:6)

In symbolic logic this is translated as the following:

(77) (∃e)[Dying(e)& Object(e, Caesar)& culminate (e,before now)]
         | | | |
      DEFAULT   VERB   VERB   TENSE

A traditional logic-book analysis of the above sentence would
give a formula as: D(c) where D represents *died* and c represents
Caesar. A more refined formula is:

(78)   (∃e) **[Dying** (e) and object (e,x)]

This   proposal   is not very different   from   (77) except   that   **the**
latter   fills   in   some   details.

Tenses   representing   time   in   Parsons   (1990) are   shown   with
operators like PAST, PRESENT or FUTURE as   in   the   following:

(79) Brutus stabbed Caesar
         stabs
         will stab
      PAST(∃e)[stabbing(e)& subj(e,Brutus)& Obj(e,Caesar)& Cul(e)]
      PRES
      FUT

This move of Parsons' (1990) combined with a present day transla-
tion   of   Higginbotham   (1985) suggests that   the   event   can   be
thought   of   as   being   located   at   *T*. At   the   level   of   interpretation,
however   this   conflation   is   restricted. Thus,   in   the   logical
representation,   event   and   tense   are   separately   quantified.
Notice   that   in   Parsons,   the   event   predicates   all   have   *-ing* forms.
This   suggests   that   event,   like staging   and   scening,   is   a   process,
different   only   in   that   it   is   probably   more   descriptive   or   nomi-
nal.

One   final   move   that   we   may   contribute   is   that   if   we   believe
Guasti's   (1993)   analysis   of   Romance   Infinitives,   then   we   may
conclude   (with   Guasti) that   event   complements   contain   an   **Agr**

projection. Although the notion of Fvent in Guasti differs from ours, we accept this conclusion and make the following moves. The pr sence of Agr in T (=Event), unlike Guasti, we say is a result of a linking estab: ished with an Agr projection. Now the M head, we conjecture, is in some way responsible for the Morphological appearance of the subject. If that is the case then we suggest that the M head has some way of linking on to the AgrS head as they, then jointl decide the subject properties. If we make this move then we are left with a possible link between the T head (where the Event resides) and the AgrO head. However, we can not, at this stage think of a concrete implementation of realizing the linking of M with AgrS and T with AgrO.

1.5 The Lenin Question

Pretheoretically, topicology is going to involve grammar and pragmatics, while subjectology seems to lend itself more consistently to grammatical treatment. Our approach is going to be computational. This is not to promise immediate (and thus shallow and unusable) results". Rather the role of the computational framework is to impose some order on our mix of grammar and pragmatics via the shape of an external requirement that needs to

1.The title of this subsection derives from the fact that Lenin had inherited from Chernyshevsky the crucial question "What is to be done ?".

be fulfilled. For the study of the clause in linguistics must, if it is to be worth anything, eventually converge with the study in psycholinguistics, in computational linguistics, and in philosophy, of the typical, sentential representation of an action or an event. Our purpose, then, is to pursue the linguistics of the clause, bearing in mind the need to make the account serve the broader purposes of a computational account -- relativizing linguistic theorizing to its non-linguistic use.

Transitivity, as we stated earlier, turns out to be a special case of topic-comment (subject-object and other trajector/landmark dyads) but studying it as a special case of the general dyad is beyond practical politics at present. The reason for this is that the nitty-gritt, of each study involves looking at specific grammatical landscapes. The landscape needed for the study of transitivity is inspectable but one needed for topic-comment is understudied and can emerge, if at all, only after the present type of exercise on transitivity reaches a certain stage.

We propose to cross-breed this core work with thematic material on transitivity in Hopper-Thompson, Giv6n, Langacker and other functionalists whose thinking complements the structuralist achievements in the parametric tradition. Specifically, we cross-breed the grid given in the structuralists with the point mass specification provided by the functionalists who are worried

about degrees of definiteness/resolution/strength at what turns out to be each functional head (it is appropriate that it is the functionalists who turn out to be informative about what the structuralists call functional heads), at each Aspect, T, D, and we shall add in chapter IV, B.

This gets us to the point where we can at least figure out the prototypical simplex clauses with some confidence and map out an agenda for things to do on this basis. We have already out-lined the main stories in this chapter, which have to do with the trajectors/landmarks, the ups and downs of givenness and newness interacting with constructs like Staging, Scening and Event to play" out the real world manifestations of a typical sentence.

The subplots are explicated in the following chapter. We first choose to explore the event. Hence the transitivity chap-ter. This lands us in a study of devices used in a language to show what is going on. Hence the agreement chapter. That takes us closer to the inner stories of D and B strength in NPs. Here we make new contributions based on the (to most readers) brand new mysteries of the Bangla classifier system, that is, the DP chapter where we hammer home the point about how functional head strength correlates with high resolution (here, nominal definite-ness) and close the narrative of the thesis.

Such a study, we claim, is good for computational linguistics (even for NLP) and theoretical cognitive science where, linguistics meets, Jackendoff style, the visual system and other forms of processing-organizing.

1.6 Organization of the Thesis

In this chapter, so far, we have elaborated the interconnections that obtain between various asymmetries and the given/ new distinction. We further proposed the syntactic impact that such interconnections may have on concepts like Staging, Scening and Event which together define the consequences cf a clause in the totality of a discourse. In this section, we outline the organization of the discussion presented in the rest of the dissertation.

In Chapter II we discuss the notion of transitivity to further demonstrate the connections between film-theoretic concepts and syntax proper by proposing to capture the transitivity of a clause through an evaluation of salience of the clause in terms of a modified version of the Discourse Representation Theory. This modification, in terms of a "Camera Angle View" and the notion of a *field,* we claim, will lead to a more efficient correspondence between the two major versions of DRT, that is, of Kamp (1981) and Heim (1982). The crucial concept of *accommoda-*

tion is discussed in detail in this regard.

We present an algorithm in section 2.4 based on the Novelty Condition of Heim (section 2.2) and a modified DRT. This algorithm is shown to fall short in certain crucial respects and is, therefore, modified later in section 2.9.2. In this revised algorithm we attempt to integrate the two separate notions of transitivity — semantic/pragmatic transitivity and syntactic transitivity -- that we identify earlier (section 2.7), in terms of a mixed mode method of parsing. Thus, we show that, Hopper and Thompson's (1980) pragmatic parameters of transitivity and Murasugi's (1992) notion of syntactic transitivity can be effectively put to use to serve a common goal, that of computational efficiency.

In Chapter III we discuss the notion of agreement as much as it bears upon our agenda. Agreement for our purpose serves the goal of identifying the participants for evaluating syntactic transitivity and therefore, ultimately, salience — the major thrust of this project. We have earlier seen in this chapter that in our attempt to find an equivalence between the VP and the NP structure we need to take care of the network of agreement relations — in addition to other networks — of a clause to achieve the goal of equivalence. In short, agreement, therefore,

provides finer details in a particular subroutine of an algorithm that we presented in the previous chapter.

The bulk of the chapter is devoted to the thesis that the object relation is more important; we try to see this in the light of a more general term like *landmark*. The primacy of **the** object was earlier (Chapter II section 2.7.4) shown to be prominent in child language and is also apparent when we try to expand our picture so that it includes unergatives and unaccusatives as well as dyadic verbs. In this chapter, unergative clauses are first shown (section 3.2) to consistently contain a deep object position. The following sections discuss ergatives, transitives unaccusatives to argue that all of them have an object at some level of derivation. This discussion also includes revisions of the Split-VP Hypothesis and the Obligatory Case Parameter.

In section 3.5 we present our analysis of the phenomenon of long-distance agreement in Hindi, based on Watanabe's (1993) Three-Layered Case Theory and claim that the analysis has an advantage over existing analyses in terms of the data that it covers as also the computational edge that it packages. In our terms an (actually) L-related position can be detected if we **are** able to track the different features like Fs (see section 3.5 **and** 3.6 for details) located/created during the derivation. This would then make our task of producing a list of the typology of

positions (in terms of the A/A' distinction, for example) easier. This, we claim, is the computational advantage of our theoretical account.

In Chapter IV the phenomenon of (Noun) Classification in Bangla (and Hindi, to some extent) is discussed in conjunction with our drive towards discovering newer asymmetries down the clause highway. The inner stories of strength resolution of B(adge) and D(eclension) are revealed in order to flesh out the relevant phrase picture as much as it contributes to the clause picture. Definiteness, in this connection, seems to correlate strongly with the new/given distinction (section 4.1). Thus, the classifier as a cognitive category and its definiteness import is presented in section 4.3.

Based on certain distinctions between Hindi and Bangla, we make a major claim regarding the typology of languages and pro- pose that languages be classified as Gender languages and Class languages, Hindi and Bangla exhibiting the characteristics of each respectively. This distinction leads us to suggest certain differences between Hindi and Bangla DPs on the basis of the relative strengths of the B and the D head in each language.

In section 4.10 we discuss Principle-Based Parsing (PBP) in connection with the Bangla classifier system and show that a PBP approach along with a strong KB will give us the right results as far as the DPs in Bangla/Hindi are concerned. We propose (section 4.10.2.1) that Frames are phrase level computational variants of the thematic concept of scening which we claimed (section 1.4.3) determines the modality aspects of a clause and thus the parsing technique that we suggest enables a computation of scenes. Lastly (4.10.3), we propose a KB called WISE which solves certain residual problems of Bangla nominal syntax.

CHAPTER II

TRANSITIVITY

2.0 Introduction

If we buy Hopper and Thompson's (1980) Transitivity theory then transitivity is no longer a matter of mechanical counting of participant NPs but is rather a matter of a discourse-derived relationship which is stronger in proportion to the intensity of the event which the clause is reporting. This intensity, which Hopper and Thompson call "the degree of Transitivity" of the event is evaluated as an aggregate of a cluster of properties or parameters, each of which contribute in some fashion to the transitivity relationship.

These discourse parameters, which we will discuss in detail later, function in discourse to distinguish the "more salient, foregrounded, actions" (Hopper, 1983). Earlier, in 1977, Fill—more had proposed the notion of a "salience hierarchy" to pick out the true object, as opposed to the oblique, in connection with pairs like the following:

(1) a. I hit Harry with the stick

b. I hit the stick against Harry

Fillmore's sa ience hierarcny included properties like **humanness,** change of location or **state, definiteness,** and totality. In reworking such a hierarchy in Hopper and Thompson's **parameters,** it turns out that given two patient NPs in a cause, the one which is higher in "Individuat ion" or **"Affectedness"** will be selected as the object of the verb whereas the less individuated or affected one is relegated to the status of bearing oblique Case Hopper and **Thompson** '980).

Our interest in this Transitivity theory lies in the fact that a **computatioral** neasure of **transitivity,** following Hopper And Thompson, would not be a **simple** counting of participant NPs but a comparative *and* relative evaluation of these parameters. Ve can **imagine** designing a **systen** whereby the transitivity of a clause can be determined on the basis of a scale where **these** parameters are arranged in their relative order of contributory potential. But this is getting into too much detail too soon.

2.1 Salience

Although Hopper and Thompson's set of **parameters** are dis-course-oriented, the elaborations that they set forth (also Hop-per, 1983) all involve clausal or sentential aspects. This is where, we think, the notion of salience cannot be totally aban-doned. In inter-sentential discourse (and **semantics)** **studies,**

the   notion of salience was **discussed**, at least **as** an   elementary
notion, in connection with the **problem** of reference of anaphoric
pronouns.   The **problem, originally** noticed by **Strawson** (1952) and
Geach   (1962), **involves** the two contradictory faces of anaphoric
pronouns,   like *it* in (2) below, picking up reference **from** their
antecedents on the one hand, and Russell's (1919) contention that
indefinites do not have reference, on the other.

(2) *A dog* **came** in.   *It* lay down under the table (**Heim**, 1982)

It was **Kripke** (1977) who suggested a way out of this puzzle
by   proposing two types of reference: "speaker's reference"   and
"semantic   **reference**". **While** Russell's indefinites can be   sub-
sumed under the latter, it is the former which decides the bound
variable status of the anaphoric pronoun in (2) above.   Speaker's
reference   depends on pragmatic rather than purely semantic fac-
tors.   As **Heim** (1982) points out in her "file-change semantics"
model, pronouns are capable of getting their reference by virtue
of   purely pragmatic factors such as an object's perceptual   (or
associative) *salience.*   In   fact, Lewis (1979) goes   one   step
further in suggesting that a pronoun may refer to whatever object
is **maximally** salient in the situation of the utterance whereby he
implies that anaphoric pronouns are only a special case of this,
as one method of raising the salience of an object is by produc-
ing a suitable utterance (Heim, 1982).   This concept of salience

is pore inclusive than Kripke's speaker's reference since it can account for the following utterances;

    (3) a. A dog has been rummaging in the garbage can.

       b. It has torn open all the plastic bags.

                               (Heim, 1982)

As Heim shows in her analysis, (3a) could have been uttered by someone who has not witnessed the event directly, but was merely inferring on the basis of an after-effect. Yet (3b) can be naturally uttered by the same speaker. In (3b) the pronoun *it* cannot be analyzed as picking up speaker's reference because there was none.

Heim argues that by Lewis' notion of salience however, the utterance of (3a) raises the salience of a particular dog — the dog that did the rummaging. Now in (3b), the anaphoric pronoun can easily refer to this most salient dog in the situation. However, Lewis' salience, Heim notes, fails to correctly interpret minimal pairs like the following:

    (4) a. I dropped ten marbles and found all of them, except
         for one. It is probably under the sofa.

       b. I dropped ten marbles and found only nine of then.
         It is probably under the sofa.
                       (Heim, 1982: 21)

By adopting Heim's notion of salience one can imagine that the first sentence of (4b) raises the salience of the tenth. Hissing marble. Still, the utterance does not succeed in raising the salience to such a degree that would allow the pronoun *it* in the subsequent utterance to refer to it. In contrast, the utterance of the first sentence in (4a) is capable of raising the salience of the object to a degree where the subsequent utterance of the pronoun is felicitous.

It can be concluded, therefore, that the salience-shifting potential of an utterance is a matter of how the utterance is encoded in terms of words. In answering the question: How exactly does wording influence the capacity of an utterance to raise an individual's salience, Heim (1982) proposes the following generalization:

> A necessary condition of a sentence S to promote an object X to maximal salience is that S contain either an NP that refers to X or a singular indefinite NP whose predicate is true of X.

This revision can now distinguish between (4a) and (4b). In the former, the first sentence contains the indefinite *one* — to be read as "one of the marbles" which is true of the tenth Barbie, the referent of the subsequent pronoun. There is nothing in the

first sentence of (4b) which can, by the above **generalization,**
raise the salience of the tenth marble.

2.1.1 **Accommodat**ion

In her discussion of novel **definites,** as in (5) and (6)
below, **Heim** Bakes use of the notion of "**accommodation**" to render
such **examples** felicitous which are otherwise unaccountable (that
is become **infelicitous)** by her Extended Novelty Familiarity
Condition [p369].

(5) Watch out, the **dog**$_i$ will **bite** you.
    (**Immediate** situation use)

(6) John read [a book about **Schubert]**$_i$ and wrote to the
    author :.
    (Associative anaphoric use)
                                        (**Heim,** 1982: 371)

Accommodation, in terms of her kind of semantics, means **making**
adjustments to a file by adding enough information to make a
particular utterance felicitous. For instance, file change stops
in case of (5) if no **accommodation** takes place. **Accommodation**
would mean an addition of a new card i with an entry like: "is a
dog somewhere close by". File change can now proceed.

When a new **file** card is introduced under **accommodation,** it
has to be linked by **cross-references** to some already existing
file cards. This is particularly relevant for (6), where a card

j is added with an entry like: "is autnor of i". **That** is, ın pairing (book, author), the second member of tne pair must have authored the first.

This concept of "cross-reference" (or "bridging" in psycho-logical literature) in analyzing "associative anaphoric" uses as in (6) above, is carried over to other analogous uses (as in (5)) except that the role of "indirect antecedent" ("a book about Schubert" in (6)) is played by a contextually salient referent.

Accommodation, which is crucial for accounting for novel indefinites as well as certain pronominal/non-pronorinal defi-nites, therefore, to us looks like a matter of salience. For example, *the dog* in (5) whicl is visually or perceptually sali-ent, already introduces a card i by the time the sentence is uttered. The utterance of (5) only "triggers" the accommodation whereupon a new card j is introduced that carries a cross-reference to i. On the basis of this we can introduce the fol-lowing principle which takes care of such definites:

A: Accommodate whatever is salient in the context of the utterance.

Alternatively, by adopting **Stalnaker's** (1974) construct of speak-er's **presupposition** as a set of possible worlds, we can replace

"context" above with "possible worlds". In fact we will extend Stalnaker's speaker's presupposition to include what we nay call speaker's pragmatic presupposition or contextual presupposition. This is, in an extended sense, equivalent to Heim's "file" — the common ground for a context. The following passage from Stalnaker (1979) is relevant in this context:

> If a goat walked into the room, it would normally be presupposed, from that point, that there was a goat in the room. And the fact that this was presupposed might be exploited in the conversation, as when someone asks, "how did *that* thing get in here?" assuming that others will know what he is talking about.

The discussion so far indicates that salience is an indispensable tool both in terms of:

(i) sentential grammar where a concept like Fillmore's (1977) salience hierarchy is reworked within a broader framework of the discourse-parameters of transitivity of Hopper and Thompson (1980),

and,

(ii) intersentential aspects of pronoun reference or definite/indefinite reference as in the frameworks presented by Lewis, Kripke, Heim and others.

It remains to be seen whether salience as a theoretical

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construct can be meaningfully involved in a computational inves-
tigation of the sort we are engaged in. That this is indeed the
case is our next topic of discussion.

2.1.2 Salience in Photographs

A group of computer scientists at the University of Massa-
chusetts have developed an efficient technique for planning the
generation of natural language texts that describe photographs of
natural scenes as processed by the UMASS VISIONS system. The
texts follow the ordering that is imposed on the scene's objects
by their visual salience. It is possible to find structural
analogues to visual salience in other domains to build simple
generation (or parsing) schemes based on them.

Avoiding the super-human fallacy, that is, requiring comput-
ers to operate more efficiently than humans themselves can do,
McDonald & Conklin (1982) developed an expedient and computation-
ally efficient, if "leaky", planning process which works by
monitoring and attending to the user's questions.

The key to the planner's simplicity lies in its making use
of the notion of "salience". Objects are introduced into the
text according to their relative importance in the conceptual
source of the text. The decision regarding which objects to

leave out is taken care of by defining a cut-off salience rating below which objects are ignored. The notion of salience needed for the task of production of short paragraphs describing photographs of houses is widely shared and people interpret what is important about a picture according to such a shared set of conventions involving the size and the centrality of objects shown as well as a knowledge of what is nor al or expected in a given domain — a car parked in front of a rural house in India would be highly salient.

The salience ratings with which the objects in the visual representation of McDonald & Conklin's (1982) planner are annotated were derived empirically through extensive psychological testing of human objects, where subjects both rated the photographs on a zero to seven scale, and wrote short paragraphs describing the scenes. Given this data, the planning algorithm runs as follows:

(1) The objects in the scene are placed in a list — Unused Salient Object List — in decreasing order of salience.
(2) Objects are taken from the list in (1), packaged with selected properties and relations, and are sent to the generator.
(3) This process is repeated until the list of objects is exhausted.

The generator uses object-specific rules to construct the text. Paragraphs thus generated on the basis of salience ratings were

shown to be effective in picking out which picture they corre-
spond to from a different camera angle.

2.1.3 Salience and Prepositions

The McDonald & Conklin (1982) planners discussed abo- e show
how visual salience simplifies an otherwise complex operation of
text generation. A related issue is that of how salience as a
construct affects our use of prepositions in natural language.
Herskovits (1986) considers salience as one of the fundamental
properties (others being relevance, typicality, and tolerance)
which influence the systematic behaviour of use of prepositions.

According to her, salience explains the direction of meto-
nymic shifts. It may be obtained visually in connection with a
given use of the objects or for some action performed within
close association with the objects. This, to our mind, is a most
standard description of transitivity. Traditionally, transitivi-
ty is understood as a global property of an entire clause such
that an activity is carried over or transferred from an agent to
a patient. One way, therefore, to measure salience is to look
into transitivity in detail — a connection we have earlier
Pointed out and on which the argumentation in this chapter rests.
But before we get into the issue of transitivity — which in-
volves a much broader network of related concepts — let us first
see what else Herskovits has to say about salience.

The   first 'near **principle'** that she proposes,   which   acti-
vates certain synecdoches, is the **following:**

   (I) One   can use a noun which basically denotes a whole   to
        refer   to the region occupied by a part of it   that   is
        typically salient.

Consider the following example:

   (7) A waiting line **at** the counter
In (7), a functionally salient part of the line, its head, should
be **established** for the **line** itself. The phrase is **applicable**
only   if the head of the line, not any other part, is very   close
to the counter. Now   consider (8).

   (8) The child in the back of the car
Here   a **salient** interior is substituted for the   whole   reference
object.

   (9) The cat is under the table
In (9),   the cat is probably not under the legs   of   the   table.
Table here stands for the table top.

   An   object is **"typically"** salient because it abides   by   the
social conventions in use.   For example, (10) below is **unpragmat-**
ic because typically the most **salient** important part of a cup   is

containing part and (10) uses cap to refer to its handle.

(10) * He held the cup by putting two fing ra through it

Herskovits has two corollaries for (I) above:

Corollary 1:   One can use an NP which **basically** denotes *a*   whole
cbject to refer to the region occupied by a part of it
that is typically visible.

Consider (11) and (12) in this connection.

(11) The rabbit is under the bush

(12) My house is on top of the hill

(11)   does not mean that the rabbit is under the whole   bush   but
under   only part of it.   Similarly,   in (12), *house* refers to   the
visible part of the house alone.

Corollary 2:   The geometric description applicable **may** be in   the
base of the object (that is. its area in contact   with
the ground plane).

(13) The house is above the apartment building

(13) depicts a situation like this:

```
   _____          _____
  :|  __   __  |:          :|             |:
  :|_:_: :_:_: |:         _:_:_:  _:_:_:_  :_
  :|  __   __  |:        / 
  :|_:_: :_:_: |:       /
  :|  __   __  |:      /
  :|_:_: :_:_|_/
  __/--------/
```
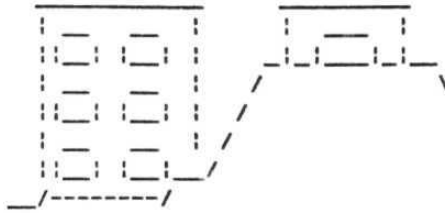
Similarly, we have:

    (14) The block is on the circle

(14) represents a diagram like the **following**:

```
        _/:   :____
       / ::___:     \
      :   :/__/       :
       _____ /
```
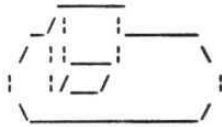
Where *block* refers only to the base of the block, we do not even think of the metonymy involved in such expressions.   Metonymy however does not apply in the following sentences because we are talking in terms of **two-dimensional** objects:

    (15) • The rectangle is in the **line**

for a situation like the following:

```
         _____
     ___:_____:___
```
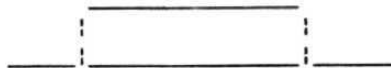
Two other near principles that Herskovits (1986) proposes are the **following**:

I.) The **geometric** description applicable may be the projection of the **object** on the plane of infinity.

(16)a. The **morning** star is to the left of the church

(16a) will be true only of the appearance of the morning star and

the church in the plane of view. This relates to **salien** e since

appearance is a salient aspect of one's experience of objects.

(III) The **geometric** description applicable may be in the projec-
tion of the object on the ground plane.

(16)b. The painting is to the right of the chair

(16b) may describe a situation like the following;

Although the painting is really higher than the chair, **'to** the

right' is in fact true of the point **approximating** the chair and

the projection of the painting on the ground. There is nothing

unnatural about (16b) because horizontal coordinates stand out in

our experience of objects.

Thus we see in **Herskovits' interdisciplinary** study of prepo-

sition in English (and this would appear to hold of other languages such as Hindi and Bangla as well) that salience refers to the kind of foregrounding of objects or object parts that arises in our interaction with and perception of our environment.

Bow does the account of salience presented so far relate to our principle A above where we viewed 'accommodation" necessarily in terms of incorporating salient objects from a contextually presupposed common ground/file? To answer the question we need to ascribe to "accommodation" a broader perspective than hitherto attempted.

2.2 Novelty Condition

In her File Change Semantics, Heim (1982) introduced the concept of file-keeping as a device, and later as a theoretical construct, to understand a dialogue or any piece of discourse. At any given point of conversation, a file contains all that has been conveyed so far. Files in her theory are introduced as an additional level of analysis to intervene between language and the world. Unlike other strictly grammar-internal levels of representation (e.g. logical form), files encode information from non-linguistic sources like perception, permanently stored knowledge, etc., along with information contributed by linguistic structures.

Suppose A is uttering the following text and B is trying to understand, that is B's task is to construct and update a file:

(17) (a) A woman was bitten by a dog. (b) She hit him with a paddle. (c) It broke in half. (d) The dog ran away
(Heim, 1982: 275)

B's file, to start with, is empty (this concept is later qualified in the theory). After (17a), B takes two new cards and numbers them 1 and 2. On card 1, B writes "is a woman" and "was bitten by 2". On card 2, B writes, "is a dog" and "bit 1". Next, when A utters (17b), B takes another new card number 3 and writes "is a paddle" and "was used by 1 to hit 2". B also, at this point, updates card 1 by adding "hit 2 with 3". After utterance (17c), B updates card 3 by adding "broke in half". Then (17d) triggers a further addition on card 2: "ran away".

With this view of conversation, Heim points out that B is following the following principle:

B: For every indefinite, start a new card; for every definite, update a suitable old card.

Heim's is not the first proposal to view communication as somehow analogous to file-keeping. Karttunen's (1976) "discourse referents" also make use of a file-keeping concept. Around the same time as Heim, Kamp (1981) had proposed the concept of Discourse Representation Structures (DRSs) which together with Heim's files

came to be identified with Discourse **Representation** Theory (DRT)

2.3 Discourse **Representation** Theory

The motivation for DRT **comes** from the **following** goals:

(18) a. giving a unified account of indefinite NPs
b. giving a unified account of definite NPs
(including pronouns in their different uses)
c. accounting for the range of anaphora
possibilities in discourse.

This, as we can see, matches our **computational** goals of giving an account of pronominal reference in discourse — a problem that has beset the construction of any satisfactory computational account in natural languages for many years now. It **will** not be out of place, therefore, to elaborate on DRT further.

The controversy regarding the status of indefinites as quantificational (Russellian view) and as referential that we **alluded** to **earlier,** becomes more acute and challenging in the realm of the donkey sentences. These are sentences containing an indefinite NP inside an **if-clause** or a relative clause and a pronoun outside that clause which refers back to the indefinite. Consider the following example:

(19) Every man who bought a donkey was happy

In Russell's account, since the indefinite **descriptions** are existentially quantified phrases, the logical fora of (19) may be represented as (in the predicate calculus notation):

(19') **(∀x)((man** x ^ (∃**y)(**donkey y ^ x bought **y))⇒x** was happy)

Since (∃X∅)>U and (Vx)(0 >U) are **logical**iy equivalent this makes **(19')** logically equivalent to **(19''):**

(19'') **(∀x)(∀y)**((man x ^ donkey y ^ x bought y⇒x was happy) ?

Now consider the following which exhibits the problem associated with donkey sentences:

(20) Every man who meets a donkey beats it.

(20) is standardly assumed to be true only in oase every man who meets at least one donkey beats every donkey that he meets. (20) therefore translates into (20').

(20') (Vx)(Vy)((nan x * donkey y ^ x meets y) ⇒ x beats y)

1.**The** symbol " here denotes the conjunction

The closest equivalent (in the sense of **(19')** and **(19'')** above) to (20^1) is **(20''):**

(20'') (∀x)((man x **^** (**∃y)(donkey** y **^** x meets **y))→** x beats y)

In **(20'')** the final y **lies** outside the scope of the existential quantifier that is supposed to bind it. We cannot, therefore, represent (20) by **means** of a formula that treats a *donkey* **exis-**tentially. Therefore, in Russellian terms, a uniform analysis is unavailable. Anaphora across a conditional gives rise to the same problem.

(21) If a man meets a donkey, he beats it

In both examples ((20-21)) a *donkey* cannot be referential. In order to get the right truth condition it cannot be quantifica-tional either. It appears to function as a universal quantifier in these examples. Therefore the right translation of (21) is not (21a) but (21b) since, in the former, in x *beats y,* the variables are free.

(21)a. **∃x∃y (man(x)^** donkey(y) **^** x meets y) => x beats y

(21)b. VxVy **((man(x)** **^** donkey(y) * x meets y)=> x beats y)

The problem with (21b) is the familiar one of (20) regarding the scope of the indefinite in addition to the **problem** of analyzing indefinites **sometimes** as existentials and **sometimes** as univer-sals.

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In the **Kamp/Heim** system definite and indefinite NPs are translated as variables which serve as discourse referents. In **Kamp's DRT** all the information collected in a discourse is represented **syntactically** by a DRS graphically depicted as a box. Statements asserted as facts by participants are entered into the matrix DRS which may contain smaller boxes representing denied or doubtful facts, temporary assumptions, etc. This is shown in (22) below where 1 and 2 in the matrix box are asserted facts, 3 is denied, 4 and 5 are possible, 8 is asserted on the assumption 6 and 7, etc.

(22)
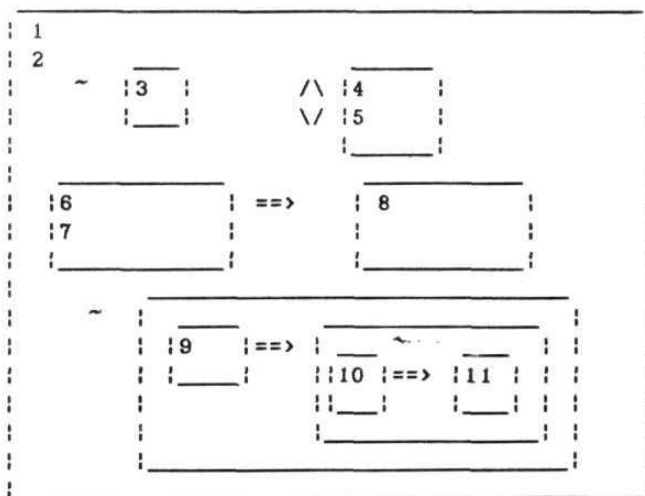
As can be inferred, there is a hierarchical structure of subdiscourses within subdiscourses, which represents the logical **struc-**

ture of the discourse.

Kamp/Heim proposed that each indefinite implies an introduc-
tion of a new variable into the discourse representation (see B
above). Let us illustrate this in Kamp's DRT (as we have already
seen how it is done in Heim's file). In (23) below, the indefi-
nite *a dog* is translated as a variable x with a descriptive
content predicated of it as in: dog (x).

(23) A dog came in

(23) is reduced to: x came in. The open formulas dog(x) and x
came in do not have truth conditions of their own but influence
the truth condition of a DRS when entered into it.

A discourse containing (23) alone will be represented as in
(24) below.

(24)

```
 _____
|          x         |
|                    |
|   A dog came in    |
|      dog (x)       |
|                    |
|    x came in       |
|_____|
```
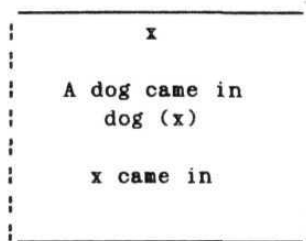
The top line of the box represents the 'universe' of the DRS
where the new variable x is entered. (24) is taken to be true if

x can be Batched with something in the world or in a model which is in fact a **dog** that cane in. In this system, therefore, the definition of truth induces existential **quantification** over the whole discourse **representation.** DRS is a potential picture of the world or the model, and it is true if *there* is a part of the world/model which is correctly described by it. This is expressed by saying that a DRS is true if it can be **'embedded'** into the world/model, formally, a DRS is true iff there is an 'embedding **function'** which verifies it according to the conditions in the DRS.

The existential **quantification** which is induced over the matrix DRS is, as we can see, **unselective** — it **simultaneously** binds **all** variables that happen to be in the universe of the DRS. If we were to construct a **computational** system based on this **model,** note that such unselective binding would simplify the algorithm considerably.

In the **Kamp/Heim** system the indefinite is therefore neither referential nor **quantificational**. Its apparent quantificational force results due to some operator (in this case) in its environment.

Quantification in general in DRT is represented in a DRS by a condition which itself is composed of two **DRSs** — an antecedent

DBS which functions as the restrictive clause, and a consequent DBS which functions as the nuclear scope, in the sense of Heim (1982). The DBS of (25) is represented by (26) below.

(25) Every farmer has a donkey.

(26)
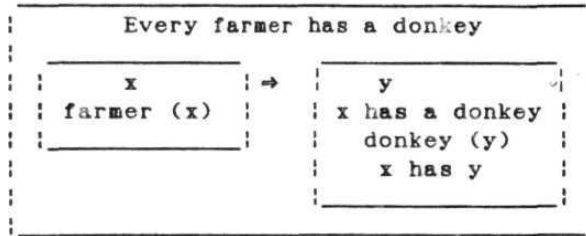
The verification part of this DRS would consist of induction of a combination of universal quantification (over the matrix DRS) and existential quantification (over the consequent sub-DRS). (26) is true if for *every way* of matching x with a farmer in the model, *there is* a way of finding a donkey that the farmer has.

The Lamp/ Heim system therefore distinguishes two kinds of NPs: (i) definite ani indefinite NPs which are not quantifica-tional, and which are translated as variables, (ii) quantifica-tional NPs all of which induce unselective restricted quantifica-tion — in DRT they trigger the introduction of a conditional into the DRS.

Anaphoric definite NPs in the Kamp/Heim system, as we have

pointed out earlier, are translated as one of the variables which are already present in the **representation**. The DRS of (27) is (28).

(27) A dog cane in. It lay down.

(28)

```
 _____
|          x            |
|    A dog came in    - |
|       dog (x)         |
|      x came in        |
|     It lay down       |
|      x lay down       |
|_____|
```
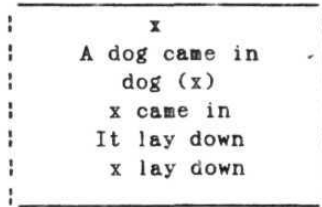
The antecedent of the pronoun *it* is the DRS variable x. In DRT the antecedent of an anaphora **must** also be "accessible" to the pronoun.

Accessibility is a part of "nodal base" in the sense of **Kratzer** (1981) where a **modal** base defines an **accessibility** relation on the set of possible worlds. **Heim** (1982) denotes it as R_B for the **accessibility** relation defined by the modal base B; "V R_B V" is to be read as: "V is accessible fron V". In DRT of **Kamp** **accessibility** is **syntactically** defined as:

(29) The variables accessible **from** a position in DRS **K** are those which appear in the universe of

(i)   **K** itself
(ii) all the DRSs that **graphically** contain **K**, and
(iii) in case **K** is a consequent DRS of a conditional,

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In (28), the dog variable x is accessible to the pronoun **from** the
position of the pronoun because they are in the sate box.   Ac-
cording to the criteria in (29) above, the pronoun *it* in (30)
cannot access the cog variable x, as shown in (3D.

(30) Every dog came in.   It lay down.

(31)
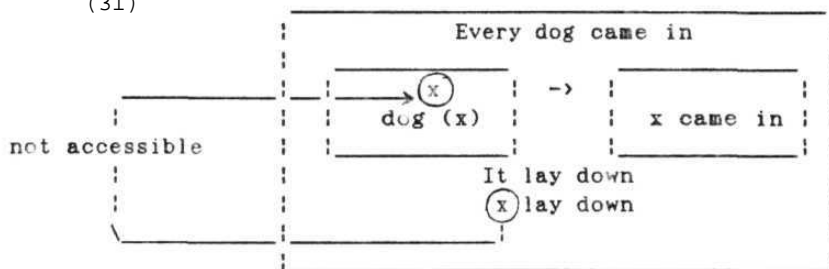
Pronouns, **therefore,** function in the **Kamp/Heim system** like
bound variables (x elements) by (i) picking up the variable of
the indefinite, and (ii) getting bound by the sane quentifier
that binds the indefinite. The variables, or discourse refer-
ents, enable the speaker to keep track of the content of a con-
versation, without being tied down to any particular referent in
the **model.**

Given this **model**, donkey sentences are no longer a **problem.**
For instance (19), repeated here as (32), is treated like any

other **conditional, with** an implicit universal quantifier and is represented as (33).

(32) If a **man** meets a donkey, he beats it.

(33)

```
┌─────────────────────────────────────────────────────────┐
│ If a man meets a donkey, he beats it.                   │
│                                                          │
│  ┌───────────────────────────┐                          │
│  │     X           Y         │   ┌──────────────────┐   │
│  │ a man meets a donkey      │   │                  │   │
│  │   man (X)                 │-->│  he beats it     │   │
│  │   donkey (Y)              │   │   X beats Y      │   │
│  │   X meets Y               │   │_____│   │
│  │                           │                          │
│  │_____│                          │
│                                                          │
│_____│
```
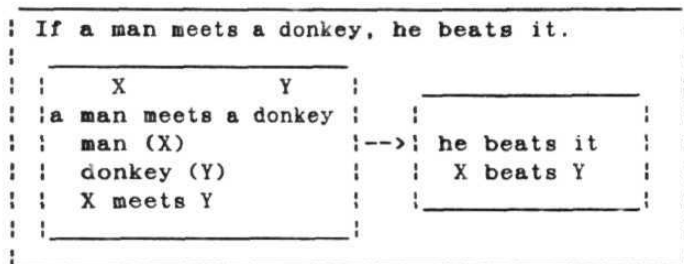
There are a few things to be noted in connection with (33):

(i) indefinites, as usual, are variables
(ii) their universal force is due to some quantifier that binds them
(iii) the pronoun can refer back to variables X and Y because these are in the antecedent box and therefore **accessible**
(iv) pronouns are in the scope of the same universal quantifier which binds the variable
(v) there is no problem with the scope of the indefinite extending beyond the clause boundary because the indefinite is not a quantifier and does not bind the pronoun

As evident from (i) to (v) above, **DRT** then solves the donkey sentence **problem.**

2.4 An Algorithm

Our interest in DRT lies in the fact that all the essential steps for picking out the reference of a pronoun are already worked out in terns of the DRS construct. Designing an appropriate algorithm on the basis of such a model can now be trivially derived. At this stage we conjecture it as follows:

(34)a. construct a 'universe' where the variables declared follow the Novelty Condition (B of section 2.4)

b. construct open formulas for the indefinites by predicating them of the variables declared in a. and by replacing the indefinite with the appropriate variable

c. translate anaphoric definite NPs, if any, in terms of variables already declared in a. (A sub-routine creates suitable pairs to decide which variables from the 'universe' to be used in such a translation)

d. check if any anaphoric variable in c. is accessible or not according to the accessibility condition ((29) above)

e. if yes, declare the discourse component as felicitous; infelicitous otherwise

f. any Q-adverb (Lewis 1975), if found, triggers an introduction of a condition in the DRS and steps a to e are repeated

This is, of course, a very rough procedure awaiting a detailed working out of the finer computational points. Nevertheless, (34) indicates the extent to which DRT can be successfully applied to solve the computational problem of reference tracking

in a discourse.

2.5 Accommodation Revisited

Files are common grounds and therefore contain discourse referents which do not correspond to any NP occurring in the discourse, but are introduced on the basis of world knowledge. The objects to be included in a file are selected on the basis of their saliency. This is how a saliency rating of objects in the surrounding would feed into the process of discourse referent introduction in a file. Such a procedure will also necessarily subsume the concept of accommodation. In accommodation, as we recall from section 2.1, listeners adjust their assumptions by adding "just enough" information to remedy the Novelty Condition "iolation. For example, an expression like *my dog* can be assumed to be felicitous only in a situation where it is accepted that I have a dog. However, if I utter (35), even without such an assumption the listener immediately accommodates the assumption that I have one.

(35) My dog is at the door

This is analogous to the immediate situation case we presented earlier in (5), repeated here as (36), which is uttered, suppose, if I see a dog around someone.

(36) Watch out! The dog will bite you

The fact that **accommodation** is a **rea'** factor in natural languages cannot be challenged but as a **theoretical** tool it **seems** to be too powerful. It **might** conceivably allow too many cases of anaphora to an accommodated antecedent. An attempt, therefore, was Bade (in **Heim**, 1982) to constrain **accommodation**. We have already pointed this out in our discussion of **Heim's** notion of accommodation. The restriction proposed in **Heim** concerned the concept of **cross-referring**, as can be noticed in (6), repeated here as (37).

(37) John read [a book about **Schubert**]. and wrote to the author _i_

As in a file, we will assume that accommodated material is also included in DRSs as and when they arise. We **will** further assume that such accommodated material is given an identity index, **distinguishing** it from material which directly refers to the text. This can be included (similar to the algorithm in (34)) as another step in an algorithm. Heim also talks about temporarily introduced **accommodation** or local **accommodation** as distinct from global or permanently accommodated material. She also suggests that the latter is preferable. According to her, local **accommodation** is needed while analyzing expressions with operators. In an analogous **computational** procedure, this can easily be achieved by tagging different types of accommodated

material differently.

Another way to constrain **accommodat**ion is by way of **making** it **minimal** — adding Just enough information to avoid a felicity condition violation. It is most readily executed if it is very **minimal**. This criterion actually clashes with what we are going to propose next and needs to be modified in the context of our **proposal**.

2.6 The Camera Angle View

We propose that the best way to capture **all** the contextual **underpinnings** of an utterance **like (3f)** above (and others, as we shall point out below) is to imagine discourse being presented in terms of photographs. That is, imagine that at each stage of a **conversation,** the listener is being presented with photograph} of the situation in question. In short, language **understanding** takes place through the camera lens. Throughout the **duration** of the **conversation,** a camera placed at the site records **all** the events as and when they occur. We emphasize that this is not just a metaphor. In fact, such a view of language understanding, especially in terms of a **computational** version of the **system,** is not impossible to imagine in the **light** of what we have presented earlier regarding the designing of a planner whose task is to generate texts based on photographs of houses on the basis of a

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salience grading of objects in the photographs.

We suggest that the exact theoretical construct in a camera-angle view of discourse understanding be what we Bay call a field. We further suggest that a field has certain advantages over a file or a DRS in Kamp/ He in DRT. Introduction of a file card is achieved in this model through a new photograph each time a new object enters the field of vision. Imagine the camera to be sensitive to such new objects (or even substantial modification of new objects — a fact which neither Kamp or Heim considers) and takes a snap each tine such a major change of state occurs. A field is never blank. Even before the utterance of (36) above, the field consists of, let us say, a flight of steps, you — the addressee — coming down the steps, and there is a dog lurking behind. By the time I utter (36), there is already a field consisting of a *dog*. By this we mean that a listener is not surprised by a definite novel-NP *the dog* precisely because s/he has popped up a field pertaining to the conversation under progress from a set of universal fields which are part of the human language processing faculty, where the utterance of a definite dog is not unexpected, given our language experience contained within this universal set.

In connection with accommodation, fields have an advantage over files in terms of the question: at what stage of a dis-

course-construction can one accommodate Material for the purpose of satisfying the felicity condition? In Heim's model, the felicity condition oust be satisfied by a file *prior* to the processing of the definite. That is, whenever a listener encounters a novel definite s/he will have to first accommodate an antecedent; only then can the definite be added to the file. However, in Kadmon's (1987) theory of uniqueness, where she makes use of DRSs rather than files, accormodation follows the entry of the definite into the DRS. Kadmon also suggests that because of uniqueness, the accommodated antecedent is entered into a DRS permanently whereas Heim allows for temporary accommodation to take place, as we have seen earlier. This tension between the two theories regarding the level and the local/global nature of accommodation can te eased out with our concept of a field, which is a deeper (and more universal) level of representation, *in tandem with* a file.

What we are now suggesting is that, theoretically and computationally, it makes better sense to allow field and file to work together albeit at different levels of representation. Accommodation would now proceed as follows: Accommodation takes place in the field at some level prior to the processing of the utterance — in the speaker's intention, for example, — but it is available at the file-level only when the utterance is actual-

ly made. This weeds out the und sirable lag between the encoun-
tering of the utterance by the listener an 1 its subsequent accom-
modation in the file in Heim's system. Secondly, an accommodated
entry remains in the field memory ( )r, if you prefer, in the
"album") once it is entered, but has a local character only in
connection with its appearance at the file-level. Kadmon's DRS,
therefore, is our file and Heim's file is somewhere between our
field and the file-level. Although this theory is forced to
propose an additional level of representation, it nevertheless
attains conceptual simplicity.

In this model , accommodation is not minimal at the field-
level but is minimal at the file-level, not according to Heim's
(1982) criteria, but according to a salience grading of the
o jects in the file where a cut-off point determines the extent
of minimality of accommodation. Translating a field into a file
will proceed accordingly. Notice that the principle A that we
proposed earlier can now be seen to be applying at the file
level. Extending the metaphor of a camera's field of vision,
salience could be seen as a device for focusing and zooming.

It remains to be seen how a field can be constructed. Given
the universal character of fields in general , we suggest that a
conceptual dependency network like Schank (1972) or a modified
version of it (or even a modified conceptual semantics of Jack—

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endoff **(1992))** can be **used** to construct a model of a field. Scripts designed on the basis of **actuu. language** experience can be **profitebly** used in this **connection,** as far as a **computaticnal model** of a field is concerned. A simple functional semantics can do the job of then translating a field into a file in accordance with the **˜zoom** potential" of various objects in the field.

2.7 Transitivity

One way in which this **zoom** potential or salience rating as we mentioned earlier can be worked out is through **transitivity.** This is crucial for our **implementat**ion to work because unless we evaluate the **salience** potential of different objects in a partic- ular setting, we cannot construct the file — and, therefore, computation cannot proceed. This requirement, therefore, merits a detailed discussion of transitivity which we offer as a justi- fication of the title of this **dissertation.**

Transitivity, as we mentioned at the beginning of this chapter, is some sort of transfer of energy from the agent to the patient. The big question that arises at this point is: is transitivity to be seen as a universal prime or is it to bo merely viewed as a theoretical construct? We will produce evi- dence from (mainly) Hopper and Thompson (1980) and others to prove that it is the former. We will also say. **however,** that a

syntactic notion of **Transitivity** is essential for a **model-driven** computation of the kind we propose to proceed. Therefore, we will distinguish between **a semantic/pragmat**ic notion of transitivity and a syntactic notion of transitivity in the course of our discussion.

2.7.1 Semantic/ Pragmatic Transitivity

Hopper and Thompson (henceforth HT) (1980) identified the following parameters according to which a transitivity rating of a particular clause can be measured.

(37)

PARAMETERS	TRANSITIVITY	
	HIGH	LOW
A. PARTICIPANTS i	2 or more participants,! A and 0	1 participant
B. KINESIS	action	non-action
C. ASPECT	te\ic	**at**elic
D. PUNCTUALITY	punctual	non-punctual
E. **VOlITIONALITY**	volitional	**un-volitional**
F. AFFIRMATION	affirmative	negative
G. MODE	realis	**irrealis**
H. AGENCY	A high in potency	A low in potency
I. AFFECTEDNESS OF 0	0 totally affected	0 not affected
J. INDIVIDUATION OF 0	**O** highly individuated	0 non-individuated!

(A)   PARKICIPANTS: No transfer at all oan take place unless at

least 2 participants are present.

(B)   **KINESIS:** Actions can be transferred from one participant   to

another   —   crucial   for the core definition of   transitivity.

States   cannot   be so transferred.   Thus **something** happens   in   *I*

kicked   the   ball but not   in   *I like football*.

(C)   ASPECT: Telic action is an action viewed from its   endpoint

and is more effectively transferred to a patient in comparison to

an   atelic action.   In (38a) the activity is viewed as   completed

but in the atelic (38b) transference is only partial.

> (38)a. mEMne caawal kheayaa
>   I- KG rice   ate
>   'I ate rice'
>
>   b. mEM caawal khaa rahaa huM
>   I   rice   eat   PROG   be-3PS
>   'I am eating rice'

HT also distinguish aspect in the sense of telicity from **'Aktion-**

sart' or lexical aspect which involves those ways of looking   at

an   action which are predictable from the lexical meaning of   the

verb.

HT   show   that if other things are equal   an   **interpretation**

where the aspect is perfective **will** make the clause more   transi-

tive than a clause where the action is interpreted as imperfect.
For example, in the Finnish example (39a), the object which is
marked by Accusative, is interpreted as perfective and is there-
fore considered to be more transitive than the object in (39b),
which is marked with a partitive Case and is interpreted as
imperfective.

    (3E)a. liikemies   kirjoitti kirjeen   valiokunnalle
           businessman   wrote   letter-ACC committee-to
           'The businessman *wrote* a letter to the committee'

      b. liikemies   kirjoitti kirjetta   valiokunnalle
           businessman   wrote   letter-PART committee-to
           'The businessman was *writing* a letter to the
           committee'

The ergative construction in Hindi is limited to perfective
environments, while a non-ergative is used in the imperfective:

    (40)a. mEMne ciTThii likhii
          I-ERG letter wrote-I-sg-fem
          "I wrote a letter"

      b. mEM ciTThii likhungaa
          I   letter write-will-I-sg-masc
          "I will write a letter"

The ergative in Hindi therefore can be considered to be more
transitive since it involves telicity. Hopper (1983) reaches a
similar conclusion regarding the comparison of Ergative, Passive
and Active in Malay and finds the ergative to be most transitive.
As far as Bangla aspect is concerned, we will discuss this in
greater detail when we talk about syntactic transitivity.

D. PUNCTUALITY: actions carried out with no obvious transitional phase between inception and completion have a greater effect on their patients than actions which are inherently on-going. For example, *hit* is punctual whereas *carry* is non-punctual. In Samoan, the contrast between the more punctual and the less punctual action is encoded in the ergative/antipassive contrast:

(41)a. saa manatu le tama i le tiene
TNS think the boy OBL the girl
'The boy thought about the girl'

b. saa manatu-a le tiene e le tana
TNS think-TRANS the girl ERG the boy
'The boy remembered the girl'

(HT. 1980)

In a. *le tama* 'the boy' is in the absolutive with no Case-marker, while the object, *le tiene* 'the girl', is Barked OBL. The action is understood to be durative. In b. the position of the object is changed and is marked by the transitive suffix -a, the action being interpreted as punctual.

The Samoan example as well as the Chukchee example (42) below (Comrie, 1973 cited in HT) show an important point in support of the hypothesis that transitivity should indeed be considered as a fundamental property of natural languages. Both these languages, and many others, show a distinct morphosyntactic marker of transitivity and intransitivity (also marked in some languages such as Eskimo).

(42)a. turg-e   nu-ntawat-an kupre-n
       friends-ERG set-<u>TRANS</u>   net-APS
       'The friends set the net'

    b. tumg-at   kopra-ntawat-Gzat
       friends-NOM net-set-<u>INTR</u>
       'The friends set nets'

This point will be considered while **providing** a morphological validity of a syntactic notion of transitivity as proposed in Murasugi (1992) where TrP is a **mere** place holder for a "feature" of Transitivity which the NPs check against in a transitive **clause.**

E. <u>VOLITIONALITY</u>: ¥hen the agent acts **volitionally** the effect on the patient is more apparent than when it is not. For example, in **Cupeño** (Hill 1969, cited in HT) volitional **and** **non-volitional** verbs are distinctly marked with suffixes *-ine* and **-yaxe** respectively. **Morphosyntactic** realizations of **volitionality** are marked on the object in Estonian: Nominative on O when no overt agent is present; partitive in case of absence of voluntary **participation** as in (43).

    (43) ta **kuulis** nende **koMnet**
         he heard   their talk (PART)
         '**He** heard their **talk**'

F. <u>AFFIRMATION</u>: In many languages the object of a negated clause appears in forms which show that the action of the verb is deflected or less direct. In French, indefinite Os in the partitive must drop the definite article normally present:

(44)a. Nous **avons** du   pain
      we   have the-PART bread
      'We have some **bread**'

   b. Nous n'avons   plus de   pain
      we   NEG-have   more PART bread
      'We have no more **bread**'

HT suggest that the object of a clause which is **imperfec-**tive, negated, **inactive,** or irrealis is somehow less of an object and is marked as such in the **morphosyntax.**

This and the next parameter, Mode, are less convincing in the HT system and we contest these two **separately** in a later section in connection with syntactic **transitivity.** Also, the psycholinguistics literature that we present does not support at least the affirmative parameter.

G. <u>MODE</u>: This parameter **distinguishes** between the **real**is and the irrealis encoding of events. An action which did not take place or is supposed to be occurring in a non-real world, is less effective than one whose occurrence is asserted in the real world. This is an opposition between the indicative and other non-assertive forms such as subjunctive, optative, hypothetical, imaginary, conditional, etc. In Yakulta, irrealis non-past clauses elicit antipassive rather than the **ergative** construction.

H. <u>AGENCY:</u> Participants high in agency can cause an action **more**

effectively than those without. The interpretation of (45a) would be that of a perceptible event with a perceptible consequence but b. is a Matter of internal state.

    (45)a. John startled me
        b. The picture startled ne

In Cupeño (Bill (1969) cited in HT) volitional and non-volitional verbs are marked with suffixes -*ine* and -*yaxe* respectively. Morphological realization of higher vs. lower Agency can be displayed in clauses with only one argument. Thus, depending on the degree of control exercised by this argument over the action, it is marked morphologically as either A or 0. Lakhota functions in this manner. Therefore, structures traditionally called 'intransitives' can be either more or less transitive depending on some discourse parameter.

I. AFFECTEDNESS OF Q: The degree to which an action is transferred to a patient is a function of how completely that patient is affected. For example, in (46a) it is more effective than in (46)b.

    (46)a. mEM-ne kitaabeM paRhliiM
           I-ERG books   read-past-took-sg-fem
           'I read the books (up)'

       b. mEM-ne kuch kitaabeM paRhiiM
           I-ERG some books   read-sg-fem
           'I read some of the books'

In Indonesian two rival suffixes -*kan* and -i are used as follows:

(47)a. dia **memanas-i** air
He   heated   water

 b. dia **memanas-kan** air
"He heated the water"

With −*i* in a. it is **implied** that the heating is gentler and **more** controlled.   With -*kan* the act of heating is more drastic,   for example,   boiling water for cooking making (47b) **more** intense. The suffix -*kan* is also the suffix used to make **causatives** and to transitivize dative verbs and is correlated with a sense of *total* effect on the object.   In the Finnish example that we saw earlier ((39)),   the Transitivity Hypothesis of HT predicts that the Accusative, which induces totally affected **Os,** gives the clause a perfective or **telic** value, while the partitive gives it an **imper-** fective or atelic value.

J. <u>INDIVIDUATION</u> OF 0: Individuation refers both to the distinct- ness   between 0 and A and to the distinctness from its own   back- **ground.** HT lists the properties of individuation as follows:

(48)

INDIVIDUATED	NON-INDIVIDUATED
proper	common
human, animate	inanimate
concrete	abstract
singular	plural
count	mass
referential, definite	**non-referential**

An action which is sore individuated, that is, has **more** of the left-hand side **properties** can be Bore easily transferred to a patient than those with **more** of the right-hand sided properties. The definite in (49a) implies that probably *John* finished the available *beer* in contrast with (49b).

(49)a. John drank the beer
   b. John drank some beer

In Hindi the *ko* marker on objects requires **them** to be animate *and* **human,** and also definite:

(50)a. mEM-ne **laRkaa** dekhaa
      'I saw a **boy**'

   b. **mEM-ne laRke-ko**   dekhaa
      I-ERG   boy-OBJ-DAT **saw-sg-masc**
      'I saw the **boy**'

In other languages, the verb and object **tend** to **merge** in case of an indefinite object — they tend to form a single unit. In an extreme case an indefinite object is not really an object but is a sub-part of a **compound** of which the verb **stem** is the head, that is, the object is incorporated into the verb. This takes place even in Bangla to some extent.

(51)a. ami kapoR   dhulan
       I   clothes   washed

   b. **amar**   kapoR-dhoVa   SeS **holo**
      I-GEN clothes-washing end became
      'I finished washing clothes'

In **(51)**b the object incorporates into the verb which creates an

intransitive clause.

Transitivity, **then,** in the HT **system,** ia a matter of **carry-** ing over an action from one participant to another which can be broken down into component parts, each highlighting a different aspect in this transferring of action in different parts of the clause (agents, verbs, objects).

2.7.2 Reduction of Transitivity

Giv6n (1985) in his discussion of **ergativity** in Newari showed that ergative morphology, especially split **ergativity,** is sensitive to the transitivity properties of a clause **whereas** nominative typology is **sensitive** to the **discourse/pragmatic** role of NPs in the clause in terms of whether they are or not the **subject/topic.** He reduces the **transitivity** properties of a clause in terns of three core properties of Agent, Patient and the Verb and the rest can be predicted through **semantic/pragmatic** general principles. These three components are:

(52)a. <u>**Agent-related**</u>: The prototypical transitive cleuse has a visible, salient, volitional, controlling agent-cause which imitates the event.

   b. <u>**Patient-related**</u>: The prototypical transitive clause has visible, salient, **non-volitional, non-controlling patient-effect** which registers the bulk of the change associated with the event.

c. **Verb-related**: The prototypical transitive clause has a compact, perfective, **real**is verb or verbal **tense-aspect modality.**

As we can see, both A and 0 are salient in a prototypical transitive clause which further consolidates our motivation for studying one in terms of the other. The other crucial point to note at this juncture is that both a. and b. above are related to th© predicational properties of a clause, i.e. by **looking** at the clause type, something about the agent and the patient can be inferred. Whereas, as Hopper (1983) has shown, verb-initial ergatives in Malay are non-predicational events. By looking at the centrality of the verb in agreement patterns of a language, again, we can say something about the Agent and Patient if a transitive clause.

By reducing HT's discourse parameters to three core notions, as in Giv6n, we have in fact reduced transitivity to Predication and Agreement — central to the discussion in the next chapter. WE motivate the last chapter (on **Classification)** on the basis of the discourse model that we have proposed in this chapter which picks out the reference of definites and indefinites in intersentential discourse according to a salience gradient.

The discussion of transitivity so far **might** give the false

impression that HT's transitivity parameters are calculable only for a simple clause. Givdn, in his discussion of **Newari**, shows that the interaction of **comp**lenient verbs and **ergative/non-**ergative subject **marking** in the **main** clause in case of sodality verbs (verbs requiring a **co-referential** subject in their **comple-**ments) like 'want', 'need', 'kill', 'break', **'work', 'can',** etc. induce an upward filtering of **transitivity.** He shows that WANT/NEED are of low **transitivity,** KILL/BREAK are of high transi-**tivity,** WORK (like EAT) is **syntactically** high in transitivity but **semantically** low on the transitivity scale, and CAN is of low transitivity but at a higher position on the scale than WANT. This again shows that **transitivity** is a **fundamental** relation in natural languages.

2.7.3 Transitivity as an Inherent Feature

Amritavalli (1979) shows that in Hindi sain verbs as well as members of compound verbs carry the intrinsic feature of transitivity, independent of their context of occurrence. In the standard theory transitivity i6 a contextual feature **like** [+__NP] , it is not a theoretical prime. Ve have been arguing against that and so does **Amritavalli.** She shows that the transitivity of a verb in Hindi **is** relevant for the operation of two rules in the language: the rule of ergative Case-marking and the rule of passive. Both rules apply if the verb is transitive and neither rule applies if the verb is intransitive. Transitive

verbs occur in the context of NP_____# and intransitive verbs in

_____#. For Hindi, there is a third possibility, where the verb

is a member of a compound verb. It is in the third context that

the above two rules apply consistently *provided* transitivity is

treated as an intrinsic feature of the verb.

In sentences with compound verbs, the transitivity of V2

which **determine** the ergative Case marking. Consider the follow-

ing:

    (53)a. khargoS **gaajar** khaa-gayaa
           rabbit carrot **eat-go-perf-masc-sg**
           'The rabbit ate up the carrots'

    b. khargoS **gaajar** khaa-gayaa hE
                                be-PRS-sg
       'The rabbit has eaten up the **carrots**'

    c. khargoS gaajar khaa-gayaa thaa
                                be-PST-M-Sg
       'The rabbit had eaten up the **carrots**'

The intransitive V2 *gayaa* here cannot induce ergative Case

marking on the subject. Consider the **following** now:

    (54)a. khargoS ne gaajar **khaa-Daale**
                  ERG   **put-PRF-M-Pl**
           'The ate up carrots'

    b. khargoS ne gaajar khaa-Daale **hEM**
                                be-PRS-Pl
       'The rabbit has eaten up **carrots**'

    c. khargoS ne gaajar khaa-Daale the
                                be-PST-M-Pl
       'The rabbit had eaten up the carrots'

The transitive V2 **Daale** in (54) triggers ergative Case marking on

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the subject.

Now let us Bee how **passivization** is affected by **different** types of compounds. For a V1V2 **compound** where V2 is **transitive,** passivization correctly applies as in (55) but not when V2 is intransitive as in (56).

> **(55)a.** kisaan ne   **mazduuroM** ke vetan de-diye
> farmer ERG labourers to wage give-give-PRF
> 'The farmer gave wages to the labourers'
>
> b. **mazduuroM** ko **veta**n de-diye gaye
>   go-PRF (pass **AUX)**
> 'The labourers were given wages'
>
> (56)a. kisaan mazduuroM ko vetan de-gayaa
>   go-PRF
>
> b. * mazduuroM ko vetan de-gaya gaye

Amritavalli (1979) points out that the ungrammaticality of (56b) is not due to any surface constraint of co-occurrence on the **two** identical forms of **jaanaa** since similar **ungrammatical** results obtain for the following:

> (57)a. wo **muurkh**   **kaam** kar-bEThaa
>   he foolish work do-sit-PRF
>   'He did something foolish'
>
> b. * muurkh kaam kar-bEThaa gayaa
>   **go-PASS**

She concludes from this set **of data** that it is the transitivity **of** V2 that is relevant for the application of the passive to take

place. Accordingly she justifies a system of designing the lexical entry of verbs in Hindi where the feature [± Transitive] is an integral part of the entry.

2.7.4 Psycholinguistic Basis of Transitivity

Having justified transitivity, so far, as a natural theoretical principle, we now present convincing evidence from the psycholinguistic material to further strengthen our proposal. Chomsky (1980) makes a distinction between computational and conceptual aspects of language and suggests that children at a very early stage may use a conceptual system to comprehend language when language-specific knowledge is not available. Resee-chers in learnability, like Wexler (1976), hypothesize that children construct meaning based on context. Wexler and Culicover (1980) show that syntax would be unlearnable unless children were able to make use of information from the underlying structure of sentences.

What the Semantic Bootstrapping Hypothesis (of Pinker, 1982, 1984) has in common with learnability theories is the idea that children's early grammar is characterized by a one-to-one form/meaning relationship between the events children witness and the linguistic input used to describe them. This is present only in the initial stages as the relationships do not apply in adult grammar. Syntactic categories are not reducible to meaning

despite the fact that early grammar makes use of this **correspond**-ence. These are two separate, interacting **sys**tens of representa-**tion**.

Slobin (1981   ) showed how children begin the process of **grammaticali zat**ion, that is, **how** they first crack the syntactic codes. Slobin shows that only certain conceptual relations are expressed and transitive events are likely to be among the basic ones. He hypothesizes that in the early stages only prototypical transitive events — the most salient events for the child — **will** be encoded in canonical form and later extended to other less typically transitive events. What is interesting for us is that Slobin bases his notion of prototypical transitive event on HT's discourse **parameters**.

Balcom (1990) extends this to mean that children are predis-posed to attend to events that are of cardinal transitivity and therefore allow them to infer grammatical relations expressed therein. A distinction is made in the literature (Newport, et al. 1977; White 1980) between the language children are exposed to ("input") and the one they actually use in constructing their grammar ("intake"). Children are "tuned in" to cardinal transi-tive events — it provides a means for children to structure their experience.

Although HT's parameters are universal, individual languages select from those parameters rather then using them all. For example, Sheyne (1982) found that only four of HT's parameters were used in San Carlos Apache.

Bruner (1972) has found that froa the first few weeks after birth, infants distinguish the category of people f:cm the category of things. Other studies have similarly found that by twelve months participants (H⁻'s A) are distinguished by infants and are endowed with permanence. Particular attention is paid to the Agent and Balcom (1990) proposes that children can distinguish agents from other participants. However, most studies report experiments which suggest agents as initiators of actions — that is, they appear in a given context prior to other participants. This could be the reason why children pay more attention to agents. In fact Golinkoff (1981) reports that both agents and patients are salient for children. According to Bloom (1973), these notions come from the child's conceptual relations: persons perform actions and things are affected by actions. This for us means that transitivity is a more basic and primary concept than, let us say, agreement which is more like a syntactic surface phenomenon. This is, therefore, another justification for study-

ing both

At the Multi-word stage, Greenfield and Smith (1976) report that the object is more salient[2] and Lebeaux (1987) attributes the lack of subjects at this stage to the difficulty in Case assignment to an external argument.

Movement is a powerful visual stimulus which, according to some researchers, even neonates attend to. Movement makes objects more perceptible against their background. Bower (1982) has found that children detect motion as early as two weeks. All this research supports Nelson and Horowitz's (1987) hypothesis that the mammalian brain is "prewired" to attend to motion.

No clear distinction is rade by children at an early stage between punctuality and aspect — their determination depends rather on the Aktionsart either inherent in the verb or conveyed by the interaction of the verb and its arguments (Tenny, 1987) and the situational context of the utterance. Bickerton (1989) suggests that the verb's situation determines its punctuality. Research in this field indicates that the distinction inherent in

1. One might also add that this is also the beginning of education for the human child regarding "power".

2. THat is, an interest in the "victim".

the punctuality and **aspect parameters,** namely, the end results being more **salient** rather than the **transitional** phase and punctual events being more likely, is adhered to.

Volitionality in a child's language is defined **more** in terms of initiation of events rather than the adult concept of agency. Children first encode the notions of animate subjects or inanimate objects in terms of movement and **intentionality.** Bloom, et al. (1975) suggest that movement controls early word order.

As far as mode is concerned, **children's** language is based on the real world and real events in it. Sachs **(1983)** reports that before the age of three her subjects rarely made reference to objects or events based on fantasy or prior experience.

Crucial aspects of individuation, as we have seen, are referentiality and definiteness. The individuated entity is discrete, bounded, and separate from its environment. Bower (1982) found that young children (2-4 months) expressed surprise when an object did not appear after being covered by a screen. These studies show that infants perceive objects as being unitary and separate from their surroundings. Also, because their early speech is grounded in the here and now, words at this stage tend to be definite and have specific reference at all times.

Regarding **affectedness** of **object**, the change should be apparent and **visible**, causing the object to move or alter its state. Nelson (1973) found that the first fifty words children use consist Bore (and first) of words describing changeable states rather than words relating unchanging attributes. For example, **'allgone'**, **'dirty'**, **'hot'** vs. 'red', **'round'**, **'pretty'**, etc. The basic underlying fact (or universal) seems to be the one of kinesis.

For HT'a affirmation parameter no substantial evidence is found which points towards the use of one over the other. Typically, in the early stages children use 'no' in isolation to express rejection or refusal, while non-existence is expressed in a sentence and is generally considered to be learned later.

In **general**, **Slobin's** hypothesis **seems** to hold true in other studies as well (such as **Bal**com 1990), that is, children begin by attending to and encoding events of cardinal transitivity and subsequently apply the grammatical device thus acquired (for example, SVO word order in these studies) to events of low transitivity.

2.8 Syntactic Transitivity

Having established transitivity as an indispensable funda-
mental relation, let us look at a proposal of syntactic transi-
tivity. Murasugi (1992) tries to account for the difference
between Accusative and Ergative languages by proposing a differ-
ence of movements (of syntactic heads) in these languages <u>and</u> a
difference of valency of TrP and TP among these two types of
languages. The respective differences in movements are depicted
in (58) and (59) below:

(58)   ACCUSE tive language $(Subj_{NOM} \quad Obj_{ACC})$

```
                            TP
                            /\
                           /  \
    --------->   SPEC     T'
    :                     / \
    :                    /   \
    :                   /     \
    :                  T      TrP
    :                 [NOM]    /\
    :                 [AGR]   /  \
    :                       /    \
    :              ---->SPEC   Tr'
    :              :           /\
    :              :          /  \
    :              :         Tr   VP
    :              :        [ACC]  /\
    :              :        [AGR] /  \
    :              :            /    \
    :              :          NP1    V'
    -------------:-----------:       /\
                   :              /  \
                   :             V    NP2
                   :                  :
                   ------------------------:
```
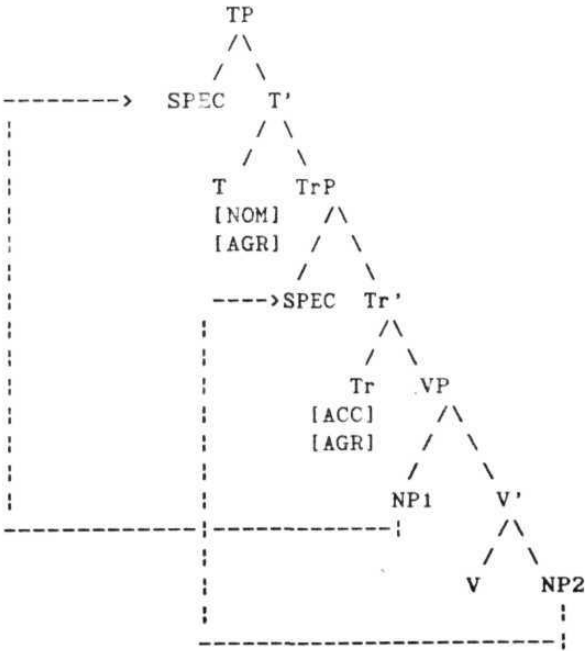
(59) Ergative language (Subj$_{ERG}$ Obj$_{ABS}$)

```
                               IP
                              /\
                             /  \
                            /    \
          -------->      SPEC   T'
          :                     / \
          :                    /   \
          :                   /     \
          :                  T      TrP
          :               [ABS]     /\
          :               [AGR]    /  \
          :                       /    \
          :              ---->SPEC    Tr'
          :              :            /\
          :              :           /  \
          :              :          /    \
          :              :        Tr     VP
          :              :      [ERG]    /\
          :              :      [AGR]   /  \
          :              :             /    \
          :              :           NP1     V'
          :              -------------:      /\
          :                                 /  \
          :                                /    \
          :                               V     NP2
          :                                      :
          -------------------------------------
```
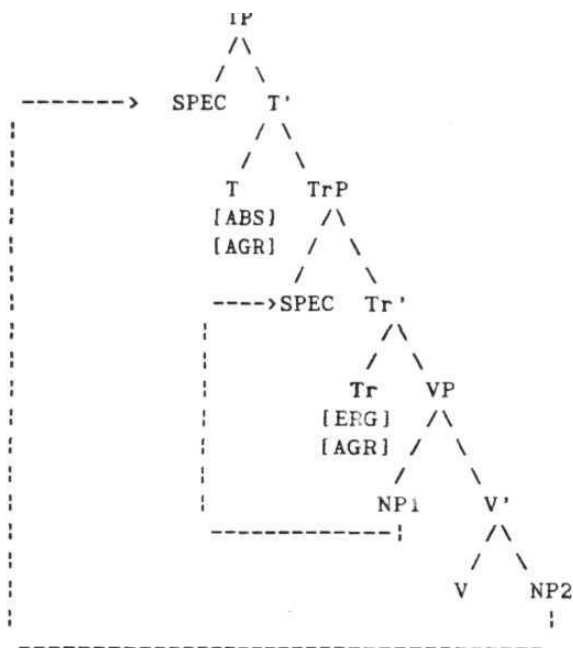
The   strong head in each case **is** indicated by bold face — T   in
the   case of Accusative languages and Tr in the case of Ergative
languages.   Notice that the series of movements result in cross-
ing paths in the former and nested paths in the latter.   In
Accusative languages the Case features contained in T and Tr are
respectively NOM and ACC whereas in Ergative languages they are
respectively ABS and ERG. Movement, as standardly assumed   in
minimalism (Chomsky, **1993)**, is due to Case (and agreement) rea-
sons .

    Murasugi   (1992) differs from Chomsky (1991, 1993) and **Pol-**

lock (1989) in not ha.ing any **AgrPs** in her **representation.**
Agreement in her system is mediated through T and Tr -- by V to
Tr to T **movement.** The other features carried by T and Tr are
[±TNS] and **[+Trans] respectively.** In intransitive clauses the
value of Tr is [-Trans] and the subject moves to SPEC TP for Case
reasons in such clauses in both types of languages under discus-
sion. So it is only the transitive paradigm that **distinguishes**
the two **movements** shown in (58) and (59).

The feature system adopted is something **like** this:

T	Tr	NP	Vt	Vi
[+TNS]	[+Trans]	[0]	$[0_1]$ $[0_2]$	$[0_1]$
[NOM]	[ACC/ERG]	[Case]	[+Trans]	[-Trans]
			[+TNS]	[±TNS]

In English the 0 features of the subject can be checked only
at LF fchere the V raises to T. Features are not necessarily
checked at the same level as their **movements.**

Now, **Murasugi's** notion of transitivity is purely syntactic
and therefore transitivity in this system is **simply** a matter of
counting the number of arguments in the VP (as also the subject
of embedded clauses in ECM structures). She qualifies it later
to say that transitivity is a matter of the number of arguments
the Tr head governs. If it governs just one argument then the
clause is [-Trans] and if it governs two arguments then it is
[+Trans]. This is slightly unfortunate and **anachronistic** since

the notion of government is no longer a theoretical prise in the framework she has chosen to present her thesis.

Different types of clauses show the following type of **movements** in her system:

(60) Transitive Clause

```
Acc - language                          Erg - language
   TP                                      TP
   /\                                      /\
  /  \                                    /  \
 T    TrP                                T    TrP
 ↑    /\                                 ↑    / \
 :   /  \                                :   /   \
 :  Tr   VP                              :  Tr    VP
 :  ↑    /\                              :  ↑    / \
 :  :   /  \                             :  :   /   \
 : :NP1  \                              :  : NP1   \
 :  : :   /\                             :  :___:   /\
 :__:_:  /  \                            :         /  \
 :      V    NP2                         :        V    NP2
 :            :                          :             :
 :            :                          :             :
 :_____:                          :_____:
```
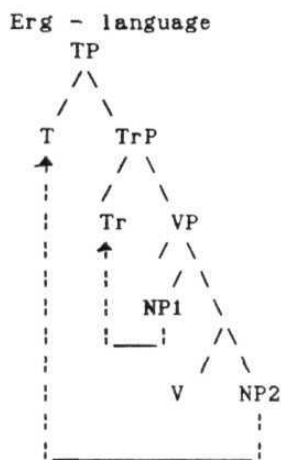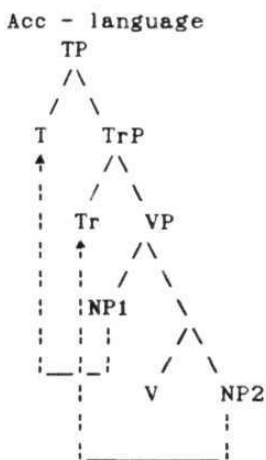

(61) **Intransitive** Clause

Note: [-Trans)   Tr has no Case feature so only SPEC   TP   is available for Case checking.

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```
        Acc - language                              Erg - language
           TP                                          TP
           /\                                          /\
          /  \                                        /  \
         /    \                                      /    \
        T     TrP                                   T     TrP
      ↗ T     /\                                   /       /\
      :      /  \                                 ↑       /  \
      :     /    \                                :      /    \
      :    Tr    VP                               :     Tr    VP
      : [-trans]/\                                :[-Trans]/\
      :        /  \                               :       /  \
      :      NP1   \                              :     NP1   \
      :_____:    /\                            :           /\
                   /  \                           :          /  \
                  V   NP2                         :         V    NP2
                                                  :_____:
```

(62) **Unergatives**

```
        Acc - language                              Erg - language
           TP                                          TP
           /\                                          /\
          /  \                                        /  \
         T    TrP                                    T    TrP
       ↗      /\                                    ↑      /\
       :     /  \                                   :     /  \
       :    Tr   VP                                 :    Tr   VP
       :        /\                                  :        /\
       :       /  \                                 :       /  \
       :     NP1   V                                :     NP1   V
       :      :    :
       :     John  sang
       :___:
```

(63) <u>Unaccusatives</u>

```
    Acc - language                    Erg - language
       TP                                TP
      /\                                /\
     /  \                              /  \
    T    TrP                          T    TrP
    ▲    /\                           ▲    /\
    ⋮   /  \                          ⋮   /  \
    ⋮  Tr   VP                        ⋮  Tr   VP
    ⋮      /\                         ⋮      /\
    ⋮     /  \                        ⋮     /  \
    ⋮        /\                       ⋮        /\
    ⋮       /  \                      ⋮       /  \
    ⋮      V    NP2                   ⋮      V    NP2
    ⋮      ⋮     ⋮                    ⋮_____⋮
    ⋮   arrived  the man
    ⋮_____⋮
```
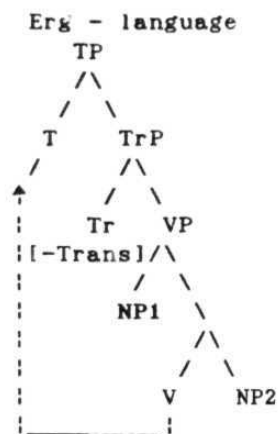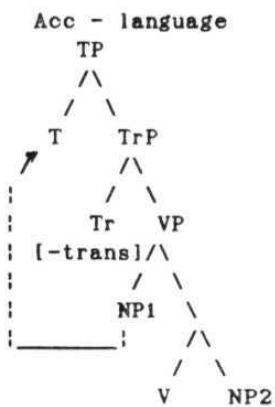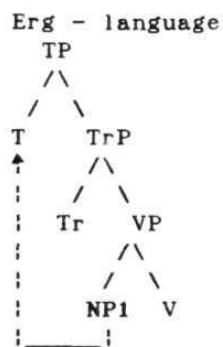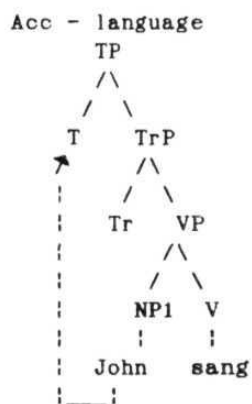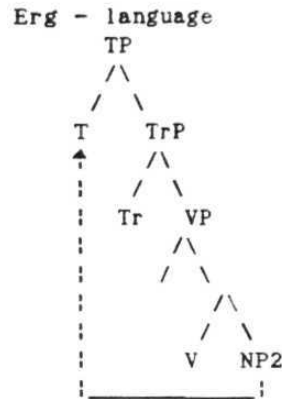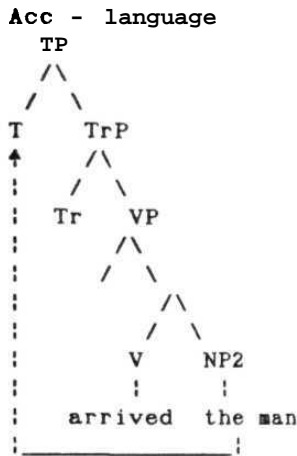
As we have indicated earlier, although in **Murasugi's treatment** of
TrP is nothing but a place holder, there are reasons to **believe**
that it carries more weight than that. Natural languages **like**
Chukchee and Eskimo were shown to exhibit **morphological** features
of transitivity and **intransitivity** which itself is a good reason
to suppose that the projection proposed is **more** real than a **m𝒆re**
place holder.   How it can be useful for our purpose will be
depicted in the section after the next.

2.9 Computation of Transitivity

     In this section we intend to show how the two notions of
transitivity presented in this chapter — **Discourse/Semantic**
transitivity (of HT) and syntactic transitivity (of **Murasugi,**
1992) — can be **accommodated** into a broader algorithm to serve
our purpose.

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First let us try to imagine what kind of computational processes transitivity represents. Or to rephrase the question in terms of what we have tried to establish so far, namely, to study salience is to study transitivity, what kind of computational processes are reflected by salience? What role does it play in the coordination of our processing certair information in our surroundings?

2.9.1 Model - Driven Computation of Salience

It is worth our pursuit to look at how Parma, Hanson and Riseman's (1980) UMASS VISIONS system works. The approach of the VISIONS system combines the bottom-up analysis of regions and edges in the raw visual image vith top-down testing of frame-based hypotheses about the content of photographs of natural scenes. The VISIONS system is, therefore, model-driven, once it moves away from the low level problem of identifying regions. For example, if the system ascertains, from available edge and region data, that there is a house in the photograph, the system will use its generic knowledge to disambiguate regions. Even if the image is actually that of a boat in the water, it might still trigger the house hypothesis because of certain similarities in the features of the house and the boat. In such a case, the elements of the picture, inconsistent with a house-scene frame,

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like the blue colour of the ground plane, would be vital in stopping the **instantiation** of that **frame** any further.

Generally speaking, an attempt is made to construct an inner model of the external world excerpt based on sensory data from that world and generic knowledge about it. Components of salience are therefore the following:

(i) First, the syste a **relies** on a region of *size* and *centrd ity* of a region to approximate the most likely model for identifying the rest of the scene.

(ii) Unexpected elements of a scene, that is, those which do not have a good fit with their slot in the hypothesized **fram** , are **important** for efficient allocation of resources (the **instantiation** of a particular frame) and will be tagged with some measure of goodness of fit.

(iii) The intrinsic importance of certain elements in **the** scene is also useful for **further** allocation **for confirmation** of **identification**. For example, given the knowledge that people are **intrinsically** more important than objects, the system will make sure that this is indeed true when it identifies an image region as people.

The **elements** of **model** building for which the notion of salience is important, as we saw in the last paragraph, are the **following** three:

(a) structural knowledge about the location in the external field of data where resources are to be focussed initially (e.g. size and centrality).

(b) use of a measure of **"goodness** of fit" to guide the instantiation of generic features.

(c) prior knowledge about intrinsic salience of objects in relation to a particular situation.

2.9.2 Mixed Mode Parsing

The parsing technique used here is a mixed-mode method which uses varying degrees of both top-down and bottom-up techniques to retain only the advantages of both approaches. Top-down parsing has the advantage that it will never consider word categories in positions where they cannot occur in a legitimate sentence. This is because the parser works from a syntactic category and checks the word that fits that category. For example, if we use the grammar (64) for a sentence *the can broke*, the parsing will start with rule 1 and will expect to find an NP to start with ART as in 4 and 5, to be followed by either a NOUN as in 4 and ADJ as in 5. But since *can* is a NOUN it finds it as expected and the AUX and VERB senses of the word are never considered.

(64)
```
1 .  S ———> NP VP
2 .  S ———> NP AUX VP
3 .  S ———> NP VERB
4 .  NP ———> ART NOUN
5 .  NP ———> ART ADJ NOUN
6 .  NP ———> ADJ NOUN
7 .  VP ———> AUX VERB NP
8 .  VP ———> VERB NP
```

The problems of repetition and long processing are avoided in a bottom-up system. For example, a sentence like *the man jumps* will require a top-down parser to backtrack twice (after failing

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to parse with 1 and 2), in a **bottom-up** approach *the man* will be constructed only once and rule 3 would match to give an S. **Among** mixed-mode approaches there is one where a top-down approach adds each constituent as it is constructed to a chart. AB the parse continues, before rewriting a symbol to find a new constituent, it can first be checked whether it is already there in the **chart** or **not.**

However, the model-driven mixed-mode parsing that was used for VISIONS could have been made more efficient, we think, if there **had** been some way to pick up the salient features instantaneously instead of first trying to construct a **model.** This, we believe, can be achieved by using the concept of syntactic transitivity of the kind we have looked at. For the purpose of execution a Principle-Based parsing technique could give us the right measure of **sophistication** we need to build in a network like the one we are considering. For details retarding Principle-Based parsing, see chapter 5 where we take up the issue of **Noun-classification** in this context. The added advantage of using Principle-Based parsing techniques for a syntactic framework like **minimalism** is that due to a reduction in the number of principles in the current framework, parsing would become simpler **computationally.** We emphasize that at this point of derivation or analysis the transitivity parameters are not taken into ac-

count.   After   we have **work~d** out the agre **·ment system** in   the

following chapter, it will become a trivial operation to pick   up

the object of an input clause. Depending on how exactly this   is

done by the **agreement** algorithm, we will be in a position   to

assign a feature to the Tr and T heads. Case/Agreement   checking

can   then take place according to the set of operations   depicted

in   (60) - (63).   Apart from the transitivity feature, agreement

will   also   decide the [±TNS] features on T which has a crucial

effect on Case/Agreement checking.

Once we have a broad idea of what the clause looks like,   by

performing   the   set of operations proposed so far, that is,   a

principle-based parsing through syntactic transitivity, we   can

now think of finding further details in connection with   the

participants in the clause. This can be **ach:eved,** we propose, by

properly   working out **HT's** parameters to suit our purpose.   That

is, all   the   lower level **computations** to achieve the **correct**

status of various participants is done through HT parameters.

Parsing here **will** proceed in a bottom-up fashion **working** out   how

different parameters and the input words interact to give us   all

possible   senses of the input words.   In cases where we have   to

resolve   the reference of anaphors, we **will** construct a computa-

tional version of our field-view of discourse and use essentially

the techniques elaborated in this section for the purpose.

We have tried to show in this section how both syntactic and semantic/pragmatic studies of transitivity are justified to serve but one goal — that is, to be efficiently used in a mixed-mode parsing strategy — in short, a computational goal.

AGREEMENT

3.0 Introduction

Unlike the discussion in the previous chapter, in this chapter we shell engage in a more or less purely syntactic analysis of the specific languages that we are concerned with, namely, Hindi and Bangla. Hindi will drive most of the discussion simply because a lot has been said by others and there is more to say about Hindi agreement than Bangla. Agreement in Bangla, ar is well known, is restricted to person agreement the description and analysis of which is fairly straightforward. Hindi, however, needs careful attention.

Before we proceed, we wou'd like to remind ourselves of the fact that agreement for our purpose serves the goal of identify-ing the participants for evaluating syntactic transitivity and therefore, ultimately, salience — the major thrust of this project. As we have observed in the Introduction, in our attempt to find an equivalence between the VP and the NP structure, notwithstanding the untenability of such an equivalence according to some (Chomsky 1981), we need to take care of the network of agreement relations — in addition to other networks — of a clause to achieve the goal of equivalence. In short, agreement,

therefore, provides finer details in a particular subroutine of an **algorithm** that we presented in the **previous** chapter.

3.1 Trajector and **Landmark Revisited**

There are certain chunks of expressions which the trajector/landmark distinction, that we introduced in Chapter I, is better equipped to deal with, as Langacker (1983) points out. Unlike subjects, trajectors can be **stative** as **well** as processual relations. Thus in the expression *talk loudly, talk* is the trajector of the stative relational predicate (adjective in this case), but it can never be designated as the subject. In (1) *to the house* is the landmark of the verb *ran* but can never be the **object**.

(1) John ran to the house

Again in (2) *Mary* **came** is the trajector while *I left* is the landmark of *before.*

(2) Mary came before I left

In space grammar, any relational predication has a trajector and a landmark as part of its internal structure. *Red,* for example, has both a trajector and a landmark regardless of whether the former is manifested overtly by a nominal expression and despite the fact that the latter never can be. The notions subject and object are elements of clausal structure whereas the

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trajector/landmark asymmetry holds of every relational predication regardless of its size or grammatical status.

Trajector/landmark is a natter of perspective rather than something expressed in **prcpositional terms**. Perspective and similar concepts like *salience* are considered to be crucial aspects of the semantic structure of an expression. The schematic definition of trajector that Langacker advances is the most appropriate to capture the class of objects variously termed as subject, agent, controller etc. in traditional discussions. The figure/ ground asymmetry is a pervasive **phenomenon** in human cognition and trajector/ landmark is seen to be a natural place to look for its operation in the language system. The trajector normally corresponds to the entity that is designated as the figure on ;;eaeral perceptual grounds. As a **moving** object is always conceived of as the figure in the scene, **linguistically** the mover is most normally selected as the subject of a motion verb. In specifying the **figure/ground** asymmetry for verbs of motion and activity, the lexical exceptions to this principle **for** the selection of the trajector (subject) are relatively few; verbs of perception and **mental/emotional** attitude present a less regular picture.

To show the correspondence between the unmarked trajector

and   the natural figure, **Langacker** claims that *before, in   front of,*   and   *over* are the unmarked members of the pairs   *before* vs. *after,   in   front   of* v s . **in** *back of,   over* v s .   *under*   t t c .   The unmarked members are more likely to be used when introducing   new **entities** in a discourse. The trajectors of these unmarked   mem- bers are the entities that are most readily perceived in a canon- ical   viewing situation — they are visually ■ore accessible   and salient.   Note that the Novelty Condition of **Heim**   (Chapter   II) ties   in quite neatly with the notion of trajector and   **landmark.** The   notion of trajector (and therefore, subject)   is   basically semantic and all the syntactic properties of a subject are   symp- toms   of the special salience that trajectors have by being   fig- ures in a relation.

Clausal subjects are supposed to exhibit greater   topicality than   other complements. Indefinites and non-specific   subjects are   barely   tolerated and new information is likely to   be   **fur-** nished through an object.   This leads to the equivalence of   the **figure/ground** relation to the **subject/non-subject** relation.   The externality of the subject in relation to the verb that we talked about in Chapter I lends itself to the interpretation that   being the   figure in a relational profile   is what makes   it   special. Even   in free word order languages like Hindi or Bangla,   adverbs can be fairly easily inserted between the subject and the residue in comparison to insertion between the object and the verb.

(3) **mEM-ne** zor-se   gas **laa** gaayaa   (Hindi)
    I ERG   **loud-with** song   sang
    'I sang **loudly**'

(4) ami **taRataRi** baRi   **gelam**   (Bangla)
    I   quickly house went
    'I went home quickly'

(5)a. mEM-ne gaanaa zor-se gaayaa
       'I sang SONGS **loudly**'
       'I sang songs LOUDLY'

   b. ami baRi taRataRi **gelam**
       'I went HOME **early**'
       'I went **home** EARLY'

(3) and (4) show the most standard word order and a shifting of

the adverb does alter the semantic import of the sentences to

some extent **(5a,b)**. This suggests that the externality of the

subject has observable effects in these languages as well. Fig-

ure/ground as abstract concepts to deal with such phenomena begin

to help make sense of them.

    However, we take this to mean that the object is **more** often

there than the subject. In Chapter II, we have mentioned at

least two studies showing the primacy of the patient role in

child language (Greenfield and Smith (1976) and Lebeaux (1987)).

In terms of **trajector/landmark** we note that a predicational

relation will always need a landmark to be covertly or overtly

specified, primarily because a trajector is the most salient

entity.   We also view the function of the notion of trajector/

landmark is to recast a clause in terms of locating a pivot — a
pointer; the rest of the clause then follows as being either the
trajector or the **landmark**. If a clause can be viewed as a paper
then such pointing establishes the axis along which the paper can
be folded to provide two separate areas.

We differ from Langacker's proposal of the importance of the
trajector or the clausal **subject**. Within the theory of Cognitive
Grammar, this is a result of searching for the **prominent** topic of
an expression. To continve the position that we are taking, we
emphasize the chain **link** that may be established when the land-
mark of an expression E becomes the trajector of **the** expression
E+1, thereby **demonstrating** again the **importance** of the notion of
landmark.

3.2 **Unergatives**

The importance of the object relation, which we are trying
to see in the **light** of a more general term **like landmark** that
also covers the parallel notion of focus, is also apparent when
we try to expand our picture so that it includes unergatives and
unaccusatives as **well** as dyadic verbs. In this on unergatives
section we will attempt to show that unergative clauses consist-
ently have a deep object position. We will discuss ergatives,
transitives and accusatives in the following sections to argue

that all of them have an **object** at some level of derivation.   **We**
begin with the most unlikely candidate.

Unergatives   are   a subtype of   **intransitives**   containing   a
subject perceived as actively **initiating** or actively responsible
for the action of the verb, like *run, talk, resign,* etc.   Sub-
jects   of   these verbs are assigned an   external   **theta-role**   (of
agent) by the verb. In many languages these are **distinguished**
morphologically.   In Italian and Danish, unergatives **form** their
perfective with *to have* (and **unaccusatives** use to be).

As we mentioned in Chapter II, both unaccusatives and uner-
gatives are **distinguished** by the presence of only one argument
in the (deep) **VP** (assuming that subjects also are **generated** VP-
internally).   Unergatives are marked by the apparent absence of
an   object and accordingly the structure that we presented in
Chapter II (62) is repeated here as (6).

(6)
```
                    TP
                   /\
                  /  \
                 T    TrP
                     /\
                    /  \
                  Tr    VP
                       /\
                      /  \
                    NP1   V
                     :    :
                    John  sang
```
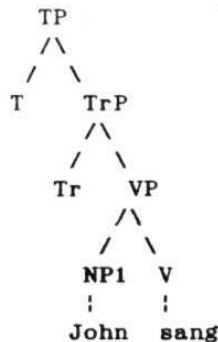
The Movement of the subject NP to [SPEC,TP] is overt in Accusative languages and takes place at LF in ergative languages. By the end of the next few sections, it will be clear why we do not prefer a structure like (6) without any **AGR** projections. For now, we adopt the Chomsky (1993) version of the ergativity **param**eter (see next section) or the Obligatory Case Principle (OCP) of Bobaljik (1993). They claim that ergative and nominative case systems are due to a parameter in Case Theory. We **will** come back to it in greater detail in section 3.4 but for now it is enough to know that if AgrS is active the resulting Case system is nominative and if AgrO is active then it is ergative. In this system, **unlike** Murasugi (1992), nominative corresponds to ergative and absolutive to accusative, the former pair being checked at [SPEC, **AGRs**] and the latter at [SPEC, **AGRo**].

However, **Laka** (1993) shows that this is not always the case. In Basque, the following obtains:

(7)a. emakumea-0 erori   da
       woman-ACC   fallen is
       'The woman has fallen'

   b. emakumea-k   barre egin du
       woman-the-ERG laugh done has
       'The woman has **laughed'**

Both **(7a,b)** are instances of intransitive predicates, the former being an unaccusative and latter an **unergative** predicate. As can

be   seen from (7), there is no single Case that gets checked for all intransitives. While the unaccusative predicate (7a) assigns a (morphologica My null) accusative to the subject, the unerga-tive assigns an ergative (Barked by -if). (7a) would lead one to think that AgrO is active in intransitives but (7b) shows that the external argument is assigned (or checks for) Case at   [SPEC, AGRs].

This   is also found in Hindi to some extent. Mahajan   (1990) and Saleemi (1994) report the following:

(8)a. kutte   bhoMke
        dog-Pi barked-Pl
        'the dogs barked'

   b. kuttoM ne   bhoMkaa
       dog-Pi ERG barked-MSg
       'the dogs barked'

(9)a. laRkii khaaMsii
        girl   coughed-Fsg
        'the girl coughed'

   b. laRkii ne   khaaMsaa
       girl   ERG coughed-MSg
       'the girl coughed'

(8)   and (9) above show that ergative Barking is   optionally   al-lowed in certain unergatives.

To   approach an adequate analysis of (7 - 9) let us look   at the   structure of unergative predicates.   Hale and Keyser   (1991) point out that unergatives are transitive at the   lexical   rela-

tional   stage — a **pre-D-structure** stage of derivation.   This   is

shown in (10a) **below.**

(10)a.   VP   b.   VP
          / \   / \
         /   \   /   \
        V   NP   V   NP
           unergative   /\ t_i
                                                N_i V
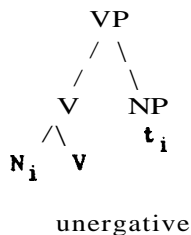
                                                    unergative

At **D-structure,** the N head of the unergative   incorporates   into

the   V.   This is shown in (10b).   The Basque data in (7)   is   ex-

plained   on   the basis of (10a), that is,   the   predicates   never

undergo **incorporation** and they involve a **light** verb and an action

nominal:

(11)a. nik   **lan** egin dut
        I-ERG work done **have-me**
        'I worked'

     b. nik   eztu! egin   dut
         I-ERG cough done   have-me
         'I have coughed'

Laka   (1993) assumes that the lack of **incorporation** explains   the

syntactic   transitivity of unergatives in Basque.   The   structure

he proposes is the following:

(12)   VP
                       / \
                     NP   V
                    barre egin
                   'laugh' 'do'
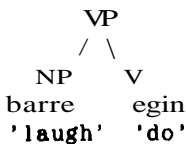
   Unergatives that assign ergatives in Hindi are also   assumed

to be **syntactically** transitive (**Mahajan**, 1990). **Notice** that the aspect of the verb in (8-9) is perfective which, in Mahajan (**1990**), is a **non-Case-assigner**. The subjects in these clauses are, therefore, assigned ergative inherently and subsequently raised to **[SPEC, AGRo]** to satisfy the licensing criterion.

Laka (1993) initially proposes the following structure for (7b):

(13)

```
                    AgrsP¹
                    / \
                   /   \
                  SPEC  \
               emakumeak / \
                     TP   AgrS
                     / \    du
                    /\   \
                   /  \   T
                  AgroP
                  / \
                 /   \
            barre_j / \
                   /   \
                  VP   AgrO
                  / \
                 /   \
                t_i  / \
                    /   \
                   t_j   egin
```

---
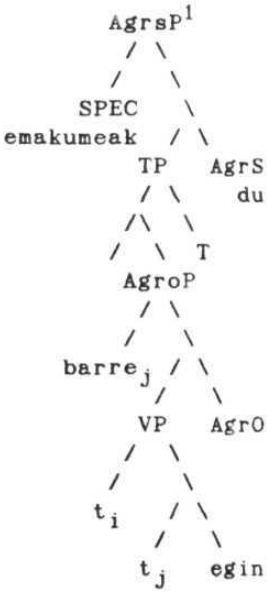
¹.AgrsP and AgroP are respectively Agr1 and Agr2 in Laka's system.

receive Case2. (13) implies that the internal structure of **unergatives** is the sane as that of the transitives. Laka (1993), **however,** gives it up in favour of a non-movement (of the internal argument) analysis based on the fact that only internal arguments of unergatives fail to carry determiners or quantifiers to **li-**cense them whereas all other nominal arguments in Basque must carry a **Det/Q** head regardless of their specificity or definite-ness. He generalizes that arguments of unergatives are **NPs** whereas other NPs are really DPs and only DPs can occupy [SPEC, **AGRs].**

Mahajan (1992) argues that only subjects which are **[+Specif-**ic] move to [SPEC, AGRo] to receive Case from AgrO. NPs marked [-Specific] receive Case directly from V (inherent Case). Con-sider the Hindi data in (8) and (9) again. Native speakers other than Mahajan himself have consistently failed to find (8a) and (9a) more specific than (8b) ar d (9b). Notice that in **Mahajan's** account the a. sentences will have to move to [SPEC, AGRo] to achieve SPEC-HEAD configuration for the purpose of agreement. Assuming with most speakers that there is no specificity differ-ence between the a and b sets of sentences, the account fails to derive the right surface structure.

However, if we adopt **Bhattacharya's** (1994) account of **long-**distance agreement with certain **modifications,** we get a better

idea of what is happening inside an unergative clause. The specific details of the proposal will be presented in section 3.5 **(Long-Distance** agreement). For our present purpose it will suffice to note that in Bhattacharya (1994) whenever a surface subject carries a visible morphological feature — either Case or agreement — a **dummy m-Case** feature **P1** is introduced in the embedded subject position in case of long-distance agreement cases which takes place in non-finite embedded clauses. We extended this dummy feature introduction **(DFI)** to cases of uner-gatives that we are looking at with the following **modifications.** As far as the DFI is concerned we propose that it depends not on visible m-Case on the subject but rather on the aspect of the verb in finite clauses like (8) or (9). We will assume with Mahajan (1994) that a nonCase assigning verb ⟨**perfect** participle in this case) always triggers the introduction of, in our system, a dummy m-Case feature. We also adopt the structure proposed in Dasgupta and Bhattacharya (1994), Bhattacharya and Dasgupta **(forthcoming),** Bhattacharya (1995) for NPs in Hindi and Bangla. **This** is shown in (14).

```
(14)                    DP
                        /\
                       /  \
                     BP    D
                    / \
                   /  \
                  NP   B
                 / \
                   N
```
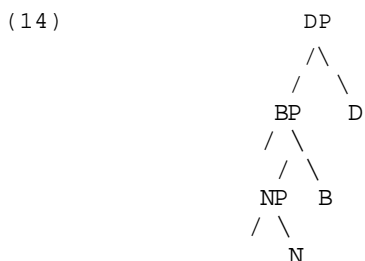
It is proposed that the syntactic environment of an NP is conditioned by two forces. Its external grammar shows up at the D (declension) head of DP and registers Case, definiteness and other relational properties. Its internal grammar is a natter of B (badge) which comprises gender and number in Gender languages and is formally instantiated in the features of the N. we explore this structure and other related issues (definiteness) in detail in Chapter IV. For now it is enough to know that B in Hindi contains only PF-visible empty features and therefore must be erased before SPELL-OUT (Chomsky, 1993).

We claim in our analysis that the valency of the dummy feature introduced by a modified DFI interacts with the valency of the B node in Hindi to decide the agreement facts in unergative clauses. In Bhattacharya (1994) if a dummy feature Pn is weak or [-strong] then it triggers movement of the NP out of the VF. If on the other hand Pn is [+strong] the NP does not move out of the VP and default agreement takes place. We also claim that the Dummy Feature Principle (DFP) operates (see section 3.5 for motivations and justifications) as in (15):

(15) DFP: P2 only if P1

By (15) we assume that a second dummy feature CDF) is introduced and attached to the object, when P1 is introduced. Notice that (15) entails a unified transitive clause structure for all types

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of   predicates -- an assumption with which this   chapter   began,
i.e. clauses always have a deep object available at some level of
der ivation.

   The strength of P2 mirrors (and depends on) the strength of
P1.   Therefore, the movement of an internal argument also depends
on the valency of the DFs.   We further assume that DFI now, after
adopting (14), need not introduce a separate node but can achieve
the same results by simply strengthening or weakening the   sister
node to the NP which is B in our system.

   With this gadget let us see what happens in case of (8)   and
(9) repeated here as (16), (17) respectively:

    (16)a. kutte   bhoMke
           dog-Pi barked-Pl
           'the dogs barked'

       b. kuttoM ne   bhoMkaa
                   ERG barked-MSg
          'the dogs barked'
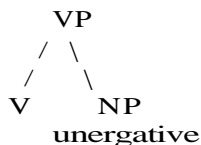
    (17)a. laRkii khaaMsii
           girl   cough-FSg
           'the girl coughed'

       b. laRkii ne   khaaMsaa
                   ERG coughed-MSg
          'the girl coughed'

We propose that for the b. sentences, since there is an overt   m-
Case present, the valency of the DF introduced is "strong" where-
as   for   a. sentences, absence of m-Case results   in   choosing   a

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"weak" DF. We suggest that only a weak or [-strong] P1 (and P2, as introduced by the DFP) results in movement of the arguments out of VP. The intuition behind this set of movements lies in the bare agreement facts of the language. In Hindi, overt Case markers or postpositions block agreement; it is, therefore, expected that their absence will result in movement out of the VP to an appropriate head since agreement takes place through the mediation of AGR heads to which T and V adjoin for checking off subject and object features respectively. The following is the structure for (17a):

```
(18)a.                    AgrsP
                          / \
                       SPEC  \
                            / \
                          TP    AgrS
                          / \
                         /\   \
                        /  \   T
                       AgroP
                        / \
                       /   \
                          / \
                         /   \
                       VP    AgrO
                       / \
                     DP1   \
                     /\      /\
                    /  \  DP2  V
                   BP   D /\  khaaMsaa
                   / \    /  \
                  NP  B  BP   D
              laRkii [+st] /\
                           B
                       [+strong]
```

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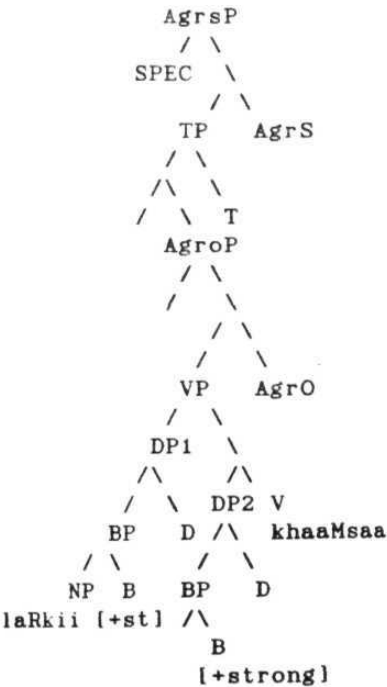
In (18a) above, since the DF introduced (which in our **modified DFI means** altering the content of B) is [+strong], the subject NP stays back in the VP and is assigned the inherent **ergative** Case. An alternative to inherent Case assignment could be a checking theory account for inherent Cases as well. Ergative Case on the subject could now be the result of N —> B——> D raising. Since N —> B raising is overt in Hindi (Dasgupta & Bhattacharya, 1994), it is quite plausible to imagine that he ergative Case feature checking takes place at [SPEC,D] once the N-B complex raises to D. This is possible since D is taken to be the site where **communication** between the internal (BP) and the external (V) world takes place. However, such an alternative would amount to making inherent Case also an instance of structural Case. Although such an attempt at unification will lead to **overall** simplicity for the grammar , it is still too early in the present state of our analysis to assume such a move. Notice that the **DP1** in (18a) will have to **move** to [SPEC,AGRs] ultimately for **licens**-ing reasons while the V **finally** moves through other **intermediate** heads (to check its own **Tense-feature** and object **agreement** fea-tures if it has an agreeing object) to AgrS where it checks off

1.As is done for licensing of PRO as a case of Null Case checking in Chomsky & Lasnik (1992), Chomsky (1993) and elaborately for Hindi in Shah (1995).

its (the V's) own default agreement phi-features **(3Msg)**

(18b)

```
                        AgrsP
                        / \
                    SPEC   \
                          / \
                        TP    AgrS
                        / \
                         A
                        /   T
                    AgroP
                      / \
                       A
                      / \
                    VP   AgrO
                   / \
                 DP1   \
                A     / \
               / \  DP2  V
             BP   D /\  khaaMsaa
            / \    / \
          NP   B  BP  D
        laRkii t+st]  /\
                      B
                  [+strong]
```
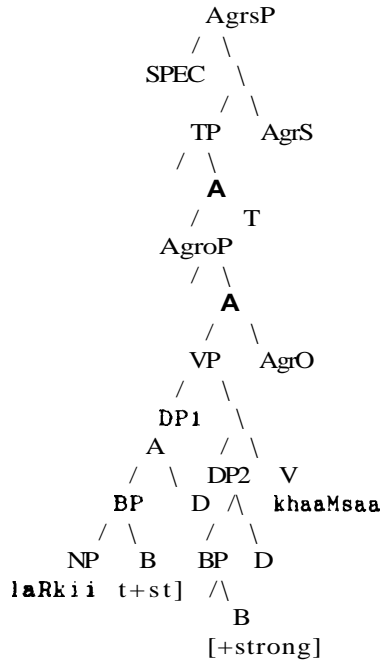
In (18b) we presume that the content of B is weak or B is [-strong]. In our system, therefore, the overt NPs in such a situation move out of the **VP.** Notice that the weakness of the B node in (18b) is correlated with the absence of an overt Case marker or postposition on the external argument. A [-strong] B of **DP1** causes it to raise out of VP to **[SPEC,AGRs]** to check for nominative Case against the raised T and phi-features against the **V** which ultimately raises, as in the case of (18a), to AgrS. **This** is how the verb in (17b) comes to agree with the subject NP.

In 3.5. we will **make** use of a modified version of **Watanabe's** (1993) **Three-layered** Case Theory to account for the **long-distance** agreement phenomenon in Hindi. We will see how certain types of features are created as a result of feature checking which, we will claim, gets cancelled against similar features elsewhere. **(18a,b)** in such a system will produce, after feature checking, the right number of features to be cancelled out against each other, accounting for the agreement facts we notice in (16) and (17).

Notice that in **(18)**, the structure for unergatives contains an object position in the form of **DP2.** This is a long known fact about unergatives. Unergatives in Dutch and German regularly passivize, from which Postal (1986) and others concluded that unergatives must have a "dummy" **object.** Further evidence of such a dummy object is shown (Jayaseelan 1989) cases like the **follow-**ing where unergatives mark accusative Case:

(19)a. John laughed <u>him</u> out of the court

b. John laughed <u>him</u>**self silly**

Unergatives in Bangla also passivize (unlike the **unaccusatives** — see section 3.4):

```
(20) e      rOkom parTi-te    heMSe     phEla    jaY
        this type party-LOC   laugh-CP fall-INF goes
        'It is possible to laugh in such parties'
```

In (20) the dummy object of the unergative becomes a dummy subject.

This discussion so far demonstrates that **unergatives** are best seen as underlyingly transitive, derived from a structure involving nominal arguments of the V (see (10) above). In some languages the process of incorporation (Hale and Keyser 1991) is overt and in others it is not. Basque and Hindi belong to the latter group. This unincorporated dummy object, therefore, counts as the second argument and the clause, for feature checking purposes, behaves like a transitive one whereby the external argument moves to [SPEC, AGRs] for Case reasons.

In fact, the attribution of an underlyingly transitive character to unergatives is the motivation behind Bobaljik's (1993) OCP which, in effect, claims an equivalence between NOMERG and ACC/ABS. If there is only one argument in the clause (that :s, if incorporation of the type (10b) takes place), Case is realized at [SPEC,AGR2] and if there are two arguments (as in Hindi and Basque) the derivation parallels that of a transitive clause where the dummy object because of its very nature cannot support any Case checked at [SPEC,AGRo] and AGR2, therefore, is not realized.

Further evidence for the existence of a non-overt dummy

object in unergatives comes from the existence of 'cognate' objects of unergatives in many languages, including Hindi. In English, typical examples of cognate objects are expressions like *fight* a *tight, dance* a *dance,* etc. In Hindi, these cognate object constructions are possible only with unergatives that take an ergative subject.

(21)a. rukun-ne   ek   madhur   haMsii   haMsii
       Rukun-ERG one   pleasant smile-F smiled-FSg
       'Rukun smiled a pleasant smile'

   b. • rukun madhur haMsii haMsaa
                               smiled-MSg

21) shows the cognate object *haMsii* 'smile/laughter' appears only in cases where the unergative verb assigns ergative to the subject.

Notice however that (21), according to our theory, generates a [+strong] DF or rather makes B of DP1 (and therefore DP2) [+strong]. Recall that a [+strong] B restricts movement out of the VP. This is clearly problematic because in (21) the V agrees with (and assigns, according to Mahajan (1990), a "partitive" Case to) the cognate object which implies the presence of the object at [SPEC,AGRo] at some point of derivation. We suggest that Laka's (1993) distinction between nominals of unergatives and other nominals in terms of the former being NP (and therefore

remaining inside the VP) and the latter being DPs (and therefore moving out) applies here for the Hindi data as far as the distinction between "dummy" objects of unergatives (16b, 17b) and "cognate" objects (21) is concerned.

Specifically, we claim that if the object of the unergative is a non-trivial DP (by which we mean a DP with its [SPEC,B] and/or [SPEC,D] filled), it moves out of the VP irrespective of the valency of the Badge node. Therefore, the presence of a non-trivial DP is a stronger requirement for the movement of arguments. This makes intuitive sense since it is imaginable that arguments with more content have a better chance of surviving on their own.

The non-triviality of the DP in (21) is quite transparent. In fact, the sentence without the Det is less acceptable and further elimination (of the adjective) deteriorates its unacceptability to the extreme. This is shown in the following:

(22)a. ? rukun-ne madhur haMsii haMsii
       Rukun-ERG pleasant smile-F smiled-FSg

   b. * rukun-ne haMsii haMsii

The respective structures of the DP2s for these two sentences are as follows:

```
(23)a ?     DP2                 b.*        DP2
         / \                            / \
           /\                             /\
          /  D                           /  D
         BP                             BP
        / \                            / \
      Det  \                         Det  \
       ┊  / \                         ┊  / \
       0 NP  B                        0 NP  B
         / \ [+strong]                  / \ [+strong]
            \                              \
            NP                             NP
           / \                            / \
         ADJ  N                         ADJ  N
          ┊   ┊                          ┊   ┊
       madhur  haMsii                   0    haMsii
```
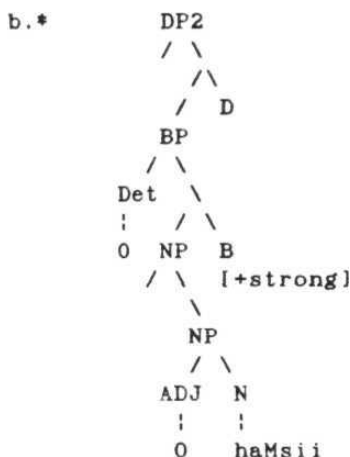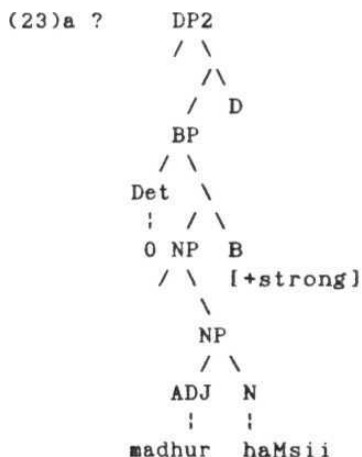
The syntactic requirement proposed in Laka (1993) that only
categories headed by a D can occupy [SPEC, AGR] holds and we
obtain the results of (21, 22).

        Notice that movement of any argument in spite of a [+strong]
Case feature associated with it is not a phenomenon to be viewed
in isolation. In Gujarati, verbal agreement in transitive
clauses takes place with the object even when the latter is
marked with a postpositional Case feature. This analysis would
predict similar movements in Gujarati transitive clauses to
account for the agreement facts.

        We conclude this section by observing that unergatives
behave like underlying transitive predicates with a dummy/cognate

object.   The Case properties of the clause fall out as a result
of the application of the OCP. Transitivity of **unergatives,** we
assume, **implies** the presence of an AgrO and as we proceed, we
will adduce further evidence of this presence, in other words, of
the pervasiveness of the **object.**

3.3 Ergativity

     As we pointed out in the previous chapter, ergative Case
•arking typology is sensitive to the transitivity property of a
clause (Giv6n 1985). A tense/aspect split in terns of ergativity
marking is typical of verbs on the higher side of the transitivi-
ty scale. As the transitivity of the verb decreases, the range
of **environments** where the subject is **marked** NOM rather than ERG
expands.   In fact, ergative **constructions** in general, as Hopper
(1983) points out for Malay, are highest in transitivity compared
to passives (which are next) and actives.   It becomes, therefore,
pertinent to study the phenomenon since one of the languages
under study, anyway, shows the (split) ergativity pattern.
Ergativity, therefore, is important from the point of view of its
position vis-a-vis transitivity and its **participation** in agree-
ment. We discuss this **participation** in detail in this section.

3.3.1 Split Ergativity in Hindi

The split ergativity phenomenon of Hindi is exhibited in a transitive clause in a perfective aspect in the following:

(24) rukun-ne   kitaab   xariidii   thii
          M ERG   book-FSg-ACC bought-PRF-FSg be-PST-FSg
      'Rukun had bougnt a book'

No other aspect tolerates ERG marking of the external argument:

(25) rukun-(*ne) kiitaab   xariide-gaa
                 book-FSg buy-FUT-MSg

(24) also shares the agreement pattern associated with ergative clauses — the inertness of external argument marked ergative, in terms of its participation in agreement morphology. The verb, therefore shows gender and number agreement with the object. If the object is overtly Case-marked (unlike in (24)), then the verb shows default agreement.

Mahajan (1989; 1990) accounts for ergative Case marking in Hindi by means of the following assumptions:

i. the perfective participle form of the verb does not assign Case, and

ii. ergative is an instance of inherent Case

1.Other accounts like that of Gair and Wali (1989) operate from a unified INFL structure and the notion of maximal c-command by a 'direct'-Case marked NP. However, our account has a different focus as it deals with a split-INFL hypothesis.

In **Mahajan's** system the assignment of structural Case is tied to the Agr system. Before we go on to present the structure for (24) and the derivation thereof, it **might** be instructive to look at Mahajan's (1990) **system** of **agreement** and related concepts.

Mahajan proposes the **movement** of Argument Shift (A-shift) to analyze agreement (and other) facts of Hindi syntax. A-shift is **movement** to an **L-related** position. X is **L-related** to Y if Y is **lexical** (V, A, N, P, Agr, T) and X is related to (included in) a projection of Y. So in the following tree everything from TP upwards (including TP) is **non-L-related** and everything else is L-related.

(26)
```
                          CP
                         /  \
                      Spec    C
                             /  \
                          AgrsP   C
                          /  \
                       Spec   Agr'
                              /  \
                            TP   Agr_s
                           /  \
                       Spec    T'
                              /  \
                          AgroP   T
                          /  \
                       Spec   Agr'
                              /  \
                            VP   Agr_o
                           /  \
                        SUB    VP
                              /  \
                            IO    V
                                 /  \
                               DO    V
```
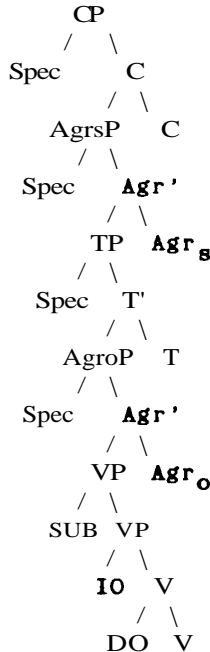
Especially the Spec of T, AgrS, Aux (if there is any) and V are the positions to which A-shift takes place. Out of these, Spec-T and Spec-Agr are potential Case positions, that is, where Case can be assigned. We will return to the distinction between L- and **non-L-related** positions in a later section (3.6) in connection with the **computational** tracking strategy we have in mind.

Related with this is the concept of L-chain. Every L-chain should have Case. For example, the L-chain (A, t, **t'**, t") has structural Case assigned to its head and the tail consists of which t, **t'**, t" are all **theta-positions** but structural Case is not assigned to these. It is like an A-chain. A in the above chain can receive structural as well as inherent Case . Inherent Case is **theta-related** and therefore not visible for the Case filter. The distinction between **L-positions** and **non-L-positions** and the concept of L-chains resolve the **conflict** between Case marking to A or A' positions across the two theories.

1. Raina (1991) states that making a distinction between IO and DO in Hindi does not make sense and assignment of both inherent and structural Case would result in Case conflict. In Chomsky (1981) A-positons are argument positions (VP-internal) and the Spec of IP. But now Subjects are generated VP-internally and therefore Spec of IP 1s not a theta-posit1on anymore. The present framework implies that it 1s an A' position to which subjects, after receiving theta-role and Case (by Infl) VP-internally, move.

Agreement is mediated through A-shift which **moves arguments** to **L-related** positions which are governed by Agr. This provides a **configuration** where agreement can take place. An Agr - governed argument position is also a **configuration** for structural Case assignment. An object in the **VP-internal** position which does not get Case in-situ moves out to the Spec of AgrO to get structural Case assigned by AgrO. Consider the **following:**

(27)
```
                 AgroP
                 /  \
              Spec   Agr'
                     /  \
                   VP   Agr_O
                   /  \
               SUB  VP
                    /  \
                  IO   V
                       /  \
                     DO   V
```
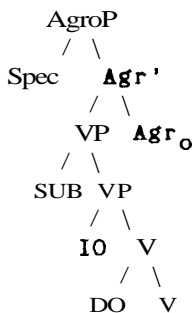
Object agreement therefore takes place in those cases where it is not possible for the verb to assign Case, for example, a perfect participle or psych verb or a passive participle.

There are two visibility conditions at work in this system. The LF visibility condition requires that **all** NPs (or chains) bear structural Case. **S-structure** visibility requires all NPs (or chains) to have Case (inherent (lexical) or structural). In

this theory **arguments** (objects) that are structurally Case-marked by the verb can never undergo **argument** shift. **Scrambling** possibilities are related to this (in)ability.

From the agreement facts of Hindi we get V-AgrO-Tense-AgrS. That is, we need two Agr positions as shown. In a typical VP structure an argument within that VP which gets the structural Case cannot move out for Case reasons but it can move out to a **non-L-related** position. Arguments not receiving structural Case **VP-internally** move to Spec of Agr position and show **agreement** by copying the agreement features **from** the Agr. Consider the following ((12) in Mahajan) :

(28)

```
                    AgrsP
                    /  \
                 Spec   Agr'
                        /  \
                      TP   Agr_s
                     /  \    :
                  Spec   T'  -aa
                        /  \
                     AgroP  T
                     /  \    -th
                  Spec   Agr'
                        /  \
                      VP   Agr_o
                     /  \    :
                  raam  VP  -aa
                       /  \
                          V
                        /  \
                     roTii  V

                          khaa-t-
```

175
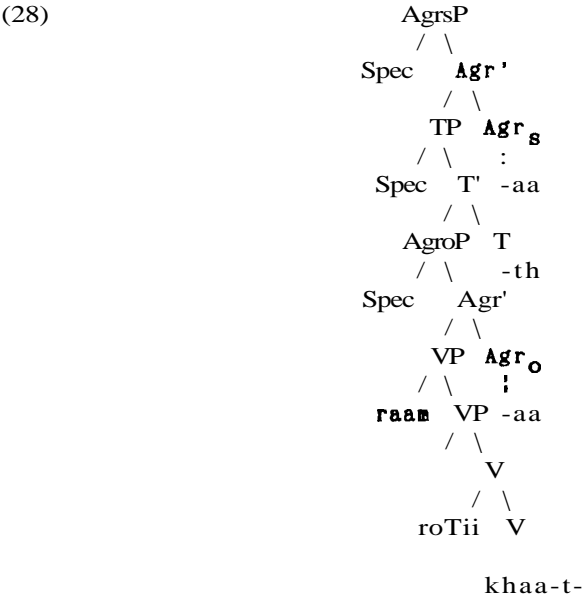
Here the V is supposed to assign structural Case to the object *roTii.* The subject moves first to Spec-T and then to Spec-Agr$_s$ and gets structural Case assigned to that position through that Agr. It has to move to Spec-T for getting the tense features of the verb. In spirit, it does not differ much from with account in Minimalism where the T moves to AgrS and the V to AgrO for the purpose of assigning structural Case to the subject at Spec-AgrS and the object at Spec-AgrO respectively. The Case features of T and V and the phi-features of Agr combine to give Case and Tense and agreement to the subject as well as the object NP.

Returning now to (24), the structure in this system will be (29).

(29)

```
                    AgrsP
                    / \
                SPEC   \
                 :    / \
           rukun-ne_i TP  \
                    / \    AgrS
                SPEC /\    :
                 : AgroP\ thii_a
                t_i / \  T
                   /   \ :
                SPEC / \t_a
                 :  VP  \
            kitaab_j /\   AgrO
                 /     \   :
                SPEC   /\ xariidii_v
                 :    /  V
                t_i NP   :
                 :    :
                t_j  t_v
```

According to **Mahajan's assumption** a. above, the V in this structure fails to **assign** Case to the object **VP-internally** and therefore the object moves to [SPEC,AGRo] to receive structural Case. In such cases, the subject is inherently Case-marked with an ergative Case marking. The subject later moves to [SPEC,AGRs] since even inherent Case has to be licensed by a structural Case assigner. The verb and the auxiliary indulge in **Head-to-Head** movement to satisfy the canonical SPEC-HEAD **configuration**.

The subject NP cannot trigger agreement in (29) since, according to Mahajan (also Khan 1989), a closer governor, the ergative *ne,* blocks such agreement. The relevant structure is the **following:**

```
(30)              AgrS
                  / \
               PP  /\
              /\  /__\
            NP  P kitaab xariidii
            ¦   ¦ thii
         rukun   ne
```

Since ne (which is **postpositional** for Mahajan) is a closer governor the subject cannot trigger agreement outside the PP.

3.3.2 **Problems** with **Mahajan's** Account

Singh (1993) notes various difficulties with this approach. He points out that the **non-Case-assigning** property attributed to

the participial fora in Mahajan's system **necessarily** pushes these
forms into the **lexicon** proper. This is not preferable since all
verbs can have similar **morphological** markers which can be derived
or predicted on the basis of the Morphological system of the
language. Mahajan's **assumption** (a above) is also empirically
inadequate since **Davison** (1988) presents cases where a perfect
participle form assigns Case. Consider the following:

    (31)a. mEM-ne unheM   dekhaa
              I-ERG they-ACC **see-PRF-MSg**
              'I saw him'

      b. * mEM-ne ve   dekhaa
                  they

The nominative NP *ve* in b. is not allowed, showing that the **PRF**
is a **Case-assigner.** Other examples of this movement are the ones
with perfect auxiliaries like *cukaa* and *gayaa*. **Saleemi** (1994)
points out that such non-ergative perfective patterns are quite
common and productive.

    (32)a. **ajmal** voh kitaab paRh **cukaa**   thaa
         Ajmal that book-F read done-PRF-M **be-PST-3MSg**
         'Ajma! had read that **book**'

      b. ajmal voh kitaab choR gayaa   thaa
                   left go-PRF-Msg
      'Ajmal had left that **book**'

    Singh (1993) also points out that according to **Burzio's**
(1986) generalization (Unaccusat ive Hypothesis), if the perfect
Participle is a **non-Case-assigner** then it should absorb the

external **theta-role**. But the **following** shows that this **is** not

the case and therefore the perfect participle not **being** a **Case-**

assigner is suspect.

(33) * unheM   dekhaa
        they-ACC see-PRF-MSg
        ('they were **seen')**   (Singh 1993: 112)

In connection with **(29)**, note that the inherently Case-marked

subject NP moves through the **[SPEC,AGRo]** to the **[SPEC,AGRs]**

position. This gives rise to two problems:

    (i) At D-structure by Spec-Head Agreement, agreement is
    established between the verb and the subject and then later
    the subject moves to Spec-Agr to get structural Case. Under
    this view the subject can agree with both the **mai** nd auxil-
    iary verb but receives structural Case from AgrS. This does
    not work in **Minimalism** because there is no Agr ir tne **VP-**
    inter.ial position for **agreement** to take place.

    (ii) The subject first moves to the Spec of AgrO and then to
    the Spec of AgrS. The t left at the Spec of AgrO should not
    be **Case-marked** because the head of the chain **(Subj$_i$, t$_i$, t$_i$')**
    should be structurally Case-marked by AgrS.

How is this achieved? There are again 2 ways:

 a. Structural Case assignment is optional and therefore the AgrO
    need not in this case Case-mark the t.

 b. Deletion of the t takes place at the Spec AgrO position.

There is some evidence for the latter view from Marathi . In

imperfect tense in Marathi **(34a,b)** are possible. The Marathi verb

in perfect tense shows **agreement** both with the subject   and   the

object, that is, there is a **slot** for object **agreement** in **Marathi**

(see **(35a,b))**

    (34)a. tu   pothi   vaac-t-o-s
          you book-F read-IMP-M-2Sg
          'you(M) are reading the **book**'

      b. tu   pothi   vaac-t-e-s
          you book-F IMP-F-2Sg
          'you(F) are reading the **book**'

-s in (34) shows agreement with the subject in person and   number

and   the   object slot shows subject agreement (in   gender).   This

piece   of data, therefore, speaks in favour of a deletion   analy-

sis.   But   the following does not. The   object   slot   registers

object gender in (35):

    (35)**a.** tu   kavitaa **vaac-l-i-s**
         you-ERG poem-Fsg   read-PRF-FSg-2Sg
         'you read the book'

      b. tu   nibandh **vaac-l-o-s**
         you-ERG essay-MSg read-PRF-MSg-2Sg
         'you read the **essay**'

If we buy the erasure story then chain formation for the   subject

to [SPEC,AGRs] movement is problematic due to the absence of   any

intermediate trace.

    A further problem posed by the account is its glossing   over

certain   details regarding auxiliary agreement. In   (24)   above,

even the tense auxiliary agrees with the object NP.   The position
of T in (33) is, however, higher than that of AGRo.   Singh (1993)
notes that it is not very clear how the object NP at   [SPEC,AGRo]
can trigger agreement on to the tense auxiliary (at least not the
SPEC-HEAD configuration).   Neither can AgrO love up to T, nor can
T   lower   to   AGRo since the latter is already   occupied   by   the
raised V.

3.3.3.   Singh's Problematic Solution

Singh (1993) proposes a more elaborate phrase structure   for
Hindi   clauses   in   which separate heads for the   nodal   and   the
aspect are provided.   The structure he proposes is as follows:

```
(36)                    TP
                       / \
                  SPEC / \
                      ASPP   T
                      / \    ┊
                 SPEC / \ the
                     /    ASP
                   VP     ┊
                   / \   -t-
              SPEC  \
              ┊   / \
           laRke NP  V
                 ┊    ┊
               kitaab  paRh
```
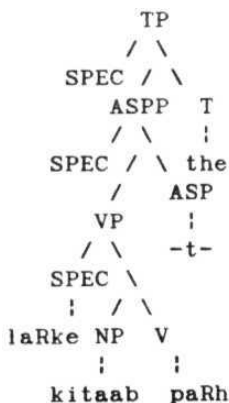

This structure acts for sentences of the following type:

    (37) laRke   kitaab   paRhte   the
          boy-MPl-NOM book-FSg-ACC read-IMP-MPl be-PST-MPl
          'The boys used to read the book'

With this structure aspect need no longer be generated in the lexicon but can be derived **syntactically.** This **solves** the **economy problem** in **Mahajan's** (1990) account. Singh's (1993) system crucially assumes a government account of Case assignment. He proposes that the imperfect ASP head ("containing" -*t* above) governs the [SPEC,V] position and assigns NOM to it.

For ergative Case assignment, as in (38) below, he assumes that the perfect ASP now assigns ergative Case to the [SPEC,V] position. The difference between the two ASP heads is that if it is imperfect, it assigns NOM and if it is perfect the **same** head assigns ergative.

(38) laRkoM-ne   kitaab   **paRhii**   thii
     boy-MPl-OBL-ERG book-FSg-ACC read-PRF-FSg be-PST-FSg
     'the boys had read the book'

The barrierhood of VP is waived by adopting Fukui & Speas (1986) where lexical projections are never barriers. Singh (1993), therefore, replaces VP with V for (37). Objective Case is assigned within the V by the verb.

This account is difficult to digest not only because it completely disregards the Checking Theory of Case efficiently using the canonical relation of SPEC-HEAD which is a logical outcome of the **Split-INFL** hypothesis (which Singh adopts), but

also because it cannot account for the **full** range of data. Consider an example of an unergative predicate discussed in the previous section, again:

(39) laRkii   **haMsii**
     girl-FSg laugh-PRF-FSg
     'the girl laughed'

In (39) although the aspect is perfective, ergative Case is not marked on the subject, which in fact bears the nominative. **Also,** as we **shall** see in the next section **(3.4),** surface subjects of **unaccusatives** do not carry ergative even when the aspect is perfective. The following is a relevant example:

(40) laRkaa   **aayaa**
     boy-MSg **come-PRF-MSg**
     'the boy **came'**

Even Singh's oᵛn account, the (following) data that he uses to show that (perfective) Aspect is the Case **assigner** for the external **argument** in **fact,** proves that Tns is the Case assigner.

(41)a. laRkoM   ne   caay   pii   thii
       boy-MPl-OBL ERG tea-F drink-PRF-F be-PST-FSg
       'the boys had drunk tea'

   b. laRkoM   ne   caay   pii
      boy-MPl-OBL ERG tea-F drink-PRF-F
      'the boys drunk **tea'**

(42)a. laRke   caay piite   the
       boy-MPl-NOM tea-F drink-INF-MPl be-PST-FPl
       'the boys used to drink tea'

    b. *laRke   caay piite
       boy-MPl-NOM tea-F drink-INF-MPl

(41,42) above show that the tense can be deleted for perfect aspect (as in (41)) but not in case of the imperfective (as in (42b)). From this, Singh (1993) concludes that ergative Case is assigned by the ASP head and not T. But this is just one part of the story. (42b) in fact, as Singh finally points out himself, shows convincingly that nominative Case is assigned by the T, in the absence of which (the T), ungrammaticality results.

    To carry on his contention that T can<u>not</u> be the Case assign-er, he points out the following data:

    (43) laRke   caay nahiiM piite
         boy-MPl-NOM tea-F not   drink-INF-MPl
         'the boys don't drink tea'

In (43) although a T is absent, the sentence is grammatical which proves to Singh's satisfaction that T is not required for the purpose of nominative Case assignment. However Singh has no account of how the nominative Case on the external argument in does get licensed in (43).

    A checking theory of Case in line with Chomsky (1993) where

T in collusion with AgrS checks for **nominative** Case at **its** Spec can provide a neater account for the above data. Ergative Case in (41) can be taken care of either by:

>   (i) inherent Case assignment within the VP in the same fashion as the unergatives which assign ergative (section 3.2)

>   (ii) a unified account of Case checking at some Agr head, hinted at in section 3.2, within the DP where D is standardly assumed to contain an Agr element (Abney 1987).

Nominative in (42) can be checked at [SPEC,AGRs] after the T head containing the subject Case feature raises to AgrS in the spirit of the checking theory of Case in Chomsky (1992, 1993). The ungrammaticality of (42b) is then easily explained as a failure of the external argument to check its Case feature against the Case feature of the T head since it lacks a T head.

If we assume T to be responsible for nominative Case (since nominative is a function of finiteness) checking, (43) is no longer a problem. Notice that in many languages negative morphology carries the syntactic tense information as well (see **Hariprasad** (1988) for evidence of negation carrying the tense feature). This is true to some extent in Bangla **perfectives.** Bhattacharya (1995) proposes a highly articulated structure for Bangla which Roy (1995) adopts in working out the negative facts of Bangla in detail. For a predicate like (44), a series of

movements la proposed which works out the derivation in detail which is partly represented in (45) **schematically.**

    (44)a. **poR-e-chi-l-am**
         read-PRF-AUX-T-1
         '(I) have **read**'

      b. **poR-0-0-0-i-ni**
         read   **1-NEG**
         '(I) have not **read**'

    (45) V+ASP+NEG+AUX+T+AGR   ==> V+AGR+NEG
                 ┆_____↑

In (45) NEG represents a fused form. Whether this is the correct order or not can be inferred from the following simple data:

    (46)a. poR-i-ni
         read-1-NEG
         '(I) did not read'

      b. pOR-o-ni
         read-2-NEG
         '(you) did/ have not **read**'

      c. pOR-e-ni
         read-3-NEG

         '(s/he) did not **read**'

The intuitive idea behind the analysis is that the presence of a Neg head blocks verb movement to T and instead the Neg loves up to the T. This **is** how a fusion of ASP, **AUX, T,** and NEG takes place **syntactically.** The correct word order is achieved by the fused Neg head's need to check off its **modality** feature at a

higher head. This provides **independent** evidence that the **Neg** •ay carry **tense information**.

The problem with Singh's (1993) analysis lies in **making Aspect** and not Tense the Case **assigner**. The dependence on the government relation for Case **assignment** also leads **him** to propose an entirely arbitrary apparatus to account for the agreement phenomena.. Subject agreement is achieved through traces left behind by the movement of the subject to [SPEC,T] (to satisfy EPP), which triggers **agreement** on the ASP while agreement on T is a^hieved by coindexation of the subject with T. Object agreement, as we **shall** see in the next section, is achieved through the process of CHAIN formation mediated by an expletive element located in the subject position.

As we see it, this account relying on the notion of government and the separation of Case and agreement, does not achieve the desirable consequence of an **overall** economy of grammar.

3.3.4 Split VP Hypothesis

As pointed out in section 3.3.1, **Mahajan's** (1990) account of subject-verb agreement gives rise to certain problems because he

1.This 1n Roy (1995) **is** assumed to be MOD.

assumes Movement of the subject NP to [SPEC,AGRo] . Although in Minimalism, such a move is illegal (the subject NP having no feature to check against the AgrO head) and a violation of the OCP as well, his needs for suggesting such a love were for binding and word order reasons.

The movement of the external argument from [SPEC,V] to [SPEC,AGRs] as not a problem in the present framework. It does not violate the Shortest Movement Principle. This principle, as Chomsky (1993) observes, subsumes ECP which subsumes the HMC (Travis, 1984). This is also consonant with Epstein's (1984) analysis of LF verb raising in English. LF raising of V over a deleted trace of T is a violation of HMC, but is not a violation of Shortest Movement since a deleted head does not count as a blocking category.

3.3.4.1 Shortest Movement

The checking theory of Case as outlined in MPLT results in crossing paths instead of the familiar nested paths. A problem unattended to in Chomsky (1991) was what prevented the NPs from raising to the Specs of the wrong Agr heads. That is, there was no account of why the object could not raise to [SPEC,AGRs] and the subject to [SPEC,AGRo]. Notice that Mahajan, written in 1990, in fact, takes the latter to be the case for subject movement in non-perfective clauses, which resulted in the problem we

have already noticed.

Chomsky (1993) **formulates** Shortest **Movement,** an **Economy**
principle (Chomsky, 1991), to resolve this problem as follows:

(47) Shortest Movement Principle

The target of movement must be no farther than the first
appropriate landing site, where **appropriate** includes the
following:

(i) A Head position for head Movement (EMC of Travis,
1984)

(ii) Spec of **AgrP,** TP, VP, etc. for A movement

(iii) Spec-CP and adjoined positions for A^1 movement

To see how (47) operates, consider (48) below which shows overt
subject aising (as in English) while the object remains in-situ
until LF.

(48)

```
                         AgrsP
                         / \
                        /   \
                   SPEC    /\
                     :    /   \
           The boy_i AgrS  TP
                 ↑         / \
                 :        /   \
                 :       /     \
                 :      T    AgroP
                 :           / \
                 :          /\
                 :         /  VP
                 :     AgrO / \
                 :         /  /\
                 :      SPEC V  \
                 :        :  :   \
           ---------------t_i praised NP
                                   the cat
```
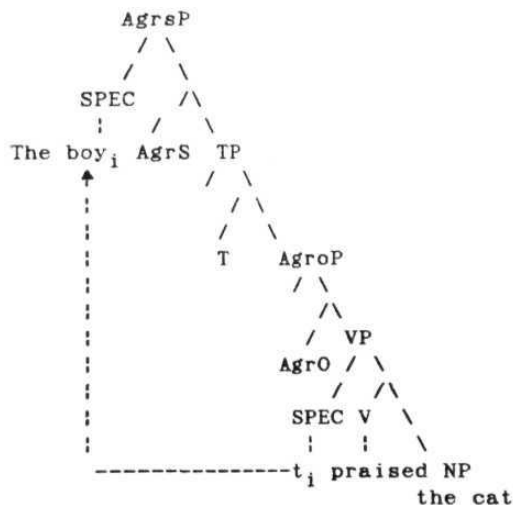
By hypothesis specifiers are freely generated which means Specs are present in a structure only if they are filled or targeted (as in 48) for movement. This is a consequence of the operation of Generalized Transformation (Chomsky, 1993). The absence of other Specs while the subject movement takes place can be inferred from (48) where Spec-AgrsP is the first appropriate landing site. The subject could not afford to raise to a [SPEC, AGRo] since the object then cannot check its features at that posi t ion.

The problem arises when an object has to raise to (SPEC, AGRo] after the subject movement has taken place. In English the object raises to [SPEC, AGRo] at LF for feature checking. The object movement must cross the trace of the subject in SPEC-VP which constitutes a violation of (47). Chomsky (1993) proposes that distance, for the purpose of (47), should be defined over chains. V raising to AgrO makes the SPEC of VP and that of AgrO now eauidistant from the complement of V position. Raising of the object can now skip one SPEC ([SPEC, V]) and is not a violation of (47). This is shown in (49).

(49)

```
                   AgroP
                  /   \
          Obj_i  / \
             :  /     \
             : AgrO    VP
             :  :     / \
             :  :    /     \
             :  : Subj/t /\
             :  :_____t_v  t_i
             :_____:
```
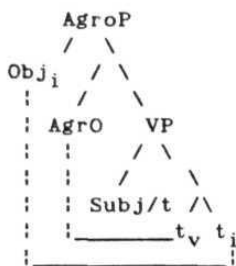
Economy conditions therefore can rule out an inappropriate move-
ment of the subject to SPEC AgrsP position if we raise the
[V+AgrO] complex to T. This implies the Strict Cycle Condition
where object raising to [SPEC, AGRo] precedes subject raising.
This will immediately exclude Mahajan's set of subject movements
where the subject moves to [SPEC, AGRs] through [SPEC, AGRo]].

Suppose that in languages with overt object raising, the
Strict Cycle Condition does not apply and further suppose that
the subject trace at [SPEC, AGRo] is needed for semantic inter-
pretations; then Epstein's (1984) account and even Mahajan's
(1990) proposal of trace deletion can see us through this deriva-
tion. But then it constitutes an ECP violation since the subject
trace at the [SPEC, VP] position cannot be deleted for theta
reasons. And if the trace is not deleted it results in violation
of the theta criterion since two chains (subject **and** object
movement) will have a link in the [SPEC, AGRo] position.

3.3.4.2 **Split-VP**

We **claim** here that the **problem** of the subject trace in [SPEC, AGRo] can be solved if we **assume** a **split-VP** structure (Koizumi 1993) of the following type (50) where the subject resides in the SPEC of the higher VP.

(50)
```
                VP
               / \
              /   \
          AgroP    V
           / \
          /   \
        VP    AgroP
       / \
      /   \
           V
```
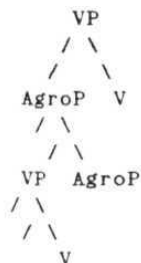
Evidence for **ISH (Kuroda** 1986, **Kitagawa** 1986, **Fukui** and Speas 1986 and others) cited suggests that subject is associated with a position lower than SPEC-IP. Thus the floating quantifier *all* in (51) is associated with the trace of the subject:

(51) The **men**$_i$ will [[**all** t$_i$] cut oranges]

　　　　　　　(from Sportiche (1988), cited in Koizumi (1993))

Koizumi points out that this does not merely prove that the subject is **VP-internal** but rather that the subject originates at a place lower than its surface position. **Nakayama** and Koizumi (1991) (cited in Koizumi, 1993) prove that the base position of the subject is in fact outside the VP as in (52).

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(52) $[_{IP} '_{XP}$ Subject X $[_{VP}$]]]

The interaction of **SIH** with such a view raises the question of choice behind the following.

(53)a.
```
        AgroP                    b.          XP
        / \                                  / \
         /\                                  / \
     AgrO  XP                            X  AgroP
         / \                                  / \
        / / \                                 / \
       X   VP                             AgrO  VP
          / \                                  / \
         V   Obj                             V   Obj
```
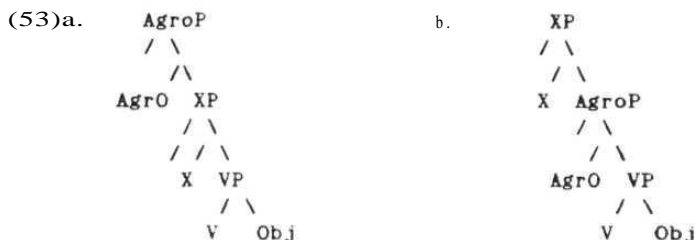
Koizumi argues in favour of the (53)b. structure and **claims** that:

   (i) Objects in English raise to [SPĿC,**A**GRo] in overt syntax for Case (Case and agreement) reasons, and

   (ii) Contrary to **ISH** the **base-position** of the subject is higher than **A**groP.

    As a consequence of (i) above the **main** verb in English also moves in the syntax to X. Koizumi shows that the Adjacency Condition (for Case assignment) is not well **motivated** and there-fore overt main verb and object movement is **theoretically** possi-ble in English. The motivation of overt object movement in English is because the NP feature of verbs — the accusative Case feature — is "strong" in English. This implies that the object •oves to [SPEC, **AGR**o] (and V to AgrO) before SPELL-OUT. The overt main-verb movement is also similarly motivated by the

presence of a "strong" V-feature of X.   He further shows that the
V-features of T and AGR are weak in English while they are strong
in   French.   Also, while the NP-features of V and AGR are   strong
in   English,   they are weak in French.   Therefore, in   French   NP
objects   stay   in   the   VP   as   in   the   following:

(54)a. Pierre a [$_{XP}$ vu$_i$ [$_{AgroP}$ [$_{VP}$ t$_i$ Marie]]]
        Pierre has   seen   Marie

   b. John has [$_{XP}$ seen$_i$ [$_{agroP}$ Mary$_j$ [$_{VP}$

He proposes (55) to account for the nature of X in (53).

(55) External Phrase Hypothesis
      [$_{EP}$ Subj [$_E$, ...]]

The exact category of E could be a parameter among languages.   In
English he assumes E to be V.   The null hypothesis is (56):

(56) Split VP Hypothesis

      EP is VP in all natural languages

(56) is a version of (55).   A transitive verb such as *cut* in (51)
will consist of, according to this hypothesis, two V's — V1   and
V2 which are spelled out as a single word *cut*.   The upper V   (V1)
is like an unergative verb (not in our terms though) whereas   the
lower V (V2) is like an unaccusative.

3.3.5 SVP for Hindi

If we adopt the split VP hypothesis for Hindi it immediately
solves   the   problem   of the trace left by   the   argument   moving

through [SPEC, AGRo] to [SPEC, AGRs] in Mahajan (1990).

Now that the external argument is no longer sitting inside a projection under AgroP, the question of its trace at Spec-AgroP does not arise. A sentence like (24) repeated here as (57) will, therefore, have a structure like (58) instead of (29).

(57) Rukun-ne   kitaab   xariidii   thii
     Rukun-ERG book-FSg-ACC bought-PRF-FSg be-PST-FSg
     'Rukun had bought a book'

(58)
```
                    AgrsP
                    / \
                SPEC   \
                  :    / \
         rukun-ne_i  TP   \
                    / \    AgrS
                 t_j / \    :
                    / \   xariidii thii
                  VP1   T
                  / \   :
               t_i /\  t_t
                  / \
               AgroP  V1
               / \    :
          kitaab /\   t_v
               / \
             VP2  t_v
             / \
          t_j   V2
                 :
                t_v
```
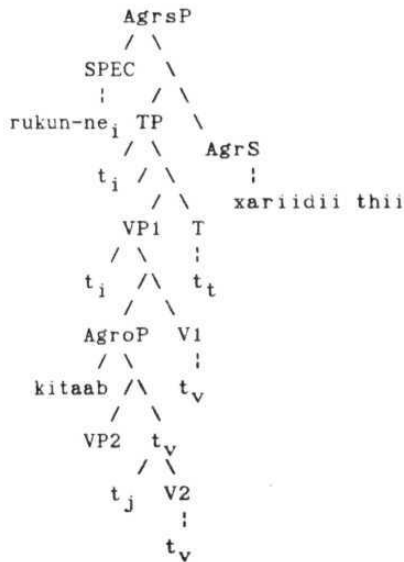
Although the various details are not worked out in Koizumi, we propose that in (58) above the subject originates at Spec-VP1 and moves to Spec-AgrsP to satisfy the licensing condition. The object NP checks for accusative Case feature overtly against the raised V at the AgrO Bead. The verb, for economy reasons (mini-

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ize *chain* *links* — Chomsky's (1993) version of Relativized Minimality) head-to-head moves to check off its V-features (Tense) and agreement features.

French participle agreement is also assumed to involve the subject touching Spec-AgroP before moving on to Spec-AgrsP (Kayne, 1985). A French participle agrees with its derived subject such as the surface subject of a passive construction or an unaccusative. The following examples depict this fact:

    (59)a. les livres de Jules Verne ont tous ete imprimes
                                             *imprime
      b. ils sont deja partis/ *partir

(59) inplies that the NP from a VP-internal position moves step by step. A participle does not agree with external arguments such as the subject of a transitive clause and an unergative predicate as shown in Kayne (1985):

    (60)a. Jean a repeint/ *repeinte la table
      b. ils ont rit/ *rits

(CO) shows that the participle does not originate in a place lower than AgroP — if it did, then participles in (60) should bear overt agreement features, which they do not.

According to (56) the subject of a transitive or an unergative originates external to the VP and therefore it cannot stop

by a [SPEC,AGRo], simultaneously the required word order of *tous* after the auxiliary is also achieved.

Notice however that our reworking of the SVP structure leaves the ergative Case assignment/ checking unsatisfactory. Koizumi's proposal does not work out these details. We imagine that the following are the possibilities:

(i) Spec-VP1 is assigned a structural ergative Case once the V2 moves up to V1, or

(ii) V1 in collusion with V2 assigns inherent ergative Case to the subject at Spec-VP1 .

Both these possibilities are problematic. (i) above is unaccept- able because structural Case checking taking place here although it involves a SPEC-HEAD configuration does not involve Case checking against a "proper" head — a basic tenet/assumption of MPLT — where proper means an AGR head. (ii) suffers from the same problem and additionally a syntactic implementation of ¨in collusion with" would be different from the spirit of Minimalism since it would have to present a Case theory utilizing either the notion of government or chain formation.

We, therefore, propose the following modification in a structure like (58). We preserve the basic insight of Koizumi's SVP by generating the subject external to the lower VP containing the object and the V, but propose the structure (61) where a type °f AgrP-split is noticed.

(61)
```
              AgrPv
              /  \
         Subj /    \
             /       \
         AgroP       Agrv
         /  \          :
      Obj_i  \         V
            /  \
          VP    AgrO
         /  \    :
       t_i   V   t_v
             :
             t_v
```

In (61) subject is generated within an Agr projection — AgrPv.
This is reminiscent of Johns' (1992) proposal regarding the
derivation of ergativity in certain Eskimo languages. For a
sentence such as (62) of Qairnimiut (from Johns (1993)) she
proposes the structure in (63).

```
(62) anguti-up arnaq       taku-ja-a
     man-REL   woman (ABS) see-TR PPL-3Sg/3Sg
     'The man sees the woman'
```

In (62) the verb carries, apart from a transitive participle, the
phi-features of both the subject and the object. The ergative is
marked by a relative marker on the subject.

(63)
```
                   AgrPv
                   / \
              NP     \
              :    / \
          arnaq AgrPn AGRv (Ø-patient)
                / \
             NP    \
             :    / \
      anguti-up NP  AGRn (Ø-agent + NUM)
                :     :
            taku-ja   a
```

(63) is a result of projection of two functional heads, **AGRv** and AGRn. AGRn is found in **transitives,** and a possessive clause take a verbal noun as its **complement** and assigns ergative Case to the NP at its specifier which is the agent of the clause. AGRn contains the phi-features of the agent and the number feature of its complement. AGRv is found in both transitive and intransitive clauses. AGRv contains the phi-features of the patient and assigns **absolutive** to its specifier. Johns (1993) proposes that the lexical head of a transitive clause, the verbal noun, undergoes head **movement** first to AGRn and then to AGRv. Along with this movement of the verbal noun to the main predicate position, the agent moves up to adjoin to AGRPv.

The structure we have proposed (61) can, therefore, take care of a larger set of empirical facts. We propose that ergative is still structurally assigned in such a split structure, but now, consonant with the spirit of **Minimalism,** it takes place in SPEC-HEAD **configuration** with an appropriate AGR head (AGRv in this case). The object moves up to [SPEC, **AGRo]** as in (58) and checks for its phi-features as well as Case feature (ACC) against the V's phi and Case features. Such an account, we claim, will also unify the Case checking procedure for both perfective and **imperfective** clauses.

3.4 Unaccusatives

Continuing with the broad theme of this chapter. that is of investigating the primacy/ pervasiveness of the object/ patient/ internal argument (see section 3.1), we now discuss unaccusatives which are more transparent than unergatives (see section 3.2) as far as the possession of a deep object is concerned.

Unaccusative predicates, unlike unergatives, have a surface subject which takes no active part in the action of the verb. That is, the subject is nonvolitional. Many languages, as we pointed out in 3.2, distinguish between unaccusatives and unergatives morphologically; in Danish and Italian, unergatives form their perfectives with *to have* while unaccusatives use *to be.* Thus in Italian, unaccusative verbs like *arrivere* 'arrive', *sembrare* 'seem', and *affondare*'sink' take *essere* 'be'.

In Chapter II (section 2.8) we pointed out that unaccusatives have a VP with an object but no subject, although they share the property, with unergatives, of possessing only one argument in the clause. More specifically, the structure pro

1.In Burzio (1981) unaccusatives are called 'ergatives': we will, however, stick to the original terminology.

posed **by Murasugi** (1992) **((63) of section 2.8) repeated here as (64) is es follows:**

(64)
```
                    TP
                   / \
                f / \
                : / \
                :T   TrP
                :    / \
                :   /   \
                :  Tr    VP
                :       / \
                :      /   \
                :     V     Obj
                :     :      :
                :   arrive  the man
                :            :
                :_____:
```
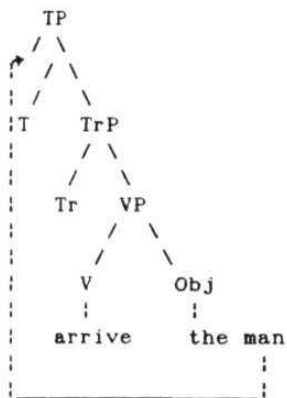
In (64) the object coves to the [SPEC,T] position in overt syntax.

In the older terminology, that is before SIH arrived, we have a structure like (65) where the accusative V *arrived* fails to assign accusative Case to the object. The object therefore moves up to Spec-IP position and receives nominative Case from the I head.

(65)

```
                      IP
                     / \
                    /   \
        --->SPEC    I'
            :      / \
            :     /   \
            :    I    VP
            :        / \
            :       /   \
            :      V     NP
            :      :      :
            :   arrived  John
            :             :
            :_____:
```
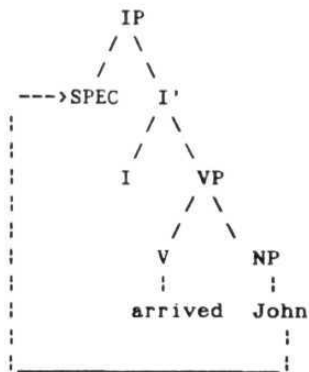
The failure of the unaccusative verb to assign accusative Case to
its object is explained by Burzio's generalization which predicts
that verbs which fail to assign an external theta-role also fail
to assign Case. Since unaccusative predicates do not consist of
a 'deep' subject, they consequently fail to assign accusative
Case to their 'deep' objects. This brings into ques*'on their
transitive status, but because they have deep objects we will
assume that they are instances of transitive verbs. The follow-
ing examples illustrate their inability to assign accusative
Case:

(66)a. • John fell him out of court

   b. * John existed himself easy

This leads to the natural conclusion that unaccusatives do
not passivize, unlike unergatives which do passivize in some

languages.In Relational Grammar this follows from the 1AEX prin-
ciple which Bays that no more than one **argument can** be advanced
to subject position in the course of a derivation. This is true
in Bangla where the lack of a volitional agent results in **ungram-**
maticality when **unaccusatives** are passivized a fact first noted
by **Klaiman** (1981):

(67) * e **rokom janla** diye   poRe   **jaWa**   jaY na
         this type window **from-LOC fall-CP go-INF** goes not
         'It is not possible to fall **from** such **windows**'

Compare this with (20) repeated here as (68) where **passivization**
does not result in **ungrammaticality.**

(68) e   rokom parTi-te **heMse**   **phEla**   jaY
         this type party-LOC **laugh-CP fall-INF** go
         'It is possibel to laugh in such parties'

The agreement facts of unaccusatives are **straightforward** in that
the verb agrees with the subject. Consider the following:

(69) laRkaa   aayaa
      boy-MSg come-PRF-MSg
      'the boy came'

(70) darvaazaa khulaa
      door-MSg open-PRF-MSg
      'the door opened'

(71) guldaan   TuuTaa
      vase-MSg break-PRF-MSg
      'the vase broke'

Notice however that although the verbs in the above sentences are
in the perfective, the subjects cannot be **marked** ergative. There-

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forc we get the following:

(72) * **laRke-ne** aayaa

(73) • darvaaze-ne **khulaa**

(74) • **guldaan-ne** TuuTaa

Saleemi (1994) attributes thiE to the agentive character of the ergative *-ne*. Since the volitionality of the surface sub-jects in (69-71) is weak, they cannot, therefore, **cooccur** with an ergative marker. To understand how we can derive this syntacti-cally, we need to look at the process of object **agreement** in **detail.**

3.4.1. Object **Agreement** in Hindi

Object agreement in Hindi takes place when the subject **is** overtly **(morphologically)** Case-marked, as seen in (24) in section 3.3. Mahajan (1990) accounts for object agreement in the **follow-**ing manner. Consider **(75):**

(75) **raam** ne roTii khaa-y-ii
     Ram-ERG bread-F eat-PRF-F
     'Ram ate the bread'

the structure for which is as follows:

(76)

```
                    Ag-sP
                    / \
                Spec   Agr'
                       / \
                     TP   Agr_s
                     / \
                 Spec   T'
                        / \
                    AgroP   T
                    / \
                Spec   Agr'
                       / \
                     VP   Agr_o
                     / \   :
                 raam   \ -ii
                        / \
                          V'
                         / \
                    roTii   V
                            :
                          khaay
```
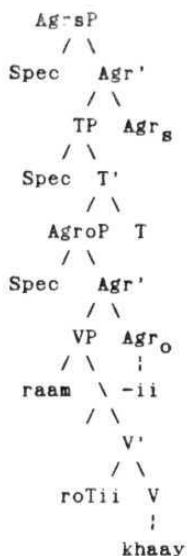
In (76) *khaay* 'ate' is a perfective fora and is a **non-Case** as-
signer like passives and participles. In (76) *raam* gets inherent
Case in its **VP-internal** position and therefore can stay in-situ
in the S-structure and thus results in the order as in (77).

(77) roTii **raam** ne khaayii

The verb moves to AgrO in this system. Tne object *roTii* 'bread'
in this case does not receive structural Case from the verb and
therefore has to move to the Spec-AgroP position where it is
supposed to get structural Case **from** AgrO. The problem for (75)
is that the **object** agrees with the verb and since agreement is a
matter of Agr and since there is no Agr in the VP, there cannot
be any **agreement.**

3.4.1.1. Evidence for **movement** to **Spec-Agr**$_O$

Mahajan (1990) cites adverbial **interpretation** as part of the evidence for the **movement** to the Spec-Agr P position. **Assuming** the work of Travis on this, it is argued that we need an **adjunc**-tion to a projection of V for a process reading of an adverbial sentence whereas the event reading involves adjunction to a projection of I. Consider (78) and (79).

<blockquote>

(78) **raam** ne   **kaam jaldii** se   kiyaa
     Ram ERG work quickly LOC do-PRF-MSg
     'Ram did his work **quickly**'

(79) raam ne   jaldii   se   **kaam** kiyaa
     Ram ERG quickly LOC work do-PRF-MSg
     '**Ram quickly** did **his work**'

</blockquote>

In both the cases the object *kaam* 'work' agrees with the   verb. The respective structures are as follows:

```
(80)          AgroP
              / \
            Spec/\
_____      _↑_/ Agr_O
   :         VP    ↑____
   :         / \        :
   :      jaldii VP      :
   :       se    /\      :          PROCESS
   :           Sub \     :
   :               /\    :
   :              /  \   :
   :            Obj   V  :
   :_____:    :___:
```

(81)
```
                          AgrsP
                          / \
                       Spec /\
                          TP Agr_s
                          /\
                         /  TP
               jaldii se / \
                       Spec  T'
                            / \
                           /   T
                       AgroP              EVENT
                       / \
                     Spec/\
          _____↑ /  Agr_o
         :        VP    ↑____
         :       / \         :
         :     Sub /\        :
         :       Obj\        :
         :         :  V      :
         :_____:  :____:
```
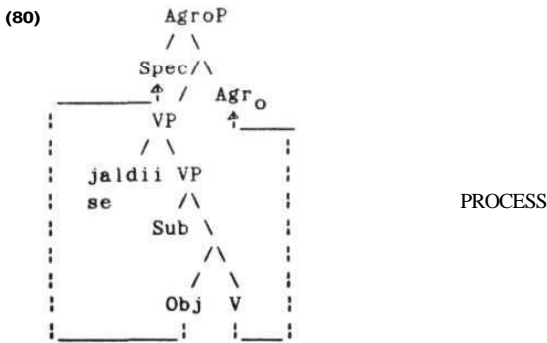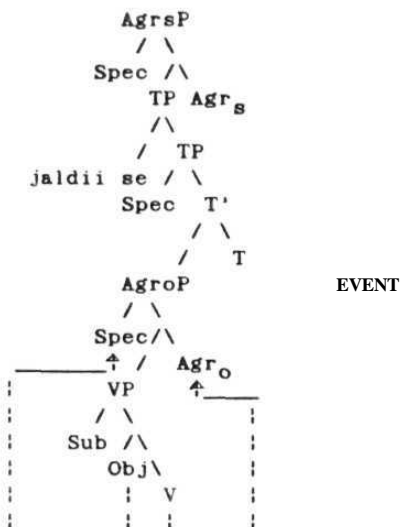
In (81) the adverb has scope over the whole predicate which is why it gives an event reading, whereas after the object Moves in (80) the adverb can have scope only over part of the predicate and therefore we get the process reading. If (81) were not the S-structure of (79) then we would have the tree as in (82).

(82)
```
                          AgrsP
                          / \
                       Spec /\
                       :  TP Agr_s
                     Sub  /\
                         /  TP
               jaldii se / \
                       Spec  T'
                            / \
                           /   T
                       AgroP
                       / \
                     Spec/\
                        /  Agr_o
                      VP
                      / \
                    t  /\
                     Obj V
```

207
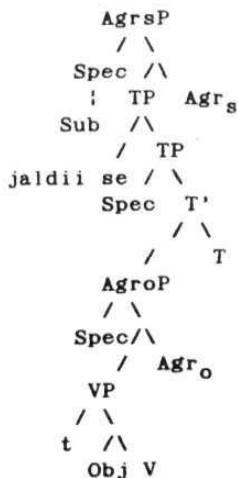
In (82) the adverb could be adjoined to either I or V and there-fore should give an ambiguous reading but **(79),as** we saw, has an event reading only, showing that the object must have Moved to the **Spec-Agr$_o$P** position at S-structure.

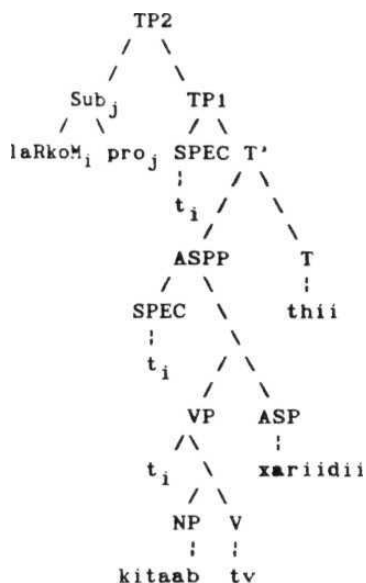### 3.4.1.2. Object **Agreement** in Singh (1993)

Singh (1993) proposes a KP structure for the **NPs** which do not trigger agreement since they have an overt **postposition.** The structure for the **KPs** like *laRke* '**boys**' and *laRkoM ne* 'boys-erg' are as **follows:**

```
(83)a.      KP                    b.        KP
           / \                             / \
          /   \                           /   \
        NP     K                        NP      K
         ¦     ¦                         ¦       ¦
       laRke   Ø                      laRkoM    ne
```

A filled K in (83b) narks it as an opaque domain for agreement purposes. The agreement on the aspect (his ASP head) and tense is taken care of through the process of CHAIN **formation.** He also assumes that CHAIN formation is Mediated by an expletive element located in the subject position. This is shown in (84b).

(84)a. laRkoM ne kitaab xariidii   thii
       boys   ERG book-F **bought-PRF-F** be-F
       '**the** boys had bought **books**'

(84)b.

```
                        TP2
                       /  \
                      /    \
                   Subⱼ    TP1
                   / \      / \
              laRkoMᵢ proⱼ SPEC T'
                          ⋮   / \
                         tᵢ  /   \
                            /     \
                          ASPP     T
                          /  \     ⋮
                        SPEC  \   thii
                          ⋮    \
                         tᵢ   / \
                             /   \
                            VP   ASP
                           /\     ⋮
                         tᵢ  \  xariidii
                            / \
                           NP  V
                           ⋮   ⋮
                        kitaab tv
```

Singh's motivation for a pro in the subject projection is EPP and the existence of sentences like the following:

    (85) lagtaa hE ki   **baariS** hogii
         seems is that rain   **be-will**
         'it seems that it will rain'

    (86) aaj   bahut khelaa gayaa
         today   very played went
         'there was a lot of playing **today'**

(85) and (86) show weather and **impersonal constructions** respec-
tively. If EPP holds then a pro subject can be assumed for these
sentences.   Whereas this is certainly true of (85-86), there   is
no   reason to assume that (84a) above also contains a pro in the
subject   position   since an overt subject already occupies this

position.   On the basis of this and other objections raised   in
connection with hie account of subject agreement (section 5.3) —
essentially the incompatibility of such accounts with the   spirit
of MPLT — we state that Singh (1993) is not an   improvement   on
earlier accounts.

    Notice that in (69-71) the verb agrees in phi-features   with
the unCase-marked surface subject.   It follows, then,   that   the
deep object, at some point of derivation, should reach the   Spec
position of   an Agr head which the V head moves to.   In   other
words,   an Agr projection is needed to account for the   agreement
facts noticed in these sentences.

3.4.2.   Revised OCP

    In section 3.2 we mentioned Bobaljik's (1993) a d   Chomsky's
(1993)   contention that ergative and nominative Case systems   are
the results of a parameter in Case Theory.   Given that there   are
two positions available for the assignment of structural Case   in
a clause, then, if the predicate contains only one argument, only
one of the Agr positions is active.   An active Agr1 results in   a
nominative Case system and if Agr2 is active, the resulting   Case
system is ergative.   This is shown in (87):

    (87) Nom. system   ➡   Agr1 active (Case 1)
         Erg. system   ➡   Agr2 active (Case 2)

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This parameter can yield either of the following :

(88)   Active **Agr1**   (89)   Active **Agr2**

    a. Transitive V   Cl , C2   **C1** , C2
    b. Intransitive V   Cl   C2

By (88-89), a true predicate is not **parametrized** and is univer-
sally assigned two Cases — Case 1 to the external argument   and
Case 2 to the internal **argument**.

    Bobaljik (1993) shows the operation of (88) in **English** as
follows:

    (90) a. she Cl saw her **C2**

        b. she **C1** **fel**l

        c. she **C1** laughed

(89) operates as follows for an ergative language **(Inuit)**:

    (91)a.   jaani-up **C1** natsig **C2** **kapi-jaNa**
           Jaani-ERG   seat   **stab-Tr**
           'Jaani stabbed a seat'

      b.   inuk C2 **tikit-tuq**
          person   arrived
          'the person **arrived**'

      c.   **ilinniagtitsiji** **C2** uqaq-tuq
          teacher   spoke
          'the teacher spoke'

Notice   (91b) is with an unaccusative predicate and Case with an
unergative.   Bobaljik stated that languages which diverge   from

this pattern should be accounted for **independently of Case** Theory. As we pointed out in 3.2, **Lasque** does not follow the pattern shown in (88-89). **Mahajan (1990)** and Laka (1993) point out that Hindi also does not **follow** that pattern. Let **us** look at the relevant data which is repeated here for comparison of tags **like** **C1** and C2.

Basque (92)a. **emakumeak C1 emakumea C2** ikusi du
               woman-the-ERG   **woman-the-ACC**   Been has
               'the woman saw the **woman**'
                                (Trans i t ive)

       b. emakumea **C2** erori du
         woman-the-ACC   fallen is
         'the woman has **fallen**'
                           (Unaccusat ive)

       c. **emukameak C1** barre egin du
         woman-the-ERG   laugh done has
         'the woman has laughed'
                          (Unergative)

Hindi (93)a. rukun-ne **C1** kitaab **C2 xariidii**
           Rukun-ERG   booi:-FSg-ACC **bought**-PRF-FSg
           '**Rukun** bought a/the **book**'
                         (Transitive)

       b. laRkaa **C1** (**ne**) aayaa
         boy-(MSg)-NOM   came-PST-MSg
         'the boy **came**'
                         (Unaccusative)

       c.(i) laRkii-ne **C1** haMsaa
            girl-(FSg)-ERG   laugh-PRF-3MSg

        (ii) laRkii **C1**   haMsii
            girl-(FSg)-NOM laugh-PRF-FSg
            'the girl **laughed**'
                        (Unergative)

The **intransitives** (b and c examples) of Hindi show that they indeed follow the Case **parameter** as stated in (87-89) as far as

activating only one Agr per clause type ie concerned. Whereas there is an asymmetry in (92b,c) — Agr2 being active in one (b) and Agr1 in the other (c) — this is not true f c r Hindi (93). Notice that in accordance with the pattern in (88), in Hindi, there is no asymmetry in Case pattern for intransitives, both of which receive C1. That, precisely, IE the problem with Hindi. On the basis of (87) we would predict C2 being the Case assigned in intransitives in Hindi.

There are three possibilities here:

(i) Hindi shows split ergativity reading Case Parameter as (89/90)
(ii) In Hindi Cl in intransitives is assigned by Agr2
(iii) OCP revision is in order.

(ii) will be in direct violation of the Checking Theory of Case presented in Chomsky (1993) where Agr2 (AgrO) is responsible for objective (ACC/ABS) Case checking and Agr1 (AgrS) is responsible for the Case of the subject (NOM/ERG). We think (i) is basically correct but OCP as stated does not mention this possibility. By (i) we mean that split ergativity can switch off the Case Parameter. In other words, (iii) is the option we would like to adopt.
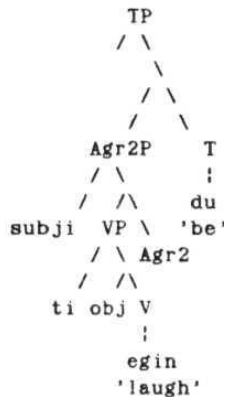
3.4.2.1. Laka's (1993) revision of OCP

Chomsky (1991) proposed that both **structural** Cases (Case 1 and Case 2) involve the mediation of Agr. The **difference** between the two is that the former (NOM/ERG) involves Tense adjoined to **Agr1** while the latter (ACC/ABS) involves V **adjoined** to **Agr2**. Structural Case therefore uniformly involves a [SPEC, X] relation. The motive of government does not **come** into play, unlike Mahajan (1992). According to Chomsky (1993) the Case features belong to Tns and V **respectively**. There are therefore two types of Case features — Tns Case features and V Case features. Laka (1993) proposes that the Case Parameter must invoke these two features rather than the Agr elements that they pair with. He, therefore, suggests the following **revision** (94) of the Case Parameter (92):

(94)a. Activate Cv :   Ergative Case system

   b. Activate Ct :   Nominative Case system

The elements in (94) which have the capacity to be active or inert are no longer Agr1 and Agr2 but the Case features of the two Case assigners V and T respectively. This **modification**, according to Laka (1993), accounts for the Basque data. The **ungrammaticality** of (95) is accounted for by the **modification** since once the internal argument has received a Case feature assigned by V, there is no Case feature left to be assigned in

Agr. The external **argument** occupying lSPEC,Agr2) will remain
Casc less.

(95)*
```
                    TP
                   / \
                      \
                     / \
                    /   \
                 Agr2P    T
                 / \      :
                /  /\    du
            subji VP \  'be'
               / \ Agr2
              /  /\
            ti obj V
                   :
                  egin
                 'laugh'
```

Laka **suggests** that **Belletti's** (1988) inherent partitive Case
is a result of Case **assignment** by Cv directly in the VP without a
mediating Agr. It is not subject to Burzio's **generalization.**
Structural Case assignment (which necessarily involves an Agr
element) by Cv results in ACC/ABS and the inherent Case assign-
ment by Cv yields partitive Case of **Belletti** (1988).

Given (94), Burzio's **generalization** necessarily follows.
Languages where Ct is active (nominative languages) Must **make** Cv
inert whenever there is only one argument to license. It **follows**
from this that clauses with only one argument **will** be unable to
assign accusative, since accusative involves Cv. Laka proposed
the following principles to account for the data:

(96) 1. Economy: 1 Argument —> 1 Case

2. Case Parameter: a. Activate Ct
                    t. Activate Cv

a. (1,2a) - if 1 NP then only Ct
    Burzio's generalization follows
    Passives exist

b. (1,2b) = if 1 NP then only Cv
    Burzio's generalization does not follow
    Lack of passives

    Antipassives

According to (96) in an ergative Case system a clause with one
argument will receive Cv Case feature, in other words, accusa-
tive. Activation of Ct in such cases will violate economy. This
explains the Basque data in (92). In 3.2 we have showed that
unergatives are underlyingly transitives and by (88-89) there is
no parametrization in case of transitive predicates. This ex-
plains the unergatives in Basque. For all practical purposes,
therefore, only unaccusatives are predicates taking a single
argument to which, thus, (96) applies. Laka concludes from this
that Burzio's generalization does not hold for ergative lan-
guages. Passive is a particular instance of Burzio's generaliza-
tion. In a dyadic predicate, if one argument is denoted, the
other argument then will be assigned Ct Case feature or nomina-
tive in a nominative system. In an ergative system object Case
is assigned (Cv + Agr) to the internal argument where the exter-
nal argument has been demoted.

3.4.2.2. OCP for HINDI

This does not work for Hindi data in (83) abov . Tne one argume it that is activated does not the bear Case feature ∴ or accusative Case. From this we sight conclude the following:
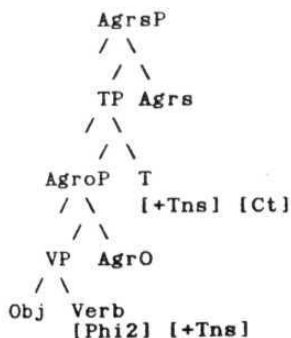
(97) Split ergativity patterns like the nominative system.

Accordingly, the one argument Case activates C_T (as in (96a)) and the external argument receives Nominative or Ergative (as in (93c(i))). This position (of (97)) forces us to consider ergative as a case of structural Case, an option we toy with in 3.2 and 3.3. We further claim that the ergative Case feature is a property of Tns. This lakes sense since Tns accommodates agentive Case features like the nom in nominative languages.

Notice however that with this assumption , our analysis of ergativity in 3.3 needs modification. In (61) we said nothing about the possible location of ERG Case feature. The analysis there implies that it is either a feature of the verb or the Agr. The latter possibility is not standardly assumed since AgrS do not have lexical content of their own. With the assumption that Erg Case feature is a property fo the Tns head, we are in need of revision of the analysis presented there since the external argument in (61) cannot check for structural ergative Case at [SPEC, Agrv].

Instead we propoose that further raising to [SPEC,AGRs][1]
takes place for the subj NP which can check for the ERG Case
feature against the AgrS head after T raises to AgrS. The Hindi
data in (95), we propose , Maintains the spirit of OCP in Bcbal-
jik (1993) by activating only one Case feature (or Agr), which
is C1 for Hindi, for predicates with one argument. OCP, in our
view, does not, therefore, need substantial revision. We claim
that the general economy principle connected with the Case param-
eter, something along the lines of (96), holds in conjunction
with (97) above.

Let us now see how (69-71) are accounted for in our system.
We present the following as the structure for these unaccusative
clauses:

(98)
```
                    AgrsP
                    / \
                   / \
                  TP Agrs
                  / \
                 / \
            AgroP   T
            / \    [+Tns] [Ct]
           / \
        VP  AgrO
        / \
     Obj  Verb
          [Phi2] [+Tns]
```


1.Which is anyway the final position of the external argument at
LF in (98).

The set of **movements** is as depicted. **We** claim 'hat **AgrPv** (as   in

(61))   is   not generated here since there is a   deep   object   for

unaccusative predicates.   The object instead is **promoted** to   the

surface subject position to **[SPEC,AGRs]**.   Due to the absence of a

deep   subject, unaccusative verbs in their lexicon do   not   carry

any   **phi-features**.   Ct here, as we have suggested above,   contain

the   ergative Case feature, ERG.   The V moves as shown   to   check

off   its   phi-features   and tense   features.   The   object   moves

through Spec-AgroP (for agreement feature checking) to Spec-AgrsP

(for Case   feature   checking).

3.4.3 The **Ergativity** Parameter

   The   reason for discussing this here in this section   rather

than in 3.3 is that it investigates a problem that results due to

the   **Ergativity** Parameter proposed in **Mahajan** (1994).   He   argues

that   the   difference between the two major types   of   languages,

Nominative/Accusative   and **Ergative/Absolutive,** can be   accounted

for   without   recourse to any particular   parameter.   These   two

different systems of Case marking patterns can be shown to **follow**

from other basic properties of the languages under **consideration.**

The basic word order of a language may be one of the factors that

contribute   to this   difference.

   Mahajan   (1994) takes the following typological   **generaliza-**

tions to be significant in determining the difference between these Case marking patterns:

(99) (i) SVO languages are never ergative. Ergativity is found only in verb-final languages

(ii) Ergative languages are quite often split-ergative

(iii) Ergative languages usually lack a verb corre-sponding to Romance/ Germanic have. The auxilliary in ergative constructions is be

(iv) Ergative languages usually have a proliferation of oblique (non-nominative) subject constructions in addition to the ergative construction itself
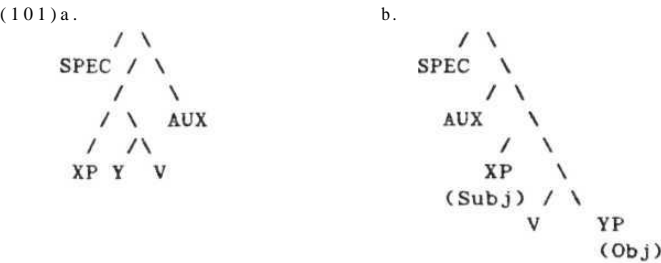
All these properties are shown to follow from the basic word order that languages possess.

To see the underlying similarity between these two language types, consider the following (Mahajan 1994:2):

(100)a. raam-ne vah kitaabeM paRhii thii
Ram-ERG those book-Pi read-PRF-FP1 be-PST-FP1
'Ram had read those books'

b. Paul les a repeintes
Paul them has repainted
'Paul has repainted them'

In both examples object agreement takes place. Object agreement in (100b) is an instance of SPEC-HEAD agreement, the clitic triggering object agreement when it passes through a [SPEC,AGRo] position. The agreement in (100a) is also, as we have seen in detail in 3.4.1, a case of SPEC-HEAD configuration involving

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AgrO.　However, in French only the participial agrees with the object　while the **auxiliary** agrees with the **subject**.　The other difference　is that the auxiliary in French is *have,* while it **is** *be*　in Hindi.　In addition, the subject **markings** of the two lan- guages　differ.　Mahajan (1994) proposes that　these　differences follow　**from**　the　basic word order difference　between　the　two languages.　The underlying structures for **(100a,b)** are　as　fol- **lows:**

(101)a.
```
          / \
     SPEC / \
         /   \
        / \  AUX
       /  /\
     XP Y  V
```
b.
```
          / \
     SPEC  \
          / \
     AUX   \
         /   \
        XP    \
     (Subj) / \
           V    YP
              (Obj)
```

These　two structures differ only in **directionality** which　leads Mahajan to state that the differences between　(100e,b) are due to different derivational　processes.

Kayne (1993) suggested that *have=be* + an empty　preposition. Therefore,　*have*　is a form which is derived　from　*be*.　Mahajan crucially　assumes that the empty P that incorporates into be　to yield　nave is generated as a sister of the subject (the　subject is **VP-internal).**

Have is, therefore, an oblique form of *be.* The empty P — which is the reason for this obliqueness — is incorporated into **AUX** *be* to yield *have.* The obliqueness is present in Hindi as a postpositional marker and in French as a **prepositional** marker. P **incorporation** can take place in French but not in Hindi. This results in leaving the surface **form** of the AUX in Hindi as *be.* The postposition surfaces as a subject **postposition.** This is assumed to be the source of the ergative marker in Hindi. This, in short, is the crux of Mahajan's account of Hindi ergativity.

The reason for **P-incorporation** taking place in French and its absence in Hindi is attributed to the following. This fact follows from the underlying structures of the two language types presented as in (101). The subject in French can both be governed by AUX and be adjacent to it. This, Mahajan **suggests,** satisfies the **incorporation** criterion. The P introduced with the subject incorporates to produce have in (101b) and the subject surfaces without the P. **Whereas** in Hindi the AUX can govern the subject but cannot be adjacent to it. Given that adjacency is crucial for **incorporation,** P to AUX incorporation will, therefore, fail for Hindi. Ergativity in Hindi is thus a matter of Hindi being SOV. The absence of *have* in SOV languages also follows from this.

Realization of P is limited to the context of the verb being
of a non-Case-assigner type. Apart from the perfect participle,
in Hindi, dative subject construction and **possessive** construc-
tions also include a non-Case-assigning predicate:

(102)a. **raam-ko** Bar   dard   hE
        Ram-DAT head ache-F be-F-PRS
        'Ram has a headache'

   b. **siitaa-kii** do bEhneM **hEM**

        Sita-GEN   two **siters be-FPl-PRS**
        'Sita has two **sisters**'

                                    (Mahajan, 1994:7)

From   this **Mahajan** claims that the Case realization of   the
subject **will** depend on the type of the predicate chosen.   If   the
predicate is a perfect participle, the Case is **ergative**, if it is
a   psychological verb, the Case is dative, when it is a noun   the
Case becomes **genitive/locative**.   In all these types of   construc-
tions, the predicate is a non-Case-assigner.

Notice that this account has certain aspects in common   with
our   analysis of unergatives in section   3.2, especially,   the
proposed **DFI**, first introduced in Bhattacharya (1994), and relat-
ed tools presented therein.   We further claim that our principle,
DFP, has an advantage over **Mahajan's** system since it accounts for
object Case marking, for **example**, in a sentence like (100a).   DFP
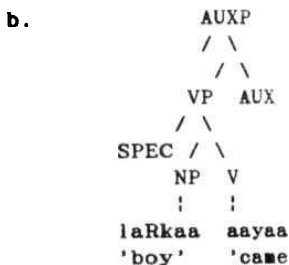
as proposed in section 3.2 (further discu sion will be presented
in section 3.5) also accounts for the overt dativ on objects in
Hindi, wherets Mahajan's account is silent on the issue of such
overt morphological markers.

   The condition for the realization of P that Mahajan proposes
is as follows:

(103) In $[_{XP}$ SPEC$[_X$ ...X...]], P appears as a sister of NP
      in [SPEC,X] if X is a non-Case-assigning category.

With this in mind let us see how Mahajan's system would derive
the Case and agreement properties of an unaccusative like the
following:

(104 1a. laRkaa   aayaa
         boy-(MSg) came-PRF-MSg
         'the boy came'

     b.   AUXP
                  / \
                 / \
                VP AUX
              / \
          SPEC / \
               NP V
               :   :
             laRkaa aayaa
             'boy'   'came

By condition (103), P cannot be realized here because [SPEC,VP]
is empty in unaccusative constructions although the internal

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argument is not assigned any structural Case since the predicate is of a nonCase assigning type. The agreement between the V and the object, which appears as a surface subject, we guess, will take place at Bome appropriate SPEC-HEAD configuration. Notice however that the system does not imply anything about the Case on the surface subject, it cannot, for example, prevent the V from assigning accusative to the subject. In other words, it does not make any predictions based on the Case Parameter. More specifically, Mahajan's account implies the following:

> *be* will appear only when the verb can check for accusative at the Spec of some Agr head

This is contrary to the standard analysis of unaccusatives where unaccusatives cannot assign any Case. The above would imply that unaccusatives will always have *have*. It also fails for Hindi unaccusatives which regularly have nominative on the sole argument, although *be* is present.

3.5 Long Distance Agreement

In this section we will see how the phenomenon of long distance agreement finds a natural explanation within a modified version of Watanabe's Three Layered Case Theory (Watanabe 1993) and our analysis of unergatives that we presented in section 3.2. Our attention, so far, has been restricted to agreement within a simplex clause. The phenomenon of long distance agreement is a

natural ground for exploring the nature of **agreement** in connection with the network of **relaticns** between a matrix and an embedded clause.

3.5.1 The Data

Participial **complement** clauses do not show agreement within the **embedded** clause. Thus in (105), although the condition for it is met, that is, the object is without **a postpositional** marker, object agreement does not take place.

> (105) rukun-ne [**maalaa-ko caawal** roTii **khaate**] dekhaa
> **Rukun-ERG** Mala DAT rice-M bread-F eat-PPL **saw—PRF-MSg**
> 'Rukun saw Mala eating **bread**'

From this , however, we cannot generalize that non-finite forms of verbs in Hindi do not show agreement. As a case in point, consider the following:

> (106) is **laRke-ko**$_i$ [pro$_i$ **saaikal** calaanii) aatii hE
> this boy-DAT **cycle-F** ride-INF-F come-3MSg
>
> '**this** boy knows how to ride a **cycle**'

The Hindi infinitive ending **-naa** shows agreement with the object in (106). This is, however, not true of all verbs. Consider the the following where the matrix verb does not trigger object agreement within the embedded clause:

1.**The** data in (98-99) 1s taken from Davison (1994).

(107) ye   laRke_i [pro_i saaikal calaa-naa] caahte hEM
     these boys-MPl   cycle-F ride-INF   want-PM be-3Pl
     'these boys want to ride a cycle

This conclusion is obviously not tenable since,, a* we shall see later in detail, the same verb can trigger agreement within the embedded clause. For now, let us just look at one example:

(108)   laRkoM   ne [caaY piinii]   caahii
        boys-Pi ERG tea-F drink-INF want-PRF-F
        'The boys wanted to drink tea'

However, our interest lies in the communication between the embedded and the matrix clause and is not restricted to agreement possibilities within the embedded structure alone.   Notice in this connection that we are already in the realm of the phenomenon of long distance agreement: the matrix clause in both (106) and (107) agree with the object of the embedded clau se. Cons der the following additional examples in this connection :

(109)a. naadyaa-ko [gaaRii   calaanii]   aatii   hE
        Nadya-F-DAT car-F-NOM drive-INF-F come- IMP-F he-PRS
        'Nadya knows how to drive a car'

   b. naadyaa-ko [TaaMgaa   calaanaa]   aata a   hE
                 tonga-M-NOM drive-INF-MSg come -IMP-MSg
        'Nadya knows how to drive a tonga'

(Butt, 1993)

Agreement within the clause shown in (106,107) in sometimes called local optional agreement and is shown in non-finite complents and small clauses (110).

(110)a. runu ne [us   kitaab ko burii] samjhaa
        Runu ERG that book-F-DAT bad-F consider-PRF-3MSg
        'Runu considered that book bad'

b. runu ne [us   kitaab ko buraa] samjhaa
   Runu ERG that book-F-DAT bad-M consider-PRF-3MSg

Long distance agreement is shown in nonfinite subjects:

(111)a, [ciTThi   likhnaa]   rukun   ke liye
        letter-F write-INF-3MSg Rukun-M for

        buraa hogaa
        bad-M be-FUT-3MSg
        'It will be bad for Rukun to write a letter'

   b. ? [ciTThi   likhnii]   rukun   ke liye
        letter-F write-INF-F Rukun-M for

        burii hogii
        bad-F be-FUT-F

   c. • (ciTThi   likhnii]   rukun   ke liye
        letter-F write-INF-F Rukun-M for

        buraa hogaa
        bad-M be-FUT-3MSg

In complements:

(112)a. rukun-ne [roTii   khaanaa]   caahaa
        Rukun-ERG bread-F eat-INF-3MSg want-PRF-3MSg
        'Rukun wanted to eat bread'

   b. rukun-ne [roTii   khaanii)   caahii
      Rukun-ERG bread-F eat-INF-F   want-PRF-F

   c. * rukun-ne [roTii   khaanii] caahaa
        Rukun-ERG bread-F eat-INF-F want-PRF-3MSg

In small clause complements:

(113)a. rukun-ne [won kitaab burii) samjhii
        Rukun-ERG that book-F bad-F consider-PRF-F
        'Rukun considered that book bad'

   b. * rukun-ne [woh kitaab burii] samjhaa
        Rukun-ERG that book-F bad-F consider-PRF-3MSg

And in raising constructions:

(114)a. aisaa lagtaa   thaa   ki rukun-ne
        such seem-3MSg be-PST-3MSg that Rukun-ERG

        kursii toR   dii   hE
        chair-F break give-PRF-F be-PRS
        'It seems that Rukun had broken the chair'

   b. * aisaa lagtaa   thaa   ki   rukun-ne
        such seem-3MSg be-PST-3MSg that Rukun-ERG

        kursii toR   diyaa   hE
        chair-F break give-PRF-3MSg be-PRS

   c. rukun-ne [kursii toR   dii]   lagtii hE
      Rukun-ERG   chair-F break give-PRF-F seem-F be-PRS

   d. * rukun-ne [kursii toR   dii]   lagtaa   hE
        Rukun-ERG   chair-F break give-PRF-F seem-M   be-PRS

(114a,b) show that the verb agrees with the direct object *kursii*
'chair[1]; (114c,d) show that it triggers long distance agreement
on the matrix verb. Notice that there is no optionality
(113,114)[1]. The constructions in (106-109) and again (111,112)
are instances of infinitivals with a null subject[2]. These are
all instances where the matrix subject is overtly marked for
Case. If it is not, then agreement cannot percolate up into the
matrix clause. This is shown by (115) below.

1. Examples (102-105) are based on Saleemi (1994).

2. For a discussion of whether the null subject is a pro or a PRO,
see Borer (1986) and Davison (1994).

(115)a. laRke [caay piinaa] caahte the
        boy-Pi tea-F drink-INF-M want-Pi be-PST-MPl
        'The boys wanted to drink tea'

    b. • laRke [caay piinaa] caahtii thii
        boy-Pi tea-F drink-INF-M want-FSg be-PST-FSg
        'The boys wanted to drink tea'

To some speakers, however, (116) is marginally accepatable:

(116) ? laRke [caay piinii] caahte the
        boy-Pi tea-F drink-INF-FSg want-IMP-MPl be-PST-MPl
        'The boys wanted to drink tea'

Psych-verb constructions:

(117)a. vaid-ne [use ThanD lagii]
        doctor-MSg-OBL-ERG he-DAT cold-FSg-ACC catch-PRF-FSg

        paayii
        find-Prf-FSg
        'the doctor found him having a cold'

    b. *vaid-ne [use ThanD lagaa]
        doctor-MSg-OBL-ERG he-DAT cold-FSg-ACC catoh-PRF-MSg

        paayaa

        find-Prf-MSg

(117b) shows the lack of optionality in local agreement possibil-

ity.

ECM construction:

(118)a. laRke-ne [usko baiThii huii] paayaa
        boy-OBL-ERG she-ACC sit-PRF-FSg be-PRF-FSg find-PRF-
                                                        MSg

        'the boy found her sitting'

    b. *laRke-ne [usko baiThii huii] paayii
        boy-OBL-ERG she-ACC sit-PRF-FSg be-PRF-FSg find-PRF-
                                                        FSg

(118b) shows that agreement is not triggered in the matrix clause. In our terminology it is then not a case of long distance agreement. But the analysis that we present later is capable of giving an account of ECM structures as well. Notice that in (118a) an overtly Case marked NP — the ECM Case Barked NP — triggers agreement within the embedded clause.

Having presented the data so far, let us see if any available analysis can account for the seemingly variable data economically.

3.5.2. Borer's Anaphoric AGR

Compare the following pair ((108) repeated here as (119a)):
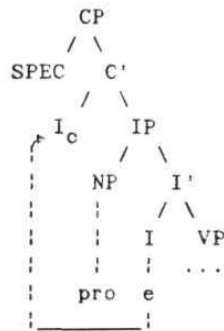
(119)a. laRkoM ne [pro caay piiniil caah.i
        boy-Pi ERg   tea-F drink-F want-PRF-F
        'the boys wanted to drink tea'

   b. laRkoM ne [caay piinaal caahaa
                       drink-M want-PRF-3MSg

Borer's (1986) theory of null subjects gives us the right results for (119b) but not (119a). For Borer both the ECs in th" finite as well as the non-finite version are pro and the differences that exist between the subjects of tensed and non-tensed clauses are the results of other principles independent of the properties of the pro. The reference of this pro is obligatorily dependent on an argument of the matrix clause. On the basis of this it is assumed to be anaphoric due to this obligatory referential depend-

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ence.   Borer   however **claims it** to be pronominal.   This **apparent** contradiction **is** sorted out by **making AGR,** which is part of 1, anaphoric in **infinitives.** The AGR is an **N-type** element that is subject to Principle A.   The structure of infinitive **clauses** in Borer, after I to C raising has taken place, is (120).

(120)

```
                        CP
                       / \
                  SPEC    C'
                       / \
                    I_c    IP
                 /         / \
                :       NP     I'
                :       :     / \
                :       :    I   VP
                :       :    :  ...
                :       :
                :     pro  e
                :_____:
```

I **in** (120) is the derived head of the CP.   Borer assumes that the **features** of the raised I percolate to its **maximal** projection, making it I_cP rather than CP. It **is** now easy to see **that** the head I   and the I_cP of the projection which it heads share   the   same binding   domain. If the I_cP. If the I_cP contains a   coindexed   c-commanding antecedent in the appropriate riorain, the head of I_cP is   bound   by this antecendent and the inflectional   features   of that antecedent percolate to this head, I, containing AGR.

Let   us consider the folloition to Spec-AgroP in the   matrix clause.   The desired agreement facts are obtained as a result   of the   interaction of the traces and the positioning of   the   Spec-AgroP of the matrix clause.   In cases where there is no long dis-

tance agreement, the infinitival form of the verb can (optional-
ly) assign Case to its object. Therefore, the object in such a
case does not nove from its d-structure position. This would
explain (119b).

For a sentence like (116) where the object triggers agree-
ment on its embedded verb but not on the mr.trix verb, Mahajan
suggests that the government of the lower AgrO by the matrix
imperfect participle makes structural Case possible in the lower
[SPEC,AGRo]. The embedded object, therefore, in this case moves
up to the lower [SPEC,AGRo] position to get Case. Ag.eement,
therefore, is restricted to the embedded clause.

3.5.4 Singh (1993)

Singh, as we noted earlier, discusses three types of con-
tructions where long distance agreement is possible, namely, ECM
structures, psych-verb constructions, and infinitival construc-
tions.

Regarding ECM structures, Singh notes that agreement does
not percolate upwards, that is, agreement is a clause internal
phenomenon. However, it is puzzling to observe a morphologically
marked NP triggering agreement (see (118a,b) for details).

For the psych-verb (or experiencer verb) constructions the
embedded object obligatorily triggers agreement within and out-
side the embedded clause. In (117a) both the embedded and the

matrix verb agree with the embedded object *ThanD* 'cold'.

Agreement is optional for the third type of construction showing long distance agreement, by far the most common construction — infinitivals. This we have seen in some detail; we have fleshed out an available type of analysis (Borer, 1986) to account for the data. Both clauses in the infinitival show identical agreement (sentence (119)). As we saw in (115), if the matrix subject is not overtly marked, agreement with the embedded structure cannot percolate up to the matrix clause. This is true for all the three types of constructions that Singh identifies.

Singh attempts an integrated view of long distance agreement by posing the following important question; Why does agreement percolate upwards for infinitivals and experiencer-subject constructions *only*? The answer, according to him, lies in the fact that in both these constructions the complement subject position is empty. The complement subject position in (119) is PRO for Singh. For Davison (1994), and by Borer's theory it is prc. We side with Singh on this count in our analysis; details and justification have been provided in Shah (1995).

(124) below illustrates the derivation of (119a) where the pro is the expletive element responsible for CHAIN formation with the subject in Singh's theory (see also section 3.4 for details).

(124)

```
                              VP
                             / \
                        SPEC / \
                 laRkoM ne   TP2   V
                            / \ caahii
                          pro  TP1
                              / \
                        SPEC / \
                          ASPP   T
                          / \
                    SPEC / \
                        /    ASP
                      VP      ¦
                     / \  piinii
                 SPEC   \
                   ¦   / \
                 PRO NP  V
                   ¦   ¦
                 caay   t
```

In experiencer subject **constructions** the experiencer subject
originates as the indirect object.   The subject position of   the
embedded clause is **empty** at d-structure.   (125) below illustrates
the derivation of (117a):

(125)

```
                              VP
                             / \
                        SPEC  / \
                    vaid ne TP2   V
                            / \ paayii
                          pro  TP1
                              / \
                        SPEC  /\
                          ASPP T
                          / \
                    SPEC /\
                        /   ASP
                      VP    ¦
                     / \  lagii
                 SPEC   \
                   ¦   / \
                 use  NP  V
                   ¦    ¦
                 ThanD   t
```

In (124, 125) above, the pro is free to participate in the agree-
ment CHAIN which extends up to pro in the main clause. This is
responsible for Barking agreement on relevant heads in the
clause. In (125) the experiencer subject is assigned inherent
dative and therefore does not need to move up in the tree.

For the **ECM constructions** the facts are different. The
embedded subject moves to the subject position, which is an
adjoined position (Spec-TP2) for Case reasons. (126) below
illustrates this:

```
(126)                        VP
                            / \
                       SPEC / \
                  laRkoM ne  TP2   V
                            / \  paayaa
                           /\   TP1
                    usko pro / \
                        SPEC  /\
                            ASPP   T
                            / \   huii
                       SPEC /\
                           /  ASP
                       VP     |
                      / \  baiThii
                  SPEC   \
                   |    / \
                   t   NP  V
                   |    |
                   t    t_v
```

In (126), *usko* 'her' is at the embedded subject position where it
is assigned exceptional accusative by the ASP head. The non-
percolation of agreement upwards in Singh's model is attributed
now to the adjoined status of the pro which is, **therefore**, unable
to participate in CHAIN formation. Agreement within the clause

is triggered by traces of the moved NP. (119b) is explained through the ambivalent nature of the infinitival/ gerundive possessing nominal or truly clausal properties.


3.5.5 Our Analysis

Both the analyses reviewed are unsatisfactory on similar grounds: empirical inadequacy and conceptual incompatibility with a checking theory of Case and agreement as well as being empirically inadequate. The objections raised against these analyses with regards to agreement in general (as in 3.3 and 3.4) apply in the case of long distance agreement as well. In short, both the systems depend heavily on an elaborate theory of traces to account for the range of data chosen. We will argue in this subsection that an articulated theory of features can provide an account for long distance agreement in a fashion which, apart from being within the general confines of the framework of Minimalism, leads to a more viable system (computationally speaking).

For our analysis we adopt Watanabe's (1993) Three Layered Case theory and modify it accordingly (see Shah (1995) for some of the modifications suggested). We will discuss Watanabe's theory in detail in section 3.6. For now let us present as much as we need for our purpose. In his theory, during the process of Case checking, a new feature is created on the highest Agr and this Agr has to, then, undergo further movements to a higher (appropriate — see section 3.6 for details) functional head to

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check this extra feature off. Thus a configuration like (127) is needed where X is a Case feature element and Y an appropriate checker of the extra feature. In this extra feature is not discharged, the Agr node cannot disappear at LF since it will contain an unacceptable entity, unchecked.

(127)
```
          YP
         / \
        Y   AgrP
           /  \
         Agr   XP
        / \    / \
       X_i Agr t_i
       △_____|
```
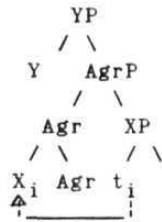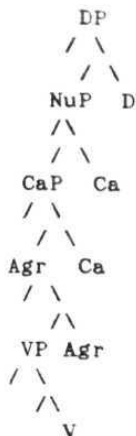
This, in short, is Watanabe's AGR-Based Case theory.

The modifications that we have in mind were first suggested in Bhattacharya (1994) and Shah (1995). Ura (1993) suggests that the feature F, created as a consequence of Case checking, should be thought of as a part of C . This is a natural extension of Watanabe's theory in light of the Checking Theory of Case where a feature is checked off against identical features contain in a functional head. Shah (1995) claims that certain non-finite constructions in Hindi are best analyzed as DPs, from which solutions to certain long-standing problems of visibility follow. She claims that the D head of such a DP contains the feature F , D being shown to possess COMP-like properties. We adopt the the DP structure based on Valois (1990) that she proposes. (128) below is the structure.

(128)
```
              DP
             / \
            /   \
          NuP   D
          /\
         /  \
       CaP   Ca
       / \
      /   \
    Agr   Ca
    / \
       /\
     VP Agr
    /  \
       /\
        V
```

F_c being a Case feature can only check off another $Case$ feature.
It is proposed, contra **Watanabe,** that agreement checking can also
create F features like F_{agr}, especially, in case of long distance
agreement. This happens *only* when **agreement feautures** are **mor**-
phologically **marked.** In section 3.2 we introduced two principles
DFI and DFP which deal with the operation of dummy features. The
motivation of dummy features **comes** from Hindi where prototypical
NP arguments **always** carry morphological markers. Evidence for P1
comes from the fact that embedded subjects always carry some in-
case as in the following:

(129) rukun ne [(uskaa/uski **i**) caay pi inaa/pi ini i] caahaa/caahi i
     Rukun ERG his/her   tea **drink-INF-M/F** want-PRF-M/F
     '**Rukun** wanted his/her (self) to drink **tea'**

The following is a piece of evidence for P2:

(130) rukun-ne [PRO sev-(ko)   khaanaa] caahaa
     Rukun-ERG   apple-(DAT) **eat-INF-M want-PRF-3MS**
     'Rukun wanted to eat the **apple'**

We suggest that the motivation for DFP comes from the following:

(131) *rukun-ne [runu pha!-ko   khaanaa]   caahaa
       Rukun-ERG Runu fruit-DAT eat-INF-M want-PRF-3MS

The intuition of this analysis comes from the fact that the
various arguments in the sentence participate in agreement
through various Case markers. This is captured by the device of
creation of dummy features on arguments inside the DP which
ultimately decide movement out of a particular argument. This
movement is responsible for creation of floating features which
establish contact with the world outside the clause.

     With this simple apparatus let us look at (119a), the struc-
ture of which is as follows:

```
(132)               DP
                   / \
                  / \
                NuP   D
               / \    [Fc]
              / \
            CaP   Nu
           / \
          / \
        Agr   Ca ==> Fc
       / \    [NC]
      / \
     VP  Agr ==> Fagr
    / \
   /      |-----
  / \    :\    :
PRO  P1  : \   V
     Ø caay \ pii
          P2
          Ø
```
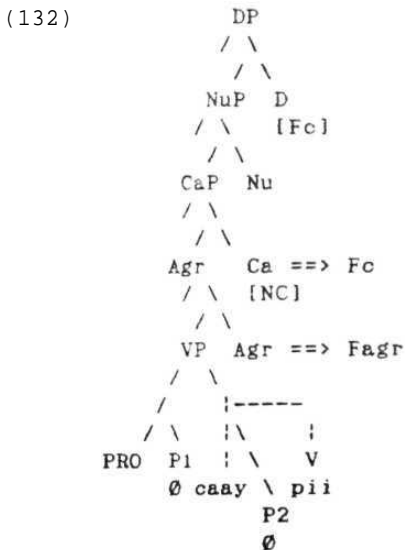
Checking off of features is indicated by a cross as shown in the

structure above. What happens is as follows. P1 (and then P2) is created because we have *ne* on the matrix subject. PRO is sanctioned at Spec-Ca thereby creating an F feature which checks off against the Fc feature of D. Now, because of P2 the object *caay* has to move to check agreement. So it loves to Spec-AgrP and checks off agreement features against the head to which the verb has raised to check off itB own features. Although P2 ia dummy it is counted as an m-case feature and therefore in this case agreement feature checking at Spec-AgrP results in an Fagr feature. This happens only when agreement is morphologically visible, in this case it is rendered so by the dummy feature P2. We will call this Fagr feature a floating Agr feature because it cannot check off within the DP and therefore it floats. This floating feature can check off only outside the domain of the DP and is in fact checked off at the Spec-AgroP against the object agreement feaures of the matrix verb when the DP moves up.

We make a distincion between the valency of P1 and P2 in case of (119a) and (119b). We claim that P1 and P2 are [-strong] in (119a) and [+strong] in (119b). The motivation for positing this distinction lies in the fact that object agreement is observed only when there is no P2-like element after the verb in Hindi. The object moving up when P2 is [-strong], therefore, makes a lot of sense. This accounts for the difference between (119a) and (119b). In case of the latter, since P2 is [+8trong], the object cannot move up for agreement reasons. The result is

default agreement. Therefore, no floating Fagr feature is available in this case and so no agreement with the matrix verb is possible. (119b) obtains for those speakers for whom P2 is for some reason [+strong].

We observe that the object raises for feature checking only when there is a [-strong] P2 available. Notice that Pn cannot be created or introduced if the matrix subject does not overtly carry a marker. This accounts for the following:

(133)a. rukun [caay piinaa]   caahataa   thaa
        Rukun   tea-F drink-INF-3MSg want-IMP-M be-PST-MSg
        'Rukun wanted to drink tea'

    b. * rukun [caay piinii]   caahatii   thii
                    drink-INF-F want-IMP-F be-PST-FSg

Since there is no Pn introduced, the embedded verb should show default agreement (133a), and (133b) is out because it violates this principle of default agreement by showing object agreement, that is, it allows the object to move when it cannot.

Consider now the following:

(134) * rukun [caay piinii]   caahataa   thaa
            Rukun   tea-F drink-INF-FSg   want-IMP-M be-PST-MSg

(134) is acceptable in Punjabi but is not acceptable in Hindi for the same reason as (133b). What happens here, we suggest, is as follows. Although the matrix verb does not carry any object agreement features there is still a superweak P1 created. That such a possibility obtains is indicated by the variety of Punja-

bi-Hindi spoken in Delhi, where the **ergative marker** *ne* is used
even in **non-perfective tense**:

> (135) tum ne   jaanaa   hE
>   **you-ERG go-INF-M** be-PRS
>   **'You** have to go'

Misplacing the **P1,** however weak, is a possibility in Punjabi.
This creates a superweak P2 which thereby induces **movement** of the
object out of the VP. We suggest that the Fagr feature that
results from the checking of agreement features by this superweak
P2-bearing object does not have the floating energy. That is, it
cannot float and therefore need not be checked off and "dies" out
before visibility. This, we assume, is the reason for the lack
of **agreement** with the matrix verb. This is depicted in (136).

```
(136)                DP
                    / \
                   / \
                  NuP  D
                 / \  [Fc]
                / \
              CaP  Nu
              / \
             / \
           Agr   Ca ==> Fc
           / \  [NC]
          / \
         VP  Agr ==> *Fagr ----:-((
        / \
       /   \
      / \    _____
   PRO *P1  :\        :
        Ø   : \       V
       caay *P2  pii
```
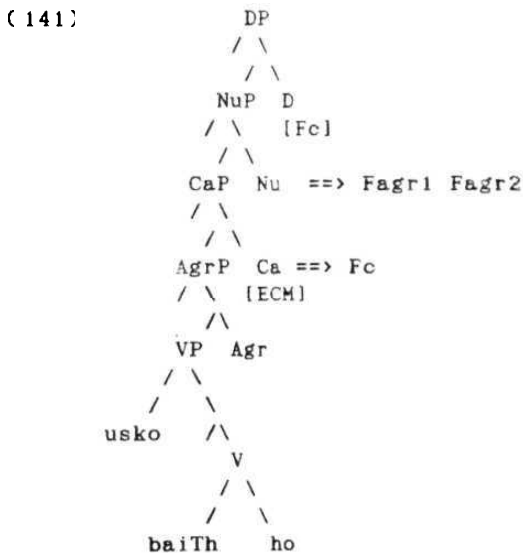
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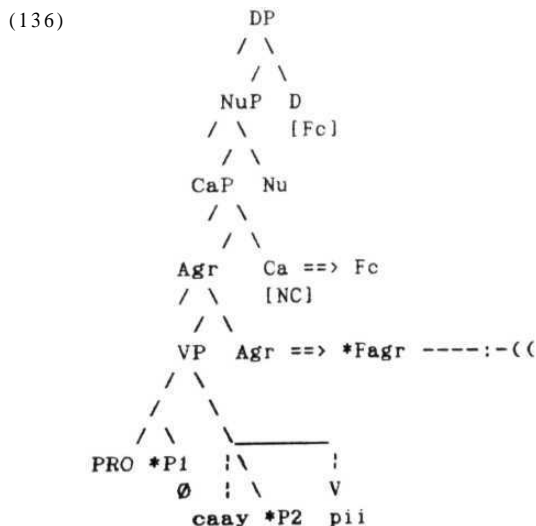
Superweak **elements** are denoted by asterisks.

Consider now (137).

(137) ? **laRke [caay** piinii) caahate   the
          boy-MP]   **want-IMP-MP]** be-PST-MP]
          'The **boys** wanted to drink **tea'**

In case of (137) **P1** that is generated contains a Nu feature,
since the matrix subject carries visible number marking. **This P1**
with a Nu value creates a weak P2 adjoined to the **object.** **This**
induces movement of the object out of **VP.** Note that the subject
is first licensed at Spec-Ca and then it has to **move** up to Spec-
NuP. The subject is doing two things and **thus** we end up **with** two
Fs. One is checked off against the Fc **on** the D, as usual, the
other being an Fagr feature which gets checked off **against** the
Fagr feature created out of the object agreement feature check-
ing. **In** other words, there **is** no floating feature left un-
checked, and therefore the matrix verb does not **snow** any agree-
ment. The relevant derivation **is** the following:

(138)
```
                    DP
                   / \
                  / \
                NuP  D
                / \  [Fc]
               / \
             CaP  Nu ==> Fagr
             / \
            / \
          Agr   Ca ==> Fc
          / \   [NC]
         / \
       VP  Agr ==> Fagr
      /  \
     /    _____
    / \   ┆          ┆
  PRO P1  ┆\         V
       Ø  ┆ \       pii
        caay  P2
                Ø
```

Consider now the psych-verb constructions as in (117).   The

relevant structure is the following:

(139)
```
                    DP
                   / \
                  / \
                NuP  D
                / \  [Fc]
               / \
             CaP  Nu
             / \
            / \
          Agr   Ca ==> Fc
          / \   [NC]
         / \
       VP  Agr ==> Fagr
      / _____
     /  ┆          ┆
    / \ ┆          ┆
   /\  ┆           ┆
 PRO P1 ┆\         V
      Ø ┆ \       lagii
        ┆  P2
        ┆  Ø
     ThanD  Ø
```

In (139) P1 and P2 are created thereby forcing movement and

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subsequent creation of **Fagr** which floats.   (117b) is bad because,

since we have **P2**, default agreement cannot take place.   Also note

that PRO does not need to check for Nu because there is no number

overtly visible on the subject and **also** in view of the fact   that

the following is out:

(140) *unheM   ThanD **lage**
        they-Pl-ACC cold-F feel-Pi

Now,   finally, we can look at the ECM cases in (118).   The

structure is represented in (141a) below:

(141)   DP
                   / \
                  / \
                NuP D
                / \ [Fc]
               / \
            CaP Nu ==> Fagr1 Fagr2
            / \
           / \
        AgrP Ca ==> Fc
        / \ [ECM]
         /\
       VP Agr
      / \
     /   \
   usko /\
          V
         / \
        /   \
      baiTh   ho

We   claim that the **movement** of this **V-complex** to Nu to check   off

agreement   feataures with the   subject   in its   Spec   should   create

<u>two</u> Fagr features.   This makes sense since both the components of

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the verb show agreement with the subject, it is not a case of a

serial verb construction where only one of the verbs takes on the

agreement markers. A more elaborate VP structure could be as in

(142) below. Notice that the ECM Case feature is checked off at

Spec-CaP but realized at Spec-DP.


```
(142)              AgrP
                   / \
                  / \
              AuxP
              / \
             / \
          VP    Aux
         / \     ┊
        /  /\    ho
    usko    V
            ┊
         baiTh
```
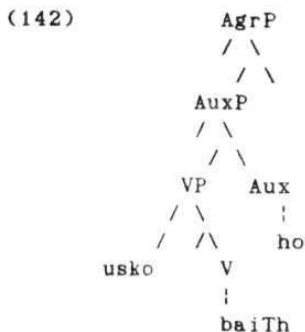

3.6. Computability of AGRs

We have shown in the last four sections that the agreement

facts of the languages under consideration lead overwhelmingly

towards establishing the pervasiveness of Agr heads. Recall that

we set out to syntactically capture the abstract notions of

trajector and landmark. In the process, the evolving theme of

the primacy of the object became the major finding of the preced-

ing sections. Unergatives, unaccusatives, and, of course, tran-

sitives, all show a distinct head — AgrO — as engaging in

intensive syntactic labour. We claim that this outcome is a

natural consequence of the current formulations in syntax explor-

ing, in genral, the **pervasiveness** of functional heads in a syntactic structure.

Kayne (1994) presents a radical theory of **grammar** where the vertical structure always determines **linear** order and if two phrases differ in linear order, they must also differ in hierarchical structure. In short, he proposes that **asymetric** c-command invariably maps into **linear** precedence. He derives a restrictive word order of specifier-head-complement as the universal basic word **order**.

Although we are not concerned with the specific proposals of Kayne (1994) we nevertheless find the following proposal regarding a restriction on the number of adjunctions to be supportive of our claim of pervasiveness of **Agr**. Kayne derives the well-known facts about the verb-second effect found in Germanic languages other than English. The relevant **example** is the following:

(143)* Gestern Peter tanzte
yesterday Peter **danced**

Given that the subject is in the Spec of IP, adjunction of *gestern* to IP is prohibited because in this theory multiple **adjunction** to a single head is disallowed. Specifiers are considered to be formally cases of adjunction. For the parallel grammatical English sentence, Kayne proposes that a covert functional head over IP is available to which *yesterday* can adjoin.

(144) Yesterday Peter danced

Kayne's proposal regarding (144) should be understood in the broader context of the need for functional heads. The existence of contentful functional heads such as Tense is not **problematic.** Tense is present in overt syntax and at LF, and there is evidence to show that it is an independent head. The general statue of **agreement** is not so clear. There are languages which do not show any **morphological** agreement but even such languages provide syntactic arguments for positing abstract Agr heads. There are many references in the syntactic literature to the ubiqui..ous presence of Agr heads and a SPEC-HEAD relation as a basic canonical relation. Kayne's proposal tries to find a deep non-morphological reason for the **proliferation** of Agr heads. Given that phrases have to often move out of their base position, only functional heads make enough landing sites available especially in something as radical as Kayne's current theory. Kayne shows that SPEC-HEAD is the <u>only</u> configuration available for licensing. Kayne suggests that an Agr can be thought of as a label for head positions imposed upon phrase **markers** by the scarcity of landing sites.

The fact that Agr heads are not restricted to canonical subject and object positions is revealed by the well-known fact of **complementizer** agreement in certain Germanic languages. In

these languages, which also show the V2 **phenomenon,** the **comple-**
mentizer agrees with the subject in person/ number. In the
following. the a. sentences show **complementizer** agreement and the
b. sentences are control **cases** (examples are all takes **from**
Zwart, 1993):

Munich Bavarian

(145)a. **damid-ds   komm-ds**
        so that-2Pl come-2Pl

b. **damid**   ich **komm**
        so that I   **come-1Sg**

South Hollandic

(146)a. **dat-(t)e** ze   kom-(m)e
        that-Pl they **come-Pl**

b. dat   ze   **kom-t**
        that they **come-3Sg**

Groningen

(147)a. of-s   toe kom-s
        whether-2Sg you come-2Sg

b. of   ik **kom**
        whether I   come-1Sg

Complementizer agreement in these cases indicates that some Agr
element interacts with the COMP in some fashion. The COMP never
gets into SPEC-HEAD agreement with the **subject.** This is evi-
denced by the **following:**

(148)a. * ze datte **komme** (South **Hollandic)**
        b. • toe ofs **koms** (Groningen)
        etc.

This shows that **complementizer** agreement is different from other

agreement phenomena which **always** involve the SPEC-HEAD relation. It natural to think (as Zwart 1993 does) that **complementizer** agreement is a morphological reflex of the **movement** of Agr to C. That this must be the case, is shown by the fact that both the **complementizer** and the verb show agreement with the subject in the same clause. Since the Spec of the Agr (which later moves to C) is occupied by the subject.

(i) the COMP cannot **move** into it, and

(ii) the verb agrees with the subject.

The motivation of the movement is to satisfy **morphological li-**censing conditions. AgrS in these languages is considered to contain a strong N-feature and the **Agr——>**C movement is a way of lexicalizing AgrS by adjoining to a position which has a lexical head (complementizer).

Watanabe's (1993) Three Layered Case Theory is formulated on the basis of substantial evidence where the shape of the COMP is determined by or relatable to the subject position inside the (embedded) clause. In this theory, the AgrS head has to move up to C to get the extra feature **F,** created out of the process of Case checking (see section 3.5 for other details and **modifica-**tions suggested) against Spec-AgrsP, and I has to be checked off against an appropriate C. An appropriate C for **Watanabe** is a C which is lexically filled. Notice that this subsumes exactly what happens in the German dialects showing **complementizer** agree-

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ment.

In this connection, let us consider the case of Greek sub-
junctives, which, like Balkan subjunctives in general, allow PRO
as well as lexical subjects. Terzi (1992) (cited in Watanabe,
1993) claims that the appearance of lexical subjects is dependent
on the clause structure:

(149)a. ...v [$_{CP}$Prt+V I $_{IP}$pro/lexical NP t$_i$...]]

   b. ...v [$_{CP}$Comp [$_{IP}$pro/lexical NP V...]]

   c. ...v [$_{CP}$∅ [$_{IP}$PRO v...]]

The verb in place of C (in the a. case) marks the fact that overt
subjects appear only in postverbal positions. All the above
three are found in Albanian and Romanian. One important thing to
notice is that there is a definite relation between the shape of
C and Case possibilities of the embedded subject; a Nominative
subject is possible only if there is some overt material in Comp.

The foregoing discussion has one significant consequence for
the purpose at hand, which we may pose as a question: How is
having an AGR in a clause structure computationally relevant?

In order to answer this question, we observe that the dis-
cussion so far, especially the facts (and analysis) of complemen-
tizer agreement in German dialects, has, by locating an AGR even
in the COMP,narrowed down the gap between L and non-L-related
positions (section 3.4). Consider the following:

(i) **Zwart's** (1993) proposal of **Agr-->**C movement;

(ii) **AgrS-->C** to check off F feature generated on AgrS;

(ill) our proposal in section 3.5 of movement of the Fc feature to the D head of a DP.

These all point to the movement of an L head to a non-L position.

While, as we pointed out, this weakens the distinction between L and **non-L-related** positions[1], we claim that **computationally** it makes our task easier — that is, the distinction is now sharper. The presence of features **like** Fc (either in D or created out of Case feature checking) and Fagr (created out of agreement checking) — as proposed in section 3.5 — can, if somehow tagged, make our **computational** task easier. This is a favourable consequence of the theory we have proposed and shown to produce satisfactory results **theoretically** in the last few sect **ions.**

The distinction between L and non-L-related positions based on the A/A' distinction becomes a controversial issue in the realm of the distinction between narrowly **L-related** and broadly **L-related** positions. Chomsky (1993) suggests including an adjunct position to the maximal projection of the L-related head in the checking domain of L-features, calling such a relation to a

1.Mahajan's (1990) account of **agreement in** Hindi which crucially depends on this distinction is also undermined .

head with L features broadly L-related. He does not, however, directly associate the question of these positions with either A or A' positions. Ura (1993) indicates that a broadly L-related position may in some cases be counted as an A position. He formulates the following in this connection:

> (150) A *narrowly* L-related position is always an A-position. A *broadly* L-related position counts as an A-position only if it is *actually* L-reiated to an L-head; otherwise it is an A' position.

> (151) A given position is *actually L-related* if feature checking actually takes place between that position and some L-head .

In our terms an actually L-related position can be detected if we are able to track the different Fs located/created during the derivation. This would then make our task of producing a list of the typology of positions (in terms of the A/A' distinction, for example) easier. This we claim is the computational advantage of our theoretical account.

Our analysis of the long distance agreement phenomenon (section 3.5), it is to be noted , differs in its approach from a purely syntactic analysis. The specific algorithm of our analysis starts with a sentence and proceeds, through the application of principles like DFP, to build a structure along with an explanation of various operations within the structure. Notice that the starting point is not a lexical entity like a verb, for

exanple. This is because, crucially, our approach serves to link

synatctic analysis to computational parsing strategies, where the

triggering structure is a given sentence. A speaker/ listener

however does not wait for the a particular sentence to be uttered

completely before starting to process the incoming information,

whereas a machine does. The natural question then is why go into

a syntactic explanation, if the goal is purely computational. To

answer this, we reemphasize the fact that by computational we

mean an initially theoretical approach where the exact implemen-

tation of the "program" is not necessarily worked out every time

one makes a computational point, but is seen as a separate phase

of the endeavour. And importantly, this approach is also bidi-

rectional in the sense that a "computational" approach can give

us valuable insights into the formal possibilities of a syntactic

theory.   It could, by that logic, lead us to certain unexplored

areas of natural language which can easily not be perceivable in

traditional theorization. Whether this is possible or not is not

our present concern and we leave the issue open for future re-

search.

        A computational theory based on a suitably modified version

of the A/A' distinction, we claim, will be able to resolve the

old computational problem of detecting a gap (non-argument Wh

elements) and a filler (argument positions) by identifying A/A'

positions through a sophisticated theory of syntax.

CHAPTER IV

CLASSIFICATION

Earlier, in chapter I, we mentioned the need to extend our concern regarding the distribution of the new/given **informational** packaging **manifested** throughout the clause structure, to the NP-**internal** substructure. This will also lead us to expect the location of a high resolution - functional head **parallelism** within this substructure. **Computationally,** again, we suggest that such a location can profitably advance parsing efficiency. We further **claim** that a clear understanding of the processing of **nominals** helps to bring down parsing **time** in the case of ill-formed expressions. If the **system** fails to return a parse for a nominal sub-tree, further processing becomes redundant. To see that this is so, consider Smith and **Genesereth's** (1985) work on search tree rearrangement showing that the ordering of conjuncts makes a difference to parsing efficiency.

This advantage carries over to a mainstream version of the Principle-Based Parsing **(PBP)** technique based on the assumption that principles apply locally to parse substructures. In a later section we take up the PBP approach to parsing to illustrate how a computational framework based on pure linguistic research in linguistics operates in the context of NPs in Bangla.

It has been the **theme** of our account BO far that high reso-
lution centered around a particular functional head of the clause
structure. In this chapter we **claim** that within the **NP** struc-
ture, this function is fulfilled by the functional head B. We
noted earlier in Chapter III, that the Badge head in our **formula-**
tions exhibits a merger of Gender and Number **information.** We
further claim that the property of high resolution, necessary for
efficiently tracking a shifting scene (Chapter I), is realized in
terms of nominal definiteness of the phrase. It remains to be
seen how exactly definiteness of a nominal phrase encodes the
new/given information.

4.1 Definiteness and the Given/New Distinction

The role of a particular entity in the discourse determines
the form, function, and the position in the sentence of the
phrase representing that entity. It is customary in discourse
analysis to identify this role as relating to information status
and specificity.

Givdn (1989) proposes the metaphor of a Discourse File in
discussing the information status aspect of NP types. Discourse
file refers to the mental file containing various entities,
actions, concepts etc. at different levels of activation that a
speaker/hearer possesses. Activation status of a particular
entity depends on the topicality of the entity. This implies

that the hearer's consciousness contributes **equally** to the deter-
mination of the information status of a **conversation.** We will
have more to say regarding this shift to the receiver's side of
the **scene-building** activity when we discuss uniqueness of defi-
nites within a **Heimian** model of discourse representation. An
entity not in use for long in the conversation is put into an
inactive discourse file; whereas a direct mention of an entity
marks it as an active member of a discourse file. Given/new,
therefore, in this model, refer to different levels of activa-
tion. Entities mentioned in the **immediately** preceding discourse
are most highly active and are, therefore, given. Entities
mentioned for the first time are least active and are, therefore,
new. In English this difference is clearly manifested in the use
of pronouns and in the use of **indefinite/definite** nouns. Me have
discussed this in detail in Chapter II.

Specificity, on the other hand, can be regarded as a contin-
uum where a reference to an entity is specific when the communi-
cative goals of the message may be altered if the reference is
substituted to another entity. For example, in (1a) the subject
NP is more specific than the instrumental NP whereas in case of
(1b) it is not so.

(Da. John was **killed** by an explosion

b. A man was **killed** by an explosion

a man in (1b) is less specific than *John* in (1a).

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Definiteness, as it relates to **NPs**, however, is a broader concept. Chafe's (1970) discussion of noun inflection (seeing it as parallel to verbal inflection) has some bearing on definiteness Barking of nouns. This concept (of noun inflection), we believe, reappeared in a different format in **Abney's** (1987) DP hypothesis where the D head of a DP contains **Agr**. We **will** present our departure from Abney in detail in a later section. Chafe's idea of noun inflection broadly covers the range expressed by the following paradigm:

(2) a. Boys score better in programming

b. A boy ate up **my** lunch

c. The boy ate up **my** lunch

(2a) above is used when one wishes to refer to a general class of boys; **(2b,c)**, on the contrary, are used to refer to a particular **member** of that class. Within the latter, it is again possible to refer to a particular **member** with which the hearer is already **familiar** with (2c) or a particular member newly introduced in the **conversation**. This, in our scheme of things, correlates with the given/new distinction. The interaction exhibited by the choice of (2a,b,c) is the basis of noun inflection. **Definiteness**, for Chafe, is a Bark of inflection. The subject NP in (2c), therefore, is *inflected* for **definiteness**. Uniqueness is another manifestation of noun inflection in Chafe's system. Some nominal

expressions are restricted to the extreme of being constituting a class of one member. Because of the unique membership of the class, the hearer can uniquely determine the referent. A unique noun, therefore, is definite. Chafe expresses this by the following rule:

(3) N————→ definite

    unique

(3) says that a unique noun must be inflected as definite. The other inflectional rules that Chafe (1970) proposes are disjunctively related to a rule like (3) since a unique noun receives only a definite inflection. We discuss the uniqueness interpretation of definites in greater detail in the following section within the Kamp/Heim model of DRT (see Chapter II for a detailed explication of the DRT model).

4.2 Uniqueness of Definites

    We referred briefly in Chapter II to Russell's (1905) analysis of definite description as carrying uniqueness implications. For example, both (4a) and (4b) imply that there is a cat, but only (4b) implies that there is only one cat.

    (4)a. A cat came to the room

      b. The cat came to the room

To include plurals like (5), definites can be thought of as referring to a unique set.

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(5) The cats cane to the **room**

This is identified as **maximality** in **Kadmon** (1987). In Evans (1980), pronouns used anaphorical ly in a discourse exhibit a similar **maximality** effect. The discourse anaphora in (6) are called E-type pronouns which refer to a maximal collection deter-**mined** by the antecedent NP.

(6)a. John owns *some sheep*. Harry vaccinates *them*.

   b. There is a *doctor* in London and *he* is Welsh.

The pronoun *them* in (6a) refers to a maximal collection of sheep owned by John; (6b) implies that there is only one doctor in London. He extends this analysis of E-type pronouns to definite descriptions used anaphorical ly.

In the **Kamp/Heim** system the novelty condition (Chapter I) associates a definite with a discourse referent (or file card) already present in the **DRS**. **Heim** accepts that definites are **typically** unique in some sense but derives it from her theory of definites. If there is more than one candidate for the discourse referent to act as the **antecedent,** the hearer confronts an **ambig-**uous context in violation of the Gricean **maxim** of **manner.** This is the reason that leads **Heim** to propose that definites have a unique antecedent in some sense. Such an account predicts the

following:

(7) The cat is at the door

(8) John has a cat and a dog. The cat's/ ?Its/ ? The **pet'**
name **is Felix.**

(Hein **1982)**

The discourse referent for *the cat* in (7) is fixed. In **(8),** the
discourse referents for both the indefinites could serve as the
antecedent.   Only *the cat* is felicitous because it fits the
description of one of the antecedents. Contextual **saliency** or
the uniqueness of the discourse referent in this **system** brings it
closer to the **Russellian treatment** of definites.   The uniqueness
effect predicted by **Heim,** however, differs from what a theory
like Evans' would predict. **Heim's** theory, as **Kadmon** (1987)
points out, will not make any distinction between (8) above and
(9) **below.**

(9) John has a cat whose name is Felix, and a dog

Evans (1980) would imply that John has only one cat in (8) and
not in (9). According to Heim, therefore, definites have some
uniqueness effects, but not as strong as those proposed by Rus-
sell or Evans. **Kadmon** (1987) holds that the uniqueness effect is
the fundamental **distinguishing** factor between a definite and an
indefinite NP. However, **Kamp/Heim** framework provides a natural
platform for the representation of uniqueness.

In connection with the Speaker/Hearer asymmetry, **Kadmon** states that the uniquely identifying information is not **available** to the hearer and thus she takes a position different **from** a shared-knowledge view of Vendler (1967) (cited in **Kadmon** 1987). The hearer's perspective is, however, paid attention to by pro- posing that even the hearer has a DRS which Bust satisfy the uniqueness requirement. The uniqueness property in the hearer's DRS is a derivative of the speaker's uniqueness.

The Uniqueness Condition that **Kadmon** (1987) proposes trans- lates roughly as follows:

  (10) If a discourse contains a definite NP x, then **all** the
       functions that verify this discourse must assign x the
       same set or individual as value

(10) states that there must be at most one set or individual in the model that x can refer to. (10) when applied to a sentence like (11) will result in the DRS depicted as in (12).

    (11) I have to show this document to exactly three
        colleagues

(12)

```
--------------------------------------------------------
:                          X
: I have to show this document to exactly
: three colleagues
:
:
:            colleagues (X)
:
:     I have to show this document to X
:
:               :X: = 3
: -------------------------------------   ------
: :   Y                               : :      : :
: : colleagues (Y)                    : :=>: Y ⊆ X: :
: : I have to show this document to Y: :      : :
: :_____: :_____: :
:_____:
```

The conditional (see Chapter II for details) in (12) says that

any set Y of colleagues is a subset of X, which Beans that the X

is the set of all colleagues.   (12) is true iff X can be Batched

with a set in the model which satisfies all these conditions,

that is, iff there are exactly three colleagues. X in (12) is,

therefore, a variable of exactly three colleagues.   Now if the

following addition is Bade in the discourse, the pronoun *they* is

linked to the same variable as its antecedent.   This is shown in

(14).

   (13) They are in the meeting

(14)

```
----------------------------------------------------
|                         X                          |
|  I have to show this document to exactly            |
|  three colleagues                                   |
|                                                     |
|                                                     |
|                  colleagues (X)                     |
|                                                     |
|     I have to show this document to X               |
|                                                     |
|                   |X| = 3                           |
|  ------------------------------------    ------      |
| |  Y                              |  |        |  |   |
| | colleagues (Y)                  |  |=>| Y C X| |   |
| | I have to show this document to Y|  |  |      | |   |
| |_____|  |  |_____| |   |
|            They are in the meeting                  |
|            X are in a meeting                        |
|_____|
```

(14)   above satisfies the uniqueness condition as stated in   (10)

since the pronoun is assigned the variable X which stands for all

the colleagues, the latter being a unique set.

It   is   assumed that the language user   develops   discourse

representations during the course of the conversation into   which

is introduced any new material and/or salient entity as and   when

such entities crop up.   In some versions of the DRT a new   varia-

ble   becomes   available whenever a definite is used   and   then   a

condition identifying the new variable with an existing (old) one

is entered into the DRS.   This is an operation performed before a

definite   is assigned any other value.   In the   Kamp/Heim   model,

therefore,   a   direct   association of the definite   with   an   old

variable is preferred.

Given this analysis of definites as unique entities, we assume that at least for the anaphoric uses of definite!, it **makes** sense to ascribe a uniqueness reading to such definites since we believe that Gricean constraints govern the effectiveness of **communication**. Notice that in the **Kamp/Heim** system definite **NPs** are identified as anaphoric since they must be associated with an already existing file card/ discourse referent. Our concern for Gricean principles was reflected in the notion of double strike that we presented earlier (Chapter I) where we contended that if focusing (always) and topical ization (optionally) are to be seen as repetition of some part of the VP then the two strategies cannot both be used in a single **sentence** for uniqueness reasons. Uniqueness, therefore, we consider as **some** sort of an extended Gricean principle that governs effective **communication**. This extension, could, we presume, take the form of a device meant for resolution of ambiguity in the context. Avoiding repetition is, therefore, a part of this general principle of uniqueness. Since a definite anaphor is old **information,** it makes sense to imagine that such definites obey this general Gricean (in our reading) principle of uniqueness. If anchoring on to a particular referent is the basic idea behind using an anaphor, then uniqueness, we claim, is the route to such a connect ion.

This anchoring through **uniqueness** is, however, much more apparent in cases of a class of expressions in **Bangla** that we take up in detail in the following sections. Classifier expressions in Bangla exhibit a **definiteness** effect that we consider as a testing ground for studying one aspect of **Computational** Linguistics, namely, machine translation. We devote a section to this aspect in connection with a **Principle-Based** strategy of parsing as formulated in Berwick et al (1991). But first we present a detailed discussion of the classifier system as it relates to **definiteness**.

4.3 Classifiers and **Def**initeness

A theory of prototypes as the basis of **categorization** in linguistics challenges the traditional Aristotelian concept of meaning. Categories are now characterized as having fuzzy edges and graded membership. Consequently the main research question in the present agenda is about the degree and the nature of categorial ity. This shift is more in **line** with a **non-categorial Wittgensteinian** non-categorial family resemblance approach. In linguistics, the concept of a prototype has been extended from being a **lexico-semantic** term to being a grammatical construct (Lakoff 1973). We may note here that our discussion of parameters of transitivity — the **functional**/pragmatic parameters — is based on a prototypical approach to **classification.**

4.3.1 Classifiers as a **Cognitive-Formal** Category

Our study so far has evoked a **formal-cognit**ive approach towards the analysis of transitivity (Chapter II) which is **accomplished** through a proper understanding of the notion of **saliency.** **Silverstein** (1986) notes that classifiers as a category-type in languages can be defined only by a **formal-functional** definition. Let us, therefore, see how classifiers relate to a prototypical approach to **classification.** If we think of classifiers as markers of categories — or categorizers — then it is important for us to study classifiers to understand the human **categorization** system.

The linguistic **categorization** through overt **classification** results in lexical forms known as the **lexico-syntactic** phenomenon of noun **classification,** including numeral classifiers. This phenomenon of linguistic **classification** may take a number of forms displaying a contrast between the noun class gender system of some languages and the sets of classifiers in some other languages. On the basis of this, we make a major claim about the types of languages in section 4.4.

From a cognitive, semantic, and cultural point of view, the function of classifiers is to categorize objects in "classes" with respect to the way we interact with them (Craig 1986). Nouns, on the other **hand,** establish reference to things in the world. A study of classifiers, thus, will result in a better

understanding of the cognitive underpinnings of the human catego-

rization **phenomenon.**

The prototype theory is in view in the Domain of Experience

Principle that Lakoff (1986) proposes:

(15) If there is a basic **domain** of experience with A, then it
is natural for entities in that **domain** to be in the sate
category as A

(15) was proposed to provide a general principle to account for

the Dyirbal classifier system more economically than Dixon

(1982). The prototype theory advances the concept of a general

cognitive apparatus that is used by the mind to categorize the

way humans do. This is **conceptually** not very distant from the

theory of salience that we elaborated in Chapter II which forms

the basis of our understanding of the **computational** architecture

of **transitivity.**

Classical theories do not permit any member of a set to more

or less salient since in a classical theory a category has **well-**

defined boundaries and membership in the category is governed by

necessary and sufficient conditions common for all the members.

A cognitive theory necessarily, therefore, gives rise to nonclas-

sical effects. Lakoff (1986) points out that cognitive theories

make sense of a humanly restricted and humanly oonceived portion

of human experience. It disturbs the classical view that con-

cepts are abstract and are separate from human experiences. It

supports the view that our conceptual system is linked to our

physical and cultural experiences[1].

We mentioned earlier that classifier systems come into being as a result of various types of human interactions carried out with the objects in the world as opposed to a view where objects are thought to be classified according to how they are in the world rather than how humans interact with them. These interactions may be social, physical or functional. In the following subsection we look at some of such interactions in connection with classifiers in Bangla. The formal aspect of classifiers as a category is discussed in detail in our analysis presented from section 4.4 onwards.

4.3.2 Classifiers in Bangla

Classifiers in Bangla include the default classifier *Ta*, the collective classifier *gulo*, the human classifier *Jon*, the inanimate count classifier *khani*, the numeral absorbing human collective classifier *ra* etc. (see Dasgupta 1983, 1985, 1987 for details).

Traditional Bangla grammar as well as Sen (1979) uses the term affix (*prottOY*) for classifiers. Sarkar (1992) uses different categories of classifiers as follows:

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1. The lexology project of Dasgupta (forthcoming) reclaims this more general domain for linguistic study.

(16) Class I: Ta Te To Ti
khana khani
gacha gachi
gulo gula gul1

Class II: Tu Tuku

Class III: ra era

Ta for Sarkar is like Bloomfield's bound morpheme. Since affixation changes the category, Ta cannot for him be an affix. Tagore (1892) used a term that translates as 'Definitive marker' whereas Chatterji (1926) used a more grammatical term such as enclitic definitives for these but this was rejected later in favour of 'class-dependent definitive' since clitics are usually full words elsewhere in the language. 7a, however, cannot be shown to be related to any other word.

Some of the earlier authors claimed *Ta* to have an onomatopoeic origin. The explanation is as follows. To show something we usually point a finger and if that leaves any doubt we touch or knock with our finger. The sound of such a knock is *TOk* or *Ta*. Using *Ta* while pointing has the same effect as the striking of a finger. This looks like a cognitive explanation for the existence of classifiers. But other, more neogrammarian explanations may carry the carry the day.

If classifiers are considered to be some kind of inflection (Chafean "inflection") markers, it is a marker of definite Case. Demonstrative pronouns in the language, however, perform a simi-

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lar function. Sarkar (1992), **therefore**, points out that *oy lot* "that **man**" cannot be replaced by *lok-Ta* '**man-cla**' "the **man**" where the definitizing effect is somehow reduced. The use of *Ta*, **accordingly** denotes a reference to the person/topic Mutual**ly-**agreed upon by the speaker and the hearer. Therefore the *Ta*, for Sarkar (1992), is referential. With this use of *Ta* the speaker wants to convey to the hearer the message that he is talking about the same person/thing that the hearer has in **mind**. A **demonstrative** pronoun involves pointing whereas the classifier does restate that in the given context the topic is identified as identical by the speaker-hearer. This terminology that Sarkar uses, is borrowed from Dasgupta (1983) who uses **them** to distinguish between the following:

> (17)a. oy   kham-duTo
>   those envelope-two-cla
>   'those two envelopes'
>
>   **b.** oy   duTo   kham
>   those **two-cla** envelope
>   'those two envelopes'

Sarkar's account misses the crucial aspect of the interaction of the two strategies in such cases. In (17) above it can be shown that *Ta* does have the definitizing property also and demonstratives by nature involve pointing. (17a) for **example**, involves, what we call, topic **identification** in spite of the presence of a **demonstrative** pronoun. In (17b), on the other hand, only the strategy of pointing is made use of. This reminds us of the

uniqueness possibilities that we pointed out in connection with the concept of double strike (Chapter I) and anaphoric definites. We presume that the crucial difference between (17a) and (17b) above obtains if we entertain the possibility of highlighting of a unique strategy in any particular discourse. In a more recent analysis, Ghosh (1995) fails to account for the difference in definiteness (or in degree of topic identification) between these two word orders.

Within the uses of *Ta* it is sometimes assumed that entities which are bigger in size receive the classifier. Tagore (1892) shares a similar opinion and identifies *Ti* as a variant to be used for smaller objects and for affectionately considered things/people. *Ta* is used not only for bigger things but also for things which are forgettable and unadorable. Objects which imply no special emotion, ans are neutral, also take *Ta*. In the following, (18a) expresses a sense of caring on the part of the speaker whereas in (18b) there is no such special sense is being expressed.

(18)a. chata-Ti   kothaY?
         umbrella-cla where
          'where is the umbrella (that little one)?

     b. chata-Ta   kothaY?
         umbrella-cla where
          'where is the umbrella?'

The classifiers like *gula, gulo, guli* denote plurality,

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This plurality, however, is definite. Plurality in Bangla could be **marked** or **unmarked**. In the following sentence, **mach** is an example of a unmarked plural fora while (20) is case of Barked but indefinite use.

(19) nodi-te   Bach thake
    river-LOC fish be-PST **HAB**
    'river has **fish**'

(20) **meYera Ekdom** taS **khEle** na
    girls at **all** card play not
    'Girls never play cards'

In cases of marked plurality wherever *guli* is used it acts as a direct plural fora of *Ta/ Ti.* Therefore these morphemes also carry some referential and some social meaning. But not **all** the differences in **interpretation** between *Ta* and *Ti* are found between *gulo* (a **form** of *gula*) and *guli*. *gulo* is more common and that is why it has a connotation of disregard, whereas *guli* is slightly tore neutral but not respectful like *Ti.* Both are used with inanimate nouns and they are most appropriate if they are used with non-human nouns. The following demonstrates the deviation from natural uses (Sarkar 1992):

(21) boy-gulo :   natural   : spoken
     book-cla
     'books'

     boy-guli :   natural   : standard calit

     lok-gulo :   natural   : spoken
     man-cla   (disregard)
     'men'

     lok-guli :   natural   : standard calit
                    (disrespectful)

     lok-era   :   natural   : standard calit
                    (neutral
                     indefinite)

ra/era are used with human nouns only. *guli/gulo* are tore defi-

nite in comparison to *ra/era.*   In cases where *Ta* is natural   *gulo*

is also natural.   Similarly wherever *Ta* is unnatural *gulo* is also

unnatural.   When *gulo* is used with human nouns the disrespectful

connotation is clear but when it is used in nonhunan or inanimate

nouns such a connotation is not inferred.

4.3.3 Definiteness of Classifiers

     In this section we discuss more of the formal properties of

classifiers with a special attention to the ways in which defi-

niteness is encoded in such structures.   The Bangla classifiers

are often called definite articles.   However, as Dasgupta (1983)

clearly pointed out, classifiers themselves are not articles.

Following Dasgupta and Bhattacharya (1994), we will show in

section 4.4, that any analysis equating classifiers with deter-

miners (as in Ramchand 1992) will violate the directionality

parameter. Hawkins (1978) has shown that the use of determiners
is discourse •otivated. Masica (1986) observed that numeral
expressions are inherently indefinite. Therefore, **numerals,** in
order to produce a definite reading, would require an overt
marking. This **marking** could be in the **form** of **demonstratives,**
word order, relative clauses etc. Bangla uses classifiers for
this purpose. Masica (1986) proposes a feature hierarchy which
is used by **Kwiatek** (1986) to situate the definiteness of classi-
fiers in Eastern **Indo-Aryan** languages **like Ahomiya,** Bangla and
Oriya. This feature hierarchy is shown in (22) below.

(22)

```
                              _____
                           |                             |
                      Referential                  Nonreferential
                           |
              ----------------------------
           |                            |
        Specific                   Nonspecific
           |                        (generic)
     ----------------
   |                |
Identified      Nonidentified
```
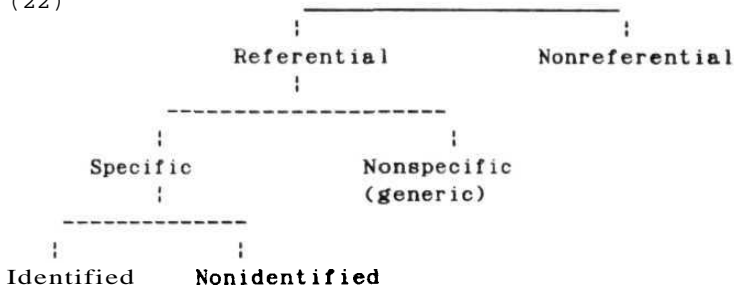
Kwiatek (1986) identifies classifiers as **[+/-Identified].** Notice
that such a **categorization** would imply that classifiers are also
specific and referential. The feature **[+/-identified]** in the
above hierarchy, for our purpose, translates to given and new
information respectively. Such a **classification** has the merit of
bringing together the notion that classifiers are specific
(Sarkar 1992) and the given/new reading of definites which, we

claim, are obligatorily Barked with classifiers.

Definiteness is a discourse-related **phenomenon** in **Hawkins'** (1978) terms, an NP bearing definiteness marking 'locates' the NP in a **pragmatically** defined discourse set of **common** knowledge, experience or discourse which is shared by the speaker and the hearer. He uses the concept of '**inclusiveness**' to explain the definite use of an NP. We note that this is completely taken care of by **Heim's (1982)** Novelty Condition (Chapter I and II) and **Kadmon's** (1987) Uniqueness Condition. By **inclusiveness,** Hawkins means that the NP is included in a set which unambiguously refers to the NP.

We will show later what the different strategies these two languages employ are to mark **definiteness**. Languages differ in terms of strategies they choose for definiteness **marking**. Hindi and Bangla differ in this respect. Both languages engage certain determiners for the task. Besides, both languages relate strong or **phonologically** overt Case marking (Hindi *ko* 'to', Bangla *ke* 'to') to **definiteness**. That is where the resemblance stops. They diverge in that Bangla, but not Hindi, has a system of Classifiers and employs the **postnominal** placement of a classifier (with or without a numeral prefix) as a device which signals nominal **definiteness**. The location and other details of the morphological **manifestations** of definiteness are worked out in detail in sections 4.5.

4.4 Gender and Class

In this section we propose a typological bifurcation of South Asian languages into two Major groups: Gender languages, like Hindi, and Class languages, like **Bangla.** We suggest a particular **formalization,** in terns of a Badge node exhibiting either Class or Gender, of the correspondence between gender in gender languages and the classifier in classifier languages. We accept as our point of departure some of the key assumptions of the minimalist version (Chomsky 1993) of the principles and parameters approach to syntax. In particular, we take it that fully inflected lexemes are inserted at lexical sites, raised to positions where they trigger **'checking' mechanisms** ensuring that **all** nodes get licensed, and finally — after finishing **all** syntactic work — 'spelled **out'** as a specific phonological shape. This analysis is a modified version of earlier accounts of Dasgupta and Bhattacharya (1994) and Bhattacharya and Dasgupta (forthcom-**ing).**

4.4.1 Case and Classifiers

The existence of approximately two major schools, as many as the number of slots available for Case **identification,** is gener-**ally** recognized. Fairbanks (1960) and **Kelkar** (1959) belong to

1. We restrict our discussion here to the phenomena surrounding the classifier *Ta*

the school which believes that Hindi has only three true Cases: Direct, Oblique, and Vocative. For example, the following show these three Cases:

(23) laRkiyaaM   "girl-fem-pl" — Direct
      laRkiyoM   "girl-fem-pl" — Oblique
      laRkiyo   "girl-fem-pl" — Vocative

These authors treat Case as inflectional in a strong structuralist sense of the term and thus as more easily identifiable with the first slot (that is, the *yoM* slot) in a construction like *laRkiyoMko* "girl-fem-pl Acc" 'to the girls', segmented for our purposes as *laRki+yoM+ko*. The crucial point is that Case here is like a bound morpheme and acts more like an integral part of the word. We also notice that *yoM* merges Gender and Number information.

The other school, exemplified by generative syntacticians (see Mahajan 1990 for the latest exposition) take *ko,* in the above example, as the surface realization of Case. It is less inflectional and behaves more like a postposition. These Barkers, as is evident, occupy the second slot.

In Bangla, however, there is no nominal (as distinct from pronominal) evidence that Cases like Oblique or Vocative exist. Case, therefore, is less inflectional in Bangla and is more like the second slot of the Hindi Case system. But Bangla has a system of Classifiers which interact more closely with subtypes of Noun than these Cases do. For example:

(24)a. amaY   phOl-Ta   daV
        to me   fruit-cla give
        'give me the fruit'

   b. mee-gulo dekhte Sundor
      girl-cla to see beautiful
      'the girls are beautiful to look at'

So far, the differences between the two languages that we notice

are as follows:

   (i) Hindi has a Gender system but does not have a system of
       Classifiers.

   (ii) Hindi has two apparent Case slots.

   What emerges from this discussion is that Hindi has more

space to operate than Bangla which is evident from the fact that

Hindi has two apparent Case positions which one might, straddling

the fence between the two theories, call inner and outer Case.

Our proposed notion of Badge is an attempt to try and reduce this

difference. We deal with the intricacies of the proposal in

section 4.5 in detail. Here we initiate the discussion.

   We are interested in the site where the postnominal Classi-

fier in Bangla and the first Case slot in Hindi appears. The

first or inner Case position in Hindi morphologically interacts

with the gender and the declension of the noun. As an example of

the latter consider *laRkaa*, the Direct plural of which is *laRke*;

but the Direct singular and plural forms of *raajaa* 'king' are

identical. In both Hindi and Bangla, this site interacts with the

noun's intrinsic features. Bangla Classifiers and Hindi inner

Case are also similar in the way that——unlike inflectional elements in highly fusional languages——they never invade the body of the stem proper, altering its final consonant, for example.

There is substantive evidence to show that Gender and Class can be unified. The prefix-type classifiers of the Bantu family show agreement with the noun-class they are attached to. This agreeing behaviour of certain classifiers is evidence that class is a gender-like category. Although in South Asian languages the Classifiers do not morphologically trigger or participate in patterns of agreement, there are overall typological grounds for saying that Classifiers and Gender are two different shapes of the same thing. We further conjecture (following Singh, p.c. via P. Dasgupta) that the loss of ergativity in Eastern IA languages was accompanied by a loss of the system of gender classification in these languages. Bangla and other Magadhan languages are presumed to have developed the system of classifiers subsequent to this attrition of the agreement system .

4.5 Badge in Bangla/Hindi

With this sort of a background we suggest a neutral term like Badge for this site since we are talking about the noun's

1. More work is needed on Oriya, which preserves Number agreement, to sort out the genetic and typological picture.

identity indications. In Class languages it houses the classifi-
er. In Gender languages it holds the Gender and Number informa-
tion. The importance of Badge is also reflected in its ability to
respond to the process of Case marking. It is a site where the
Case information spills over. There is evidence that noun subtype
properties interact with theta/ Case properties in an obvious
way. Larson (1985) has demonstrated this for bare NP adverbs.
He argued that adjunct NPs get their theta-roles and Case through
the N since nouns have intrinsic semantic properties; that is,
certain lexical items get their theta properties from being what
they are and where they are. The idea that noun subtype informa-
tion can feed Case and theta features becomes easy to implement
if we postulate a Badge site housing noun subtype properties.

   We mentioned in section 4.3 that Bangla, but not Hindi, has
a system of Classifiers and employs the postnominal placement of
a classifier (with or without a numeral prefix) as a device which
signals nominal definiteness. The account of these and related
phenomena which we develop elsewhere (Dasgupta and Bhattacharya
1994) proposes that the syntactic environment of a noun phrase is
conditioned by two forces. Its external grammar shows up at the
Declension (or D) head of the DP and registers Case, definiteness
and other relational properties. Its internal grammar resides in
what we have called the Badge (or B) enclosure of the noun com-
plex. The D slot mediates the instructions of the external world.
The Badge decides how the internal world, that is, the N is to be
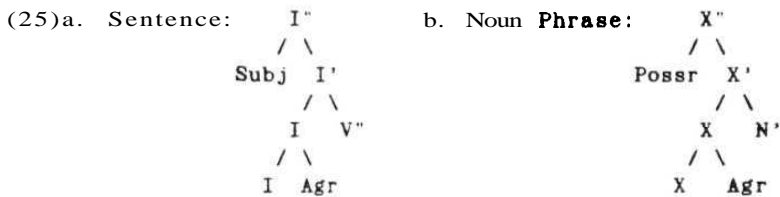
organized. To this we now turn.

Badge comprises Gender and Number in Gender languages and is formally instantiated in the feature composition of the Noun. In Class languages of the Classifier subtype, we suggest, Badge may be a site, between the Noun word proper and the Declension, where a Classifier (with or without a numeral prefix) may appear. On such an analysis, both Hindi and Bangla manifest **definiteness** by strengthening Det (the Spec of B') or D in both languages, or B in Bangla where it may be weak (zero B) or super-strong (overt). Options for B in Hindi are limited; gender is **lexically** fixed and number depends upon speaker's choice. Thus Hindi cannot strengthen B to mark **definiteness**. We propose that in both types of language the content of B interacts with that of D to determine the often fused shapes of the relevant inflectional morphology.

Before we work out the specific details relating to the interaction of Badge and Declension within the minimalist framework, in the next section, we show how DPs in Bangla differ from DPs in European languages.

4.6 The Bangla DP

We maintain the position of Dasgupta and Bhattacharya (1994) (henceforth **D&B),** the first work to propose a DP analysis of Bangla **NPs,** that Bangla NPs are best analyzed as DPs.

Abney (1987) shows that *in* **Hungarian** (and Turkish) possessor **constructions,** the possessed N agrees with the possessor. The possessor carries Nominative Case **marking** which is standardly assumed to and be assigned under government by the element Agr in **Infl.** In a sentence Agr occupies an Inflectional position outside the VP; Agr in a noun phrase, Abney conjectures, occupies a similar position:

```
(25)a.  Sentence:    I"          b.  Noun Phrase:     X"
                    / \                             / \
                 Subj  I'                        Possr  X'
                      / \                             / \
                    I    V"                         X    N'
                   / \                             / \
                  I   Agr                         X   Agr
```

In (25b) X is a "nominal **inflectional**" category. Modals are the only lexical class representing **Infl** and Abney proposes that the category Determiner is the NP equivalent to modals in English while looking for a suitable label for X. A typical canonical **configuration** of a DP in English will have the form:

```
(26)                        DP
                           / \
                              D'
                             / \
                            D   NP
```

In English, French and German D is identified as the Det where

agreement morphology occurs.

The account presented here for Bangla and Hindi closely resembles, but at the same time brings into focus certain differences with, the familiar European language type as described in the standard literature of parametric syntax. The D head of the DP in these languages is a Det and precedes the NP, conforming to the general pattern of head-first functional projections in that language type. The South Asian D head of the DP follows the NP and is not Det. The South Asian Det which carries deictic features precedes the N' but must be analyzed as a Spec (of what we shall call B'), not as the head of DP. The real D in South Asian languages is a DP-final element and is in line with the generalization that South Asian functional projections exhibit the head-last pattern throughout the language type.

Trying to extend to Bangla the general form of the current parametric accounts of syntax, D&B faces the question of a suitable candidate for the D head of the Bangla DP. Det is identified as the D head in English, German and French where it is the site for Agr morphology, but this leaves open the identity of D in other languages like Bangla. They note that in Bangla an identification of Det as D would lead to certain architectural problems since every other head in Bangla, lexical or functional, is final in its projection. Det is initial in the nominal construction from which they conclude that it cannot be the head. They further present the following minimal pair to strengthen their claim:

(27) e   **lokTa**$_i$ jane je   **er**$_i$/**tar**$_i$ bhay   aSbe
    this Ban   knows that **his-Prox** brother will-cose
                            his-Seq
    'This nan knows that his brother **will** cone'

(28) **e**$_i$ jane je   **er**$_i$/***tar**$_i$ bhay   aSbe
    he-Prox knows that his-Prox   brother will-come
                            his-Seq
    'He knows that his brother **will come**'

The enbedded coreferential pronoun may either be a Proximal or a Sequent in (27), where the antecedent DP contains the noun meaning **'man'**; but it is obligatorily Proximal in (28), where the antecedent DP is a bare Det e **'he'** whose Proximal feature must be responded to. If the Det was the D head of DP, it would have equally unoverridable **Proxima**lity in (27), precluding the coreferential Sequent *tar* 'his-Seq' which in fact occurs. The fact that the determiner carries the Proximal feature which has to be visible from (and copied at) other relevant sites in the sentence might lead one to believe that the determiner might be the head of this **construction.** But that possibility is ruled out since *tar* 'his-Seq' is in fact allowed in (27).

D as the classifier element *Ta* acting as a site for definiteness, as we mentioned earlier, is also ruled out. **Ramchand's** (1992) analysis is not preferable for the following reason. One motivation behind positing DP as a functional projection was that it functions as a site for dependential morphology **like** Case and agreement. Abney's D has the inflectional Agr element which is the Case **assigner.** One piece of evidence for the presence of Case

would be **morphological** variation, which is not observed in the case of *Ta* or other classifiers. D&B infer **from** the absence of variation that D in Bangla does not contain Case features. In Hindi it does, as is evident from direct *laRkaa* 'boy' and *laRke* 'boys' versus oblique *laRke kaa* 'boys's' and *laRkoM kaa* 'boys', of (the) boys' showing obvious variation. Obliqueness at the gender/number site in Hindi is a piece of evidence for Case. German shows overt Case at D as in *der Mann* 'the-Nom **man**', *den Mann* 'the-Acc man', etc. Abney does provide evidence for dependential morphology at D in the languages he considers, in partic- ular, agreement morphology.

Bangla Classifiers neither bear Case nor trigger adjectival/ determinerial agreement:

(29)a. e   cheleTa
      this boy-cla
      'this boy'

   b. oy   meYe-Ta
      that girl-cla
      'that girl'

D&B (1994) take D to be a site for Declension which encodes Case, definiteness and other relational properties.

4.7 Spec-DP

The preceding section has given us an empirically explicit idea of the nature of the head of the DP in Bangla nominal con- structions. In this section, we look at the other "periphery"

where syntactic energy is concentrated in the present **framework.** In doing that we discuss the GCS and the Gerund constructions in **Bangla** as evidences for a Spec-DP position. This would give us a **justification** of the both ends of a DP structure like the following:

```
(30)             DP
                / \
            SPEC / \
                  D
```

4.7.1 Genitive Classifier Structure

Considering that the present **framework** emphasizes a morphological assessment of strings on the basis of the degree of **lexicalization,** it is worthwhile to pursue an analysis of a construction which behave like a single morphological unit. GCS is such a domain where we initiate our inquiry. In any parametric account of Badges as well as **Ds,** GCS is among the facts it should be able to handle. (31) below exemplifies a GCS construction.

```
(31) toma-r-Ta
     your-Gen-Cla
     'the yours'
```

One of the properties of a GCS is that it is non-recursive, that is, (32) is ruled out.

```
(32)* toma-r-Ta-r-Ta
```

But it is equally interesting to note that (33) is **possible** in an appropriate context.

    (33) `du-jon-er-Ta`
         `two-Cla-Gen-Cla`

        `'the` one belonging to **both'**

(33) shows that there **is** no particular restriction on the **Cla-Gen-Cla** order **from** occurring. Nor is it the case that a *Ta-r-Ta* order is not allowed since (34) is possible (again, in an appropriate context).
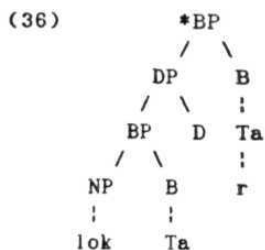
    (34) paMc-Ta-r-Ta
         `five-cla-gen-cla`
         'the one pertaining to five **o'clock'** (from **paMcTa** '5 **o'**
         `clock')`

Bhattacharya (1995) provides no formal account of (31-34) or rather stipulates that whenever *Ta* marks an NP as definite, strong features of the classifier prohibit any more definiteness marking. We now have a better account of this phenomenon as it **falls** within the general restriction imposed upon felicitous **constructions** by the Uniqueness Condition that we studied in detail in section 4.2. Once the definiteness information is decoded by encountering a definiteness marking classifier **morph,** appearance of another such **morph** leads to **unparsability.** Bhatta-charya (1995) further notes the fact that a **num-cla-gen-cla** is more tolerable if a context can be provided. This could be as in (34) above because a numeral generally takes a classifier after it and has lexically frozen readings **like** 'five o' **clock'.** The

construction **Num+Cla,** therefore, does not really count as exhibiting a definitive use of the classifier. **Sarkar's (1992)** contention that *Ta/Ti* **limits** or definitizes the preceding numeral. therefore, is not true. As a result another classifier will **be** needed if any definitive leaning is to imposed. A simplified structure will be **like** (35) below.

(35)
```
                    BP
                   / \
                DP    B
               / \    ¦
            BP    D   Ta
           /\     ¦
      paMc Ta     r
```
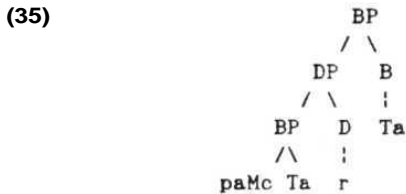
Definiteness in Bangla is established, as we have seen, through strengthening of different sites **like** the Det and the D (*ko* and *ke,* for example in Hindi and Bangla **respectively)** in both the languages and a **superstrong** B in Bangla. We suggest that definiteness is established by a Spec-head relationship and if the definiteness feature is detected in such a relationship the maximal projection licensed by that head gets the **definiteness** effect. This can be built in the parsing scheme that we propose in section 4.10. This is true of DP-B and BP-D relations both of which are Spec-head relations. A Spec-head checking is done **via** the checking domain (Chomsky 1993); DP and BP are the checking domains for B and D respectively. The **following,** however, is **out:**

(36)
```
              *BP
             /  \
           DP    B
          /  \   :
        BP    D  Ta
       /  \      :
     NP    B     r
      :    :
     lok   Ta
```

A GCS like (32), we noted earlier, is also not possible. We believe that *paMcTa* acts more like a unit than *lokTa*. For one thing, nothing can be inserted between the classifier and the noun in the former while possible to have (37) as a version of the latter.

(37) lok du-To
     man two-cla
     'the two men'

The reason behind this, we presume, is because such an incorporation is exhibited only by a numeral and since *paMc* 'five' is itself a numeral there should be no need for a further numerical modification of it. To rule out such structures one could propose a constraint on the **accessibility** of checking domains. However, such a constraint **will** not serve our purpose since *lok-Ta-r* 'of the **man**' in *lok-Ta-r-Ta* '**man**-cla-gen-cla' and *paMc-Ta-r* 'five-cla-gen' in *paMc-Ta-r-Ta* 'five-cla-gen-cla' should be **equally** inaccessible for the bigger B head; **still** only one structure is ruled in. Note that, such a constraint will not prevent the generation of *toma-r-Ta-r-Ta* 'you-gen-cla-gen-cla' (32). It

is quite possible that the deeper B in case of *paiic-Ta-r-Ta* and *du-jon-er-Ta* 'two-cla-gen-cla' does not have anything in its checking domain to establish a Spec-head relationship and consequently the deeper **DPs** do not carry any **def**initeness effect. We have to show that *lok* '**man**' and *toma-r* 'your' are in the checking domain, that is, they are in the Spec positions of the head **Ta.** But *lok* like *paMc* is a sister of the deeper B and as such **cannot** be a part of the Spec of the head.

It is possible to conceive of the **following** set as an expanded form of these expressions:

(38)a. toma-r-Ta-r-Ø-Ta
you-gen-c la-gen-0-cla

b. lok-Ta-r-Ø-Ta
man-cla-gen-Ø-c1 a

c. paMc-Ta-r-0-Ta
five-cla-gen-Ø-c1 a

d. du-jon-er-Ø-Ta

two-cla-gen-Ø-c1 a

0 in (38) above denotes the missing NP object. Notice that in **(38a,b)** 0 is a property which "belongs" to the pronoun and the noun **respectively,** whereas in the latter two cases it is not so and the numerical expressions are **just** a property of 0, they do not possess it. In (38), therefore, 0 is an inalienable noun (by extension) and **inalienability** is a **semantically** dependent notion. By this token we can consider *tumi* and *lok* as the possessor arguments and **Ø** as the inalienable argument. A type of binding

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relation through predication holds between these **arguments** which imposes a Mutual **m-command** relation (Vergnaud **and Zubizarreta** 1992). This will rule out the first two expressions if a copy of 0 is present which, therefore, fails to follow the mutual •-**command** condition. In case of **(38c,d)** this is not the case. Here 0 is not an inalienable noun. As such a **m-commanding** relation may not hold between these two arguments. However, if **∅** was overt in **(38a,b)** the condition of mutual n-command could not have been set. Vergnaud and **Zubizarreta's** (1992) criterion, therefore, may not be duplicated at the word level. More concretely these two do not lexically specify an **inalienable** argument in their lexical entries. **This** makes omission easier because there is no binding relation in these cases. Whereas for the first two expressions, omission of the inalienable argument leads to unacceptability. This makes sense because in case of **(38a,b)**, the noun or the possessor pronoun is picked out for reference for definitizing by adding *Ta,* any further inalienable argument of that possessed part will retain that definiteness information rendering the occurrence of another *Ta* **ungrammatical**. This is not true of the numerical expressions which modify intended nominal arguments; since the implied nouns are novel entities, emphasizing them with a definitive force does not clash with the existing *Ta* morpheme. The crucial point that emerges is that the implied (deleted) object noun **is** a new entity in case of a **numer-**

ical expression*.

The non-recursive property of the GCS coupled with its being & postnominal classifier, closes the phrase. This is in line with the DP hypothesis in general. Fukui and Speas (1986) claimed that functional categories possess certain features by which they can license a unique specifier which 'closes off' the category's projection [2][FN: This is done in their system by dis-charging Kase features which are a unification set of the usual Case features (Objective Case assigned by V, for example) and F(unctional)-features (Nominative Case assigned by Agr/Tns, Geni-tive by 's, +WH by Vh-Comp, for example in Fukui,1986)1 .

4.7.2 Gerunds

Another piece of evidence for the existence of a Spec-DP position, as we mentioned earlier, is gerunds in **Bangla.** In order to account for the structure of such constructions and related to this, the assignment of Case in such structures, let

---

1. However, there is a problem that we have to address: assuming that Fukui and Speas (1986) right the expression *lok-Ta-r-Ø-Ta* containing a Genitive following the first instance of the classi-fier should be possible because such a Genitive will make addi-tion of further material possible and therefore should be able to project a phrase which would include 0. Given the present frame-work, this does not seem possible.

2. This is done in their system by discharging Kase features which are a unification set of the usual Case features (Objective Case assigned by V, for example) and F (unctional) features (Nominative Case assigned by Agr/Tns. Genitive by 's, +WH by Wh-Comp, for example in Fukui, 1986.

us begin with the following examples:

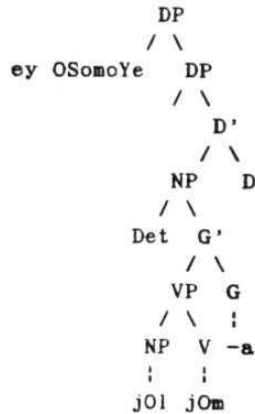(39)a. ey   jOl   jOma-Ta   bhiSon biroktikOr
        this water logging-cla very   bothersome
        'this fact of water logging is quite bothersome

   b. ramei   ey   OSomoYe   aSa-Ta
      Ram-gen this   neg-time-loc coming-cla
      'this Ram's coming at odd times'

   c.* ey   OSomoYe ram aSa-Ta

   d. ey   OSomoYe   ciThi aSa-Ta
      this Neg-time-Loc letter coming-cla
      'this coming of the letter at odd times'

Genitive in Bangla is notorious for its numerous uses.   One
of these uses is that of representing the agentive role.   In
(39c) we see that *ram* plays an agentive role and somehow that is
expressed by a Genitive marker which is bearable only in the
position shown in (39b) above.   This is indirect evidence for the
fact that the Genitive is assigned at the Spec of DP position.
Notice,   however,   that scrambling of *ciThi* out to the initial
position is ruled out.   This is because gerunds tend to be more
rigid as far as their internal structure is concerned.   Gerunds
thus resist scrambling.   Since *ciThi* is the Theme in this sen-
tence it needs to stay with *aSaTa*.

The   typical gerund structure in Bangla is as   follows   (the
decision to have a Det daughter of NP is a provisional mechanism,
as is the hybrid notation of G,G',NP; see 4.9 for the exact

position proposed for Det):

(40)
```
                        DP
                       / \
              ey OSomoYe  DP
                         / \
                           D'
                          / \
                        NP   D
                       / \
                     Det  G'
                         / \
                       VP   G
                      / \   :
                    NP   V  -a
                     :   :
                    jOl jOm
```

G in (40) denotes a noun type element and *ey OSomoYe* occupies an adjunct position which itself can get Genitive Case for Fukui's (1986) account makes it possible for anything (including an adjunct) to move to the Spec-DP position for Case reasons. For an expression like **(39b),** we will claim that *ram* is generated at the lower Spec-DP position and receives **configurational** Genitive **Case.**

Coming now to **(39c,d),** we see that they have two different structures. For **(39d),** since there is no Spec generated, there is no VP too and the V is the equivalent structure. Further-•ore, DP *ciThi,* being a sister of the lexical V, receives a direct theta role (and Case); whereas for (39c), the verb can give only an indirect theta role to *ram* which in an alternative account is allowed to move to the Spec-DP position from the Spec-

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VP position.

In Abney's (1987) account the node D has Agr features which "assign" Genitive Case in possessor constructions but since Bangla does not manifest agreement, we claim that such an analysis is not needed. As noted earlier, in Bangla, therefore, the DP "gets" Case in the Spec-DP position which could either be base-generated or licensed by movement of the DP to this position. This is similar to Chomsky's (1981) story of Genitive Case assignment. Gerunds, therefore, provide crucial evidence for the existence of a Spec-DP position.

4.8 The strength of B

In Chomsky's (1993) exposition of the *Minimalism* programme, the notions of government, D-structure and S-structure are all discarded. Morphological properties of lexical items come to the fore. Inflectional features of any lexical item are inserted along with it whenever the item is drawn from the lexicon. These features are then subject to a feature checking mechanism whereby the item reaches the specifier position adjacent to each functional head (F) and gets its features checked against the Bet of features contained in these Fs. If the features match then the relevant feature marking (an abstract formal object) at F disappears and the lexical item enters the PF component under SPELL-OUT; if it does not, then F remains and the derivation "crashes"
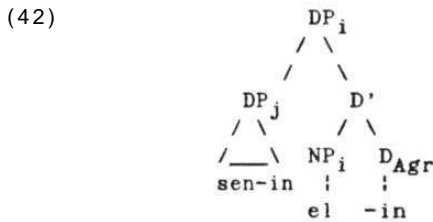
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at PF. For an expression to converge (not crash) at PF and to be
interpreted by a performance system it should be made entirely of
legitimate PF objects and unchecked abstract features at F are
not   legitimate PF/LF objects. Agr as a functional element in a
typical sentence has two kinds of features: V-features to check
the features of the verb adjoined to it and NP-features to check
the features of NPs (or DPs) that raise to the Specifier position
of Agr (Chomsky 1993). In this analysis we are interested in the
NP-features of the functional head B.

   We assume that nouns are drawn from the lexicon along with
all their morphological features including phi-features. The B
site in Hindi consists only of PF-visible ("strong") but segmen-
tally unspecified ("enpty") inflectional features, which must be
erased by checking, in the system of Chomsky (1993), so that the
representation converges at PF. The notion of PF-visibility is
crucial in a checking theory — there are segments, PF-visible by
definition, and there two kinds of abstract (non-segmental)
features, which Chomsky calls weak and strong (invisible and
visible, respectively, at PF). For a derivation to converge at
PF, it must erase all strong abstract features by PF.

   In Chomsky's reworking of Pollock, Agr_s and Agr_o are used as
'mnemonics' to distinguish between the two functional roles of
Agr, namely, subject and object agreement. According to Chomsky
(1993) Agr is a collection of phi-features like Gender, Number
and Person. In our parallel nominal system there should be avail-

able an Agr position. One crucial difference between this Agr element and the more familiar Agr in D pertainB to the mediating role it plays: Abney-Agr which resides in D is typically a matter of two NPs. For example, consider the following Turkish example and its structure:

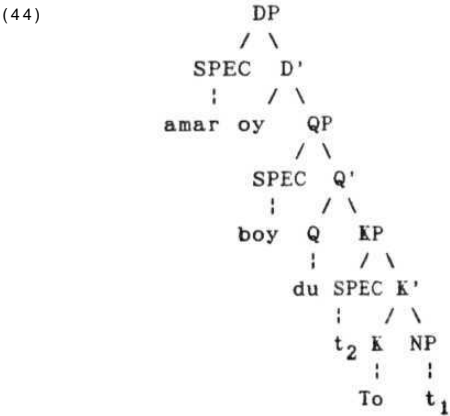(41) sen-in   el-in
      you-Gen hand-2Sg
      'your hand'

(42)
```
                    DP i
                   /  \
                  /    \
                 /      \
            DP j         D'
            / \         / \
           /___\   NP i   D Agr
          sen-in   :       :
                   el    -in
```

Agr in D here links DP_i to NP_i, that is, two NPs. The phi-features of B proposed here have to do with just one NP, the one that the B serves. Presumably Bangla B, if null, has Chomsky-weak' (PF-invisible) phi-features, while Hindi B always has Chomsky-strong phi-features.

Consequently a Hindi N must raise to B in the overt syntax to go through feature checking and to make the derivation converge as otherwise these Chomsky-strong phi-features of the Hindi B will survive till PF. These naked features are not legitimate PF objects and so the derivation will crash. Bangla raises N to B at LF because the Bangla B is, if overt, a classifier morpheme

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with a distinct phonological shape of its own and posing no **PF-**licensing problems. If null, it has no **PF-visible** material at all, again posing no problems and requiring no N-raising in the overt syntax.

Ghosh (1995) departs **from** DAB (1994) in identifying Abney's (1987) D with Determiners in Bangla. Be further uses Lobel's (1989) **QP** and Tang's (1990) **KP** for building up the structure of the Bangla DP as in (44) for a phrase **like** (43). Ghosh proposes that Case features are located at **K**.

(43) **amar** oy   boy   du-To
     my   those book **two-cla**
     'those two books of nine'

(44)
```
               DP
              / \
           SPEC  D'
            ¦   / \
         amar oy  QP
                 / \
              SPEC  Q'
               ¦   / \
             boy  Q   KP
                  ¦  / \
                 du SPEC K'
                     ¦  / \
                    t₂ K  NP
                       ¦   ¦
                      To   t₁
```

The rest of his argument follows this structure which, however, we note, violates the head parameter in a fashion similar to **Ramchand** (1992) which we pointed out in section 4.6. An adoption of **Kayne's** (1994) LCA is not explicitly stated, neither is any empirical, **Bangla-internal justification** for the specifics of

Ghosh's apparent adoption of **Kayne** presented.

There are other problems with Ghosh's (1995) invocation of **Minimalist** Principles to account for the set of **movements** that his possibly premature (and certainly not **independently** Motivated) conversion to the LCA forces him to posit. In general, the needs for feature checking which would drive his Last Resort movements are presented in an unconstrained package of "agree-**ment**" features that never seem to show up in the overt morphology of any classifier language of Asia. In particular and even more **damagingly,** a [+definite] **Det,** in his system, whether lexical or non-lexical, **optionally"** makes the feature of **K** strong which induces a NP to **Spec-KP** movement. Firstly, **optionality** of strength in this system seems ad hoc. Secondly, by this logic of D strength driving NP **preposing,** one would expect a lexical D (a demonstrative Det, in his system) being a case of a strong D to attract all **NPs** to its own Spec. The need for a [+strong] head to fill its Spec along with the need for a null **[+definite]** D to fill its Spec in Ghosh's system pull in opposite directions and cannot both be used to explain the **definiteness** effect in Bangla **DPs.** Ghosh (1995) is silent about the prominent connection between Genitive Case checking and the Spec-DP position (Miyagawa 1993 and Bhattacharya 1994). The failure of a coherent account of the mechanism of Genitive Case assignment in this system leads to the absence of any morphological statements reflecting the need to establish a connection between various

heads like D, **Q** and **K**.

Our present account (similar to DAB (1994)) **makes clear claims** regarding the relative strengths of heads responsible for displaying the definiteness effect. In this **system,** the account of N-raising taking place in syntax (Hindi) or LF (Bangla) results in simple stateaents about the contrastive definiteness effect observed across these two language types (see below).

The feature-only content of nominal B in Hindi is similar to the French verbal Agr as opposed to the English facts (see Pollock 1989 and Chomsky 1993). Pollock's (1989) idea of **I-to-V** lowering in English type languages is redone in terns of verb raising in both types of languages in Chomsky (1993). French Agr in **Chomsky** has strong V-features (features of the verb that the functional elements hold up for checking, Chomsky 1993) and since strong features are visible at **PF,** V in French Bust raise to delete the strong V-features in the Agr for the relevant derivations to converge.

Analogously, in our account, the strong feature content of the nominal B triggers overt syntactic N-raising in Hindi. Consider (44) below in this connection.

```
(44) ye      meraa giit
      this   my     song
      'this song of mine'
```

In (44) **meraa 'my'** gets its genitive Case checked vis-a-vis the

B complex, which **exceptionally governs** it. after the N *giit* 'song' raises to B. We assume that this is because B, unlike D, has no stable, **independently** specifiable phonological content and thus has no lexical identity (not even the attenuated kind that D has) until N raises to it. **N-raising** ensures feature checking for Hindi in the overt syntax. Once checked, **B's** features disappear in the sense of becoming **phonologically** invisible (cf. Chomsky 1993 on Agr in French), and the head complex N-B functions as a single inflected lexeme.

Can D **Case-mark *meraa*** directly? Or does N-B raising to D empower it to Case-mark? Our account compels us to say that D assigns (or **equivalently** licenses) Case on its own. Since we allow Bangla to **procrastinate** N-to-B raising to **LF**, the Bangla s-structure D is separated from its N by a **lexemeless** B. Such a D must be able to assign Case on its own in the Bangla version of (45) — a variant of (44) — which is **grammatical**.

(45) meraa ye **giit**
    my   this song
    'this song of mine'

By parity of reasoning, D must do so in Hindi as well. The question is whether this is a desirable feature of our analysis. On conceptual grounds, we would argue that it is. D has independent phonological **segmental** content in both Bangla and Hindi. It merits recognition as a distinct site of indexation and **grammati-**

cal processes. Languages that have D (Japanese may turn out not to have it) instantiate Case on the D site (consider *ko* 'to' in Hindi and *ke* 'to' in Bangla) and can reasonably permit one Case-bearing D to assign Case to another D. Another consideration, apart from the Case facts, is that Ds show agreement and thus deserve, like verbal Agr, to be recognized as potential Case assigners.

Notice that an expression like (44) in Bangla is excluded as a nominal projection (though the string is okay as a verbless clause meaning 'This is my song'):

    (46)* ey   amar gan
          this my   song
          'this song of mine'

The Bangla B is weak (like English Agr as compared to French), and thus does not require N-raising to take place in the overt syntax. A Bangla B is either null (devoid of strong or PF-visible features) or a classifier morpheme (a low content lexeme). It does not contain inflectional features which, being PF-visible but devoid of phonological content that can be spelled out, might require N-raising in the overt syntax to check and erase the feature content of an empty B in order to forestall the outcome where the derivation, without N-raising in the overt syntax, crashes at PF because of unerased B-features. Bangla therefore procrastinates N-raising to LF. Thus (46) is excluded because,

assuming that N as a lexical head cannot assign Case, and assum-
ing that the non-N-raising Bangla B (like a Hindi B in a deriva-
tion without N-raising) also cannot, there is no way for *amar*
'my' to get Case. So the only variant available, (47), shows the
word order of (45) in Hindi:

    (47) **amar** ey   **gan**
          my   this song
          'this song of **mine**'

    At this point we may ask why Bangla needs to raise *gan*
'song' to B at all. Presumably the reason, if there is one, is
perfectly general. We speculate that no lexical head can be
interpreted in situ at LF. The principle of FI (Full Interpreta-
tion) requires them to have a formally identified function. So N
must attach to the functional head B at LF. The functional heads
work as mediators for the purpose of FI. The constitutive fea-
tures of a functional head F are checked in a sister relation
(Murasugi 1992). This mechanism underwrites FI. See Chomsky
(1993) for some relevant discussion.

4.9 Definiteness and Head Movement

    Definiteness in Bangla, as shown elsewhere (Dasgupta, 1983)
is not directly expressed by a classifier morpheme like *Ta* per

se. It is associated in some cases with N NUB Cla word order:

(48)a. duTo   kham
       two-cla envelopes
       'two envelopes'

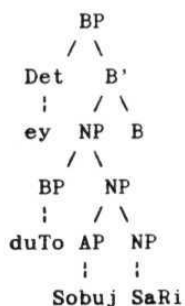   b. kham   duTo
      envelopes two-cla
      'the two envelopes'

But the construction (48b) exists only for Numerals of sufficiently low cardinality——prototypical ly two or three. A small Num may structure-preservingly (in a nonstandard sense) [FN:The idea of structure-preservation here is a semantic one. Postnominal classifier elements can carry a limited amount of cardinality information: *laThi-gacha* 'the (*singular*) walking stick', *juto-joRa* 'the *pair* of shoes', *Dim-gulo* 'the (*plural*) eggs'. We suggest that this is why Numerals with an inconspicuous amount of cardinality information can slip into the Badge without occasioning semantic incongruity. For whatever reason, **kham-satTa* 'the seven envelopes', **Dim-aTTa* 'the eight eggs' and other examples with postnominal large numerals are excluded] head-move to Badge (see (49a-c)), yielding Num-prefixed Badge which way, structure-preservingly (in the standard sense), head-move to the B head of the matrix BP. This will give (48b). The movement of a small Num to the B head of the lower BP first (see (49b)) is necessitated by the Head Movement Constraint.

(49)a.
```
              BP
             / \
                B'
               / \
            BP     B'
           /\    / \
        Num B   /    \
         :   : NP     B
         du  To :
         :    ↑ kham
         :___:
```
b.
```
              BP
             / \
                B'
               / \
            BP     B'
           /\     /\
          /  B   NP\
       Num  / \ :    B<-
        : Num_j B kham :
       t_j :    :        :
          du___To        :
              :_____:
```

(22)c.
```
              BP
             /\
                B'
               / \
            BP    B'
           / \   /\
        Num  B  NP B_i
         t_j  t_i: / \
                :Num_j B
                :  :   :
              kham du  To
```

This kind of head-to-head **movement** is **independently** needed anyway in the language to account for various nominal modifier expressions and related word order facts. Consider (50).

    (50) ey   duTo   Sobuj **SaRi**
         this **two-cla** green sari
         'these two green saris'

Notice that the **Numeral-Classifier** sequence may occur right after the Det as in (50) or **postnominal**ly as in (51), but never in an intermediate position as in (52).

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(51) ey   Sobuj **SaRi-duTo**
     this green **sari-two-cla**
     'these two green saris'

(52)* ey   Sobuj duTo   **SaRi**
      this green two-cla sari

This **may** be due to the fact that numerated Badges **may** play
left adjunct within BP but, maybe for **FI-related** reasons (of the
kind outlined earlier — see the discussion after (47)), not
within NP proper. It is quite possible that there is a general
constraint prohibiting functional projections from interrupting a
lexical projection. **This** ensures that there is no way to generate
(52). Consider the following trees for further elaboration:

(53)a.   BP   b.   BP
              / \   / \
           Det   B'   Det   B'
            ¦   / \   ¦   /\
           ey NP B   ey NP B
              / \   / \ ¦
            BP   NP BP_i NP $duTo_i$
            ¦   / \   /\
          duTo AP NP   AP NP
               ¦   ¦   ¦   ¦
             Sobuj SaRi   Sobuj SaRi
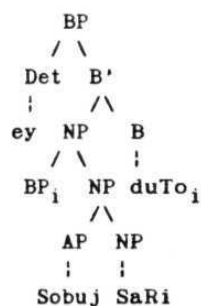
These   are   the **representations** for (50)   and   (51)   respectively
where   *duTo* 'two-cla' head-moves to the B head of the matrix   BP
(as   elaborated in (49)) to derive (51).   Presumably a   "defi-
nite" B has   some features of the sort   discussed by **Murasugi**
(1992) that require checking in **a** sister relation and thus   **trig-**

ger **B-raising** in the overt syntax in **examples** like (53b). We conjecture that definiteness in Bangla and **Hind.** involves "strengthening" one or lore of the sensitive sites D, B, and Det, which we have so far taken to be an acceptable Spec of **BP**, a point **reexamined** below, **All** three are choice points in Bangla and thus may serve, if strengthened, to express **definiteness**. Hindi B is always "strong" (that is, in Chomsky's (1993) system, **PF-visible**) — **medium-strong** rather than super-strong in the context of our notion of strengthening — and thus, not being a choice point, is inert as far as definiteness is concerned .

Notice that the NP *Sobuj SaRi* 'green saris' here is a lexical projection, a fact which protects it from interruption by a functional projection like BP *duTo* 'two-cla'. This reasoning, if correct, provides independent motivation for the existence of a functional projection like BP.

We consider the possiblity that, in continuing to place the Det *ey* in a [Spec, BP] position, we are cleaving to an untenably pre-Abneyan perspective in one crucial detail. Our decision obviously does amount to an exception to the otherwise general pattern of only maximal projections being allowed as specifiers. But we wish to submit that any accout is bound to do something stipulative about Det in South Asian languages. Functional heads like T, Agr, B, and our D (outer case) appear in (at least **su-**

perfcially) **projection-final** positions; Det does not, which **makes**
it at best an untypical functional head if one wishes to treat it
as a functional head at all. Readers who prefer an acount that
says **Num/Q** and Det are heads that do, **untypically** for South Asia,
occupy the **superficially** initial position in their projections
are welcome to mutatis the mutandis in our analysis, and to
begin to construct a response to our worry that theirs is an
equally **question-begging** account. Such a superficial **modifica-**
tion **will** not jeopardize the moves that make our overall analysis
tick. And if a deeper and satisfying revision becomes available
generalizing, say, fron the properties that Det and **Q/Num**
share with A, and conceivably working with a head **movement** mecha-
nism that maps Agr **[MaxP** F] into F-Agr **[MaxP t],** where F is a
functional Head, MaxP is a maximal projection, and Agr a new type
of agreement node that handles these little apparent modifiers of
nominals — then we will of course hail such a revision as con-
tributing to our project of formalizing the nuts and bolts of
saliency and **identification.**

4.10 Principle-Based Parsing

The latest convergence of interests between Natural Lan-
guage Processing (NLP) and pure linguistic research in syntax has
led to the development of a principle-based approach as an alter-
native to one based on rules. Such an approach to NLP may be
viewed as a **computational** application of the syntactic research

perspective **variously** known as **the** Principles and **Parameters** approach or the GB approach. A principle-based (or **parametric)** approach to parsing does not rely on a **complicated,** language-specific and **construction-specific** set of context-free rules but involves the **interaction** of some principles (housed in different modules) with other principles and with the setting of parameters, in the sense of Chomsky, 1981. In Principle-Based Parsing (PBP) as applied to Machine Translation **(MT),** therefore, writing a grammar would **basically** mean stating parametric differences between languages. This **characteristically** linguistic activity thus turns out to be potentially a direct contributor to the enterprise of understanding what it takes to work out a serious and sustainable theory and practice of translation. Thus, our account **links** the parametric approach both to translation and to **parsing.**

The **following** list may serve as a quick reference guide for evaluating the relative advantages of PBP over a rule based **approach.**

1. In the parametric approach, principles interact *deductively* to produce the same result as would a large number of CF rules (see Berwick, 1991 in this connection).

(54) Disadvantages of a Rule Based Approach

1. Involves a complicated set of rules. The ATN based pars-
   ers of Bates (1978) and Wood (1970), for example, handle
   passives as a series of if-then rules and use   register
   assignments and an ordering of rules (see Berwick 1991).

2. This approach does not work in the context of translation,
   because we will need language-specific rules.

3. As & result of 1 and 2, the grammar size becomes formida-
   ble for a MT system.   METAL (Slocum et al 1984), where
   each parser operates multilingually, GETA (Vauquois 1975),
   SUSY (Maas 1984) etc. are some of the examples.

4. As a consequence, an Earley's (1970) algorithm for CF
   languages can quadruple its running time if the grammar
   size is just doubled (Barton 1984).

5. It fails to preserve a modular organization of the gram-
   mar .

6. As Dorr (1991) notes, trying to capture the multiplicative
   effects of linguistic constraints in the form of rules
   results in a failure to separate movement from agreement
   , for example, and the grammar size becomes explosive.

(55) Advantages of a Principle-Based Approach

1. Syntactic structures are derivable by means of formal
   procedures, or deductively, from principles.

2. Does not require language-specific and construction-
   specific context-free rules.

1.For subject-verb agreement we can have rules like: S→NP
NP$_{sg}$ and S→NP $_p$VP $_{p}$ but then we need rules for passive and
agreement also: S>NP $_{sg}$be $_{sg}$VP $_{+en}$ and S>NP be$_{pl}$ VP$_{pl}$]$_{+en}$

3. Modularity **involves building simpler** independent compo-
   nents. language descriptions are reduced in size, allowing
   general conditions to be **factored** out.

4. Modularity **makes** inclusion of new languages in the system
   easier, that is, the system is tore readily extensible.

5. The grammar writer by setting up parametric values has
   unlimited access to the operating principles of the sys-
   tem.

6. Properties **common** to various languages, that is, cross-
   linguistic **generalizations**, are now captured in terms of
   modularized principles.

7. **Multiplicative** effects of constraints are spelled out in
   the **form** of rules. Ve can now have an **underspecified**
   grammar and independent modules that handle movement and
   agreement, for example.

8. The task of the grammar writer is to determine various
   parameter settings and thus we do not need a separate
   grammar for each language. So, adding a language would
   mean merely adding fresh parametric settings, easing the
   burden of the **programmer**.

9. No extensive ordering of the rules is required and, be-
   cause the principles are abstract, a declarative framework
   can be used.

4.10.1 PBP and the Bangla Classifier

   In this section we will look at a particular translation
problem in Bangla and see how a principle-based approach can
handle it. A restricted version of a bidirectionally operating
MT system between Bangla and Hindi will have to carry a parameter
setting regarding the use of Classifiers in Bangla and their
absence in Hindi nominal expressions. An exercise involving such
a restricted operation might seem regressive in a period shaped

by NLP goals based on discourse models. Some scholars night argue that **the only** fruitful NLP task is the analysis of sentences as they **configure** in real speech situations. However, our reading of the current state of affairs suggests that it may not be such a waste to break down our goal of building the ultimate NLP system into **smaller** subgoals. We believe that such a manoeuvre will yield far more encouraging short-term results. Let us now take a look at the expression of definiteness in the examples of **most** immediate interest. The important contrast **is** between the **definite/indefinite example** of (48) similar to (56) below.

(56)a. **boy-[duTo/tinTe]**
   book-[**two-cla/three-cla**]
   '**the** two/three books'

   b. **[duTo/tinTe]** boy
   [two-cla/three-cla] book
   '**the** two/three books'

In (56a), where the noun complex contains a Badge following the noun lexeme proper, we get a definite reading. In (56b), where the Badge material occurs as an independent word consisting of [Nun Badge] and precedes the noun lexeme (which in (56b) is the sole member of the noun complex), we obtain an indefinite reading[1]. The semantics of such **definitizing** seems to involve a

1. Note that *boyTa*, where the Badge in the noun complex has no numeral prefix, behaves identically with respect to definiteness it means 'the **book**' -- and may be considered to imply an understood numeral **'one'**. The corresponding indefinite expression is *EkTa boy* (with the numeral *Ek* **'one'**), not **Ta boy*.

novel versus familiar entity distinction. If we use a direct method, for MTing these fragments into Eindi using finite state transducer machines, it will give us word for word Hindi **equiva-** lents as in (57).

(57)a. kitaabeM do
book-pl two

b. do kitaabeM
two book-pl
'two books'

At some stage of such a direct translation, (57a) will be rewritten as (58) because the (57a) surface word order is unac- ceptable in Hindi:

(58) do kitaabeM

(58) as we can see, is the same as (57b), which means that in Hindi we are unable to capture the difference in definiteness exhibited by (56). In fact (58) will be marked unacceptable as a translation of **(56a).** Hindi, as we know, employs a different set of strategies to express **definiteness**———it cannot strengthen the B site as it has only *B-features,* no B site.

If we assume with **Lieber** (1980), that affixes have separate lexical entries, which is a part of their morphological informa- tion. Bs in Bangla are, therefore, part of the lexicon and have distinct lexical conceptual structures (LCS). Various subcatego- rization **possibilities** of B suggest that its LCS should include a

statement that it **s-selects** a canonical structural realization (Chomsky, 1986a), **canonically** an N (or a **DP/A/Q** etc.) as its **complement.** Full **Interpretation** (Chomsky, 1986a) extends the projection principle to the morphological component and by the same token an affix would carry a theta-grid which percolates to the **dominating** node.

4.10.2 **Computing** Scenes

The discussion so far has provided us with a fairly broad base on which we intend to tackle the problem. There are two sets of issues we will have to address concerning the direction-ality of translation. The general architecture of the system, which we elaborate further in the next section, will constitute a **language-independent** interlingual **(IL) representation** to be acted upon **simultaneously** by two subcomponents before proceeding towards a TL **representation.** One component, which we **call** the Generate Tree Procedure (GENTREE), will provide us with bare syntactic structures (very much **like** the ones we saw in the last two sections) with the help of the **X'-theory** and some other parameters. The other component, which we call the Principle and Parameters Component **(PARACON2),** will host all the principles, the rest of the parameters, and the constraints. These two subcomponents forming a larger component which deals with the syntactic procedures of the system **will** act **interactively** to

produce substitution-ready **IL** representations[1].

We will recommend a bottom-up approach, since a top-down parser (and a parser with a dominant grammar component, more often than not, tends to become one) is not robust **enough** to deal with deviant expressions.

As we mentioned **earlier,** Badges like 7a and *duTo* are like clitics when **postnominal**. We extend the analysis to suggest that an *index transference* mechanism takes place in such cases and the host acquires the index of the clitic. A 7a in the Bangla B crucially contains, apart from other features, a referential feature of its own. Bangla, therefore, has a parameter (that regards B as a clitic), as a part of **PARACON2**, which is absent in Hindi. A feature fusion (and a theta-grid fusion) takes place at the node **dominating** the clitic. This is **made** possible by percolation (of features and theta-grids) triggered by a phonologically real clitic/ affix **like** 7a **(Roeper** 1987). We suggest that whenever such a fusion takes place, that is, the referential index of a cliticized B appears at a **completed** XP phrase, an empty position (which attains a thematic shape once it is out of the IL) is licensed **prenominal**ly (determined by the constituent order parameter of the TL) in the IL representation. This is in

1. This is similar to the model proposed by Dorr to some extent but we will demonstrate shortly how it differs from it, especially 1n terms of possible control structure and knowledge based positions (see Bhattacharya 1993 for a similar discussion).

line with the criterion that every element that appears in a well-formed structure must be licensed (Chomsky 1986a:p93). This licensing fails whenever theta-grid/feature fusion fails to take place, that is, whenever B is thematically empty. The distribution of empty positions also, then, is parametric between these two languages. The constituent structures of a category is decided by a constraint which is a part of the X'-subsystem. Such a constraint will decide that B can have a Noun/Quantifier/Gerund/DP/A/P as its complement to the left; if it does not find one it does not complete the phrase. (59) below lists some of the parameters of Bangla and Hindi and (60) gives a view of how GENTREE and PARACON2 interact.

(59)a. **Parameter** setting for principles of **X'** Module

BANGLA		HINDI	
1. **subj-comp-head**	Order of constituents	1.**subj-comp-head**	
2a.**Det-N-B**		2.**Det-(Num)-N**	
b.**Det-Num-N**			
3. DP/G/A-(N)-B		3. ————————	
4. spec(D):DP	Specifiers	4.**spec(D):DP**	
5. **spec(N):Det-Num-e**		5.**spec(N):Det-Num-Ø**	
6. YES	Clitic Adjunction	6.**NO**	
7. YES	Index Transference	7. **NO**	

(59b) Parameter setting for the distribution of empty categories

BANGLA		HINDI
e_b	Types of empty categories	e_{det} e_{num}

(60)

Step	GENTREE	PARACON2	
I	Tree building; Cliticization; Complete Phrase Procedure	Constraints on agreement and Case! Index Transference	
II	**substitution**	Agreement features check	

This MT **system** would involve two **steps.** During I GENTREE

applies and projects each lexical item to its maximal projection

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(given certain constraints of the complete-phrase stage), attach-es phrases (relative to the Head), **and** predicts empty **elements** (**like** traces in the **prenominal** position for Hindi and **postnominal** for Bangla). This procedure then generates trees which are underspecified as to the value of various features. **PARACON2** then checks on each subtree locally for **well-formedness** and either returns modified structures or rules out certain struc-tures based on principles and constraints.

For step II we then have **substitution-ready** language-independent **IL representations** as inputs which, referring to the TL lexicon, gets substituted appropriately to derive the TL forms. Note that the IL forms can be translated into any TL form which means that you would need exactly one parser and one gener-ator for translating any language couple. Its **extensibility** to other languages is a major advantage of an Interlingual approach.

4.10.2.1 Frames

Frames, we propose, are phrase level **computational** variants of the thematic concept of scening which we claimed (section 1.4.3) determines the modality aspects of a clause. We will now give a simplified picture of how this system, if implemented, might operate. We make use of frames (similar to the **"snapshots"** of Dorr 1991) to show the projection of lexical items and how steps I and II of (60) operate to produce parses and well-formed

TL forms. Parsing, as is evident, is **bottom-up** and **LR.** Lot us **look at** (61a).

(61)a. **chele** Ta
       boy   **cla**
       'the boy'

First *chele* is projected up to N to give **(F1)**

**(F1)**

```
 _____
|   N    |
|   :    |
| chele  |
|_____|
```
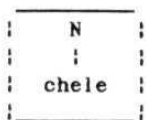
PARACON2 applies to instantiate features N, G, P and is unspecified as to the value of DEF. The **same** procedure applies on *Ta* and we get (F2).

(F2)

```
 _____     _____
| N[3MS] |   | B[S+]  |
|   :    |   |   :    |
| chele  |   | Ta     |
|_____|   |_____|
```

In (F2) the **feature-value** of P is default 3 and G is unspecified for *Ta.* Now by the cliticization parameter associated with the **X'-subsystem,** the **postnominal B** gets cliticized to N and fused features get focused at N through *Index* **Transference.** This is something which is ignored in the **GENTREE** but realized only at the **PARACON2.** N gets projected to its maximal bar level at this stage and we get something **like** (F3).

(F3)

```
 _____
: NP[3MS+] :
:    :      :
:    N      :
:   /\      :
:N   B      :
:_____ :
```
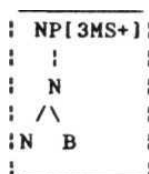
The NP now has the feature set [3MS+]; such an NP, that is, one
with a positive referential value will license an empty Det node
according to the Hindi parameter and constituent ordering re-
strictions. This gives us the following frame (acceptable in an
implementation that does not hug its linguistic basis excessively
closely):

(F4)

```
 _____
:   NP[3MS+] :
:   / \      :
:Det   N     :
:     /\     :
:    N  B    :
:_____ :
```
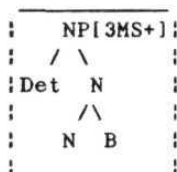
The fact that the Det is to the left is realized from the X-
theory module. The next frame is of the pure IL form which has
been substituted with appropriate lexical items of Hindi, satis-
fying the feature agreement and thematic similarity requirements,
to give the following:

(F5)

```
 _____
:    NP[3MS+] :
:    / \      :
:Det   N      :
: :    :      :
:vah laRkaa   :
:_____  :
```
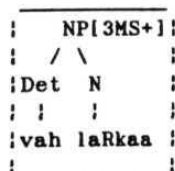
For other **fragments** that we have talked about, a **similar** kind of approach would derive the right surface order of the TL. However, we need to Mention here that if the feature-set **collect**ed at NP has a numerical feature-value then another **prenominal** empty position **will** be created. This **prenominal** position is motivated on independent grounds in both Bangla and Hindi.

In the other direction, that is, translating from Hindi to Bangla, it will suffice to point out that if the SL expression feature-percolates a positive value for the **Definiteness** feature then, by the same token as the pronominal empty position, a **postnominal** empty position will be created which gets substituted during the generation step by a B in Bangla. For example (61b) in Hindi will generate (61c) in Bangla.

> **(61)b.** ve   laRke
>   those boy-PL
>   **'those boys'**
>
> c. oy   **chele-gulo**
>   those **boy-cla**
>   **'those boys'**

In **(61a,b)** both the lexical items in Hindi have the value PL for Number and *ve* has the value + for referential expression. These, then, **collectively** decide to create a cliticized B node containing these **features.** *gulo* in Bangla, as we know, is the classifier marking for plurality which, **thus,** instantiates that node. But, as we shall see in the next section, this is not **all.**

4.10.3 WISE

The **system** as it has been described to be **operating is** not, however, the **complete** story. Consider the following **Bang**la **expressions**:

    (62)a. boy-duTo
            book-two-cla
            'the two books'

       b. oy   duTo   boy
            those **two-cla** book
            'those two **books'**

Notice that (62a) is our earlier example (56a). These two are distinct in their **interpretation**. There is no better way to capture this subtle semantic/ pragmatic difference than to give a fragment of a discourse:

    (63) A: ki   cay
             what **want-Aux**
             'what do you want?'

         B: boy-duTo

         C: oy duTo boy

The former reply (by B) to the query, we **suggest,** involves 'reminder of familiar information' and the latter, **'pointing'.** This difference, unfortunately, is not captured in the Hindi equivalents which return the **same** fora for both these expressions as (64).

```
(64) ve    do   kitaabeM
     those two book-PL
     'those two books'
```

Next, we suggest a Modification of the earlier solution and also explicate our position vis-a-vis the overall architecture of the system.

We would like to suggest[1] that MT be firmly situated in AI and we claim that the parametric approach is the most effective way of doing it. Implicit in such a programme is the proposal that semantics not merely be a subroutine of syntax, but be more flexible regarding possible control structure positions; in other words, semantics be a coroutine of syntax. To achieve such a goal, we propose that an Interlingual (ID approach be adopted and a KB component be introduced in its immediate surrounding in such a way that it feeds directly into the IL representations. (65) below represents the general architectural design of the system.

1. These are worked out in further detail in Bhattacharya (1993)

(65)

```
 ___
:SL :
:___:
  :                 _____
  :                :  _____  :
  :                : :            : :
  :                : :  GENTREE   : :
  :         _____ : :            : :
  :        :       : :_____: :
  :        :       :       ⇧↓        :
  :        :       :  _____   :
  :        :       : :            : :
  :        :       : :  PARACON2  : :
  :        :       : :            : :
  :        :       : :_____: :
  :        :       :_____:
  :        :                ⇧
  ▼        :
 ___       :        _____
:IL :◄─────:       :                 :
:___:      :       :                 :
  :        :       :    W I S E      :
 _▼_       :_____▶:                 :
:TL :              :_____:
:___:
```

!TL !
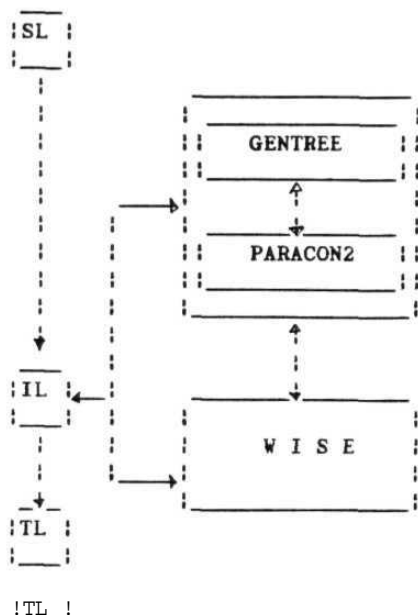
    As a **modification,** we suggest that this KB component acts as a third subcomponent apart from the GENTREE and **PARACON2** that we have already talked about. This component, which we call WISE (Word Intensions and Semantic Equivalents), joins the coroutine of GENTREE and **PARACON2,** so that now we have a three-way coroutining. Such an approach avoids the pitfalls of a model **like** Dorr's **(1991)** which is not adequate to handle **thematically** divergent structures resulting in a mismatch. WISE will thus interact with the other two subcomponents to identify this **seman-**

1. Dorr's model also **involves** as we mentioned earlier, three steps, but our modified model **acheives** the task 1n two steps by predicting the empty positions **in** the first step itself bypassing, thereby, the need to have a third step **involving** movement for generating **TL** surface word order.

tic difference through **AI** techniques like Inferencing. The answer to such puzzles as the ones brought out by (62-64) and (66-67) will, then, **lie** in the KB component (which hosts the principles and **parameters);** and enriching this **component** could, **in** the relatively distant future, possibly lead us somewhere.

VISE is an interactive computer-based KB where the user **is** the domain expert in a position to directly encode knowledge to the KB. It contains at least the following two **components:**

(i) knowledge acquisition/ updating tool/ **component** and

(ii) **application** component

During (i), knowledge is acquired and added by interacting with the domain expert. Once the KB grows, it **will** contain information about possible **configurations**, in IL fora, and about **problem** features like B in Bangla and its absence in Hindi. During (ii),any gaps or faults in reasoning are identified and the new knowledge thus gained is incorporated updating the KB. For example, that the content of B in Bangla is different from the Hindi B is detected and stored as new knowledge early in the system.

Semantic/ pragmatic knowledge is encoded in WISE through high-level knowledge structures. For an efficient use of knowledge, tools are put to use to acquire domain knowledge in relation to specific problems. In this case an enquiry system "**stationery** shop" script can act as a valid **subdomain.** With such **scriptal** knowledge WISE will infer that in Bangla (63C) involves

'pointing' and can be captured in Hindi through an adequate paraphrasable translation.

The need for a KB component is more clearly visible in case of the following:

(66)a. tin-Te   mach
       three-cla fish

   b. tin-khana Bach
      three-cla fish

The former can be ambiguous but not the latter which can only have an inanimate interpretation. A carefully designed KB can provide clues for solutions to such problems. For example, a key word in the context of the utterance (66a) might trigger a script which will disambiguate the expression with respect to the feature of animacy. The expression will accordingly be either translated into the only available Hindi counterpart (67) or be paraphrased.

(67) tiin machliYaaM
     three fish-PL

Thus, the introduction of a KB component is an indispensable tool for an efficient MT system.

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