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The digital shift and syntactic complexity: Mean sentence length in Finnish news journalism

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Abstract: This article examines the observed increase in mean sentence length in Finnish-language news media in the context of changes in the media ecosystem after 2010. The phenomenon is analyzed against two competing explanations: the expansion of interpretative or analytical practices in journalism, and the acceleration of editing processes.

The results lend support to both explanations and demonstrate how their combined effect has increased the syntactic complexity of Finnish-language news by roughly 20 % over just a decade. While offering substantial evidence for the growing prominence of interpretative journalism in core news reporting, the study also provides a unique perspective on how shifting socio-economic conditions can place even well-established genres in a state of linguistic dynamism.

Given the ongoing global debate about the role of news media in democratic societies, the finding that rising syntactic complexity reduces accessibility for an increasing share of the population marks a significant development.

Keywords: syntactic complexity, news journalism, corpus linguistics

Zusammenfassung: Dieser Artikel untersucht den beobachteten Anstieg der durchschnittlichen Satzlänge in finnischsprachigen Nachrichtenmedien im Kontext der Veränderungen im Mediensystem nach 2010. Das Phänomen wird anhand zweier konkurrierender Erklärungen analysiert: der Ausweitung interpretativer bzw. analytischer Praktiken im Journalismus und der Beschleunigung redaktioneller Prozesse.

Die Ergebnisse stützen beide Erklärungen und zeigen, wie ihre kombinierte Wirkung die syntaktische Komplexität finnischsprachiger Nachrichten innerhalb nur eines Jahrzehnts um etwa 20 % erhöht hat. Während die Studie deutliche Belege für die wachsende Bedeutung interpretativen Journalismus in der Kernberichter-

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stattung liefert, bietet sie zugleich eine einzigartige Perspektive darauf, wie sich veränderte sozioökonomische Rahmenbedingungen selbst auf etablierte Genres sprachlich dynamisierend auswirken können.

Angesichts der anhaltenden globalen Debatte über die Rolle der Nachrichtenmedien in demokratischen Gesellschaften ist die Feststellung, dass eine steigende syntaktische Komplexität die Zugänglichkeit für einen wachsenden Teil der Bevölkerung verringert, eine bedeutende Entwicklung.

Resumen: Este artículo examina el aumento de la longitud media de frases [observado] en los journalism en finés en el contexto de cambios en el ecosistema mediático después de 2010. Este fenómeno es analizado a través de dos explicaciones complementarias: la distensión de las prácticas interpretativas o analíticas en el periodismo y la aceleración de los procesos editoriales.

Los resultados respaldan ambas explicaciones y demuestran cómo, combinadas, han supuesto un incremento del 20 % en la complejidad sintáctica de las noticias en finés en tan solo una década. Si bien el estudio aporta pruebas sustanciales de la creciente importancia del periodismo interpretativo en la cobertura de noticias, también ofrece una perspectiva única sobre cómo los cambios socioeconómicos pueden empujar incluso a los géneros más consolidados hacia un estado de dinamismo lingüístico.

El hallazgo del aumento de la complejidad sintáctica en noticias, lo cual reduce su accessibilidad a un segmento creciente de la población, consistuye una importante llamada de atención en el marco del debate global sobre el papel del periodismo en las sociedades democráticas.

1 Introduction

1.1 Preliminary observation of increasing sentence length

News journalism worldwide has undergone a major transition from a daily-delivered, material newspaper into real-time online news production. Has this transition changed the language of news journalism and if so, how? In Finland, the transition to online news production dates back to 2010. In that year, the public broadcast company Yle launched its news website and the national broadsheet *Helsingin Sanomat* began to publish all its news online alongside its daily paper.

In a preliminary analysis examining Finnish news articles as language data, a considerable increase in mean sentence length was observed, starting from the very year 2010. The observed increase in sentence length was circa two words or 25 % from 2010 to 2019. Given that Heikkinen et al. (2001) reported differences of around

one word to be enough to differentiate the mean sentence length of the news genre (11.2) from fiction literature (9.8) and nonfiction literature (12.7), that increase can be considered remarkable and is evidence of a surprising dynamism in the language of the news media.

In previous studies, there has been perhaps a tendency to treat the news media as linguistically more static than could be called for, at least in light of the observations reported here. There are few previous studies of syntactic complexity in news journalism in general, and in what exists, syntactic complexity is mainly seen from a comparative perspective, such as comparing professional versus citizen media (Tolochko & Boomgaarden 2018) or in terms of geographical variation (Indarti 2018). The underlying assumption is that the syntactic complexity of news media is not in constant flux. Changes over time in the syntactic complexity of newspapers have been studied by Demske (2022) but her analysis of German newspapers spanned almost two hundred years of the Early Modern period (1609–1797).

The rapid increase in syntactic complexity of articles in the news media in Finland also bears real-world implications: the 25 % difference in mean sentence length corresponds roughly to the difference in argumentative texts for CEFR level A1 and C2 Finnish L2 learners (Mylläri 2020). If the increase in mean sentence length is connected to rising syntactic complexity, news reporting in Finnish is rapidly losing its wide accessibility, a matter which has grave democratic implications. If the language of the news becomes exceedingly difficult, more and more people will struggle to access it.

This article attempts to pinpoint where the identified increase in mean sentence length originates. Approaching the matter empirically, it must first be established whether the preliminary observations are indeed telling of systemic change in the Finnish news media. Therefore, the sentence lengths in different news sources and journalistic genres within them must be compared. Thus, the first research question is:

> **Research question 1 (RQ1):** *Is the increase in sentence length a systemic change in Finnish news media in terms of news sources and journalistic genres?*

The first research question is answered with the help of the following hypothesis:

> **Hypothesis 1 (H1):** The increase in sentence length is a systematic change and all analysed news sources undergo a similar development concerning the syntactic complexity metrics and show consistent mutual correlation. Further, they behave similarly in terms of journalistic genres.

1.2 Syntactic complexity

Having delineated boundaries for where the change is found, the next question is to analyse where the increase originates. Mean sentence length, often operationalized as the mean length of a T-unit, is a common variable used to analyse syntactic complexity, alongside metrics such as clauses per T-unit or S-nodes per T-unit (Bulté & Housen 2012; Jagaiah, Olinghouse & Kearns 2020). Thus, it is natural to seek context for the increasing sentence length from the discussion related to syntactic complexity.

The notion of complexity in itself has received broad interest in linguistics and has been applied, according to Housen et al. (2018) at least in formal theoretical linguistics, historical linguistics, language evolution studies, comparative linguistics, language typology, computational linguistics, psycholinguistics and neurolinguistics in addition to their own field, second language research. In explicating the theoretical construct of complexity in general (and syntactic complexity more specifically), important distinctions are usually made between relative and absolute complexity and between system and structural complexity. Relative complexity refers to the complexity experienced by language users in performing a language-related task, while absolute complexity refers to the complexity of the language. Absolute complexity is further divided into system complexity, which refers to the complexity of a language or a sub-system of a language and structural complexity, which refers to the complexity of its utterances.

Structural complexity especially syntactic structural complexity has been most intensively put to use in L2 (second language) and EAP (English for Academic Purposes) studies. There, it has often been operationalized as a statistically computed variable or set of variables used to predict a level of language proficiency. Here, studies confirm that syntactic complexity does relatively reliably predict the level of language learning. The most used measure for syntactic complexity in this line of research has been the mean sentence length or length of T-units (Mylläri 2020; Bulté & Housen 2012; Jagaiah, Olinghouse & Kearns 2020).

More recently, attention has also been paid to syntactic complexity as an object of interest itself. Still, these studies have methodologically relied on what Biber et al. (2020) call “omnibus variables”, that is, variables that conflate many facets of syntactic complexity. In some cases, such an index is derived from several separate measurements and weighted into a final score (c.f. e.g., Lu 2010). Biber et al. (2020) see this as inherently problematic. While the use of a single variable can be justified if it is used as an independent variable, for characterising syntactic complexity there is no need to do the same. Instead, Biber et al. (2020) argue for more nuanced analytical processes that are sensitive to how the prevalence of different kinds of syntactic constructions may differentiate between types of complexity.

One distinction missed by most omnibus variables proposed in L2 and EAP research is between embedding and concatenation. That distinction is highly relevant for this article, as it provides two competing views of the substance of the increase in sentence length. Citing Chafe (1985) and Givón (1998), Barker and Pederson (2009) note that formal written language relies more on subordination, spoken language on concatenation. Written language reflects editing processes that are less subject to immediate processing constraints, so written data masks and compresses the online decisions that ultimately yield the linguistic form that is produced (ibid.). Barker and Pederson's results also show that, while language users do not rely more on embedding when asked to explain things than when they are asked to simply report them, there is a strong tendency towards embedding when language users are prompted to answer a *why*-question compared to a *what*-question.

1.3 Interpretative journalism

As one possible explanation for the observed change in sentence length, journalism studies have noted how journalistic practices are undergoing a transition from fact-oriented and objective news reporting into a more personal, analytical, interpretative and emotive style (c.f. e.g., Djerf-Pierre & Weibull 2008; Soontjens 2019). This shift has been assigned multiple names that are often used interchangeably: interpretative journalism, advocacy journalism, analytical journalism and contextual journalism (Soontjens 2019). However, the term interpretive journalism is used in this study.

The expansion of interpretive journalism has been studied both quantitatively and qualitatively, using a variety of conceptualizations and operationalizations (for the European context cf. e.g., Soontjens 2019; Reunanen & Koljonen 2018; Esser & Umbricht 2014; Salgado & Strömbäck 2012; Hopmann & Strömbäck 2010) where it has been identified as a strong trend spanning already some decades. However, while the trend of interpretive journalism is assumed to be clear and observations regarding it have been made in different countries, its causes have remained elusive (Salgado et al. 2016).

The expansion of interpretive journalism might contribute to increasing sentence length in the online era because online resources provide readers with a constant flow of information and bite-size descriptions of events; the capability for explanation, analysis and meaning-making have become the remaining edge for mainstream news media. Thus, journalistic practices related to interpretive journalism (that were already expanding before the online era) have become more and more crucial to the mainstream news media's *raison d'être*. According to Reunanen

and Koljonen (2018), most of the Finnish journalists they interviewed for their study recognized the pressure to produce more interpretive stories. They also felt that the pressure was likely to increase rather than decrease in the future.

In this study, as a basis for recognising interpretive journalism in the texts, the four central features of interpretive journalism listed by Soontjens (2019) have been taken as a starting point as they efficiently summarise earlier research debates on the subject (for an extensive discussion, c.f. Salgado & Strömbäck 2012). These features are 1) the presence of journalists as observers, analysts or commentators in the reporting, 2) that events are explained or analysed and the emphasis is on the question *why* rather than the conventional *who*, *when* and *where* questions of traditional news journalism, 3) the reporting contains evaluations of actors or events and 4) it also contains prospective speculation about the future.

Two of these features, explanation and analysis of events and evaluation are directly related to syntactic complexity and sentence length, as their most prototypical expressions include clausal subordination and embedding. Explanations of an event and speculation about its causes and consequences are often communicated via causative structures, such as those based on causative conjunctions (e.g., *koska* 'because' and *jotta* 'so to' in Finnish), causative adverbs (e.g., *siksi*, 'therefore') or other expressions that explicitly posit statements in cause-effect relation to each other. The most common of these are the causative subordinate clauses, which have a prototypical function in answering *why*-questions. The analysis or evaluation of events usually entails embedding the utterances communicating them within matrix clauses that say something about them as statements. This embedding can carry evaluative or epistemic functions. The two other features, the presence of a journalist (perhaps most visibly in the context of written news articles by first-person voice referencing the journalist) and speculation about future events (Finnish lacks grammatical future tense) have no similar mechanisms that would directly influence sentence length in Finnish.

To scrutinise the proposed explanation related to interpretative journalism, the second research question with its hypothesis is formulated as:

> **Research question 2 (RQ2):** *Is the increase in sentence length connected to other linguistic changes that are congruent with the aims of interpretative journalism: 1) the presence of journalists as observers, analysts or commentators in the reporting, 2) events being explained or analysed and emphasis on the question why, 3) the reporting containing evaluation of actors or events and 4) prospective speculation about future?*

> **Hypothesis 2 (H2):** In all analyses, the studied linguistic markers are congruent with the aims of interpretative journalism: syntactic embedding, as measured in the counts of subordination, is closely connected to the increased sentence length. The syntactic structures studied show interpretative traces in closer examination.

Note that any corroborations of the H2 do not lead to proving that interpretative journalism is the cause for the increase in sentence length, but, depending on the degree of corroboration, it does make it more or less likely.

1.4 Accelerating news production

As a second potential factor in increasing sentence length, the intensifying competition in the new media environment has put mainstream news media under pressure to streamline their processes to react faster and cut costs (Cision 2019). The online media environment, especially social media, is often able to react to news events as they evolve. If mainstream media organisations wish to remain competitive, ever faster news production processes must be undertaken.

The main aim of text editing and proofreading processes is to bring a draft version of a text stylistically closer to style guides and thus increase the text's comprehensibility. One important aspect of this is to split complex conglomerate sentences into separate shorter ones. Thus, as an alternate causal hypothesis, if there is less work allocated to such processing, the increase in sentence length could reflect the fact that articles are published in a less-finished stage than earlier.

According to style guides, there are no strict norms on which kinds of clausal connections should be split, as the norms are given in the format of preference for sentences with limited complexity and where one sentence corresponds with one idea or thought (Iisa, Oittinen & Piehl 2006, 76; Itkonen & Maamies 2007, 91). Since identifying excess complexity caused by this process cannot be pinpointed to any particular type of clausal structure, the process cannot be tracked based on any fixed list of linguistic structures, with the possible exception of a high frequency of coordination. Replacing lists of NPs with more abstract terms that cover the same entities and splitting coordinated main clauses into separate sentences are common strategies for limiting verbosity.

However, less time spent simplifying sentence structures in the editing process leads to a situation where the sentences increase in length but the increase is connected to a broad range of features. Thus, it could be surmised that any residual increase in sentence length, unexplainable by interpretative journalism, could be down to acceleration.

What's more, in many cases the interpretative and acceleration explanations could both be present simultaneously: an unedited sentence may be long and complex to include interpretative elements (such as evaluative matrix clauses or causative subordinates) but the reason why such sentences survive the editing and proofreading stages is that such stages are no longer thorough.

> **Research question 3 (RQ3):** *Is the increase in sentence length connected to linguistic changes that are congruent with the accelerating publication process?*

Because the linguistic features for operationalising this research question are harder to come by, the evidence possibly provided for it is necessarily weaker than is the case with RQ2. The hypothesis for this research question is:

> **Hypothesis 3 (H3):** The data shows that the increase in mean sentence length is connected to coordinating elements. Further, a more detailed examination reveals a connection to conglomerate sentences, which, according to style guide norms, could be easily split into simpler sentences.

2 Data and methods

The data set used for this study contains all of the text-format material from four important news outlets in Finland: the main national broadsheet newspaper *Helsingin Sanomat* (*HS*), the public broadcast company (Yle), national tabloid *Iltalehti* (*IL*) and the national news organisation Suomen Tietotoimisto (STT). *Helsingin Sanomat* and STT material span from 2000 to 2019, while Yle and *Iltalehti* from 2010 to 2019. As the first stage of preprocessing, the data was cleaned and its metadata categories aligned across news sources. All of the texts were processed by the TurkuNLP Finnish neural parser (Kanerva et al. 2018) for lemmatisation and morphological and dependency analyses and analysed with an automated quote detection system.

For this study, four distinct genre categories were defined. The core news articles include news texts belonging to the sections for politics, economy, foreign and domestic news. The culture category includes sections for culture, entertainment and lifestyle. The external opinion category includes texts from the opinion sections as well as external editorial pieces. Journalistic opinions include news analyses, columns, editorials and other similar journalistic genres. As the classification is based on the categorisations of each outlet, marked in the metadata of the dataset, they might be slightly incongruent with what detailed genre analysis of each article would yield.

For comparison, we balanced the four categories by randomly sampling an equal number of articles from each category. Because STT and *Helsingin Sanomat* are represented in the data for the period from 2000 to 2009 and *Iltalehti* and Yle were not, they were allocated twice the number of articles, 10,000 to 5,000 in all categories. The sample size is large because we wanted to track month-by-month correlations among our different news sources and article categories. The large sample size also substantiates other statistical measurements conducted and presents a realistic view of the inherent variation in the data. In the case of *Iltalehti*,

the sample size exhausted the number of journalistic opinion texts actually published but not by much.

Quotes detected by an automated quote detection system were removed. This was done to study the change in the syntactic complexity of the data outside the fluctuations in the number of quotes. Because the quote detection system detects quotes by their reporting matrix clauses, detected quotes are, by definition, long and syntactically complex. Uncontrolled, they leave open the possibility that any observed increase in mean sentence length is simply attributable to an observed increase in the use of quotes.

The sizes of the samples in terms of tokens and sentences are listed in Table 1 below:

Table 1: Sample statistics

			tokens		sentences	
Media	**article category**	**texts**	**all**	**without quotes**	**all**	**without quotes**
HS	culture	10,000	3,053,267	2,694,212	244,490	221,710
	external opinion	10,000	2,586,914	2,438,920	197,249	189,146
	journalistic opinion	10,000	3,424,011	3,065,847	266,855	245,392
	news	10,000	2,365,579	1,779,633	199,384	161,515
IL	culture	5,000	969,447	776,617	84,891	70,111
	journalistic opinion	4,485	1,468,566	1,350,000	119,745	112,538
	news	5,000	930,295	627,982	76,898	56,112
STT	culture	10,000	1,679,046	1,434,353	146,344	129,312
	news	10,000	1,513,288	1,070,049	129,881	100,466
Yle	culture	5,000	1,458,116	1,142,932	127,482	105,185
	journalistic opinion	5,000	2,684,815	2,432,797	217,821	202,487
	news	5,000	1,196,084	871,251	105,733	83,493

The main variable in this study is the mean sentence length (MSL). It is used as a measurement in itself and as a reference variable for detecting which other variables are correlated with it through Pearson's correlation coefficient.

Alongside MSL, a variety of other measures for syntactic complexity have been used in previous studies. These include the length of T-units, clauses per T-units and length of NPs, to name a few (c.f. e.g., Housen et al. 2018). Computing the number of clauses or phrases per sentence would not have been practical considering the large

data size, because they require much manual work even on top of dependency parsing; hence, sample sizes would have been limited. Therefore, the number of clauses per sentence has been approximated indirectly, using finite verbs per sentence (FPS), conjunctions per sentence (CPS) and commas per sentence (CoPS). These, in concert, are used to look for a robust signal of whether the change in sentence length can be understood in terms of increasing the number of clauses per sentence or lengthening of phrasal units.

For testing the second and the third hypotheses, conjunctions have been divided into subordinating and coordinating conjunctions (SCPS, CCPS, respectively). Relative pronouns per sentence (RPS) have also been calculated, as well as clausal complements per sentence (ComPS). With subordinating conjunctions, relative pronouns and clausal complements, we aim to gauge the syntactic complexity of the embedded variety, which directly relates to hypothesis two. They also indirectly relate to hypothesis three: if the increase in syntactic complexity does not bear the marks of embedding, the residual increase must be due to concatenation.

All the variables mentioned above are analysed by correlation analysis complemented with linear regression models to see how consistently linear the developments are. If the change in language is a response to a gradually changing environment of text production, strong linearity is to be expected.

For a closer examination of the particular syntactic features that are connected to the increase in MSL, we use **dependency biarchs** (BIARCH), **dependency trigrams** (DEPTRI) and **pos-tagged archs** (POSARCH). All of these seek a balance between having frequent enough features while having descriptive power on the surface level. They are different ways of operationalising the idea of syntactic patterns or syntactic constructions in a computationally robust way.

BIARCHs consist of three directly connected nodes in the dependency tree. They seek to capture regularities on the vertical dimension of a dependency tree. If syntactic complexity is understood in terms of deeper dependency trees, an increase in complexity should be visible as an increase in the variation of BIARCHs, as trees are stretched and new elements are inserted as dependency chains. Thus, this connects BIARCHs directly to syntactic embedding.

DEPTRIs are the dependency roles of three consecutive words in a sentence. Unlike BIARCHs, the words in the trigram are not necessarily syntactically related; their dependency relations might point outside the trigram window. Because Finnish has a relatively free word order (Vilkuna 1989), they better reveal if the changes are related to fixed or idiomatic constructions or other phraseological units. DEPTRIs do not have a similar, direct connection to syntactic complexity but they do show if the change is connected to certain formulaic structures and construction types.

The third feature, POSARCH, consists of only two nodes connected by a dependency arch but the part-of-speech category of both nodes is included. This complements the two other features by adding a further layer of information and thus makes the dependency relations more specific. The contribution of POSARCHs is to connect the observations into more specific functional tendencies and to detect if the increase in sentence length is connected to specific uses of, for example, pronominal reference or coordination between APs, NPs or VPs.

The statistical dependency analysis is conducted only on the core news categories of the four media sources and the frequency of each feature for every month of the period is counted. Only features that appear in 30 separate months are considered. This is to make the correlation scores with MSL more informative. If a feature has a frequency score in at least 30 of the 120 months of the period, its frequency is bound to reside in the higher frequency quantiles. The correlation between MSL and the relative frequency of each feature is computed and the correlation score distributions are studied.

Finally, a qualitative analysis of sentences with high sum correlation is conducted to assess whether those features that correlate with MSL can be aligned with hypotheses two or three. In this analysis, four syntactic or pragmatic phenomena are looked for in the sentences: causative elements, first-person voice, reporting matrix clauses and coordination between NPs and clauses. The first three relate to hypothesis two and are markers for interpretative journalism and the fourth one relates to hypothesis three of sloppier editing. As most of the empirical heavy lifting in this article is done by the more large-scale statistical analyses, the manual part serves a complementary purpose. To keep the breadth of the study within the constraints of the article format, close reading is conducted only on the HS data.

3 Results

3.1 MSL in media sources and genre categories

The development of MSL across the four news sources and four genres is depicted in Figure 1. The figure shows a clear and consistent increase after 2010 in some segments but not all. This concerns first and foremost not only all core news genres but also journalistic opinion texts in *Iltalehti* (*Helsingin Sanomat* and Yle here show some ambiguity) and culture news in HS.

The reference lines are mean sentence lengths in [1] 11.2 in newspapers (11.2) and [2] non-fiction (12.7) in Heikkinen et al. (2001).

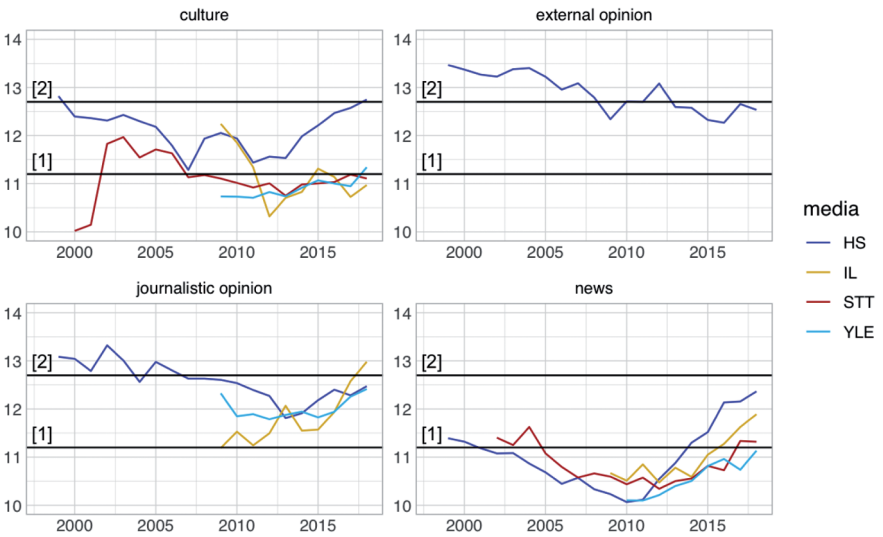


Figure 1: Mean Sentence Length across media sources and genre categories.

Heikkinen et al. (2001) report an MSL of 11.2 for a newspaper corpus collected from 1996–1998. After that, the situation has changed remarkably but the change has been quite different across categories. Interestingly, there seems to be a relatively high agreement among the media sources about the direction of trends. In the case of core news texts, we see a clear increase, whereas in the cases of opinion and (to some extent) culture sections, with already high MSLs, less so. Thus, the change overall has meant the dilution of the differences between genres and there seems to be a convergence towards the level Heikkinen et al. (2001) reported for nonfiction in their data.

The visual inspection of Figure 1 is complemented by the more detailed correlation analysis shown in Table 2, which analyses the correlation between time and MSL. While Figure 1 is based on yearly mean averages, the correlations in Table 2 are computed on a monthly level; thus, they provide a more robust and reliable view of the development. Figure 1 shows that the trends shared by all core news genres, *Helsingin Sanomat* culture news and *Iltalehti* journalistic opinion texts are rising.

Hypothesis one also demands consistency from the observed increase in MSL. Analysing linear regression models for each data category provides a picture of that consistency. Table 2 provides summary statistics for each linear regression model. The estimate column shows the slope of the fitted line. The larger the estimate score, the steeper the slope. The std. error column shows the standard error of the fitted line, that is, how far the actual data points fall from what is expected based on the

fitted line. The smaller the standard error, the better the linear representation captures the variation in the data. The p% and p level give the statistical significance of the fitted model, while the p% column shows the actual probability of the null hypothesis as a percentage and the p level expresses this probability as an established three-level grade[1].

Table 2: Correlation between time and mean sentence length

		estimate	std.error	p %	p level
HS	culture	0.00040	0.000054	0.00 %	***
	external opinion	-0.00011	0.000040	0.69 %	**
	journalistic opinion	0.00002	0.000041	58.42 %	
	news	0.00088	0.000037	0.00 %	***
IL	culture	-0.00019	0.000076	1.51 %	*
	journalistic opinion	0.00046	0.000050	0.00 %	***
	news	0.00046	0.000040	0.00 %	***
STT	culture	0.00012	0.000048	1.13 %	*
	news	0.00032	0.000040	0.00 %	***
Yle	culture	0.00018	0.000036	0.00 %	***
	journalistic opinion	0.00016	0.000039	0.01 %	**
	news	0.00037	0.000030	0.00 %	***

In Table 2, the average estimate is around 0.00027 and the average standard error 0.000042. Only four categories score steeper than average estimates and below the average standard errors: the four news categories. This means that sentence lengths in these categories grow faster and the linear model represents this growth better than with the eight other categories. On the opposite end is the *Iltalehti* culture category with its negative slope and very high standard error of 0.000076. To illustrate what the linear model seeks to capture, the best and worst-fitting models are depicted in Figure 2:

1 * mean 5 % > p > 1 %, ** means 1 % > p > 0.1 %, *** means p < 0.1 %. This grading is used throughout this paper.

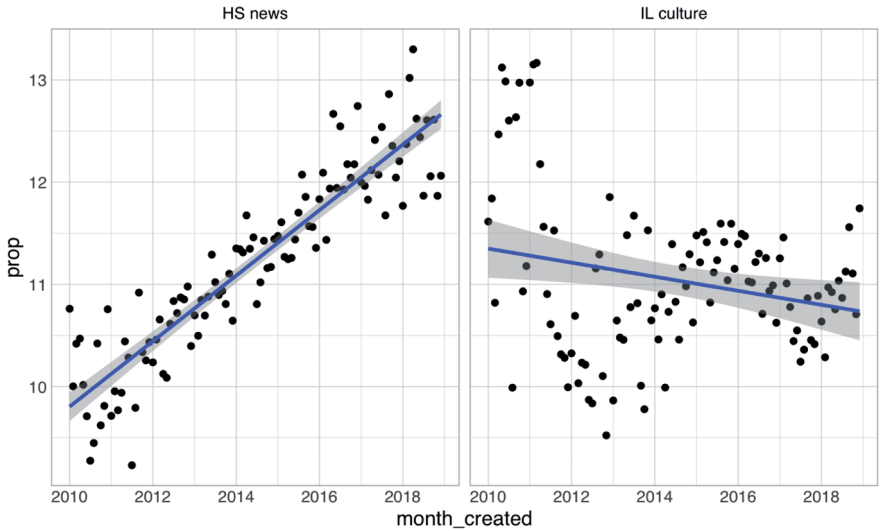


Figure 2: Linear regression models with 95 % confidence areas for *HS* core news and *IL* culture categories. The dots are monthly mean sentence lengths, the blue line is the regression estimated by the model and the gray area shows that the estimate is likely to reside with a confidence of 95 %.

While the distribution in *Iltalehti* culture seems to either be more unstructured or complicated[2], HS news shows a clear linear dependency between time and average sentence length. According to Table 2, the average sentence length in the core news grows faster in *Helsingin Sanomat* than in *Iltalehti*, STT or Yle (which all have relatively comparable slopes between 0.00032 and 0.00046 and standard errors between 0.00003 and 0.00004).

The pairwise correlations between the core news segments span from 0.38 (Yle to STT) to 0.71 (Yle to *Helsingin Sanomat*), most landing in the high 0.5 to high 0.6 range. Correlation coefficients from 0.5 to 0.7 are usually considered moderate-to-high degree. In addition, all these correlations have very low p-values, making the observations statistically very significant.

2 It is possible that a polynomial regression model would relatively well fit the average sentence length of the *IL* culture category. However, that venue was left unanalysed in this study.

Table 3: The pairwise correlation in mean sentence length between data categories through time (monthly datapoints). Correlation coefficient (number) and statistical significance (*-grading)

		HS				***IL***			**STT**		**Yle**		
		culture	**ext. op.**	**j. op.**	**news**	**culture**	**j. op.**	**news**	**culture**	**news**	**culture**	**j. op.**	**news**
HS	culture	X	-0.12	0.11	0.53***	0.09	0.43***	0.51***	0.22*	0.43***	0.26**	0.25**	0.53***
	ext. op.	-0.12	X	-0.02	-0.21*	-0.01	-0.15	-0.20*	0.04	-0.10	-0.09	0.05	-0.38***
	j. op.	0.11	-0.02	X	0.02	0.15	0.13	0.20*	0.21*	0.17	0.11	0.12	0.03
	news	0.53***	-0.21*	0.02	X	-0.24*	0.59***	0.67***	0.17	0.58***	0.44***	0.35***	0.71***
IL	culture	0.09	-0.01	0.15	-0.24*	X	-0.10	-0.07	0.04	-0.06	0.02	-0.19	-0.07
	j. op.	0.43***	-0.15	0.13	0.59***	-0.10	X	0.57***	0.23*	0.49***	0.37***	0.28**	0.50***
	news	0.51***	-0.20*	0.20*	0.67***	-0.07	0.57***	X	0.30**	0.58***	0.34***	0.32***	0.66***
STT	culture	0.22*	0.04	0.21*	0.17	0.04	0.23*	0.30**	X	0.28**	0.14	0.19	0.16
	news	0.43***	-0.10	0.17	0.58***	-0.06	0.49***	0.58***	0.28**	X	0.27**	0.31***	0.38***
YLE	culture	0.26**	-0.09	0.11	0.44***	0.02	0.37***	0.34***	0.14	0.27**	X	0.24*	0.35***
	j. op.	0.25**	0.05	0.12	0.35***	-0.19	0.28**	0.32***	0.19	0.31***	0.24*	X	0.20*
	news	0.53***	-0.38***	0.03	0.71***	-0.08	0.50***	0.66***	0.16	0.38***	0.35***	0.20*	X

The *Iltalehti* journalistic opinion texts also show moderate-high correlation scores with *HS* news (0.59) and *Iltalehti* news (0.57) and slightly more modest with STT news (0.49) and quite low with Yle and STT news (0.50 and 0.49). While the visual inspection of Figure 1 led us to expect some level of correlation with *HS* journalistic opinion texts as well, there does not seem to be much correlation there. On the other hand, *Helsingin Sanomat* culture news reaches moderate correlation scores with all core news texts (0.53 to 0.43).

Outside the scores mentioned above, Table 3 does not show any other remarkable correlation scores. Thus, the rise in overall sentence length in the whole data can be limited to the core news articles, culture news of *Helsingin Sanomat* and the journalistic opinion texts in *Iltalehti* (and to some extent Yle). It is noteworthy that there does not seem to be any other competing trends, where some other combination of segments would show moderate or high levels of mutual correlation. Hence, the conclusions are that a) there is a systemic change in the data that concerns more than one of the segments and b) there is only one such change. As this concerns mostly the core news segments, hypothesis one is corroborated. While there is some variation in how the mean sentence length develops between news sources, the core news categories clearly carry the same signal.

3.2 Other measurements for syntactic complexity

Table 4 shows the correlations between three indirect syntactic complexity metrics and the MSL: commas, conjunctions and verbs per sentence. The fourth column, non-finite verbs, holds the average number of non-finite verb forms per sentence. In Finnish, clause-like constructions can be formed around infinitives or participles and their arguments. These are often not separated by commas or conjunctions from the rest of the sentence, even though in many ways they behave similarly to subordinated clauses. Non-finite verb forms also occur in other, less clause-like functions (like elements in verbal temporal conjugations) so they can be assumed to hold a bit more noise compared to the other three metrics.

Interestingly, sentence length is highly correlated with the number of commas and conjunctions per sentence in the same categories, which are also mutually highly correlated in terms of change in MSL over time: *Helsingin Sanomat* culture and news, *Iltalehti* journalistic opinions and news, STT news and Yle news. None of these have any correlation scores with MSL below 0.68, most landing well above 0.7. In *HS* news the correlation is near-linear in both metrics. While the third metric, the number of finite verb forms, has across the board much lower correlation scores, the same trend is visible there as well. This suggests that the rise in sentence length is connected to an increase in the number of clauses per sentence. It remains un-

clear what explains the variation between verbs (FPS) and commas and conjunctions per clause (CoPS and CPS, respectively).

Table 4: Correlation coefficients for commas, conjunctions, finite verb forms, non-finite verb forms with MSL through time and the averages these coefficients (monthly datapoints)

		CoPS	CPS	FPS	NFPS	avg
HS	culture	0.72	0.72	0.69	0.80	0.73
	external opinion	0.61	0.67	0.51	0.42	0.55
	journalistic opinion	0.63	0.73	0.42	0.62	0.60
	news	0.90	0.88	0.85	0.81	0.86
IL	culture	0.84	0.85	0.45	0.62	0.69
	journalistic opinion	0.87	0.89	0.76	0.59	0.78
	news	0.71	0.85	0.56	0.25	0.59
STT	culture	0.48	0.49	0.42	0.50	0.47
	news	0.78	0.68	0.46	0.37	0.57
Yle	culture	0.62	0.62	0.44	0.50	0.55
	journalistic opinion	0.65	0.58	0.57	0.68	0.62
	news	0.80	0.72	0.73	0.26	0.63

The correlation between MSL and non-finite verb forms (NFPS) shows remarkable differences between the media sources within the core news category. *Helsingin Sanomat* shows a high correlation, in line with the other metrics, whereas the scores for *Iltalehti*, STT and Yle are surprisingly low (0.25, 0.37 and 0.26) much lower than correlations in the other genres. This shows that while there are concurrent changes in the language of news reporting in these outlets, the exact linguistic practices they lead to adopting seem to be at least somewhat different.

The main observation from Table 4 is that the rise in sentence length is closely connected to the accompanying rise in syntactic complexity, at least in terms of T-units and T-like units per sentence. Sentences, on average, constitute a higher number of clauses and clause-like constructions and this leads to rising sentence length in terms of words. However, there is no ready explanation for why these metrics show lower correlations with sentence length in those data segments that are not involved in the rising trend. The correct interpretation for the lower correlation rate is that sentence length in the other categories does not predict as well the number of verbs, commas, conjunctions or infinite verb forms per sentence. In summary, the results so far corroborate hypothesis one. There is a systematic and syn-

chronous change in the language of news reporting in Finnish, that is visible across all news sources and concentrates mainly on the core news category.

3.3 Embedding or concatenation?

Table 5 adds correlations for four additional metrics to the ones studied before: coordinating conjunctions, clausal complements, relative pronouns and subordinating conjunctions. The last column again marks the average of the correlation scores of the four preceding columns. Table 5 shows the same pattern as the ones before: in the genres where the sentence length has risen the most, the correlation between sentence length and other syntactic complexity measurements is also the highest. This concerns news and culture in *Helsingin Sanomat*, news and journalistic opinion in *Iltalehti*, news in STT and news in Yle. The only exception is *Iltalehti* culture, which shows a higher average correlation score than its news section, perhaps because of the surprisingly low correlation between MSL and relative pronouns in *Iltalehti* news. This again shows that while the trend generally seems quite clear, the idiosyncrasies of the language use in each category begin to show when the level of detail is increased.

Table 5: Correlation coefficients for coordinate conjunction, clausal complements, relative pronouns and subordinate conjunctions with MSL through time, and the averages these coefficients (monthly datapoints)

		CCPS	ComPS	RPS	SCPS	avg
HS	culture	0.64	0.75	0.57	0.57	0.63
	external opinion	0.56	0.69	0.43	0.39	0.52
	journalistic opinion	0.65	0.66	0.56	0.43	0.58
	news	0.79	0.88	0.78	0.79	0.81
IL	culture	0.78	0.68	0.75	0.57	0.70
	journalistic opinion	0.79	0.87	0.72	0.78	0.79
	news	0.73	0.65	0.49	0.72	0.65
STT	culture	0.40	0.52	0.47	0.27	0.42
	news	0.52	0.62	0.53	0.54	0.55
Yle	culture	0.53	0.54	0.54	0.34	0.49
	journalistic opinion	0.50	0.71	0.50	0.41	0.53
	news	0.60	0.74	0.56	0.61	0.63

Regarding the research hypotheses, the results seem to corroborate hypothesis two: clausal complements, relative pronouns and subordinate conjunctions, which were intended to capture embedding, are tightly connected to the increase in MSL. Concerning hypothesis three, the results are more inconclusive. As the result for hypothesis two is positive, the results do not outright corroborate hypothesis three nor do they counter it. Quite the contrary, coordinate conjunctions seem to be as much involved as the other metrics.

3.4 Syntactic patterns

The analysis above has relied on omnibus variables and has been able to verify a consistent signal of increasing syntactic complexity across all core news genres in all media sources. That analysis is now complemented with a more exploratory account, where the observed change is brought closer to the surface level of language use. This is done with the help of three syntactic features: BIARCHs, POSARCHS and DEPTRIs.

The three groups of features are first compared against the development of mean sentence length and the correlation between mean sentence lengths and the relative frequency of each feature is recorded. Because frequency distributions follow power laws, while it seems that sentence length development is linear, the logarithmic transformation is computed to the relative frequency scores of features.

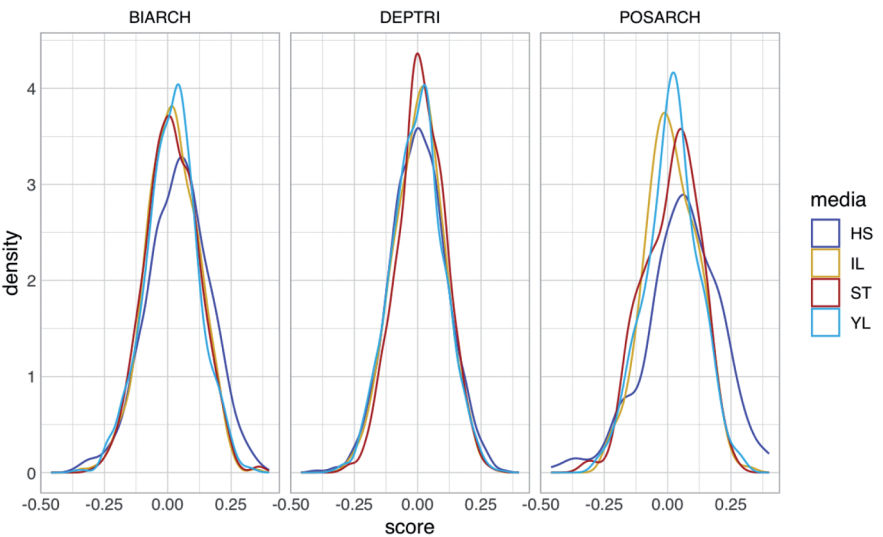
The distribution of correlation scores is shown in Figure 3 below for all three feature groups. The first thing to note is that correlation scores are generally relatively low compared to the mutual correlations between different omnibus variables. Only very few features have a correlation coefficient above 0.2 and even that is a very modest score. However, there is a clear difference among the three groups in Figure 3. DEPTRIs show a very uniform distribution with clear, high peaks residing very close to the zero. The shape of the distributions is generally very Gaussian, meaning that distribution to higher and lower bands of correlation has much to do with random variation. In POSARCHs, deviations from the Gaussian distribution are much more pronounced and the curved distributions indicate the presence of underlying subcategories. The third group, BIARCHs, falls somewhere between the other two.

For example, in the *Helsingin Sanomat*-curve of the POSARCH figure, there is a modest bump around the -0.3 mark, a shoulder around -0.2, a peak in 0.5 and another shoulder around 0.2. Thus, there are two groups of POSARCH features that are inversely correlated with the mean sentence length, the majority group with a very slight positive correlation following random variation and a secondary group with a pronounced correlation. The interpretation of this is that a) the correlation with

mean sentence length can divide POSARCH features into categories and b) while the majority of features are positively correlated with MSL some reside left of the peak and decrease in frequency as the mean sentence length increases. Similar clear observations cannot be made with BIARCHs and even less with DEPTRIs. Thus, there does not seem to be any specific fixed constructions or patterns that could explain the rise in sentence length but information about part-of-speech is required to identify subgroups of features that increase and diminish in frequency.

That all groups show the location of the majority peak at the right-hand side of the zero-point should be understood to indicate that most of the sentence length increase is simply more of the same. Also interesting is that *Helsingin Sanomat* has the most pronounced differences between subgroups in the POSARCH figures. This is congruent with other metrics analysed above, where *HS* showed the clearest and steepest increase in syntactic complexity. The figure also shows how each media source has a very distinct profile. This, at last, shows that while there seems to be a shared tendency in increasing sentence length, what that means and entails in the case of each source, varies.

Figure 3: BIARCH, DEPTRI and POSARCH correlation distributions



Even at their highest, in *HS*, the correlations only reach the mark of around 0.4. This shows that while some patterns have a mild connection with the rise in MSL, it only concerns a few patterns and even with them the correlations are low. Thus, rising sentence length only partially entails a change in what kind of syntactic patterns the

sentences hold. A large part seems to be about evenly distributed re-organizations of the distribution, which cannot be pinpointed to any clear group of construction types.

In the following, we will take a closer look at actual sentences that have many POSARCH features with higher-end correlation with mean sentence length. This gives some indications to which linguistic practices the high-correlating features might be connected. All sentences in the data have been assigned a score which is based on the sum of their POSARCH features' correlation coefficients. The high-scoring sentences were compared with randomly sampled sentences to see if pragmatic or syntactic features related to hypotheses two or three were overrepresented in either one.

Altogether 600 sentences were manually analysed. 300 represented the most high-scoring sentences and 300 were a random sample. For considering the effect of sentence length (high-scoring sentences were generally longer than sentences on average), the sentences were sampled respecting same length-bands. As a result, the manually analysed sample had 100 sentences for three length-bands for both random and high-scoring sentences.

This was done to account for four phenomena related to research hypotheses: 1) the presence of first-person voice, 2) syntactic patterns related to causation, 3) reporting matrix structures, especially those where the matrix clause is sentence-initial and 4) coordination[3]. The frequencies of these are consistently higher in the high-scoring sets than in random samples, although statistical significance is not reached in every comparison. The comparative percentages are given in Table 6, alongside statistical significance grades:

Table 6: Frequencies of analysed features in high-scoring sentences versus random samples of same sentence length

	long sentences			mid-range sentences			short sentences		
	high score	random	χ2	high score	random	χ2	high score	random	χ2
First person	21	2	***	7	1	*	18	0	***
Causative	21	2	***	9	3	–	5	3	–
Concatenation	61	21	***	45	18	***	31	16	*
Reporting clause	32	4	***	16	10	–	26	7	**

3 In addition, misanalysed direct quotations were also counted. In the longest length-band, high-scoring sentences had 12 % of those, whereas the random sample only 6 %. In other bands, only few direct quotations were found, and only from the random samples.

Furthermore, the overlap of these features, that is, sentences that have both concatenation and consequential structure, are completely missing in the random sample. Instead, they occur consistently among the high-scoring sentences.

The first-person instances fall into two categories: quotations that span several sentences and thus are unnoticed by the quotation detection system based on reporting clauses and texts containing first-person narrative. The latter are examples of narrative journalism, where the journalist's voice is internal to the narration.

That both types of first-person voice co-occur frequently in the context of syntactic features that are connected to the rising sentence length leads to the deduction that both narrative form and lengthening of citations are an integral part of the observed change. Both can also be easily understood in the context of interpretative journalism, as they both put people and their experiences at the centre of reporting.

Sentences whose structural complexity results from causative elements are more frequent in high-scoring sentences but only in the longest length statistically significantly. Most cases are instances of causative subordination. Their function often is to explain causes, consequences or motivations behind an observed event or action. The caused event usually has been presented earlier and is referred to by a paraphrase or summary in this sentence.

Example 1

Trumpilla on nyt takanaan niin monta niin ylivoimaista voittoa, että republikaanien on alettava hyväksyä se, että hänestä on todennäköisesti tulossa puolueen presidenttiehdokas.

Trump now has so many overwhelming wins, that the Republicans must begin to accept, that he likely is going to be their presidential candidate.

While Example 1 contains a clear causative structure, it also contains other structures that fit well with the core functions of analytical journalistic style. These include projections about probabilities of future events and speculations about the motivations and events of political actors. While the logical or propositional format of the sentence is that the number of Trump's wins necessarily leads to Republicans having to modify their attitude, the core content relates to a party's willingness to accept certain probabilities. In short, it is a projection of attitudes and predictions.

While concatenating more content in sentences, either by coordinating clauses or NPs, is relatively common in the news genre in general, it is much more frequent in sentences belonging to the high-scoring groups. In the longest and shortest samples, the difference is statistically very significant. Moreover, there also seems to be a qualitative difference in what kind of elements are coordinated and what the function of that coordination is. The concatenation cases in the random sample are of very usual and unmarked type:

Example 2

Sen jälkeen 93 metrin pitkä , 20,5 metriä leveä ja 350 tonnia painava siltarunko kuskataan vapun tienoilla telakalla suuren pukkinosturin alle.

After that, 93 meters long, 20.5 meters wide and 350 tons heavy bridge frame is transported around Labour Day under a big gantry in the drydocks.

In contrast, the concatenation cases in the high-scoring sets seem to have a quite different nature:

Example 3

Suurimmassa vaarassa ovat ihmiset, joilla ei ole taloudellisia mahdollisuuksia hankkia esimerkiksi ilmastointia, tai joiden kyky huolehtia itsestään on muuten heikentynyt, kuten alkoholistit tai mielenterveysongelmaiset.

In greatest danger are people who have no economic means to acquire air-conditioning, or whose capability to look after themselves is otherwise compromised, such as alcoholics or those with mental health problems.

Example 4:

Ei Euroopan unionissa voi koskaan olla täysin ehdoton, pitää aina etsiä luovia ratkaisuja, ja se luova ratkaisu on se, että Kreikka esittää uskottavan ohjelman ja hyväksyy sen omassa parlamentissaan.

In the European Union you can never be completely unconditional, you must always look for creative solutions, and the creative solution right now is that Greece presents a credible programme and adopts it in its own parliament.

In Example 3, the concatenation presents an extensive taxonomy of people who are vulnerable to recent heat waves in Central Europe, which in turn serves the purpose of connecting the climate crisis to its social implications. Example 4 comes from an extended quotation. The relatively complex syntactic structure coordinates three clauses on the highest level, one of which functions as a matrix clause to two coordinated subordinate clauses.

The first two sentences of Example 4 build a wide context of European Union politics and its realities and the third one materialises it to a more present context. Its two subordinate clauses describe a temporally ordered process, which the third sentence projects as a creative solution for current predicaments. The reason why all this is fitted in a single sentence is perhaps the aim to build allusions towards spoken language and natural train of thought. If adhered strictly to style guides' preferences, sentences like this would certainly be split.

Further, there are more cases in the high-scoring sentences than in the random sample where the coordinated clauses in the sentence could be easily cut into independent sentences without many semantic or pragmatic implications:

Example 5

Yritys tai organisaatio voi näin vähentää omaa tietokonekapasiteettiaan sekä käyttää ja maksaa ohjelmistoista ja kapasiteetista vain silloin kun se niitä tarvitsee.

A company or organisation can so reduce its own IT capacity and use and pay for software and computing capacity only when it needs.

Example 5 first coordinates two clauses, one with the predicate verb structure *voi vähentää* ('can reduce') and the other with coordinated *käyttää ja maksaa* ('pay and use'). On the level of phrases, it coordinates *yritys* and *organisaatio* and *ohjelmistot* and *kapasiteetti*. As a result, the sentence communicates much information but that information is not so much carried by its propositional organisation as it is by its naming and listing of things, enabled by the ways they are coordinated.

The high-score sentences have a higher number of sentences that begin with a reporting clause, in which the sentences carrying the actual propositional content are embedded as subordinates. These cases fall roughly into two categories: 1) indirect quotations or instances that reside somewhere between reported speech and thought and 2) hedging. There does not seem to be a major qualitative difference in the distributions between these types in the high-scoring sentences versus the random sample. The only difference is in quantities: in high-scoring sentences, there are simply more of both types.

Example 6

Nyt näyttää siltä, että ne eivät halua tehdä sitä myöskään hankkimalla itse rahoitusta markkinoilta , vaikka niillä on sama korkein luottokelpoisuusluokitus kuin ERVV:llä .

Now it seems that they are also unwilling to do it by acquiring further financing from the markets themselves, even though they have the same highest credit ranking as the EFSF.

The purpose of the matrix clause in Example 6 is to hedge the claim in the embedded clause into a matter of appearances or probabilities rather than an indisputable fact. The embedded clause makes a claim about the willingness of German and French governments to capitalise German and French banks. While the sentence projects the willingness of governments to do one thing or the other as a probability rather than certainty, it makes a strong claim about appearances; thus, it lets facts speak for themselves. This is a common characteristic in academic writing strategies (cf. e.g., Meyer 1997) and signals a style of journalism that surpasses mere reporting of events and seeks a more analytical tone and expert voice.

The inspection so far has corroborated both hypotheses two and three. Especially for hypothesis two, the case seems strong. The overrepresented syntactic features are clearly connected to pragmatic aims related to interpretative journalism but it seems there is also an abundance of cases where sentences are stretched by the insertion of loosely related, concatenated elements.

4 Conclusion

In this article, we set out to ask whether the increase in mean sentence length in Finnish news media is a systematic phenomenon, encompassing all studied media outlets and showing consistent distribution across journalistic genres. The answer to this question is a resounding yes. While there is some variation across media sources, their mutual correlations within the core news genres are high. Of other genres, tabloid (*Iltalehti*) journalistic opinion texts and broadsheet (*Helsingin Sanomat*) culture news also seem to carry the same signal. In the case of the latter, this is predictable, as *Helsingin Sanomat* culture is the only culture section with long, feature-like articles, compared to the shorter entertainment-centric news of the others. The development of *IL* journalistic opinion remains unexplained. Further, the increase in mean sentence length correlated strongly with other common metrics used to measure syntactic complexity.

The second and third questions are more complicated. Whether interpretative journalism and faster news production were the cause of the increase in mean sentence length but causality is difficult to ascertain. However, the empirical evidence presented is congruent with the hypothesis that practices related to interpretive journalism have led to an increase in sentence length. Subordinate conjunctions, clausal complements and relative pronouns are all correlated with MSL. More detailed syntactic features with the most correlation with MSL also seemed to be connected to these practices. The confirmation of hypothesis 2, from the perspective of journalism studies, is strong evidence in showing how interpretative practices are indeed expanding to core news reporting and not restricted to dedicated, clearly marked opinionated and analytical genres.

The evidence for a link between faster production times and sentence length, based on concatenation and coordination, is weaker yet it must be remembered that our metrics had a weaker chance to explicitly capture this association in the first place. Thus, as there is no direct evidence directly refuting hypothesis 3 either, acceleration must be held as a possible explanation alongside interpretative practices.

In addition to answering its research questions, the present article has made two important additional observations. The first is that while all four studied media sources confirmed a common trend of increasing sentence length, more fine-

grained analysis revealed unique profiles for each. Methodologically, this supports the points made by Biber et al. (2020) that omnibus variables mask a considerable amount of underlying, relevant variation yet the source of that variation remains unexplained. A possible explanation could be that, as the main observation of this paper is that acceleration and interpretative practices probably work in tandem to increase sentence length, different sources mix these two influences in different proportions. This however requires further study.

The second additional observation is that the language of the newspaper seems to be much more dynamic and volatile than thought concerning changes in the linguistic practices of the relevant language community, journalists in this case. Previous studies comparing summary statistics between genres (e.g., Heikkinen et al. 2001, for Finnish) seem to allude to glacial speeds of change and assume that these summary statistics could be used for descriptive purposes for long periods. Our study has shown that this, at least in the context of our data, patently is not so. It would not be far-fetched to expect similar processes to also occur elsewhere. Given that the decrease of reading-related tasks in PISA measurements is a process widespread in the Organization of Economic Cooperation and Development (OECD) and the fact that the syntactic complexity of news is rapidly increasing, the news is becoming increasingly more difficult to access for larger and larger segment of the population; this tendency is hardly without major implications for the democratic future of these societies.

References

Barker, M., & Pederson, E. 2009. Syntactic complexity versus concatenation in a verbal production task. In T. Givón & M. Shibatani (Eds.), *Syntactic complexity: Diachrony, acquisition, neurocognition, evolution* (pp. 391–405). John Benjamins.

Biber, D., Gray, B., Staples, S., & Egbert, J. 2020. Investigating grammatical complexity in L2 English writing research: Linguistic description versus predictive measurement. *Journal of English for Academic Purposes*, *46*, https://doi.org/10.1016/j.jeap.2020.100869

Bulté, B., & Housen, A. 2012. Defining and operationalising L2 complexity. In A. Housen, F. Kuiken, & I. Vedder (Eds.), *Dimensions of L2 performance and proficiency: Complexity, accuracy and fluency in SLA* (pp. 21–46). John Benjamins.

Chafe, W. 1985. Linguistic difference produced by differences between speaking and writing. In D. R. Olson, N. Torrance, & A. Hildyard (Eds.), *Literacy, language, and learning* (pp. 105–123). Cambridge University Press.

Cision. 2019. *Cision's 2019 global state of the media report*. Cision.

Demske, U. 2020. Variation across newspapers in Early Modern German. *Journal of Historical Syntax*, 6, 13–18.

Djerf-Pierre, M., & Weibull, L. 2008. From public educator to interpreting ombudsman: Regimes of political journalism in Swedish public service broadcasting, 1925–2005. In J. Strömbäck,

M. Blach-Ørsten, & T. Aalberg (Eds.), *Communicating politics: Political communication in the Nordic countries* (pp. 195–214). Nordicom.

Esser, F., & Umbricht, A. 2014. The evolution of objective and interpretative journalism in the Western press: Comparing six news systems since the 1960s. *Journalism & Mass Communication Quarterly*, 91(2), 229–249. https://doi.org/10.1177/1077699014527459

Givón, T. 1998. Literacy and grammar. Institute of Cognitive and Decision Sciences (Technical Report No. 97–09).

Heikkinen, V., Lehtinen, O., & Lounela, M. 2001. Kuvia kirjoitetusta suomesta. *Kielikello*, 1.

Hopmann, D. N., & Strömbäck, J. 2010. The rise of the media punditocracy? *Media, Culture & Society*, 32(6), 943–960. https://doi.org/10.1177/0163443710379666

Housen, A., De Clercq, B., Kuiken, F., & Vedder, I. 2019. Multiple approaches to complexity in second language research. *Second Language Research*, 35(1), 3–21. https://doi.org/10.1177/0267658318809765

Iisa, K., Oittinen, H., & Piehl, A. 2006. *Kielenhuollon käsikirja*. Yrityskirjat.

Indarti, D. 2018. Syntactic complexity of online newspaper editorials across countries. *Studies in English Language and Education, 5*, 294–307. https://doi.org/10.24815/siele.v5i2.11320

Itkonen, T., & Maamies, S. 2007. *Uusi kieliopas*. Tammi.

Jagaiah, T., Olinghouse, N. G., & Kearns, D. M. 2020. Syntactic complexity measures: Variation by genre, grade level, students' writing abilities, and writing quality. *Reading and Writing, 33*, 2577–2638. https://doi.org/10.1007/s11145-020-10057-x

Kanerva, J., Ginter, F., Miekka, N., Leino, A., & Salakoski, T. 2018. Turku neural parser pipeline: An end-to-end system for the CoNLL 2018 shared task. In *Proceedings of the CoNLL 2018 Shared Task*.

Lu, X. 2010. Automatic analysis of syntactic complexity in second language writing. *International Journal of Corpus Linguistics, 15*(4), 474–496. https://doi.org/10.1075/ijcl.15.4.02lu

Meyer, P. 1997. Hedging strategies in written academic discourse. In R. Markkanen & H. Schröder (Eds.), *Hedging and discourse* (pp. 21–41). De Gruyter. https://doi.org/10.1515/9783110807332.21

Mylläri, T. 2020. Measuring syntactic complexity in learner Finnish. *Apples – Journal of Applied Language Studies, 14*(2). https://doi.org/10.47862/apples.99134

Reunanen, E., & Koljonen, K. 2018. Not partisans, but participants. *Journalism Studies*, 19(5), 726–744. https://doi.org/10.1080/1461670X.2016.1204940

Salgado, S., & Strömbäck, J. 2012. Interpretive journalism: A review of concepts. *Journalism, 13*(2), 144–161. https://doi.org/10.1177/1464884911427797

Salgado, S., Strömbäck, J., Aalberg, T., & Esser, F. 2016. Interpretative journalism. In C. de Vreese, F. Esser, & D. N. Hopmann (Eds.), *Comparing political journalism* (pp. 50–70). Routledge.

Soontjens, K. 2019. The rise of interpretive journalism. *Journalism Studies, 20*(7), 952–971. https://doi.org/10.1080/1461670X.2018.1467783

Tolochko, P., & Boomgaarden, H. G. 2018. Analysis of linguistic complexity in professional and citizen media. *Journalism Studies*, 19(12), 1786–1803. https://doi.org/10.1080/1461670X.2017.1305285

Vilkuna, M. 1989. *Free word order in Finnish: Its syntax and discourse functions*. Suomalaisen Kirjallisuuden Seura.