Text structure as an indicator of the writing development of descriptive text quality

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Abstract: Composing a well-written text is a prolonged and challenging process. The present study explored the incipient stages in descriptive texts written (pen and paper) or dictated by 283 Hebrew-speaking Israeli children in second to fifth grades. This study aims to better understand the interplay between age, literacy-related abilities, and descriptive text quality by exploring developmental aspects across grade levels regarding text structural quality, length of text and literacy related abilities, and by analyzing the relation between text structural quality and literacy related abilities (cognitive, transcriptional, linguistic, and reading), beyond length of text and grade level. Regarding the developmental aspects, the results indicate that text structure quality becomes more sophisticated and complete with age, attaining high-quality descriptive text structure from third grade on in the production of autonomous texts with genre-driven elaborate features. Length of text and literacy related abilities also increase with age. Regarding the relation between text structural quality and literacy related abilities, we found in 2nd grade, for P&P text, a significant total effect of syntactic lexical ability on text structure rank, partially mediated by length of text, and a weaker but still significant direct effect of syntactic lexical ability on TS rank, when controlling for length of text. We also found in 5th grade, for DICT text, a significant total effect of reading high ability on TS rank, not mediated by length of text.

Keywords: Text Structure, Descriptive Texts, Text Quality, Literacy, Writing Development

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1. Text structure as an indicator of text quality

The concept of "text quality" has been contested and remains elusive as it depends on how it is studied, the perspectives taken on what is a "good" text, and the different disciplinary orientations toward writing (Beauvais, Olive, & Passerault, 2011; Berman, 2008; Kellogg, 1994; Stavans et al., 2019; Tolchinsky, 2019, 2020). Text construction requires the integration of structural components (e.g., "events" in narrative texts, "topics" in informative/descriptive texts, and "claims" in argumentative texts) into a unified piece of discourse supported by a genre-specific cannon (Donovan & Smolkin, 2002). In this study, text quality is addressed in terms of the macrostructure compositional factors – text structure (TS) - in accordance with the discourse genre in question (Berman & Nir-Sagiv, 2007; Tolchinsky, 2019; Uccelli et al., 2019). The analysis of text structure (hereafter TS) provides insights into the writer's representation by understanding how its constituent parts are arranged (Sanders & Schilperoord, 2006). It has been argued that in poorly structured texts, cognitive resources are spent on creating its organization, which may or may not be effective in achieving its discursive purpose and sustain the translation of the writer's ideas (Kintsch, 2004; Williams & Pao, 2014). Moreover, the lack of knowledge of the TS and the ability to identify main and secondary information in a text, may hamper reading comprehension and possibly writing proficiency (Turcotte, Berthiaume & Caron, 2018).

2. Descriptive Texts: importance, development, and features

In this study, descriptive texts are conceptualized as the form (mode) of the discursive function of presenting factual information. Descriptions/information plays an important role in scientific (i.e., when children seek resources and information for any type of scholastic inquiry or knowledge) and procedural writing (i.e., when children as well as adults are called to use descriptions to guide an action such as instructions in a manual or a recipe in a cookbook). In addition, the unique structure of descriptive/informative texts can both stand alone or be incorporated into other texts genres (e.g., in a narrative, one can find a descriptive/informative TS in the setting of the plot). The descriptive text components have distinct functions, such as a identifying the entity to be described, detailing the entity's attributes, and concluding with a "wrap up" (Martin & Christie, 1984; Tolchinsky, 2019). Last, from a sociocultural perspective, writers producing descriptive text must anticipate the communicative needs of a reader by considering both the type and amount of information to be provided (Coker, 2012) and how to position the text based on the writer's understanding of the intentions in the illocutionary force of a description (Reeder & Shapiro, 1997).

Studies have reported on the characteristics of the descriptive genre as necessary to convey specific information to the reader/hearer about the object, event or situation being described (Schleppegrell, 1998). These characteristics include identification of the object of the description and provisions of details (De Temple, Wu, & Snow, 1991), use of linguistic resource such as adjectives, relative clauses, and prepositional phrases (Schleppegrell, 1998), and the elaboration by means of the type and number of details included as well as their organization in the text (Hemphill et al., 1994). The rhetorical components of a descriptive text are hierarchically structured with "core" and "peripheral" elements such as object identification statement (the entity to be described) followed by the details (the entity's physical or actions attributes) (Martin & Christie, 1984) and a closing (indicating the end of the description) (Tolchinsky, 2019). The organization of these components follows the macrostructural compositional constraints by the specific sociocultural bound genre's discursive aspects (Berman & Nir-Sagiv, 2007), arranging information for particular purposes (Kress, 1994) and coherently weaving relationships among cognitive representation of textual ideas to facilitate text comprehension (Kintsch, 2004).

Studies on the production of descriptive texts by school-aged children have been scarce (Iparraguirre, 2014). Previous studies indicated that with the increase of school grade, there is a growing complexity of the descriptive text manifested in the ability to condense information and add details to the aspects described, which lead to a better thematic and structural organization (Christie & Derewianka, 2008). Iparraguirre (2014) showed that in elementary school, children showed a progression in descriptive text-quality across a continuum between particularistic, context-dependent principles, and universalistic-oriented principles, which displayed different perspectives and types of information. In a recent study, Tolchinsky (2019) demonstrated that at elementary school, descriptive TS develops gradually from providing a set of qualities to building a descriptive schema constituting the introduction of the described entity, a set of justified qualities and a generalization borne out of previously provided information. In Hebrew speaking-writing children at school age this topic has not been explored.

3. Literacy – related abilities associated with descriptive text quality

The challenge of composing a good text requires drawing on different competencies effectively in real time and with a limited processing capacity (Berninger & Winn, 2006). This process convenes and orchestrates transcription skills (i.e., handwriting and spelling), linguistic knowledge (i.e., vocabulary and syntax), textual discursive knowledge (i.e., genre specific patterns and reading) and cognitive ability (i.e., using tasks that assess rapid automated naming and working memory as well as a non-verbal cognitive constructs assessed by the Raven matrices) – which differentially contribute to generating, organizing, holding, and

translating ideas into good quality written texts (Tolchinsky, 2019; McCutchen, 2006). For example, transcriptional fluency frees working memory (WM hereafter), allowing the writer to attend to higher-level abilities such as text organization (Wagner et al., 2011; Bourdin & Fayol, 1994; Chanquoy & Alamargot, 2002; Puranik & Al Otaiba, 2012). Moreover, studies comparing written or dictated narrative texts showed that transcription hampers the length of written texts (Hildyard & Hidi, 1985) but not the TS organization (Scardamalia, Bereiter, & Goleman, 1982).

The cognitive load in writing requires the writers' attention to planning, problem-solving, short- and long-term memory, executive functions, and recruitment of meta-cognitive and metalinguistic knowledge to achieve a well-written text (Kim & Schatschneider, 2017). Among the cognitive measures (Raven's Progressive Matrices, RAN - rapid automatized naming, and WM – working memory) related to writing development of text quality, Raven - a nonverbal cognitive measure - provides a cognitive basis for ideational organization grounded in the ability to reason and infer a point of view, state it clearly, and back it up in a logical manner, weaving educed relations between claims and support (Kim & Schatschneider, 2017). Performance on the Raven's Progressive Matrices has been found to be related to a range of cognitive abilities, including fluid intelligence, WM, attention, and problem-solving. The RAN task - a cognitive measure of speed and efficiency in retrieving and naming a series of visually presented stimuli - taps skills related to rapid integration of phonological and visual processes (Wolf & Bowers, 1999; Wolf & Denckla, 2005) and it also has been related to cognitive abilities such as general processing speed (see e.g. Georgiou et al., 2013) , linguistic, , and reading abilities (Araújo et al., 2015; Chen et al., 2021) (word reading in different orthographies as in Landerl & Wimmer, 2008 and Landerl et al., 2019) . RAN requires the regulation of processes in attention, memory and articulation, so it also involves some abilities of WM (Weng et al., 2016). In association to writing, RAN measures are scarce and novel (Albuquerque, 2017). Few studies investigating the predictive power of RAN in writing outcomes, suggest that its relationship to writing ability may depend on a range of individual and contextual factors such as spelling accuracy becoming automatized and less laborious (Berninger & Winn, 2006). While the Raven and the RAN task may have some indirect relationships to each other through shared cognitive processes such as attention and WM, they are considered to be distinct measures of different cognitive abilities. WM relates to online production effect on processing overload, assuming that children's writing develops within a limited working-memory capacity (Swanson & Berninger, 1996) that gradually automates components related to low-level processes (e.g., transcription skills) to free resources for other cognitive and linguistic demands (Maggio et al., 2012). Linguistic resources enable the translation of ideas into texts by means of words and syntactically appropriate sequences. Studies have shown that children's oral proficiency is closely related to their text production (Silverman

et al., 2015) and vocabulary is reported to be a good literacy-related indicator of writing quality (Seroussi et al., 2021). Vocabulary was found to be a good indicator in narrative and descriptive texts (Olinghouse & Wilson, 2013) contributing especially to text productivity, lexical richness, and TS (Castillo and Tolchinsky, 2017). Laufer and Nation (1995) define measures of lexical richness as an attempt to 'quantify the degree to which a writer is using a varied and large vocabulary' (p. 307). In contrast, studies on syntactic knowledge and text quality have yielded inconclusive affirmations. Syntactic complexity increases with familiarity and skill of school-related writing (Schleppegrell, 2004), but differs according to text genres (Purcell-Gates, 1988; Tower, 2003). And though grammaticality judgment ability predicted text quality as early as third graders (Olinghouse, 2008) repeating structurally complex sentences did not render longer and richer texts (Berninger et al., 2011).

Aspects of reading–writing relations have also shown (Shanahan, et al., 2006) that reading-related skills (e.g., word analysis, vocabulary size, and comprehension) interactively influenced writing-related skills (e.g., spelling, vocabulary, syntactic knowledge, and knowledge of story structure). High and low reading skills were related to composition quality (Abbott & Berninger, 1993) and word-reading ability affects the compositional quality (Olinghouse, 2008). Moreover, the relations found between the reading skills and the structure of the texts vary across ages, genres, and text components (Stavans et al., 2020).

There has been a considerable amount of research on the relationship between text length and text quality in the development of writing in elementary school children. Some studies have suggested that longer texts are generally of higher quality (Graham, Harris, and Hebert, 2011), while others (Janssen, Braaksma, & Rijlaarsdam, 2006; Kellogg & Raulerson, 2007) found no significant relationship between text length and quality. In all, studies suggest that there is a relationship between text length and text quality in elementary school children's writing, but that this relationship is complex and depends on other factors such as vocabulary use, organization, and fluency (Graham & Perin, 2007).

More specifically and relevant to descriptive text quality, Coker (2006) studied text length, content elaboration, spelling, sentence conventions, and genre features in written productions as indicators of text quality; and showed that 1st to 3rd graders' background, literacy skill, 1st grade teacher, and 1st grade classroom environment were predictors of writing quality and output. In a later study Coker et al. (2018) showed that as early as first grade there were qualitative differences in the production of descriptive texts whereby children with low transcription abilities and low production level of sentences, also produced low quality TS in terms of poor topic presentation, details, and support. Coker (2018) laid out a complex network of indicators related to the evolution of a descriptive text in early writing development emphasizing the centrality of a comprehensive developmental model

of writing. Tolchinsky (2019) concluded that literacy related indices such as the ability to produce a self-sustained discourse, the ability to handle meaning relation among words, and a good WM, explained differences at the lower levels of text quality, whereas a good spelling explained incremental changes in the quality of the descriptive TS.

4. Written versus dictated text productions

Comparing oral and written text production can provide insights into the underlying cognitive and linguistic processes involved in language production in both modalities. For example, research has shown that spoken language tends to be more spontaneous and less planned than written language, and that the two modalities may involve different syntactic structures and lexicon (Halliday, 1994). By comparing the characteristics of oral and written production we gain insights into factors that facilitate or hamper the composition of a descriptive text. Such production differences have shown that the quality of written texts may be better than dictated texts in skilled writers (in students' stories Graham and Weintraub, 1996) or typed texts (in college students Varghese and Abraham, 1998). Berninger and Swanson (1994) compared the written and dictated stories of children in grades 3-7 and found that the written stories were longer, contained more words, and had a more complex syntax than the dictated stories.

This evidence suggests that producing a written text may have advantages over producing a dictated text for elementary school children because a written production allows children to engage in the process of translating their ideas into written language while engaging in planning, revising, and editing their writing, towards perfecting their writing skills. In tandem, producing a dictated text may also have advantages for young children. Dictation affords focusing on content (generating and expressing ideas) verbally, unconstrained by writing abilities. In particular, this is helpful for children struggling with handwriting or spelling (Graham & Weintraub, 1996). Studies have shown that by eliminating the burden of transcription children's dictated texts may be longer, and the quality of the TS will be unaffected (e.g., Graham, 1990; Hilyard & Hidi, 1985; Scardamalia, Bereiter, & Goelman, 1982). On the other hand, if transcription hampers text production at the word and sentence level, we expect the oral productions to surpass the quality of the written text in terms of vocabulary, syntactic complexity, and textual features.
Recently, studies have shown that the modality of production affects TS quality so that children whose TS is complete in their oral renditions, also have a more complete TS in the written one (Arfé et al., 2016; Silverman et al., 2015; Tolchinsky 2019), and that mid-elementary school children demonstrate similar or superior text complexity in lexical richness (Strömqvist, et al., 2002), syntactic complexity (Ravid & Berman, 2006), and content units (Boscolo, 1990) in the written compared to the dictated production (Salas & Tolchinsky, 2017). In general, written texts tend to be

more detailed and linguistically complex than dictated texts which may relate to the modality, context of delivery, age, experience with writing, and genre specific TS such as the one in quest - a descriptive text.

5. Study

This study aims to better understand the interplay between age, literacy-related abilities, and descriptive text quality. At the first stage, by exploring developmental aspects across grade levels regarding text structural quality, length of text and literacy related abilities, and at the second stage, by analyzing the relation between text structural quality and literacy related abilities beyond length of text and grade level. To this end, the present study set out to explore the TS quality of descriptive texts among elementary school children in two production modalities (unmitigated P&P and mitigated DICT) by addressing the following questions:

RQ1: How TS quality, text length and literacy-related abilities develop across grades?

RQ2: Is there a relation between literacy related abilities (cognitive, linguistic, reading) and texts quality (text-structure rank), beyond grade and length differences?

5.1 Participants

The participants in this study were 283 Hebrew-speaking schoolchildren (143 boys and 132 girls) in 2nd (n = 66), 3rd (n = 67), 4th (n = 61), and 5th (n = 89) grades, from three public schools in middle to high socioeconomic status (SES) residence areas in central Israel. The two inclusion criteria for the schools in this study were that they belonged to the secular public-school stream, and that all parties involved (parents, teachers, and supervisors) showed interest and agreed to cooperate. Participants' age was defined by their grade level. Seven newcomers with less than 2 years of schooling in Israel were excluded, six participants left the school midyear and 5 children showed no interest in participating. Moreover, eight children were excluded because they did not produce a descriptive text in both modalities. All participants had a signed parental consent.

Descriptive text instruction in the Israeli context is part of the national curriculum for language and literacy education (Ministry of Education, 2002). This curriculum consists of general guidelines for teaching texts of various genres (argumentative, informative, descriptive, and explanatory) and in the different modalities (spoken and written; receptive and productive). One of the shortcomings of this national curriculum is the lack of a developmental grounding. It does not provide information on how to process a descriptive text at different grade levels, nor does it provide specifications as to expected outcomes and achievements at each grade level in terms of text productions in general, and descriptive TS in particular. While there are general objectives and a general

reference to the structure, linguistic characteristics and uniqueness of each genre, the actual translation of these objectives into classrooms practices is subject to interpretation and initiatives by school principals, educators, and language education supervisors.

5.2 Material and Procedures

Two descriptive texts were produced by each child on topics drawn from pedagogic repositories and previous studies - one text for each modality. The instructions (in class for P&P and individually for DICT) were (in free translation from Hebrew) as follows:

> We meet children your age from different classes in different schools in the country and we ask them to write an essay on the following topics.
>
> a. *Can you please write a text (essay) about: your favorite character from the TV / literature / movies / computer?*
> b. *Can you please dictate to me so that I can write your text (essay) about: your favorite teacher?*
>
> *Try to detail and explain as much as possible why you like the character/hero/teacher so that the other children can be impressed and get to know the character in depth.*

Modes of text production: One descriptive text was collected in class by all children in an unmitigated pen and paper (P&P) modality and the other was collected individually in a mitigated dictation (DICT) modality by the experimenter. The experimenter wrote the dictated text onto paper so the child could see the text. Revisions were made orally by means of false starts or rephrasing (all documented by the experimenter) with no reports of children's specific writing requests. These two text modalities were used to establish whether the production, and more specifically the TS, could be hampered by the mechanics of writing. The time limit for the P&P writing task was a language class period (roughly 40 minutes). The teacher was present in the room, attending to classroom management only. Composition writing is a typical activity in the language class and as such the texts were collected as a regular classroom activity. As a routine, out of the 40 minutes class period, roughly 10-12 minutes are devoted to task instructions, leaving a maximum of 30 minutes for the children to write - a usual and reasonable amount of time for the children to produce a written text at all grade levels. For the individual (DICT) task there was no time limitation as it was one of the several tasks conducted by an experimenter. The descriptive text dictation task did not exceed 15 minutes. The order of administration of text production was counterbalanced as the P&P productions took place in class during class time for half of the sampled participating groups while the DICT productions were collected individually with half the children in each class performing each of these individually collected tasks

in inverse order. In addition, order effect concerns were mitigated by the different topics of the tasks, the time lapse of two weeks and the multiplicity of tasks each child was performing.

5.3 Literacy-related Abilities Assessment

Cognitive ability was assessed by two different tests: a) The Raven's Colored Progressive Matrices (Raven, Court, & Raven, 1990) that were administered collectively where each child completed a pattern presented in the form of 6 × 6 matrix; and b) Rapid Automatized Naming – letter (Shany et al., 2006) was administered individually and consisted of 50 five Hebrew printed letters, each repeated randomly 10 times, to be read aloud by the child as fast as possible. Scores were calculated by the number of letters per minute read correctly and transformed into percentages.

Transcription ability was measured by handwriting fluency and spelling. Handwriting fluency task, administered individually, measured the number of letters written in a minute (Wagner et al., 2011(. A type - token ratio (TTR) was calculated between fluency in writing a single letter as opposed to different letters many times. Spelling was assessed collectively in class by dictating two different lists of 20 content words and 20 function words (Shany et al., 2006). A combined percentage score of correct spelling (out of 40 items) of both types of words was calculated. It should be noted that transcription measures of writing fluency and spelling were only used in the analysis of the development of the transcription indicators but were not relevant when analyzing TS as the different modalities were written by the participant (P&P) and by the experimenter in the role of a scribe (DICT).

Linguistic ability was measured by lexical richness and syntactic receptive score. The former consisted of a fifteen-item synonym and a fifteen-item antonym test (Glanz, 1989;) and by a ten-sentence completion of derivational adjectives test (Avivi Ben-Zvi, 2010). Both tests' scores constituted the lexical richness score. The latter, the syntactic receptive score combined the average of the syntactic judgment and correction task tests (Shany et al. 2006) also administered individually.

Reading ability was measured by high (reading comprehension) and low (reading accuracy, fluency, and phonological awareness) -level reading skills. The reading comprehension tests consisted of 15 multiple-choice questions targeting different levels of understanding (Brandão & Oakhill, 2005) adapted for grade level and administrated in class. The reading accuracy and fluency tests consisted of reading 38 isolated words and reading a whole narrative text (Shany et al., 2006), both administered individually. A phonological awareness - phoneme deletion task (Shany et al., 2006) was also administered individually. Scores for all tasks were calculated as percentages of correct answers and low- and high-level scores were weighted.

5.4 Data Coding

The text data collected in both modalities (P&P and DICT) were transcribed in orthographic transcription exactly as the children wrote them (including spelling and punctuation) and as they dictated them. Each modality was analyzed separately. The transcribed texts were segmented into clauses (following the clause definition as the argument and predicate used in Berman & Slobin, 1994 – a unit of analysis that resonates with "number of ideas expressed" proposed by Puranik et.al., 2007, p. 257), and coded as a TS (TS) component. The segmentation into clauses and the coding of each clause as one of belonging to a TS component was carried out by a trained research assistant and the authors. A randomly selected sample of 5% of the texts was used to establish the units of analysis, research assistants' training and coding. Interrater reliability based on the independent coding of these texts showed (92%) agreement in clause segmentation, and (87%) agreement in determining TS component by 3 raters – 2 research assistants and one of the authors. These precents of agreements were the lowest threshold reached on the sample by comparing the clausing and component coding between each assistant and the researcher.

Coding for length included the total number of orthographic words as written by the subject in the P&P and by the experimenter in the DICT production. Orthographic words were defined as a sequence of letters delimited by a space before and after the sequence to compare TS quality in two production (un/mitigated) modalities. It should be noted that we did not segment words in terms of morphology or morphosyntax as this analysis pertains primarily to TS and measures of length for our purposes were limited to number of words and clauses. The clauses, following the construct of an argument and a predicate (Berman & Slobin, 1994) were taken to be the minimal ideational construct which we associate with as an idea unit. The same coding was applied to dictated and written texts.

The clauses in each text were analyzed as part of one of the three main text components: a) identification and or presentation (exposition) of object/scene of description; b) direct attributes (description of personality, action, physical) and/or indirect elaboration on the attribute (described by illustration, narrative, or explanatory statement); and c) conclusion/end which wraps the description in an overt statement. Tolchinsky, Johansson, & Zamora (2002) showed that in expository texts by elementary school children opening the text with an introduction was easier than closing it with a conclusion and later Tolchinsky (2019) builds a 1-6 scalar score of descriptive text quality to rank texts that include all or part of the components as indicators of text quality. Motivated by these studies, we developed a 1- 4 scalar rank-score (adapted for the specific elementary school population and educational practices in Israel described above which also consider language and

rhetorical differences – see Tolchinsky & Stavans 2023) for each P&P and DICT texts accounting for the presence of clauses attesting to: the identification of the object, the relative presence of direct or indirect attributes, and a conclusive clause. Irrespective of the number of clauses, texts were coded into one of four text quality ranks, and the leap from one rank to the other considers both quantity and quality of TS components as illustrated below:

Rank 1: *Anything that is not defined by the following ranks*

Table 1. 4th grade

My dad is a high-tech man	Direct (action)
But he died of a heart attack	Indirect (explanation)

Rank 2: *Introduction (identification of object of description) + at least one direct attribute (physical, action or personality) or at least one indirect elaboration (illustration, narrative, or explanation) that addresses a descriptive detail/attribute indirectly*

Table 2. 5th grade

She is called Mally	Identification
She is a math teacher	Direct (actions, personality)
She is very helpful to me to improve my grades	
She helps me study for tests	
and she also helps the other pupils	
She is a nice teacher	

Rank 3: *Introduction (identification of object of description) + at least two direct attributes (physical, action or personality) + at least one indirect elaboration (illustration, narrative, or explanation) that addresses a descriptive detail/attribute indirectly*

Table 3. 2nd grade

My hero is named Neymar	Identification
Neymar is a football (soccer) player	Direct (action)
he was born in Brazil	
and he plays in Barcelona Spain	

Neymar has a few golden balls	
and one golden shoe	
he is among the best player in the world	Direct (physical)
with Brazil he won 9 cups in the Mundial	Indirect elaboration (illustration)
and in Barcelona he won four cups.	
Neymar joined Barcelona last season	
And Barcelona paid for him a hundred thousand euros	

***Rank 4**: Introduction (identification of object of description) + at least one direct attribute (physical, action or personality) + at least two indirect elaborations (illustration, narrative, or explanation) that addresses a descriptive detail/attribute indirectly + conclusion/end*

Table 4. 2nd grade

I love Mary Poppins	Identification
because she sings beautifully	Direct (physical)
she is cute and nice	Direct (personality)
she comes from my native country	
(she is) famous	
and she has very beautiful <unreadable>	
I like her very much more than anything else	
because she is very generous	Indirect elaboration (explanation)
and unconsciously attractive	
and she is very sweet, generous, loving, and smart.	
she is one of four servants in the house	Indirect elaboration (explanation)
and she is by far the most pretty one	
because of all that I have written	End
I love the charming Mary Poppins.	

The leap from rank 1 (a list of objects, actions, qualities, or emplacements) to rank 2 requires at least one direct attribute or indirect elaboration of an attribute – a specific attributed descriptive detail following the introduction. The leap to rank 3

must contain at least two direct attributes and one indirect elaboration on an attribute following the introduction, enriching the details with two direct attributes (quantity) and an additional indirect elaboration on one of the attributes (quality). The leap to rank 4 requires one direct attribute and two indirect elaborations on the attribute in addition to the introduction and a concluding element. A greater weight to the indirect elaboration (enhancing both quantity and quality) enhances the quality of the descriptive text going beyond the basics of a descriptive detail in a direct attribute once the object of the description has been identified. The indirect elaborations on the direct attribute require the recruitment of diverse genre related to extended texts such as an illustration by means of narration or explanation, often alluding to different contexts (different time and place of a sequence of events relevant to the attribute) and a logical and cohesive transition from the direct attribute to an indirect elaboration.

5.5 Data Analysis

To address RQ1, after we built the TS quality ranks (TS rank), we used the Goodman and Kruskal's tau, that measures the relationship between two categorical variables, to examine the relationship between a participant's grade level and the TS rank , and the Kruskal Wallis test, a non-parametric test, to determine whether text length (in terms of number of clauses and number of words), and abilities, as continuous non-normally distributed variables, are significantly different between grades.

To address RQ2, we first performed, at the univariate level, the Kruskal Wallis test to determine differences in literacy-related variables between ranks, separately for each grade and modality. This statistical test checks whether there is an association between abilities (excluding spelling and writing fluency) and ranks by comparing the distributions of the scores between the ranks. To fully understand the exact role of text length on the relationship between abilities and TS rank, we also used a mediation model, using Hayes process procedure (version 3.5). In this procedure we checked whether literacy related abilities predict TS rank, whether literacy related abilities predict text length, and whether literacy related abilities still predict TS quality when controlling for text length (Baron and Kenny, 1986). At the multivariate analysis, we ran a cumulative odds ordinal logistic regression with proportional odds to determine the effect of each literacy related abilities on TS rank, stratified by grade level and adjusted for length and all the other literacy related abilities. In this analysis, length was expressed in terms of number of clauses, to keep the same unit used in data coding. This test allows us to isolate the independent impact of the abilities on TS rank, that cannot be attributed to grade level or text length. Data were analyzed using IBM SPSS statistics software (Version 27.0, for Windows), and $p < .05$ was significant for all analyses.

6. Results

6.1 RQ1: How TS quality, text length and literacy-related abilities develop across grades?

6.1.1 Grade level and TS quality (by rank)

The first question addresses the relation between rank and grade level for each production modality with the purpose of identifying developmental trends in the TS quality. To this end, the texts were coded for the presence and organization of *structural elements (TS)* were ranked into one of four ranks reflecting the expected high quality of text organization for each modality and grade level. Figure 1 displays the distribution of TS rank by grade level (age) and production mode (unmitigated P&P and mitigated DICT).

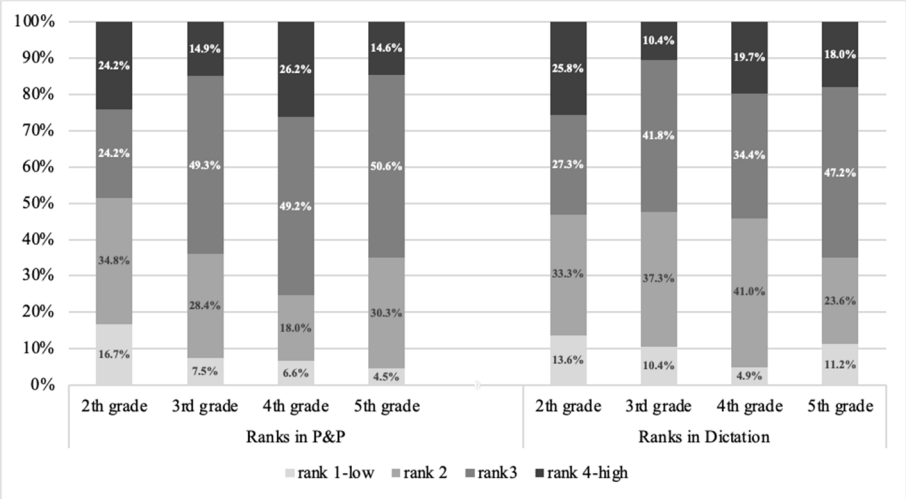

Figure 1: The probability of a participant to produce a well-structured descriptive text in different modalities at each grade level.

The findings show that the distribution of TS quality is significantly different between children at different grade levels in P&P modality (Goodman-Kruskal tau =0.029; $p<0.01$), as well as in dictation modality (Goodman-Kruskal tau =0.020; $p<0.05$). It should be noted that even though rank and grade-level were associated in both P&P and DICT modalities, children did not necessarily score at the same TS rank in both modalities. Only 39% of the children in 5th grade; 33% in 4th grade; 33% in 3rd grade and 38% in 2nd grade produced both P&P and DICT texts at the same TS rank. For these children, TS quality does not seem to be altered by the modality.

Figure 1 illustrates the probability of each child in each grade level to produce a text at each rank in both modalities. For example, a 2nd grader has a 16.7% probability to produce a TS quality at rank 1 (lowest text quality) and a 24.2% probability to produce a TS quality at rank 4) highest text quality) in P&P. When comparing between the 2 modalities, in the 2nd grade the probability to produce a text of the same quality is quite similar, with the greatest increase from rank 1 to rank 2 and a slight decrease from rank 2 to rank 3 and no leap from rank 3 to 4. This is not the case for 3rd, 4th and 5th graders who seem to produce better texts in P&P modality than in DICT modality (i.e., slightly higher percentage at ranks 3 and 4 and lower percentage at rank 1).

To summarize, though we would expect that TS as measures of text quality will steadily improve in more elaborate and rich rhetorical components as children get older, have more experiences and instruction in writing, the texts rendered showed fluctuations in TS quality. For instance, the probability to be at the highest TS quality rank in the P&P modality, 2nd and 4th grade almost the same and in the DICT modality they are very similar. Moreover, both 2nd and 4th grade outperform the age level that follows them (3rd in the case of 2nd grade and 5th in the case of 4th grade). This result is counter intuitive and may be explained by the instructional program in schools whereby in both 2nd and 4th grade there is greater emphasis on TS. Moreover, the quantitative results may shun out some qualitative differences indicating that there is improvement of quality over quantity in as far as how and what each element constituting the rank includes.

6.1.2 Grade level and Length (words and clauses)

The relation between length and grade level in each modality (P&P and DICT) is summarized in Table 5 (see appendix 1 for more detailed data).

Table 5. Text Length Median (Range) as Related to Age and Modality of Production

	2nd	3rd	4th	5th	Sig (K-W)
P&P					
Clauses	7(2-24)	11(3-24)	11(2-30)	14(2-24)	<.001
Words	27.5(2-105)	45(13-108)	49(9-156)	60(11-144)	<.001
DICT					
Clauses	9(2-29)	10(3-27)	12(2-47)	12(2-33)	<.001
Words	32(6-111)	41.5(11-128)	48(12-210)	51(5-155)	<.001

The findings indicate that texts become longer in terms of words and clauses with grade (Kruskal Wallis, p<.001), as illustrated in table 1. In P&P modality, the average

Table 6. Literacy related abilities Median (Range) as Related to grade level

Abilities	2nd	3rd	4th	5th	Sig (K-W)
Raven	87.5(41.7-100)	86.1(50-100)	88.9(33.3-97.2)	94.4(38.9-100)	<.001
RAN	45.5(26.4-71.4)	50.5(28.8-75)	57.7(29.4-88.2)	63.2(36.9-94)	<.001
Syntactic Receptive	66.7(0-91.7)	60.7(14.3-92.9)	75(29.8-100)	85.1(8.3-100)	<.001
Lexical Depth	42.8(6.7-83.3)	51.1(8.9-94.4)	58.9(14.4-100)	67.2(23.3-95.6)	<.001
Reading High-Level	71.7(13.3-96.7)	76.7(23.3-100)	80(36.7-100)	76.7(26.7-100)	<.001
Reading Low-Level	79(56.5-99)	89.9(67.8-99.7)	91.2(61.4-99.8)	94.8(57.6-99.8)	<.001
WFTTR	0.7(0.2-1)	0.5(0.2-1)	0.4(0-1)	0.3(0-0.8)	<.001
Spelling Correct	51.3(7.5-85)	75(25-100)	82.5(37.5-100)	87.5(40-100)	<.001

relative increase from grade to grade is 28% for clauses and 33% for words. In DICT modality, the average relative increase from grade to grade is 10% for clauses and 17% for words. In both cases, the increase is not uniform, for example the number of clauses doesn't change from 3rd and 4th grade in P&P modality and from 4th to 5th grade in dictation modality. When looking at the number of words, the highest increase occurs between 2nd and 3rd grades in both P&P and DICT modalities (67% and 28%, respectively).

6.1.3 Grade level and abilities

The relation between abilities and grade level is summarized in Table 6. The findings indicate that abilities related to text productions increase across grade level, except for WFTTR that decreases with grade level. All the effects but the reading high level effect are significant (Kruskal Wallis, $p<.001$) and most of the transitions from one grade to the next one is also significant (KW Pairwise Comparisons). The greatest relative increase is for lexical depth (56%).

6.2 RQ2: Is there a relation between literacy related abilities and texts quality, beyond grade and length differences for each production modality?

6.2.1 The relation between literacy related abilities and texts quality-univariate level

Table 7a (for P&P) and 7b (for DICT) below show the median scores (and range) for each literacy indicator by grade and rank.

Table 7a. Literacy Related Indicator's Medians Score at Each TS Rank by Grade in ***P&P Productions***

P&P	Raven	RAN	Syntactic Receptive	Lexical Richness	Reading High-Level	Reading Low-Level
2nd Grade						
rank1	83.3(58.3-88.9)	42.9(35.9-71.4)	58.3(45.2-83.3)	41.1(28.9-73.3)	53.3(53.3-96.7)	80.0(69.3-85.7)
rank2	86.1(41.7-97.2)	46.9(26.4-55.6)	52.4(0-83.3)	41.1(15.6-71.1)	66.7(13.3-90)	74.6(56.5-97.6)
rank3	90.3(44.4-97.2)	49.5(37.5-65.2)	67.9(21.4-91.7)	48.9(6.7-83.3)	83.3(13.3-96.7)	78.8(64.8-99)
rank4	88.9(61.1-100)	44.8(38.7-54.6)	72.0(51.2-84.5)	49.4(26.7-60)	76.7(26.7-96.7)	79.3(69.9-96.2)

3rd Grade						
rank1	91.7(86.1-94.4)	49.3(28.8-64.6)	76.2(51.2-77.4)	46.7(41.1-60)	83.3(63.3-86.7)	85.0(83.9-93.5)
rank2	86.1(61.1-97.2)	51.4(32.6-65.2)	67.9(36.9-92.9)	47.8(21.1-94.4)	76.7(40-100)	90.1(76.2-99.7)
rank3	88.9(58.3-100)	50.5(32.2-75)	59.5(14.3-84.5)	54.4(8.9-73.3)	76.7(23.3-100)	91.1(67.8-99)
rank4	86.1(50-97.2)	50.9(29.4-75)	61.3(36.9-84.5)	48.9(15.6-73.3)	66.7(33.3-90)	87.7(68.9-99)
4th Grade						
rank1	91.7(75-91.7)	54.6(29.4-62.5)	70.8(58.3-78.6)	62.2(55.6-70)	83.3(53.3-90)	92.3(90.5-99.8)
rank2	91.7(80.6-97.2)	55.6(38-74.1)	69.0(42.9-92.9)	56.7(38.9-71.1)	73.3(63.3-100)	89.0(71.6-99.3)
rank3	88.9(33.3-97.2)	58.9(38.5-78.9)	75.6(29.8-100)	56.1(14.4-100)	75.0(36.7-93.3)	91.5(61.4-99.8)
rank4	90.3(36.1-97.2)	56.7(31.3-88.2)	83.3(35.7-100)	66.7(21.1-90)	85.0(46.7-100)	92.7(74.1-99.8)
5th Grade						
rank1	86.1(58.3-94.4)	60.4(36.9-67.3)	76.8(29.8-91.7)	74.4(57.8-82.2)	70.0(60-86.7)	93.3(86.7-99.8)
rank2	94.4(58.3-100)	62.5(43.9-94)	84.5(28.6-100)	66.7(28.9-95.6)	78.3(26.7-93.3)	95.1(57.6-99.3)
rank3	94.4(69.4-100)	64.4(44.1-88.3)	84.5(8.3-100)	68.9(31.1-88.9)	76.7(40-100)	95.9(72-99.6)
rank4	94.4(38.9-100)	68.0(47-75)	91.7(46.4-100)	66.7(23.3-88.9)	76.7(40-96.7)	92.3(70-99.1)

Table 7b. Literacy-related indicator's Medians score at each TS rank by grade in **DICT productions**

DICT	Raven	RAN	Syntactic Receptive	Lexical Richness	Reading High-Level	Reading Low-Level
2nd Grade						
rank1	86.1(41.7-88.9)	48.1(27.3-71.4)	52.4(44-83.3)	41.1(22.2-73.3)	70.0(13.3-86.7)	74.6(56.5-89.7)
rank2	83.3(44.4-97.2)	47.4(32.6-57.7)	58.9(21.4-83.3)	40.0(6.7-71.1)	66.7(13.3-96.7)	80.0(70-99)
rank3	88.9(47.2-100)	45.5(26.4-65.2)	75.0(31-91.7)	48.3(15.6-83.3)	81.7(43.3-96.7)	79.1(68.2-96.2)

rank4	88.9(58.3-97.2)	45.2(30.1-55.6)	66.7(0-84.5)	53.3(17.8-75.6)	73.3(26.7-90)	79.0(67.1-94.8)
3rd Grade						
rank1	80.6(61.1-91.7)	45.5(32.6-55.1)	52.4(36.9-77.4)	51.1(31.1-60)	66.7(40-86.7)	87.4(79-97.2)
rank2	86.1(58.3-97.2)	51.7(29.4-75)	60.7(14.3-92.9)	53.3(8.9-73.3)	76.7(40-100)	89.2(70.5-99)
rank3	88.9(50-100)	53.6(28.8-75)	67.9(44-92.9)	52.8(21.1-94.4)	80.0(33.3-93.3)	90.3(68.9-99.5)
rank4	77.8(69.4-97.2)	47.9(37.7-53.6)	51.2(35.7-67.9)	43.3(26.7-57.8)	50.0(23.3-86.7)	95.1(67.8-99.7)
4th Grade						
rank1	91.7(77.8-97.2)	60.0(54.9-78.9)	67.9(51.2-75)	45.6(34.4-65.6)	76.7(50-100)	89.1(83.2-92.3)
rank2	88.9(33.3-97.2)	53.6(31.3-68.2)	75.0(29.8-100)	56.7(21.1-87.8)	80.0(46.7-100)	90.5(74.1-98.7)
rank3	91.7(69.4-97.2)	59.9(29.4-88.2)	83.3(45.2-100)	65.6(14.4-100)	83.3(36.7-93.3)	93.8(61.4-99.8)
rank4	84.7(77.8-97.2)	60.1(37.5-74.1)	75.6(42.9-92.9)	56.1(38.9-75.6)	75.0(63.3-86.7)	93.0(70.9-99.8)
5th Grade						
rank1	93.1(38.9-100)	65.3(44.1-83.5)	80.4(8.3-100)	51.7(23.3-84.4)	61.7(40-80)	89.8(69.6-99.1)
rank2	94.4(58.3-100)	65.0(48.5-91.9)	84.5(44-100)	68.9(31.1-95.6)	76.7(33.3-99)	96.4(70-99.6)
rank3	94.4(58.3-100)	63.2(36.9-94)	88.7(29.8-100)	67.2(37.8-86.7)	78.3(46.7-96.7)	95.2(85.2-99.8)
rank4	94.4(75-100)	62.5(51.5-75)	91.7(28.6-100)	71.1(28.9-88.9)	80.0(26.7-100)	93.9(57.6-98.5)

Note: **Bold:** Kruskal Wallis $p < .05$

The findings presented in Table 7a (for P&P unmitigated modality) and 7b (for DICT mitigated modality) show a generalized lack of association between the different literacy-related indicators and the text-quality ranks across school levels and production modality. The only significant associations found were between syntactic complexity and TS rank in 2nd grade in the P&P modality, and between reading high-level and TS rank in 5th grade in the DICT modality. Despite the few significant associations, there were observable increasing trends in the different modalities: for P&P texts an increase in Raven and high-level reading in 2nd grade, an increase in syntactic receptive in 4th grade, and increase in RAN and syntactic

receptive in 5th grade; whereas in DICT texts there was an increase in syntactic receptive and lexical richness in 2nd and 5h grades.

6.2.2 The relation between literacy-related abilities and texts quality with text length as a mediator

To test the mediation hypothesis of whether length of text acts as a partial mediator, caused by a chain effect where syntactic complexity influences length of text, and length of text - in turn - influences TS quality, the only a mediation effect was found in the P&P production of the 2nd grade (see Figure 2).

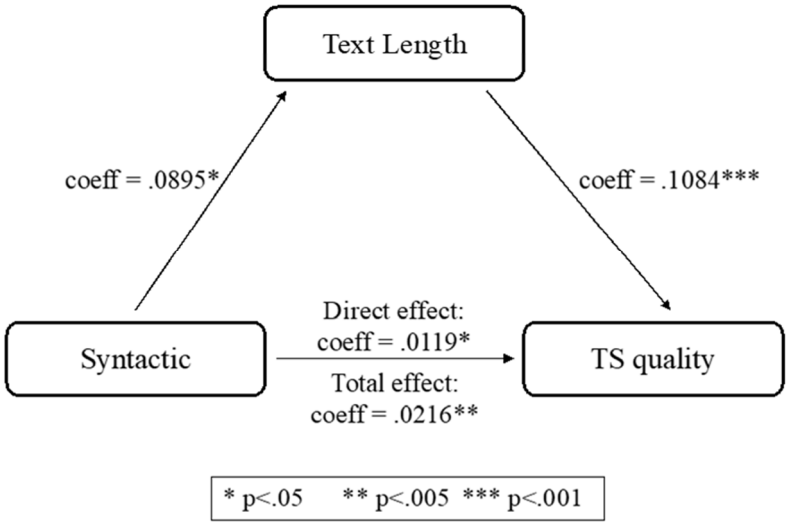

Figure 2: Mediation effect of length of text on the relation between syntactic ability and TS rank in the 2nd grade P&P production

Testing the mediation hypothesis for syntactic complexity and TS rank in 2nd grade in the P&P modality shows that when length acts as a partial mediator: (1) syntactic complexity significantly predicts TS quality (coeff=.0216;p<.005); (2) syntactic complexity significantly predicts length of text (coeff=.0895;p<.05); (3) length of text significantly predicts TS quality (coeff=.1084;p<.001) and (4) syntactic complexity still significantly predicts TS quality, but less strongly, when controlling for length of text effect (coeff=.0119;p<.05). No mediation effect of length of text in 5th grade in the dictation modality was found concerning the effect of reading high-level on TS quality.Mediation effects of length were not found in the other grades or text

modality productions as there were no significant relations between the literacy related abilities and the TS quality.

6.2.2 The relation between literacy-related abilities and texts quality – multivariate analysis

Tables 8a (for unmitigated P&P) and 8b (for mitigated DICT) show the result of a multivariate ordinal logistic regression that enables us to find out what is the independent effect of each ability on TS rank, that is not related to the effect of other abilities or to the effect of length.

Similar to the P&P modality, in the DICT modality (Table 8b), adding one clause increases the odds of being at a higher TS rank - in 2nd grade by 1.15 (95% confidence interval [CI] = 1.04-1.28 $p < .001$), in 3rd grade by 1.11 (95% confidence interval [CI] = 1.02-1.22 $p < .001$), and in 5th grade by 1.15 (95% confidence interval [CI] = 1.06-1.24 $p < .001$) - given that the other variables in the model are held constant.

To summarize, TS quality is mostly affected by the length of the text, and after controlling for length very few abilities affect the TS rank. The more clauses (ideas) the better the TS quality which suggests that TS relies mainly on ideas that string its rhetorical elements into a genre-driven cannon. In 5th grade, with the revision affordance of the P&P production, linguistic indicators such as syntactic and lexical ability, contribute to high TS quality consisting of richer vocabulary and more elaborate sentences.

7. Discussion

The first goal of the study was to sketch the development of descriptive TS quality in written and dictated productions of 2nd to 5th grade Hebrew-speaking children. To exclude the effects of the mechanics of transcription such as handwriting (Graham & Harris, 1997) or spelling (Babayiğit & Stainthorp, 2010; Arfé, Dockrell, & De Bernardi, 2016; Limpo, Alves, & Connelly, 2018) on the descriptive TS quality (Hildyard & Hidi, 1985; Scardamalia, Bereiter, & Goleman, 1982; Tolchinsky, 2019), we elicited a P&P (unmitigated) and a DICT (mitigated) production modality. The interpretation of the results were guided by the descriptive text rhetorical structure containing the identification statement of the described entity, followed by details (physical or actions attributes) (Martin & Christie, 1984) and a closure (declared end of the description) (Tolchinsky, 2019), which resulted in 4 TS quality profiles.

Table 8a. Ordinal Logistic Regression TS Quality Ranks of ***P&P Production***

Grade	2nd		3rd		4th		5th	
Variable	OR (95% CI)	Sig.	OR (95% CI)	Sig.	OR (95% CI)	Sig.	OR (95% CI)	Sig.
Raven	1 [0.95, 1.04]	0.92	0.98 [0.93, 1.03]	0.39	0.95 [0.9, 1.01]	0.12	1.01 [0.97, 1.06]	0.51
RAN	0.99 [0.93, 1.06]	0.82	1.04 [0.99, 1.09]	0.10	1 [0.95, 1.05]	0.95	1.02 [0.98, 1.06]	0.36
Syntactic Receptive	1.03 [0.99, 1.07]	0.11	0.97 [0.93, 1.01]	0.13	0.99 [0.95, 1.03]	0.64	1.03 [1, 1.07]	0.03*
Lexical Richness	0.98 [0.93, 1.02]	0.34	1.01 [0.97, 1.06]	0.61	1 [0.94, 1.06]	0.98	0.96 [0.92, 0.99]	0.02*
Reading High-Level	1.01 [0.97, 1.04]	0.69	0.98 [0.95, 1.02]	0.28	1.04 [0.98, 1.1]	0.16	1.01 [0.97, 1.05]	0.57
Reading Low-Level	1.04 [0.97, 1.1]	0.25	1.05 [0.97, 1.13]	0.24	1.02 [0.95, 1.09]	0.61	1 [0.93, 1.07]	0.98
No. of Clauses	1.36 [1.19, 1.55]	0.00*	1.25 [1.1, 1.43]	0.00*	1.26 [1.12, 1.41]	0.00*	1.06 [1, 1.13]	0.05

In the P&P modality (Table 8a), adding one clause increases the odds of being at a higher TS rank - in 2nd grade by 1.36 (95% confidence interval [CI] = 1.19-1.55 $p < .001$), in 3rd grade by 1.25 (95% confidence interval [CI] = 1.1-1.43 $p < .001$), and in 4th grade by 1.26 (95% confidence interval [CI] = 1.12-1.41 $p < .001$) - given that the other variables in the model are held constant. In 5th grade an increase in literacy-related measures increases the odds of being at a higher TS rank for the syntactic receptive indicator

by 1.03 (95% confidence interval [CI] = 1.03-1.07 p < .05) and decreases the odds of being at a higher TS rank for the lexical richness by 0.96 (95% confidence interval [CI] = 0.92-0.99 p < .05).

Table 8b. Ordinal Logistic Regression TS Quality Ranks of ***DICT Production***

Grade	2nd		3rd		4th		5th	
Variable	OR (95% CI)	Sig.	OR (95% CI)	Sig.	OR (95% CI)	Sig.	OR (95% CI)	Sig.
Raven	1 [0.96, 1.05]	0.84	1.01 [0.95, 1.06]	0.85	1 [0.96, 1.05]	0.87	1.02 [0.98, 1.06]	0.40
RAN	0.94 [0.89, 1]	0.05	1.01 [0.97, 1.06]	0.58	1.02 [0.97, 1.07]	0.45	1 [0.96, 1.04]	0.98
Syntactic Receptive	1.02 [0.98, 1.05]	0.39	1.02 [0.98, 1.06]	0.35	1.02 [0.97, 1.06]	0.48	0.99 [0.97, 1.02]	0.71
Lexical Richness	1.02 [0.98, 1.07]	0.28	1.01 [0.96, 1.05]	0.80	1.02 [0.97, 1.08]	0.45	1.02 [0.99, 1.06]	0.24
Reading High-Level	0.98 [0.95, 1.01]	0.28	0.97 [0.94, 1]	0.08	0.97 [0.92, 1.02]	0.22	1.02 [0.98, 1.05]	0.36
Reading Low-Level	1.03 [0.98, 1.1]	0.26	0.98 [0.92, 1.05]	0..61	1.01 [0.94, 1.07]	0.83	0.96 [0.89, 1.02]	0.20
Clauses	1.15 [1.04, 1.28]	0.01*	1.11 [1.02, 1.22]	0.02*	1.06 [0.99, 1.13]	0.08*	1.15 [1.06, 1.24]	0.00*

The TS profiles (ranks) increased in complexity from a list of attributes to a full descriptive schema containing a declared identification statement, a graded set of attributes and a conclusion. The results show that across grade levels, the probability of finding texts with basal structural profiles decrease in both production modalities and the probability of finding complex texts with a complete descriptive genre schema increased differentially with school grade. These results concur with previous findings (for descriptive texts Tolchinsky, 2019; for argumentative texts Stavans et al, 2019) across grade-levels and in both modalities, suggesting a developmental path that depends on a hierarchical relation between core and support elements (Stavans et al, 2019; Tolchinsky, 2019; Donovan & Smolkin, 2002; Berman & Nir-Sagiv, 2007; Tolchinsky, 2019; Uccelli et al., 2019). While core and support elements are dominant in the hierarchy of a descriptive TS in most texts across grade-level and modality, the introduction and conclusion are peripheral in that they serve to frame the description. The weighted transition from core to peripheral components and from genre-grounded to production modality reflects general trends in the development of extended discourse abilities which orchestrate content, modality, and context towards the rhetorical structure acculturation expected of the child. As children gain experiences and instruction in writing, greater variety of rhetorical components are deployed (Christie & Derewianka, 2008).

A closer look at the probability of producing a descriptive TS of different quality across grade levels and the modalities, revealed significant differences. The 2nd graders gravitate towards lower text quality (ranks 1 and 2 constitute nearly half of the texts) but the 3rd, 4th and 5th graders produce higher text quality (ranks 3 and 4), particularly in rank 3 which contains more elaboration of the core and support elements of a descriptive TS especially in P&P. This rank indicates an increase in the number and type of attributes of the described entity (weighted to more direct attributes in addition to indirect elaborations). There was no improvement with grade level in the probability to include the conclusion component as expected in rank 4, but a rather erratic developmental path was observed with P&P surpassing DICT productions across all grades except 2nd grade. Tolchinsky (2019) explains that "[c]onclusions are not an essential function of descriptions; in fact, they keep the interlocutor away from the entity being described … [and that providing] a conclusion for a descriptive text requires a detachment from the particular and an attachment to the general, resulting in a lower probability for this component to appear during the early years of elementary school" (p.309). As a conclusion does not play an essential function in a description, when present, it serves different functions in the different modalities and grade levels. The texts in 2nd grade contain a conclusion functioning as a formulaic remark "the end"; while in 3rd grade (more in P&P), 5th grade (more in DICT) and in 4th grade to a large extent the conclusion has a substantial content closure function such as "because of all these qualities, I

like …" or "X is my hero because he resembles me". The leap in the quality of the conclusion from 2nd grade on may be a result of formal instruction. The patterns we observe for P&P, and not for DICT, may also diverge not only in terms of written versus oral modality but also the benefits of planning and revision the written production offers. Beyond planning and revising being part of formal writing instruction especially in P&P, the DICT production allows the more experienced writers an opportunity to exclude a conclusion because of the informal communication context with the experimenter (not only the modality). Instruction in and experience with writing as well as the taught revision and planning strategies result in better TS quality in the (unmitigated) P&P modality, while the oral production (DICT) seems to be interpreted as an opportunity to deliver ideas "online" that need (or can) not be organized and revised.

TS quality has been related to the text length as a measure of text productivity. The relation between text length and text quality are split. These studies have shown that longer texts produced by more experienced writers tend to have higher text quality by means of (a) coherence, organization, and use of language conventions; (b) the writing tasks (i.e., argumentative texts require lengthier texts to fully develop and support a claim, while descriptive or narrative writing do not as long as the content is well-organized and engaging for the interlocutor). Our findings concur with previous studies in that length and TS quality are associated in both DICT and P&P modalities (McCutchen, 2011). Longer texts containing more words and more clauses (ideas) across the grade-levels relate to TS quality ranks (Tolchinsky, 2019; Castillo & Tolchinsky 2017), and the effect of length on TS quality depends on grade-level and modality (Salas & Tolchinsky, 2017; Olinghouse et al. 2015; Bourdin & Fayol, 2022). The length of a P&P production contributes to TS quality in terms of ideas (clauses) at all grade levels, and in 2nd and 4th grades it is also enhanced by the number of words used to express these ideas (Carvalhais, Limpo, & Pereira, 2021). In the DICT modality, TS quality increases as the number of clauses (ideas) increases across all grade levels but only in the 5th grade these increments are significant. When profiling the TS quality in relation to length by words, we observe that all grades except the 5th grade exhibit great leaps (nearly double or more words) from low to high TS in the unmitigated P&P and mitigated DICT texts. However, the profile of TS quality in terms of number of clauses (ideas) does not relate so pronouncedly across the production modality and grade level suggesting that wordy texts do not necessarily embed ideational complexity. In the 2nd, 3rd and 4th grade there is a trend of a small increments in the number of clauses as TS quality increases in both modalities but in the P&P these increases are more pronounced than in the DICT. Thus, ideational richness benefits - albeit in different intensity – the DICT modality.

To explore the contributing power of literacy-related abilities to the descriptive TS quality by Hebrew-speaking/writing children, we first profiled the development

of literacy-related abilities across grade level. Concomitant to previous findings, the abilities related to text productions increase across all grade level where the transitions from one grade to the next is significant (Stavans et al., 2019) except for two abilities – writing fluency which decreases with grade level and the high-level reading comprehension that remains stable. The decrease - albeit small - in writing fluency with age may be an artifact of the task used and the participants' attitude towards its performance. The younger participants whose attention to writing is grounded in performing both the mechanics of writing wrote the alphabet letters sequentially repeating the sequence while the older participants were concerned with speed and quantity of letters rather than the variability. The reading comprehension ability based on typical age-related scholastic texts showed insignificant increments across grade levels suggesting that their ability is a reflection of instructional and pedagogical practices inherent in class activities.

While cognitive, transcriptional, linguistic, and reading literacy-related abilities develop across grade levels, our second goal to explore (in two modalities separately) the relation between literacy related abilities and TS quality, length, and abilities' effects on TS quality when controlling for text length text. Our findings partially confirmed literacy-related effects on TS quality for each grade and modality separately. Most abilities were not associated with descriptive TS quality. However, in 2nd grade and only in the P&P production, the syntactic receptive ability increased as the TS quality increased. This finding diverges from previous studies (e.g., Berninger et al., 1992; Tolchinsky, 2019) where syntactic abilities either are in inverse relation to TS quality or are not associated with writing in elementary school children, and studies on adolescents and different genres (Beers & Nagy, 2011). However, the findings converge with previous studies in Italian (Arfé et al., 2016) and English (Dockrell & Connelly, 2016) in elementary school children showing that increasingly complex syntactic structures are associated with exposure and experience to school-related writing (Reilly, Zamora, & McGivern, 2005; Schleppegrell, 2004; Berman, 2008; McCutchen, 2011). Greater receptive syntactic ability ascertains the means to encode ideas in a richer TS so as to include more elements and to organize them in accordance with textual conventions of the discourse genre and generating ideational complexity (Berman and Nir-Sagiv, 2007). Against our expectations, the lack of significant effects of literacy-related abilities on TS quality in both modality in 3rd and 4th grade levels remain unexplained. However, in 5th grade and only in DICT production there was a positively significant association between reading comprehension and TS quality. Unlike the younger writers whose attention is in the form (syntactic ability) more than the content of adequate written text (in P&P), the more mature writers seem attentive to content (in DICT) drawn from reading comprehension. As stated by Ahmed, Wagner, and Lopez (2014): "[c]hildren who read for comprehension were more familiar with the

format of larger texts and story structures, and it's possible that skilled readers apply this knowledge to their writing." (p. 14).

To ascertain that the relation between TS quality and literacy-related abilities was not an artifact of text length, we explored a mediation hypothesis and found mediation effects only in the 2nd grade and only in the P&P modality. This finding suggests that in the early stages of text production, especially in the modality that allows for revision such as the P&P, the quantity of text produced and the syntactic ability recruited to the composing process is a scaffold to a better TS quality. It is possible that the heightened care on the form at this age enables affordances in the later grades (3rd, 4th and 5th) to attend to other aspects of TS quality that are not closely associated with a specific literacy-related ability as mediated by the text length. This may explain why there were no further text length mediation effects in these grades as there were no significant associations between the literacy-related abilities and the TS quality in P&P, and though there was an association between TS quality and high-level reading abilities in the DICT modality in 5th grade, these were not mediated by the text length.

In the 5th grade, the formal aspects of the descriptive TS are used for more elaborate analytical and expository texts with a diverted focus on the versatility of the structure in the service of content elaboration. This in turn explains why the 5th grades do not seem to improve their P&P productions by increasing the text length as they may have perfected their revision and planning skills, they have experience with this genre, and its current use caters to more elaborate writing tasks. In fact, in the P&P modality, TS is affected by the linguistic abilities - syntax and lexicon – which are the base of the microstructure. By contrast, the lengthier 5th grade's DICT TS profits from the informality and spontaneity of an oral "synchronic" delivery that affords a well-structured descriptive text at the macrostructure. As DICT modality is restricted in the possibility of revision, text length my function as an alternate tool for revision (by addition and iteration).

To conclude, the macrostructure of descriptive TS quality depends on the elements that constitute the cannons of the genre and may range from very basic to comprehensive TS quality ranking by identify the essential elements required to describe an object or situation - including an introduction, attributes, and a conclusion. In this study we show that what determines a high-quality descriptive TS is the presence of more elaborate components, such as different attributes (which are less frequent), related to the text content and ideas. The presence of these components prevails across all ages, but only the more experienced and instructed children produce richer and more balanced texts including more sophisticated attribute and non-formulaic conclusion components.

The modality of production showed slight differences between the youngest children who benefit more of the mitigated DICT production by means of description compared to the older children, and between the oldest children who

are more proficient in writing and for whom the unmitigated P&P production is favored. Text length contributes to TS differently according to modality in all grade levels. In P&P which allows for revision, text length is associated with TS quality up to 5th grade; but in the DICT modality the 5th grade TS quality improves as their syntactic ability is better, their lexicon remains simple, and their texts are lengthier – possibly compensating for the modality limitations for revision. There is no single "one size fits all" profile that can be drawn as there is great variability in productions across grade levels and text modality as related to TS quality.

8. Limitations and further research

One possible limitation in studies such as this is the multifaceted aspect of exploring how literacy-related measures (often based on a single standardized test that has been developed and used for different purposes) as indicators of a genre specific text production. More specifically, the genre of analytic texts allow for interweaving genres especially but not only in descriptive texts. For example, in writing descriptive texts we may find an embedded narrative which may function as an illustrative detail describing the object or situation. Similarly, in an argumentative text we may encounter an embedded descriptive text or even narrative that functions as support to the claim. The complexity of these productions requires crafting a scoring and coding scheme that must rely on theoretical information but requires further studies to secure its accuracy across languages, ages and topics. Inevitably, in multifaceted studies with limited access to a large pool of participants, the number of tasks to perform, and the scheduling in of the collection, the limitation of relying on a single sample of writing and dictating is important. Lastly, this study is limited and calls for further confirmatory studies to ascertain the relation between the content richness of the TS quality not only quantitatively but also qualitatively, so as to profile age related contributions to the development of TS quality. One such example that came up in this study was that 2nd and 5th graders seemed similar in their deployment of a conclusion yet a closer look at the quality of the conclusion provided greater insights into the quantitative result.

Future studies are needed to go beyond the individual abilities, processes, and products, as these may be reshaped by our understanding of more sociocultural and participatory writing outcomes across languages and educational practices in different countries, and different literate traditions. One possible direction for further exploration are the practices used to teach and evaluate writing. As the requirements for authentic extensive discourse productions in writing have shifted since children are exposed to the written language by means of new technologies and new needs for writing. There is a need for revision especially when boundaries between writing and speaking (i.e., "finger speech" as texting) are getting blurred in formal and informal writing practices. These emerging forms are enhanced by

technologies, applications and templates introduced into the classroom, the practices, the evaluation, and the expectation of the educational system.

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References

Abbott, R. D., & Berninger, V. W. (1993). Structural equation modeling of relationships among developmental skills and writing skills in elementary and intermediate writers. *Journal of Educational Psychology, 85*, 478-508. https://doi.org/10.1037/0022-0663.85.3.478

Ahmed, Y., Wagner, R. K., & Lopez, D. (2014). Developmental relations between reading and writing at the word, sentence, and text levels: A latent change score analysis. *Journal of educational psychology, 106*(2), 419. https://doi.org/10.1037/a0035692

Albuquerque, C. P. (2017). Rapid naming: The importance of different reading and spelling dimensions. *Avances en Psicología Latinoamericana, 35*, 43-60. https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.3715

Arfé, B., Dockrell, J. E., & De Bernardi, B. (2016). The effect of language specific factors on early written composition: The role of spelling, oral language and text generation skills in a shallow orthography. *Reading and Writing*, *29*(3), 501-527. https://doi.org/10.1007/s11145-015-9617-5.

Araújo, S., Reis, A., Petersson, K. M., & Faísca, L. (2015). Rapid automatized naming and reading performance: A meta-analysis. *Journal of Educational Psychology*, *107*(3), 868. https://doi.org/10.1037/edu0000006

Avivi Ben-Zvi, G. (2010). Morpho-lexical development across the school years (Unpublished doctoral dissertation). Tel Aviv University, Tel Aviv, Israel. (In Hebrew)

Babayi it, S., & Stainthorp, R. (2011). Modeling the relationships between cognitive-linguistic skills and literacy skills: new insights from a transparent orthography. *Journal of Educational Psychology, 103*, 169-189. https://doi.org/10.1037/a0021671

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182. https://doi.org/10.1037/0022-3514.51.6.1173

Beauvais, C., Olive, T., & Passerault, J. M. (2011). Why are some texts good and others not? Relationship between text quality and management of the writing processes. *Journal of Educational Psychology, 103*(2), 415. https://doi.org/10.1037/a0022545

Beers, S. F., & Nagy, W. E. (2011). Writing development in four genres from grades three to seven: Syntactic complexity and genre differentiation. Reading and Writing, 24, 183-202. https://doi.org/10.1007/s11145-010-9264-9

Berman, R. A. (2008). The psycholinguistics of developing text construction. *Journal of Child Language*, 35, 735-771. https://doi.org/10.1017/S0305000908008787

Berman, R. A., & Slobin, D. I. (1994). *Relating events in narrative: A crosslinguistic developmental study*. Hillsdale, NJ: Lawrence Erlbaum.

Berman, R. A., & Nir-Sagiv, B. (2007). Comparing narrative and expository text construction across adolescence: A developmental paradox. *Discourse Processes*, *43*, 79-120. https://doi.org/10.1080/01638530709336894

Berninger, V. W., Yates, C., Cartwright, A, Rutberg, J., Remy, E., & Abbott, R. D. (1992). Lower-level developmental skills in beginning writing. *Reading and Writing: An Interdisciplinary Journal, 4*, 257-280. https://doi.org/10.1007/BF01027151

Berninger, V. W., & Winn, W. D. (2006). Implications of advancements in brain research and technology for writing development, writing instruction, and educational evolution. In C. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 96-114). New York, NY: Guilford Press.

Berninger, V. W., Nagy, W., & Beers, S. (2011). Child writers' construction and reconstruction of single sentences and construction of multi-sentence texts: contributions of syntax and transcription to translation. *Reading and writing*, *24*(2), 151–182. https://doi.org/10.1007/s11145-010-9262-y

Berninger, V. W., & Swanson, H. L. (1994). Modifying Hayes and Flower's model of skilled writing to explain beginning and developing writing. *Children's writing: Toward a process theory of the development of skilled writing, 2*, 57-81.

Boscolo, P. (1990). The construction of expository text. *First Language*, 10(30), 217-230. https://doi.org/10.1177/014272379001003003

Bourdin, B., & Fayol, M. (1994). Is written language production more difficult than oral language production? A working memory approach. *International Journal of Psychology, 29*, 591-620. https://doi.org/10.1080/00207599408248175

Bourdin, B., & Fayol, M. (2022). Facilitating Text Production in Fourth Graders: Effects of Script-Based Knowledge and Writing Prompts. *Frontiers in Psychology*, *13*, 821011-821011. https://doi.org/10.3389/fpsyg.2022.821011

Brandão, A. C. P., & Oakhill, J. (2005). "How do you know this answer?" - Children's use of text data and general knowledge in story comprehension. *Reading and Writing, 18,* 687-713. https://doi.org/10.1007/s11145-005-5600-x

Carvalhais, L., Limpo, T., & Pereira, L. Á. (2021). The contribution of word-, sentence-, and discourse-level abilities on writing performance: a 3-year longitudinal study. *Frontiers in Psychology*, 2924. https://doi.org/10.3389/fpsyg.2021.668139

Castillo, C., & Tolchinsky, L. (2017). The contribution of vocabulary knowledge and semantic orthographic fluency to text quality through elementary school in Catalan. *Reading and Writing, 31*, 293-323. https://doi.org/10.1007/s11145-017-9786-5

Chanquoy, L., & Alamargot, D. (2002). Working memory and writing: Model evolution and research assessment. *L'Annee psychologique*, *102*, 363-398. https://doi.org/10.3406/psy.2002.29596

Chen, Y. J. I., Thompson, C. G., Xu, Z., Irey, R. C., & Georgiou, G. K. (2021). Rapid automatized naming and spelling performance in alphabetic languages: A meta-analysis. *Reading and Writing*, *34*(10), 2559-2580. https://doi.org/10.1007/s11145-021-10160-7

Christie, F., & Derewianka, B. (2008). School discourse. *Learning to write across the years of schooling.* London: Continuum

Coker, D. (2006). Impact of first- factors on the growth and outcomes of urban schoolchildren's primary- writing. *Journal of Educational Psychology, 98*(3), 471. https://doi.org/10.1037/0022-0663.98.3.471

Coker, D. L. (2012). Descriptive writing. *Handbook of writing: A mosaic of new perspectives*, 159-172.

Coker Jr, D. L., Ritchey, K. D., Uribe-Zarain, X., & Jennings, A. S. (2018). An analysis of first-writing profiles and their relationship to compositional quality. *Journal of Learning Disabilities*, *51*(4), 336-350. https://doi.org/10.1177/0022219417708171

De Temple, J. M., Wu, H. F., & Snow, C. E. (1991). Papa Pig just left for Pigtown: Children's oral and written picture descriptions under varying instructions. *Discourse Processes*, 14(4), 469-495. https://doi.org/10.1080/01638539109544797

Dockrell, J. E., & Connelly, V. (2016). The relationships between oral and written sentence generation in English speaking children: The role of language and literacy skills. Written

and Spoken Language Development across the Lifespan: Essays in Honour of Liliana Tolchinsky, 161-177. https://doi.org/10.1007/978-3-319-21136-7_11

Donovan, C. A., & Smolkin, L. B. (2002). Children's genre knowledge: An examination of K-5 students' performance on multiple tasks providing differing levels of scaffolding. *Reading Research Quarterly, 37*(4), 428-465. https://doi.org/10.1598/RRQ.37.4.5

Georgiou, G. K., Tziraki, N., Manolitsis, G., & Fella, A. (2013). Is rapid automatized naming related to reading and mathematics for the same reason(s)? A follow-up study from kindergarten to grade 1. *Journal of Experimental Child Psychology, 115*, 481–496. http://dx.doi.org/10.1016/j.jecp.2013.01.004.

Glanz, J. (1989). Chemed: A comprehensive testing battery. Ramat Gan, Israel: Barak. (In Hebrew).

Graham, S. (1990). The role of production factors in learning disabled students' compositions. *Journal of Educational Psychology*, 82, 781–791. https://doi.org/10.1037/0022-0663.82.4.781

Graham, S., & Harris, K. R. (1997). It can be taught, but it does not develop naturally: Myths and realities in writing instruction. *School Psychology Review*, *26*(3), 414-424. https://doi.org/10.1080/02796015.1997.12085875

Graham, S., Harris, K. & Hebert, M. (2011). It Is More Than Just the Message: Presentation Effects in Scoring Writing. Focus on Exceptional Children. 44. 10.17161/foec.v44i4.6687.

Graham, S., & Perin, D. (2007). What we know, what we still need to know: Teaching adolescents to write. *Scientific studies of reading*, *11*(4), 313-335. https://doi.org/10.1080/10888430701530664

Graham, S., & Weintraub, N. (1996). A review of handwriting research: Progress and prospects from 1980 to 1994. *Educational psychology review*, 8, 7-87. https://doi.org/10.1007/BF01761831

Halliday, M. A. K. (1994). Spoken and written modes of meaning. Media texts: Authors and readers, 7, 51-73.

Hemphill, L., Feldman, H. M., Camp, L., Griffin, T. M., Miranda, A. E. B., & Wolf, D. P. (1994). Developmental changes in narrative and non-narrative discourse in children with and without brain injury. *Journal of Communication Disorders*, *27*(2), 107-133. https://doi.org/10.1016/0021-9924(94)90037-X

Hildyard, A., & Hidi, S. (1985). Oral - written differences in the production and recall of narratives. In D. R. Olson, N. Torrance & A. *Hildyard* (Eds.) *Literacy, language, and learning* (pp. 285–306).

Iparraguirre, M. S. (2014). Elementary school students as authors of a description: stages in the learning of writing and linguistic-discursive styles/Alumnos de tercer y séptimo grado de nivel primario como autores de una descripción: etapas en el aprendizaje de la escritura y estilos lingüístico-discursivos. *Infancia y Aprendizaje*, *37*(4), 740-784. https://doi.org/10.1080/02103702.2014.977107

Janssen, T., Braaksma, M., & Rijlaarsdam, G. (2006). Literary reading activities of good and weak students: A think aloud study. *European Journal of Psychology of Education*, *21*, 35-52. https://doi.org/10.1007/BF03173568

Kellogg, R. T. (1994). *The psychology of writing*. Oxford: Oxford University Press.

Kellogg, R. T., & Raulerson, B. A. (2007). Improving the writing skills of college students. *Psychonomic bulletin & review*, *14*, 237-242. https://doi.org/10.3758/BF03194058

Kim, Y.-S. G., & Schatschneider, C. (2017). Expanding the developmental models of writing: A direct and indirect effects model of developmental writing (DIEW). *Journal of Educational Psychology, 109*, 35-50. https://doi.org/10.1037/edu0000129

Kintsch, W. (2004). The construction-integration model of text comprehension and its implications for Instruction. In R. Ruddell, & N. Unrau (Eds.), *Theoretical models and processes of reading (5th ed., pp. 1270-1328). Newark, DE: International Reading Association.* https://doi.org/10.1598/0872075028.46

Kress, G. (1994). Learning to write (2nd ed.). London, England: Routledge. (Original work published 1982) 334 *Journal of Literacy Research*, 51(3)

Landerl, K., & Wimmer, H. (2008). Development of word reading fluency and spelling in a consistent orthography: An 8-year follow-up Consistent Orthography: An 8-Year Follow-Up. *Journal of Educational Psychology, 100*(1), 150–161. https://doi.org/10.1037/0022-0663.100.1.150

Landerl, K., Freudenthaler, H. H., Heene, M., De Jong, P. F., Desrochers, A., Manolitsis, G., ... & Georgiou, G. K. (2019). Phonological awareness and rapid automatized naming as longitudinal predictors of reading in five alphabetic orthographies with varying degrees of consistency. *Scientific Studies of Reading*, *23*(3), 220-234.

Laufer, B., & Nation, P. (1995). Vocabulary size and use: Lexical richness in L2 written production. *Applied linguistics*, *16*(3), 307-322. https://doi.org/10.1093/applin/16.3.307

Limpo, T., Alves, R. A., & Connelly, V. (2018). Testing the effectiveness of handwriting interventions: introduction to the special issue. *Reading and Writing, 31*, 1249-1253. https://doi.org/10.1007/s11145-018-9862-5

Maggio, S., Lété, B., Chenu, F., Jisa, H., & Fayol, M. (2012). Tracking the mind during writing: Immediacy, delayed, and anticipatory effects on pauses and writing rate. *Reading and Writing, 25,* 2131-2151. https://doi.org/10.1007/s11145-011-9348-1

Martin, J., & Christie, F. (1984). *Language, register and genre in children's writing.* Geelong, Australia: Deaking UP.

McCutchen, D. (2006). Cognitive factors in the development of children's writing. In C. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 115- 130). New York, NY: Guilford Press.

McCutchen, D. (2011). From novice to expert: Implications of language skills and writing-relevant knowledge for memory during the development of writing skill. *Journal of writing research, 3*(1), 51-68. https://doi.org/10.17239/jowr-2011.03.01.3

Ministry of Education (2002). *The curriculum in linguistic education: Hebrew - language, literature, and culture – a program, for state and state-religious elementary schools* (in Hebrew). Retrieved in: https://meyda.education.gov.il/files/Curriculum/hebrew-1-6.pdf

Olinghouse, N. G. (2008). Student- and instruction-level predictors of narrative writing in third students. *Reading and Writing, 21*, 3-26. https://doi.org/10.1007/s11145-007-9062-1

Olinghouse, N. G., & Wilson, J. (2013). The relationship between vocabulary and writing quality in three genres. Reading and Writing, 26, 45-65. https://doi.org/10.1007/s11145-012-9392-5

Olinghouse, N. G., Graham, S., and Gillespie, A. (2015). The relationship of discourse and topic knowledge to fifth graders' writing performance. *Journal of Educational Psychology 107,* 391–406. https://doi.org/10.1037/a0037549

Puranik, C. S., & Al Otaiba, S. (2012). Examining the contribution of handwriting and spelling to written expression in kindergarten children. *Reading and Writing, 25*, 1523-1546. https://doi.org/10.1007/s11145-011-9331-x

Purcell-Gates, V. (1988). Lexical and syntactic knowledge of written narrative held by well-read to kindergartners and second graders. Research in the Teaching of English, 22, 128-160.

Raven, J. C., Court, J. H., & Raven, J. C. (1990). *Manual for Raven's Progressive Matrices and Vocabulary Scales-Section 2: Coloured progressive matrices*. Oxford, UK: Oxford Psychologists Press.

Ravid, D., & Berman, R. A. (2006). Information density in the development of spoken and written narratives in English and Hebrew. *Discourse Processes*, *41*(2), 117-149. https://doi.org/10.1207/s15326950dp4102_2

Reeder, K., & Shapiro, J. (1997). Children's attributions of pragmatic intentions and early literacy. *Language Awareness*, *6*(1), 17-31. https://doi.org/10.1080/09658416.1997.9959913

Reilly, J., Zamora, A., & McGivern, R. F. (2005). Acquiring perspective in English: the development of stance. *Journal of Pragmatics, 37*(2), 185-208. https://doi.org/10.1016/S0378-2166(04)00191-2

Salas, N., & Tolchinsky, L. (2017). Hunting for the links between word-level writing skills and text quality. In E. Segers & P. van den Broek, (Eds.), *Developmental perspectives in written language and literacy: In honor of Ludo Verhoeven* (pp. 103–118). John Benjamins Publishing Company. https://doi.org/10.1075/z.206.07sal

Sanders, T. J. M. and Schilperoord, J. (2006). Text structure as a window on the cognition of writing; How text analysis provides insights in writing products and writing processes. In C. MacArthur; S. Graham, and J. Fitzgerald (Eds.), *Handbook of Writing Research*. (pp. 3386-402). New York: Guilford Press.

Scardamalia, M., Bereiter, C., & Goleman, H. (1982). The role of production factors in writing ability. In M. Nystrand (Ed.), *What writers know: The language, process, and structure of written discourse* (pp. 173–210). New York: Academic Press https://doi.org/10.1163/9789004454118_013

Schleppegrell, M. J. (1998). Grammar as resource: Writing a description. *Research in the Teaching of English*, 182-211.

Schleppegrell, M. J. (2004). *The language of schooling: A functional linguistics perspective.* Mahwah, NJ: Lawrence Erlbaum. https://doi.org/10.4324/9781410610317

Seroussi, B., Stavans, A., & Ehrlich, S. Z. (2021). Relations between literacy-related abilities and the lexical quality of expository texts of Hebrew-speaking children. *Journal for the Study of Education and Development, Infancia y Aprendizaje, 44*(1), 47-81. https://doi.org/10.1080/02103702.2020.1848088

Shanahan, T., MacArthur, C. A., Graham, S., & Fitzgerald, J. (2006). Relations among oral language, reading, and writing development. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 171-183). New York, NY: Guilford Press.

Shany, M., Bahat, A., Lachman, D., Shalem, Z., & Zeiger, T. (2006). *"Aleph-Taph": An assessment system for reading and writing disabilities*. Tel Aviv, Israel: Yesod.

Silverman, R. D., Coker, D., Proctor, C. P., Harring, J., Piantedosi, K. W., & Hartranft, A. M. (2015). The relationship between language skills and writing outcomes for linguistically diverse students in upper elementary school. *The Elementary School Journal*, *116*(1), 103-125. https://doi.org/10.1086/683135

Stavans, A., Seroussi, B., & Zadunaisky Ehrlich, S. (2019). Literacy-related abilities' effects on argumentative text quality structure. *Journal of Literacy Research, 51*(3), 315-335. https://doi.org/10.1177/1086296X19859515

Stavans, A., Seroussi, B., Rigbi, A., & Zadunaisky-Ehrlich, S. (2020). The contribution of reading abilities to the writing quality of expository text structure in Hebrew speaking elementary school children. In *Reading-writing connections* (pp. 123-145). Springer. https://doi.org/10.1007/978-3-030-38811-9_8

Strömqvist, S., Johansson, V., Kriz, S., Ragnarsdóttir, H., Aisenman, R., & Ravid, D. (2002). Toward a cross-linguistic comparison of lexical quanta in speech and writing. *Written Language & Literacy*, *5*(1), 45-67. https://doi.org/10.1075/wll.5.1.03str

Swanson, H. L., & Berninger, V. W. (1996). Individual differences in children's working memory and writing skill. *Journal of Experimental Child Psychology, 63*, 358-385. https://doi.org/10.1006/jecp.1996.0054

Tolchinsky, L. (2019). Evolving structure of descriptive texts and learners' abilities. *Journal of Literacy Research*, 51(3), 293-314. https://doi.org/10.1177/1086296X19858354Tolchinsky, L., Johansson, V., & Zamora, A. (2002). Text openings and closings. Textual Autonomy and differentiation. *Written Language and Literacy*, *6*, 219-253. https://doi.org/10.1075/wll.5.2.05tol

Tolchinsky, L., & Stavans, A. (2023). Cultural shaping of standpoint and reasoning in analytical writing. In Rogers, Paul, Russell, David, Carlino, Paula y Marine, Jonathan (2023). *Writing as a human activity: Implications and applications of the work of Charles Bazerman*. Fort Collins, Colorado: The WAC Clearinghouse; University Press of Colorado, pp.143-166. https://doi.org/10.37514/PER-B.2023.1800.2.06

Tower, C. (2003). Genre development and elementary students' informational writing: A review of the literature. *Literacy Research and Instruction, 42*, 14-39. https://doi.org/10.1080/19388070309558394

Turcotte, C., Berthiaume, R., & Caron, P. O. (2018). Description and interactions of informative text structure knowledge and skills of French-speaking students. *Reading and Writing*, *31*(9), 2147-2164. https://doi.org/10.1007/s11145-018-9875-0

Uccelli, P., Demir-Lira, Ö. E., Rowe, M. L., Levine, S., & Goldin-Meadow, S. (2019). Children's early decontextualized talk predicts academic language proficiency in midadolescence. *Child development*, 90(5), 1650-1663. https://doi.org/10.1111/cdev.13034

Varghese, S.A., & Abraham, S.A. (1998). Undergraduates arguing a case. *Journal of Second Language Writing, 7,* 287–306. https://doi.org/10.1016/S1060-3743(98)90018-2

Wagner, R., Puranik, C., Foorman, B., Foster, E., Tschinkel, E., & Kantor, P. (2011). Modeling the development of written language. *Reading and Writing, 24*, 203-220. https://doi.org/10.1007/s11145-010-9266-7

Weng, X., Li, G. & Li, R. Mediating Effects of Working Memory in the Relation Between Rapid Automatized Naming and Chinese Reading Comprehension. *J Psycholinguist Res* **45**, 945–959 (2016). https://doi.org/10.1007/s10936-015-9385-z

Williams, J. P., & Pao, L. S. (2014). Developing a new intervention to teach text structure at the elementary level. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of reading disabilities* (2nd Ed., pp. 361–374). New York: Guilford Press