

## Assessing L2 Portuguese writing: idea density and sentence complexity

*Avaliando a escrita do português L2: densidade de ideias e complexidade das frases*

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**Abstract:** Idea density and grammatical complexity were proposed as writing assessment parameters by Snowdon *et al.* (1996) and by Kemper *et al.* (2001) in the *Nun Study* (Snowdon 2001). The same parameters are used here to assess advanced Portuguese L2 writing in a learning context (C1/C2) in order to confirm them as valid assessment measures in a L2. Quality in writing is expected to translate into lexical precision and richness as well as sentence complexity. Results confirmed that reading has an influence on writing quality, insofar as the students who usually read are the ones who got the highest scores in both parameters. Results were nevertheless highly variable due to the heterogeneity of the group of participants. Both measures, idea density and grammatical complexity, were found to be correlated in two writing tasks, a synthesis and a writing prompt, which led to the conclusion that participants who write with lexical precision and richness also produce higher complexity sentences regardless of language and writing task variability.

**Keywords:** idea density; grammatical complexity; assessing writing; Portuguese L2.

**Resumo:** A densidade de ideias e a complexidade gramatical foram propostas como parâmetros de avaliação da escrita por Snowdon et al. (1996) e por Kemper et al. (2001) no Nun Study (Snowdon 2001). Os mesmos parâmetros são usados aqui para avaliar a escrita de português avançado em L2 em contexto de aprendizagem (C1/C2), a fim de confirmá-los como medidas de avaliação válidas em uma L2. Espera-se que a qualidade na escrita se traduza em precisão e riqueza lexical, bem como em complexidade das frases. Os resultados confirmaram que a leitura tem influência na qualidade da escrita, na medida em que os alunos que costumam ler são os que obtiveram as maiores pontuações em ambos os parâmetros. Os resultados foram, no entanto, altamente variáveis devido à heterogeneidade do grupo de participantes. Ambas as medidas, densidade de ideias e complexidade gramatical, foram correlacionadas em duas tarefas de escrita, uma síntese e uma escrita, o que levou à conclusão de que os participantes que escrevem com precisão e riqueza lexical também produzem sentenças de maior complexidade, independentemente da variabilidade da tarefa de linguagem e de escrita.

**Palavras-chave:** densidade de ideias; complexidade gramatical; avaliação da escrita; Português L2.

## Introduction

Foreign language teaching is often associated with a practical set of skills that enable learners to use a second language (L2) mainly in a professional setting, in life when immigration is at stake, or as a leisure activity. In all cases, it may be far more than a tool that enables language users (Cook, 2002) to solve immediate needs. Although the utilitarian view of L2 learning has come to replace a more intellectual take on the process (Matsuda, 2001), the latter view appreciated the mental challenge implied in appropriating the written code of a given language, whereas the first concentrates efforts on oral skills.

Since this text is specifically about writing skills, the focus here will first be on assessing writing (subsequent to reading) as well as on the mental challenges and benefits of writing (and reading) skills in any language and how to enhance them in the L2 classroom, specifically in a L2 Portuguese classroom.

The ways in which writing is associated with benefits in later life stages are thoroughly described by Snowdon, Kemper et al. (1996) and Snowdon, Greiner et al. (1999). Less educated individuals tend to show earlier signs of dementia than those who have higher levels of literacy skills. This is of course related not only with the cognitive and neurological advantages of reading and writing, but also with differences that may be associated with lower intellectual demands throughout life (Snowdon et al., 1996), regardless of what may have caused those differences. Not only do high literate individuals tend to live longer (Snowdon et al., 1996; Snowdon et al., 1999; Snowdon, 2001), they also keep their cognitive functions intact for longer. This does not mean that dementia is not to be considered; instead, it means that the physical signs of dementia set in these individuals' brains, but their effects are delayed.

It is therefore impossible to consider reading-writing activities as mere language exercises after reading about the *Nun Study*. Literacy skills become something other than grammar repositories or optional homework activities for several reasons. They must emerge from that statute into the priority list of

language teaching in general, or teachers will miss a golden opportunity of enriching the mental reserve of their students. Perhaps a more humanistic take on teaching informs this view. If language teaching overtakes a simple utilitarian view of languages, it may be seen as a privileged tool to improve students' lives now and probably further ahead, should they continue their learning path. In fact, according to Kroll and Bialystok (2013), learning a language has benefits at any stage of an individual's life. Combining writing with L2 learning seems therefore like a good deal.

While studying aging processes of nuns who belonged to two American congregations, Snowdon (2001) came across autobiographical texts written by the nuns early in their lives when they joined the congregations. In order to assess the effects of aging on language skills, specifically in writing, the same nuns were asked to produce autobiographical texts more than fifty years after they had written their first short autobiographies. This resulted in a ninety three texts *corpus* that could be compared to its equivalent written decades before by the exact same authors about the same subject, their lives. Texts written later in life were notoriously different insofar as some had lost sentence length, complexity, richness and vivaciousness, while others, despite some loss in these respects, still maintained some of the early command of language tools.

So as to measure the quality of the nuns' writing, Kemper *et al.* (2001) describe the steps to isolate two parameters. The first was idea density, a lexical approach that measures richness and precision in writing and depends on world knowledge as well as language abilities throughout life. The second was grammatical complexity and measured the degree to which a sentence is built around unconventional syntactic maneuvers. While this handling of sentences makes them more interesting, it also demands more of general comprehension, because of the overload it represents for temporary memory storage. Complex sentences are considered to be the ones which show left branching or multiple subordination as opposed to more sequential word orders (Cheung & Kemper, 1992; Snowdon et al., 1996; Snowdon et al., 1999; Kemper

et al., 2001). Both measures will be discussed later in the text.

In light of these findings, the research question posed here focuses on the possibility of finding close results in L2 Portuguese writing, since Snowdon et al. (1996) and Kemper et al. (2001) referred to findings in L1. This would mean that regardless of language, idea density and grammatical complexity are always associated in writing and may be used as assessment tools and as teaching goals.

The main objective was to assess quality in L2 Portuguese writing in an advanced proficiency level, C1/C2 (according to CEFR (Conselho da Europa, 2001) framework of proficiency levels). Specific objectives focused on assessing idea density and grammar complexity in two writing tasks, a synthesis and a writing prompt. Both tasks depended on previous readings and were performed by a group of adult students who enrolled in the Annual L2 Portuguese Course at Faculdade de Letras da Universidade do Porto. Research hypotheses were the following:

1. Students who read more, show higher results in both parameters measured, idea density and grammar complexity;
2. Written production may show quality variation due to proficiency level (as there were four proficiency sublevels in the class), L1 typological proximity and task type;
3. L2 Portuguese writing may show an association between idea density and grammatical complexity, thus confirming findings from the *Nun Study*.

The first part of this text covers theoretical framework that supports later findings. This is split into two main sections that focus on lifelong benefits of learning foreign languages and literacy benefits for cognitive reserve in which idea density and grammar complexity are included.

The second part of the text shows the methodological framework which is followed by conclusions.

## 1. THEORETICAL FRAMEWORK

### 1.1 Multilingual perks

There are benefits that result from using and/or learning multiple languages (Bialystok, 2001; Cook, 2002; Kroll & Bialystok, 2013; Paradis, 2004; Pinto, 2013): Multilingual individuals need to train cognitive control of their languages throughout life. That imposes an additional overload on working memory, which, in turn, tends to keep it sharper than a monolingual can manage with, in later stages of life (Kemper et al, 2001; Kroll & Bialystok, 2013; Snowdon et al., 1996).

Among these consequences, Bialystok et al. (2012) point out cognitive flexibility. This results from a continuous need to control different linguistic stimuli and responses, since languages are not separate entities in the brain (Paradis, 2004). This flexibility pays off later in life, when working memory functions tend to decline and inhibitory control becomes increasingly fragile (Bialystok et al. 2012; Kroll & Bialystok, 2013; Kemper et al. 2001). The circuits involved in effortfully managing the different linguistic systems of a multilingual individual resist time better, since they feed a sharper high level, thought a more efficient multi-tasking ability and sustained attention (Bialystok et al., 2012). This happens due to the probable benefits of linguistic processes over the nonlinguistic ones of executive control (Costa, 2019; Kroll & Bialystok, 2013).

Bi- or multilingualism on the brain effects are described by Bialystok *et al.* (2012) as a constant reorganization of neural circuits to accommodate necessary functional connections demanded by the constant linguistic practice. This has an impact on concept grasp and language use in general, as well as in cognitive reserve.

### 1.2 Using language as a working tool

If potential benefits of multilingualism are paired with the language processing in general as in teaching a language, there seems to be an additional advantage. That is precisely what Snowdon (1997)

brings to light when he describes the case of Sister Mary, an one hundred one years old nun, who died with no apparent clinical signs of Alzheimer's disease, even though her brain autopsy showed some of the physical evidence that could be conducive to a dementia diagnosis. Snowdon (1997) explains the situation as follows:

Although it is arguable whether Sister Mary had the type and quantity of neuropathologic lesions that are necessary to meet the neuropathologic criteria for Alzheimer's disease, her neuropathologic lesions still may have caused damage to her brain and reduced her cognitive abilities, although not enough to qualify for a clinical diagnosis of dementia (Snowdon, 1997, 155).

What the author enhances on the quote above is that in spite of developing neurologic signs of dementia, an individual may still keep cognitive functions generally intact. This happened not only to Sister Mary, although she was one of the most salient examples, but also to other sisters, who donated their brains for research (Snowdon, 1997). Additionally, Sister Mary was not one of the most educated in the group of nuns observed and extensively tested by Snowdon. She had a meager eight years of education at age nineteen, when she started to teach children, and only got her graduation diploma at forty-one. Yet her attitude is always described as energetic, in control and even bossy towards her fellow sisters in the congregation.

Although her vivaciousness could be partially responsible for her graceful aging process, teaching may be attributed an important role in the successful keeping of cognitive flexibility and sharpness. Teaching is a continuous effort to approach information from diverse points of view to make it comprehensible for others. This implies the use of language inasmuch as it demands a thorough choice of words, a careful adjustment to the level of knowledge of the interlocutor, and a constant vigilance over the intersection between what is taught and what is grasped and hopefully learned and reused.

There are, of course, lifestyle issues that count, but in what comes to language use and language(s) learning and use, it seems relevant to consider specific

benefits that may inform teacher training programs and language teaching options.

This brings a renewed interest to language teaching and learning since there is evidence that multilingualism helps keep brain functions like inhibition of stimuli, word recall, and cognitive control, but there seems to be proof that continuously working with language throughout life may delay dementia effects. Furthermore, most of the participants in the *Nun Study* (Snowdon, 2001) were teachers and worked until late stages of their lives. Sister Mary worked full time as a teacher until she was seventy-seven years, after which she taught math as a part time job up to eighty-four (Snowdon, 1997).

### 1.2.1 Why the previous benefits matter

Four of the fourteen participants in the study presented here were L2 Portuguese learners, but also teachers in training. They were all preparing to teach Portuguese in their home countries, East Timor and Vietnam. Others were language students, not integrated in student teacher training and one was a translator.

The fact that this advanced class of L2 Portuguese was composed of language students and workers, and student teachers in training raised awareness to the fact that for these learners there might be more to consider than just learning an additional language. Although this was not the core of the research, it led to awareness of the fact that there may be more to language teacher training than simply preparing trainees for their professional activity. It may also be regarded as the start of a mental journey that demands constant brain exercise and permanent language handling so as to meet teaching / learning goals. This might protect teachers' (or other language workers') brains from the effects of dementia, but more than that, it draws attention to what language manipulation may do for us all through the constant need to explain, paraphrase and re-work language either through speaking, or perhaps mainly through writing.

Writing demands attention, careful revision and a precise handling of language in order to achieve rhetorical goals, even if we write to ourselves (Emig, 1977; Murray, 2013). It is also a recursive process (Pinto, 2017) that feeds on its own processing of writing and reading to re-write. That effortful manipulation of language provides the writer with an opportunity to learn and to build a personal voice. In Murray's words,

The writer is a master weaver, rewriting before writing by making connections between pieces of information, observations, ideas, theories, memories, fears, hopes that when connected create a new meaning" (Murray 2013, 13).

So if writing presents itself as a mode of learning, in Emig's own terms (1977), it seems relevant to consider its assessment and to dedicate time to its development in class.

The next two sections explain the parameters used to assess lexical richness and sentence complexity in advanced Portuguese L2 proficiency levels, idea density and sentence complexity (or grammatical complexity). Both measures were based on the same parameters used by Kemper and colleagues for the *Nun Study* (Kemper et al., 2001). In what comes to sentence complexity, there were adjustments to be made since the languages tested are different. Nonetheless, the degree of complexity considered for Portuguese obeys to the same principles used in the *Nun Study*.

### 1.3 Idea density

*Idea* is often regarded as an elusive abstract notion, one that is hardly subject to measurement or assessment. It is more often associated with an inspiration, a spark of creativity that triggers action or with private thoughts that may never be shared. However, if an idea is to come to light, words are one of the means used to work on it and convey it to an interlocutor. Following Pinto (2009), the verbal translation of our ideas opens the door to our thought, which enables others to grasp our intended meaning

and at the same time gives us the chance to re-work our own ideas in the first place.

Reading constitutes an attempt of entering the realm of thoughts and ideas that gave origin to a written product. This is not to say that by reading we always grasp the whole meaning intended by the writer. In fact, Manguel (2010) describes the product of reading comprehension as an imperfect creation that never really is what the author meant. It is rather the product of the reader's mind when in contact with the text, therefore only a shadow of what started the writing process remains. In a L2 this shadow may be even more elusive due to proficiency level, cultural distance, conceptual misunderstanding and sentence miscomprehension. More often than not, sentences are made of familiar words that, put together in a certain way, are opaque thus preventing meaning from being grasped. What then allows us to understand the ideas captured in sentences? And what are ideas made of?

According to Snowdon et al. (1996; 1999) ideas are connected to a set of relations in a sentence that are interlocked with the verb and its arguments. Idea density reflects quality and precision in those relations. Kemper *et al.* (2003) say that "[t]he number of propositions expressed in a sentence is a measure of how informative it is" (p. 5). The authors built on Kintsch's (1974; 1998) notion of proposition which he sees as the product of personal memories and knowledge stored throughout life. The combination of both results in a construction made of language and concepts that does not always have a direct correspondence to the real world. Propositions are, Kintsch (1998) says, the means through which we convey an idea and its architecture depends on the matching of verbs and their arguments.

The quality of the text thus resides on the writer's ability to control and bend these structural relations in favour of meaning resulting in a richer writing. The core of its quality and precision comes from the accuracy and efficacy that connections between the elements in a chunk of words show. In order to do so, the writer needs to be aware of how these connections work, especially if writing takes place in a L2. The additional weight of producing a text in a L2 often

pushes learners into the path of simpler, more superficial written products that may not even express the full extent of the writer's intentions. It is therefore vital to give L2 learners the opportunity and time to explore challenging readings that may inform later writing. This requires support in regards to the processing of L2 sentences mainly with less competent writers and readers.

Avid readers are more often than not good writers, as Pinker (2014) explains, so the habit of grasping the meaning of challenging syntactic constructions may prove contagious when the reader in question starts to write (Emig, 1983). In this case, the processing underlying written comprehension and the subsequent verbalization of the previously read ideas is under focus.

Bearing in mind that this process was undertaken in Portuguese L2, a few obstacles were anticipated, such as structural and lexical oversimplification, functional mistakes, difficulties in grasping meaning, lack of writing skills, and others. The students who participated in this study were tested for their writing in L2 Portuguese in order to assess the quality of their written production, through idea density count and grammatical complexity scoring, but also to confirm if potential findings in a L2 could match the findings of the *Nun Study* in what concerns the quality and complexity in writing in a L1. Writing assessment followed two reading tasks performed in two separate classes. The same students had already been tested for reading skills by doing a cloze test.

The transition of reading a text to writing about it is supported by an ability to understand meaning and translate it into a personal, adequate and precise language. In other words, it must reflect the accurate grasp of ideas and recycle them into a new written product.

The link between thought and its verbal expression results in an idea (or a proposition). Therefore, a verbally encoded message derives not from an independently composed code of disentangled lexical items, but from an organized set of chunks that are deeply embedded in thought itself. Lists of words do not make for organized utterances. Groups of

interrelated words set in a specific order that depends on function are the core of ideas. Ideas are then linked, even at a pre-verbal level, by elementary predication relations which are verbally expressed (Kintsch, 1998). In order to code these relations, the learner needs to have verbal tools that enable access and organization of language elements which in turn reveal conceptual as well as pragmatic ingredients of thought. This requires an intentional grip of language. One that goes beyond an automatic and torrential use of language (Sachs, 2017) that derives from everyday use. Intricate thought requires sophisticated language tools, which is the reason why an elevated use of written language reflects a high command of higher mental functions, and a considerable resistance to time erosion imposed by dementia.

According to Kemper et al. (2001), idea density comes from the propositional content of utterances that may in turn be split and counted (Kintsch, 1974; Turner & Greene, 1977). By dividing sentences or utterances in propositional units, we are able to measure idea density by calculating propositional average per 10 words (Kemper et al., 2001; Chand et al., 2012).

In fact, Chand *et al.* (2012) define idea density as "the only approach that directly measures the ability to use world knowledge to structure propositions in spontaneous speech" (p. 5). These authors follow Kintsch (1974; 1998) in that they state that a text may be reduced to a list of propositions or coded ideas.

The three groups of main propositions are predicators, modifiers and connectors, according to Kintsch (1974). These are regarded as the items that represent ideas and are therefore selected as an idea each: Verbs, adjective, adverbs, connectors or prepositional phrases (Snowdon et al. 1996; Snowdon et al. 1999).

Brown et al. (2008) also define the proposition, as Kintsch (1974; 1998) describes it, as the verbal unit more directly involved in comprehending and retrieving the content of a written message. That is why the authors see idea density as a measure that goes beyond referential values of real entities. Verbs and their structural argument network refer to whatever a writer wants to refer to, thus opening a door to the ideas

that first shaped the topic engraved in the text, regardless of their referential value.

Following Kintsch (1998), propositional units do not directly derive from nouns. First, because they are usually embedded in structural branches that stem from the verb, and second, because the author does not contemplate them as parts of idea relations. Furthermore, nouns are regarded as less attached to specific mechanisms of function words (Brown et al., 2008; Chand et al., 2012; Kintsch, 1998), hence more prone to be used as parts of phrases already contemplated by idea density analysis.

Apart from idea density, sentence complexity or grammatical complexity was also used as an assessment parameter, still following the method used in the *Nun Study* (Kemper et al., 2001; Snowdon et al., 1996; Snowdon et al., 1999).

#### **1.4 Grammatical complexity or sentence complexity**

Rosenberg and Abbeduto's (1987) model of written assessment for children was the basis from which Cheung e Kemper (1992) developed their own grammar assessment of writing. Following their work, Snowdon et al. (1996) and, later, Kemper, Herman and Lian (2003) developed a scale of grammar complexity for sentences. This system showed a co-relation with working memory retention abilities, mainly if used to assess writing. Cheung and Kemper (1992) explain that less conventional organization patterns in a sentence may overload reading and writing processing abilities since verbal items that need to be integrated later in a sentence have to be temporarily stored in order to be available when integration is needed. This is not to say that longer sentences are the ones that imply more processing effort. In fact, according to Grabe (2009) or to Koda (2010), long sentences may actually be self-explanatory inasmuch as they may be built sequentially. If content is approached in a way that meets anticipation patterns, the reader, but also the writer, faces less obstacles in (re)coding meaning. If, on the contrary, the sentence is built in an unexpected way, the less experienced reader may face difficulties

trying to retain information, process the incoming new content and re-integrating the previous information later on. This seems to be particularly effortful in a L2, since meaning is not immediately (re)constructed and word relations are not always obvious and therefore automatic. This means right branching sentences are easier to process whereas left branching imposes an additional load on working memory.

Pinker (2014) shows how this extra load turns an utterance into a potential maze: "Admitted olympic skater Nancy Kerrigan attacker Brian Sean Griffith dies" (Pinker 2014, 110). Left adjective position in relation to nouns is not necessarily the same in Portuguese (although it also occurs), but there are other left branching constructions that may represent the same unsurpassable maze. One of them would be left branching relative clauses; another example would be longer conjunctive subordinate phrases that may occur left of the main verb.

The unexpectedness of left branching may be even more confusing when L2 learners were never exposed to alternative word orders in the same language, or even if their own L1 or other L2s they use do not contemplate the same sentence possibilities. However, when it is familiar, sentence processing may be smoother. When testing American learners of L2 German, Bernhardt (1991) noticed that more advanced students would look for right elements in sentences thus acknowledging typical word order in German (SOV). By looking for the verb on the right side of the sentence, L2 German readers showed that they were expecting such a word order and were thus looking for the main verb. If subordinate branches are placed left of the verb, that implies that readers, as well as writers, need to store that information in order to integrate the main content later. The longer the left branching, the harder it is to retain and integrate, even more so when this type of processing is necessary in a L2.

If reading a less conventional sentence organization is a heavy task on working memory, writing it in a L2 presupposes not only the knowledge that such word order is possible, but also the effect that it imprints on the potential reader, because such an organization is intentional. Furthermore, it implies

being aware of the linguistic tools that may have the potential to translate thought accurately and originally. When a writer chooses to interrupt the linear SVO sequence in Portuguese, there is an underlying intention in that option. It may just stem from a rhetorical option, but it may also represent the will to engage in syntactic maneuvers that have a potential enriching effect in the text.

Despite the fact that these maneuvers add interest and richness to a text, L2 writers or senior writers, although for different reasons, tend to show a slower sentence processing due to working memory constraints (Pinto, 2008; Small, Kemper & Lyons, 1997). The higher the proficiency level in a L2, the quicker these types of sentences tend to be processed, either in reading, or in writing. In a L2, grammar complexity not only represents a working memory measure (Kemper et al. 2001; Small, Kemper & Lyons, 1997), but it also reflects the proficiency level of the writers as well as their literacy skills either in their L1, or in other L2s. Other languages may, in fact, be the means through which similar unconventional word orders may have been made salient.

Left branching and complex subordination tend to present obstacles to less experienced and less proficient readers and writers (Kemper, Crow & Kemtes, 2004; Small, Kemper & Lyons, 1997; Pinker, 2014), hence the option of testing advanced L2 Portuguese learners as part of their writing assessment. By checking on the use of complex sentence existence in these students' writing, it is possible to infer that they are aware of how semantic relations work in a given sentence, in spite of an unexpected sequence. This awareness may also derive from a natural interest in writing which in turn leads the reader to increasingly intricate sentence patterns through reading. The contagion from reading to writing, Emig (1983) believes, would in those cases leverage writing skills and reading comprehension in general.

Avoiding contact with challenging sentence organizations is a lost opportunity to build on literacy skills. In fact, Kemper, Crow & Kemtes (2004) postulate the frequent exposure of seniors to complex sentences

in order to keep processing abilities as sharp as possible. The same can be said of L2 learners who, if not in contact with such structures, never know they are an option. Noticing the inner workings of sentences and making their mechanisms obvious can be a valuable strategy in class, especially if reading is not a regular presence in students' lives. All in all, avoiding difficult sentences to facilitate immediate comprehension has consequences in later stages of a L2 learning process, when those sentences are more frequently approached and expected.

As previously mentioned, the participants in this study had been previously tested for their reading comprehension skills by doing a cloze test (Lopes, 2014). The results showed problems with left branching relative clauses. There were obstacles in reading these sentences and in providing the relative pronoun missing, either because students did not grasp the meaning of the sentence, or paragraph (Pinker, 2014), or because they were not able to store previous information long enough to integrate it later in the sentence and did not read more than once or twice to disambiguate meaning. Kintsch (1998) also explains that this inability to process complex sentences may stem from a lack of competent content representation of the meaning in the sentence, that is, the sentence just misses to match an expected overall meaning. Either way, these constructions proved difficult in reading, so when testing writing they were highly valued for their complexity.

In order to assess the complexity of the participants' sentences, a scale was created for Portuguese. This was based on Kemper's own scale (Cheung & Kemper, 1992; Small, Kemper & Lyons, 1997; Kemper & Kemtes, 1999; Kemper *et al.* 2001; Kemper, Crow & Kemtes, 2004; Kemper, Herman & Liu, 2004) as well as on Pinto's (1994) scale and considers unconventional branching and multiple subordination as the most complex structures. The scale used to assess grammatical complexity in written sentences is available in Part II.



## 2. METHODOLOGICAL FRAMEWORK

### 2.1 Procedures, participants, and materials

A group of 14 (4M; 10F) advanced L2 Portuguese learners participated in this study. Nationalities were varied: German (2), Spanish (5), Italian (1), Russian (1); Venezuelan (1), Vietnamese (1), and Timorese (3). Age variation was between 20yo and 60yo, average age being 29, 21 (standard deviation 9,916).

All the participants were enrolled in a L2 Portuguese Annual Course held in Faculdade de Letras, Universidade do Porto. Nine of them (64, 28%) were also BA, MA or Ph.D students in the same university. Four of them (28,57%) were also L2 Portuguese teachers in training as they were enrolled in L2 Portuguese MA. Portuguese was a L3 (Hammarberg, 2001) for all of them and it was not a first L2 for any of them. They all had learned or acquired other L2s before. L1s were also varied, but they generally matched nationalities. The exceptions were Timorese languages: tétum, tokodede, and quemaq. The last two are oral languages.

The participants answered a questionnaire before the course started which focused on their reading habits and their self-assessed difficulties with Portuguese. Among these were reading and writing skills, vocabulary and pronunciation.

The class was exposed to two literary press columns. After reading them in different lessons, teacher and group discussed the main topic of each text, looked into sentence peculiarities and possible intentions behind them, the

**Table 1 – Reading-writing tasks in two different lessons**

Synthesis of the text	Writing prompt from the same title
<i>Olhar para ontem</i> António Lobo Antunes	<i>O meu lugar</i> José Luís Peixoto

1. Teacher handed out the text;
2. Students read the text in silence, after which several aspects (grammar, meaning) of it were discussed;
3. Students wrote their tasks autonomously after class;

effect they have on potential readers and shared opinions about both texts. The students were then prompted to write two texts. After reading the first press column, *Olhar para ontem*<sup>1</sup> (by António Lobo Antunes), the students were asked to write a synthesis, whereas following the second reading, *O meu lugar*<sup>2</sup> (by José Luís Peixoto), the teacher asked them to write a text with the same title as the one they had read and discussed in class. Both texts were written autonomously, as individual tasks, out of the lesson space for time limit reasons. Table 1 describes the steps taken in reading-writing class. Texts were rated for their idea density (ID) and grammatical complexity (GC). For GC Table 2 was used as a scale that ranges from less complex, rated with 0 or 1 point, mostly simple sentences that are linearly organized, to highly complex sentences. These are scored with 4 or 5 points and match the criteria of complexity mentioned before as well as an adjustment to L2 Portuguese demands. Grammatically complex sentences are mainly the ones that show multiple subordination and left branching.

ID was calculated following the formula used by Snowdon et al. (1999), although not for the last 10 sentences of texts, as the procedures described by the authors for the Nun Study. Texts produced by the participants in this study were considerably shorter. While there were several

Table 2 – Scale of grammatical complexity in L2 Portuguese writing	
Score	Sentences
0	Imperativas
	SVC
	SVO
	SVI
	SVS'
1	Causais, temporais, consecutivas e conclusivas
	Opositivas e restritivas
	comparativas
2	Infinitivas,
	Participiais
3	Relativas de encaixe à direita (antecedente em CD ou em CI)
	Subordinadas conjuncionais condicionais
4	Relativas de encaixe à esquerda (antecedente em SU da oração subordinante)
	Subordinadas múltiplas
5	

<sup>1</sup> *Olhar para ontem* may be literally translated into looking backwards. However, it is more often used in the sense of gazing into the void or not paying attention to

what is happening. The text is about a man who suddenly finds out his wife is about to leave him.

<sup>2</sup> *O meu lugar* means my place. The text was about the feeling of returning home after travelling.

texts produced, most of them were composed of little more than 4 or 5 sentences. Only 3 texts had at least 10 sentences, so 7 texts were selected for analysis due to the fact that they showed a minimum of 6 sentences. Propositions were considered, following Brown *et al.* (2008), verbs, adjectives, adverbs, prepositional phrases, and conjunctions (or connecting propositions of time, cause, or other relations). Although the authors used CPIDR, or *Computerized Propositional Idea Density Rater*, in this case the texts were rated manually. Ideas, according to Snowdon *et al.* (1996), match basic propositions counted as follows:

$$\text{Number of Ideas} \div \text{Number of words} \times 10 =$$

Quantitative as well as qualitative results obtained are described and discussed below.

## 2. RESULTS

Quantitative analysis looked for an association of both analysis parameters, thus confirming results from the *Nun Study*.

Results show that there is a co-relation between ID and GC in both writing tasks and between tasks. Table 3 also shows a co-relation between ID found in the synthesis and GC found in the same title writing prompt. IBM SPSS Statistics, 26, was used for statistical analysis.

Co-related variables (6 last sentences)		Results $\rho$ Spearman
Synthesis	Writing Prompt	
ID	ID	$\rho = ,559^*$ , $p = 0,038$
	GC	$\rho = ,606^*$ , $p = 0,022$
GC	ID	$\rho = ,654^*$ , $p = 0,011$
	GC	$\rho = ,584^*$ , $p = 0,028$

## 3. DISCUSSION

First, ID found in the synthesis shows an association with the same parameter in the writing prompt, which may mean that there are no differences due to task variability. Overall, the participants who reach higher scores in ID in one of the writing tasks

consistently obtain equally high scores in the other writing task. Different tasks did not impact in ID production, which means that ID is independent from the fact that the synthesis was more attained to a previous reading than the same title writing prompt, which gave more freedom to participants since it was a more personal and creative task than the synthesis. The fact that participants kept ID stable in both tasks also confirmed that direct reliance in vocabulary read in *Olhar para ontem* before was not relevant for the synthesis quality. Writing ability seems to be independent from the reading task specifically done before, although it probably feeds on literacy skills in general.

Additionally, there is an association between GC in the writing prompt and the same parameter in the synthesis. The same happens with ID. Neither one of the parameters show task variability. A high grammatical complexity score in a writing task seems to indicate the same score in writing in general.

The results also showed a significant co-relation between the number of correct answers in the previous cloze test and results found in both writing tasks. Participants who had previously provided more correct answers in the cloze test are the ones who scored higher in grammatical complexity in both writing tasks, specifically when it comes to subordinate conjunctive phrases. It is possible to say then that a better reader tends to produce more complex sentences, the same is to say that a reader for whom subordination is no obstacle, is also the one who is more likely to produce the same kind of sentence, or at an approximate level of complexity.

Writers who showed a higher ID are the ones who also imprint more complexity to their sentences. This confirms findings from the *Nun Study* for Portuguese L2 writing tasks. It shows that precision and richness in writing are intrinsically connected to the proficient use of grammar and with the ability to store and integrate linguistic elements in a sentence. This proves that meaning needs to be handled in such a way that the manipulation of the different elements of a sentence are unambiguously interwoven.

Table 4 – Results from the previous Cloze Test - Reading; ID and GC Results – Writing

Participants	Proficiency Level	Cloze*	ID**	ID W.	GC***	GC W.
			Synthesis	Prompt	Synthesis	Prompt
1	C1.2	22,58%	4,28	0	13	0
3	C1.1	45,16%	3,65	4,53	19	9
9	C1.1	0	4,40	0	3	0
11	C2.1	0	4,81	5,80	17	11
12	C1.1	0	5,16	4,23	9	13
13	C1.1	29,03%	5,22	0	19	0
14	C1.1	0	4,78	4,40	13	21

\*. Percentage of correct words found on a previous Cloze Test;

\*\* . Mean Idea Density in both writing tasks per sentence;

\*\*\*. Grammatical complexity total scores in both writing tasks (6 last sentences) of each text

#### 4. CONCLUSIONS

Findings described previously confirm results obtained by the *Nun Study* in what concerns the association of ID and GC in writing. This answers the research question posed before and opens a door to the validity of using ID and GC to assess writing in a L2. Furthermore, it raises awareness of the importance of looking at reading and writing as language learning goal in themselves.

It may be inferred that a structurally more complex text, following Kemper et al.'s (2001) definition of sentence complexity, tends to be a richer language sample since both ID and GC consistently showed an association. It may also be inferred that a writers who are able to produce such texts are not affected by the nature of the writing task. Considering the *Nun Study*, one might also expect these writers to enjoy their mental abilities for longer.

The main objective set before was to assess the quality and complexity of L2 Portuguese writers in advanced proficiency levels, which was possible as far as both parameters go. Specific objectives focused on assessing idea density and grammar complexity in two writing after reading tasks, a synthesis and a writing prompt.

The hypotheses mentioned before led to expectations about the influence of variables such as proficiency level, since there were three sublevels in the class (C1.1; C1.2; C2.1). This is still to be confirmed since most of the participants were placed as C1.1

learners whereas only two of them were considered either C1.2 or C2.1. There was no intraindividual variability due to task differences and interindividual discrepancies were congruent throughout both writing tasks and a previous reading task, the cloze test analyzed before.

Another hypothesis related to the probability of an advantage in writing when students' L1s were typologically close to Portuguese, as expected from Spanish speakers or Italian speakers.

This remained unconfirmed as the best readers and writers according to established parameters were indeed a Spanish speaker, but also a German speaker. There seems to be more to reading and writing in L2 Portuguese than just the advantage of cognates or structure similarities.

In fact, the (re)creation (Emig, 1977) demanded by writing demands more than translating word to word or following grammar rules. These are certainly very much needed mechanisms, but they are also functions that need to be integrated in a broader comprehension-production process. This crosslinguistic ability comes, according to Goodman, Goodman and Flores (1979) from literacy skills built along the literate learner's life. Hornberger (2004) mentions a common base knowledge made of crosslinguistic connections, rhetorical devices and linguistic maneuvers that feed biliteracy skills when reading and writing are at stake in whatever language one uses.

Paradis (2009) reminds us that proficiency results from fluency, so the apparent ease underlying writing processes mean that those writers sit on a considerable amount of previous work. That is what enables them to have access to transferable grammar or lexical items, to build on previously used mechanisms and to expand that knowledge through practice. This is not to say that these biliteracy mechanisms come effortless in aide of the writer. More often than not, it is quite the opposite, since multilingual individuals continuously need to inhibit unnecessary

intrusive stimuli in favour of the right linguistic option (Bialystok, 2001; Bialystok et al., 2012; Paradis, 2004; 2009). It is far from being an automatic process, at least in the early stages of L2 learning. However practice will only make perfect if the basis on which the learner builds is already a rich one, otherwise practice will do little more than automatizing whatever is regularly used. That is why attention is an important tool in the path to precision and richness, since it makes unconventional sentence maneuvers noticeable and lexical options salient in reading. So the contagion from reading (Emig, 1983) is probable.

It may also be stated that, considering results described before, ID and GC seem to complemente one another not only in writing but in reading as well. What this tells us is that the psychoneurolinguistic mechanisms of reading and writing are intertwined to the point that one draws on the other (Damasio & Damasio, 2000; Damasio & Tranel, 1993; Geschwind, 1965; 1979).

Nonetheless it may not be enough to develop metalinguistic awareness if language resources are not made noticeable (Schmidt, 1990). In order to notice the mechanisms sustaining written texts in order to use them afterwards, the reader or writer needs to take a step back (Olson, 1994). That helps the introduction of an unexpected word instead of a more automatic one and it also boosts the ability to look at sentences from diverse standpoints. This is also what happens through the revision stage of writing. Although the students were asked to write their texts without any time constraints, some of them were clearly not worked on as they were handed out to the teacher as first and only versions of the tasks. This may be due to two main reasons. First, the lack of practice in writing and second the pervasive belief that writing is dispensable in a L2 learning process. Indeed the students who got better scores in reading and writing were also the ones whose tasks were neatly organized on the page. Clearly, they were not the first versions, even if the texts had not been written before, as revision may happen before writing itself is printed (Murray, 2014). These were also the same students who, when asked about their reading habits in a questionnaire before the course

started, stated they enjoyed reading in general and engaged in reading in Portuguese. Explicit instruction on how to read or write is often unnecessary when it comes to avid readers. Actually, writing itself works as a learning mode to quote Emig's (1977) title. Being a recursive psycholinguistic process, writing profits from practice (Pinto, 2014) and this includes reading to write Hirvela (2004).

Hirvela postulates "writerly reading" (2004), that is, an analytical kind of reading that is made in order to write.

It is thus vital to expose L2 learners to challenging readings and to elicit rich, complex writing from them. As we know from the *Nun Study*, the benefits of using language to (re)code meaning is associated with higher quality of intellectual functions in older age. That *per se* should be enough to consider writing as a fundamental component of language use. However, the advantage goes beyond that if we consider the benefits of manipulating a L2 to its most enjoyable level. The one that allows a L2 learner to fully use it as a tool to work on and about thought, other than the more comfortable L1.

## References

- Bernhardt, E. B. (1991). *Reading development in a second language: theoretical, empirical, and classroom perspectives*. Ablex.
- Bialystok, E. (2001). *Bilingualism in development. Language, literacy and cognition*. Cambridge University Press.
- Bialystok, E.; Craik, F. & Luk, G. (2012). Bilingualism: consequences for mind and brain. *Trends in Cognitive Science*, 16 (4): 240-250. doi: 10.1016/j.tics.2012.03.001
- Brown, C.; Snodgrass, T.; Kemper, S.J.; Herman, R. & Covington, M.A. (2008). Automatic Measurement of Propositional Idea Density from Part-of-Speech Tagging. *Behavior Research Method*, 40(2):540-545. <https://doi.org/10.3758/BRM.40.2.540>
- Chand, V.; Baynes, K.; Bonnici, L. & Farias, S. (2012). *Analysis of Idea Density (AID): a manual*. [https://www.researchgate.net/publication/267362822\\_Analysis\\_of\\_Idea\\_Density\\_AID\\_A\\_Manual](https://www.researchgate.net/publication/267362822_Analysis_of_Idea_Density_AID_A_Manual)
- Cheung, H. & Kemper, S. (1992). Competing complexity metrics and adults' production of complex sentences. *Applied Psycholinguistics*, 13(1), 53-76. <https://doi.org/10.1017/S0142716400005427>
- Conselho da Europa (European Council, 2001). *Quadro Europeu Comum de Referência para as Línguas*. Porto: Edições Asa.
- Cook, V. (2002). *Portraits of the L2 user*. Multilingual Matters.
- Costa, A. (2019). *The bilingual brain*. Allen Lane, Penguin Random House.
- Damasio, A. & Damasio, H. (2000). Language and the brain. In K. Emmorey & H. Lane (Eds.), *The signs of language revisited*. An anthology to honour Ursula Bellugi and Edward Klima. Lawrence Erlbaum.
- Damasio, A. & Tranel, D. (1993). Nouns and verbs are retrieved with differently distributed neural systems. *Proceedings of the National Academy of Sciences of the United States of America*. 90, 4957-4960.
- Emig, J. (1977). Writing as a mode of learning. *College Composition and Communication*, 28(2), 122-128. <https://doi.org/10.2307/356095>
- Emig, J. (1983). *The web of meaning*. Boynton/ Cook Publishers.
- Geschwind, N. (1965). Disconnexion syndromes in animals and man. *Brain*, 88(2), 237- 294. doi: 10.1093/brain/88.2.237
- Geschwind, N. (1979). Specializations of the human brain. *Scientific American*, 241(3), 180-199. <https://doi.org/10.1038/scientificamerican0979-180>
- Goodman, K.; Goodman, Y. & Flores, B. (1979). *Reading in the bilingual classroom: literacy and biliteracy*. InterAmerica Research Associates.
- Grabe, W. (2009). *Reading a Second Language: Moving from Theory to Practice*. Cambridge University Press.
- Hammarberg, B. (2001). Roles of L1 and L2 in L3 production and acquisition. In Cenoz et al. (Eds.), 2001. *Cross-linguistic influence in third language acquisition: Psycholinguistic perspectives*, pp. 21-4. Multilingual Matters.
- Hirvela, A. (2004). *Connecting reading and writing*. The University of Michigan Press.
- Kemper, S.; Kemtes, K. A. (1999). The age invariance of working memory measures and noninvariance of producing complex syntax. *Behavioral and Brain Sciences*. 22 (1), 102-103. [https://kuscholarworks.ku.edu/bitstream/handle/1808/8360/Kemper\\_working%20memory%20measures%20and%20noninvariance%20complex%20syntax.pdf;jsessionid=B48CBE7F1441DEFB8D156E87E5EC613A?sequence=](https://kuscholarworks.ku.edu/bitstream/handle/1808/8360/Kemper_working%20memory%20measures%20and%20noninvariance%20complex%20syntax.pdf;jsessionid=B48CBE7F1441DEFB8D156E87E5EC613A?sequence=)
- Kemper, S., Greiner, L., Marquis, J. & Mitzner, T. (2001) Language decline across the life span: Findings from the Nun Study. *Psychology and Aging*, 16 (2), 227-239. <https://doi.org/10.1037/0882-7974.16.2.227>
- Kemper, S., Herman, R.E. & Lian, C. (2003). Age differences in sentence production. *Journals of Gerontology: Psychological Sciences*, 58, 260-269. DOI: 10.1093/geronb/58.5.P260
- Kemper, S., Herman, R.E., Liu, C. J. (2004). Sentence production by younger and older adults in controlled contexts. *Journals of Gerontology: Psychological Sciences*, 58B: 220-224. doi: 10.1093/geronb/59.5.P220
- Kemper, S., Crow, A. & Kemtes, K. (2004). Eye-Fixation Patterns of High - and Low -Span Young and Older Adults: Down the Garden Path and Back Again. *Psychology and Aging*, 19(1), 157-170. <https://doi.org/10.1037/0882-7974.19.1.157>
- Kintsch, W. (1974). *The representation of meaning in memory*. Erlbaum Kintsch.
- Kintsch, W. (1998). *Comprehension. A paradigm for cognition*. Cambridge University Press.
- Koda, K. (2010). *Insights into second language reading. A Cross-linguistic approach*. Cambridge University Press.

- Kroll, J. & Bialystok, E. (2013). Understanding the consequences of bilingualism for language processing and cognition. *Journal of Cognitive Psychology*, 10, 1-18.
- 10.1080/20445911.2013.799170
- Lopes, Â. F. (2014). *A compreensão leitora em português L2 nos níveis C1 e C2: contributos para a compreensão de sentido não literal*. Universidade do Porto, Faculdade de Letras. Dissertação de Mestrado.
- Manguel, A. (2010). *Uma história da leitura*. Lisboa: Editorial Presença.
- Matsuda, P.K. (2001). Reexamining audiolingualism: On the genesis of reading and writing in L2 studies. In D. Belcher & A. Hirvela (Eds.), *Linking literacies*. Perspectives on L2 reading-writing connections, pp. 84-105. The University of Michigan Press.
- Murray, D. M. (2013). *The craft of revision*. Wadsworth.
- Olson, D. R. (1994). *The world on paper*: The conceptual and cognitive implications of reading and writing. Cambridge University Press.
- Paradis, M (2004). *A Neurolinguistic Theory of Bilingualism*. John Benjamins.
- Paradis, M. (2009) *Declarative and procedural determinants of second languages*. Amsterdam/Philadelphia: John Benjamins Publishing Company
- Pinker, S. (2014). *The sense of style*. The thinking person's guide to writing in the 21st century. Penguin Books.
- Pinto, M. da G. L. C. (2008). A literacia e o envelhecimento cognitivo. In M. da G.L.C. Pinto (Ed.), *Da aprendizagem ao longo da vida ou do exemplo de uma relação ternária: agora, antes, depois*. Porto: Faculdade de Letras da Universidade do Porto.
- Pinto, M. da G. L. C. (2009). *A linguagem ao vivo*. Porto: Faculdade de Letras da Universidade do Porto
- Pinto, M. da G. L. C. (2013). Plurilinguismo: Um trunfo? *Letras de Hoje*, 48(3). 369-379.
- <https://revistaseletronicas.pucrs.br/ojs/index.php/fale/artic le/view/12584>
- Pinto, M. da G. L.C. (2014). *A escrita. O papel da universidade na sua otimização*. Porto: Faculdade de Letras da Universidade do Porto.
- Pinto, M. da G. L. C. (2017). Da revisão na escrita: uma gestão exigente requerida pela relação entre leitor, autor e texto escrito. *Revista Observatório Palmas*, 3(4), 488-517. DOI: <https://doi.org/10.20873/uff.2447-4266.2017v3n4p488>
- Rosenberg, S.; Abbeduto, L. (1987). Indicators of linguistic competence in the peer group conversational behavior of mildly retarded adults. *Applied Psycholinguistics*, 8, 19-32. <https://doi.org/10.1017/S0142716400000047>
- Sachs, O. (2017). *O Rio da consciência*. Relógio D'Água.
- Schmidt, R. (1990). The Role of Consciousness in Second Language Learning. *Applied Linguistics*, 11(2), 129-158. <https://doi.org/10.1093/applin/11.2.129>
- Small, J.A.; Kemper, S. & Lyons, K. (1997). Sentence comprehension in Alzheimer's Disease: Effects of grammatical complexity, speech rate, and repetition. *Psychology and Aging*, 12(1). <https://doi.org/10.1037/0882-7974.12.1.3>
- Snowdon, D. A. (1997, April). Aging and Alzheimer's disease: lessons from the Nun Study. *Gerontologist*, 37(2), 150-6. doi: 10.1093/geront/37.2.150
- Snowdon, D. A. (2001). *Aging with grace. The nun study and the science of old age*: how we can all live longer, healthier and more vital lives. Fourth Estate.
- Snowdon, D. A., Kemper, S. J., Mortimer, J. A., Greiner, L. H., Wekstein, D. R. & Markesbery, W. R. (1996). Linguistic ability in early life and cognitive function and Alzheimer's disease in late life: Findings from the Nun Study. *JAMA*, 275, 528-532. doi: 10.1111/j.1749-6632.2000.tb06347.x.
- Snowdon, D. A.; Greiner, L.; Kemper, S.; Nanayakkara, N. & Mortimer, J. (1999). Linguistic ability in early life and longevity: Findings from the Nun Study. In J.-M. Robine; B. Forette; C. Franceschi & M. Allard (Eds), *The paradoxes of longevity*, pp 103-113. Heidelberg: Springer-Verlag. [https://doi.org/10.1007/978-3-642-60100-2\\_9](https://doi.org/10.1007/978-3-642-60100-2_9)
- Turner, A.; Greene, E. (1977). *The construction and use of a propositional text base*. University of Colorado. Psychology Department.