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Textual and Polyphonic Structures in Climate Change and COVID-19 Discourses: Macro- and Micro-Linguistic Analysis

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Abstract:

The Intergovernmental Panel on Climate Change (IPCC) aims to present scientific material to policymakers and a huge audience with different educational backgrounds so that they may respond to the growing man-induced Climate Change (CC). IPCC releases Assessment Reports, Summaries for Policymakers (SPM) and scientific assessments to identify the latest knowledge about CC. World Health Organization (WHO) has declared COVID-19 to be an international pandemic. WHO, accordingly, produces Situation Reports (SRs) about the COVID-19 epidemiological data. Being scientific documents about major two global issues, SPM and SRs are linguistically investigated. To render a comprehensive analysis of SPM and SRs discourses, macro- and micro-features of texts are considered. The analytical framework is bidimensional. Macro-textual features are inspired by the contributions of Van Dijk (1977, 1980); Van Dijk and Kintsch (1983); Kintsch and Van Dijk (1987) and Hamburger (1981). The analytical micro-level framework is founded on ScaPoLine polyphonists' contributions: Nølke, Fløttum and Norén (2004). Findings illustrate SPM-SR differences at the macro- and micro-level. The study detects newly-used polyphonic items. It is concluded that CC and COVID-19 scientific discourses are polyphony-dependent, but multi-voicedness is a dominant feature in CC discourse.

Keywords: Climate Change Discourse, COVID-19 Discourse, Macro-structure, Microstructure, Polyphony.

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1. Introduction:

Climate Change (CC) is thought to be a discourse-sensitive topic. The way non-scientific audiences comprehend the serious issue of CC relies, first and foremost, on the linguistic components employed in CC communication. Recently, CC has made a transition from being a purely scientific and physical phenomenon into a cultural and communicational phenomenon (https://www.nhh.no/contentassets/bb3cafcf224f4dd3b138303ac9441345/flottum_abstract_lsp_bergen.pdf). The previous words, Kjersti Fløttum's, position language amidst CC research. If we consider Tannen's words that language is the apparatus that grants reality a physical structure (1993), and if CC is meant to have a being, or an existence, as an international issue, it is language that endows it with that.

CC discourse is dominated by "Threat" metaphors (Nerlich 2012, as cited in Kapranov 2017, 96). During his COP26 speech, British Prime Minister comments that Alexandria, Miami and Shanghai will be lost beneath the waves if temperature rises four degrees more, which is a serious ultimatum against the threat caused by CC. (https://enterprise.press/stories/2021/11/07/alexandria-is-4-degrees-away-from-becoming-the-long-lost-city-of-57445/). In this concern, CC effects reach any part on earth, which imposes a serious challenge to humanity.

CC communication becomes "a salient topic in science" (Nerlich, Koteyko and Brown 2009, 1). Science has made CC a universal issue that has severe influences on the whole planet, and it is our turn to "particularize" this issue (Hulme 2009, 330). Considering Hulme's call to particularly deal with CC as a point of departure, this paper proposes how discourse analysts may observe it. CC deals with the long-term shifts in the

patterns of weather and temperature. These shifts may either be natural or manmade (https://www.un.org/en/climatechange/what-is-climate-change). Since the beginning of this millennium, a great diversity of studies have been conducted to examine various genres of texts and talks dealing with CC, which articulates the role played by language in CC communication (Fløttum and Gjerstad 2017).

The Intergovernmental Panel on Climate Change (IPCC) is constituted in 1988 in response to the expanding interest in CC. IPCC is sponsored by the UN and aims to present scientific/objective material about CC. Accordingly, IPCC prepares special reports, summaries for policymakers and scientific assessments to identify the latest knowledge about CC. On its website, IPCC considers CC to be "a threat to human wellbeing and health of the planet" (https://www.ipcc.ch/).Consequently, this research attempts to examine the IPCC scientific discourse so that this global issue may get more focus in the humanities.

As indicated on its online site, the IPCC unleashes Assessment Reports (ARs) about CC and its dangers. IPCC is currently on its sixth cycle, working on its newest AR: the Sixth Assessment Report (AR6) comprising the contributions of three Working Groups (WGs) and a Synthesis Report (SR). In August 2021, WGI accomplished its contribution: The Summary for Policy Makers (SPM). SPM is a part related to AR6 which contains the most important and condensed scientific data about CC. As obvious by its name, SPM targets policymakers, so that the relationship between science and politics may be confirmed.

Coronavirus Disease 2019 (COVID-19), another global issue, sets a severe challenge to humanity since its outbreak. This goes back to its

being highly contagious. World Health Organization (WHO) has declared COVID -19 an international pandemic with global concerns. WHO, accordingly, produces Situation Reports (SRs)/evidence-based scientific documents about the pandemic disease, its effects, cases, deaths and the epidemiological data. SRs and SPM are targeted by this paper.

To render a comprehensive analysis of discourse, it is proposed to consider macro- and micro-features of texts. Macro-structures capture the communicative message of discourse and its fundamental essences. Macro-structures entail discourse micro-structures, which render discourse as a unified coherent unit. Micro-structures are the components of the sentences, clauses and phrases which from the local level in discourse. Macro- and micro- discourse structures should harmonize so that the gist /gestalt of the higher macro-level may be connected to the components of the micro-sentential level (Van Dijk 1977, 1980; Van Dijk and Kintsch (1983); Kintsch and Van Dijk1987 and Hamburger 1981).

To speak science means to be accurate and precise. Yet, linguistic items, yielding more than one point of view, namely polyphony, may form scientific information. Though scientific discourse aims to negotiate absolute facts about the status quo, it sometimes voices multi-voices. These multi-voices are occasionally transacted in a manner that seeks to construct, and transmit, a single voice/opinion. This single voice usually reflects the transmitter's standpoint. In this concern, language offers the resources required for an unbiased detection of the voice advocated and those which are, despite existing in the background, declined.

Polyphony, rooted in music, refers to the combination of melodic tones, or multiplied voices. At the hands of the Russian linguist Mikhail Bakhtine,

polyphony has made its first jump and is extended to study the diversity of voices in literature. Characters are regarded as voices. According to Bakhtine, polyphony means that characters in literature do not echo the author's view (Malcuzynski 1984). Bakhtine's polyphony seeks to unleash the characters' voices and regard them to be separated from the narrator's. When Bakhtine initiates the term "polyphony", he uses it to indicate variations of viewpoints and voices.

The second, and seemingly most significant, jump transfers the notion of polyphony to linguistic analysis. This is the change that began with the French linguist Oswald Ducrot. The Ducrotian trend in language has inspired and resulted in The ScaPoLine Theory (Dahl and Fløttum 2014, 405). ScaPoLine is an abbreviation of La théorie scandinave de polyphonie linguistique: The Scandinvian Theory of Linguistic Polyphony.

Considering language to be dialogic and interactive, the detection of multi-voices in discourse is significant for an objective interpretation. Besides the speaker's voice, there may be various voices encoded in discourse. This indicates that language, at the sentential level, may reflect a plurality of voices or viewpoints. Discourse subject, according to The ScaPoline Theory, is by no means the sole speaker. Other voices or viewpoints may be included in the same piece of discourse. These voices may be expressed either explicitly, as in the case of direct quotes or citations, or implicitly, as in the cases of negation and the contrastive conjunction "but". Multi-voicedness detection is dependent on the observation of certain discourse /transition markers.

Such multi-voiced sequences of discourse are to represent various points of views (POVs). The ScaPoLine Theory tackles multi-voiced,

or polyphonic, discourse constructions and the relevant POVs encoded. According to ScaPoLine, multi-voicedness and multi-POVs parallel. The ScaPoLine Theory postulates that different discourse markers reflect different discourse voices as their point of departure.

Fløttum and Dahl (2014, 66) recommend that more studies should consider the "text layout". Hence, this paper examines macro- and micro-linguistic features in CC and COVID-19 scientific discourse and the way IPCC knowledge claims are expressed. Macro-features are discussed so that the textual building blocks may be explained. Micro-features are investigated via the potential of ScaPoLine. The Scandinavian polyphonists presume that language markers entail voices/views. Accordingly, this paper is expected to answer the following questions:

How are SPM and SRs structured?

How are voices of different authors constructed and represented collectively?

How frequently are explicit and implicit polyphony manipulated?

2. Theoretical frameworks:

2-1 Macro-structure

Van Dijk (1980) considers discourse macro-structure as the "core" of discourse and its "theme or topic" (41). Van Dijk (1977) explains macro-structures as follows: "any proposition entailed by a subset of sequence is a macro-structure for that sequence" (137). This highlights the multi-levelled nature of macro-structure. To have access to the text macro-structure is to capture the "global meaning" of discourse (41).Van Dijk and Kintsch (1983, 53-54) present some signals which detect and identify text macro-

structures. These are: titles, subtitles, headings, captions, initial appearance of sentences, summaries, advance organizers, questions and reminders. These macro-structure markers occur at a higher textual level under which micro-structure signals are arranged. Because discourse structure needs to be understood at the global macro-level and the local micro-level as well (Kintsch and Van Dijk 1978, 365), studying discourse at the macro- and micro-level is conducted.

Van Dijk (1977) explains the structures of macro-level/macro-structures in reference to the "TOPIC OF DISCOURSE" (123). Linguistic notions as "topic" or "theme" are thought to refer to larger stretches of discourse to signal what is being talked about (123). The general macro-structure of multi-macrostructures is identified by its domination above and reference to the whole sequence (137). Van Dijk and Kintsch (1983) consider micro-structure to be "a network of interrelated propositions" which form the macrostructure (52).

For a text to have a macro-structure, it has to be interpreted as a whole coherent unit of discourse. Components of individual sentences, in such a coherent macrostructure, signal the text micro-structures (Hamburger 1981, 343). Micro-structure constituents are the items/elements, such as words or phrases, which belong to the set of micro-structures, as clauses or sentences, which are entailed by the macro-structure. Hamburger (1981) adds that the relation between the macro-constituents of discourse and the micro-structures set textual coherence: "a macro-constituent is actualized in a text as a semantic gestalt. A micro-constituent forms part of the gestalt because it partially or completely repeats the macro-constituent." (343). In this research, linguistic polyphony is selected to be the feature detected at the micro-level structural analysis.

2-2 Micro-structure: polyphony

Polyphony, an utterance-related occurrence, has its origin in musicology to signal the integration of two or more simultaneous voices (Nølke 2017, 37). Displaying the interaction of two or more voices without a dominant one, polyphony shows difference from dialogism (38). The Geneva linguists discuss discourse polyphony within the scope of the presence of two or more represented interlocutors (39). Oswald Ducrot has a focus on the speaker-utterer distinction. The speaker (S) is in charge of the speaking act itself. Utterers (S0) are those whose points of views (POVs) are present in discourse ((Nølke 2017, 40). Negation, for instance, presents linguistic polyphony.

To understand the sentence "the girl is not stubborn", one needs to consider the speaker's implicit assumption that someone/the utterer thinks that "the girl is stubborn", an idea that the opposite is true. Thence, Ducrot considers negation to be a polyphonic construction. Ducrot (2004) believes that discourse polyphony exhibits the fundamental argumentative nature of language. Inspired by Ducrot's work, ScaPoLine started in the eighties and revolved around the dialogic nature of discourse showing how the relationship between purely linguistic forms and polyphonic meaning can be elucidated (Nølke 1985, as cited in Nølke 2017, 50).

Kjersti Fløttum, Coco Norén and Henning Nølke collaborate to develop ScaPoLine so that the theory may have its interactive method of Critical Discourse Analysis (CDA) and meaning construction. Nølke (2017) explains the ScaPoLine functional targets: to interpret the utterance act, to focus on discourse structure and to decode utterance meaning from a purely linguistic orientation (54). ScaPoLine is, accordingly, an objective

method due to its reliance on language per se to heuristically offer discourse clarification.

2-2-1 Internal/Implicit polyphony

An utterance, sometimes, negotiates two POVs: one POV pertains to the speaker; the other pertains to the non-present utterer. This case is internal polyphony. Nølke (2017) presents some linguistic forms which entail internal polyphonic structures (P. Structures). "Stop+ing"- form, "that-clause" and "perhaps" are three instances encoding polyphony (90). "That-clause" shows internal polyphony in which "The utterance speaker (S0) assumes responsibility for the POV conveyed by the matrix clause and the textual speaker (S) assumes responsibility for the POV conveyed by the subordinate clause" (Nølke 2017, 112). "Perhaps" produces two POVs. One is about the actuality of the proposition; the other is about its probability

Fløttum and Dahl (2011, 214) consider epistemic modals "may, might, could, would" to negotiate internal polyphony. They consider "not" and "but" as items delivering internal polyphony (214-215). They explain "but-construction" as: "b but q where p and q constitute two propositions – or arguments – in contrast: p represents the concession and q the argument that the speaker identifies him- or herself with." (215).

2-2-2 External/Explicit polyphony

According to Nølke (2017), external polyphony is detected when an utterance negotiates two POVs: one POV is integrated with the speaker; the other is associated with a second or a third person/DE (91). Citations or reported speeches are examples.

2-3 Related studies

Fløttum, Dahl and Kinn (2006) examine academic discourse from a polyphonic perspective. They detect voices of authors and other researchers in 450 research articles. It is concluded that both culture and language affect the presence of voices in discourse. Fløttum and Stenvoll (2009) examine Blair's two speeches in the British parliament (2004) and in the European one (2005) from a polyphonic angle. Fløttum (2010b) examines EU political discourse within a framework of ScaPoLine. Results support the claim that political discourse is rich with polyphonic instances.

DiFrancesco and Young (2011) investigate CC visual communication in printed media. Young and Dugas (2012) investigate CC in English and French newspapers ; English newspapers pay more attention to CC. Fløttum and Gjerstad (2013) examine the South-African Green Paper to discuss the way the government presents the issue of CC. The study starts with the hypothesis that CC is negotiated as a narrative with multi-voicedness. Fløttum and Dahl (2014) analyze the SPMs released by IPCC Assessment Report 4 and Assessment Report 5. Results indicate the differences between the SPMs in (un)certainty negotiations.

Ryghaug, Marianne & Tomas Moe Skjølsvold (2016) study CC communication in Norway. CC is presented as being a controversial issue, which opens space for CC scientists and skeptics. This results in a public opinion considering CC an unurgent issue. Fløttum, Gasper and Lera St. Clair (2016) investigate the SPMs of the IPCC fifth cycle. Results manifest that each WG's summary manifests a typical framing and theme emphases. Fløttum and Gjerstad (2017) explain CC narratives in the sense that when CC is narratively communicated it becomes easier to identify its

complicated status .Schäfer and O'Neill (2017) analyze CC communication within a frame analysis approach. They define frames as being the act of selecting some aspects of an issue and expressing these aspects in a manner endowing them with prominence.

Dahl and Fløttum (2019) investigate CC construction by energy companies. The data comprises three reports by three major corporates. Search terms are responsibility, risk and opportunity. Results uncover that the three companies, Statoil (now Equinor), Suncor Energy and Total, deal with CC differently. Total considers CC as its responsibility, Suncor Energy considers it as a job peril and Statoil believes that CC is a chance.

Previous literature spells that ScaPoline is mostly utilized in CC context with reference to certain P-structures. Previous studies also show interest in CC encoded stories. This research is original as it analyzes CC and COVID-19 discourse within a bi-dimensional methodology: macro-and micro frameworks. WG1 document has not been analyzed yet. Detecting all P-structures in the newest data released by IPCC and WHO and integrating macro- and micro- analyses, this research seems to be original.

3. Methodology:

Data of analysis pertain to two international organizations: IPCC and WHO. The IPCC has initiated its newest cycle, the sixth, and WGI has released its report on CC, which is available at (https://www.ipcc.ch/report/ar6/wg1/). SPM is selected for analysis, as it presents an accurate summary of the state of CC. SPM relies on collaborative work executed by a large number of scientists to provide policymakers with condensed and unbiased information about CC. WHO presents weekly SRs on COVID-19, of which the newest SRs initiated from March 1 to March 8, 2022 are selected for

the study, available on line at (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/)

The Analytical Framework is bidimensional. The first is performed at the macro-structure level of discourse. The analytical macro-level framework is based on Van Dijk (1977, 1980); Van Dijk and Kintsch (1983); Kintsch and Van Dijk (1987) and Hamburger (1981). Analytical micro-level framework is founded on ScaPoLine polyphonists' contributions: Nølke, Fløttum and Norén (2004), Fløttum(2010a), Fløttum and Dahl (2011), Fløttum (2014), Dahl and Fløttum (2014), and Nølke (2017).

The data is downloaded and manually analyzed. Instances and types of polyphony are examined so that multi-voicedness in scientific discourse may be uncovered and evaluated. All instances of internal and external polyphony are considered. The Analysis Section considers selected examples of p-structures; all discovered p-structures are typed in Appendix A and B. Table 1 is prepared for this study to summarize the macro-analytical tools:

Table (1): Macro-structure signals

Macro-structure markers	Examples
Titles	Book titles, chapter titles
Subtitles, headings, captions	Subordinate titles, subtitles dis- .played at the bottom of images
Summaries	Brief statements or accounts of the .main points

Advance Organizers	Tools used to facilitate comprehension such as analogies and metaphors, storytelling, graphic organizers, visual aids
Questions and Reminders	Questions that recall previous information
Initial Appearance of Sentences	Initial sentences connecting previ-.ous information to the coming

Table 2 is prepared to summarize the micro-structure markers of polyphony: Table (2): Micro-structure signals/Polyphony

Internal Polyphony	External Polyphony
It negotiates two POVs: one POV is associated with the text speaker; the other POV is associated with the utterance speaker who is the non-present utterer.	It negotiates two POVs: one POV is associated with the speaker; the other POV is associated with a second or a third person.

Examples: stopped + (V+ING), That –clause, Adverbial "perhaps/ probable". Epistemic modals: "may, might, could and would". The negation by "not". The contrastive conjunction/ connective "but".	Examples: "since+ clause", "it seems to me…" reported speech and citation.

4. Analysis and findings:

4-1 Macro-structure analysis of CC discourse: SPM

Representing the form of a scholarly research article, IMRaD is an acronym for Introduction, Methods, Results and Discussion (https://libguides.ccga.edu/researchbasics/imrad).**IMRaD-resembling organization of SPM indicates that it is written by scientists who observe the well-defined procedures and steps required for academic paper writing. The macro-structure of SPM helps to simplify its understanding, especially for politicians who may not be familiar with scientific discourse. To understand SPM, or any text, it is not necessary to have access to all the sentences. Discourse comprehension and retrieval depend on the presence of structured macro-propositions in a hierarchical organization.**

SPM highest macro-structural level contains the document macro-title and two subtitles, the macro-proposition representing the text as a

whole: "Climate Change 2021: The Physical Science Basis. Summary for Policymakers." The visual design underneath the document title and subtitles represents the whole planet. This acts as an advance organizer symbolizing the macro-content. So, verbal and visual discourses are employed to denote the document's macro-propositional content. Underneath the visual discourse, there is a caption signifying the global theme relative to the macro-title "Working Group I Contribution to the Sixth Assessment Report of the Intergovermental Panel on Climate Change."

The overall macro-structure of SPM document shows numerous illustrative footnotes, figures and tables. **Advance organizers, visual aids, are used abundantly to facilitate understanding. Captions are used as illustrative aids to summarize and explain.** This is expected since SPM is mainly a scientific paper whose authors seek an accurate description of CC state. SPM intends to summarize hundreds of papers on CC, so the use of illustrative figures serves the purpose of presenting information in a condensed space. **SPM lowest level of macro-structure is manifest in sentence sequences. This is the point where macro- and micro-structural levels become identical.**

Moreover, SPM is written in the following main five sections:

Introduction

The Current State of the Climate

Possible Climate Features

Climate Information for Risk Assessment and Regional Adaptation

Limiting Future Climate Change

Each section has a theme encoded by its title. Each section is subdivided into subsections. The sections/headings and the sub-sections/headings are numbered in a manner reminiscent of academic research papers. Being scientific, SPM is undertaken by scientists and written in the form of a research article. This emphasizes the relation between science and policy, as SPM addresses policymakers. With slight differences, SPM seems to resemble IMRaD model, a four-section research article.

The "Introduction" presents the general theme of SPM in simple terms. It offers SPM readers the overall strategy in which the document explains its issue. It also presents the topics that will be discussed and the global theme of the document. Its condensed space makes it look like a summary of the topics to be discussed. It symbolizes the "Introduction" in scholarly research, though the introductory part in academic articles is longer and more expository.

"The Current State of the Climate" begins with a small paragraph that summarizes its related content and positions the current SPM in the context of previous ARs. This section is divided into second- and third-level sections. Tables are included in the text to clarify the data. Illustrative figures and visual designs follow third-level sections to represent information in a summarized manner. This section seems to resemble the "Literature Review" section in academic papers.

"Possible Climate Features", the third part, begins with a short introductory paragraph that advances the topic. It is further divided into second and third-level sections with tables, figures, visuals and captions. This part, which is reminiscent of the "Analysis and Discussion" in academic

researches, follows the same structural organization of the previous section.

"Climate Information for Risk Assessment and Regional Adaptation" observes the same structural strategy of the previous sections. It is a reminder of "Results" in research articles. The final section, "Limiting Future Climate Change" outlines the findings and anticipates future action to control Climate Change. It follows the same structural planning. This part resembles the "Conclusion" in scholarly researches.

Hence, the overall structural organization of SPM presents a hierarchical arrangement of topics from general to specific. The fixed structuring of topics, the use of short introductory paragraphs, the employment of illustrative figures and visuals and the smooth development from general themes to particularly related topics-all render the process of text comprehension and data retrieval easier. **SPM seems to be a new genre whose form and content observe scientific papers guidelines, but aims to address policymakers. The subtitle "Summary for Policymakers" is considered to be the only reference to policy in the scientific research SPM.**

4-2 Macro-structure analysis of COVID-19 discourse: SRs

Having a look at SRs macro-structure, it is apparent to note the difference between SRs and SPM's structural organization. SRs rely on the title for topic clarification, in-text heading for data presentation and visual communication for data illumination. Captions are used underneath the visuals so that the image content may be elucidated. Tables and figures are included in the text for data exposition.

SRs macro-structures mainly depend on the title, the headings, the figures and the visuals. No section divisions are used; no heading divisions

are employed. Numbering SRs parts and sub-parts is not provided. SRs lack the form of scholarly articles, as they look more like illustrative essays.

4-3 Micro-structure analysis of CC discourse: SPM

WG1 is involved in assessing the physical scientific basis of CC (https://www.ipcc.ch/). Examination of explicitly communicated voices and implicitly negotiated ones are the targets of this analysis. SPM is prepared by many authors; therefore, the following analysis examines their presence as voices in the document.

4.3.1. That-clauses (19 Occurrences)

That-clause is a marker of internal polyphony as presented in the first instance met in SPM:

- It is unequivocal that human influence has warmed the atmosphere. (p.4)

The utterance speaker (S0) is responsible for the POV delivered by the matrix clause; the textual speaker (S) is in charge of the POV conveyed by the subordinate clause/ that-clause. Consider the following explanation:

POV1: [S] (TRUE [human influence has warmed the atmosphere.])

POV2: [S0] (UNEQUIVOCAL [POV1])

It is obvious that despite the absence of second and third personal discourse identities/pronouns, internal polyphony is encoded by the structure. POV2 goes in the same line with POV1 to condemn humans for CC. Following the same analytical line, SPM is marked by 19 instances of that-clauses generating internal polyphony. The following is another example:

-…extremely likely that human-caused stratospheric ozone depletion was the main driver of cooling (p.5)

POV1: [S] (TRUE [human-caused stratospheric ozone depletion was the main driver of cooling]).

POV2: [S0] ([POV1] IS EXTREMELY LIKELY]

That-clauses generate p-structures that blame man for CC. S and S0 share the same POV about considering the cause of CC to be human. This induces policymakers to issue laws and strict decision to prevent man-induced pollution.

4-3-2 Adverbials/ adjectives of probability (5 Occurrences)

- The likely range of total human-caused global surface temperature increase… (p.5)

"likely" is used as an adjective modifying "range", which is suggested to negotiate internal polyphony like adverbs of probability:

POV1:[S] (TRUE [The range of total human-caused global surface temperature increase…])

POV2: [S0] ([POV1] IS LIKELY)

Though second and third personal discourse entities/pronouns are not explicitly mentioned, the structure entails implicit polyphony. S0 is the SPM non-present author. The two POVs consider man responsible for CC, which motivates decision -makers to issue laws against human's mischievous conduct.

4-3-3 Negation by not/no (3 Occurrences)

- These improvements are not sufficient in many polluted regions to achieve air quality (30-31).

POV1: [S0] (TRUE [These improvements are sufficient in many polluted regions to achieve air quality])

POV2: [S] ([POV1] IS FALSE)

S is responsible for POV2, and refutes POV1. POV1 seems to be SPM's non-present contributors' idea, which is in contrast with the speaker's POV. This example encourages policymakers to perform more procedures facing pollution.

4-3-4 Unusual (1 Occurrence)

Though "unusual" is not in the taxonomy offered by ScaPoLine polyphonists, it is thought that this adjective delivers implicit polyphony:

- However, surface open ocean pH as low as recent decades is unusual. (P.8)

POV1: [S0] (TRUE [There is surface open ocean pH as low as recent decades]).

POV2:[S] ([POV1] IS UNUSUAL)

S considers POV1, which pertains to SPM non-present authors, to be "unusual". This can be interpreted as a call to save marine life.

4-3-5 Extremely unlikely (1 Occurrence)

- Some recent hot extremes observed over the past decade would have been extremely unlikely to occur without human influence. (p.8)

POV1: [S0] (TRUE [Some recent hot extremes observed over the past decade would have been to occur without human influence])

POV2:[S] ([POV1 IS EXTREMELY UNLKELY])

Using "extremely unlikely" as an adjective is thought to entail implicit polyphony. POV1 does not consider man the source of CC, with the implicit argumentation that there is no need to issue new laws against human-caused pollution. POV2 considers man in charge of CC, which directs discussion towards new issued laws against human's behaviors.

4-3-6 Epistemic modals (13 Occurrences)

Modal-based POVs tone down the propositional content in POV1 presented by S0:

- High-impact outcomes could occur at global and regional scales. (27)

The modal "could" represents S's POV:

POV1: [S0] (TRUE [high-impact outcomes occur at global and regional scales])

POV2:[S] ([POV1] COULD HAPPEN)

4.3.7. Very unlikely (1 Occurrence)

In the adverbial position, "very unlikely" has one occurrence and is considered to generate implicit polyphony. This marker presents S-S0 contrastive POVs, and endorses POV2:

- Human influence has very unlikely contributed to most of them. (p.8)

POV1: [S0] (TRUE [human influence has contributed to most of them]).

Pov2: [S] ([POV1] IS VERY UNLIKELY).

4.3.8. But (8 Occurrences)

To formalize the contrastive conjunction "but", the construction *P* (the point conceded) *but* Q (the proposition S identifies with/adopts) is counted. This makes "but" negotiate four POVs:

- Decreases in global land monsoon precipitation from the 1950s to the 1980s are partly attributed to human-caused Northern Hemisphere aerosol emissions, but increases since then have resulted from rising GHG concentrations and decadal to multi-decadal internal variability. (p.9)

The above example offers two cases of polyphony, the first is via the adverb "partly"; the second is via "but"."Partly" will be explained it its related section. Regarding the conjunction "but", it generates four POVs:

POV1: Decreases in global land monsoon precipitation from the 1950s to the 1980s are partly attributed to human-caused Northern Hemisphere aerosol emissions.

POV2: POV1 is an argument in favour of the conclusion r

POV3: increases since then have resulted from rising GHG concentrations and decadal to multi-decadal internal variability

POV4: POV3 is an argument in favour of the conclusion non-r.

The letter "r" stands for the conclusion which is investigated so that an interpretation may be reached. The example can be explained as follows: the text speaker agrees that "Decreases in global land monsoon precipitation from the 1950s to the 1980s are partly attributed to human-caused Northern Hemisphere aerosol emissions". This, implicitly, directs

discourse towards the conclusion "r" that "we should worry about human-caused activities." However, the connective "but" makes the conclusion "r" invalid and renders the conclusion "non-r" that "there is no need to worry". The textual speaker accepts the proposition introduced by the conjunction "but", POV3.

- Alternative assumptions may result in similar emissions and climate responses, but the socio-economic assumptions and the feasibility or likelihood of individual scenarios are not part of the assessment (p.12)

The previous example can be interpreted as: the speaker admits that "Alternative assumptions may result in similar emissions and climate responses", which leads to an argument favoring the implicit conclusion "r" that socio-economic assumptions may lead to climate change and their being under control is currently necessary. Using "but" advances the claim that "the socio-economic assumptions and the feasibility or likelihood of individual scenarios are not part of the assessment", which negated the conclusion "r": controlling socio-economic factors is not needed at the moment. Polyphonic "But" seems to discourage climate action.

4-3-9 Modifying prepositional phrases (15 Occurrences)

Although modifying prepositional phrases (MPPs) are not part of ScaPoLine polyphonists' taxonomy, they come second as regards the polyphonic structures' high frequency. This study suggests that MPP–based construction can be formalized as : *P, MPP Q*, where P is POV1 assumed by S0, and Q is POV3 endorsed by S. MPPs do not offer contrastive POVs; rather, they present new argumentative domains (POV3) in addition to the POV1.MPPs generally revolve around man's negative effects on CC:

- Climate change is already affecting every inhabited region across the globe, with human influence contributing to many observed changes in weather and climate extremes (p.10)

It seems that S admits the proposition modified by MPP. MPPs are thought to generate four POVs:

POV1: Climate change is already affecting every inhabited region across the globe affects the earth.

POV2: an argument in favor of the conclusion (r) that discussing CC effects is necessary.

POV3: with human influence contributing to many observed changes in weather and climate extremes.

POV4:POV3 leads to an argument in favor of the conclusion MPP-r, that discussing the human effect is also important.

POV1 seems to go back to the non-present authors', while POV3 concerns the speaker.

4.3.10. Partly (2 Occurrences)

"Partly" is considered to communicate implicit polyphony. The two POVs are not in contrast as POV2 pertaining to S moderates POV1 pertaining to S0:

- This warming is mainly due to increased GHG concentrations, partly reduced by cooling. (p.11)

POV1: [S0] (TRUE [This warming…reduced by cooling])

POV2:[S] ([POV1] IS PARTLY).

4-4 CC discourse: Knowledge claims

Being scientific reports and assessments, IPCC documents communicate (un)certainties in a clearly coherent manner. Accordingly, three scales are presented: the likelihood scale, the confidence scale and the agreement scale. These scales assess the frequency of occurrences of propositions and claims (https://archive.ipcc.ch/pdf/IAC_report/IAC%20Report.pdf). Negotiating certainties, uncertainties, and likelihood pertaining to scientific claims in an adequate manner aids to convince the message recipient of the content negotiated. So, actions directed against CC may be accepted; CC skeptics may be convinced. The following tables demonstrate the scalar distribution and the number of occurrences of knowledge postulates. All assessed claims in SPM are presented in the following tables:

Table (3): The Likelihood scale

Terminology	Likelihood of occurrence
Virtually certain	8
Extremely likely	3
Very Likely	17
Likely	25
More likely than not	4
About as likely as not	-
Unlikely	1
Very unlikely	1
Extremely unlikely	2
Exceptionally unlikely	-

Table (4): The Confidence scale

Confidence in the Correctness of a Claim	Frequency
Very high confidence	10
High confidence	86
Medium confidence	45
Low confidence	4
Very low confidence	-

Table (5): The Agreement scale

High agreement-limited evidence	-
Low agreement-Limited evidence	-
High agreement-much evidence	-
Low agreement-much evidence	-

According to the aforementioned tables, the majority of SPM claims are situated in the high end of the scales. As for the outcomes, it is either very likely or likely that the mentioned consequences happen. The Confidence scale presents a high confidence of the presented claims.

The agreement scale does not appear in SPM. Its absence in the text may be compensated by the high representation of confidence and likelihood of the propositional content. Hence, the claims in the SPM guide the discursive discussions and debates in IPCC towards common consent. Based on the aforementioned tables, SPM is prepared by scientific authors who direct their audience towards high confidence claims.

4-5 Micro-structure analysis of COVID-19 discourse: SRs

On its website, WHO declares that Weekly Epidemiological Updates (WEU) and Weekly Operational Updates (WOU) are released so that COVID-19 and its variants may globally be pursued. *Two WEUs and two WOUs are published from 1 March to 8 March 2022.*

4-5-1 WOU on COVID-19: 1 March 2022

Three instances of direct quotations from identified sources are detected. Implicit polyphony is seldom employed in WOU discourse. This may go back to the nature of WOU, that it does not focus on presenting POVs or arguments; rather, it reports on WHO's anti-COVID-19 measures.

4-5-2 WEU on COVID-19: 1 March 2022

This research considers "however" a conjunction entailing implicit polyphony, like that of "but". Three examples of polyphonic "however" are detected:

1) Since the beginning of January 2022, the African Region has continued to report a decreasing trend…However, eight countries in the Region (16%) reported an increase of over 20% in cases. (p.7)

POV1: the African Region has continued to report a decreasing trend

POV2:POV1 is an argument in favor of the conclusion r

POV3: eight countries in the Region (16%) reported an increase of over 20% in cases.

POV4: POV3 is an argument in favor of the conclusion non- r

The SR author accepts that there is a decreasing trend of COVID-19 cases

in Africa, which orients discourse communication towards the conclusion that there is no need to exert more procedures fighting the pandemic. The conjunction "however" intensifies the claim that eight African countries still report an increase in cases, which implies the internal voice that there is a need to continue the preemptive procedures and vaccination in order to stop the disease.

So, some voice considers a decrease in COVID-19 cases, while the SR author's voice views an increase in the cases. This directs discourse towards the proposition with which the SR author is identified: there is an increase in COVID-19 cases. This increase results in the conclusion that WHO should exert more efforts facing the epidemic.

4-5-3 COVID-19 WOU: 8 March 2022

WOU manifests five examples of explicit polyphony via direct quotes about the cooperative efforts confronting the pandemic. As for implicit polyphony, seven examples are detected via using "in addition to", "would", "could", "not", "that-clause", "yet" and "likely":

- In addition to public education, the teams would announce the location and dates where the community could access the vaccination. (p.4)

"In addition to" entails two POVs:

POV1: [S0] (TRUE [the teams would announce the location…])

POV2: [S] (PUBLIC EDUCATION IS IN ADDITION TO [POV1])

"Could" and "would" are also polyphonic as they express a mitigated POV pertaining to the author.

Consider the following example:

- …data suggests that people with pre-existing mental disorders do not appear to be disproportionately vulnerable to COVID-19 infection. Yet, when these people do become infected, they are more likely to suffer hospitalization. (p.7)

"that-clause" and "likely" imply polyphony. "Yet" is a new item added by this research to the taxonomy of polyphonic items. Entailing four POVs, "Yet" evokes four POVs like that of "but".The dominant POV in the previous SR is interested in anti-COVID-19 collaborative work, which is appropriate to the WOU target.

4-5-4 COVID-19 WEU: 8 March 2022

-Omicron still has a growth rate advantage over Delta…However, evidence for a reduced generation time of Omicron suggests the transmission advantage may be lower" (p.6)

Via "however", the above example entails four POVs: the author accepts someone else's voice that Omicron has a growing rate over Delta, which orients discussion towards the conclusion r that Omicron is far more dangerous than Delta and there must be new methods to slow its outbreak. This conclusion is denied when the author reports his voice that Omicron transmission may be lower, which orients the argument towards the viewpoint that there is no need to worry about Omicron.

As for negation, three examples of negation are detected, each entails two POVs. The first pertains to an unidentified source; the second concerns the author:

- There is no recent evidence on the impact of Omicron. (p.7)

POV1: [S0] (VALID [There is recent evidence on the impact of Omicron])

POV2:[S] (INVALID [POV1])

The author's POV is that Omicron is not dangerous, which motivates WHO to be more concerned with COVID-19.

This epistemic modal "may be" appears twice with an implicit voice presupposing probability.

This research consider "although" to be a contrastive connective triggering polyphony, though it is not mentioned in ScaPoLine taxonomy. "Although" generates four POVs, parallel to "but":

-Although a declining trend in the number of cases was reported regionally, Bhutan reported a 23% increase as compared to the previous week. (p.15)

POV1: a declining trend in the number of cases was reported regionally

POV2: POV1 is an argument in favor of the conclusion r (no more efforts)

POV3: Bhutan reported a 23% increase as compared to the previous week

POV4:POV3 is an argument in favor of the conclusion non-r

WEU's author regards COVID-19 to be more dangerous than Omicron; therefore, more preemptive measures are recommended. This encourages WHO to take more anti-virus procedures.

5. Discussion:

Polyphony means that the author considers other's viewpoints and positions, either explicitly or implicitly. A multitude of opinions and voices is a natural feature of political discourse (Fløttum 2010b; Fløttum and Stenvoll 2009), but what about academic/scientific discourse? Fløttum, Dahl and Kinn (2006) consider academic/scientific discourse to be polyphonic. For this reason this paper attempts to investigate polyphony in scientific discourse.

Depending on the context, ScaPoLine interprets individual linguistic items. The theory, in accordance, bridges the gap between individual discourse components and the wider context of situation. SPM is based on many POVs, arguments and discussions, that is why it should be written in a manner that reflects them. Implicit voices are not accurately identified, but it is known that they pertain to a variety of scientists other than that of the textual speaker. Although many scientists are responsible for SPM, one theme seems to cover the majority of SPM sentences. "Human-Induced Climate Change" is thought to be the dominant theme in SPM. This, in turn, encourages the efforts to take action against CC.

Implicit polyphonic constructions prove to be abundant in CC discourse. It is noticed that SPM has no single instance of external polyphony, as no instances of citations or reported speech are detected. This may go back to the nature of SPM scientific discourse which favors the neutral and unidentified presentation of the non-present voices rather than directly referring to them. Instead of direct references to the source of information, SPM authors evaluate the evidence and cases of uncertainties via formal guidance communicating the knowledge claim assessments. IPCC

guidance presents degrees of confidence and likelihood in the conclusions. It is evidenced that SPM propositions are endowed with high confidence and likelihood, which signifies the integrity of SPM content.

The analysis section presents some polyphonic constructions that are discovered by the current study, as they are not mentioned by ScaPoLine polyphonists. As regards CC discourse, the following polyphonic structures are unique for this study: "likely" as an adjective or an adverb, "unusual" as an adjective, "extremely unlikely" as an adjective, "very unlikely" as an adverb, "partly" as an adverb and "MPP". The use of "likely" shows the highest frequency as a scalar distribution in CC discourse. This conforms to the skeptical nature of scientific information.

It is noticed that that-clause constructions manifest the highest frequency regarding their representation in SPM. SPM authors favor that-clause structures so that they may be able to explain and illustrate the proposed content in a convincing manner. MPPs come next as to the number of occurrences, which reflects the authors' inclination towards clarifying their propositions. This harmonizes with that-clause preference so that the expository nature of SPM may be confirmed.

P-structures triggered by "but", "not/no", "extremely unlikely", and "very unlikely" (Total 13 Occurrences) offer S-S0 contrastive POVs regarding climate measures. Modals (13 Occurrences) minimize the threat posed by S0's POV, but reflect congruent POVs. The rest of p-structures (42 Examples) reflect S-S0 agreement to stimulate anti-climate actions and blame man for CC. P-structures encoded in "but" and "very unlikely" (Total 9 Examples) discourage climate action and consider man irresponsible of CC. Modals reduce the force of the content without a contrast. The remnant

structures (46 Examples) clearly blame humans for CC. Consider the following table:

Table (6): P-Structure Distribution

Target of P- structure	Number of Occurrences
All P-structures	68
S-S0 Contrastive POVs	13
S-S0 Congruence	55
P-structures Discouraging Climate Action	9
P-structures Mitigating Climate Action	13
P-structures Encouraging Climate Action	46

CC-encoded P-structures orient argumentation towards POV considering man to be responsible for CC. Polyphonic structures generally motivate anti-CC actions. Although "but" and "very unlikely" impede climate action, this should not be taken as a sign of contradiction because SPM is prepared by diverse authors. Scalar ranking of scientific claims prompts the trustworthiness of the outcomes. Since the data present man's harmful effects as being reliable and agreed upon, policymakers are encouraged to issue laws against human's negative behaviors.

Assessment of knowledge claims in CC discourse results in SPM directing argumentation towards a consensus that the data presented enjoys confidence and, accordingly, it should be dependable. Being the dominant

theme in SPM, man-induced climate change is endowed with a high degree of credibility. This induces policymakers to take actions and issue policies that may lessen the effects of man on CC. Hence, the relationship between science-based SPM, discourse analysis and politics becomes evident.

The overview of SPM's macro-structure indicates that it a scientific document undertaken by researchers and scientists. As negotiated by its subtitle, the document is addressed to policymakers. The resulting genre is a scientific text observing rules of academic articles, but addresses decision makers. This brings science, policy and language in one crucible.

SRs are the principal device by which WHO reports and measures its reaction towards the pandemic. SRs update the epidemic status and WHO's collaborative efforts with other organizations and figures so that the disease outbreak may be controlled. Accordingly, WHO releases two types of SRs: the epidemiological and the operational. Analysis of COVID-19 SRs presents explicit polyphony in WOUs, as eight examples of direct citation from identified sources are included in the documents. WOUs are expected to manifest citations because these WOUs report WHO's collaboration with others to face the virus. WEUs do not show explicit polyphony, as these reports are concerned with the data concerning the pandemic, its cases and deaths.

Both WEUs and WOUs employ few cases of polyphony, though WEUs have more internal polyphonic examples. This signals that SRs are written by more than one author. These background authors become visible when polyphonic discourses are interpreted. The following table summarizes SRs cases of polyphony:

Table (7): SRs polyphonic cases

WEUs	WOUs
Number of pages:23+14=37	Number of pages 14+13=27
-:Explicit polyphony	Explicit polyphony: 8 examples
Implicit polyphony:12 examples	Implicit polyphony:7 examples

SPM contains 35 pages, which makes it of nearly equal size as WEUs and a little bit longer than WOUs. In spite of that, SPM is filled with many instances of polyphony, the implicit type. This means that a vast plurality of authors are behind SPM and, consequently, their voices should be present. Though there is no single instance of the plural pronoun "we", the plentiful employment of polyphony compensates the non-present voices for their absence. SPM does not show instances of direct citations, as it seems that SPM authors find it more objective to express the scientific data neutrally without personal references.

It is noticed that SRs lack the form of scholarly papers. They also have no knowledge claims. SRs are written like an expository essay. Newly-discovered polyphonic items are significant in this research. SRs are considered to utilize polyphonic discourse items as: "however", "although", "likely", "yet" and "MPPs". These items are not part of the Scandinavian polyphonists' taxonomy. It is noticed that p-structures are few in SRs. It seems that this scientific genre is not written by numerous authors. "But", "although", "no" and "yet" offer contrastive POVs. The dominant one considers the increase in cases and that Omicron is less dangerous than COVID-19. This encourages decision-makers to exert more effort and issuing laws that may confront coronavirus.

The current paper undertakes a controversial issue in sociology, which is integrating macro- and micro-levels of analysis (Turner 2005, 405). Turner considers micro- and macro- to be abstract labels employed in the identification of reality (2005, 409-410). He considers the social universe to be operating at macro, meso and micro levels which capture "the most fundamental properties of the social universe" (409). Each level of the social universe is managed by social forces.

Macro-level forces include the composition and the distribution of people. Meso-level forces refer to the ordering of relations among individuals. Micro-level forces entail roles of individuals, their density, movements and courses of action (410).Taking Turner's approach as a starting point, this article considers a text to be a social universe with its variables. The macro-level in discourse is considered to signal the organization of the whole document, its overall structure. The meso- and micro-levels are combined to refer to the linguistic components at the sentential level and the functions of their choices.

The study is original in the sense that it discovers newly-used polyphonic markers and incorporates sociology, via the notion of macro-structure, and linguistics, via discourse polyphony.

6. Conclusion:

SPM/AR6 and SRs report the agreed propositions on two critical issues affecting all humans: CC and COVID-19 respectively. SPM and SRs depend on scientific authors accredited by IPCC and WHO. SPM and SRs are concerned with purely scientific data.Yet, CC and COVID-19 discourse practices are proven to be distinct.

SPM authors observe the rules required for academic writing. That is why SPM has numbered sections and subsections in an arrangement reminder of research papers. SRs, on the contrary, do not present a form of academic articles. Instead, they resemble expository essays with a major heading and its subheadings.

SPM authors demonstrate their presence via implicit polyphony. Conversely, SRs authors demonstrate their presence via fewer examples of explicit and implicit polyphony.

SPM authors do not employ citations to acknowledge the source of information. Contrariwise, SRs authors cite and identify the source. SPM assesses knowledge claims accurately and endows propositions with a scalar evaluation. This method renders SPM more accurate and credible. SRs do not employ any assessment of the content. Accordingly, SPM and SRs differ in both form and content: the macro- and the micro-structure.

Analysis discovers new discourse components that have a polyphonic interpretation and that have not been included in the Scandinivian taxonomy. Macro-structural discourse analysis uncovers the uncontaminated scientific scholarly article-like SPM, and the essay-like SRs. Micro-structural analysis presents SRs's habit of employing explicit polyphony, and SPM's abstaining from it.

Finally, this research incorporates sociology, discourse analysis and linguistic polyphony to confirm the polyphonic nature of scientific discourse and the distinctive universes pertaining to SPM and SRs with the resulting diverse macro-structures.

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الهياكل النصية ومتعددة الأصوات في تغير المناخ وخطابات كوفيد-19: التحليل اللغوي الكلي والجزئي

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ملخص البحث:

بنية النص والتراكيب متعددة الأصوات في خطابَيْ تغير المناخ وكورونا: تحليل لغوي كلي وجزئي

تهدف الهيئة الدولية المعنية بتغير المناخ إلى تقديم مادة علمية إلى صانعي السياسات والجمهور؛ حتى يتمكنوا من الاستجابة لتغير المناخ المتزايد الذي يسببه الإنسان، ومن ثم تصدر تلك الهيئة تقارير وملخصات وتقييمات علمية لتحدد أحدث المعلومات عن تغير المناخ. وقد أعلنت منظمة الصحة العالمية أنّ وباء كورونا هو جائحة عالمية، وبناء على ذلك فهي تصدر تقارير حالة حول الجائحة، ولكون الملخصات التي تصدرها الهيئة الدولية لتغير المناخ وتقارير الحالة التابعة لمنظمة الصحة العالمية وثائق علمية حول قضيتين عالميتين رئيستين فإنّ تلك الوثائق موضع هذا البحث لغويًّا. ولتقديم تحليل شامل فإنّ السمات الكلية والجزئية للنص يتم فحصها، ومن هنا فإنّ الإطار التحليلي ثنائي الأبعاد؛ فتحليل السمات الكلية للنص مستوحى من «فان دايك» أما التحليل الجزئي فهو يرتكز على نظرية الأصوات المتعددة. وأوضحت النتائج الاختلافات بين الوثيقتين، واكتشفت الدراسة العديد من العناصر اللغوية التي تتضمن أصواتًا متعددة، وتخلص الدراسة إلى أن خطابَيْ تغير المناخ وكورونا يعتمدان على وجود أصوات خلفية متعددة تظهر بوضوح جلي في خطاب تغير المناخ؛ فإذا كان العلم قد جعل من تغير المناخ وكورونا قضايا عالمية فإن هذه الورقة البحثية تعتبرهما قضايا لغوية

الكلمات الدالة: خطاب تغير المناخ ،خطاب كورونا، بنية النص الكلية، بنية النص الجزئية، الأصوات المتعددة

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