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Electronic version
URL: http://journals.openedition.org/discours/8770
DOI: 10.4000/discours.8770
ISSN: 1963-1723

Publisher:
Laboratoire LATTICE, Presses universitaires de Caen

Electronic reference
Anje Müller Gjesdal, « The Influence of Genre Constraints on Author Representation in Medical Research Articles. The French Indefinite Pronoun *On* in IMRAD Research Articles », *Discours* [Online], 12 | 2013, Online since 10 July 2013, connection on 31 January 2018. URL : http://journals.openedition.org/discours/8770 ; DOI : 10.4000/discours.8770

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Anje Müller Gjesdal
University of Bergen


URL : http://discours.revues.org/8770

Titre du numéro : *Varia*
Coordination : Saveria Colonna et Sarah Schimke
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Anje Müller Gjesdal
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Scientific discourse is characterized by highly normative and strict genre constraints on language use, both on the macro (text) and micro (word) level. The purpose of this article is to study the distribution of the French indefinite pronoun *on* and its interpretative values across the sections of French-language medical articles (KIAP corpus) in the IMRAD format (Introduction, Methods, Results and Discussion). The main hypothesis is that the IMRAD structure entails a specific distribution of macro level textual structures (author roles, argumentation, rhetorical functions), and that this is reflected in the distribution of micro level linguistic markers, such as the pronoun *on*. Previous studies based on a more limited material (Gjesdal, 2008) indicate that the variation in the interpretative values of *on* seems to be influenced by the IMRAD format, and, furthermore, that the different values seem to correspond to different author roles. Particular emphasis will be put on the influence of the linear sequencing of text imposed by the IMRAD format and the distribution of author roles and speech acts across the text.

**Keywords:** genre, IMRAD, pronouns, *on*, scientific discourse

1. **Introduction**

Scientific discourse is a field of highly normative genres, imposing strong constraints on individual writing style (Bazerman, 1988; Swales, 1990 and 2004; Bhatia, 1993). Genre constraints are frequently formalised through journal style sheets that need to be applied in order to achieve publication. The main topic of this article is the influence of one such formatting model, the IMRAD structure, on the use of personal pronouns representing the author, and more specifically the French polysemy of pronoun *on*. I will argue that the IMRAD structure governs the distribution of *on* across the text, as well as the appropriate interpretative values in a given section. In this sense, the influence of IMRAD on pronominal use is an empirical example of the larger question of genre constraints in scientific discourse.
The IMRAD format (Introduction, Methods, Results and Discussion) is a text structure that provides rules for the textual organization of research articles, and is widely used and largely obligatory in many disciplines, particularly in medicine and the natural sciences. IMRAD is a rigid schema for text production and IMRAD research articles are subject to strong and explicit genre constraints. On the textual surface level, the genre constraints can be observed in a linear sequencing of the text, as the format determines a fixed number of sections as well as the order of their sequencing. However, I will argue that IMRAD also imposes constraints on the deeper text level, through the ordering of the distribution of informational content and argumentation across the text, specific themes and functions such as presentation of methodology and results being assigned to certain sections, while argumentation and conclusions are assigned to others.

It is likely that the constraints of the IMRAD format also affect the textual representation of different textual voices, and particularly the voice of the author. Rastier (2005), Fløttum et al. (2006) and Poudat (2006) have shown that different author roles can be assigned to different sections of a scientific text, and argue that this is in fact an important feature of scientific genres. In this paper, I will argue that different author roles, corresponding to different “speech acts” can be observed by way of micro-level linguistic features, such as personal pronouns, expressions of epistemic modality and verb tense. To demonstrate this, I will examine the use of the French indefinite pronoun on in medical research articles. The indefinite pronoun on, corresponding to the English one, can be used to express a range of meanings, referring to the speaker, to the speaker-hearer couple, to individuals external to the communicative situation, or indefinite use. Fløttum et al. (2006) have observed that the semantic flexibility of the pronoun on is used for a variety of purposes in the genre of the research article, referring to the article author him-/herself, to the reader but also to other researchers and the scientific community at large.

The material analyzed is taken from a subcorpus of medical research articles in the KIAP (Kulturell identitet i akademisk prosa / Cultural identity in scientific discourse) corpus (see http://kiap.uib.no/KIAPCorpus.htm; for a further description of the corpus, see Fløttum et al., 2006). The KIAP corpus was established by Professor Kjersti Fløttum at the Department of Foreign Languages at the University of Bergen (Fløttum et al., 2006) and the main objective of the project was to investigate the influence of variables such as discipline and language on scientific discourse. The corpus consists of 450 research articles from three languages (English, French, Norwegian) and three disciplines (medicine, economy and linguistics). The articles were taken from established and respected journals in their field, from both France and Quebec. This article studies the subcorpus of French medical articles, for practical reasons known as frmed, consisting of 50 articles.

1. The articles in the subcorpus frmed are taken from the following journals: Annales de médecine interne, Bulletin de la Société belge d’ophtalmologie, Maladies chroniques au Canada. The journals were selected on
The article is structured as follows: Section 2 presents the IMRAD model, Section 3 discusses the notion of author roles in research articles, while Section 4 describes the use of the pronoun on in research articles. Section 5 presents the results of the corpus analyses, while Section 6 sums up the results of the article.

2. The IMRAD model

The IMRAD structure is a textual format for research articles that was introduced in the 1940s and originated in the health sciences. By the 1980s it was used in all research articles in the major medical research journals (Sollaci & Pereira, 2004), and it has now become predominant in many disciplines, not only in the natural sciences.

The IMRAD structure divides the research article into sections that perform different tasks in the text. The Introduction section contains a presentation of the object of study and methodology, as well as a literature review situating it within the research field (Adams Smith, 1984: 28–29). In terms of rhetorical moves, the Introduction section is characterized by the introduction of background information, reviewing of related research and presenting new research (Nwogu, 1997: 126).

The Methods section presents the data used in the study (Adams Smith, 1984: 30) and is characterized by the following moves: describing the data collection procedure, describing the experimental procedure and describing the data-analysis procedure (Nwogu, 1997: 125).

The Results section lays out the article’s results, and is characterized by two rhetorical moves: indicating consistent observations and indicating non-consistent observations (Nwogu, 1997: 125).

The Discussion section contains a discussion of results and methods and explains the data (Adams Smith, 1984: 30), the situation of the findings with respect to other studies in the field, and possibly a conclusion and implications for future work. In terms of rhetorical moves the section is characterized by the highlighting of the overall research outcome, explanations of specific research outcomes as well as statements of research conclusions (Nwogu, 1997: 125). Consistent with this, Heslot (1980) observed that the Discussion section typically serves to confront the author’s results with previous findings.

2. The distribution of rhetorical functions and information across the IMRAD structure has been conceptualised in various ways in the literature. Biber and Finegan (1994) argue that the IMRAD sections correspond to textual micro-purposes, meaning that each section carries out a specific task within the framework of the text, while Nwogu (1997: 126) provides an account of “the schematic structure of information in the medical research paper […]” focusing on the distribution of so-called ‘moves’ across the sections of texts in the IMRAD format. Brevéga (2000) argues that IMRAD imposes constraints on the kind of speech acts that are acceptable at different points in the text; Methods and Results sections are for describing, while evaluating, arguing and concluding may be done in the Introduction and Discussion sections.
In addition to text level functions such as information distribution and rhetorical moves, several micro-linguistic features have been observed to be characteristic of the different sections of the IMRAD structure, as is illustrated by Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Introduction</th>
<th>Methods</th>
<th>Results</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal pronouns</td>
<td>third person singular, second person plural</td>
<td>“they”</td>
<td>“they”, absence of the first person singular pronoun</td>
<td>first person singular (“I”)</td>
</tr>
<tr>
<td>Verb tense</td>
<td>present tense</td>
<td>past tense</td>
<td>past tense</td>
<td>past tense</td>
</tr>
<tr>
<td>Verb semantics</td>
<td>“report”</td>
<td>“receive”, “take”, “ask”, “do”</td>
<td>“show”</td>
<td>“report”</td>
</tr>
<tr>
<td>Argumentative connectives</td>
<td>“however”, “therefore”</td>
<td></td>
<td>“thus”, “since”</td>
<td></td>
</tr>
<tr>
<td>Modal markers</td>
<td></td>
<td></td>
<td>modal auxiliaries (could, may, will, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Micro-linguistic features of the IMRAD structure
(based on Heslot, 1980; Swales, 1990; Nwogu, 1997; Fraser, 2002)

On the macro-linguistic level of the text as well as the micro-linguistic word-level, IMRAD is a format of standardisation, not only of the surface structures of the text, but also of the way argumentation and the author’s voice are expressed. In other words, the linear structuring of the text in sections imposed by the IMRAD format corresponds to a linear distribution of rhetorical functions across the research article. Thus, the surface level organization of the IMRAD structure corresponds to a deep level organization of the rhetorical and argumentative functions, and in this sense IMRAD can be said to have wide-ranging implications for scientific discourse. As Pontille (2007: 230) has pointed out the IMRAD structure has a wider significance than mere text formatting:

> En servant de points d’appui communs aux auteurs et aux lecteurs, le format IMRAD standardise les procédures d’évaluation et matérialise un lien social et cognitif au sein des pratiques discursives d’un groupe professionnel³.

On the basis of this observation, I will now go on to examine how the IMRAD format structures aspects of author manifestation in research articles. More

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3. “As a shared support for authors and readers, the IMRAD structure standardises evaluation procedures and materialises a social and cognitive bond within the discursive practices of a professional group” (my translation).
specifically, I will examine the interaction between the IMRAD format and a specific rhetorical structure, i.e. the textual representation or manifestation of the author in and through author roles (Rastier, 2005 and 2011; Fløttum et al., 2006). Furthermore, I will examine how the properties of the IMRAD format may influence the distribution of micro-linguistic features that are central to the representation of author roles across the text, exemplified by the distribution of the French pronoun on across the IMRAD structure.

3. The rhetoric of scientific discourse: author roles

In this article I argue that author manifestation can be analyzed as large-scale textual structures, induced by the repetition and interaction of micro-linguistic features that are reflective of personhood, as well as the regular recurrence of a certain informational and argumentative content. Moreover, the unfolding and distribution of the textual representation of the author is structured and governed by the IMRAD format.

Fløttum et al. (2006: 81) propose the notion of author roles to describe regularities in the textual representation of the author of research articles. They distinguish four author roles that can be observed on the basis of linguistic clues, such as verb forms and verb semantics, modal markers and personal pronouns. The roles they ascribe to the textual representation of the author are the writer role, the researcher role, the arguer role and the evaluator role corresponding to different modes of textual representation of the author.

The writer role is typically associated with discourse verbs, as in the following examples:

1. In Sections 3.1, 3.2 and 3.3, I describe each of the possible perspectives [...].
   (engling34)

2. I shall return to this sequence later, [...].
   (engling20)

The researcher role is characterized by the presence of research verbs in the immediate co-text, demonstrated in the following examples:

3. As before, I calculate welfare gains [...].
   (engecono06)

4. [...] I assume that this position is Spec, VP [...].
   (engling01)

I conducted these interviews in Spanish.
(engmed04)

The arguer role is characterized by so-called position verbs, like *argue*, *claim*, and *believe*:

Yet, I *argue* that these on-line studies only examine the immediate activation of individual word meaning [...].
(engling22)

Finally, the evaluator role is associated with verb constructions whose semantic content signals emotional or evaluative content, as in the following examples:

I *have been struck by* the practical differences that separate present-day econometrics and experimental economics, [...].
(engecon30)

But I *am sceptical about* extending iconicity to distance phenomena.
(engling03)

4. The French pronoun *on* in scientific discourse

Previous research has indicated a range of linguistic markers relevant for the representation of the author voice in the research article (Fløttum et al., 2006). In this article I will examine the use of the French indefinite pronoun *on*, to see how and if its use and interpretation varies across the IMRAD structure. While the basic semantic content of *on* is traditionally taken to correspond to the English impersonal or generic pronoun “one”, *on* has in fact come to have a much wider and more flexible referential potential in present-day French than its English counterpart. *On* can be used to express a range of meanings, but is today largely used to refer to a collective including the speaker him-/herself, corresponding to the English “we”.

The interpretation of *on* is largely contingent on discourse genre and varies greatly between formal and informal registers (Gjesdal, 2008). In the genre of the research article the pronoun *on* makes it possible to negotiate genre constraints that posit the impersonal as an ideal, while at the same time making the author’s voice heard. In a seminal study, Löffler-Laurian (1980) investigated the use of the French pronouns *je*, *nous* and *on* in research articles to analyze their role in author manifestation. According to Löffler-Laurian, pronominal use is a reflection of genre constraints, and allows for negotiating the simultaneous demands of complying with the need for personal presence in order to promote one’s own research and adhering to the impersonal ideal of scientific discourse. She also observes that the use of *on* changes with the textual progression and the topics discussed; when talking about domains of experience *on* has a *personal* value, i.e., referring to the
author and the team of researchers; when talking about theoretical matters on has a generic, indefinite value. Loffler–Laurian also emphasizes the role of the verbs associated with on in identifying the reference of this pronoun, and concludes that the pronouns on and nous contribute to masking the author’s voice rather than emphasizing it. This illustrates the influence of genre constraints on pronominal use in research articles, and the way in which pronominal use in research articles differs from everyday language.

4.1. Interpretative values of on in the research article

In a more recent study, Fløttum et al. (2006) observed that the semantic flexibility of the pronoun on is used for a variety of purposes in the genre of the research article, referring to the article author him-/herself, to the reader but also to other researchers and the scientific community at large. Accordingly, Fløttum et al. (2006) propose a classification of the different values on may take on in research articles (illustrated in Table 2). They distinguish six different values distributed on a continuum of author involvement, ranging from complete identification with the author (ON1), to reference to others (ON6).

<table>
<thead>
<tr>
<th>Values of on</th>
<th>Referent(s)</th>
<th>Corresponds to</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON1</td>
<td>author(s)</td>
<td>“I”/“we”</td>
</tr>
<tr>
<td>ON2</td>
<td>author(s) + reader(s)</td>
<td>“I”/“we” + “you”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“I”/“we” + the reader(s))</td>
</tr>
<tr>
<td>ON3</td>
<td>author(s) + limited discourse community</td>
<td>“I”/“we” + “you”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“I”/“we” + my colleague(s))</td>
</tr>
<tr>
<td>ON4</td>
<td>author(s) + unlimited discourse community</td>
<td>“I”/“we” + everybody</td>
</tr>
<tr>
<td>ON5</td>
<td>reader(s)</td>
<td>“you” (the reader(s))</td>
</tr>
<tr>
<td>ON6</td>
<td>other(s)</td>
<td>“he”/“she”/“they” (other researchers)</td>
</tr>
</tbody>
</table>

Table 2. Interpretative values of on in research articles (cf. Fløttum et al., 2006)

4.2. Disambiguation criteria

In order to make the basis for classifying the interpretative values of on in the research article more transparent, I will apply the following disambiguation criteria proposed by Fløttum et al. (2007):

- ON1 often occurs with metatextual or deictic elements and the verb tenses futur and passé composé. ON1 is also characterized by discourse and research verbs. ON1 is often found in the Introduction section;
- ON2 is characterized by cognitive and perception verbs, the verb tenses futur and passé composé as well as metatextual elements;
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- ON3 occurs with the verb tense *présent*, modal auxiliaries, especially *pouvoir*, specialized and technical vocabulary and generalising adverbials;
- ON4 is characterized by the verb tense *présent*, modal auxiliaries, especially *pouvoir*, verbs that are unrelated to the research process and generalising adverbials;
- ON5 occurs with metatextual elements, the verb tense *futur* and perception verbs;
- ON6 occurs with bibliographical references that may be more or less explicit and precise.

While disambiguation criteria such as these often allow for the identification of the appropriate referent(s) of *on*, it should be noted that they are not always conclusive. In many cases, a clear decision simply cannot be made.

5. Analyses: *on* and author roles across the IMRAD structure

The main research questions that will be examined are as follows: to what extent is the distribution of *on* and its various interpretative values influenced by the IMRAD structure, and to what extent do the interpretative values correspond to different author roles.

The analyses have been carried out in two separate strands. Section 5.1 presents a qualitative case study of the distribution of *on* and its associated author roles across the IMRAD structure in a single article. This section aims to give a close reading of how various micro-linguistic features contribute to the interpretation of *on*, and how this pronoun relates to the notion of author roles. The qualitative analysis is enriched with a quantitative analysis of the distribution of the pronouns *nous* and *on* across the IMRAD structure (relative and absolute frequencies) in Section 5.2, and finally an analysis of the interaction between *on* and verb semantics across the IMRAD structure in the subcorpus *frmed* (Section 5.3). On the basis of the author role model proposed by Fløttum et al. (2006), I examine the hypothesis that the verbs associated with *on* in the different sections of the IMRAD structure may be indicative of various author roles.

As Carter-Thomas and Chambers (2012: 19) note, the combination of quantitative and qualitative analyses is in fact dominant in corpus-based research on academic discourses, especially in the analysis of discourse level functions. Carter-Thomas and Chambers (2012: 19) neatly demonstrate this approach through their analysis of the use of author roles and first person pronouns in article introductions in French and English, where a preliminary qualitative analysis of a single article is followed by a quantitative analysis. The results of their study indicate that qualitative and quantitative analyses complement each other and that a combination of the two may generate new insights.
5.1. Case study: interpretative values of on across the sections of the IMRAD structure

In order to examine the interaction of three parameters (IMRAD, on and research article author roles) I have selected an article for qualitative analysis. The selected article, *frmed02* (Laurier et al., 1999), exhibits an extensive use of on compared to the other articles in the subcorpus, furthermore it seems to display a preference for on rather than nous for representing the authors’ voices, as can be seen from Table 3. Table 3 also indicates a variation across the IMRAD structure, both in the absolute frequency of on as well as in the interaction of on and nous, the other personal pronoun that may refer to the authors themselves in medical research articles.5.

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Methods, Materials and Results</th>
<th>Discussion</th>
<th>Conclusion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nous</td>
<td>On</td>
<td>Nous</td>
<td>On</td>
<td>Nous</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>0</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>On</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Nous</td>
<td>1</td>
<td>On</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>

Table 3. Nous and on in the article *frmed02* (absolute frequencies)

Due to the polysemous nature of on, these numbers tell us relatively little as they stand, and a qualitative analysis is needed to deepen the understanding of the findings. What do the figures reflect in terms of the interpretative values of on? Since on may potentially refer to the author him-/herself, a collective of the author and colleagues, the reader, and even persons exterior to the author-reader couple, the material had to be examined manually in order to assess the distribution of interpretative values across the IMRAD sections. The findings are also evaluated with reference to the characteristics of the IMRAD structure presented in Section 2.

5.1.1. The Introduction section

The Introduction section is generally reserved for an outline of the research problem and the state of the art of the research field. In terms of pronominal use, it is characterized by the interpretative values ON1 (referring to the Author(s), corresponding to “I/we”), and ON6 (referring to other person(s), corresponding to “he/she/they”, other researchers). This is consistent with the findings of Régent (1992: 68) who observes that the personal marks of the author, including the personal pronouns nous and on are particularly frequent in the Introduction and Discussion sections.

To what extent are the interpretative values of on identified in the Introduction section connected to and reflective of the micro-purposes or speech acts that

5. There are no occurrences of the first person singular pronoun je (or the variant j') in the subcorpus *frmed*, since medical articles are generally collectively-authored.
the literature has established as characteristic of the Introduction section of an IMRAD article?

The occurrences of ON1 are clustered in the final paragraph of the section, and all refer explicitly to the research process, as in the following example:


We established the rate of hospitalization and the average length of these hospitalizations [...] then classified the hospitalizations of 1994-1995 according to age, sex and month of admittance. We then estimated the cost of hospitalizations for asthma in 1994-1995.

The occurrences of ON1 are associated with contextual elements typical of uses of on corresponding to the first person pronouns “I” and “we”. On the level of temporal reference, several textual clues contribute to the identification of the referent; the past tense referring back to research that has already been carried out, and the adverb ensuite (“then”) referring to the sequencing of the different stages of the research process. Furthermore, lexical items referring to the research process make it possible to identify the referent of on as the person(s) responsible for the research process itself, the research verbs établir and estimer and several more or less technical terms that describe the research process (taux, durée moyenne, coût).

In sum, these contextual elements make it reasonable to state that on does in fact represent the authorial voice, speaking as the subject that has carried out the research, corresponding to the author role of Researcher in the terms of Flötterød et al. (2006).

The Introduction is also characterized by the interpretative value ON6, referring to a third party external to the author-reader couple. In the Introduction section there are three occurrences of ON6, all referring to other researchers. In all these cases the reference to others is confirmed by textual clues, i.e., co-occurring bibliographical references, as in the following example:

10. On a récemment observé une telle baisse en Suède [références bibliographiques].

Such a drop has recently been observed in Sweden [bibliographical references].

In this example, not only the references, but also the indication of geographical position – Sweden – indicates that somebody other than the Quebec-based article authors made the observations.

6. All the examples’ translations are my own. Although “one” is the literal equivalent of on in English, I have chosen to render on by pronouns or impersonal constructions that are pragmatically and functionally equivalent in context. The English glosses are not intended to be “natural” translations, but retain the original structure as far as possible.
In sum, if we were to range the interpretative values of on on a scale of closeness to and distance from deictic centre – the ego – we see that the Introduction section is characterized by the most extreme interpretative values, ON1 and ON6. Can this be explained in terms of the rhetorical constraints imposed by the IMRAD structure?

It could be argued that the interpretative values of on are linked to the rhetorical micro-purposes of the Introduction section, which as we have seen are typically those of describing one’s own project and situating it within the research field in relation to other projects/authors. In this perspective, the Creating A Research Space model, CARS, proposed by Swales (1990: 141) may account for the variation in the Introduction section. Swales argues that article introductions are typically characterized by rhetorical moves that help the author establish him-/herself within the research field and argue for the relevance of their research. The different values of on that were identified in the Introduction section may be consistent with this strategy. ON6, referring to other researchers and previous research situates the article in the research field, while ON1 contributes to the credibility and authority of the author’s own research.

Let us now move on to the second section of the article, Methods.

5.1.2. The Methods section

The Methods section is dominated by the value ON1 (referring to the authors, corresponding to the pronoun we), which is hardly surprising since all the occurrences appear in contexts describing the research activity that has been carried out. This is indicated by technical research vocabulary (e.g., analyse de variance) as well as research verbs such as estimer (“estimate”) and calculer (“calculate”), as in the following example:

   *We carried out a two-factor analysis of variance for age and sex.*

All occurrences of ON1 in the Methods section are associated with the author role of Researcher. This result is, of course, to be expected, as the primary function and micro-purpose of this section is to lay out the methodology and the data behind the analyses and results. It is also consistent with the findings of Lofller-Laurian (1980), who observes that on used in scientific discourse tends to have a more personal value in contexts where concrete research work is described and a more generic or indefinite value in contexts referring to theoretical discussions.

Let us now move on to the Results section.

5.1.3. The Results section

The Results section is characterized by ON1 (referring to the authors, corresponding to “we”) and associated with the author role of Researcher. However, it also contains occurrences of on that are more ambiguous, and less easily classifiable. To illustrate this complexity, let us look at the following example:
La figure 1 montre que les plus hauts taux d’hospitalisation pour l’asthme en 1994-1995 ont été observés chez les garçons de 0 à 1 an et que le groupe des garçons de 1 à 4 ans affiche aussi un taux élevé. Les garçons de moins de 5 ans sont hospitalisés à peu près deux fois plus souvent que les filles du même âge. On remarque cependant la tendance inverse dans les tranches d’âge supérieures à 10 ans, où les taux sont plus élevés chez les sujets de sexe féminin.

Figure 1 shows that the highest rates of hospitalization for asthma in 1994-1995 were observed in boys from 0 to 1 year [...]. However the opposite tendency is noticed for those older than 10 years [...].

In this example, it seems reasonable to attribute the value ON2 to on, referring to the collective of the authors and their readers, but it would also be possible to argue that it is an example of ON4 (authors and “unlimited discourse community”, i.e., the general opinion) or even ON5 (referring to the readers only, corresponding to the pronoun “you”). Crucially, on functions as part of a metatextual construction, conveying instructions to the readers on how to interpret the data and the arguments presented, as indicated by from the cognitive verb remarquer, which invites the reader to a shared perspective of the text. The argumentative connective cependant (“yet”, “however”) orients the processing of the information and provides argumentative clues for the reading.

The occurrences of the interpretative ON2 can be read into the didactic style that characterizes the genres of scientific discourse. Rastier (2005: online, Section 5) analyzes scientific discourse as represented narration, and introduces the notion of the guide as a textual actor responsible for the didactic orientation of the text, reflected in certain linguistic markers:

Le Guide (au sens où l’on parle d’une visite guidée) assume une tâche didactique d’accompagnement du lecteur et utilise des figures de participation. Par exemple, il emploie le nous inclusif (“Nous avons vu plus haut…”). Ses actions sont des actions partagées de parcours du texte, d’où la fréquence de verbes de mouvement et de perception (venir, voir, etc.). En multipliant ces figures de participation, le style reader-friendly aujourd’hui recommandé retrouve certains aspects de l’accommodatio rhétorique et confère un ton didactique vaguement convivial à un nombre croissant de textes scientifiques.

In this perspective, the polysemy of on could be seen as a reflection of the Guide, on being a less intrusive and perhaps more reader-friendly marker than vous/“you”, which could potentially imply a more authoritarian attitude vis-à-vis the readers.

7. “The Guide (in the sense that one speaks of a guided visit) performs the didactic task of accompanying the reader and uses figures of participation. For example, he uses the inclusive we (‘We saw above…’). His actions are shared actions of traversing through the text, hence the frequent use of movement and perception verbs (come, see, etc.). By multiplying these figures of participation, the reader-friendly style that is recommended today reinvents certain aspects of the rhetorical accommodatio and confer a didactic, vaguely convivial tone to a growing number of scientific texts” (my translation).
Let us now go on to the Discussion section.

5.1.4. The Discussion section

The Discussion section is characterized by the interpretative values ON₁ (referring to the authors themselves), and ON₄ (referring to the authors and an “unlimited” discourse community, corresponding to “I/we” + “everybody” [tout le monde]). This is the generic value of on, which is in fact considered to be its default value in French. An example of this can be seen in the following example:


In 1994-1995, there was a return to the levels of hospitalization for asthma of 1988-1989 [...].

In this case, the construction on a assisté à is in fact closer to an impersonal expression like il y a eu (“there was”) than to a personal pronoun. Rather than reflecting the personal voice of the author, on is merely part of a presentational device for referring to a large-scale societal trend observed by the authors.

This article is idiosyncratic in the sense that it includes a Conclusion section, a section that is not obligatory in the IMRAD structure.

5.1.5. The Conclusion section

This section is characterized by ON₁ (referring to the authors), associated with the author role of the Researcher, as in example [14]:


We noted a slight decrease in the average stay.

In this example, on is associated with the cognitive verb constater, which indicates participation in the research process, fitting well with the status of the Conclusion section as a place for summing up findings and observations. Furthermore, the verb tense, passé composé, is a textual clue for the temporal situation of the referent of on, as it generally indicates a value close to the deictic centre (i.e., the speaker).

In order to enrich and extend the qualitative analysis, I carried out a quantitative analysis of the distribution of on and nous across the IMRAD structure in the entire subcorpus frmed⁸, which will be presented below.

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⁸. Due to the highly complex semantics of on as well as the many factors involved in the textual representation of author roles, it was not possible to carry out a full analysis of all occurrences of on and nous in the subcorpus with reference to author roles within the scope of this article (this would also necessitate the analysis of co-occurring verbs, adverbs and other contextual elements). This would however be an interesting task for future research.
5.2. The distribution of the pronouns *nous* and *on* across the IMRAD structure

In the KIAP corpus, all articles in the IMRAD format have been coded so that searches can be performed according to the IMRAD sections. On the basis of these searches, I did a simple calculation of the absolute and relative frequencies of the pronouns *nous* (“we”) and *on* in the different sections. The relative frequencies were calculated on the basis of the total number of words in each section. The results (relative and absolute frequencies) are shown in Table 4.

<table>
<thead>
<tr>
<th>Section</th>
<th>Introduction (13,800 words)</th>
<th>Methods, Materials and Results (71,760 words)</th>
<th>Discussion (47,888 words)</th>
<th>Conclusion (5,062 words)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOUS</strong> (relative frequency)</td>
<td>0.27</td>
<td>0.18</td>
<td>0.20</td>
<td>0.24</td>
</tr>
<tr>
<td><strong>NOUS</strong> (absolute frequency)</td>
<td>37</td>
<td>132</td>
<td>95</td>
<td>12</td>
</tr>
<tr>
<td><strong>ON</strong> (relative frequency)</td>
<td>0.21</td>
<td>0.18</td>
<td>0.15</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>ON</strong> (absolute frequency)</td>
<td>29</td>
<td>131</td>
<td>71</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 4. Distribution of the pronouns *nous* and *on* across the IMRAD structure in the subcorpus *frmed*

As can be seen in Table 4, the distribution of the pronouns *nous* and *on* varies across the sections of the IMRAD structure, which is consistent with previous analyses of the distribution of pronouns in research articles in the IMRAD format (Heslot, 1980; Biber & Finegan, 1994). In the *frmed* subcorpus, both *nous* and *on* are more frequent in the *Introduction* and *Conclusion* sections than in the *Methods, Materials and Results* and *Discussion* sections. These findings are consistent with the observations in 5.1, where the *Introduction* section was seen to correlate with certain rhetorical moves, such as claiming one’s place in the research field, which requires a strong personal presence, manifested, *inter alia*, by the pronouns *nous* and *on*. Of course, due to the limited size of the corpus and the fact that the absolute frequencies are low, findings should be taken with caution, however the data nevertheless indicate a relation between article section and the frequency of personal pronouns potentially representing the author’s voice.

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9. However, there is one discrepancy between the coding of the corpus and the IMRAD structure, as sections pertaining to *Methods, Materials and Results* have been coded as a single section in the KIAP corpus. For this reason, the quantitative analyses present them as a single section, while they would strictly speaking be in separate sections in the IMRAD structure.
5.3. The interaction of on and verb types – variation across the IMRAD structure

A key linguistic feature associated with the author roles of the research article is verb semantics. As seen in Section 3, the various author roles tend to be associated with certain kinds of verbs, such as discourse verbs in the case of the author as writer. In this section, I will present the results of an analysis of the verbs associated with on across the sections of the IMRAD format. The purpose of this analysis is to examine whether any patterns can be discerned in the interaction of on and verbs, and whether the verb semantics confirm the findings of the qualitative analysis.

5.3.1. Introduction

The Introduction section is a comparatively short section of the medical research article, and accordingly presents a limited number of verb types as well as occurrences thereof. The verbs most frequently associated with on, constater and estimer (see Table 5) seem to correspond to an impersonal construction corresponding closely to passive constructions such as “is observed”/“is estimated”:

[15] En France, avec un recul de 3 ans, on constate que fin 1998, 57 200 personnes dépendantes aux opiacés suivent un traitement de substitution par la buprénorphine haut dosage (HD) et 7 150 personnes dépendantes aux opiacés sont sous méthadone. (frmed22)

[16] On estime qu’en 1997, le cancer du col utérin sera diagnostiqué chez 1 300 Canadiennes et qu’environ 390 d’entre elles en mourront. (frmed05)

<table>
<thead>
<tr>
<th>Verb type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constater</td>
<td>4</td>
</tr>
<tr>
<td>Estimer</td>
<td>4</td>
</tr>
<tr>
<td>S’ intéresser</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 5. Verb types – Introduction (13,800 words)

5.3.2. Methods, Materials and Results

Since the Methods, Materials and Results section is the most extensive of the sections, there is greater variation in the occurrence of verb types, and a larger number of occurrences of each verb than in the other sections. Research verbs such as observer, noter and estimer are very frequent (see Table 6), which clearly illustrates that on is associated with the author role or the researcher in this section, as illustrated in the following examples:

10. For brevity’s sake, only verbs with two or more occurrences have been included. Modal verbs and periphrastic constructions have also been excluded.
Dans six cas, on observe des valeurs significativement supérieures à la moyenne québécoise: spina biﬁda au Saguenay-Lac-Saint-Jean et dans la région Terres-Cries-de-la-Baie-James; hydrocéphalie congénitale pour la Côte-Nord; atrésie et sténose du côlon, du recrum et du canal anal dans le Bas-Saint-Laurent; anomalies congénitales de la paroi abdominale en Estrie; et syndrome de Down à Montréal-Centre.

Sur les 12 cas associés à un HLA B 27 +, on retrouve un rapport homme/femme de 5 à 7.

<table>
<thead>
<tr>
<th>Observer</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noter</td>
<td>11</td>
</tr>
<tr>
<td>Retrouver</td>
<td>11</td>
</tr>
<tr>
<td>Constater</td>
<td>7</td>
</tr>
<tr>
<td>Remarquer</td>
<td>4</td>
</tr>
<tr>
<td>Estimer</td>
<td>3</td>
</tr>
<tr>
<td>Supposer</td>
<td>3</td>
</tr>
<tr>
<td>Avoir</td>
<td>2</td>
</tr>
<tr>
<td>Considérer</td>
<td>2</td>
</tr>
<tr>
<td>Établir</td>
<td>2</td>
</tr>
<tr>
<td>Trouver</td>
<td>2</td>
</tr>
<tr>
<td>Être</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 6. Verb types – Methods, Materials and Results (71,760 words)

5.3.3. Discussion

The Discussion section is clearly characterized by cognitive verbs (see Table 7), i.e., verbs referring to a mental process such as savoir and ignorer, as in the following examples:

On sait déjà que les héroïnomanes sont susceptibles d’adhérer aux mesures de protection collective, d’hygiène de l’injection, par exemple [références bibliographiques], comme aux contraintes des traitements individuels antirétroviraux ou autres [références bibliographiques].

Peu de données d’enquête ont été recueillies sur l’hystérectomie, et on ignore dans quelle mesure ces questions ont fait intervenir un biais lié à l’auto-déclaration.
Although cognitive verbs are less readily defined as research verbs than verbs such as *observer* that clearly refers to the empirical research process, it seems reasonable to categorize them as research verbs, i.e., as part of the reasoning that is integral to the research process.\(^{11}\)

<table>
<thead>
<tr>
<th>Verb</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constater</td>
<td>4</td>
</tr>
<tr>
<td>Retrouver</td>
<td>4</td>
</tr>
<tr>
<td>Observer</td>
<td>3</td>
</tr>
<tr>
<td>Savoir</td>
<td>3</td>
</tr>
<tr>
<td>Ignorer</td>
<td>2</td>
</tr>
<tr>
<td>Décrire</td>
<td>2</td>
</tr>
<tr>
<td>Voir</td>
<td>2</td>
</tr>
<tr>
<td>Diminuer</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 7. Discussion (47,888 words)

### 5.3.4. Conclusion

Since most medical research articles do not include a *Conclusion* section, the results from the subcorpus *frmed* are too limited to warrant speculation (the *Conclusion* section of the subcorpus contains 5,062 words). However, it should be noted that out of 13 occurrences of *on*, 7 are associated with the modal verbs *pouvoir* and *vouloir*. Generally, these constructions seem to be associated with the author role of evaluator, as in the following example:

[21] Ce positionnement est non seulement lourd de contraintes pour les patients mais aussi pour la famille et *on peut craindre* qu’avec des contraintes élevées, on en arrive à une baisse de compliance et un risque d’échec plus important de la chirurgie. (frmed36)

However, modal verbs may also be associated with the author role of arguer, as in the following example:

[22] *On peut faire* l’hypothèse qu’il en est de même des conduites addictives alimentaires et dans d’autres conduites comportementales où les bases et les mécanismes neuro-biologiques sont les mêmes que dans les toxicomanies. (frmed13)

\(^{11}\) For a discussion of cognitive verbs as research verbs, see Fløttum et al. (2006: 117).
6. Concluding remarks

How do genre constraints influence author representation in research articles? This was the main question examined in this article, exemplified by the influence of the IMRAD format on the use of personal pronouns representing the author, and more specifically the French polysemous pronoun on.

On, being a polysemous pronoun, can represent the author’s voice, as well as the reader(s) or person(s) external to the author-reader couple. To what extent does the IMRAD structure govern the distribution of on across the text, as well as the selection of the appropriate interpretative values in a given section? Moreover, can the variation in pronominal use across the IMRAD structure be linked to a variation in rhetorical functions (such as arguing, presenting research, etc.), that the literature has shown to be specific to certain sections of the IMRAD structure?

In this paper, I have presented a set of qualitative and quantitative analyses of a set of French medical research articles taken from the KIAP corpus, in order to account for the variation in the use of the pronoun on in medical research articles. In Section 5.1, I presented a qualitative case study of a research article characterized by a frequent use of on where I examined the variation in the interpretative values of on across the IMRAD structure as well as the pronoun’s interaction with various author roles. Following Fløttum et al. (2006) and Rastier (2005 and 2011) I understand author roles as the linguistic representation of various aspects of the author as a textual being (Writer, Researcher, Arguer, Evaluator, Guide). Furthermore, I applied the classification of values of on in research articles proposed by Fløttum et al. (2007), who identified 6 values ranging from ON1 = the researcher (I/we) to ON6 = other persons external to the author-reader couple (i.e., other researchers). The analysis presented in 5.1 indicated that there is indeed a variation across the IMRAD structure, both in the absolute frequency of on as well as in the interaction of on and nous, the other personal pronoun that may be used to refer to the authors themselves in medical research articles.

The Introduction section was characterized by the interpretative values ON1 (referring to the Author(s), corresponding to “I/we”), and ON6 (referring to other(s), corresponding to “he/she/they”, other researchers), which is consistent with previous findings. Most of the occurrences correspond to the author role of Researcher. Interestingly, the Introduction section also contained some instances of ON6, referring to parties external to the author-reader couple, in most cases other researchers. These observations tie in with Swales’ (1990) CARS model of Introduction sections in research articles, in which he argues that this section is frequently used for identifying gaps in existing research and situating one’s own research within the field.

The Methods and Results sections were both dominated by the value ON1 and the author role of Researcher. In addition, the Results section contained several occurrences of on that were more ambiguous, in the sense that it was at times
unclear whether on referred to the authors exclusively, or to a collective including the reader(s), thus creating a didactic or metatextual effect, including the reader in the process of reasoning.

The Discussion section was characterized by the value ON1 and ON4 (referring to the authors and an “unlimited” discourse community, corresponding to “I/we” + “everybody” [tout le monde]), i.e., the generic value of on, which is in fact considered to be its default value in French.

The article also contained a Conclusion section, which is unusual for the medical research articles in the KIAP corpus. The section was characterized by ON1 and on was associated with the author role of the Researcher. In this section, on was largely associated with cognitive verbs used as research verbs.

In order to complement the qualitative analyses, two quantitative analyses were carried out. Section 5.2 presented an analysis of the distribution of the pronouns nous and on across the IMRAD structure. A comparison with nous was considered useful, because on and nous may both represent the author’s voice in medical research articles, which generally avoid using the first person singular pronoun je, both because of genre constraints and because most medical research articles are multi-authored articles. The results show that the distribution of the pronouns nous and on varies across the sections of the IMRAD structure, which is consistent with the literature. Both nous and on are more frequent in the Introduction and Conclusion sections than in the Methods, Results and Discussion sections. Moreover, these findings are consistent with the observations in 5.1, where the Introduction section was seen to correlate with certain rhetorical moves, such as claiming one’s place in the research field, which requires a strong personal presence, manifested, inter alia, by the pronouns nous and on.

In Section 5.3, I examined the interaction of on and verb types, and to what extent this interaction varies across the IMRAD structure. Verb types are a key indicator of the interpretative value of on, by situating the pronoun’s referent in relation to the research process described (research verbs), or through metatextual clues (discourse verbs).

The results indicated that the verb types associated with on vary across the IMRAD structure. In the Introduction section, constater and estimer are the verbs most frequently associated with on and correspond to impersonal or passive constructions such as “is observed”/“is estimated”. The Materials, Methods and Results sections exhibited a greater variation in verb types, as well as a larger number of occurrences of each verb type. Research verbs such as observer, noter and estimer were frequent, and in these cases on was associated with the author role of the Researcher. The Discussion section was characterized by cognitive verbs, i.e., verbs referring to a mental process or state, such as savoir and ignorer. Since the number of words in the Conclusion section is limited, the results for this section should be interpreted with caution. However the analyses indicate a predominance of modal constructions, associated
with the modal verbs *pouvoir* and *vouloir*. Generally, these constructions seem to be associated with the author role of Evaluator, although modal verbs and modal expressions more generally may also be associated with the author role of Arguer.

In summing up, the set of analyses allows us to conclude that the IMRAD structure does in fact seem to influence the frequency and interpretative values of *on* across the text. This variation seems to be linked to the regulation of rhetorical structures and argumentative moves that is imposed by the IMRAD format; certain speech acts and micro-purposes are assigned to specific parts of the text. This could in turn be seen as an example of the influence of genre constraints on all sequential units of the research article. The IMRAD structure is therefore a powerful tool for the coherence of the discourse community, because its schema governs the representation of the author’s voice and rhetorical structures associated with it.

References


