Noun phrases and postverbal clitic pronouns meet Lambek's pregroups in French

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full paper

Abstract : This paper is the first part of a more comprehensive work on the agreement in gender and number in French with the tool of Lambek's pregroups. This work continues the typing given in [BL01]. Here are proposed the noun phrase where the agreement is required for all words within the phrase and postverbal clitic pronouns used with the imperative where it is not necessary.

Keywords : Computational linguistic, pregroups, noun phrase, clitic pronoun, imperative

1   Introduction

J. Lambek proposes pregroups [Lam99] as an algebraic tool for analysing natural languages. Elements of pregroups, called types, are assigned to single words. The string of types assigned to a string of words is then transformed by calculations. The string of words is considered as a sentence if, and only if, the string of types is transformed into a sentence type by the laws of the pregroups.

The pregroup depends on the actual language considered. It has been applied with success on fragments of English [Lam99], French [BL01], German [Lam00] [LP02a] [LP02b] and Italien [CL01].

One starts with the monoid $(G, \cdot, 1)$ of *basic types* which are often common to several languages so that:

$$a1 = a = 1a$$
$$(ab)c = a(bc)$$

Then, one adds a partial order relation on basic types which is supposed to be reflexive, transitive and antisymetric:

$$\frac{}{a \to a} \qquad \frac{a \to b \; b \to c}{a \to c} \qquad \frac{a \to b \; b \to a}{a = b}$$

The partial order is also applied to string ot types:

$$\frac{a \to b \qquad c \to d}{ac \to bd} \quad \textit{(compatibility of the order}$$
$$\textit{with the concatenation)}$$

A pregroup is a partial ordered monoid with two operators of adjunction $(-)^\ell$ and $(-)^r$ respecting:

$$a^\ell a \to 1 \quad aa^r \to 1 \quad (contraction)$$
$$1 \to aa^\ell \quad 1 \to a^r a \quad (expansion)$$

For calculations only contraction rules are needed. Expansion rules are only used to prove properties like:

$$1^\ell = 1 \quad 1^r = 1$$
$$(ab)^\ell = b^\ell a^\ell \quad (ab)^r = b^r a^r \qquad (type\ closure)$$
$$a \to b \Leftrightarrow b^\ell \to a^\ell \quad a \to b \Leftrightarrow b^r \to a^r \quad (contravariance)$$

A *type* is a string of simple types $a_1 a_2 \dots a_n$. One notices easily a simple type is a type if $n = 1$. If $n = 0$, the empty string is noted 1 according to the usual mathematical convention.

The system is based on the fact that the verb is the core of the sentence: it naturally introduces the type s of the declarative sentence.

In the sentence *Jean mange*, the verb is waiting for a subject. As the type n is assigned to nouns, the type $n^r s$ is also assigned to the verb.

$$\begin{array}{cc} Jean & mange \\ n & n^r s \end{array} \quad : n\,(n^r s) \to s$$

The bracket means there is a possible reduction between two types into the empty string[1]. If the verb is waiting for an object of type o, then it receives the type $n^r s o^\ell$.

$$\begin{array}{ccc} Jean & mange & \underbrace{une\ pomme} \\ n & n^r s o^\ell & o \end{array} \quad : n\,(n^r s o^\ell)\,o \to 1 s 1 = s$$

Moreover, a convention is added for each basic type x, $\hat{x} \to x \to \bar{x} \to \bar{\bar{x}}$. The hat ^ and the bar $-$ are a notation to get new types[2]. In this way, it is possible to obtain easily and automatically next types according to the partial order and a semantic link can be kept between those types. It will be very useful later.

The difference between each language is only in the formation of the compound types which are assigned to words. Actually, word order is not necessarily the same. The type of a given word is determined by its nature and the place it is supposed to have compared to other words of the sentence. That's why the type of a given word in a given situation can be different according to the considered language. For example, compare the case of the clitic pronoun for the same sentence in English and in French:

$$\begin{array}{cc} Je\ \underline{le\ vois} & I\ see\ \underline{him} \\ \bar{\imath} o^{\ell\ell} \bar{\imath}^\ell & o \end{array}$$

This paper presents a way to handle the noun phrase more precisely than in [BL01] including several adjectives, the definite and undefinite articles and the agreement in gender and number. A model

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[1] This notation was used first by Z. Harris [Har66]

[2] The origin of the bar comes from the $\bar{X}$-theory of Chomsky and Jackendoff [Jac77] and the hat appears first in [LP02a].

for postverbal pronoun clitics is proposed in order to complete [BL01] about clitic pronouns where agreement is not necessary.

2 Noun phrases

The French noun phrases depend on gender and number. They have type $\boldsymbol{n}_{gn}$. Here the gender g can be m (masculine) or f (feminine). The number n has two singulars, s and s', and a plural p. The value s of the subscript n stands for a singular phrase whose first letter is a consonant, s' for a singular phrase whose first letter is a vowel.

The noun phrases considered here are composed of a determiner, which can be a definite article (*le*, *la*, *l'*, *les*) or an indefinite article (*un*, *une*, *des*), a count noun or a mass noun and eventually some adjectives. Adjectives can occur between the determiner and the noun as attributive or just after the noun as postpositive. All the words of a noun phrase are declined according to gender and number.

For example:

masculine singular	*le / un petit chat noir*
masculine plural	*les / des petits chats noirs*
feminine singular	*la / une petite grenouille verte*
feminine plural	*les / des petites grenouilles vertes*

The following table lists determiners according to different cases of noun they precede.

determiners	definite	indefinite	partitive
masculine singular	*le*, *l'*	*un*	*du, de l'*
feminine singular	*la*, *l'*	*une*	*de la, de l'*
plural	*les*	*des*	—

The count nouns have the type $\boldsymbol{c}_{gn}$ and the mass nouns the type $\boldsymbol{m}_{gn}$ where the value of g and n depends on the particular noun and is given in the dictionary.

Some nouns are both mass and count nouns often with different meanings.

The articles preceeding a count noun are typed as following:

un	$\hat{\boldsymbol{c}}_{ms'}\boldsymbol{c}^{\ell}_{mn}$	where $n = s,s'$
une	$\hat{\boldsymbol{c}}_{fs'}\boldsymbol{c}^{\ell}_{fn}$	where $n = s,s'$
des	$\hat{\boldsymbol{c}}_{gp}\boldsymbol{c}^{\ell}_{gp}$	where $g = m,f$
le	$\hat{\boldsymbol{c}}_{ms}\boldsymbol{c}^{\ell}_{ms}$	
la	$\hat{\boldsymbol{c}}_{fs}\boldsymbol{c}^{\ell}_{fs}$	
l'	$\hat{\boldsymbol{c}}_{gs}\boldsymbol{c}^{\ell}_{gn}$	where $g = m,f$ and $n = s,s'$
les	$\hat{\boldsymbol{c}}_{gp}\boldsymbol{c}^{\ell}_{gp}$	where $g = m,f$

It is assumed that $\hat{x}_{gn} \rightarrow \boldsymbol{n}_{gn}$ where $x = \boldsymbol{c}, \boldsymbol{m}$ and $g = m, f$ and $n = s, s', p$.

$$\underset{\text{le}}{} \quad \underset{\text{chat}}{} \qquad\qquad \underset{\text{un}}{} \quad \underset{\text{avion}}{}$$
$$(\hat{c}_{ms}\underbrace{c^{\ell}_{ms}})\,c_{ms} \to \hat{c}_{ms} \to n_{ms} \quad (\hat{c}_{ms'}\underbrace{c^{\ell}_{ms'}})\,c_{ms'} \to \hat{c}_{ms'} \to n_{ms'}$$

There are nouns that begin with a vowel like *arbre, avion* or with an aspirate *h* like *homme* but not like *haricot*. In this case, the vowel of the definite article has to be elided and replaced by an apostrophe to avoid a hiatus.

$$\overset{*}{} \underset{\text{le}}{} \quad \underset{\text{avion}}{} \qquad\qquad \underset{\text{l'}}{} \quad \underset{\text{avion}}{}$$
$$(\hat{c}_{ms}\underbrace{c^{\ell}_{ms}})\,c_{ms'} \qquad\qquad (\hat{c}_{ms}\underbrace{c^{\ell}_{ms'}})\,c_{ms'} \to \hat{c}_{ms} \to n_{ms}$$

This situation appears only in the singular with definite articles.

The noun phrases built with a *mass noun* are introduced by the preposition *de*: *je mange de la confiture*, *je bois de l'eau*. But the sentence * *je mange de le pain* is replaced by *je mange du pain* where *du* is equivalent to * *de le* which is incorrect due to the pronunciation. A mass noun phrase appears only in the singular and its determiner is always definite.

The articles and the prepositions used in mass noun phrases are defined as following:

$$
\begin{array}{lll}
\text{la} & \hat{m}_{fs}m^{\ell}_{fs} & \\
\text{l'} & \hat{m}_{gs}m^{\ell}_{gn} & \text{where } g = m,f \text{ and } n = s,s' \\
\text{de} & n_{gs}\hat{m}^{\ell}_{gn} & \text{where either } n = s,s' \text{ if } g = f \text{ or } n = s' \text{ if } g = m \\
\text{du} & n_{ms}m^{\ell}_{ms} &
\end{array}
$$

Types are easily applied to the following examples and counter-example:

$$\underset{\text{de}}{} \quad \underset{\text{la}}{} \quad \underset{\text{farine}}{}$$
$$(n_{fs}\underbrace{\hat{m}^{\ell}_{fs}})\,(\underbrace{\hat{m}_{fs}m^{\ell}_{fs}})\,m_{fs} \quad \to n_{fs}$$

$$\underset{\text{de}}{} \quad \underset{\text{l'}}{} \quad \underset{\text{eau}}{}$$
$$(n_{fs}\underbrace{\hat{m}^{\ell}_{fs}})\,(\underbrace{\hat{m}_{fs}m^{\ell}_{fs'}})\,m_{fs'} \quad \to n_{fs}$$

$$\underset{\text{du}}{} \quad \underset{\text{pain}}{}$$
$$(n_{ms}\underbrace{m^{\ell}_{ms}})\,m_{ms} \to n_{ms}$$

$$\overset{*}{} \underset{\text{de}}{} \quad \underset{\text{les}}{} \quad \underset{\text{chats}}{}$$
$$(n_{ms}\underbrace{\hat{m}^{\ell}_{ms}})\,(\underbrace{\hat{c}_{mp}c^{\ell}_{mp}})\,c_{mp}$$

The adjectives in a French noun phrase can be attributive, when they are placed before the noun, or postpositive, when they are placed just after the noun they qualify. There can be several of both in the noun phrase. There can be also some other words between these adjectives like coordinating conjunctions (*et*, *ou*) and adverbs (*très*, *plus*) or some commas. But here, neither coordinating conjunctions, adverbs nor commas are handled, so the study is reduced to several attributive adjectives and at most one postpositive adjective in a noun phrase. In [BL01], adjectives were not considered in noun phrases.

Some adjectives can only be attributive, some only postpositive. It seems there is no general rule to classify French adjectives referring to their size, to their meaning, to their goal or something else

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[AG99] like in German [LP02a]. It is supposed that the available positions of a given adjective in the noun phrase are known.

Comparing the noun phrases *le beau petit chat* and ** le petit beau chat*, it appears that the order of the both adjectives *petit* and *beau* is important. So it is necessary to consider a kind of *hierarchy* in the case of several attributive adjectives to respect their order in a noun phrase. The hierarchy of a given adjective is assumed to be known. Two adjectives within the same hierarchy are commutative. Different levels for the hierarchy are defined. The level 0 is used for the noun and the eventually postpositive adjective. At least two levels, 1 and 2, are necessary for attributive adjectives.

It is assumed that:

$$x_{gn0} \rightarrow x_{gn1} \rightarrow x_{gn2} \rightarrow x_{gn} \ where \ x = \boldsymbol{c}, \boldsymbol{m} \ and \ g = m, f \ and \ n = s, s', p.$$

It is possible that more hierarchy levels will be needed one day. They can be then added very easily in the partial order of the types.

Here is an example to illustrate the hierarchy of adjectives:

$$\begin{array}{ccccc} le & beau & petit & chat & noir \end{array}$$
$$(\hat{\boldsymbol{c}}_{ms}\underline{\boldsymbol{c}^{\ell}_{ms}})(\boldsymbol{c}_{ms2}\underline{\boldsymbol{c}^{\ell}_{ms2}})(\boldsymbol{c}_{ms1}\underline{\boldsymbol{c}^{\ell}_{ms1}})(\underline{\boldsymbol{c}_{ms0}})(\underline{\boldsymbol{c}^{r}_{ms0}\boldsymbol{c}_{ms0}}) \quad \rightarrow \hat{\boldsymbol{c}}_{ms} \rightarrow \boldsymbol{n}_{ms}$$

There could be another way to do reductions in this example, but it doesn't yield the type $\boldsymbol{n}_{ms}$:

$$(\hat{\boldsymbol{c}}_{ms}\underline{\boldsymbol{c}^{\ell}_{ms'}})(\boldsymbol{c}_{ms2}\underline{\boldsymbol{c}^{\ell}_{ms2}})(\boldsymbol{c}_{ms1}\underline{\boldsymbol{c}^{\ell}_{ms1}})(\boldsymbol{c}_{ms0})(\underline{\boldsymbol{c}^{r}_{ms0}}\boldsymbol{c}_{ms0})$$

Types of adjectives are composed of two single types whose *number* can be different. For example, *bel* is a masculine singular adjective beginning with a consonant which can only be followed by a masculine singular word (adjective or noun) beginning with a vowel, hence the type $\boldsymbol{c}_{ms2}\boldsymbol{c}^{\ell}_{ms'2}$.

$$\begin{array}{ccc} \text{*} \ le & beau & avion \end{array}$$
$$(\hat{\boldsymbol{c}}_{ms}\underline{\boldsymbol{c}^{\ell}_{fs}}) \ (\boldsymbol{c}_{fs2} \ \underline{\boldsymbol{c}^{\ell}_{fs2}}) \ \boldsymbol{c}_{fs'0}$$

$$\begin{array}{ccc} le & bel & avion \end{array}$$
$$(\hat{\boldsymbol{c}}_{ms}\underline{\boldsymbol{c}^{\ell}_{fs}}) \ (\boldsymbol{c}_{fs2}\underline{\boldsymbol{c}^{\ell}_{fs'2}}) \ \boldsymbol{c}_{fs'0} \quad \rightarrow \hat{\boldsymbol{c}}_{ms} \rightarrow \boldsymbol{n}_{ms}$$

Notice that the count noun has a new type $\boldsymbol{c}_{gn0}$ which is in fact a subtype of its original type $\boldsymbol{c}_{gn}$. So, if there is no adjective in a noun phrase, the latter type can always be used.

The way of defining types for adjectives in mass noun phrases is the same as for count noun phrases, except that the type $\boldsymbol{c}$ is replaced by $\boldsymbol{m}$.

$$\underset{(n_{ms}\underbrace{m^{\ell}_{ms}})}{du}\ \underset{(m_{ms1}\underbrace{m^{\ell}_{ms1}})}{bon}\ \underset{m_{ms0}}{pain}\ \underset{(m^{r}_{ms0}m_{ms0})}{frais}$$

A noun phrase can have a function of an object, so it is assumed that:

$n_{gn} \to o_{gn} \to o$ where o is the basic for an object, $g = m, f$ and $n = s, s', p$.

A noun phrase is sometimes introduced by a preposition like *à*. This preposition can introduce an indirect object or an adverbial phrase of location. Types ωo^{ℓ} and λo^{ℓ} are defined as possible types for *à* [BL01].

$$\textit{à Jean} \qquad (\omega o^{\ell})\, n_{ms} \to (\omega o^{\ell})\, o_{ms} \to (\omega o^{\ell})\, \underbrace{o} \to \omega$$

$$\textit{à la plage} \quad (\lambda o^{\ell})(\hat{c}_{fs}\underbrace{c^{\ell}_{fs}})\, c_{fs0} \to (\lambda o^{\ell})\, \hat{c}_{fs} \to (\lambda o^{\ell})\, n_{fs} \to (\lambda o^{\ell})\, \underbrace{o} \to \lambda$$

$$\textit{à la poule} \quad (\omega o^{\ell})\, (\hat{c}_{fs}\underbrace{c^{\ell}_{fs}})\, c_{fs0} \to (\omega o^{\ell})\, \hat{c}_{fs} \to (\omega o^{\ell})\, n_{fs} \to (\omega o^{\ell})\, \underbrace{o} \to \omega$$

For another problem of pronunciation, the articles *le* and *les* can't follow the preposition *à*. The expressions * *à le* and * *à les* are respectively replaced by *au* and *aux*.

$$\textit{au chat} \qquad (\omega \underbrace{c^{\ell}_{ms}})\, c_{ms0} \qquad \to \omega \qquad \text{where } \textit{au} \text{ stands for } {}^* \textit{à le}$$

$$\textit{aux chats} \qquad (\omega \underbrace{c^{\ell}_{mp}})\, c_{mp0} \qquad \to \omega \qquad \text{where } \textit{aux} \text{ stands for } {}^* \textit{à les (masculine plural)}$$

$$\textit{aux poules} \qquad (\omega \underbrace{c^{\ell}_{fp}})\, c_{fp0} \qquad \to \omega \qquad \text{where } \textit{aux} \text{ stands for } {}^* \textit{à les (feminine plural)}$$

When *au* is used as a locative preposition, the type ω just has to be replaced by λ.

3 Verbs in the imperative tense and postverbal clitic pronouns

As said before, the aim of calculating with Lambek's pregroups is to obtain the type of a sentence. The type s stands for a declarative sentence whatever the tense. Define a type s_8 such that $s_8 \to s$ which represents a declarative sentence in tense of the imperative [3]. The negation with imperative is not considered here.

The imperative does not require a subject and has only three persons of conjugation: the second of the singular (*prends*), the first and the second of the plural (*prenons*, *prenez*).

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[3] Several types s_i for different tenses have been defined in [BL01].

Metarule 1 *If the type of the infinitive of a verb is i, then the type of an imperative form of this verb, whatever its person, is s_8.*

If the type of the infinitive of a verb is ix^ℓ, then the type of an imperative form of this verb, whatever its person, is $s_8\bar{x}^\ell$ where $x = o, \omega, \nu, \lambda$ or λ'.

If the type of the infinitive of a verb is $ix^\ell\bar{y}^\ell$, then the type of an imperative form of this verb, whatever its person, is $s_8 x^\ell \bar{y}^\ell$ where $x = o$ or ω and $y = o, \omega$ or ν and $x \neq y$.

Each case of the metarule can be illustrated as following:

$$\begin{array}{cc} viens\ ! & mange\ \underbrace{la\ pomme}\ ! \\ s_8 \to s & (s_8 \underbrace{\bar{o}^\ell})\ \ o_{fs} \quad \to s_8 \to s \end{array}$$

$$donne\ \underbrace{la\ pomme}\ \underbrace{à\ Jean}\ ! \\ (s_8 \omega^\ell \bar{o}^\ell)\ \ o_{fs} \quad \omega \qquad \to s_8 \to s$$

In French, postverbal clitic pronouns are only used with verbs in tense of non-negative imperative (*dis-lui, vas-y, donnez-lui une pomme*).

The two clitic pronouns *en* and *y* replace noun phrases which are respectively introduced by the prepositions *de* and *à*. These noun phrases can either be an indirect object complement or an adverbial phrase of location. But *en* is mostly used as a partitive clitic pronoun and *y* as a locative clitic pronoun.

In the imperative, an accusative clitic pronoun always follows immediately the verb (*donne-le*). The partitive clitic pronoun *en* is always the last (*prends-en, donne-lui-en*). Accusative and partitive clitic pronouns can't occur together in a sentence (** donne-le en*). The postverbal dative clitic pronoun, when it is not the only clitic pronoun, comes then either after the accusative or before the partitive (*donne-le-lui, donne-lui-en*). Two clitic pronouns of the same type can't be the complements of the same verb (** donne-le-la*). Similarly to the treatment of italian postverbal clitic pronouns in [CL01], assign the following types:

Accusative	*le, la, les* : $\bar{o}, \bar{o}\omega\bar{\omega}^\ell$
Dative	*lui, leur* : $\bar{\omega}, \bar{\omega}o\nu^\ell$
Locative	*y* : λ'
Partitive	*en* : ν

The case of the reflexive clitic pronouns is not considered here where *moi, toi, nous* and *vous* can be accusative or dative postverbal clitic pronouns. Indeed, each of them can't match with some persons: *prends-toi un livre, prends-nous un livre, prends-lui un livre* but not ** prends-vous un livre*. To handle

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those particular cases, the typing of the finite form of the verb could be done using subtypes of s_t, o and ω based on the person.

$$
\begin{array}{ll}
\textit{mange - la} & \textit{obéis - lui} \\
(s_8\bar{o}^\ell)\,\bar{o} \qquad \rightarrow s_8 & (s_8\bar{\omega}^\ell)\,\bar{\omega} \qquad \rightarrow s_8
\end{array}
$$

$$
\begin{array}{ll}
\textit{donnons - lui }\underbrace{\textit{la pomme}} & \textit{donne - le }\underbrace{\textit{à Jean}} \\
(s_8 o^\ell \bar{\omega}^\ell)\,\bar{\omega} \quad o_{fs} \quad \rightarrow s_8 & (s_8 \omega^\ell \bar{o}^\ell)\,\bar{o} \quad \omega \quad \rightarrow s_8
\end{array}
$$

$$
\begin{array}{ll}
\textit{donnez - lui - en} & \textit{donnons - le - lui} \\
(s_8 o^\ell \bar{\omega}^\ell)(\bar{\omega} o \nu^\ell)\,\nu \quad \rightarrow s_8 & (s_8 \omega^\ell \bar{o}^\ell)(\bar{o}\omega\bar{\omega}^\ell)\,\bar{\omega} \quad \rightarrow s_8
\end{array}
$$

Like for the noun phrases, some problems of hiatus can appear because there are some finite forms in the imperative which end with a vowel *e* and some clitic pronouns which begin with a vowel, *en* and *y*.

In French, the verbs, except the auxiliaries *avoir* and *être*, are divided into three groups. The first group is composed of verbs whose infinitive ends with *-er* like *donner*, the second by verbs whose infinitive ends with *-ir* and whose present participle ends with *-issant* like *finir* with *finissant*, the third is composed of the remaining.

The conjugation of the verbs of the second and third groups in the imperative is like *prends, prenons, prenez* where the end is always a *s* or a *z*. So, there is no problem when the partitive clitic pronoun *en* is used : *prends-en*, *prenons-en*, *prenez-en*.

But, for the first group, the conjugation is like *donne*, *donnons*, *donnez*. So, it appears that * *donne - en* is incorrect because of the pronunciation. A *s* is added to avoid the hiatus so that the correct form is *donnes - en*. The dictionary will indicate to which of the three groups a verb belongs.

Metarule 2 *If a verb belongs to the first group, the finite form of this verb at the second person of the singular has type:*

- $s_8\bar{\nu}^\ell$ *if it ends with the letter* s

- $s_8\bar{o}^\ell$ *else.*

The finite forms of the verbs of the first group whose person is either the first or the second of the plural and the verbs of the second and third group at the tense of the imperative have the two types $s_8\bar{o}^\ell$ *and* $s_8\bar{\nu}^\ell$.

One example of a third group verb:

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prendre: third group

prends - le	*prends - en*
$(s_8 \bar{o})\, \bar{o}$	$(s_8 \bar{\nu})\, \nu$

For the verbs of the first group, the types for the persons of plural are both available:

donner: first group

donnons - le	*donnons - en*
$(s_8 \bar{o})\, \bar{o}$	$(s_8 \bar{\nu})\, \nu$

But for the second person of singular of the verbs of the first group in the imperative, the two cases have to be distinguished:

donne - le	*donnes - en*
$(s_8 \bar{o})\, \bar{o}$	$(s_8 \bar{\nu})\, \nu$

so that the following cases can be avoided:

* *donne - en*	* *donnes - le*
$(s_8\, \bar{o})\, \nu$	$(s_8\, \bar{\nu})\, o$

The bar $-$ is added on the last component of the type of the verb to avoid that a dative could precede an accusative:

* *donne - lui - le*
$$(s_8\; o^\ell \bar{\varpi}^\ell)\; \bar{\varpi}\; \bar{o}$$

and partitive to precede dative:

* *donnes - en - lui*
$$(s_8\; \omega^\ell \bar{\nu}^\ell)\; \nu\; \bar{\varpi}$$

but to accept:

donnes - en $\underbrace{à\ Jean}$
$$(s_8 \omega^\ell \bar{\nu}^\ell)\, \nu\quad \omega$$

The imperative of *avoir*, *être*, *savoir* et *vouloir* are irregular:

- *avoir* (auxiliary): *aie*, *ayons*, *ayez*

- *être* (auxiliary): *sois*, *soyons*, *soyez*

- *savoir* (third group): *sache*, *sachons*, *sachez*

- *vouloir* (third group): *veuille*, *veuillons*, *veuillez*

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In the imperative, the verb *être* behaves like a verb of the third group, whereas the three other exceptions, *avoir*, *savoir* and *vouloir*, behave like verbs of the first group.

The verb *aller* belongs to the first group. Its conjugation in the imperative is *va*, *allons*, *allez*. Like all verbs of the first group, the two cases of the second person of the singular have to be distinguished:

$$allons \; \underbrace{\text{à la plage}} \; ! \qquad allons \text{-} y \; !$$
$$(s_8 \underbrace{\bar{\lambda}^\ell}) \; \underbrace{\lambda} \qquad (s_8 \underbrace{\bar{\lambda}'^\ell}) \, \underbrace{\lambda'}$$

$$va \; \underbrace{\text{à la plage}} \; ! \qquad vas \text{-} y \; !$$
$$(s_8 \underbrace{\bar{\lambda}^\ell}) \; \underbrace{\lambda} \qquad (s_8 \underbrace{\bar{\lambda}'^\ell}) \, \underbrace{\lambda'}$$

$$* \; vas \; \underbrace{\text{à la plage}} \; ! \qquad * \; va \text{-} y \; !$$
$$(s_8 \underbrace{\bar{\lambda}'^\ell}) \; \underbrace{\lambda} \qquad (s_8 \underbrace{\bar{\lambda}^\ell}) \, \underbrace{\lambda'}$$

4   Future work

The agreement in gender and number has been introduced here for French in the noun phrase. It will be later necessary in the verb phrase where the clitic pronoun can influence the ending of the past participle of a verb. The case of reflexive verbs has to be considered carefully: the agreement in gender and number is sometimes required, sometimes not. The stative verbs need another special treatment. The negation is another problem which is not as easily disposed of as in German [LP02b].

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