



Cognitive sciences and variants:
Commedia, Rime and the poetical works of Giacomo da Lentini

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This paper is based on the fact that some variants or errors in the traditional versions of a work are attributable to the same cognitive processes that are involved in the process of copying.¹

¹ It has often been necessary to compare philology to linguistics and the neuro-sciences and many philologists such as Ascoli, Monaci, Timpanaro and Segre recognize the importance of evaluating the cognitive processes involved in the act of copying. Roncaglia, in his *Principi e applicazioni di critica testuale*, explains that each copyist has a coefficient of error frequency, which varies according to his ability, attention and the moment in which the copy is made, and that “*un copista di media qualità commette almeno un errore a pagina*”.

During the act of copying the subject reads a part of the text, memorizes it, mentally dictates it to himself and then writes it down. The process is summed up by Roncaglia as follows:

- 1) reading (the phase of the exemplar) the level of the model the phase of the base text model the stage of the model
- 2) transition from the phase of the exemplar to the phase of the copy
- 3) memorization
- 4) interior dictation
- 5) writing
- 6) transition from the phase of the copy to the phase of the exemplar

Through each of these phases there is a progressive simplification and trivialization as the mind tends to focus on the most basic aspects and to neglect the rest, which leads to a series of variants or genuine mistakes. Reading and memorization can be inaccurate; in the interior dictation phase, even if the reading and memorization were correct, the copyist tends to express the concepts according to his own lexical knowledge; in the transition from the phase of the exemplar to that of the copy, a lack of attention can direct the saccadic movement to an incorrect position from which the reading or writing is resumed (a phenomenon which Roncaglia called *false hooking* and which corresponds to the *saut du meme au meme*).

The errors listed above are just those that are caused by cognitive processes associated with the act of copying, but underlying these processes there is the entire process of perception (in our case that of sight above all) and the relative emotional reactions.

Today, the relationship between the cognitive sciences and textual criticism has been studied and analyzed in great depth: Canettieri, Fuksas, Turner and Fauconnier are just some of the scholars with an approach

In order to evaluate the frequency with which this phenomenon occurs, we have conducted a statistical investigation of the variants and errors in the Italian manuscript traditions, in particular the *Commedia* and *Rime* of Dante Alighieri and the poetical works of Giacomo da Lentini, which are used as our sample or exemplars.

Introduction: the cognitive aspects of the act of copying

Several cognitive processes are involved in the act of copying written texts that go beyond the strictly linguistic sphere (such as sight or the motor coordination of the hand that is required in order to write). However, for the sake of simplicity, it is possible to divide copying processes into four main cognitive processes:

1) **Attention.** This is the ability to filter out and select a few environmental stimuli while ignoring others. It varies and is inconstant during a single work session and it tends to progressively decrease. Mackworth² conducted the first *clock test* experiments, which established that there is a rapid decline in attention during the first 30 minutes of a work session and a slower decrease in the successive hour and a half.

Before starting our analysis, it is necessary to emphasize some essential data, due to their important influence on the phenomenon of attention:

- a) the conditions under which the copyists of the texts worked;
- b) the tendency to introduce variations due to the elastic nature of vernacular forms that were not yet definitive;
- c) the deterioration of manuscripts on parchment, which often caused gaps and lacunas that copyists had to fill in.

2) **Reading.** This is a psycholinguistic process which converts into sounds a sequence of signs that are arbitrarily defined, organized in an ordered sequence on the page, which form linguistic units of increasing complexity (from letters to syllables, words and phrases). This process takes place by means of the *mechanism of anticipation* and the *mechanism of deciphering or decoding*.

The *mechanism of anticipation* is a process of prediction by means of which the reader imagines what is written before completely deciphering it, and it can apply to the entire text as well as the single word. It is based on linguistic indicators (found in the text) and extra-linguistic indicators (deriving from the reader's previous knowledge about the contents of the text).

defined as *cognitive philology*: this type of textual criticism avails itself, in addition to the classic instruments of philological investigation, also of studies belonging to the cognitive sciences.

This paper attempts to classify variants on the basis of the cognitive processes which generate them: a similar attempt has already been made by Marta Rovetta in her thesis about the variants in Giacomo da Lentini and Guilhèm IX. The difference between our two investigations lies in the criteria of classification adopted: Rovetta starts from the linguistic variant that leads to a variation in the meaning, whereas this paper proceeds in the opposite direction, as this is believed to be more appropriate for evaluating the cognitive processes involved in the act of copying.

² Mackworth, 1967

The *mechanism of deciphering* is the process (perceptual and cognitive) by means of which the reader analyzes a section of text and breaks it down into the units that it consists of. The stage at which a reader has mastered this skill can be defined as the *able reader phase* or *lexical phase*³. In this phase there is no need to convert each separate letter from a sign into a sound but whole written words are recognized as single units with their relative pronunciation, and no longer by means of a slow and laborious process of analysis).

In reading, *short-term memory* uses a phonological type of codification and maintains the sequential order of the words, so as to avoid inversions and omissions. The operative aspect of short-term memory is the *working memory* which, in reading, consists in the *verbal short-term memory*.

3) **Working memory.** This is represented by a quantity of information temporarily stored in the reader's short-term memory. It is vital to ensure comprehension during the activity of reading.

4) **Writing.** This is the visual representation of linguistic expression by means of conventional graphic signs, and each language has its own peculiarities of orthography, namely its own conventional spelling system.. Handwriting is an act of motor programming and memory: the writer must be able to recognize and mentally visualize the signs and letters that correspond to sounds and words, and he must also be able to recall and replicate the hand movements that are necessary for writing. In copying a text these skills must be coordinated so that the sequence of kinetic actions made by the hand are carried out while visually checking that there are no errors and that source text and the copy correspond.

During the act of copying these four cognitive processes must be well integrated. If this is not the case or if only one of them is deficient or not properly performed variants or errors can arise, due to lack of attention or an inadequate functioning of the processes of reading, writing or the working memory.

This research paper observes and classifies variants and errors in the medieval Italian tradition, with the aim of isolating its most significant variants associated with the above-mentioned processes of cognition. Regional linguistic variants and those that we can consider as voluntary will therefore not be considered.

The sample consists of 2,728 verses, as follows:

- 870 verses from the *Commedia* (*Inferno* 1 and 2; *Purgatorio* 15 and 16; *Paradiso* 32 and 33). The two initial cantos were chosen, in addition to two central cantos and the two last cantos. The *tradition* of the *Commedia* consists of 27 manuscripts written in the *Antica Vulgata*;
- 963 verses of the *Rime* (with a tradition of over five hundred manuscripts);
- 895 verses of the works of Giacomo da Lentini, with a selection of equal numbers of lyrics and sonnets (with a tradition of 22 manuscripts).

Significant variants obtained by their respective negative critical apparati⁴ have been arranged and codified in a double classification. The first of these evaluates the variant on the basis of the

³ Tressoldi and Cornoldi, 1991

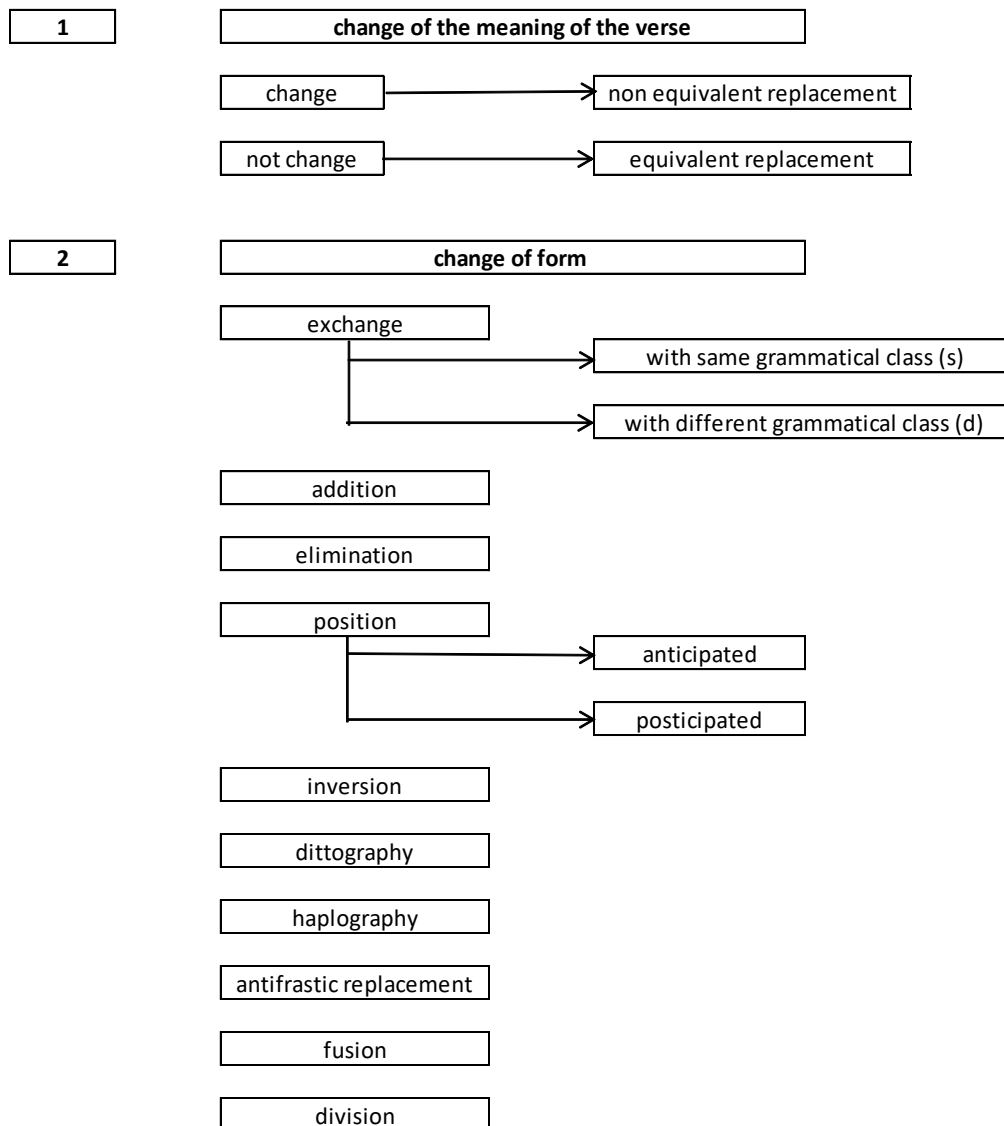
⁴ For the *Commedia*, Petrocchi 1966-1967; for the *Rime*, De Robertis 2002; for the *Giacomo da Lentini*, Antonelli 1979.

change of meaning or sense that it gives to the verse (equivalent or non-equivalent), while the second divides variants according to which of various grammatical classes or typologies they belong to (exchange, addition, elimination, position, inversion, dittography, haplography, antiphrastric replacement, fusion and division).

The sample

abbr.		tot verses	verses with significant variants	n° significant variants	rhyme scheme	metre
Commedia (ed. Petroschi)		870	658	1571		
inf 1	Inferno I	136	89	202	ABA BCB CDC	11
inf 2	Inferno II	151	111	248	ABA BCB CDC	11
purg 15	Purgatorio XV	145	114	296	ABA BCB CDC	11
purg 16	Purgatorio XVI	145	121	308	ABA BCB CDC	11
par 32	Paradiso XXXII	151	113	254	ABA BCB CDC	11
par 33	Paradiso XXXIII	145	110	263	ABA BCB CDC	11
Rime (ed. De Robertis)		963	365	1063		
R1	Così nel mio parlar vogli'esser aspro	83	31	87	ABbC, ABbC, CDdEE	7-11
R2	Voi che 'ntendendo il terzo ciel movete	61	21	41	abc bac c deed ff; abc bacdd	11
R3	Amor che nella mente mi ragiona	90	31	77	ABBC, ABBC, CDE e DFDFGG	7-11
R4	Le dolci rime d'amor ch'io solea	146	52	117	AbBcB, aAcCD, EeDdD, FfEGG e	7-11
R5	Amor che movi tua virtù dal cielo	75	14	50	ABBC, ABBC; CDDEFF	11
R6	Io sento sì d'amor la gran possanza	106	59	194	AbC AbC CDDE CDDEFF	7-11
R7	Al poco giorno ed al gran cerchio d'ombra	39	12	40	ABCDEF FAEBDC CFDABE ECBFAD DEACFB BDFECA; AFC	11
R8	Amor tu vedi ben che questa donna	66	22	65	ABA ACA ADD AEE	11
R9	Io son venuto al punto della rota	72	44	177	ABC ABC CDE e DFF	7-11
R10	E' m'incresce di me sì duramente	92	30	78	AbCA bCCD EdFf EE	7-11
R11	Poscia ch'amor del tutto m'ha lasciato	133	49	137	A a (a) B b c D A a (a) B b c D d E e F G g F	5-7-11
Giacomo da Lentini (ed. Antonelli)		895	381	686		
C1	Madonna dir vo voglio	80	62	129	a b a C, d b d C, e e f (f)G, h h i (i) G	7-11
C2	Meravigliosa-mente	63	47	98	a b c, a b c; d d c	7
C3	Guiderdone aspetto avere	56	28	47	a8 a8 b4, c8 c8 b4; d e d (e)F, g h g (h)F	8-4
C4	Amor non vole ch'io clami	50	16	22	a8 b8, a8 b8; c8 c8 d8, e8 e8 d8	8
C5	La 'namoranza disiosa	48	14	20	a9 b9 b9 a9; c9 d9 d5 C	5-9-11
C6	Ben m'è venuto prima cordoglienza	40	32	72	A (a5)B, A (a5)B; (b5)C C, D D	11
C7	Donna, eo languisco e no so qua speranza	50	15	17	A (a5)B; C (c5) B; D d e e F F	7-11
C8	Troppo son dimorato	60	15	17	a b C; d e f, d e f	11
C9	Uno disio d'amore sovente	60	5	6	A a5 B; C c5 d d E E	11
C10	Amando lungiamente	70	28	45	a b b (b5)A, a b b (b5)A; c9 d (d5)C c5	11-5-9
C11	Madonna mia, a voi mando	56	25	33	a b, a b; c d d c	7
C12	S'io doglio no è meraviglia	35	4	6	a8 b8, a8 b8; c8 c8 b8	8
C13	Poi no mi val merzé né ben servire	45	31	60	A B c, A B c; (c3)D (d5)B C	7-11
S1	Lo giglio quand'è colto tost'è passo	14	3	4	A B. A B. A B. A B; C D E, C D E	11
S2	Sì come il sol che manda la sua spera	14	6	10	A B. A B. A B. A B; C D E, C D E	11
S3	Or come pote sì gran donna entrare	14	4	6	A B. A B. A B. A B; C D C, D C D	11
S4	Molti amadori la lor malatia	14	6	9	A B. A B. A B. A B; C D E, C D E	11
S5	Donna, vostri sembianti mi mostaro	14	4	4	A B. A B. A B. A B; (b?)C D E, C D E	11
S6	Ogn'omo c'ama de' amar so 'nore	14	11	21	A B. A B. A B. A B; C D C, D C D	11
S7	A l'aire claro ò vista ploggia dare	14	12	44	A B. A B. A B. A B; C D E, C D E	11
S8	Io m'aggio posto in core a Dio servire	14	6	8	A B. A B. A B. A B; C D C, D C D	11
S9	Lo viso mi fa andare alegremente	14	0	0	A B. A B. A B. A B; C D C, D C D	11
S10	Eo viso - e son diviso - da lo viso	14	0	0	A B. A B. A B. A B; A A B, A A B	11
S11	Si alta amanza à pres'a lo me' core	14	1	2	A B. A B. A B. A B; C D E, C D E	11
S12	Per sofferenza si vince gran vetoria	14	2	2	A B. A B. A B. A B; C D E, C D E	11
S13	Certo me par che far dea bon signore	14	4	4	A B. A B. A B. A B; C D C, D C D	11
		2728	1404	3320		

Classification of significant variants



First classification

Variants are assessed according to their ability to change the meaning or sense of the verse and then divided into two categories:

- **equivalent replacement:** a variant that does not substantially modify the meaning of the verse.

e.g. inf 1, 11

tant'era pien di sonno a quel punto
tant'era pien del sonno

In this case the variant *di/del* is equivalent because it does not change the meaning of the verse. One must however bear in mind that a variation of meaning is not necessarily associated with a change of the grammatical class and that within the same grammatical class exchanging one

word, such as a preposition, for another can often considerably modify the meaning of the phrase.

- **non-equivalent replacement**: a variant that substantially modifies the meaning of the verse.

e.g. inf 1, 113

che tu mi seguì e io sarò tua guida

che tu m'insegnì

Second classification

- **exchange**: an element in the text is replaced by another element from the same grammatical class (s) or from a different grammatical class (d):

exchange within the same grammatical class (here a pronoun).

e.g. *Così nel mio parlar v. 6*

tal che per lui, o perch'ella s'arretra

tal che per lei, o perch'ella s'arretra

exchange with a different grammatical class (here from noun to pronoun).

e.g. *Così nel mio parlar v. 9*

Ella ancide, e non val ch'uom si chiuda

Ella ancide, e già non val perché altri si chiuda

- **addition**: a variant that adds an element to the text.

e.g. inf 2, 67

Or movi, e con la tua parola ornata

Or moviti, e con la tua parola ornata

- **elimination**: a variant that elides an element of the text.

e.g. inf 1, 28

Poi ch'ei posato

Poi posato

- **position**: a variant in which an element of the text is anticipated or delayed.

e.g. inf 1, 12

che la verace via abandonai

*che la diritta via abandonai (from inf 1,3 *che la diritta via era smarrita*)*

- **inversion**: a variant in which the positions of two elements of the text are inverted.

e.g. inf 2,15

secolo andò e fu sensibilmente

secolo fo e andò

- **dittography**: the repetition or duplication of a word, phrase, letter or combination of letters in the text;

e.g. purg 16, 5

come quel fummo ch'ioi ci coperse
come quel fummo che ch'ioi

- **haplography**: the omission of words or letters when they come immediately after the same words or letters.

e.g. purg 16, 23

diss'io. Ed elli a me
diss'elli

- **antiphrastic replacement**: a variant with a meaning that is opposite to that of the alternative variants.

e.g. par 32, 118

Quei due che seggon là su
Quei due che seggon la giù⁵

- **fusions and divisions**⁶: variants that are clearly generated by the fusion of two adjacent elements or the division of one element into two or more elements, often due to the lack of space in the manuscript.

e.g. purg 15, 25

a che non posso
anche non posso (fusion)

e.g. purg 15, 49

s'appuntano
saputo anno (division)

⁵ The phenomenon is equivalent to *polar error*, which means that it is *idiosyncratic*.

⁶ *Illegal fusion* and *illegal division* are terms that regard the assessment of spelling proficiency (compare Tressoldi and Cornoldi, 1991). Here they are used with the sole aim of presenting the phenomena and they clearly do not denote any lack of spelling ability. Also Teresa Proto, in her article *Speech and scribal errors as a window into the mind. Evidence for mechanism of speech (re)production and system of mental representations*, uses the corresponding terms *fusion* and *fission* to indicate these phenomena.

Abbreviations and notes for reading

e	empty word	
f	full word	
eq rep	equivalent replacement	
not eq rep	non-equivalent replacement	
add	addition	
elim	elimination	
pos	position	
inv	inversion	
hapl	haplography	
ditt	dittography	
fus	fusion	
div	division	
antiph rep	antiphrastric replacement	
ex	exchange	
nbc	not better classifiable	variants that it was not possible to classify
noun	noun	
verb	verbal form	
adj	adjective	
art	article	
prep	preposition	
pr	pronoun	
inter	interjection	
adv	adverb	
conj	conjunction	
pr noun	proper noun	
comb	combination	variants consisting of various elements from different grammatical classes

Notes on the calculations performed

1) Unless otherwise specified the percentages are calculated on the basis of the total number of significant variants excluding the metric variants (and thus out of a total of 2,955 significant non-metric variants). Variants designated as *nbc* (not better classifiable) are also

included in the calculation (1.2 % of the variants classified, always non-equivalent replacements).

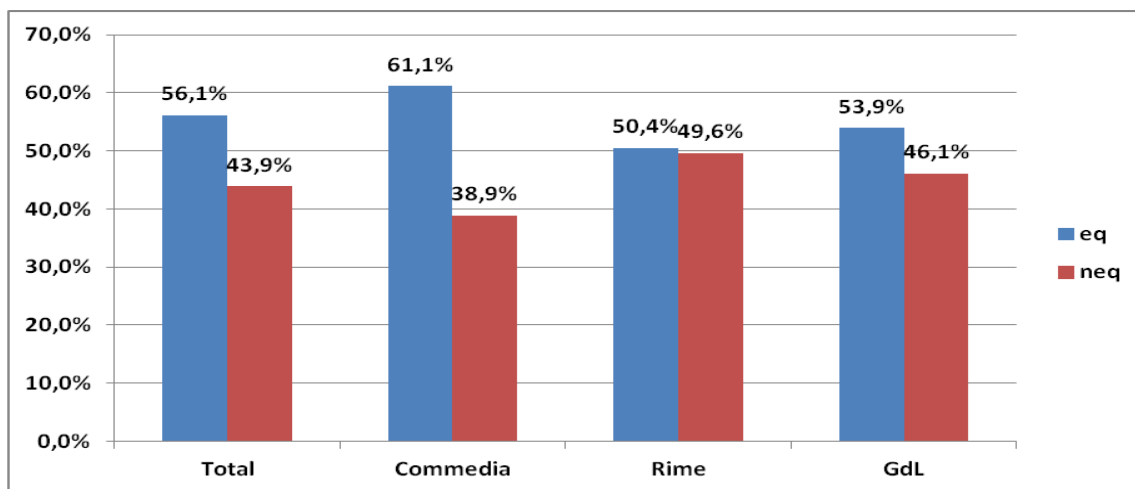
2) Metric variants are not included in the calculation, being separately counted in a special paragraph.

3) Although in *Lo viso mi fa andare alegramente e Eo viso - e son diviso - da lo viso* by Giacomo da Lentini (S9 and S10) there are no significant variants the sample has not been changed so as not to distort it. We have chosen to continue the analysis while preserving the order of the edition.

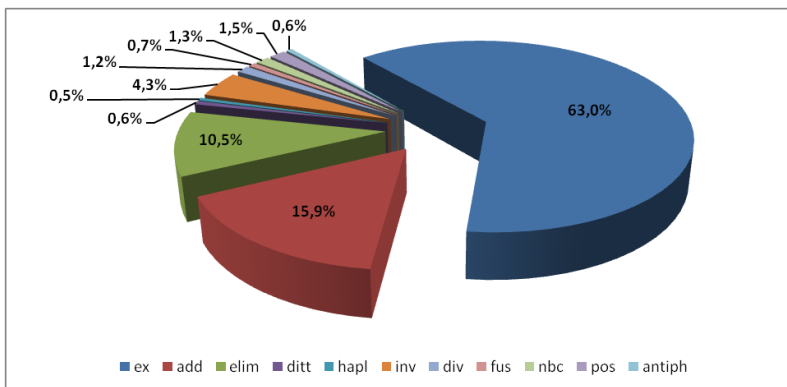
4) We have chosen to use the term *verbal form* instead of *verb* to refer to the fact that Italian verbs have many variants consisting of various grammatical aspects (person, number, mood, tense, etc.). Further specifying this classification could have been confusing and unnecessarily complicated.

Overall results

As the following graph highlights, as regards the first classification of variants, in the total sample equivalent replacements (eq) are the most frequent, with a percentage difference of 12.2% compared to non-equivalent replacements (neq). It should however be pointed out that, although equivalent replacements are more prevalent in the *Commedia* and in Giacomo da Lentini's works, in the *Rime* (for reasons will be evaluated below) equivalent replacements only exceed non-equivalent replacements by 0.8%.



In fact each part of the sample has its own particularities. For example equivalence is particularly prevalent in the *Commedia*, while inversion is more common in to the *Rime*, and addition and elimination are more prevalent in Giacomo da Lentini's works. Considering the total sample the results of the second classification of variants, according to their various grammatical classes, are represented by the following graph.



The results for the different parts that make up the total sample are shown in the following table (percentages emphasised in bold indicate the most important statistical differences):

	ex	add	elim	ditt	hapl	inv	div	fus	nbc	pos	antiph
total	63,0%	15,9%	10,5%	0,6%	0,5%	4,3%	1,2%	0,7%	1,3%	1,5%	0,6%
Commedia	66,6%	21,9%	10,7%	1,1%	0,4%	3,7%	1,0%	0,9%	0,9%	1,4%	0,4%
Rime	62,9%	15,8%	9,6%	0,2%	0,5%	5,6%	1,9%	0,5%	1,3%	1,3%	0,5%
GdL	53,1%	24,6%	12,0%	0,2%	0,6%	3,2%	0,2%	0,6%	2,2%	2,2%	1,2%

Empty words and full words

Before making a more specific analysis of the separate cases, the particular phenomenon of “empty” words, i.e. those that are more subject to variation and the transformation of their meaning, should be emphasized. The meaning of this term is explained by Roncaglia:

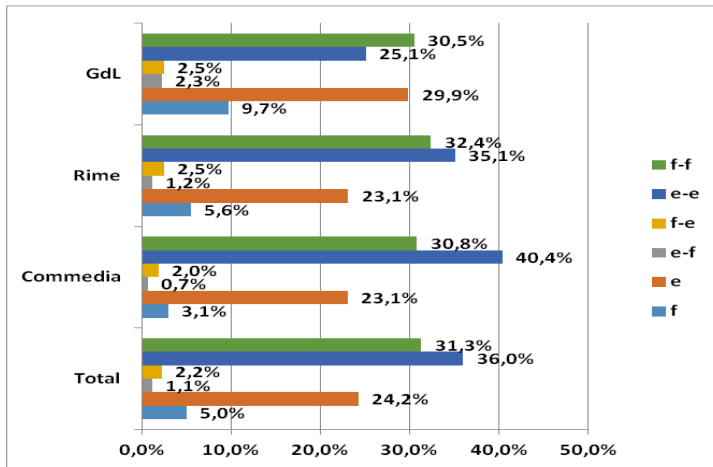
la memoria tende a fermarsi e a trascurare quel che è o appare ridondante. Di qui, perdite, che colpiscono più facilmente parole provviste certo d’una valore stilistico, ma non strettamente indispensabili al senso, e anche elementi necessari al senso, ma solo come legami sintattici: parole “vuote” o leggere, preposizioni, congiunzioni, negazioni, monosillabi.⁷

The results show that empty words are not only especially prone to be lost (as in cases of elimination) but also to be transformed or inter-exchanged. For this reason they require a separate analysis, as variants regarding empty words occur in all of the cases that we have classified and they represent those linguistic elements that are more prone to variation (prepositions, conjunctions, articles, adverbs, pronouns and possessive adjectives), especially if they are monosyllabic.

While full words always entail a close correspondence between the concept and the written sign, this is not the case for empty words. The copyist’s understanding of the concept is fundamental, as it helps him to recall the sign from his memory, and acts as an intermediary between his memory system and the procedure of encoding in the copy. If this does not occur, there is less likely to be a correct memorization.

⁷ Roncaglia, 1974-1975

Although my analysis revealed that empty words (e) were more frequently involved in variants in general, there were more replacements from full word to full word (f-f).



The **pronoun** is a part of speech that is particularly subject to variation, and can thus be defined as an empty word. The main variations that concern it are:

1) the elimination or addition of the pronoun:

Meravigliosa-mente, 34

Similmente eo ardo
similmente ardo

Così nel mio parlar vogli'esser aspro, 26

com'io di dire altrui che ti dà forza?
come di dire altrui che ti dà forza?

2) the inversion of the pronoun with respect to the other parts of the phrase:

Le dolci rime d'amor ch'io solea, 70

che sian tutti gentili o ver villani
che tutti sian gentili o ver villani

3) the exchange of demonstrative and relative pronouns:

par 33, 14

che qual vuol grazia e a te non ricorre
che chi vuol grazia e a te non ricorre

Amor che nella mente mi ragiona, 72

penso che mosse
penso chi mosse

4) the non-equivalent exchange of the personal pronoun, due to the **misunderstanding of the subject**, a phenomenon that is particularly typical of the *Rime*:

Così nel mio parlar vogli'esser aspro, 6

tal che per lui, o perch'ella s'arretra
tal che per lei, o perch'ella s'arretra

Così nel mio parlar vogli'esser aspro, 53

Così vedess'io lui fender per mezzo
Così vedessi'io lei fender per mezzo
Così vedess'io lo fender per mezzo

This can be attributed to the particular style of the *Rime*, which is more difficult to understand than the other two works, due to its particularly elegant and refined style.

The class of empty words that is most subject to change is that of **prepositions**, especially simple prepositions (those without inclusion of the article), which are often inter-exchanged as being equivalent (especially *a-di*, *in-su*) although we will also analyze examples of non-equivalent preposition exchanges.

Meravigliosa-mente, 30

a lo suo seno ascoso
in del suo seno ascoso

par 33, 133

in me guardando, una sola parvenza
di me guardando, una sola parvenza

Equivalent replacements

In these variants the mechanism of anticipation often has a decisive role. When he has attained the *able reader phase* or *lexical phase*⁸, the reader understands the meaning of a word (often a preposition) before he has completely read the relevant portion of text. In this process, if there is a low level of attention, the sense of the word can remain in the mind while the word is changed (the meaning is remembered but not the sign).

Some variants of inf 2, 93 provide a good example of this phenomenon:

né fiamma d'esto 'ncendio non m'assale
et incendio d'esto foco non m'assale
né foco d'esto 'ncendio non m'assale

The triad *incendio - fiamma - foco*, all of which are terms belonging to the same semantic field, have varying and unstable positions within the phrase, but in all three cases, the basic sense remains unchanged.

⁸ Tressoldi and Cornoldi, 1991

The mechanism of anticipation is also responsible for equivalent replacements that are due to the greater familiarity of a certain word to the one that the copyist has just read, as in the numerous cases of *dietro-retro*, *dire – parlare*, *ove – dove*. This process thus leads very often to trivializations.

Roncaglia writes as follows:

Sarà in particolare da tener presente la tendenza a quella che possiamo chiamare “traduzione mentale”; il significante riconosciuto alla lettura viene mentalmente tradotto nel proprio significato, e questo a sua volta può venire ritradotto in un altro significante, di valore equivalente o prossimo, ma di forma più familiare al copista⁹.

See the example in inf 1, 85:

Tu se' lo mio maestro e 'l mio autore
Tu se' lo mio maestro e 'l mio doctore

In a note to this verse Petrocchi writes as follows:

la variante *dottore* in luogo di *autore* è da respingere; si sono già veduti i casi d'oscillazione tra gli epiteti che designano Virgilio: *maestro*, *duca*, *dottore* e *simili*. Qui *maestro* è già nel verso, e quindi *dottore* sarebbe una ripetizione, mentre *autore* stabilisce un differente attributo del poeta rispetto a quello di “guida”, cioè lo scrittore che esercita sopra Dante la più alta *auctoritas*. D'altronde ci portano molto agevolmente ad *autore* la stessa tradizione manoscritta del luogo e il vantaggio della *lectio difficilior* dinanzi ai numerosissimi *dottore*.¹⁰

The variant *doctore* is in fact a trivialization with respect to its alternative variant *autore*. In his edition of the *Commedia*, Giorgio Inglese writes:

autore: termine che Dante, sulla scorta di Ugucione, *Der.*, riporta al greco *autentin* [oss. acc. *authènten*] che tanto vale... quanto *degno di fede e di obbedienza*. E così *autore*... si prende per ogni persona degna di essere creduta e obedita (*Convivio* IV, VI 5).

In inf IV 113, where he compares the form *auctoridade*, Inglese explains in a note:

autoridade vale tanto quanto *atto di fede e obbedienza* (*Convivio* IV, VI 5). [La forma *auctorità* (Triv) si esclude perché Dante tiene distinti *auctor* (dal verbo *augeo* “accresco”) e *autor*, riferito al greco *authènten*].

Also the replacement of the exclamation in inf 1, 4 is an emblematic case:

⁹ Roncaglia, 1974-1975

¹⁰ Petrocchi, 1966-1967

Ahi quanto a dir qual era è cosa dura
E quanto a dir qual era è cosa dura

As many as twenty manuscripts of the *Antica vulgata* contain the variant *E quanto*, the etiology of which cannot be explained from a palaeographic point of view. It is also unclear if *E* is meant to be interpreted as an interjection or as a conjunction. In this paper I have preferred to interpret it as an interjection and it is therefore treated as a equivalent variant: to interpret it as a conjunction would effectively remove the exclamative quality from the whole phrase. One can therefore suppose that in most cases the copyist must have simply substituted the interjection *Ahi* with another one (*E*) taken from his personal vocabulary.

Non-equivalent replacements

The substitution of an element of the text by an element that alters the meaning of the phrase is a non-equivalent replacement. This phenomenon applies to 43.9% of the sample and it is particularly prominent in the *Rime*, where it is the most common type of variant. From a cognitive point of view, many different factors could have generated these variants, such as interference of the memory, misreading, a lack of attention with the intromission of irrelevant environmental stimuli, as well as tiredness and the weakening of the working memory. See the following example with the exchange of a noun:

inf 1, 20

che nel lago del cor m'era durata
che nel loco del cor m'era durata

The expression *lago del cor* means the heart, imagined as a hollow space full of blood like a lake; the copyist instead must have interpreted the heart as a specific location in the body (*loco* = place) and he therefore memorized and wrote *loco*.

One should also bear in mind that *lago* e *loco* are phonetically similar, being both of two-syllables with the same initial and final letters. It was thus very easy for them to be interchanged during the memorization of the passage.

The sound aspects of words have an important influence on memorization, since the more similar two sounds are the more likely they are to be interchanged and this fact is also a basic element in many cases of repetition, in which a similar sound can become a *fake engagement* for the point of resumption of the copying process.¹¹

inf 1, 47

con la test'alta e con rabbiosa fame
con la test'alta e con bramosa fame

As also Petrocchi observes, the substitution of *bramosa* in place of *rabbiosa* certainly reflects the influence of inf 1, 49 (*di tutte brame*).

Another example of phonological influence is purg 15, 18:

salendo su per lo modo parecchio
salendo su per lo monte parecchio
salendo su per lo mondo parecchio

¹¹ Roncaglia, 1974-1975

salendo su per lo modo soperchio

Here *Modo* – *monte* – *mondo* are all variants with phonological proximity.

In verse 16 there is a similar phonological proximity between the variants and *soperchio* was probably also affected by the influence of the variations of v 18, despite the lack of a real rhyme between *specchio* and *soperchio*.

purg 15, 16

Come quando da l'acqua o da lo specchio

Come quando da l'acqua o dal soperchio

Also an exchange of a preposition can drastically affect the meaning. The importance of this phenomenon is well represented by inf 1, 102:

verrà che la farà morir con doglia

verrà che la farà morir di doglia

Non-equivalent variants that completely distort the meaning compared to alternative variants are defined as *nbc* in this paper (not better classifiable). Some of them have a palaeographic explanation, while the reasons for others are completely incomprehensible. See the following examples:

inf 2, 30

ch'è principio a la via di salvazione

che per noi più a la via de salvazione

Here what might seem to be an intentional variant is probably an overall misunderstanding in copying the exemplar.

p	r	i	n	c	i	p	i	o
p	e	r	n	o	i	p	i	u

r and *e*, *nci* and *noi*, *pio* and *piu* are easily confused one with the other. Such variants can be associated with the process of deciphering or decoding: in fact the attention determines the direction of the saccadic movement, namely the place where the eyes are directed; if the level of attention decreases, the saccadic movement can therefore lead the gaze to an incorrect location.¹²

This is quite distinct from the following case:

purg 16, 55

prima era scempio, e ora è fatto doppio

prima era scempio che mi fa cierto doppio

About this variant we can suppose that the copyist may have been copying from by a decayed manuscript, which was illegible from *scempio* to *doppio* and that he compensated for this by filling in the gaps as best he could. Many of the non-equivalent variants that it has not been possible to classify better could be the result of similar phenomena.

¹² Hoffman - Subramaniam, 1995

Non-equivalent variants also frequently consist of **exchanges of pronouns**. We have already had occasion to analyze this phenomenon in the case of empty words, when it often causes misunderstandings of the subject. In *Voi che 'ntendendo il terzo ciel movete*, for example, from v 30 to v 39 there are a series of misunderstandings:

L'anima piange, sì ancor le .ndole,

L'anima piange, sì ancor gli dole

e dice: "Oh lassa me, come si fugge

E dice: Oh lasso me, come si fugge

questo pietoso che m'ha consolata!"

questa pietosa che m'ha consolata

Degli occhi miei dice questa affannata:

"Qual ora fu che tal donna gli vide!

E perché non credeano a me di lei?

Io dicea: "Ben negli occhi di costei

de' star colui che le mie pari uccide".

de' star colui che li miei pari uccide

E non mi valse ch'io ne fossi accorta

che non mirasser tal, ch'io ne son morta".

In *Amor che nella mente mi ragiona*, another important exchange of person is in v 81:

quand'ella la chiama orgogliosa (in reference to the *canzone*)

quand'io la chiamo orgogliosa

The exchange of person also continues in the next few verses.

As we have mentioned in the analysis of the variants of empty words, the reason for this large number of misunderstandings of the subject in the *Rime* may be due to the literary genre as, compared to the *Commedia*, which tends to have a linear narrative of events or emotional situations narrated in the first person, the *Rime* are characterized by some passages that are rather difficult to comprehend straight away, and in which the subject of the phrase is often open to misunderstanding. Not surprisingly, in *Le dolci rime*, exchanges of the person are not so evident: the *canzone* is not so much a genuine lyric poem as a "treatise about courtly love", that is much closer to a didactic than to a lyrical genre.

In the tradition of Giacomo da Lentini the most significant non-equivalent variants especially relate to the exchange of adjectives and nouns. See the following examples:

Madonna, dir vo voglio, 56

a voi, bella, li miei sospiri e pianti

a voi madonna li miei sospiri e pianti (hypermetry)

Madonna, dir vo voglio, 66

a voi, donna spietata

a voi bella spietata

Meravigliosa-mente, 45

tanto bella mi pare

tanto forte mi pare

Meravigliosa-mente, 55

Canzonetta novella

Canzonetta fina (hypometry)

Ben m'è venuto prima cordoglienza, 15

ch'eo non vorria da voi, donna, semblanza

ch'eo non vorria da voi bella semblanza

A l'aire claro ò vista ploggia dare, 8

e 'ntradui amici nascereci errore

e fra due amanti

e fra dui amori

The triad *bella* – *donna* – *madonna* is often interchanged. One might suppose there was an intentional variant, or that it was due to the constant re-emergence of these terms from the copyist's memory, given their frequent presence in courtly lyrical poetry. The last example we have provided tends to support this second hypothesis: if one accepts the variant *amici*, as *lectio difficilior* and because it is certainly more suitable to the text, the two variants *amanti* and *amori* can be considered as interferences of the memory due to their regular use in courtly lyrical poetry.

Other non-equivalences of adjectives remain obscure, such as in *purg 16, 13*

m'andava io per l'aere amaro e sozzo

m'andava io per l'aere grosso e spesso

where *grosso* and *spesso* are synonyms, a stylistic device often used by Dante. In contrast, however the rhyme has been lost.

Additions and eliminations

Together these cases represent 26.4% of variations in the total sample. Additions and eliminations can be generated by some rather varied cognitive contingencies: erroneous reading (due to an incorrect process of anticipation or decoding), incorrect memorization of the passage, writing, and interference by the memory. In our sample those variants that add the implied subject in order to improve the comprehensibility of the text are quite frequent:

inf 1, 64

Quando vidi costui nel gran diserto

Quando io vidi

purg 16, 111

Per viva forza mal convien che vada

Per viva forza mal convien ch'io vada

Voi che 'ntendendo il terzo ciel movete, 59

Allor ti priego che ti riconforte

Allor io ti priego che ti riconforte (hypermetry)

Allor io priego che ti riconforte

The phenomenon is less frequent in the tradition of Giacomo da Lentini, where the insertion of the possessive adjective is the most common addition.

These variants demonstrate once more the conservative action of the meaning in the process of anticipation and in the memorization of the passage. The subject, as the mainstay and cornerstone of the proposition, resists elimination and tends to be reinstated during the process of memorization. Obviously, the phenomenon also occurs with those pronouns that, inserted by means of synalephe, do not alter the isometry (*ei, io, 'i, etc.*).

Here is another example of conservation of the sense:

inf 1,38

e 'l sol montava 'n su con quelle stelle
e chel sol montava'n su con quelle stelle

inf 1,39

mosse di prima quelle cose belle

The addition of *chel* (= *che il*) makes the metre irregular but adds more clarity of meaning to "chi muove quelle cose belle".

Instead, as regards the interference of memory, see the example of inf 1, 9:

dirò de l'altre cose ch'i' v'ho scorte
dirò dietro dell'altre cose ch'i' v'ho scorte

The addition of *dietro*, which is not attributable to the repetition from an adjoining verse or from a misreading, seems to have the characteristics of a genuine interference by another memorized text or an irrelevant extraneous stimulus that the copyist did not filter out of his mind and his attention.

In inf 1,116 an interference of the memory can be observed that leads to hypermetry with the addition of two syllables (and thus the hypothesis of an intentional variant can be excluded):

vedrai li antichi spiriti dolenti
vedrai che fan gl'antichi spiriti dolenti

The addition of conjunctions is very prominent, especially when they occur at the start of the line, as in the following example:

Madonna dir vo voglio, 29

eo sì fo per long'uso
ed eo già fo per long'uso

The addition of a conjunction within the verse is also quite frequent, for example in inf 1, 89:

aiutami da lei famoso saggio
aiutami da lei famoso e saggio

The meaning has been significantly changed here. In his note to this verse Petrocchi writes:

e saggio non sarebbe privo di buona attestazione [...] ma è senza dubbio da rifiutare; *saggio* (o *savio*) è sostantivo designante i poeti in generale, e Virgilio in modo specifico (ad es. Inf. VIII 3; XIII 47 ecc.).

We can assume that the conjunction has been added because *famoso* and *saggio* can be considered as two adjacent adjectives and that the copyist therefore decided to divide them with a conjunction. In his note to this verse Giorgio Inglese writes:

La variante *famoso e saggio* è ben attestata da Urb + Mad Rb [β?], con Fi Laur Pr; ma che *saggio* sia sostantivo è suggerito dal riscontro con 10.128 e Pg 27.69 nonché dalle analoghe occorrenze di *savio* (7.3, 12.16, ecc.): Virgilio è *famoso* quale *saggio*].

Inversion

The inversion of elements within the verse regards 4,3% of the variants. Although present throughout the whole sample, the percentage of inversion or exchange of position is especially relevant in the *Rime*. The cognitive aspect that is most relevant here is that of the short-term memory. Even if the text is read correctly, during the process of memorizing the passage or during the inner dictation some elements are reversed. See the following examples:

Così nel mio parlar vogli'esser aspro, 25

sì di rodermi il cuore

di rodermi sì il cuore

Così nel mio parlar vogli'esser aspro, 67

che son fatte per me scudiscio e ferza

che fatte son per me scudiscio e ferza

A phenomenon that recurs quite often is the inversion of the elements in a series. See the emblematic case of inf 1, 108:

Eurialo e Turno e Niso

Eurialo e Niso e Turno

Petrocchi writes in his note:

Le varianti che elencano nell'ordine i nomi Eurialo – Niso – Turno, nascono dall'arbitrio dei copisti che hanno affiancato i due amici Eurialo e Niso, mentre Dante ha inteso esplicitamente alternare un eroe d'un campo con altro dell'esercito avverso: Camilla ed Eurialo, Turno e Niso.

It is rather risky to define these inversions as "arbitrary" as, from a cognitive point of view, the phenomenon is easily explained: the copyists put Euryalus and Nisus next to each other because in the *Aeneid* they are friends and in the fourteenth century their friendship was a literary motif or *topos*. There could well have been a momentary lapse of attention while reading the passage, and so the associative criterion prevailed, instead of the one proposed by Dante. Euryalus and Nisus are more easily associated and the mention of Turnus may have been unconsciously (and not arbitrarily) postponed. In fact Giorgio Inglese, although of the same opinion as Petrocchi, is more cautious in not considering this as an arbitrary variation:

Simbolico intreccio dei "martiri" italici: (Camilla, eroina dei Volsci, "decus ITALIAE" [Aen. XI 508]; Turno, re dei Rùtuli e Teucrici (Eurialo e Niso) protagonisti del libro IX [intreccio che

va perduto nella variante *Niso e Turno di Urb e Ash*]. Si rivela qui un importante motivo virgiliano (XII 830 ss) e augusteo: la fusione fra ausoni e troiani in cui si conclude provvidenzialmente la vicenda di Enea.¹³

Positions

A word copied a short time ago remains impressed for a certain period in the memory, which can then mechanically recall it due to a stimulus (phonetic, visual, etc.) by means of the mechanism of false hooking. Note inf 1, 5:

esta selva selvaggia e aspra e forte
questa selva selvaggia e dura e forte

Here *dura* comes from inf 1, 4 (*Ahi quanto a dir qual era è cosa dura*);

inf 1, 12

che la verace via abbandonai
che la diritta via abbandonai

Here *diritta* comes from inf 1, 3 (*che la diritta via era smarrita*)

par 33, 74

e per sonare un poco in questi versi
e per sonare alquanto in questi versi

Here *Alquanto* derives from 33, 73 (*ché, per tornare alquanto a mia memoria*)

inf 1, 116

e vedrai li antichi spiriti dolenti
e udirai li antichi spiriti dolenti

Here *udirai* comes from da inf 1, 115 (*ove udirai le disperate strida*).

This last example is more complex: the copyist has associated *spiriti dolenti* with the previous mention of *disperate strida* and has therefore quite understandably maintained the references within the narrative to auditory phenomena.

In the tradition of Giacomo da Lentini, in addition to repetitions similar to those to be found in *Inferno*, we find the following very significant one:

Meravigliosa-mente, 20

dipinsi una pintura
dipinsi una figura

Meravigliosa-mente, 23

guardo 'n quella figura
guardo 'n quella pintura

Obviously there is a close conceptual equivalence between *figura* and *pintura* but, having said that, we can make two hypotheses: the first that there is a double repetition, where the false hooking is due to the close equivalence of the terms; the second is that there was only one repetition at v. 20 and that the copyist, at v. 23, noticing his error, deliberately wrote *pintura* so as not to create a cacophonous repetition and so as not to have to go back and correct v 20.

¹³ Inglese, 2007

Dittography

Dittography is the erroneous repetition of the same word, letter or group of letters. Roncaglia writes:

Ognuno può constatare che i movimenti della mano possano talora non essere esattamente coordinati alle intenzioni come ci si possa ingannare circa i movimenti compiuti e quelli da compiere, soprattutto quando più movimenti identici debbano essere ripetuti l'uno di seguito all'altro. In presenza di nessi grafici complicati possiamo così avere, per inadeguato controllo dei riflessi motori, trasposizioni, semplificazioni (aplografie) o indebite ripetizioni di segno (dittografie).¹⁴

See for example inf 1, 44:

ma non s' che paura non mi desse
ma non s' che paura nommi mi desse.

In addition to the difficulties that Roncaglia has called our attention to, in our case the copyist probably wanted to unite *non mi* to form *nommi* but then he immediately forgot that he had done so and copied the second *mi*.

Another typical kind of dittography can be found in the tradition of Giacomo da Lentini:

La 'namoranza disiosa, 12
Per forza di gioia amorosa
Per per forza di gioia amorosa

Haplography

This type of error, generally linked to the mental process of anticipation, is very understandable when one considers the general lack of punctuation in medieval manuscripts. See the following examples:

par 33, 79
E' mi ricorda ch'io fui più ardito
Et misericordia ch'io fui più ardito
E' m'incresce di me s' duramente, 92
Che me n'ha colpa e mai non fu pietosa
Che mena colpi e mai non fu pietosa

If one considers what the copyists presumably read (*emiricorda / chemenhacolpa*), these variations are comprehensible.

Antiphrastric replacement

This type of variant is rare but while in *Commedia* and *Rime* it has a frequency of 0.6%, in Giacomo da Lentini's works it represents 1.2% of variants. See the following examples:

¹⁴ Roncaglia, 1975

par 32, 118

quei due che seggon là su più felici
quei due che seggon là giù più felici

par 33, 98

mirava fissa, immobile e attenta
mirava fissa e mobile e attenta

Io sento sì d'amor la gran possanza, 10

nolsosterria, però ch'ellè finita
nolsosterria, però ch'ellè infinita

Io sento sì d'amor la gran possanza, 94

di buona fama ch'altri di lui suona
di mala fama ch'altri di lui suona

Amando lungiamente, 21

e per dolce aspettare
e per troppo aspettare

Poi no mi val merzé né ben servire, 13

anzivorrea per ella pena avere
anzivorrea per ella bene avere

A l'aire claro ò vista ploggia dare, 6

e de l'amare rendere dolzore
e l'amarezza tornare in dolziore

In addition to the lack of attention (*mirava fissa e mobile* is such an obvious oxymoron that it leaves little doubt as to the inattentiveness of the copyist) and the possible presence of some gaps in the source manuscript, as was perhaps the case in the last example, the process of anticipation is again playing a decisive role in these variations. Take for example *dolce/troppo aspettare*. Here the verb *aspettare* can produce a negative impression (*troppo aspettare* – waiting too much) if the process of anticipation leads the copyist to make his customary mental associations as regards the verb *aspettare*. This phenomenon is therefore very close to being a genuine parapraxis or *Freudian slip*¹⁵ in which, in addition to the experiential aspect, also the cultural background is significant. In fact *troppo aspettare*, as well as *la dolce attesa* (sweet or pleasurable waiting), is a *topos* that is common in courtly lyrical poetry that, like all *topoi*, affected the reading, memorization and writing of the copyists, whose minds were accustomed to these expressions and therefore to replicating and perpetuating them whenever their attention lapsed and the meaning of the verse permitted it.

Fusions and divisions

1.5% of the variants analyzed are fusions and divisions. Obviously this phenomenon is linked to the lack of punctuation and spaces in the manuscripts, which can easily lead to misunderstandings in copying the exemplar. They are therefore rather wide-ranging phenomena that occur due to carelessness and incorrect reading. See the following examples:

¹⁵ Freud, 1971

par 32, 145

Veramente, ne forse tu t' arretri

Veramente, ne forsi tucti arietri

Le dolci rime d'amor ch'io solea, 100

Ciò ch'i' ho detto qui, sia per supposto

Ciò ch'i' ho detto qui, sia per suo opposto

Exchanges within the same or a different grammatical class

According to Stefanie Shattuck-Hufnagel¹⁶ the linguistic units involved in errors of exchange or substitution usually belong to the same grammatical class, and our analysis of the sample confirms this.

Exchanges within the same or a different grammatical class	same	different
total	80,6%	19,4%
Commedia	83,2%	16,8%
Rime	79,6%	20,4%
GdL	73,4%	26,6%

Verbal forms are the parts of speech that are the most prone to exchange, especially if they are non-equivalent. 47.1% of such exchanges entail an equivalent verb and 52.9% involve a non-equivalent verbal form. Although the *Rime* tend more towards non-equivalence, here exchanges of verbal forms are generally equivalent (57.5%), while in *Commedia* and Giacomo da Lentini's works the opposite phenomenon occurs since, despite a general tendency towards equivalence, exchanges of verbal forms tend to be non-equivalent (53.6% in the *Commedia* and 55.5% in Giacomo da Lentini).

The most frequent exchanges between elements of different grammatical classes are preposition-adverb exchanges and preposition-conjunction exchanges. This phenomenon is of course in line with our previous analysis concerning empty words.

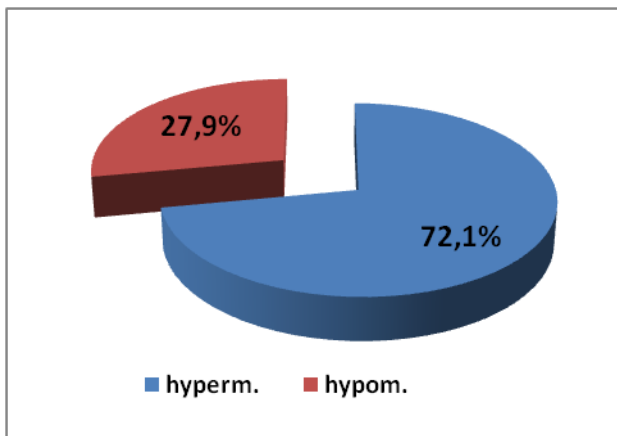
¹⁶Shattuck-Hufnagel, 1979

Exchange with different grammatical class (d)

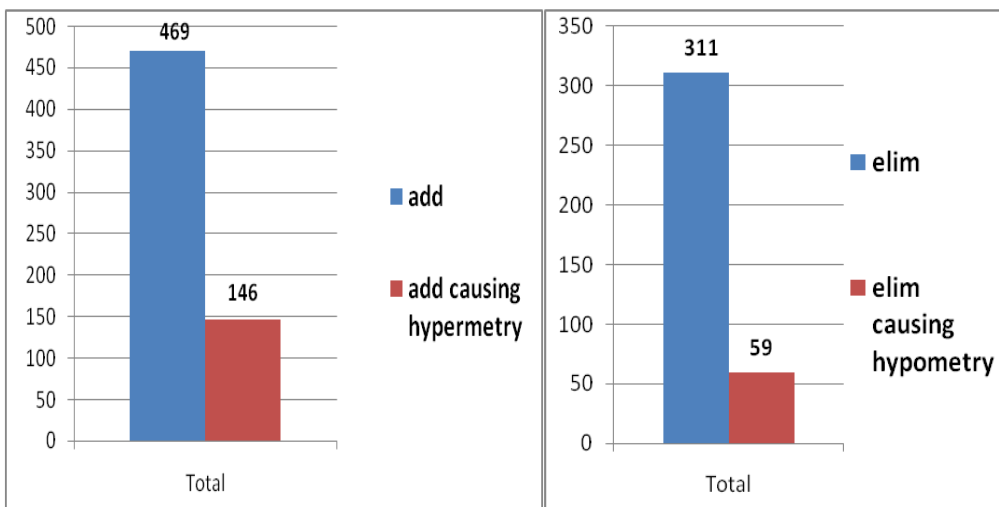
	adj	art	adv	comp	conj	inter	pr noun	pr	prep	noun	verb
adj	0,0%	0,2%	0,1%	0,1%	0,1%	0,0%	0,0%	0,1%	0,1%	0,3%	0,1%
art	0,2%	0,0%	0,0%	0,0%	0,2%	0,0%	0,0%	0,0%	0,9%	0,0%	0,0%
adv	0,4%	0,0%	0,0%	0,1%	0,2%	0,0%	0,0%	0,7%	0,4%	0,1%	0,2%
comp	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
conj	0,0%	0,2%	0,2%	0,1%	0,0%	0,0%	0,0%	0,3%	0,8%	0,0%	0,1%
inter	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,2%	0,0%	0,0%	0,0%
pr noun	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
pr	0,1%	0,1%	0,5%	0,1%	0,3%	0,0%	0,0%	0,0%	0,4%	0,1%	0,0%
prep	0,0%	0,6%	0,2%	0,0%	0,4%	0,0%	0,0%	0,2%	0,0%	0,0%	0,0%
noun	0,4%	0,0%	0,2%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,4%
verb	0,0%	0,0%	0,2%	0,0%	0,1%	0,0%	0,0%	0,2%	0,3%	0,3%	0,0%

Metric variants

23.6% of variants are metric variants, with a clear predominance of hypermetry over hypometry.



Although it might seem normal to associate hypermetry with addition and hypometry with elimination, the data show that the opposite is the case:



From the graph it can be seen that hypermetry is involved in only 5% of additions and hypometry in only 1.6% of eliminations.

Metric variants thus appear to be largely independent from the phenomenon of additions and eliminations. Instead the meter often comes to the copyist's aid, leading him to compensate (by adding or deleting elements) so as to make the verse isosyllabic. See the following examples:

inf 1, 41

sì c'ha bene sperar m'era cagione
sì di ch'el ben sperar m'era cagione

Amor che nella mente mi ragiona, 72

costei penso chi mosse l'universo
costei penso movesse l'universo

In the first case the addition of *di* is compensated by the elimination of the final vowel of *bene*, while in the second case the elimination of the pronoun *chi* is compensated by the transformation of the verb *movere* from the remote past (*passato remoto*) to the imperfect subjunctive (*congiuntivo imperfetto*) tense. The rhythm helped the copyist not to lose sight of the metric references that persisted in his memory, constituting an aid for the memorization of the words. According to Paolo Canettieri:

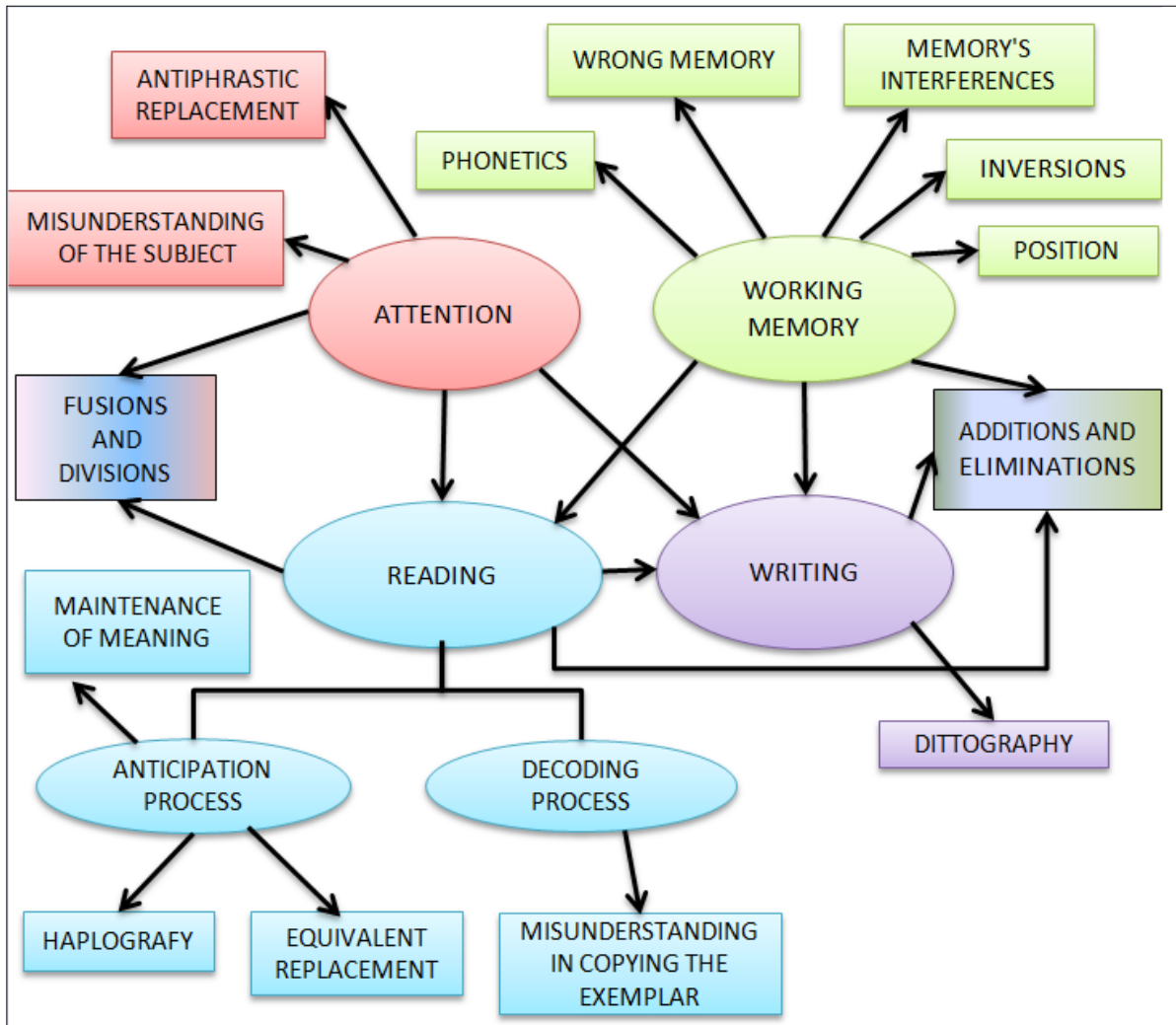
il metro e il ritmo presentano più vantaggi adattivi, fra questi, fondamentali, soprattutto tre: il coordinamento delle azioni, la segmentazione e la discrezione temporale e, infine, la funzione di appoggio per la memoria verbale. Secondo questa teoria, le strutture metriche regolari hanno fornito un grandissimo vantaggio adattivo per le civiltà che hanno poi sviluppato un sistema culturale complesso.¹⁷

Canettieri conducted an experiment with 48 subjects which showed how rhythm, combined with repetition and rhyme, increases long-term memory capacity. Nevertheless reliable evidence is lacking for its influence on short-term memory, and therefore on working memory. In fact, if one isolates the metric variants of *Commedia* and the sonnets of Giacomo da Lentini (the parts of our sample that have a consistent rhyme and metric pattern) the percentage of hypermetry and hypometry does not differ substantially from that of the total sample.

Conclusions

The diagram below highlights the relation of dependence of the variants we have analysed on the main cognitive processes involved in the act of copying.

¹⁷Canettieri, 2003



One could theoretically associate the data regarding the variants of the sample to the cognitive processes related with them in order to get an idea of the importance of the various different cognitive processes involved in producing these variants but such a calculation would certainly lead to some biased and misleading conclusions, as it would be impossible to determine the respective importance of a number of cognitive processes acting together. It is also impossible to establish the existence of other factors that can affect cognitive processes, such as strong emotions or illness, simply by looking at the variations. What we can deduce is simply the primary influence of attention and the working memory, due to their involvement in the processes of reading and writing, as well as the greater quantity of variants that involve them.

A general classification of the importance of the four main cognitive processes involved in the act of copying, in descending order of importance, is as follows:

- 1) attention
- 2) working memory
- 3) reading
- 4) writing

Writing, which might have seemed to be the logical protagonist of the process of copying, paradoxically appears to be the least essential. It is in fact only the mechanical manifestation of an intricate sequence of neuronal signals that derive in turn from attention, the working

memory and reading. Not surprisingly, the only variation that can be totally attributed to writing is dittography, that would nevertheless not exist if a good level of attention was present.

Today modern techniques of investigation (such as *functional neuroimaging*)¹⁸ allow us to directly observe and measure the involvement of the various areas of the brain in complex cognitive processes (involving multiple signals), while the more traditional evoked potential (EP) and event-related potential (ERP) tests could only measure information processing capacities in more simple cognitive tasks. Neuroimaging therefore makes it possible for us to resolve many doubts about the physiological processes of cognition, providing great benefits not only to neurobiology but also for many other sciences and disciplines, such as psychology, psycholinguistics, the philosophy of language and cognitive philology.

A team from the University of Zurich¹⁹ is now investigating the biological aspects of the development of languages over time and their work has shown that the tendency of the mind to trivialize and simplify has a much more decisive role than was previously thought as regards the changes that languages undergo over time.

In the future we may be able to dispel the doubts raised by this paper concerning the effects of specific cognitive processes on the various types of variants and therefore facilitate the choice between different variants, in order to create the edition of a text. Understanding the relationship between cognitive processes and variants makes it possible to safely discard those variables that arise due to the lack of attention or a deficit of working memory.

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¹⁸ Adina L. Roskies, 2003

¹⁹ Bickel, Witzlack-Makarevich, Choudhary, Schlesewsky, Bornkessel-Schlesewsky, 2015

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