# The Acquisition of Inflection

# and The Dual Mechanism Model: A Case Study

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The study of syntactic development in children, for all intents and purposes, is reducible to a single minded inquiry into how the very young child (implicitly) knows to distinguish between lexical *stems* and functional *affixes*. Hence, the overriding question burning in the minds of most developmental linguists is morpho-phonological in nature. For instance, it would seem that the child must at least know (*a priori*) the stem before she can then engage in a dual-track process by which ambient separation of the morpho-phonological distinction attributive to past tense is carried out, say, between the paradigmatic representation of the English word *play* vs. *play-ed* */ple-d/* (a dual processing which provokes separation of the */play/*-stem and the */d/*-affix). Otherwise, it could be conceivable for the young child that the pair *play-played* would represent altogether two different lexical stems, and, stored as such, reflect two distinct though relatively similar semantic notions (a single processing): perhaps not unlike what we do find regarding derived words where an otherwise 'two-morpheme' analysis of [*teach*]-*{er}* is processed (tagged, stored and retrieved) as a 'single-morpheme' stem [*teacher*], similar to how the word [*brother*] is stored. (See Clahsen et al. 2001).

In this paper, we limit our discussion to exploring the developmental onset of inflection in child language acquisition and to seeing if such a maturational-based interpretation of the Dual Mechanism Model (DMM) is justified. We believe the findings provided in this study coincide with a maturational-based interpretation consistent with the Dual Mechanism Model, a processing model which seeks to distribute specific language processing tasks related to stem+affix separation to certain areas of the brain-inflection being just one such processing task. In general, the notion of a 'maturational DMM' relies heavily on our current understanding of brain-to-language processing as well as on more general hemispheric/task-oriented notions which lie behind human brain development. For instance, if-as our current understanding of the brain-language relation leads us to believe-the idea that the more substantive elements of language (i.e., lexical stems and derivational formations) are rather pinned to associative-sensitive regions of the brain is correct, coupled with the growing sentiment that there resides a separate region of the brain which partakes in affix partition, then a maturational view of brain-language development would naturally predicate chronological asymmetries between *associative* stem and *rule-based* affix/inflection onsets.

Overall, we conclude that the child language data presented herein indeed do demarcate a dual stage in the acquisition of child English inflection, and that the data could be characterized in two ways: (i) that children gradually gain access to and eventually make tacit use of innate syntactic knowledge, allowing them instinctively to know to separate stem from affix-leading to a *Gradual Development Hypothesis* which shows developmental asymmetry between the

acquisition of lexical vs. functional categories (Radford 1990)-and (ii) that such *prima facie* knowledge naturally arises from *The Dual Mechanism Model,* a processing model that offers the best of both worlds in that it can account for both how the child comes to 'know' lexical stems in the first place, and subsequently, how such stems come to be distinguished and project morpho-phonological material leading to stem vs. affix separation.

Two-and three year old children gradually go through a stage during which they sporadically omit possessives 's, so alternating between saying (e.g.) *Daddy's car* and *Daddy car*. At roughly the same age, children also go through a stage (referred to by Wexler (1994) as the **optional infinitive** stage) during which they sporadically omit the third person singular present tense +s inflection on verbs, so alternating between e.g. *Daddy wants one* and *Daddy want one*. The question addressed in this paper is whether children's omission of both inflections is related and potentially tied to processing factors as determined by the DMM. The question is explored in relation to data provided from a longitudinal case study of one child.

By the very definition of the Dual Mechanism Model, children 'know' that Inflected forms *are not* lexical since such forms are conceptualized and generated in a separate processing modular. The DMM maintains that a clean separation takes place between the *lexical stem* and the *affix*-a stem is 'meaning based' and thus is believed to be housed in the temporal-lobe region of the brain (associative-based ), while the affix is 'abstract' and thus is equated to more formal processing located in the frontal-lobe region (rule-based). The lexicon lists only lexical items (stems) while functional items (affixes) are added at a second stage in the numeration. The DMM credits the Brain/Mind with having two fundamentally different cognitive modes of language processing-this dual mechanism has recently been reported as reflecting inherent qualitative distinctions found between (i) regular verb inflectional morphology (where rule-based *stem+affixes* form a large contingency) and (ii) irregular verb constructions (where full lexical forms seem to be stored as associative chunks). The *Language Faculty* thus provides us with two ways of symbolic representation. (See Pinker 1999, Clahsen 1999 for a review of the DMM).

Radford and Galasso (1998), Galasso (1999/2003c) Radford (1999, 2000, 2004) provide English data showing that children show asymmetric development regarding the complete formation of the dual mechanism model-i.e., while the mechanism for word/stem acquisition may be fully (or at least partially) developed from the outset of early child speech, the more formal mechanisms dealing with affix structures and the stem+affix separation involves a more protracted development. The data provided indicate that English children may initially enter into a 'No Agreement' / 'No Inflection' stage-one of acquisition during which they completely omit (rule-based) Inflections.

The first aspect of inflection we turn to is the potential syntactic relationship that holds between the acquisition of possessive 's and the third person singular +s. Prior to age 3;2 the data show no attested use of either nominal possessive 's or verbal inflected +s in obligatory contexts.

(1) <u>OCCURRENCE IN OBLIGATORY CONTEXTS</u>

| AGE | 3sgPres *s* | Poss 's |
|---|---|---|
| Stage-1 2;3-3;1 | 0/69 (0%) | 0/118 (0%) |
| Stage-2 3;2-3;6 | 72/168 (43%) | 14/60 (23%) |

(2) Stage-1: 'No AGReement-No INFLection' (Radford & Galasso 1998)

Possessives:   That Mommy car. Me dolly. No baby bike. Him name.

Have me shoe. *Iwant* me bottle. It me.

Question:   Where Daddy car? This you pen? What him doing?

Declarative:   Baby have bottle. Car go. Me wet. Me playing. Him dead

*(*Iwant* examples are analyzed as formulaic since no other supportive material

providing for a functional analysis of nominative case is found in the relevant stage).

(3) Stage-2: 'OPtional AGRement -INFLection'

Possessives:   That's Mommy's car. My dolly. Baby's bike. His name.

Question:   Where's Daddy's car? This is your pen? What (is) he doing?

Declarative:   Baby has bottle. Car goes. I'm wet. I'm playing. He's dead.

The OI stage (as suggested by Wexler 1994) would simultaneously incorporate both data sets as described in his initial Optional Infinitive stage-1. Radford & Galasso, however, make a clear

demarcation between the two stages, with the complete absence of any optional functional projections for their stage-1. Overall, children in this initial stage-one of pre-syntactic development are forced into projecting very limited structure. For instance, (and this is not an exhaustive list):

(4) (a) Possessive projections, which rely on an AGReement relation with a nominal INFL, must default to an objective case (e.g. Me show, Mommy car);

(b) Verb projections are limited to VPs without INFLection (hence auxiliary-less question and declarative bare verb stems) (e.g. *What him doing?, Car go.*);

(c) Subjects, which rely on an AGReement with a verbal INFL, must default to having an objective case (e.g., *Me wet*).

Consider the syntactic structures below pairing the two data sets, with stage-one showing no inflectional phrase (IP) agreement. Regarding (4a) above, we follow Kayne's analysis (1994: p.105) in assuming that nominal inflected structures such as *Mommy's car* would contain an IP projection with the structure (5) below (with (5a) having an I nominal head and (5b) a verbal head):

(5) (a) Nominal [IP Mommy [I 's] car]     (b) Verbal [IP Mommy [I 's] driving]

Radford & Galasso (1998) suggest that both nominal possessive *'s* and verbal 3sgPres *+s* are indeed reflexes of the same agreement mechanism. Such a relationship would be expected under a maturational-based interpretation of the DMM given the assumption that both INFL-related structures are theoretically derived from the same unique area of the brain which is ultimately responsible for affix generation and separation. In support of this hypothesis, Schütze and Wexler (1996), Schütze (1997) similarly suggest that both instances of Non-Inflection (i.e. zero possessive 's and verbal +s) may be the singular result of the head of I being underspecified (or potentially, as this study shows, non-specified)-the differing results amounting to whether or not it is a verb or a nominal element that gets underspecified is merely seen in respect to the kind of specifier-agreement features the head carries. In other words, what we are espousing here is a more unifying approach to inflection in two fundamental ways: first, in the sense of Kayne (above), that IP no longer

need be restricted to serving verbal elements only and that nominal elements as well may potentially be expressed as housed within IP; and second, that the mechanism behind IP may in fact reduce to a more unifying process by which new interpretations of the DMM along with maturational hypotheses of brain-to-language development can now enter into the equation. Overall, we could draw similar conclusions regarding the full extent of how inflections manifest across the board pertaining to both nominal and verbal heads-showing a Pre-INFL/AGR stage exhibiting the limited INFL and AGR structure discussed in (4). For the remainder of this paper, we'll take each potential INFL structure in turn and follow its development as indicated by the data.

(6) POTENTIAL INFL STRUCTURES

*Structure: Stage-One / -AGR*        *Structure: Stage-Two /+AGR*

(a) Poss: * [*IP* Mummy [I {-agr}-ø] car]        [IP Mummy [I {+agr}'s] car]

[*IP*   Me   [I   {-agr}]   dolly]                [IP   My   [I   {+agr}] dolly]

(b) Case:   [*IP* Him [I {-agr}] dead]        [IP He [I {+agr}'s] dead]
[*IP* Me [I {-agr}] wet]        [IP I [I {+agr} 'm] wet]

(c) Verb:   [*IP* Baby [I {-agr} have]]...        [IP Baby [I {+agr} has]]...
[*IP* Car [I {-agr}go -ø]]        [IP Car [I {+agr} go-es]]

I believe it is worthwhile to note that similar findings are born out and widely attested in the literature and are consistent with the general notion that language acquisition involves some sort of *incremental feature-building* (Radford 2000)-viz., the notion that if language does proceed in an incremental way, then it should be of little surprise that the more robust and primitive aspects of a language should come on-line and precede more abstract aspects of language-specifically, the default {-agr} feature projections attributed to the VP (by default) come on-line before {+agr} projections attributed to the IP. (Galasso (2003c) describes such early stage-one structures as reduced to simple lexical VPs and NPs). This gives us the flavor of saying that a *maturational scheduling* is behind the chronological ordering of features (much in the spirit of the Brown studies (1973) which sought to show a time-line of affix morpheme development-moving from potentially viable semantic-based participle forms {en}, {ing} through to true rule-based inflectional forms 3PSg {s}, Possessive {s}, Past Tense {ed}.

Next, we turn to the child's earliest use of Case (6b) with respect to overt Copular sentences. If we assume (following Radford 1999) that children build-up morpho-syntactic features (relating to AGR/INFL) incrementally, then, at least hypothetically speaking, there could be a stage during which the functional I head could go non-specified. This pre-INFL stage shows itself in the data when we examine the development of case. Returning to the axiom drawn in (4c), we can provide a straightforward account of why two-and three-year-olds alternate between agreement-less forms like *Me playing* and agreeing forms *I'm playing*. The INFLectional relationship binds Pro(nominal) Case to the AGR features of the head in I. The two types of clause are characterized below:

(7) (a) [$_{IP}$ Me [I {-agr} ø ] playing]     (b) [$_{IP}$ I [I {+agr} 'm ] playing]
    (c) * [$_{IP}$ Me [I {+agr} 'm] playing]    (d) *[$_{IP}$ I [I {-agr} ø ] playing]

* (unattested in the data)

A chronological development is observed to hold between the Nominal INFL of Case on one hand and the Verbal INFL of Tense/Agreement on the other. The table below shows the relative frequency of *I* and *me* subjects in copular sentences. (Prior to age 2;6, Nom Case is virtually non-existent with the earliest forms showing as unanalyzed chunks):

(8) <u>FREQUENCY OF I/ME SUBJECTS IN COPULAR SENTENCES</u>

| AGE | NOMINATIVE *I* | OBJECTIVE *ME* |
| --- | --- | --- |
| 2;6-2;8 | 10/14 (71%) | 4/14 (29%) |
| 2;9 | 15/19 (79%) | 4/19 (21%) |
| 2;10-3;0 | 51/55 (93%) | 4/55 (7%) |
| 3;1-3;6 | 105/111 (95%) | 4/111 (5%) |

(9) (a) Me wet (= I am wet). Me in there (= I am in there). Me car (I am car).

   (b) I am me. I am batman. I'm sick. I am car.

The agreement relationship that binds the +Agr head to Pron(nominal) Case could be argued as having the same structure found in (6):

(10) (a) [$_{IP}$ Me [I {-agr} ø ] wet]          (b) [$_{IP}$ I [I {+agr} 'm ] sick]

In (10b) above, the head of I is marked +AGR and so carries all the relevant syntactic features associated with the Spec-Head configuration (i.e., an overt copular maintaining present Tense and Case features assigned to an overt nominative pronoun). Similar asymmetries of development along with parallels of structure pertaining to possessors likewise manifest in the data. If we look at the earliest first person singular possessor structures, we find adhering to (4a) that Objective *me* possessors dominate early on with only the genitive case *my* forms at first gradually emerging, and then only being mastered over a protracted time of syntactic development. (Prior to the age 2;6, all potential possessor forms carry the default objective case).

(11) FREQUENCY OF FIRST PERSON/SINGULAR POSSESSORS

| AGE | OBJECTIVE ME | GENITIVE MY/MINE |
|---|---|---|
| 2;6-2;8 | 53/55 (96%) | 2/55 (4%) |
| 2;9 | 11/25 (44%) | 14/25 (56%) |
| 2;10 | 4/14 (29%) | 10/14 (71%) |
| 2;11 | 5/24 (21%) | 19/24 (79%) |
| 3;0 | 4/54 (7%) | 50/54 (93%) |
| 3;1-3;6 | 6/231 (3%) | 225/231 (97%) |

When comparing the development of subject-verb agreement to that of possessor agreement, the data suggest that subject-verb agreement emerges sooner than possessor agreement. It is suggested in Radford and Galasso (1998) that this asymmetry in the development of an otherwise unique agreement mechanism may be the result of overt vs. covert features that get encoded on INFL. It may be that the earlier subject-verb agreement is triggered by the overt use of {*'m/am*} encoded in the head of the verbal I. Possessors, on the other hand, may rely on an invisible trigger mechanism in the sense that there is no overt feature encoded on the head of the nominal I. If this generality is anywhere on the right track, one assumption that could have universal consequences for child language acquisition may be that children's INFL mechanism is triggered by the relevant overt head features (much in accordance with Schütze and Wexler's position stated above).

(12) <u>FREQUENCY OF SECOND PERSON POSSESSORS</u>

| AGE | YOU | YOUR |
|-----|-----|------|
| 3;2-3;4 | 14/16 (88%) | 2/16 (12%) |
| 3;5 | 7/34 (21%) | 27/34 (79%) |
| 3;6 | 2/29 (7%) | 27/29 (93%) |

(13) (a) No you train (= It's not your train). No you baby. This is you pen. (3;2)

    (b) That's your car. Close your eyes. Where's your friend? (3;5)

(14) (a) [*IP* You [I {-agr} ø] train]      (b) [IP Your [I {+agr} ø] car]

Third person singular forms *him/his* appear in the data at around the age of 3;6 10/13 (77%) of the relevant structures have an objective *him* possessor, the remaining 3 (23%) having a genitive *his* possessor.

(15) (a) It's him house. It's him hat. (x2) Him eye is broken. Go to him house.

    (b) What's his name? (x3)

(16) (a) [*IP* him [I {-agr} ø] house]      (b) [IP his [I {+agr} ø] name]

When comparing the data (up to age 3;6) of third person singular subjects with that of third person singular possessors, we find a parallel pattern of development showing the default objective case *him* throughout. This finding would be consistent with the view that at the early stage of syntactic development, the head of INFL goes unspecified for both nominal (genitive) and verbal (subject) INFL heads in accordance with (4) above.

    Typical copular clauses with third person singular subjects are given below (taken from data files reaching age 3;6):

    (17) (a) Here's him. Where's him? Him is alright. Him is my friend.

Him is hiding. Him is a big woof-woof. What's him doing?

Where's him going? Him dead. Him my friend. Him blue.

(b) He's happy. He's bad. He is a bad boy. He's in there.

He happy. He a elephant.

25/32 (78%) of the copular sentences with third person singular subjects have objective *him* subjects. This figure parallels *him* possessors which showed a similar 77% rate of usage. Again, these finding are consistent with the view that INFL should be reconsidered and rather thought of in a more holist manner, pertaining to the agreement mechanism that brings about nominal and verbal inflection. Moreover, in refashioning this holistic status of INFL, a single maturational trigger having to do with inflection/agreement comes to mind with the claim that it is responsible not only for the systematic failure and/or gradual development of both nominal and verbal INFL (on the one hand), but also may aid developmental linguistics in understanding more global issues of abstract grammatical functions in child language acquisition (on the other).

We can summarize the data thus far: we find an interesting parallel between the development of both nominal INFL (yielding objective possessor *me/you/him* forms) and verbal INFL (yielding objective *me/him* subjects). These reported INFL non-specifications are produced well up to age 3;6, after which time full mastery of INFL takes hold (for complete data analyses, see Galasso 2003c). Furthermore, (following Kayne) by granting the possessive *'s* structure as having the status of a possessor-agreement inflection, we can better understand the obvious parallels drawn here between the development of s-possessives and s-verbal inflections. These parallels are summed-up as follows: just as possessor agreement fails to be marked early-on in the files (e.g., *Baby bottle, Him name*), a result of the holistic failure of the (nominal) INFL mechanism, so too do subject-verb agreements fail to get marked (e.g. H*im is my friend. Where's him going?*), a result of the holistic failure of the (verbal) INFL mechanism. In conclusion, what the data suggest is that there is a three-stage model of the acquisition of inflection (and not a two-stage model, *pace* Wexler's OI-stage). The first stage in the data provides us with a glance at what a true pre-INFLection stage might look like, a stage characterized by all the classic hallmarks of a lexical stage-one (cf. Radford 1990). Any notion of an Optional Infinitive/Inflectional stage, as these data suggest, must be relegated as having the status of a 'stage-two' in the syntactic development of a child, where INFL related material gradually comes on-line and begins to take-on optional projections. In the final analysis, these findings correspond with both a maturational and holistic treatment of INFL-both of which are compatible with a maturational DMM.

Overall, the data presented in this study suggest that an interesting and previously unreported symmetry holds between the developments of subject-verb agreement structures on one hand and possessor+noun structures on the other. The data show an initial *no inflectional* stage-one

followed by an *optional inflectional* stage-2. The symmetry is explained under the hypothesis that grants INFL a holistic status. The data reveal that leading up to age 2;6, the utterances are completely void of INFLection. At around age 2;6, the data reveal an optional inflectional stage at which alternations emerge between forms like *me car* / *my car*, *Him dead / He is dead,* and *Baby have bottle / Baby has bottle, etc.*

**Notes**

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Following Schütze and Wexler (1996), the notation [+agr] is used as an informal way of indicating that INFL carries a set of person/number features which agree with those of its specifier, and the notation [-agr] serves to indicate that the relevant features are un(der)specified in some way.

**References**

Borer, H. & Wexler, K. (1987) "The maturation of syntax", in T. Roeper & E. Williams (eds.), *Parameter Setting,* 123-172, Dordrecht: Reidel.

Brown, R. (1973) *A First Language: Three early stages*, Harvard University Press.

Chomsky, N. (1981) *Lectures on Government and Binding*, Foris, Dordrecht.

(1995) *The Minimalist Program*, MIT Press.

(1999) "Derivation by Phase", *MIT Working Papers in Linguistics*,18.

(2000) *New Horizons in the Study of Language and Mind*, CUP.

Clahsen, H. (1990) "Constraints on parameter setting: A grammatical analysis of some stages in German child language", *Language Acquisition* 1, 361-391.

(1999) "Lexical entries and rules of language: A multi-disciplinary study of German inflection", *Behavioral and Brain Sciences* 2, 991-1060.

Clahsen, H. Sonnenstuhl, I; and Blevins, J. (2001) "Derivational Morphology in the German mental Lexicon: A Dual Mechanism Account", MS., University of Essex.

Galasso, J. (1999) *The Acquisition of Functional Categories: A Case Study,* Ph.D. Dissertation University of Essex.

(2003a) "Notes on a Research Statement for Child First Language Acquisition". MS., California State University, Northridge.

(2003b) "Towards a Converging Theories Model of Child Language Acquisition: Continuing Discontinuity", (paper no. 2. CSUN).

(2003c) *The Acquisition of Functional Categories*, IULC Publications, Indiana University.

Hoekstra, T. and P. Jordens (1994) "From adjuct to head", in T. Hoekstra and B. Schwarts (eds.) *Language Acquisition Studies in Generative Grammar*, Benjamins, Amsterdam, pp. 119-149.

Kayne, R. (1994) *The Antisymmetry of Syntax*, MIT Press.

Pinker, S. (1999) *Words and Rules,* Basic Books.

Radford, A. (1990) *Syntactic Theory and the Acquisition of English Syntax*, Blackwell Publishers.

(1995) "Phrase structures and functional categories", in P. Fletcher & B. MacWhinney (eds.) *The Handbook of Child Language*, Blackwell, 483-507.

(1997) *Syntactic Theory and the Structure of English*, CUP.

(2000) "Children in search of perfection: Towards a Minimalist Model of Acquisition", *Essex Research Reports in Linguistics* 34.

(2004 In Prep.) *Children's English: Principles-and Parameters Perspectives*, CUP. (MS., University of Essex).

Radford, A. and Galasso, J. (1998) "Children's Possessive Structures: A Case Study", *Essex Research Reports in Linguistics* 19, 37-45.

Schütze, C. (1997*) INFL in child and adult languages: agreement, case and licensing*, Ph.D. Diss., MIT.

Schütze, C. and Wexler, K. (1996) "Subject case licensing and English root infinitives", in A. Sringfellow, D. Cahana-Amitay, E. Hughes, and A. Zukowski (eds.) *Proceedings of the 20th Annual Boston University Conference on Language Development*, Somerville, Mass., Cascadilla, 670-681.

Wakefield, J. and Wilcox, M.J. (1994) "Brain Maturation and Language Acquisition: Theoretical Model and Preliminary Investigation", in D. Maclaughlin and McEwen, S. (eds.), *Proceedings of the*19 *Annual Boston University Conference on Language Development*, Somerville, Mass., Cascadilla, Vol. 2, 643-654.

Wexler, K. (1994) "Optional infinitives, head movement and the economy of derivations in child grammar", in D. Lightfoot and N. Hornstein (eds.), *Verb Movement,* CUP, 305-350.

Wijnen, F. and Bol, G. (1993) "The escape from the optional infinitive stage", in *Papers in Experimental Linguistics,* University of Groningen, 239-48.