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IMPACT OF WRITING STRATEGIES ON TEXT QUALITY: A CASE STUDY

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Abstract. *When it comes to teaching foreign languages, writing is often a neglected skill. Students are not equipped with the necessary writing strategies to facilitate the writing process and improve the overall quality of the produced text. Therefore, the aim of this research is to make the writing process more comprehensible by shining some light on various writing strategies and their impact on text quality. The study focuses on writing in German as a foreign language, specifically on four texts (whose complexity gradually increased) the participant wrote during the four- month writing course accompanied by a think-aloud protocol and keystroke-logs. Firstly, the research focuses on the analysis of the data drawn from the think-aloud protocol and keystroke logs, which help determine the writing strategies. Secondly, the quality of each text is determined. The focus of the final phase is to determine how task complexity impacts the choice of writing strategy, as well as how task complexity and writing strategy influence the quality of the final text. The overall aim of the research is to dissect the process of writing, making it more comprehensible both for students and teachers, as well as to develop guidelines for teaching writing in a foreign language.*

Key words: *writing process, writing strategies, writer profile, text quality*

1. INTRODUCTION

When teaching writing in a foreign language, especially in higher education – though secondary education is no exception – it is often presumed that students are familiar with the notion of a text as well as that they will be able to write a high-quality text without detailed instructions. Therefore, the writing skill is often reduced to homework assignments, a method that is becoming increasingly problematic due to quick development of generative AI.

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However, as generative AI is still not quite so good that it could substitute humans in writing various types of texts, the writing skill remains one of the essential communicative skills when learning a foreign language. In order to write a good text and convey the intended message, the writers have to employ certain writing strategies, both when writing in their mother tongue and in a foreign language. Some of these strategies may be more or less beneficial for the quality of the final text. Thus, as many studies have shown, it is important to give clear instructions about the writing process in class and educate the students about the cognitive processes that occur during writing (Cumming 1989; Breuer 2019; Silva 1993; Raimes 1987; van den Bergh & Rijlaarsdam 2001).

The aim of this paper is to contribute to the improvement of teaching writing in L2 through highlighting the importance of teaching writing strategies. From the perspective of psychology of writing, we aim to investigate how task complexity impacts the choice of the writing strategy, as well as how these two factors influence the quality of the final text. Based on the results, we aim to develop implications for teaching writing in the second/foreign language.

2. Writing as a Cognitive Process

"I write because I don't know what I think until I read what I say." This quote from the American writer Flannery O'Connor perfectly describes the relationship between thinking and writing – writing is namely a thought process, that is, it consists of various cognitive processes. Hayes and Flower (1980) were among the first researchers to investigate the writing process from the psychological perspective. Equating the writing process with a problem-solving activity, they adopted the think-aloud method from psychology for researching the cognitive processes during writing. Their research resulted in distinguishing between three main cognitive processes that occur during writing: planning, which consists of generating and organizing ideas, and setting goals; translating [ideas into text, author's note]; and reviewing, which consists of evaluating and revising (Flower & Hayes 1981). The model was later reevaluated by Hayes (1996) and complemented by the working memory component.

Building on the theory of Flower and Hayes that writing is in its nature a problem-solving activity, Bereiter and Scardamalia (1987) came up with a developmental model of writing which distinguishes between two types of writing: writing as knowledge-telling and writing as a knowledge-transforming process. Based on these two strategies, they distinguish between novice and expert writers. The knowledge-telling strategy is typically employed by novice writers and consists in finding information about the topic in the long-term memory and formulating this information into ideas, whereas the knowledge-transforming strategy is reserved for expert writers, who are able to set clearer goals and adjust and organize the information from their long-term memory in order to fulfill their rhetorical and pragmatic goals. However, it is important to note that the two strategies should not be understood as mutually exclusive, but rather perceived as two extremes on a continuum (Alamargot & Chanquoy 2001, p. 6).

On the other hand, Galbraith (1999) challenges the assumption that writing can be reduced to merely problem-solving, arguing that such hypothesis disregards the creative nature of language and reduces it to a process of expressing the knowledge stored in the long-term memory. He highlights that knowledge is not composed of a number of ideas

that exist independently of each other, but rather that the knowledge used for problem-solving and for writing are two types of knowledge which are stored in different areas of our long-term memory. Therefore, he labels writing a knowledge-constituting process and develops a two-process model of writing. This means that the ideas that the writer conveys during writing are not merely the ideas that are stored in the long-term memory, but rather that those ideas can be developed further during the process of writing. As van den Bergh and Rijlaarsdam (2001) put it, the ideas appear in our brain as cognitive nodes and each change that we make in the text can trigger the activation of new nodes that we had not been aware of before. During this process, Galbraith (1999) notes, the writer cannot only use the knowledge that he or she has stored in the long-term memory, but they can also come to new insights.

Despite the differences in their understanding of the writing process, two things remain the basis of every theory of writing: the fact that it engages working memory (Kellogg 1994; Kellogg 1996) and that it consists of the three main cognitive processes: planning, translating, and revision (all of which can further be divided into subprocesses). During writing, the writer will, consciously or not, combine these processes in a certain way, that is, they will employ a certain writing strategy. Until now, many researchers have tried to understand how these strategies can impact the quality of the final text, in other words, which strategies might yield better results. For example, Kellog (1988) investigated the impact of two planning strategies, rough drafting and outlining, on the quality of the final text. The results show that outlining has a positive effect on the quality of the text, since planning the content in advance in more detail offloads the working memory during writing and allows the writer to focus more on the translating and the revision process. A similar conclusion was reached by Kaufer, Hayes and Flower (1986), who investigated the impact of planning to sentence formulation. These two studies refer to writing in L1, but the results have also been corroborated in a study that focusses on L2 writing (Ellis & Yuan 2004). The authors of this study conclude that planning prior to writing has a positive effect on text quality because it gives the writer more confidence in their ability to express themselves accurately, which also leads to producing a more complex text.

In addition to planning, revision strategies also have a great impact on text quality. In the context of writing, revision "means making any changes at any point in the writing process" (Fitzgerald 1987: 484, cf. Alamargot and Chanquoy 2001). Many authors have tried to identify which revision strategies yield the best results (Eklundh 1994; Olive and Kellogg 2002; Piolat and Roussey 1991; Scardamalia, Bereiter and Steinbach 1984; Sommers 1980; Van Gelderen and Oostdam 2004). The results show that expert writers tend to perceive the text in a holistic way and revise more globally, with the focus on meaning, while novice writers are more focused on microstructural revisions (such as orthography or grammar mistakes). Moreover, expert writers have a wider array of revision operations at their disposal and their writing is often non-linear, while novice writers tend to present the information in the order in which it comes to their mind. When it comes to writing in L2, a greater number of microstructural revisions is to be expected; however, novice writers (or L2 learners whose L2 knowledge is at a lower level) are often unable to detect the mistakes and are more likely to resort to paraphrasing when faced with a language obstacle, rather than to diagnose the mistake and revise it (Flower et al. 1986).

Based on prior research it can be concluded that some writing strategies may be more beneficial and lead to higher quality texts. In the next chapter, we will present the most common writing strategies based on relevant literature.

3. Writer Profiles and Writing Strategies

Based on the way that writers combine the three main processes during writing, they develop, consciously or not, a writing strategy, which leads to a higher or a lower quality text. One of the first intents to identify writing strategies was made by Williamson and Pence (1989), who divided the writers into three groups based on the way they employed the process of revision: linear revisers, who revised their texts after finishing the first draft; intermittent revisers, who occasionally stopped to make revisions while writing; and recursive revisers, who often stopped to revise the written text and made a number of drafts while writing.

In their analysis of the writing process, Flower and Hayes (1980) identify four writing patterns: *depth first*, when the writers planned each sentence in advance and revised before moving onto the next sentence; *get it down as you think of it, then review*; *perfect first draft*, when the writers were focused on the text as a whole and aimed to write the best text possible, hence they planned holistically; *breadth first*, when the writer plans the content beforehand, makes the first draft and revises afterwards.

One of the most detailed studies on this topic was conducted by Torrance, Thomas and Robinson (2000). They analyzed 715 essays of undergraduate students and identified four patterns of writing behavior: *minimal-drafting strategy*, when the writers developed only one or two drafts; *outline and develop*, when the writers planned the content both before and during writing; *detailed-planning*, when the writers used content-planning methods such as brainstorming, mind-mapping or rough drafting; and *think-then-do*, when the writers did not develop any kind of an outline prior to writing.

A very similar typology of writers was created by van Waes and Schellens (2003). They compared writing strategies in two contexts: when the writing was done by hand and when it was done on the computer. Their study yielded five writer profiles i. e. writing strategies: *initial planners*, who planned the content in advance and consequentially revised less during writing; *average writers*, whose values for every variable were around average; *fragmentary stage I writers*, who did not plan much before writing and revised mainly while creating the first draft; *stage II writers*, who postponed their revision process until the end of the first draft; *non-stop writers*, whose values for each variable were below average.

When it comes to writing on the computer, Kim (2020) introduced the *internet search* variable into her study. Similar to previous studies, she identified four types of writers: *plan-based*, *revision-based*, *search-based* and *correction-based writers*, the difference between revision-based and correction-based writers being that revision-based writers are more focused on macrostructural revisions, and correction-based writers' main focus are micro-revisions, i. e. revisions of orthography or grammar structures.

The review of relevant literature leads to the conclusion that the strategies mainly revolve around the two processes: planning and revision. Thus, the writers are either more focused on planning the content beforehand and therefore revise less during writing, or they plan less beforehand, which leads to more revisions during writing. Considering the previously described typologies, we developed four writer profiles:

1. Planners (*perfect first draft* (Hayes & Flower 1980), *linear revisers* (Williamson and Pence 1989); *initial planners* (Torrance, Thomas, and Robinson 2000); *plan-based writers* (Kim 2020));
2. Mixed-method writers (*intermittent revisers* (Williamson and Pence 1989); *outline and develop* (Torrance, Thomas, and Robinson 2000); *fragmentary stage I writers* (van Waes and Schellens 2003));

3. Revisers (*breadth first* (Hayes and Flower 1980); *minimal-drafting* (Torrance, Thomas, and Robinson 2000); *stage II writers* (van Waes and Schellens 2003); *revision-based writers* (Kim 2020));
4. Intuitive writers (*think-then-do* (Torrance, Thomas & Robinson 2000); *non-stop writers* (van Waes and Schellens 2003); *correction-based writers* (Kim 2020)). These writers are usually familiar with the task and the type of text they are supposed to write and are therefore able to produce a high-quality text with neither much detailed planning in advance nor many revisions during writing.

Based on data from concurrent think-aloud protocols as well as from keystroke logging data, the writer in this case study will be allocated to one of the four writer profiles for each of the four texts.

4. Task Complexity and Text Quality

While the writing strategy is an important factor in producing a high-quality text, other factors such as task complexity can also impact the quality of the final text. The more complex the writing task is, the more load it will place on the working memory. Hence, it is often hypothesized that a more complex task will negatively impact the ability of the writer to produce a high-quality text. This hypothesis was named a *trade-off hypothesis* (Skehan 2009).

The opposite of this hypothesis is the so-called *cognition hypothesis*, a term coined by Robinson (2001) to describe the fact that writers sometimes produce a higher quality text in the condition where the task complexity is increased, since the writer will make a greater effort to fulfill the task properly and therefore lead to a better quality of the final text.

In this paper, we seek to investigate the impact of task complexity on the choice of writing strategy as well as the impact of these two factors on text quality. We hypothesize that the increase in task complexity will force the writer to switch to a strategy that allows them to scaffold the task and approach the writing from a different perspective.

5. Research Questions and Research Methodology

In this study we aim to investigate whether and how task complexity impacts the choice of writing strategy. Therefore, the first research question is as follows:

RQ1: Does task complexity influence the choice of writing strategy, and if so, how?

Moreover, given that research on the influence of task complexity on text quality is inconclusive – in other words, both aforesaid theories have been corroborated by further studies – we aim to determine whether there is a relation between task complexity and certain aspects of text quality, which poses the following question:

RQ2: Which aspects of text quality are influences by task complexity and how?

It is assumed that both task complexity and writing strategies will have a certain impact on the quality of the final text. That brings us to the third research question:

RQ3: How do task complexity and writing strategy impact certain aspects of text quality?

We hypothesize that the writer will try to structure the text better as task complexity increases, which means that they will try to employ a greater amount of planning, preferably before the writing process begins (H1). We also hypothesize that the quality of text structure and cohesion will be directly proportional to the amount of planning (H2). However, due to writing in L2, we presume that increased task complexity will negatively

impact the linguistic features of the text, such as grammar, orthography or sentence structure (H3).

The present study is a case study conducted in the context of customer service. The study follows the development of the writing skill of one participant over the course of four months. The participant is a customer support agent who replies to clients' requests via e-mail. They speak German as a foreign language at the B2 level according to the CEFR. In the scope of the study, the participant completed four writing tasks in which they wrote replies to customer requests over the course of four months (one at the end of each month). During these four months, the participant took part in a writing course, where they received instructions about the writing strategies and their advantages and disadvantages, but they were free to construct their writing process as they wished during the sessions. The choice of writing strategy was therefore not influenced by the researcher.

The time for the task was limited to 30 minutes. The tasks progressively get more complex, in that the amount of information to be conveyed to the client is increased, which should force the participant to pay more attention to text structure and content. Moreover, the last task differs from the previous three tasks in that the participant does not have any ready-made solutions regarding the client's request, i. e. they have to employ a knowledge-transforming strategy rather than the knowledge-telling one (Bereiter and Scardamalia 1987).

Each writing session was video-recorded and accompanied by a concurrent think-aloud protocol. The data therefore consists of transcribed think-aloud protocols, keystroke-logs (based on the video-recording of the writing process) and measurements of text quality. Transcripts from think-aloud protocols were coded (Appendix A), as well as keystroke logs. The writing session is divided into two stages: Stage I, until the end of the first draft, and Stage II, from the end of the first draft until the final text (Van Waes and Schellens 2003) For the coding of keystroke logs a tagset from Conjin et al. (2022) was used, with some adaptations made for the purpose of determining the writing strategy (Appendix B). The tagset was created mainly for assessing revision in L1, but all its categories apply to L2. However, as opposed to a surface change in wording/phrasing in L1, which mainly has to do with the writer wanting to convey a different meaning, in L2 there is a possibility that a word with wrong meaning was used and the revision consists in substituting it with the right word. Therefore, we added "wrong wording" to the category of Surface revisions. Moreover, some categories have been omitted, such as *number of backspaces, number of characters deleted/inserted, list of part-of-speech tags words inserted/deleted*, since they would not contribute to determining the writing strategy. Furthermore, the categories *temporal location (time from start process)* and *duration (duration and pause before revision)* have been omitted, it would be very hard to determine the correct timing of revisions without a keystroke-logging program such as Inputlog, and these data are not crucial for determining a writing strategy. Additionally, pauses were analyzed according to the type of pause (planning (global/local), formulation, revision, reading the task, reading the written text), and the length of the pause.

Data from think-aloud protocols and keystroke logs will be used for determining the writing strategy. Finally, for the assessment of text quality, a rubric from Beauvais, Olive, and Passerault (2011) was used and the texts were assessed by three independent external raters.

6. RESULTS

6.1. Writing strategy – Think-aloud protocols

In the first protocol, the coded data constitutes the following sequence:

Pl_k T Pl_ig Pl_k Pl_o Rl_g Pl_ig Rr Pl_sp Rl_st Rr Pl_k Pl_o Rl_st Pl_o Rl_pp Rl_st Rl_st Rl_sp Rg Pl_o Rl_sp T Pl_ig Pl_o Rl_sp Rl_g Rl_st Rg Rr Rl_st Rg Rl_st Rl_st Rl_st Pl_o Rg Rg

As the data shows, there is no general planning of the text before the writing process. During the first three fourths of the writing process, the writer only plans and revises locally. Local planning also occurs more frequently in the first part of the writing process, after which local revision outweighs the planning. During the writing process, the writer also scrolls back to read the task twice. Then, toward the end of the writing process, there is an increase in global revision. The writer reads the written text from beginning to the end (which can also be interpreted as global revision, i. e. *evaluation* (Flower, et al. 1986)), after which they start revising the whole text, starting from the second paragraph to the end of the text.

Since no global planning occurred at any point in the writing process, and the local planning only occurred at the sentence level, but not at the paragraph level, which triggered more frequent revisions and global revisions toward the end of the writing process, the writer can be described as a **reviser**.

In the second protocol, the coded data constitutes the following sequence:

Pl_k Rl_st Pl_k Rl_st Rl_pp Pl_ig T Pl_ig Rl_st Rl_pp Rl_sp Pl_k Pl_ig Rr Rl_st Rg Rl_st Pl_ig Rl_st Pl_k Rg Rg Rg Rl_st Rl_g Rl_st Rl_sp Rr Rl_st Rl_pp Rl_st

In comparison with the first protocol, it is obvious that the writer plans less frequently in the second protocol and the planning process is scattered throughout the writing session rather than densely stacked toward the beginning. This can be explained by a qualitative difference in the planning process: while no planning occurs at the text level in either protocol (i. e. outlining of the whole text), the planning in the first protocol occurs at the sentence level, while in the second protocol the writer plans paragraph by paragraph. Similar to the first protocol, global revision is moved toward the end of the writing process.

Although no global planning is registered in the second protocol either, there is a qualitative difference in the planning process, in that the writer now plans bigger chunks of text (at paragraph level), therefore planning is scattered out throughout the whole writing process. Due to this qualitative difference in the planning process, we are prone to categorize the writer as a mixed-method writer in the second protocol.

In the third protocol, the coded data constitutes the following sequence:

T Pg_o Pl_k Pl_k Rl_sp Rl_sp Pl_ig Rl_sp Rl_sp Rr Rg Pl_o Rl_sp Rl_st Rl_st Rl_st Rr Rg Pl_st Pl_ig Rl_sp Rl_st Rl_st

Compared to the first two protocols, it is noticeable that this is the first protocol in which global planning occurs at the beginning, immediately upon reading the task, in the form of outlining of the whole text. After that, local planning is almost evenly distributed throughout the whole writing process, occurring even toward the end of the writing process. This can be explained by the fact that the Stage II of the writing process takes up one third of the total writing time (see Table 1). At this point, the writer comes back to the first

paragraph and starts the revision process from there (marked by the second global revision in the codes).

Considering that the writer made a global outline of the text at the beginning, followed by periods of evenly distributed local planning mostly on paragraph level, as well as that Stage II of the writing process was marked mostly by global revision, we can conclude that in the third protocol the writer is using the **mixed-method** strategy.

In the fourth protocol, the coded data constitutes the following sequence:

Pl_k Rl_st Rl_st Rl_st Rr Rl_st Rl_st Rl_st Rl_sp Pl_o Pl_ig Rl_st Rl_g Rl_pp Rl_st Pl_o Pl_k Rl_st Rg Rl_p Pl_ig Pl_ig Rl_st Pl_o Rl_st Rl_st Rl_st Rg Rg

As can be inferred from the codes, in the fourth protocol there is no global planning before writing. However, in contrast to Protocol 2 and 3, local planning is not frequent at the beginning, but it is rather distributed in the second half of the writing process. Rather, the writer seems to be focused more on revision, and revises the text thoroughly in Stage II. Data from keystroke logs corroborates this: Stage II takes up exactly 40% of the writing process, and the writing process is the longest so far (see Table 1).

From this data we can conclude that the planning process is usually triggered by the revision process, and not vice versa. Therefore, due to lack of planning at the beginning, more revisions in the text were to be expected and the writer can be described as a reviser. However, a qualitative difference between the reviser in Protocol 1 and the one in Protocol 4 must be highlighted: while the writer transfers the revision process toward the end in both protocols, semantic revisions and revisions above word level are more frequent in Protocol 4, whereas in Protocol 1 there is a domination of surface changes.

6.2. Writing strategy – Keystroke logs

The keystroke-logging data for all four protocols is presented in the following table:

Table 1 Keystroke-logging data for all four protocols

Revision	Type	Protocol 1	Protocol 2	Protocol 3	Protocol 4
Orientation	Surface changes	75.9%	69.2%	78.6%	20%
	Deep (semantic) change	24.1%	31.8%	21.4%	80%
	Microstructure	100.0%	87.5%	66.7%	75%
	Macrostructure	-	13.5%	33.3%	25%
Domain	Subword	37.9%	34.6%	28.6%	10%
	Word	41.4%	38.5%	28.6%	30%
	Phrase	6.9%	11.5%	35.8%	10%
	Clause	-	11.5%	-	30%
	Sentence	6.9%	-	-	20%
	Paragraph	-	-	7.1%	-
Pauses	Planning	43.9%	45.5%	70.6%	51.7%
	Revision	57.1%	54.5%	29.4%	48.3%
Duration	Process	22:27	16:41	13:38	22:52
	Stage 1	56.1%	64.9%	63.9%	60%
	Stage 2	43.9%	35.1%	36.1%	40%

Table 1 shows that most revisions in the first three protocols were surface changes, whereas the deep (semantic) changes take the overhand in the fourth protocol. In the first protocol, most revisions occurred below the clause level, while sentence revisions occurred only toward the end of the writing process. No whole-paragraph revisions were registered. Moreover, when it comes to semantic changes, no macrostructure revisions were noted (changes in overall aim or subtopic). In addition to that, the Stage II of the writing process (the stage in which the writer revises the written text) is the longest of all four protocols, with most revisions taking place in this writing stage. Although the revisions occur only at the microstructural level, global revision in form of whole-text evaluation is present in Stage II. This confirms the data from think-aloud protocols and corroborates the conclusion that the writer is to be described as a **reviser** in the first protocol.

Compared to the first protocol, surface changes are slightly less present in the second protocol, but there are also more revisions above the clause level, as well as more revisions at the phrase level. Additionally, while in the first protocol the writer was mainly focused on surface changes, within which only microstructural changes were noted, there is a slight shift toward more deep (semantic) revisions in the second protocol, as well as toward more macrostructural changes. The situation is similar in the third protocol, where a third of all semantic changes are macrostructural changes. Moreover, in Protocols 2 and 3, Stage II is shorter than in Protocols 1 and 4 and takes up about a third of the whole writing process. This might be a consequence of more planning at the beginning of the writing process, as noted in the think-aloud protocol data. This is especially the case in the third protocol, where most pauses were used for planning, which means that planning episodes were rather frequent during the writing process as well, not only at the beginning of the process.

Even though there are less planning episodes in Protocol 2 compared to Protocol 3, data from think-aloud protocol shows a qualitative difference in the planning process in Protocol 2, so the writer can be described as a mixed-method writer in both Protocol 2 and Protocol 3.

Protocol 4 differs greatly from the first three protocols, first and foremost in the distribution of the two revision types – surface and deep changes. Compared to the previous protocols, there are significantly more revisions above the phrase level, which suggests a greater focus on global revision. This comes as a consequence of the lack of planning both at the beginning of the writing process and during the writing process. In protocol 4, the writer is almost exclusively focused on revision. Moreover, most semantic revisions take place in Stage II of the writing process, so revision is moved toward the end of the writing process. A notable fact is also that, while most revisions are contextual (90%; "revisions made when the writer moves away from the leading edge and makes a revision in a previously written and completed sentence", cf. Conjin et al. 2022), a third of the contextual revisions are immediate revisions, that is, revisions made at the point of cursor location (cf. Conjin et al. 2022), which means that the writer went back to a certain point in text, started revising, and the revision triggered the translating process at that location. This means that the writer does not resort to the "think then do" strategy, but rather revises the text globally multiple times during the writing process. Based on the keystroke-logging data, the writer belongs to **revisers** in the fourth protocol, which is in line with the conclusion drawn from think-aloud protocol data.

6.3 Text quality

Text quality was assessed by three independent external raters who are professional lecturers and teachers of German as a foreign language. Four factors of text quality were assessed: language (grammar, spelling), sentence structure and cohesion, text structure, and task fulfillment. A mean and standard deviation were calculated 1) for each of the factors separately, to account for possible impact of task complexity and writer strategy on individual factors, and 2) for all factors collectively. The values of the factors are as follows:

Table 2 Text quality values

Protocol	Overall		Grammar and spelling		Sentence structure and cohesion		Text structure		Task fulfillment	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	4.08	0.52	2.67	1.15	4.33	0.58	4.67	0.58	4.67	0.58
2	4.92	0.14	5.00	0.00	4.67	0.58	5.00	0.00	5.00	0.00
3	4.58	0.29	3.33	1.15	5.00	0.00	5.00	0.00	5.00	0.00
4	**3.83**	0.95	**2.67**	1.15	**3.67**	1.53	**4.33**	1.15	**4.67**	0.58

As can be seen from Table 1, Protocol 2 has the highest overall value, followed by Protocol 3. Even though the tasks complexity increases, text quality values from Protocol 1 to Protocol 3 also increase, with an exception of *Grammar and spelling* in Protocol 3, which drastically decreases in comparison to Protocol 2. Moreover, Protocol 4 has the lowest values for all criteria, but the most drastic decrease can be seen in *Grammar and spelling*.

The major difference between protocols 1-3 and Protocol 4, as mentioned before, lies in the fact that for Protocol 4, the writers had to employ the knowledge-transforming strategy, because they could not lean on prior process knowledge to solve the customer's problem. Evidently, this transition from knowledge-telling to knowledge-transforming took a toll on all aspects of text quality, especially on the linguistic abilities as well as the ability to connect sentences and structure the text in a plausible way.

As for the impact of task complexity on text quality, it can be concluded that 1) increased task complexity negatively impacts linguistic abilities, but not necessarily other factors such as text structure or task fulfillment, and 2) if the challenge consists in changing the approach to writing from knowledge-telling to knowledge-transforming, it has a negative impact on all aspects of text quality, irrespective of the writing strategy.

6.4 Correlation between task complexity, writing strategy and text quality

As can be seen from Table 2, the lowest quality texts are the ones in Protocol 1 and Protocol 2. This can be due to two factors:

1) In both protocols, the Reviser strategy was used. This means that there was no global planning prior to writing the text and the planning was mainly done at the local level, sentence by sentence. This could have led to a cognitive overload during writing, preventing the writer from being able to focus their attention on the linguistic form, sentence and text structure, and covering all points from the task.

2) Both tasks can be described as highly complex: the complexity of the first task lies in the fact that the writer had not had the opportunity to write such a text prior to the study, so they are yet to familiarize themselves with the requirements of such a task. The complexity of the fourth task consists in the necessary change of strategy, from knowledge-telling to knowledge-transforming.

Table 2 Correlation between task complexity, writing strategy and text quality

Task complexity	Writing strategy	Grammar and spelling	Sentence structure and cohesion	Text structure	Task fulfillment
		M	*M*	*M*	*M*
1	Reviser	2.67	4.33	4.67	4.67
2	Mixed-method	5.00	4.67	5.00	5.00
3	Mixed-method	3.33	5.00	5.00	5.00
4	Reviser	2.67	3.67	4.33	4.67

That being said, it is clear from the results that the two tasks (Protocol 1 and 4) were the most complex for the writer, and that with increased task complexity the writer resorts to the Reviser strategy.

When it comes to Protocols 2 and 3, it can be concluded the writer has familiarized themselves with the form of the text, not least because they had had more writing practice during the writing course. Although the task complexity gradually increased, it seems that the complexity did not impact the ability of the writer to organize a greater amount of information into a coherent text, which is corroborated by the fact that the values for the criteria *Sentence structure and cohesion*, *Text structure*, as well as *Task fulfillment* gradually increased from Protocol 1 to Protocol 3, which may be attributed to the choice of writing strategy.

As for linguistic knowledge, reflected in the criterion *Grammar and spelling*, Table 2 shows that the lowest values are in Protocol 1 and 4. The highest value for this criterion is in Protocol 2, when the writer switched to the mixed-method strategy, but the values gradually decreased from Protocol 2 to Protocol 4. It can therefore be concluded that the linguistic knowledge suffers under the pressure of task complexity, which is in line with the trade-off hypothesis (Skehan 2009). However, more research is needed to fully confirm these results.

7. Discussion

Based on a case study we have demonstrated how task complexity can impact the choice of writing strategy, as well as how these two factors can influence text quality. The results show that with increased task complexity, the writer resorts to the Reviser strategy, which refutes Hypothesis 1. However, it seems that this strategy, with no prior global planning, negatively impacts the coherence and cohesion of the text, and that the mixed-method strategy helps improve the overall sentence and text structure. In other words, this means that more planning leads to a better organization of the text, which confirms Hypothesis 2. When it comes to Hypothesis 3, the results show a decrease in values with higher task complexity, with an exception of Protocol 2, where better values for *Grammar*

and spelling criterion could be attributed to the mixed-method strategy. However, more research is needed in this area and we deem the results for Hypothesis 3 inconclusive.

Although task complexity was varied by incorporating more information into the task, i. e. the task required the writer to convey more information to the customer, which posed the biggest challenge for text coherence and cohesion, it seems that for this writer the complexity of the task did not consist it the amount of information, but rather in the fact that the task was new. Hence, Protocol 1 has the lowest values because this is the first time that the writer is confronted with autonomous composition of the whole e-mail, and Protocol 4 was a challenge because the writer did not have prior process knowledge to rely on, so the knowledge-telling strategy could not be used. These results show that task complexity can be achieved in many ways and shed light on just how personal and individual the writing process can be. However, since a greater amount of planning in Protocol 2 and 3 yielded better results for text coherence and cohesion, it would be well-advised to incorporate more planning into tasks of higher complexity as well. In order to research whether switching to mixed-method or Planner strategy would improve the results in a task of higher complexity, more research is needed.

The results imply that there should be more explicit instruction regarding the given text type, to account for the greater complexity caused by the lack of knowledge about the text type. Moreover, the results suggest that it is the combination of global planning and global revision (i. e. the mixed-method strategy) that yields the best results. Therefore, it could be beneficial to teach students explicitly how to plan efficiently prior to starting the writing process, as well as how to revise efficiently on the text level (global revision), rather than to let them intuitively choose the writing strategy.

The aim of this study was to shed light onto the individual writing process and gain insight into if and how the person adjusts their writing process according to task complexity. Given that this study consists only of one case, i. e. one writer, it is hardly generalizable, which is its biggest limitation. However, this study is only a part of a PhD project which encompasses seven case studies altogether, and we hope to be able to draw more reliable and generalizable conclusions from a greater set of data.

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UTICAJ STRATEGIJA PISANJA NA KVALITET TEKSTA: STUDIJA SLUČAJA

Kada je reč o učenju stranih jezika, pisanje je često zanemarena veština. Učenici nisu opremljeni neophodnim strategijama pisanja koje bi olakšale proces pisanja i poboljšale ukupan kvalitet sastavljenog teksta. Stoga je cilj ovog istraživanja da učini proces pisanja razumljivijim fokusirajući se na različite strategije pisanja i njihov uticaj na kvalitet teksta. Istraživanje je fokusirano na pisanje na nemačkom kao stranom jeziku. Korpus obuhvata četiri teksta koje je učesnik istraživanja napisao tokom četiri meseca kursa pisanja na sesijama pisanja, a podaci uključuju i protokol razmišljanja naglas i zapisnik praćenja pokreta na tastaturi. Zadaci progresivno postaju kompleksniji. Prva faza istraživanja predstavlja analizu podataka dobijenih iz protokola razmišljanja naglas i podataka iz zapisnika pokreta na tastaturi, uz pomoć kojih će biti određena strategija pisanja. U drugoj fazi istraživanja određuje se kvalitet svakog teksta. Cilj finalne faze istraživanja je da se utvrdi kako kompleksnost zadatka utiče na izbor strategije pisanja, kao i kako kompleksnost zadatka i strategija pisanja utiču na kvalitet konačnog teksta. Konačni cilj istraživanja je da se proces pisanja razgradi na činioce i na taj način učini razumljivijim kako za studente tako i za nastavnike, kao i da se razviju smernice za podučavanje pisanja na stranom jeziku.

Ključne reči: *proces pisanja, strategije pisanja, profilisanje autora, kvalitet teksta*

APPENDIX A

Code	Explanation	Abbreviation
Task reading	reading the task	T
Planning: global	determining the overall structure and organization of the essay	Pg
▪ Outlining	organizing thoughts into a structured plan	Pg_o
▪ Idea generation	brainstorming potential ideas for the writing task	Pg_ig
▪ Keywords	identifying keywords, superficial planning	Pg_k
Planning: local	selecting a specific topic or organizing information within a paragraph or a sentence	Pl
▪ Outlining	organizing thoughts into a structured plan	Pl_o
▪ Idea generation	brainstorming potential ideas for the writing task	Pl_ig
▪ Keywords	identifying keywords, superficial planning	Pl_k
Revision: global	reorganizing the structure of the essay or adjusting the overall focus; checking if all subtasks have been addressed	Rg
▪ Rereading		Rr
Revision: local	correcting errors or making small changes within a paragraph	Rl
Surface change		
▪ Spelling		Rl_sp
▪ Grammar		Rl_g
▪ Punctuation		Rl_p
▪ Style	substituting a word or a phrase to fit it better into the context	Rl_st
▪ Paraphrasing	substituting a word or a phrase to make up for the lack of knowledge	Rl_pp
▪ Typography	typo	Rl_t
▪ Cosmetics	change of font	Rl_c
▪ Wrong wording	using a wrong word due to lack of knowledge or negative transfer from L1	Rl_ww
	Semantic (deep) change	
Microstructure	supporting info, emphasis, understate, coherence, cohesiveness	Rl_mic

APPENDIX B

Property		Feature	*Value*
A. Orientation	**1**	**Surface change**	Numeric
	1.1	Typography	Numeric
	1.2	Capitalization	Numeric
	1.3	Punctuation	Numeric
	1.4	Spelling	Numeric
	1.5	Grammar	Numeric
	1.6	Cosmetics/presentation	Numeric
	1.7	No change	Numeric
	1.8	Wording/Phrasing	Numeric
	1.9	Wrong wording	Numeric
	2	**Semantic (deep)**	
	2.1	Microstructure changes (supporting info, emphasis, understate, coherence, cohesiveness)	Numeric
	2.2	Macrostructure changes (overall aim, subtopic)	Numeric
B. Evaluation	1	Correct start	Numeric
	2	Correct revision	Numeric
C. Action	1.1	Insertion	Numeric
	1.2	Deletion	Numeric
	1.3	Substitution	Numeric
	1.4	Reordering	Numeric
D. Domain	**1**	**Linguistic domain**	
	1.1	Subword	Numeric
	1.2	Word	Numeric
	1.3	Phrase	Numeric
	1.4	Clause	Numeric
	1.5	Sentence	Numeric
	1.6	Paragraph	Numeric
	2	**Number of backspaces**	
	2.1	Number of words deleted	Binary
	2.2	Number of words inserted	Binary
	2.3	Number of sentences deleted	Binary
	2.4	Number of sentences inserted	Binary
E. Spatial location	1	Word finished	Numeric
	2	Intended word	Numeric
	3.1	Word initial	Numeric
	3.2	Clause initial	Numeric
	3.3	Sentence initial	Numeric
	4	Characters from leading edge	Binary
	5	Words from leading edge	Binary
	6	Precontextual (1 – contextual)	Numeric
	7	Immediate (1 – distant)	Numeric