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Reflexive Metadiscourse and Reading Linguistics, Economics and Chemistry Research Articles by Tunisian Doctoral Students

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Abstract

The present study sets out to address a critical academic feature necessary to understand research articles (RAs) through investigating foreign language (FL) Tunisian doctoral students' awareness of the kind of relationship between text, writer, and readership in English research articles across three distinct disciplines: Linguistics, Economics, and Chemistry. The study focuses on how this awareness is shown in lexico-grammatical choices and analyzed through Ädel's (2006) model of metadiscourse. The study investigates the relationship between the participants' awareness of the reflexive metadiscursive units and subject-matter knowledge, reading strategies, and language proficiency. These three elements constitute the basics of learning foreign languages and analyzing their connections to metadiscourse can lead to developing a deeper grasp of the pre-requisite conditions for comprehension. Their analysis would yield useful insights on the most appropriate ways of teaching academic reading/writing to university students, raise their motivation for learning and help them acquire the required skills that allow them to become members in full standing of their respective academic communities.

Keywords: metadiscourse, reading comprehension, research articles, academic community.

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Introduction

The increasing demand for reading empirical research articles at university has been quite challenging for native as well as non-native speakers. Despite the overwhelming availability of information via printed or electronic texts, the challenge remains. Through the medium of the English language, students find it necessary to acquire the necessary linguistic skills that allow them to explore and keep up to date with the novelties in their respective domains. Thus, students must develop the necessary linguistic, generic and academic reading and writing skills.

Hyland and Lyons (2002) define English for academic purposes as "language research and instruction that focuses on the specific communicative needs and practices of particular groups in academic contexts" (p. 2). The purposes for which writers generally construct texts help them shape their writings in conventional ways, while learners generally need to be acquainted with these functions and features. EAP emerged as a branch of English for Specific Purposes (ESP) that aimed to teach English and focus solely on academic contexts (Flowerdew & Peacock, 2001; Hyland & Lyons, 2002).

EAP theory stresses that reading and writing are shaped by a series of imposed steps and moves, on the one hand, and by the pre-requisites of each specific domain on the other. One of these exigencies consists of the structural and metadiscursive signals writers use to guide their readers.

Metadiscourse theory has taken two different directions: a broad approach and a narrow one. Several scholars adopted the broad approach (Camiciottoli, 2003; Crismore & Farnsworth, 1989; Crismore & Vande Kopple, 1997; Haas & Flower, 1986; Hyland, 2005; Jalilifar & Alipour, 2007; Vande Kopple, 1985). Their studies focused on the necessity of paying attention to the overall rhetorical (textual) structure of texts, on the one hand, and on the ways writers express themselves and address their readers (interpersonal), on the other. This broad approach also highlights that metadiscursive units represent the ways writers perceive the world and mirror the writers' attempts at persuading their readers.

Some theorists contested the distinction made between the textual and interpersonal dimensions (Ädel, 2006; Mauranen, 1993; Toumi, 2012) and favored a narrow approach to metadiscourse that focuses on the textual signals and excludes instances where the authors reflect upon the real world or mirror their personal views. They considered them as non-reflexive since they deal with issues outside the ongoing discourse. Although this approach seems to be minimalistic and restrictive in the sense that it excludes key fundamental factors influencing the comprehension process, its value lies in the classification of metadiscursive textual elements and the reproduction of other similar texts. This approach, which was led by several theorists (Backlund, 1998; Bunton, 1999; Dahl, 2004; Mauranen, 1993; Valero-Garcés, 1996) also helped in clearing up the possible overlap between the depiction of the ongoing text, the extraneous description of the real world and the author's viewpoints.

Adopting the reflexive approach to metadiscourse was restricted to studies which compared written corpora across languages and disciplines (Ädel, 2006; Dahl, 2004; Salas, 2015; Toumi, 2012; Valero-Gracés, 1996) while the relationship between reflexive metadiscourse and reading comprehension remains under-researched.

To bridge this gap, the present study seeks to probe the relationship between reflexive metadiscourse and reading strategies, language knowledge, and subject-matter knowledge to conceptualize the place of metadiscourse within the wide-ranging and complex mechanism of reading. The study at hand also considers the impact of the reader's perception of the world and the general knowledge and exigencies of discourse communities in the production and comprehension of texts. It approaches these elements not from a metadiscursive standpoint but from the demands of the socio-cognitive perspective to reading comprehension revisited under Kintsch's (1998) construction-integration theory. The present study aims at answering two questions:

1- What is the correlation between reflexive metadiscourse awareness and reading strategies, subject knowledge and language proficiency across three disciplines?

2- In what ways can reflexive metadiscourse awareness lead to a successful understanding of research articles?

Literature Review

This section presents an overview of the theoretical principles and studies related to reflexive metadiscourse and reading comprehension. The first part of this section discusses reading comprehension theory, and the main processes involved in the interpretation and understanding of texts. The discussion paves the ground for pointing out the specificity of reading for academic purposes. Two branches of metadiscourse, namely reflexive metadiscourse and non-reflexive metadiscourse, are investigated, and then a narrow approach is adopted.

Reading Comprehension

Reading research centers on several approaches that serve to guide readers to the best ways of processing texts. Bottom-up, top-down, and interactive approaches led mainly by (Carrell & Eisterhold, 1988; Grabe, 1991; Van Dijk & Kintsch, 1983) are considered the most important ones. The bottom-up approach tries to highlight how reading starts from processing single and tiny units such as graphemes up to larger 'chunks' such as lexical, syntactic and discoursal units to construct an enriched understanding of texts. The other way (top-down) stresses the need to evoke a general conceptualization of texts or 'schema' and then go down to check how this imposed schema can be validated or rejected by the single units constructing texts.

These two approaches have been criticized by some theorists (Carrell & Eisterhold, 1988; Eskey & Grabe, 1988) who proposed that reading should rather be

perceived as an interaction between the two levels, top-down and bottom-up, to account for the 'flexibility' and richness of the reading process. Although Kintsch (1998) hailed this step as a significant departure from traditional theories of reading, he thought that there was still a need to revisit reading comprehension and its major components such as schema framework from a broader perspective. This approach, according to him, should account for the social dimension related to the thinking process of the reader, which cannot be isolated from the mechanical deciphering of lexical and syntactic units.

In his groundbreaking book, Kintsch (1998) revisits the primary findings discussed in an earlier book co-authored by Van Dijk and Kintsch (1983) and builds up a more grounded theory of reading that addresses the limitations pointed out in the top-down and bottom-up theories. The model distinguishes between two essential and subsequent stages: construction and integration.

During the first stage (construction), comprehension is characterized by a 'chaotic' and unorganized classification of knowledge and a disorderly connection between mental nodes. At this phase, "mental representations are formed by weak production rules that yield disorderly, redundant and even contradictory output" (p. 94).

Contrary to the schema theoretic view of reading comprehension, in which the mind is assumed to block the formation of contradictory, redundant or wrong constructions right from the outset, "the production rules in the construction-

integration theory are weak and dumb and do not discriminate what is contextually appropriate from what is not" (Kintsch, 1998, p. 95).

This stage is followed by a subsequent phase (integration) that allows readers to swiftly and gradually establish semantic relationships between the newly processed relationships and similar concepts evoked from one's background knowledge of similar other texts or personal social experiences. This phase 'sifts' the read input based on contextual relevance and allows the reader to establish a robust network between the processed ideas and excludes the ones that prove to be contextually irrelevant.

The description of the interwoven variables and processes that constitute the reading process is still a necessary but not sufficient condition for understanding how readers appropriately comprehend texts. Written discourse in its multiple forms has often been categorized as a generic sample that represents the social and discoursal community's exigencies. The relationship of ownership and imposition between the members of discourse communities and written texts has been widely discussed within genre studies and was pioneered mainly by (Bazerman, 2012; Bhatia, 2004; Swales, 1990), who worked on delimiting the position of texts within an often-changing social environment.

Academic reading has also been the center of focus of many theorists who tried to highlight the importance of raising awareness to the specific moves and strategies of academic texts. Daoud (1991) for instance, analyzed non-native speakers' comprehension of English for Science and Technology (EST) texts in Arabic and

French. The study found that participants struggled with the rhetorical structure of the texts due to a lack of attention to metatextual features. Labassi (2009) trained chemistry students in quick reading strategies to identify important research articles, leading to enhanced metaknowledge of reading strategies. Dhieb-Henia (2003) also emphasized the importance of metaknowledge strategy training in reading scientific research articles for Biology students to understand the texts' rhetorical and generic structure.

English for Academic Purposes (EAP) theory emphasizes the importance of structural signals in guiding readers through texts, allowing for easier comprehension and production. EAP, which is the offshoot of English for Specific Purposes (ESP), tried through the works of key figures such as (Dudley-Evans, 1994; Hyland, 2004; Swales, 1990) to introduce the practical steps and moves that are often followed in the production of similar academic research papers. The differences between hard and soft sciences were often regarded as delimiting factors when regulating how such moves and steps figure out in scientific papers.

Among the academic features addressed across areas of specialization are the metadiscursive units that aim basically at guiding readers through text and helping them interact with readers. The role of these signals or metadiscursive features in the processing and production of texts is elaborated in the following section.

Metadiscourse

Harris introduced the term "metadiscourse" in 1959 to describe how writers or speakers help navigate their audience. Williams later incorporated it in his 1981 book, using it to refer to "writing about writing." Since then, the concept has gained traction in applied linguistics, becoming a focal point for various researchers examining it from multiple viewpoints.

The Broad (Non-Integrative) Approach

Hyland and Tse (2004) identify three main guiding principles for the definition of metadiscourse:

a) Metadiscourse is distinct from propositional discourse

The first principle anchoring the broad approach is the division generally made between two principal layers: the metadiscoursal and the propositional. Although Hyland and Tse (2004) highlighted the vagueness of the term proposition, they tried to outline the defining features that help to delimit the concept by suggesting that propositional material is “something that can be argued about, affirmed, denied, doubted, insisted upon, qualified, tempered, regretted, and so on” (p. 160)

b) Stance

Stance constitutes a major concept within the broad approach. It can be defined as the expression of “personal feelings, attitudes, value judgment, or assessments”

(Biber et al., 1999, p. 966). The concept entails the adoption of a personal view regarding the propositional content.

c) Writer-reader interaction

The third principle underpinning the broad approach to metadiscourse highlights the interaction between writer and reader. Hyland and Tse (2004) think that "all metadiscourse is interpersonal in that it takes account of the reader's knowledge, textual experiences, and processing needs, and that it provides readers with an armory of rhetorical appeals to achieve this" (p. 161).

The Narrow (Integrative) Approach to Metadiscourse

The second approach to metadiscourse, named the narrow or integrative approach, aims to revisit some of the critical features of metadiscourse and focuses on the textual elements that help in building up the cohesion and coherence of texts. Ädel (2006) questioned the feasibility of considering metadiscourse as the elements that do not add to propositional content by pointing to the looseness of the definition of proposition put forward by Halliday (1994) and reiterated by Hyland and Tse (2004).

Ädel (2006) explains that an example such as "*I have discussed X and Y in chapter 4*" must be considered as propositional since it can be refuted, affirmed, or contradicted. As a result, words such as "I" and "in chapter 4" are not necessarily metadiscursive.

To disentangle this proposition-metadiscourse relationship dilemma, Ädel (2006) proposed to define metadiscourse as a commentary on the running text and as the elements that are separate from the 'subject matter' of texts in order to avoid the truth-conditional criterion.

> I proposed that, if we really want to do away with defining metadiscourse in terms of truth-conditional semantics, we should not equate it with non-propositional or non-ideational material, but instead conceptualize it as a (fuzzy) discourse phenomenon, which, to some extent, can stand in juxtaposition to the text's content or subject matter. (Ädel, 2006, p. 186)

Ädel's Model of Reflexive Metadiscourse

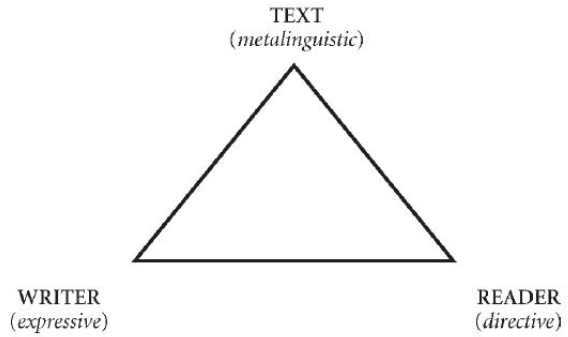
Sharing similar features with Mauranen's (1993), Ädel (2006) proposed a model of reflexive metadiscourse that finds its roots in Jakobson's (1980) typology of the functions of language. These are: metalinguistic where focus is on code or text, expressive where focus is on addresser, conative or directive where focus is on addressee, referential where focus is on context, poetic where focus is on message, and phatic where focus is on contact.

However, only three of these functions are taken up in metadiscourse expressions, namely, the metalinguistic, the expressive, and the directive (Ädel, 2006). "Their corresponding foci, or so-called 'components of the speech event', are the *text*/*code*, the *writer* and the *reader."* (Ädel, 2006, p.17).

Accordingly, validity, attitude markers, and reference to other narrators qualify as non-reflexive because they refer to the internal state of mind of the author or other writers outside the text.

Figure 1

The Reflexive Triangle. Adopted from Ädel (2006, p. 18)



- The *text* (or code) component involves linguistic material that refers to or focuses on the current text *as text*, or the discourse taking place in it. For example, the words used in the text, parts of the text (pages, sections, chapters), or the entire text (essay, article, leaflet).
- The *writer* component is expressed by linguistic material that focuses on the current writer *qua* writer.
- The *reader* component is "expressed by linguistic material that explicitly refers to or addresses the reader in his role as reader" (Ädel, 2006, p. 18-19).

Ädel (2006) makes a distinction between two main categories: *metatext* and *writer-reader interactions*. Metatext is the linguistic material used to guide the reader through the text and to comment on the use of language. The focus is on the structure, discourse actions, and wording of the text. For example: *in this essay; . . . will be discussed, in the following: see page 16; to conclude; strictly speaking; I will summarize . . .; in* brief....

The writer-reader interaction manifests itself in the ways writers interact with their imagined readers to help them achieve a proper understanding or anticipate their reactions. For example: *You will probably think that . . .; Does this sound . . . to you? Correct me if I'm wrong, but . . .; as you will see; dear reader*.

Within each category, there is a distinction between personal and impersonal reflexive metadiscursive elements. Personal metadiscourse refers to the writer or reader of the current text through the explicit use of *I, we, our* or nouns such as *the writer* or *reader*. For example, *as I have shown, as you have seen in our discussion above, as a writer, I would like to argue, the reader might think that*. Impersonal metadiscourse refers to an implicit self-presentation through the passive form or some non-finite verb forms like (*to sum up, as stated clearly).*

Methodology

Participants

The selected participants form a group of 90 Tunisian doctoral students. Thirty participants from each of the three areas of specialization, namely Linguistics, Economics, and Chemistry, were purposefully selected. Initially, a total of 100 students were handed a background questionnaire to select the sample matching the purpose of the study. Only 90 participants met the following selection criteria:

1. Doctoral students of Linguistics, Economics, and Chemistry.

2. They are in the process of reading research articles related to their Ph.D. research theses.

Corpora

The research article was chosen as a genre for the study at hand. It is considered as an authentic representation of academic discourse that generally embeds highly contested issues allowing negotiation and criticism. Research articles have been thoroughly studied in genre theory and have been allotted more attention than other genres due to their importance in academia.

The three articles selected for this study cover three main areas: Chemistry, Economics, and Linguistics. These disciplines were chosen on account of the observation made by some authors (e.g. Silver, 2003) that they are representative of the three main branches of science: humanities, social sciences, and natural sciences (Salas, 2015). It is expected that the differences between these three domains entail variation in the proportion and distribution of metadiscursive units, and this is an area of research well worth exploring and investigating.

Two selection criteria for choosing the articles were applied: length and relevance. Since long articles need more time and effort to process, the researcher chose short articles, (1,880 words, 1,668 and 3,111 respectively). This choice of short articles was made to encourage the participants to complete their reading of the articles relatively quickly and efficiently.

As for the second criterion, all three articles are representatives of the three respective areas of specialization (Linguistics, Economics, and Chemistry) and they deal with general and familiar topics in the three domains.

The Economics and Chemistry articles followed the same rhetorical structure: Introduction, Methods, Results, and Discussion (IMRD). In the Linguistics article, the Methods and Results were named Methodology and Outcomes respectively, and a section titled 'The research focus' followed the Introduction section.

The First article (A1) is titled: Reading Titles of Empirical Research Articles. It was published in 2009 in *The Reading Matrix*: an indexed international electronic journal. The study reports on how postgraduate university students of Chemistry were taught to read titles of empirical RAs. The purpose of the module taught and reported on in the article was to help students gain awareness of the importance of expeditious reading and use this strategy to scan academic journals quickly and to select appropriate and relevant research papers easily. The writer of the article, a well-known Tunisian university professor of Linguistics, taught the module.

The second article is titled: Tax Incentive and Foreign Direct Investment in China. It was published in 2018 in *Applied Economics Letters*, a well-known and indexed journal with an impact factor of 0.50 in 2017. This article compares the variables that led to the termination of tax incentives before China's economic reform of 2008. The article fits within the general area of specialization of all the Economics participants as it deals with general economic issues and concepts.

The third article is in Chemistry and is titled: Non-enzymic Browning during Storage of White Hard Grape Pekmez. The article was published in 2003 in *Food Chemistry,* a well-known journal with an impact factor of 3.39 in 2018. The article investigates the impact of the storage period on some of the chemical components of a Turkish product. The article is deemed simple and easy by most of the participants.

Instruments

The study used qualitative and quantitative data collection instruments to assess the participants' awareness of reflexive metadiscourse units in their reading of the research articles. Two qualitative instruments were used: a pre-reading questionnaire and a post-reading semi-structured interview. These two instruments aimed to provide the researcher with the necessary background information about the participants' demographic information, reading, and writing habits, as well as the difficulties they faced while reading the research paper at hand.

The quantitative instruments consisted of (1) a Test of English as a Foreign Language (TOEFL) to measure the participants' language proficiency, (2) a Survey of Reading Strategies (SORS) to count the number of reading strategies generally employed, (3) a subject-matter knowledge test to evaluate the participant's proficiency in their respective areas of specialization and (4) a think-aloud protocol to help the analyst count the number of recalled metadiscursive units. This method served also to thematically and qualitatively categorize the types of reading strategies employed during the reading stage.

Table 1.

Summary of the Research Instruments

I. Pre-reading stage	
- A background questionnaire	The aim is to assess the participants' linguistic and educational backgrounds, along with their reading and writing behaviors and the difficulties generally encountered.
- Test of English as a Foreign Language (TOEFL)	The aim is to evaluate the participants' linguistic and academic reading level.
- Subject-specific knowledge test	The purpose is to measure the participants' knowledge of their specific areas of specialization.
- Survey of Reading Strategies (SORS)	The purpose is to evaluate the most frequent reading strategies participants generally employ.
II. Post-reading stage	
- A semi-structured interview	It is used to help the participants express their thoughts on the article's difficulty, its relevance, and the strategies employed.
- Think-aloud protocols	The aim is to help in the counting process of the recalled metadiscursive and idea units along with qualitatively analyzing the reading strategies employed during the reading stage.

Analysis

The study at hand opted for two types of analyses: quantitative and qualitative. The primary reason for this decision was the nature of the research instruments used in

this study. Four primary sources of data were quantitatively analyzed: SORS, TOEFL, the recalled metadiscursive units, and the subject knowledge test. Since it was difficult to achieve an accurate assessment of these different instruments, a series of qualitative analytical tools were resorted to. These included the post-reading semi-structured interviews, the think-aloud protocols and the questionnaire.

Quantitative Analysis

First, to count the number of the reflexive metadiscursive units found across the three articles, the researcher opted for the corpus analysis toolkit for concordancing and text analysis: Antconc (version: 3.5.8.). The three analyzed articles were converted from word to txt-format and entered into the software. The search terms included the three following initials: MX/, /WO/, /RO/. These three initials refer to the metatextual, writer-oriented and reader-oriented metadiscursive units used in the analysis of the articles. At a later stage, the articles' subsections were cut and pasted on separate txt files and entered again into the software to count the frequency of the metadiscursive units across each article's sub-section.

Reflexive Metadiscourse Taxonomy and Coding Scheme

The study was based on a taxonomy developed in Mauranen (1993) and Adel (2006) and adopted by Toumi (2012). A total number of 42 forms of reflexive metadiscursive units were identified. Each unit was given a respective code. The coding scheme was used for the segmentation and coding of the articles, and then in the identification of

the reflexive metadiscursive units readers recalled during the reporting phase. The following table represents the coding scheme used for this study.

Table 2.

The Coding Scheme for Reflexive Metadiscourse Analysis

Forms and categories of reflexive metadiscursive units	**Code**
I. Metatext	
Reference of high explicitness	
1. reference to the whole text 2. reference to part of the text 3. adverbs of time 4. Adverbs of place	a. MX/RHE/REFW b. MX/RHE/REFAR c. MX/RHE/ADVTIME d. MX/RHE/ADBPLACE
Discourse labels: 1. Illocutionary verbs 2. Verbs+adverbs 3. Manner 4. Nouns 5. Illocutionary but reflexive in context	a. MX/RHE/ILLOCU b. MX/RHE/VERADV c MX/RHE/MANN d.MX/RHE/NOUN e. MX/RHE/ILLCONT
Phoric markers 1. Topic shifts 2. Preview 3. Review 4. Overview	a. MX/RHE/TOPSHIF b. MX/RHE/PREV c. MX/RHE/REV d. MX/RHE/OVERV
Reference of low explicitness	
Internal connectors 1. Contrast 2. Sequence 3. Addition 4. Generalizing	a. MX/RLE/CONTR b. MX/RLE/SEQU c. MX/RLE/ADD d. MX/RLE/GENER
Discourse labels 1. Verbs 2. Nouns	a. MX/RLE/VERB b. MX/RLE/NOUN

Ambiguous reference to the text 1. Reference to the whole text 2. Ambiguous adverb of time 3. Ambiguous adverb of place ***4.*** enumeration of steps	 a. MX/RLE/REFW b. MX/RLE/ADVTIME c. MX/RLE/ADVPLACE d. MX/RLE/ENUM
Code glosses 1. Rephrasing 2. Explaining 3. Elaborating 4. Exemplifying	 a. MX/RLE/REPH b. MX/RLE/EXPL c. MX/RLE/ELABO d. MX/RLE/EXEM
II. **Reader-oriented**	
Reflexivity of high explicitness	
1. Addressing the reader directly 2. 2nd Person pronouns 3. Noun 4. Imperative	a. RO/RHE/ADDR.DIREC b. RO/RHE/PRON c. RO/RHE/NOUN d. RO/RHE/IMPER
Reflexivity of low explicitness	
1. Addressing the reader indirectly 2. Concessives ***3.*** Questions	a. RO/RLE/ADDR.INDIREC b. RO/RLE/CONCESS c. RO/RLE/QUEST
III. Writer-oriented	
Reference of high explicitness	
Writer's explicit reference to oneself **1.** Person pronoun **2.** Exclusive **3.** Possessive **4.** Oblique forms **5.** Noun	 a. WO/RHE/PRON b. WO/RHE/EXCLU c. WO/RHE/POSS d. WO/RHE/OBLI e. WO/RHE/NOUN
Reference of low explicitness	
Ambiguous reference to the writer's person 1. Person pronoun **2.** Exclusive but (absence of an explicit reference to the current author)	 a. WO/RLE/PRON b. WO/RLE/EXCLU
I. Participant-oriented	
Writer-reader interaction	a. PO/WR

The following example shows how the segmentation and coding of the articles were carried out:

> ***In this paper*** <MX/RHE/REFW> ***we*** <WO/RHE/EXCLU> ***will focus narrowly*** <MX/RHE/VERADV> on one possible operationalization of an expeditious strategy, ***namely*** <MX/RLE/EXEM> reading titles in academic articles that might form part of a wider program to teach students to read more effectively and efficiently. For reasons stated ***above***, <MX/RHE/REV> ***we*** <WO/RHE/EXCL>) feel that such operationalizations are vital.

1. **Reference to the whole article**: <MX/RHE/REFW>. This category is represented by a noun (**this paper),** and it conveys the function of introducing the topic; it is generally situated in the abstract or at the beginning of sections, as is the case here.

2. **The writer's explicit reference to himself**: <WO/RHE/EXCLU> The author is making an explicit reference to himself through the exclusive pronoun we.

3. **Discourse labels**: <MX/RHE/VERADV> Using a verb and adverb "Focus narrowly" the author is making an explicit attempt at narrowing down the focus of his study and diverting the reader's attention to the salient information he is going to present.

4. **Code glosses:** <MX/RLE/EXEM> This category is represented by the word "namely", which embeds an example of the focus of the study the author alluded to.

5. **Phoric markers:** <MX/RHE/REV> It is represented by the word "above" and aims to help the reader make a connection with what was said before.

The next step was to count the number of the reflexive metadiscursive units the participants managed to recall. For this purpose, the participants' verbal reports were transcribed and translated into English.

Each metadiscourse marker or reported relation is worth one point, and the total number is then turned into a percentage to be compared against the total number of metadiscourse items/ relations found in each RA. The following passage is taken from the verbal reports of a Linguistics participant to show how the analysis was conducted:

> ***In this paper*** <MX/RHE/REFW> ***we*** <WO/RHE/EXCLU> ***will focus narrowly*** <MX/RHE/VERADV> on one possible operationalization of an expeditious strategy, ***namely*** <MX/RLE/EXEM> reading titles in academic articles that might form part of a wider program to teach students to read more effectively and efficiently. For reasons stated ***above***, <MX/RHE/REV> ***we*** <WO/RHE/EXCL>) feel that such operationalizations are vital.
>
> It's very important to stop at the purpose of the paper <MX/RHE/REFW>, which is the topic sentence of the first paragraph in this new section. This paper focuses narrowly <MX/RHE/VERADV> on one possible operationalization. (P12)

The participant here managed to recall the metadiscursive unit (reference to the whole article (*in this paper*) when he said: "*the purpose of the paper*" and he managed to remember the discourse label (*focus*) when he repeated the same word saying: "this paper *focuses* narrowly".

To analyze the participants' results of the SORS, TOEFL, reflexive metadiscourse awareness, and subject-matter knowledge tests, the researcher used

SPSS (Statistical Package for Social Sciences, version: 25). Two main SPSS analytical tools were used: Pearson correlation and multiple linear regression.

Qualitative Analysis

The main sources for qualitative data were the questionnaire, the post-reading interview, and the think-aloud protocols. The method selected for the analysis of these two qualitative sources was conventional content analysis in which the researcher started with the raw data, developed a coding scheme, and classified the emerging themes and categories. Concerning the answers to the semi-structured interview and the questionnaire, the themes that emerged were the following: the participants' assessment of the difficulty of the RA, their position regarding the writing style of the author, the generally employed reading strategies, and their preferred writing styles. As for the think-aloud protocols, the themes that were categorized revolved around the types of reading strategies readers employed and the difficulties they encountered while reading the research article. (For more details, see Wichka, 2021)

Results and Discussion

Correlation Between Reflexive Metadiscourse Awareness and Reading Strategies, Subject Knowledge and Language Proficiency

The findings indicated that Economics participants had the lowest language proficiency score. All the participants, however, had a very high reading strategies score, while Linguistics and Chemistry students had better subject-matter knowledge scores than the Economics respondents.

Dissecting those results was a necessary step before looking into the correlation between the three variables and the readers' awareness of metadiscourse. To tackle this question, a series of multiple regression analyses was conducted, and the resulting outcomes are summarized as follows:

a. Linguistics participants' awareness of metadiscourse negatively and significantly correlated with their scores on reading strategies.

b. Economics participants' awareness of metadiscourse positively and significantly correlated with their language proficiency.

c. Chemistry participants' awareness of metadiscourse positively and significantly correlated with their reading strategies and subject-specific knowledge.

Negative Correlation Between Linguistics Participants' Reading Strategies and the Recalled Metadiscursive Units

Table 3.

Correlation Between Linguistics Participants' Metadiscourse Scores and Language Proficiency, Subject-Specific Background Knowledge, and Reading Strategies

		Metadiscourse recalls	SORS	TOEFL	Subject knowledge
Pearson Correlation	Metadicourse recalls	1.000	-.732	.145	-.222
	SORS	-.732	1.000	-.592	-.214
	TOEFL	.145	-.592	1.000	.295
	SUBJECT KNOWLEDGE	-.222	-.214	.295	1.000
Sig. (1-tailed)	Metadiscourse recalls	.	.008	.345	.269

	SORS	.008	.	.036	.277
	TOEFL	.345	.036	.	.204
	SUBJECT KNOWLEDGE	.269	.277	.204	.

The results of the multiple regression analysis indicate that the reading strategies employed by linguistics participants negatively correlated with the recalled metadiscursive units (r= -.732, p = 0.008 < 0.05).

Table 4.

Coefficients of Multiple Regression Variables

Coefficients[a]											
		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Correlations		
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part
1	**(Constant)**	128.606	26.035		4.940	.003	64.901	192.310			
	SORS	-1.150	.279	-1.015	-4,127	.006	-1.831	-.468	-.732	-.860	-.817
	TOEFL	-.150	.105	-.358	-1.425	.204	-.408	.108	.145	-.503	-.282
	Subject knowledge	-.155	.097	-.333	-1.605	.160	-.392	.081	-.222	-.548	-.318

a. Dependent Variable: Metadiscourse recalls

The coefficient of the SORS results predicted around 64% of the variance of reflexive metadiscourse scores, which is a good result according to Tabachnick and

Fidell (2019). This result implies that the more metacognitive and cognitive reading strategies participants successfully employed, the lower the number of metadiscourse units they recalled.

Although most of Linguistics participants paid attention to fewer ideas, they managed to get to the gist of the article and understood it efficiently and quickly, thanks to the successful mastery of specific metacognitive strategies.

P2, for instance, had a reading strategy score of 90, but she only recalled 15.78% of reflexive metadiscursive units. P2 first read the title and the abstract to find out the aim of the study. She then went through the introduction stopping at some keywords such as EAP, professional writing, and reading of titles. These words helped her trigger her knowledge of associated words and allowed her to evoke her content schema.

Participant 2: "The author is focusing here on one element of reading which is the expeditious and quick reading and the question of titles. Because they help readers read selectively."

This first understanding helped her build up a preliminary but rough idea about the article. P2 then started to skim most of the introduction trying to focus on the topic sentences of each paragraph and predict the upcoming content to integrate information within the preliminary understanding she had already formed in the beginning:

> I have started to understand a little bit; I'm sort of anticipating the upcoming part, I mean the research problem…. I'm just making guesses about the content. Expeditious reading vs extensive reading, yes! So, his interest is in how professionals read.

Guided by skimming and guessing, P2 tried to integrate relevant information into her background knowledge to grasp the purpose of the study.

P2: "I'm not reading in terms of focusing on meaning; I'm rather relating it to research."

The integration process helped her build up a clearer understanding of the purpose of the study and she arrived at an understanding that the article was about expeditious reading and reading titles of academic research articles specifically. Skimming, in effect, served as a facilitating strategy that helped her either spot key information or decide whether to continue reading or not.

P2: "I'm skimming quickly to decide whether to continue reading or not."

Throughout the remainder of her reading, P2's reading was controlled by three core strategies: skimming, guessing, and going back and forth between sections. P2 then, moved to the conclusion section to get a summary. She claimed that her purpose of her reading was always to integrate reading into writing:

P2: "So I need to go back to understand better. I went back to the skipped paragraphs, so he is talking about a course, an overview of a program at university.

The conclusion to be drawn from the readings of Linguistics participants is that metadiscursive awareness is contingent upon a mastery of hierarchical set of metacognitive, cognitive, and support strategies. The number of metadiscourse

elements readers are aware of does not generally help in the understanding of texts unless readers have sufficient mastery of specific metacognitive and cognitive strategies.

Reflexive metadiscourse units, in fact, were found to be connected to a series of metacognitive, cognitive strategies, and support strategies. Metadiscourse awareness is considered a facilitating factor that works interactively within all stages of metacognitive knowledge. If appropriately deciphered, metadiscourse units can help provide useful comprehension feedback for the strategies already used, enrich the formal and content schematic representations of the read text, and consequently lead to successful comprehension.

Positive Correlation Between Economics Participants' Language Proficiency and the Number of Recalled Metadiscursive units

Table 5.

Correlation Between Economics Participants' Metadiscourse Scores and, Language Proficiency, Subject-Specific Background Knowledge and Reading Strategies

		Metadiscourse recall	SORS	TOEFL	Subject knowledge
Pearson Correlation	**Metadiscourse recalls**	1.000	.238	.732	.565
	SORS	.238	1.000	.026	.087
	TOEFL	.732	.026	1.000	.197
	Subject knowledge	.565	.087	.197	1.000
Sig. (1-tailed)	**Metadiscourse recall**	.	.254	.008	.045
	SORS	.254	.	.471	.406
	TOEFL	.008	.471	.	.293
	Subject knowledge	.045	.406	.293	.

The results of the multiple regressions analysis shown in the table demonstrate that only Language proficiency (TOEFL) correlated positively with the number of reflexive metadiscursive units recalled in the article. (r= .732, p= 0.021< 0.05).

Table 6.

Coefficients of Multiple Regression Variables

Coefficients											
		Unstandardized Coefficients		standardized Coefficient			95,0% Confidence Interval for B		Correlations		
Model		B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	-13.789	20.246		-.681	.521	-63.330	35.751			
	SORS	.228	.251	.185	.909	.399	-.387	.843	.238	.348	.184
	TOEFL	.826	.265	.644	3.121	.021	.179	1.474	.732	.787	.632
	Subject knowledge	.195	.096	.422	2.037	.088	-.039	.430	.565	.639	.412

The TOEFL coefficient predicted around 63% of the variance of reflexive metadiscourse scores, which is a good result. This finding indicates that the participants who had low proficiency scores recalled less metadiscursive units. The results have demonstrated that most Economics participants struggled with understanding some lexical terms that were critical to understanding the article. These

words were in most cases associated with several metadiscursive units that help the reader focus on the purpose of the study.

For instance, P56 reported that she could not understand the meaning of the word "incentives", so she moved to the introduction to try to understand the relationship between tax incentives and foreign direct investment mentioned in the title. Coming across the purpose of the study and a critical reflexive metadiscursive function (*introducing the topic)*, P56 could not again understand another keyword: "justification"**.**

Participant 56: "the purpose of the study is about justification of tax incentives. What is justification?"

Building on a weak mastery of reading strategies, P56 skimmed most of the sections, trying to compensate for her lack of understanding. Further, P56 had trouble reading the variables in the tables; she could not grasp the logical relationship between tax incentives and the new variables she came across.

Like P56, three other participants expressed difficulty understanding the word *incentives*

Participant 45: **"**…tax incentives …I don't know what that means exactly"

Participant 37: "the purpose of the study is about justification of tax incentives. What is justification?"

Participant 41: “I don’t understand the word incentive. I think it’s related to taxes and direct investment in China”.

This deficiency in deciphering essential lexical items and spotting metadiscursive units led to poor interpretation of the article’s main idea. These findings confirm several studies discussing the relationship between lexical knowledge and comprehension. Jafarinejad and Tavakoli (2011) investigated the relationship between discourse markers and language proficiency in the reading comprehension of Iranian university students. The results revealed that discourse markers played a facilitating role in making comprehension smoother and that language proficiency affected readers’ comprehension. In a similar vein, Kintsch (1998) found that good readers recognize words twice as fast as poor readers do and that efficient decoding skills make readers less dependent on discourse context in recognizing a word. Ulijn and Salager (1998) also stressed that lexical proficiency and knowledge of syntax strongly interact with each other and are fundamental components of reading comprehension.

The results of this study have shown that reflexive metadiscourse units could be viewed as a special type of lexical elements that are mainly concerned with establishing the internal cohesion and coherence of texts. The successful activation of those metadiscursive units requires the ability to recognize and understand the associated lexical and syntactic units. The activation of connections between reading strategies, lexical, syntactic, and metadiscursive units generally puts into action the

appropriate types of formal and content schemata. If these connections are successfully established, readers generally find no difficulty comprehending the text's message.

Positive Correlation Between Chemistry Participants' Reading Strategies, Subject-Matter knowledge and the Number of Recalled Metadiscursive units

Table 7.

Correlation Between Chemistry Participants' Metadiscourse Scores, Language Proficiency, Subject-Specific Background Knowledge, and Reading Strategies

Correlations					
		Metadiscourse recall	SORS	TOEFL	Subject knowledge
Pearson Correlation	Metadiscourse recall	1 .000	.650	.483	.598
	SORS	.650	1.000	.683	.024
	TOEFL	.483	.683	1.000	.403
	Subject knowledge	.598	.024	.403	1.000
Sig. (1-tailed)	Metadiscourse recall	.	.021	.079	.034
	SORS	.021	.	.015	.474
	TOEFL	.079	.015	.	.124
	Subject knowledge	.034	.474	.124	.

The results of the multiple regressions below show that both reading strategies (SORS) and subject-specific knowledge correlated significantly and positively with the recalled number of reflexive metadiscourse units ($r= .650$, $p= 0.006 < 0.05$), ($r= .598$, $p= 0.006 < 0.05$).

Table 8.

Coefficients of Multiple Regression Analysis

Coefficients[a]											
		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Correlations		
Model		B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	-79.454	21.338		-3.724	.010	-131.666	-27.242			
	SORS	1.102	.267	.961	4.133	.006	.450	1.755	.650	.860	.651
	TOEFL	-.367	.193	-.483	-1.901	.106	-.840	.105	.483	-.613	-.300
	SUBJECT KNOWLEDGE	.552	.133	.769	4.142	.006	.226	.878	.598	.861	.653

a. Dependent Variable: Metadiscourse recall

The two independent variables predicted around 77% of the variance of reflexive metadiscourse scores, which is a statistically significant result. The results have shown that Chemistry readers' understanding was, in many instances, controlled and shaped, first, by the types of reading strategies they employed, and second, by their ability to understand the scientific terms found in many sections of the article.

P64, for instance, reported that she needed to start with the title to get an idea about the purpose of the study. Then, she expressed her familiarity with the word *browning* when she said:

> It is a method employed to test the effect of browning during storage, in general, we apply this method to plants, some products are generally kept and stored in markets, so we have to run some tests on the quality and quantity of them, so I think this article is trying to seek some solutions.

P64 continued reading trying to confirm her guesses. She, however, could not understand the word hydroxymethylfurfural (HMF), which is an organic compound formed from reducing sugars in honey and various processed foods in acidic environments when they are heated through the Maillard reaction. For that purpose, she resorted to scanning and skimming the introduction to identify the information needed. P64 was aware of the generic moves and steps in RAs introductions and showed a mastery of her domain knowledge when she explained other scientific words. She then skimmed the Materials and Methods, a decision that was mainly shaped by her keen awareness of the organization of research articles:

> I generally don't read everything. The author here lists all the materials and brands used in his research. I only pay attention to the methods, if I want to use one, I generally try to find it on the references page and then I look it up on the internet to find the original source because here you can't find how such a method works.

In the results section, P64 looked at the tables first and deduced some essential information about (HMF), and all along the rest of her reading, she was integrating and adding new details to her already solid and clear understanding of the main topic of the article. Interestingly, most of the chemistry participants in this study employed efficient strategies and tried to look for the new information located mainly in the abstract, at the end of the introduction and in the results and discussion sections.

Evidently, some participants' readings were in total agreement with how professional scientists process research papers.

Bazerman (1985) used several interviews and observations to study the reading processes of seven physicists reading text material in Physics. He found out that scientists did not read sequentially. Instead, they tended to look at the introductions, conclusions, and perhaps scanned figures to get the gist of the article. Most of the subjects employed selective reading strategies in order to concentrate on the 'new knowledge' that could enrich their content schema. In a similar vein, Huckin (1987) noted that scientists generally approach new research papers in a way dominated by 'newsworthiness.' He explained that scientists generally start reading the title, the abstract, then they look for the most critical information usually expressed in tables, figures, and graphs, and in the end, they move to the results section.

The relationship between reflexive metadiscourse and the reading construct considering these results is still shaped by a hierarchical structure of the reading strategies that control and regulate the readers' ability to decipher critical lexical and syntactic units. Specialized vocabulary, however, plays a fundamental role in helping readers activate and summon into action the appropriate content-background knowledge schema required for comparing the article against similar ones.

Establishing these connections helps in the building of a basic textual comprehension that is meant to deal with the surface and basic level of comprehension. To cover new ground, however, there seems to be a need to call upon

some social and personal experiences that help add an extra layer to comprehension. Only a limited number of readers who are immersed or extensively involved in the rules and structures that control, and shape discourse could activate this layer.

As Kintsch (1998) elucidated, this integration requires the addition of extraneous nodes from our social experiences in the form of situation models along with context. This phase eliminates constructed meanings that are irrelevant and inappropriate and retains only those meanings that prove to be situationally solid and socially grounded.

Conclusion and Recommendations

Reading comprehension is a complex and multifaceted process involving a set of intertwined strategies that operate at different levels. Various models of reading were developed to account for this complexity. The study at hand investigated the relationship between reflexive metadiscourse awareness and the reading comprehension of Tunisian doctoral students of Linguistics, Economics, and Chemistry. The study highlighted the effectiveness of the construction-integration model (Kintsch, 1998) because it resituated reading comprehension from a socio-cognitive perspective that lays importance on the fluidity and dynamism of daily human experiences in relation to the cognitive constructs of reading.

The significance of constructing a theoretical bridge between reading and metadiscourse stems from the dearth of research addressing this issue. Much of the research addressing the relationship between reading and metadiscourse did not go

beyond the descriptive level, nor did it firmly place metadiscourse within the broad and intricate mechanisms of reading comprehension.

Based on the results of economics participants' reading, the study at hand suggests that metadiscourse markers can be considered a particular type of lexical units that are mainly concerned with the cohesion and coherence of texts. The ability to establish the cohesion of texts is not dependent on processing metadiscursive units solely; readers must also successfully decipher and understand associated lexical items found in relevant sections in order to deploy the appropriate content and formal schemata. Therefore, metadiscourse awareness appears to play an intermediary role between lexical knowledge, schemata, and comprehension.

Moreover, the present work adds to the number of studies that explored the role metacognitive knowledge can play in ensuring successful comprehension of texts while anchoring at the same time metadiscourse within this relationship. This study reveals that successful employment of metacognitive strategies, such as skimming, scanning, re-reading, previewing, reviewing, or summarizing do not help readers understand texts until and unless they are cognizant of the role metadiscoursal units can play in establishing the cohesion and coherence of texts (Wichka, 2021).

Proficient readers employ several metacognitive strategies in order to arrive at understanding texts quickly, but they also need to look for useful metadiscursive units present in critical sections such as the abstract, introduction, discussion and conclusion. While reading, readers must switch back and forth between the three

principles of metacognition: planning, monitoring, and evaluation, as this provides them with insightful feedback on the efficiency of the strategies employed, on the one hand, and the utility of parsing metadiscursive units, on the other.

Pedagogically, the outcomes of the present study can contribute to teaching English for Academic Purposes (EAP) by providing some guidelines for university students. These guidelines can explicitly raise Linguistics students' awareness of the most critical reading strategies that help them detect metadiscursive units and condense long texts into short and connected key ideas. The study also reveals that Economics students should be exposed to the basics of the English language with a view to improving their linguistic level before academic skills are explicitly taught. Finally, concerning the teaching of English to Chemistry students, this research demonstrates that instruction should focus on explicitly raising their awareness of key scientific and metadiscursive items needed to trigger their content schemata and to allow them to develop a coherent and satisfactory understanding of academic texts.

Like any other studies, the study at hand is representative of a particular approach, and there may be room for expanding its scope. For example, it would be interesting to examine how the theoretical framework would fit into the description of the performances of readers across different languages and/or nationalities. The linguistic and cultural specificities of languages may differentially impact the ways readers from diverse backgrounds process texts.

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