

THE APPLICATION OF 'MORF' TO THE STUDY OF THE DEVELOPMENT OF ITALIAN VERB MORPHOLOGY*

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1. Introduction

This study is concerned with the development of Italian morphology in the first stages of language acquisition. It can be understood both as a contribution to the development of computer tools in the study of child language and as a sequel to a series of studies on the acquisition of inflection carried out by Dressler and Makovec-Černe (1995a, b), Dressler and Thornton (1996), Tonelli et al. (1995). The theoretical model of first language acquisition underlying all these studies is functionalist (Dressler 1985, 1996a) and constructivist (Karpf 1990, 1991; Peltzer-Karpf 1993; Karmiloff-Smith 1992, Dressler and Karpf 1995).

The specific model of morphology adopted here has been developed by Dressler et al. (1987); Dressler (1989); Kilani-Schoch (1988), Dressler and Merlini Barbaresi (1994), and thereby differs from approaches to the acquisition of Italian morphology assumed in other works (Bottari et al. 1993; Cipriani et al. 1994) and even from other functionalist approaches (Pizzuto and Caselli 1993, 1994)¹.

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¹ For the acquisition of Italian derivational morphology within the framework of NM see Lo Duca (1990). See, further, Brandi and Cordin (1990) for a study on the acquisition of the lexicon based on principles compatible with NM.

Concerning specifically Italian inflectional morphology, we follow the framework worked out by Dressler and Thornton (1991, 1996) within NM, focusing our interest on the acquisition of verb inflection.

The device we employed for our analysis is the MORF system, a semiautomatic device for morphological tagging of speech data developed in the CHILDES environment (Cappelli et al. 1995) and modified according to the specific purpose of this study.

2. The MORF system

The main characteristics of MORF can be summarized as follows:

- a) MORF programs have been conceived to work with CHAT transcribed files (MacWhinney 1991) with the aim of obtaining the automatic morphological coding of data. The particular advantage of this system is that it has been designed to take into account the non-standard forms in children's utterances (phonologically modified words, neologisms, errors).
- b) MORF works using dictionaries at three levels. By default it uses a children's dictionary, i.e. a dictionary of words actually attested in child transcripts. At a second level, it matches a morphological reference dictionary of the adult language allowing both the morphological labelling of the child's standard forms and the correlation of the child's non-standard forms with the corresponding correct targets. At a third level, a dictionary (the single child dictionary) is created containing all forms produced by the child provided with the respective morphological labels.

In the modified version of the system devised for this paper a set of new codes was added to the 1,900 verb lemmas of the morphological reference dictionary corresponding to the categories proposed for the analysis of Italian verb inflection (see below).

3. The coding system of Italian verbs according to NM

The model of verb inflection developed following the principles of Natural Morphology (Dressler and Thornton 1991, 1996; Dressler 1996b) assumes that:

- 1) sets of verb paradigms, depending on morphological and morphonological generalizations, are grouped into hierarchically organized systems of inflectional classes, i.e. macroclasses, classes, subclasses and microclasses and
- 2) productive microclasses are prototypical and form the core of higher classes.

According to this model, Italian verbs are grouped into two macroclasses, signalled by the thematic vowels /a/ and default /i/ respectively, with a subsystem of classes, subclasses and microclasses and a large number of isolated paradigms.

The nucleus of the first macroclass is the most productive microclass of Italian verb inflection, as represented by the verbs in *-a-re* (with the thematic vowel *-a-*): *parl-a-re* 'to speak', *mangi-a-re* 'to eat'.

To this macroclass belong also parts of the paradigms of six suppletive verbs: *d-a-re* 'to give', *st-a-r-e* 'to stay', *f-/f-a-re/fac(c)-* 'to make', *v-/and-a-re/vad-* 'to go', *s-/sap-e-re/sap(p)-* 'to know' and *av-e-re* 'to have'.

The second macroclass has /i/ as the default thematic vowel. This vowel is the actual thematic vowel of the class represented by the verbs in *-i-re* which comprises the two subclasses exemplified by *sent-i-re* 'to hear' (without radical /isk/ amplification) and by the slightly productive microclass (=subclass) represented by *cap-i-re* 'to understand' (with radical /isk/ amplification):

Pres Ind *sent-o, sent-i, sent-e, sent-ono*;
 Pres Subj *sent-a, sent-ano*; Imp *sent-i!*
 Pres Ind *cap-isc-o, cap-isc-i, cap-isc-e, cap-isc-ono*;
 Pres Subj *cap-isc-a, cap-isc-ano*; Imp *cap-isc-i!*

The second subclass *capisco/capire* is morphotactically more opaque than the subclass *sentire*, because of the /isk/ amplification of the athematic root.

The default thematic vowel /i/ of the second macroclass is replaced in many instances by the thematic vowel /e/ in the unproductive class represented by verbs in *-e-re* with the two subclasses exemplified by *tem-é-re* 'to fear' (with stress on the thematic vowel in the Infinitive) and by *créd-e-re* 'to believe' (with stress on the radical vowel). The first subclass is totally unproductive and comprises various isolated paradigms (eg. *ved-é-re* 'to see', *cad-é-re* 'to fall', *sed-é-re* 'to seat' etc.) and just one mini-microclass (*piac-é-re* 'to like'). The second subclass includes a larger microclass exemplified by *créd-e-re* 'to believe' (1.Sg Pres Ind *cred-o*, Inf *créd-e-re*, Pas Rem *cred-e(-tt)-i*, Past Part *cred-u-to*), some smaller microclasses (eg. *conosc-e-re* 'to know', *rispond-e-re* 'to answer' etc.) and numerous isolated paradigms (eg. *chied-e-re* 'to ask', *b-e-re* 'to drink' etc.).

The system of codes employed for the tagging of the 1,900 verb forms contained in the morphological reference dictionary of MORF according to the classes of Natural Morphology illustrated above is exemplified in the appendix.

4. The data

The data we rely on in this study come from 24 transcriptions of an Italian girl (Sara) between the ages of 18 and 36 months². They were collected in a half-structured play situation, in which the child played with the mother and the investigator. The data were transcribed using the CHAT system and the application of MORF allowed the morphological coding of each verb form with respect to inflectional classes and inflectional categories (Person, Number, Tense and Mood).

Some general information on the transcripts is summarized in Table 1:

² Part of the transcripts analysed here have been used in a study by Ceccherini et al. (1996) on the acquisition of Dim, where more information on the child is included.

Table 1. The Sara corpus

Sessions	01 – 08	09 – 16	17 – 24
Age	1;6.23 to 1;11.16	2;0.30 to 2;5.9	2;6.13 to 3;0.15
No. of utterances	2565	2516	1876
MLU	2.161	2.864	5.717

5. The analysis of the data

As mentioned before, the application of MORF to the data collected for this study allowed the morphological coding of each verb form with respect to inflectional classes (Macroclasses and Subclasses) and inflectional categories (Person, Number, Tense, Mood).

5.1. The acquisition of inflectional classes

Following the theory of Natural Morphology we can deduce (in addition to token frequency effects) two main predictions for the acquisition process:

- 1) what is more productive is learned earlier,
- 2) what is less marked is learned earlier.

As we have just argued, in the inflectional system of Italian the first macro-class (AA) is by far the most productive. In the second macroclass, the most productive subclass (microclass) is the one with /isk/ amplification (ISR) while the other subclasses (INI, ENI, ERI) are unproductive.

Among the regular verbs, the most productive class is the first microclass (AAR) of the first macroclass as illustrated in the following Tables (2 and 3):

Table 2. Regular verbs belonging to subclasses

	types	tokens
AAR	139 (78%)	1782 (82%)
ENI	1 (1%)	21 (1%)
ERI	24 (13%)	248 (12%)
INI	9 (5%)	70 (3%)
ISR	6 (3%)	34 (2%)

Table 3. Total verbs belonging to subclasses

	types	tokens
AA	143 (66%)	2902 (58%)
ERI	41 (19%)	1485 (30%)
ENI	10 (5%)	387 (8%)
INI	15 (7%)	151 (3%)
ISR	6 (3%)	34 (1%)

Table 2 illustrates the frequency of occurrence of the solely regular verbs of each subclass in the child's utterances, whereas in Table 3 irregular verbs (isolated paradigms) are included (added as satellites to the respective regular classes).

As the values indicate, there is a significant difference in the rate of acquisition between the first class verbs (AA) and the second class verbs (ERI, ENI, INI, ISR). The large number of tokens of the AA class in Table 2 - if compared to the small difference of types between AA in Table 2 and AA in Table 3 - reflects the high frequency of six irregular verbs (*dare, stare, fare, andare, sapere, avere*).

Within the second macroclass, it can be noted that there is a rare and late occurrence of the only productive microclass (ISR). This apparently challenging result for the theory of Natural Morphology can be explained as follows:

- 1) it is only slightly productive in adult language;
- 2) it is the only microclass which has an amplification, namely *-isc-* of the root, thus making it longer than the verbal theme, thereby violating an important principle of naturalness, i.e. the principle of iconicity;
- 3) it is morphotactically more opaque than any other verbal microclass in the Present Tense (which is the central tense category and the first acquired by Sara).

Low productivity and violation of the principles of iconicity and morphotactical transparency make this microclass less natural (more marked) than other microclasses. This may explain the fact that forms with /isk/ emerge later than forms without /isk/ within verbs of this microclass, as illustrated in Table 4:

Table 4. Verbs belonging to subclass ISR

		age 1;8.20 – 1;11.16	age 2;3.28 – 2;5.9	age 2;6.13 – 3;0.15
PP	-ito, -ita	4	4	9
Inf	-ire		1	4
Imp	-ivo			1
3.Sg Ind Pres	-isce	1		2
1.Sg Ind Pres	-isco			5
3.Pl Ind Pres	-iscono			3

As Table 4 illustrates, in the first group of examples (sessions 04 to 08) there are 4 PP forms in *-ito* (2 *pulito*, 2 *capito*) and only one form with *-isc-* (*Sara pulisce* 'Sara is cleaning'). Also from sessions 14-16 there are just Past Participle forms in *-ito* (2 *capito*, 1 *pulito*, 1 *finito*) and Infinitive forms in *-ire* (*capire*); only with session 17 do forms in *-isc* become more frequent (3 *capisco*, 1 *capisce*, 2 *capiscono*, 1 *guariscono*, 3 *finisco*, 1 *finisce*).

The other subclass INI in adult conjugation has two microclasses, the more regular and more transparent type (*sentire*, *dormire*, *dormito*) and the less transparent type (*aprire*, *aperto*). Sara in the first sessions avoids the opaque PP forms *aperto*, only in the last session (age 2;11.1) are there two forms of *coperto* from *coprire*:

*SAR: *ma l'ho coperto troppo.*

*SAR: *ho coperto il viso e and +...*

We can explain this strategy adopted by Sara as follows: she has probably acquired the division of the subclass *-ire* into the microclasses only very late and has first generalised the more transparent microclass.

As to the subclass ENI it has a large number of isolated paradigms. Many paradigms and microclasses however differ only in the Passato Remoto which Sara, as far as verbs of this subclass concerns, never produced, or in the PP which Sara used only for 3 verbs (isolated paradigms) all ending with *-uto*: *caduta* (Sara02), *seduta* (Sara03). She also used the irregular form *visto* from *vedere* 'to see' which is an isolated paradigm with very high token frequency and has to be considered a rote-learned form. Thus one could hypothesise that Sara groups different microclasses and paradigms together until she learns the differences. Thus she forms from the microclass *piacere* and the isolated paradigms *cadere* and *parere* one microclass.

5.2. The acquisition of morphological categories

The general prediction of Natural Morphology is that a less marked category is acquired before the corresponding more marked categories.

Among all tenses the Pres is least marked, among the moods the Ind is least marked, with a markedness reversal in the 2.Sg, where the Imperative is less marked than the Indicative. As far as past tenses are concerned, in Italian the perfective aspect is less marked than the imperfective aspect, from which follows that the Pass Pross is less marked than the Imp³. Furthermore the Pass Rem is a stylistically marked form of the perfective aspect (in Trieste, where the girl was born and lives, it is used only in formal style). Among the non-finite forms, the Ger is more marked than the Inf.

Our data show (Table 5)⁴ that these categories are acquired by Sara in accordance with markedness predictions, although we cannot say more about the earliest phases of acquisition because we were not able to record Sara before 18 months.

Table 5. Tenses and moods

session	age	grammatical category
1	1;6.23	1.-3.Sg Pres Ind, 2.Sg Imp*, Inf, Pass Pross
2	1;7.10	1.Pl Pres Ind
3	2;0.30	3.Pl Pres Ind
9	2;1.5	Imp
10	2;2.1	Fut
17	2;6.13	Sub, Ger
23	2;11.1	Pass Rem

* Imp=Imperative

As Table 5 illustrates, from the first session onwards (age 1;6.23) Sara produces not only the 3.Sg of the Pres Ind and the 2.Sg of the Imp, (which are the most unmarked forms) but also the 1.-2.Sg of the Pres Ind. She already uses the Infinitive and the Pass Pross, the least marked past form, which consists of the auxiliary 'have' and the PP (like the English Pres Perf).

In the second session she adds the 1.Pl and in the third session the 3.Pl of the Pres Indi. In session 9 she uses the Imp, in session 10 the Fut. From session 17 Sara produces forms of the Ger and of the Subj. The only form of the Pass Rem is produced in the 23rd session.

5.3. Errors in Sara's production

The last topic we want to briefly address here is the errors characterising Sara's acquisition profile. Sara produced few errors, the only frequent one being the 2.Sg

³ Similar assumptions have been confirmed by works on the development of morphology in Italian L2 (Giacalone 1993, Schmid 1995).

⁴ Giannelli and Manzini 1995, Pizzuto and Caselli 1994, Zenti 1993 for similar results.

of the Imp of the first macroclass *mangi!* 'eat!' instead of the correct *mangia!* (cf. Pizzuto and Caselli 1993: 176). In the first session this error occurred twice compared with 8 correct forms of the same verb, while in session 11 (2;2.1) the same error occurred 4 times as against 2 correct forms. As illustrated below:

	Macroclass I	Macroclass II
2.Sg Imp	-a	-i
2.Sg Pres Ind	-i	-i

the wrong form *mang-i* produced by Sara is identical both with the correct 2.Sg of the Imp of the second macroclass and with the 2.Sg of the Ind of all verbs.

Thus the ending *-i* is in adult language a superstable marker of the 2.Sg of the Ind, whereas *-a* and *-i* are the specific Imp forms of the first and the second macroclass. This means that Sara has, optionally, extended the superstable marker from the Ind to the Imp, which is a symptom of the instability of mood distinctions.

6. Conclusion

In conclusion, we may say that the modified version of the MORF system we have presented in this study has been worthwhile for two reasons. First of all it has proven to be a valuable tool in describing the acquisition of Italian verb inflection in terms of Natural Morphology, secondly the work we did in order to add new codes of Natural Morphology was useful for checking the classification of microclasses and paradigms in adult and child language.

Moreover, Sara's acquisition processes support several concepts of Natural Morphology, such as the precedence of unmarked over marked categories, and the hypothesis of a top-down manner of acquisition. The subdivision of Italian verb inflection into two macroclasses has already been acquired at the beginning of the recordings, but apparently there is no subdivision of the two classes of the second macroclass into its four subclasses and many more microclasses. When Sara acquires the /isk/ expansion of the ISR subclass, the least of these four subclasses is identified, but not the subdivision of the ENI subclass, nor most microclasses of the ERI subclass.

Lastly we can state that the emergence of the conjugation system seems to be guided by the principle of productivity, but it is less important than the parameter of morphotactic transparency.

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Appendix

Coding System of Italian Verbs According to the classes of Natural Morphology

First Macroclass: inf -are

Regular	Subclass AA	Microclass	R 01	e.g. <i>parlare</i> , 1.Sg <i>parlo</i>
Irregular	Subclass AA	Microclass	I 01	<i>dare, stare</i> and some derivatives
	Subclass AA	Isol. paradigm	I 02	<i>fare</i>
	Subclass AA	Isol. paradigm	I 03	<i>andare</i>
	Subclass AA	Isol. paradigm	I 04	<i>sapere</i>
	Subclass AA	Isol. paradigm	I 05	<i>avere</i>

Second Macroclass: inf -ere, -ire

Class -ire I

Subclass INI (without radical -isc amplification):

Subclass INI	Microclass	01	e.g. <i>sentire</i> , 1.Sg <i>sentito</i>
Subclass INI	Microclass	02	e.g. <i>aprire</i>
Subclass INI	Isol. paradigm	03	<i>salire</i>
Subclass INI	Isol. paradigm	04	<i>fuggire</i>
Subclass INI	Isol. paradigm	05	<i>udire</i>
Subclass INI	Isol. paradigm	06	<i>venire</i>
Subclass INI	Isol. paradigm	07	<i>morire</i>
Subclass INI	Fluct. paradigm	08	<i>mentire</i>
Subclass INI	Fluct. paradigm	09	<i>apparire</i>
Subclass INI	Isol. paradigm	10	<i>assalire</i>
Subclass INI	Fluct. Microclass	11	<i>compire</i>
Subclass INI	Isol. paradigm	12	<i>uscire</i>

Class -ire I, Subclass ISR (with radical -isc amplification):

Subclass ISR		01	e.g. <i>capire</i> , 1.Sg <i>capisco</i>
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Class *-ere* ESubclass ENI (with accent on infinitive ending *-ére*)

Subclass ENI	Isol. paradigm	01	<i>temere</i>
Subclass ENI	Isol. paradigm	02	<i>sedere</i>
Subclass ENI	Microclass	03	e.g. <i>piacere</i>
Subclass ENI	Isol. paradigm	04	<i>tenere</i>
Subclass ENI	Isol. paradigm	05	<i>cadere</i>
Subclass ENI	Isol. paradigm	06	<i>volere</i>
Subclass ENI	Isol. paradigm	07	<i>potere</i>
Subclass ENI	Isol. paradigm	08	<i>dovere</i>
Subclass ENI	Isol. paradigm	09	<i>valere</i>
Subclass ENI	Isol. paradigm	10	<i>parere</i>
Subclass ENI	Isol. paradigm	11	<i>persuadere</i>
Subclass ENI	Isol. paradigm	12	<i>dolere</i>
Subclass ENI	Isol. paradigm	13	<i>vedere</i>
Subclass ENI	Isol. paradigm	14	<i>rimanere</i>
Subclass ENI	Isol. paradigm	15	<i>solere</i>
Subclass ENI	Isol. paradigm	16	<i>godere</i>

Class *-ere* ESubclass ERI (without accent on infinitive ending *- / ere*):

Subclass ERI	Microclass	01	e.g. <i>credere</i>
Subclass ERI	Isol. paradigm	02	<i>piovere</i>
Subclass ERI	Isol. paradigm	03	<i>vivere</i>
Subclass ERI	Microclass	04	e.g. <i>conoscere</i>
Subclass ERI	Isol. paradigm	05	<i>nuocere</i>
Subclass ERI	Isol. paradigm	06	<i>bere</i>
Subclass ERI	Isol. paradigm	07	e.g. <i>esistere</i>
Subclass ERI	Isol. paradigm	08	<i>nascere</i>
Subclass ERI	Microclass	09	e.g. <i>chiudere</i>

Subclass ERI	Isol. paradigm	10	<i>chiedere</i>
Subclass ERI	Isol. paradigm	11	<i>concedere</i>
Subclass ERI	Microclass	12	e.g. <i>prendere</i>
Subclass ERI	Microclass	13	e.g. <i>rispondere</i>
Subclass ERI	Isol. paradigm	14	e.g. <i>fondere</i>
Subclass ERI	Isol. paradigm	15	<i>espandere</i>
Subclass ERI	Isol. paradigm	16	<i>scindere</i>
Subclass ERI	Isol. paradigm	17	<i>correre</i>
Subclass ERI	Isol. paradigm	18	<i>annettere</i>
Subclass ERI	Isol. paradigm	19	<i>mettere</i>
Subclass ERI	Isol. paradigm	20	<i>discutere</i>
Subclass ERI	Isol. paradigm	21	<i>affiggere</i>
Subclass ERI	Isol. paradigm	22	<i>dire</i>
Subclass ERI	Microclass	23	e.g. <i>erigere</i>
Subclass ERI	Microclass	24	e.g. <i>leggere</i>
Subclass ERI	Microclass	25	e.g. <i>piangere</i>
Subclass ERI	Microclass	26	e.g. <i>emergere</i>
Subclass ERI	Isol. paradigm	27	<i>stringere</i>
Subclass ERI	Isol. paradigm	28	<i>distinguere</i>
Subclass ERI	Isol. paradigm	29	<i>assumere</i>
Subclass ERI	Isol. paradigm	30	<i>redimere</i>
Subclass ERI	Microclass	31	e.g. <i>togliere</i>
Subclass ERI	Isol. paradigm	32	<i>risolvere</i>
Subclass ERI	Isol. paradigm	33	<i>spegnere</i>
Subclass ERI	Isol. paradigm	34	<i>redigere</i>
Subclass ERI	Isol. paradigm	35	<i>scrivere</i>
Subclass ERI	Isol. paradigm	36	<i>rompere</i>
Subclass ERI	Isol. paradigm	37	<i>esigere</i>
Subclass ERI	Isol. paradigm	38	<i>scuotere</i>

Subclass ERI	Isol. paradigm	39	<i>esprimere</i>
Subclass ERI	Isol. paradigm	40	<i>muovere</i>
Subclass ERI	Isol. paradigm	41	<i>cuocere</i>
Subclass ERI	Isol. paradigm	42	<i>espellere</i>
Subclass ERI	Isol. paradigm	43	<i>essere</i>
Subclass ERI	Isol. paradigm	44	<i>produrre</i>
Subclass ERI	Isol. paradigm	45	<i>trarre</i>
Subclass ERI	Isol. paradigm	46	<i>porre</i>