



# Exploring the Distribution Regularities of Referees' Comments in IMRaD Structure of Academic Articles



Chenglei Qin, Chengzhi Zhang

Department of Information Management, Nanjing University of Science and Technology, Nanjing, China

## Introduction

Peer review is playing an essential role in scientific communication, which is closest to the natural state of the evaluated object (Narin, 1978). For a long time, limited by the traditional peer review mechanism, the peer review reports are not large-scale open access, scholars cannot unveil the mystery of peer review from the perspective of text content. Most scientific articles' structural functions can be divided into IMRaD structures (Introduction, Materials & Methods, Results, and Discussion). Exploring the distribution regularities of peer review comments among different structural functions can reveal the critical points of referees' focus and help students or early-career researchers deepen their understanding of peer review mechanisms.

## Methodology

**Dataset**  
1,333 papers' section structural functions were recognized by the feature words of section type from Atmospheric Chemistry and Physics. The feature words of section type can be found Table 1). The distribution of the dataset from 2001 to 2016 is shown in Figure 1.

Table 1. Feature words of section type

Type	Feature words
I	introduction, motivation, background, overview, review of literature
M	system, theory, method, methods, methodology, model, models, framework, approach, approaches, methodologies, experimental, experiment, experiments, data, data and methods, equations, equation, eq., eq. eqs., parameters, parameter, coefficients, coefficient
R	result, results, analysis, measurements, measurement
D	discussion, discussions, conclusion, conclusions, summary, concluding, summary and conclusions

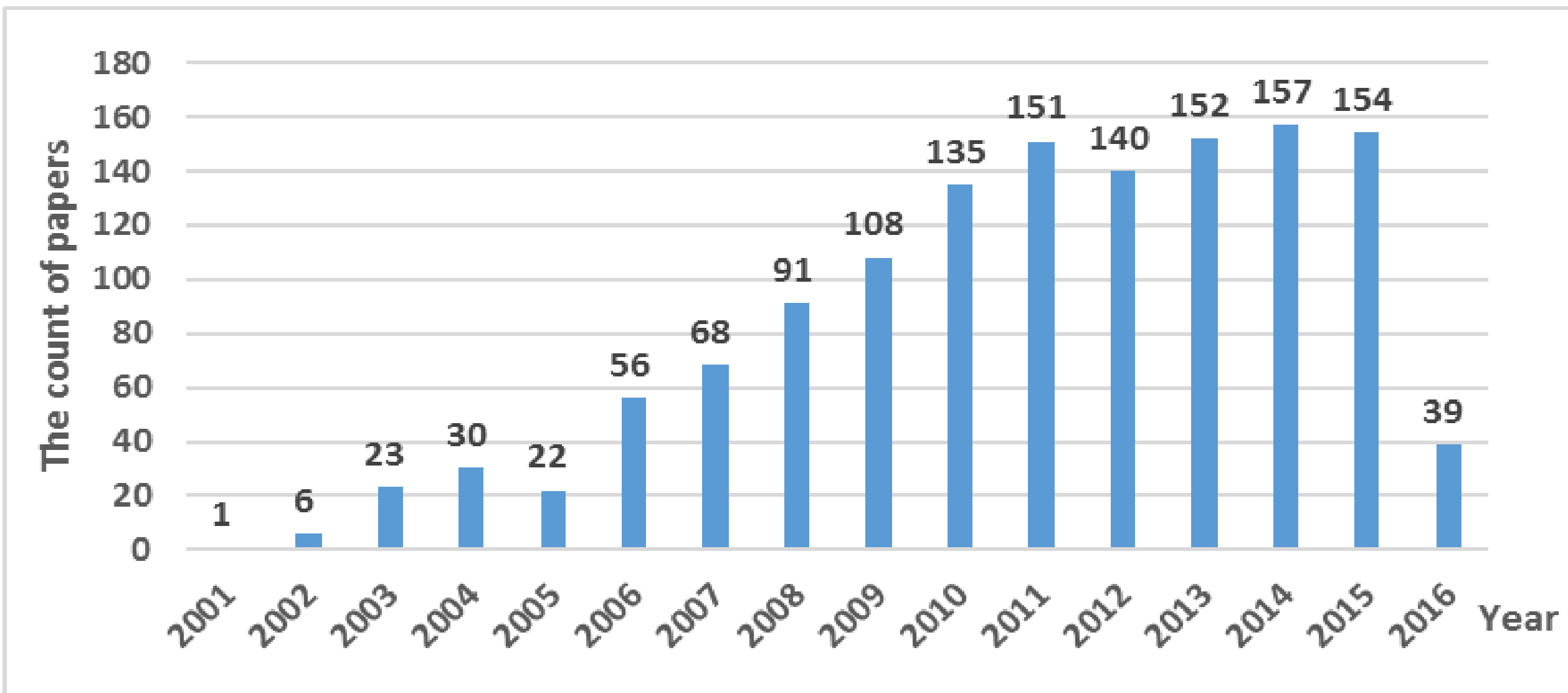


Figure 1. The distribution of papers from 2001 to 2016

## Location Information Extraction of Referees' Comments

The location information (such as page, line, table, figure, equation, et c.) of reviewers' comments can be extracted through the rules of the regular expression (The rules can be found in <https://github.com/kakabular/peer-review>). According to the style of the ACP review reports, one paragraph generally comments on one problem. Therefore, we treat one paragraph as one comment sentence. The distribution of the number of peer review comments with location information is shown in Figure 2. The lowest coverage rate is 0.77.

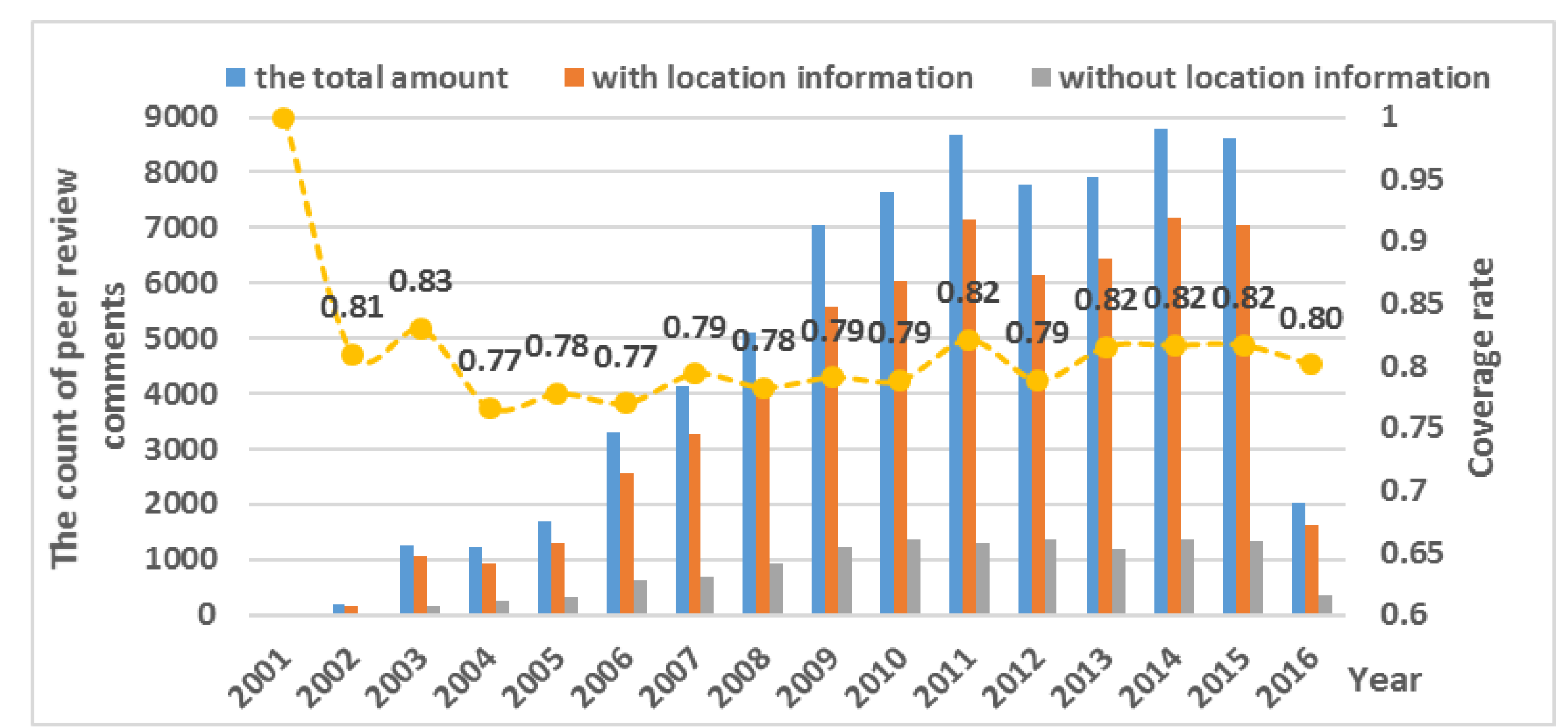


Figure 2. The distribution referees' comments from 2001 to 2016.

## Results

Taking the year of 2007 as an example, Figure 3(a)- 3(e) shows the distribution of peer review comments in the IMRaD structure, which presents that in the majority of cases the proportion of peer review comments distributed in the Materials and Methods sections is significantly higher than in the Introductions and Discussion sections, reflecting deeper concern of the referees on materials, methods and experimental results. Figure 3(f) shows the average distribution of the review opinions in the IMRaD structure that 40% and 43% of reviewer comments are directed at Materials & Methods and Results, which can verify the above findings. Figure 3(g) shows the distribution of the review comments in the actual sections, from which it can be seen that the number of review comments distributed in the opening and ending sections of the paper is significantly less than the sections in the middle part. The distributions of peer review comments in other years (for example, in the year of 2003, 2009, 2011, 2013, 2015) are shown in Figure 4

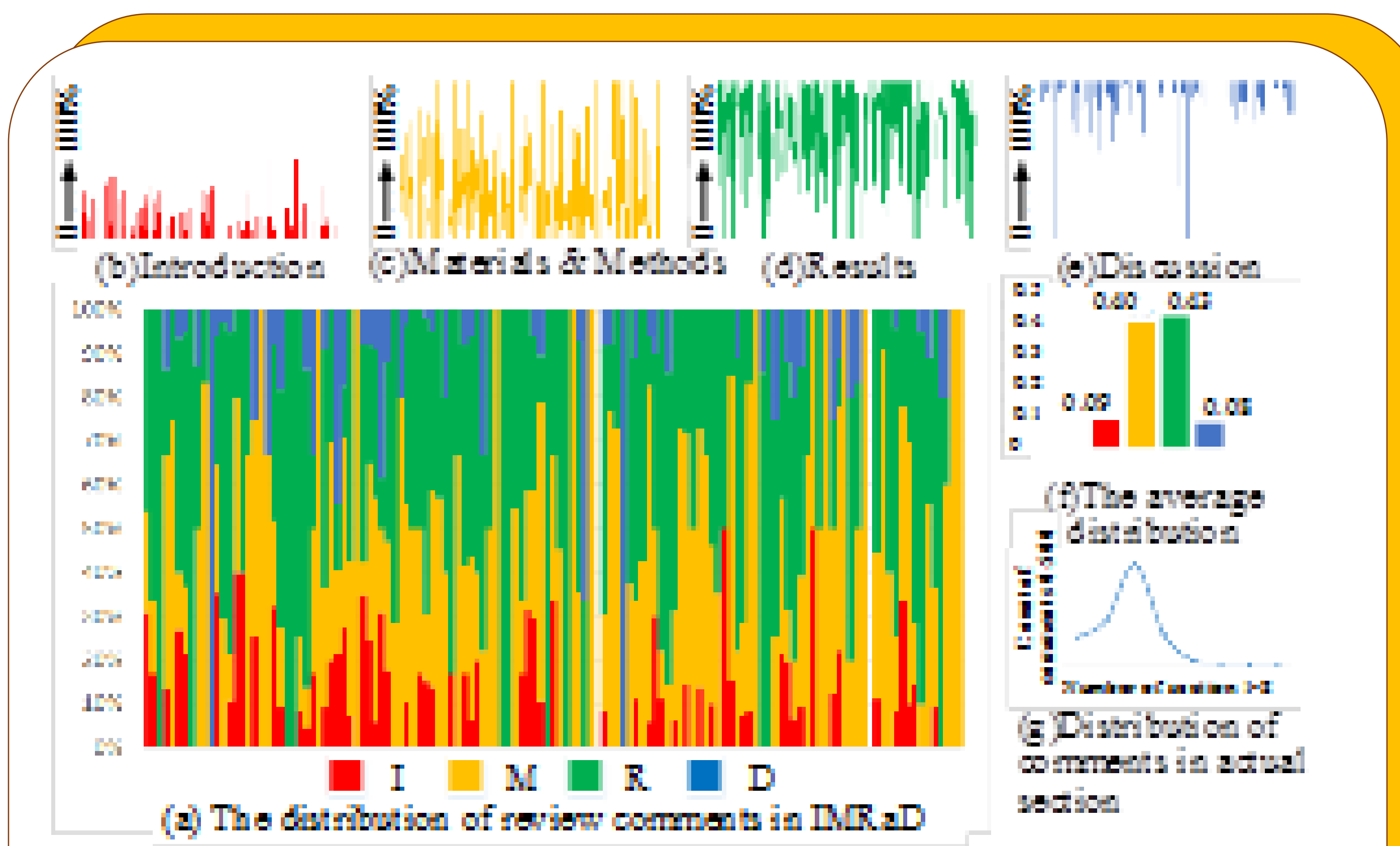


Figure 3. The distribution of referees' comments of data in 2007.

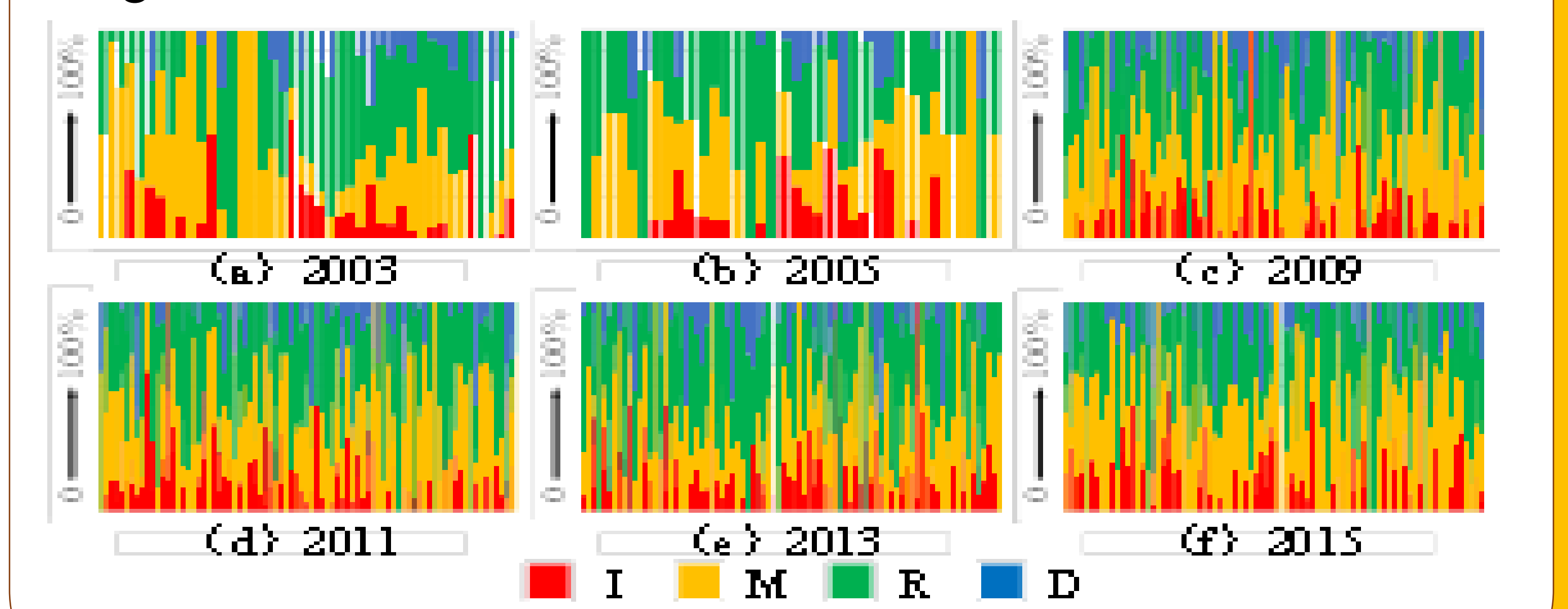


Figure 4. The distribution of referees' comments in other years

## Conclusion

Based on ACP data from 2001 to 2016, this paper explores the distribution of peer review comments in different structural functions of academic articles and actual chapters. The results show that the reviewers pay more attention to Materials & Methods and Results. The proportion of reviewers' opinions in the middle sections of a paper is higher than that in the beginning and end of a paper.

## Acknowledgement

This work is supported by the National Natural Science Foundation of China (No. 72074113).

### Contact

Chenglei Qin (clqin@njust.edu.cn)

Chengzhi Zhang (Corresponding author, zhangcz@njust.edu.cn)