

# Pedagogical Analysis of Two Indonesian Science News Articles

## *A Multimodal Study*

Yulizar Komarawan

*Department of Linguistics, School of Postgraduate Studies, Universitas Pendidikan Indonesia*  
*yulizar.komarawan@upi.edu*

**Keywords:** Classification, Framing, Formality, Indonesian Science News Articles, Multimodal Analysis.

**Abstract:** Nowadays, web 2.0 helps us raise scientific literacy. It provides a space for experts to disseminate the current scientific knowledge or journalists to spread the re-contextualized scientific knowledge which is easy to be understood by non-specialized publics. Perhaps, that just raises a question: how can journalists successfully transform complicated scientific knowledge into accessible knowledge for lay audiences? This study investigates how scientific knowledge is reconstructed in Indonesian science news articles so that it is accessible for the lay audiences. Particularly, the present study focuses upon the process of recontextualization of scientific writing discussing gene. A qualitative case study was employed to achieve the goal. Particularly, this study focused upon analysing classification, formality, framing of the articles. Two multimodal texts taken from two Indonesian websites *kompas.com* and *nationalgeographic.co.id* were used as the data of the present study. The findings suggest that Indonesian news media tend to present the knowledge in weak classification, low formality and weak framing.

## 1 INTRODUCTION

The development of technology has driven many changes especially on the way people communicate ideas. In recent years, for example, personal blogs or websites are being used to communicate scientific knowledge. The new media, as Ashwell (2014) states, have helped to shape public understanding of science and understand the current development of science. Furthermore, such media have emerged a new scientific discourse or register called “the science popularization article” (Calsamiglia and van Dijk, 2004; Myers, 2003; de Olivera and Pagano, 2006). The term popularization here refers to “the transformation of specialized knowledge into ‘everyday’ or ‘lay’ knowledge, as well as a re-contextualization of scientific discourse” (Calsamiglia and van Dijk, 2004, p. 370). Therefore, the scientific popularization is not simplified version of scientific knowledge.

Researchers state that the re-contextualization of scientific knowledge involves various strategies of explanation (see Molek-Kozakowska, 2016, 2017; Myers, 2003). According to Calsamiglia and Van Dijk (2004), the strategies include definition, metaphor, and other strategies which enable

language users to relate the new knowledge to old knowledge. Moreover, Molek-Kozakowska (2016) discusses that making science popular involves various ways such as creating simple stories, using understandable language and visuals, selecting appropriate newsworthy issues and framing of scientific works, and choosing a rhetorical presentation of research findings that avoid alienating lay audiences. In other hand, Dimopoulos, Koulaidis, and Sklaveniti (2003, 2005) state that the re-contextualization of scientific knowledge deals with organising principles, prevailing convention, and legitimating ideologies of institutional. This view is closely associated to the notions of classification and framing proposed by Basil Bernstein.

Much research has been conducted to investigate the scientific popularization. Molek-Kozakowska (2003, 2016, 2017) focused upon the stylistic hybridity of press articles. De Olivera and Pagano (2006) investigated the realization of lexicogrammar of discourse presentation in the scientific news articles. Dimopoulos, Koulaidis, and Sklaveniti (2003, 2005) analysed how the scientific knowledge was re-contextualized in Greek press articles and Greek textbooks for secondary level. However, it seems that the study which specifically addresses

how Indonesian journalists transform complicated scientific knowledge into accessible knowledge for lay audiences has not been deeply explored yet. Therefore, this study investigates how scientific knowledge including terms, notation, symbols and images is re-contextualized in the Indonesian news articles.

## 2 LITERATURE REVIEW

In order to understand how scientific knowledge is re-contextualized in the press articles, the current study uses the notion of classification (Bernstein, 1996), formality (Halliday and Martin, 1996), and framing (Bernstein, 1996). The term classification refers to the epistemological relationship between knowledge categories (Bernstein, 1996). The knowledge can be categorized as the specialized scientific knowledge or everyday common sense knowledge. Therefore, there are two types of classification, namely strong classification (well-defined border-line between the types of knowledge) and weak classification (blurred border lines between them) (Dimopoulos, Koulaidis, and Sklaveniti, 2005). To investigate the content specialization in the press articles, the current study seeks for the level of lexical density of factual scientific information in the texts and the visual representation in the images as proposed Kress and Van Leeuwen (2006).

Formality deals with the degree of abstraction and specialization of the modes both linguistic and visual modes. Formality runs from low formality indicated by the use of codes which resembles the vernacular to high formality indicated by the use of the codes which follows the convention of scientific experts when communicating scientific knowledge (Koulaidis, Dimopoulos, and Sklaveniti, 2001; Dimopoulos, Koulaidis, and Sklaveniti, 2005). In texts, the markers of formality involve the use of notation, symbol, and specialised terminology, nominalizations, passive voice, and syntactic complexity while in images the formality can be investigated through degree of abstraction or articulation of pictures (Kress and van Leeuwen, 2006).

Framing, which can be strong and weak, deals with positions between readers and texts. Strong framing happens when the texts have higher positions than the readers while weak framing readers have more access to the texts. In linguistic codes, framing can be identified through the use of imperative, interrogative, or declarative sentences

and pronouns by the writers. Meanwhile, in images framing is realized through distances and angles (Koulaidis, Dimopoulos, and Sklaveniti, 2001).

## 3 METHODOLOGY

The present study was located within qualitative study. Particularly, this study was classified as a case study since the study it focused on single case (Stake, 1985), which is, the re-contextualization of scientific knowledge in two science news articles and the case is analysed deeply. As discussed earlier, the current study focused upon the notion of classification, formality, and framing which were used as the framework. This study used two science articles taken from *kompas.com* containing 224 words (12 sentences) and *National Geographic*.co.id containing 418 words (23 sentences). Both of the texts discuss cell and contain pictures. The data were then analysed using systemic functional grammar (Bloor and Bloor, 2004; Halliday and Matthiessen, 2014) and visual grammar (Kress and van Leeuwen, 2006). In analysing the data, the study investigated the linguistic mode. It was then followed by the analysis of visual mode.

## 4 FINDINGS AND DISCUSSION

This section presents the results from the analyses of linguistic and visual modes in science news articles along the three dimensions of classification, formality, and framing in both linguistic mode and images.

### 4.1 Classification

The degree of content specialization or classification is verbally investigated by analysing the lexical density of factual pieces of specialised information in texts (Koulaidis, Dimopoulos, and Sklaveniti, 2001). Based on the analysis, it was found that KOMPAS uses only 16% of specialised information or 35 specialised words out of 224 words such as *sel*, *nukleus*, *mikroskopberflouresensi*, *membrannukleus*, *amplitude*, *fluktuasi*, *distrofiotot*, and so on. In similar vein, National Geographic Indonesia uses only 11% of specialised words or 47 specialised words out of 418 words such as *editing gen*, *guntinggenetik*, *CRISPR-Cas9*, *mutasigenetik*, and so on. The findings suggest that both media use less

than 50% of specialised words. It can be categorized as weak classification.

Visually, the degree of content specialization can be investigated in terms of function and type (Dimopoulos, Koulaidis, and Sklaveniti, 2003). With regards to their function, images can be narrative, classificational, analytical, and metaphorical (see Kress and van Leeuwen, 2006) while in term of type, images can be realistic, conventional, and hybrid (Dimopoulos, Koulaidis, and Sklaveniti, 2003).

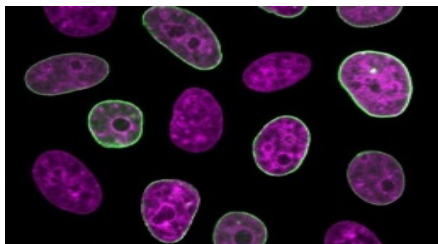


Figure 1: Nucleolus of human cell taken from Kompas.com.

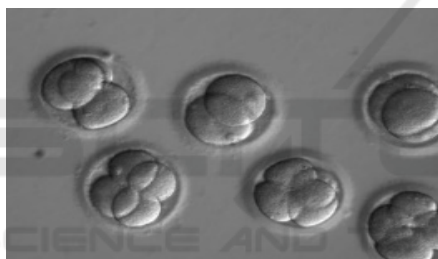


Figure 2: Human embryo taken from nationalgeographic.co.id.

The analysis of images suggests that both images are categorized as analytical images since they show the relations between the object of representations. The use of analytical images indicates the writer foreground moderate classification. Meanwhile, in term of type the images can be classified as realistic since it “represent reality according to human optical perception” (Koulaidis, Dimopoulos, and Sklaveniti, 2001, p. 10). Realistic pictures indicate weak classification.

## 4.2 Formality

As stated previously, the analysis of the degree formality of language use in the articles focuses upon the use of notation and specialised terminology, nominalisations, passive voice, and syntactic complexity (Dimopoulos, Koulaidis, and Sklaveniti, 2005). The results from the analysis of two articles are presented in Table 1 and 2.

Table 1: The language of formality including specialised terms/notation/symbol and nominalization.

Media	Frequency	
	Specialised terms/notation/symbol	Nominalization
Kompas	33	3
NG	47	9

Table 2: The language of formality including syntactic structures (paratactic and hypotactic) and passive voice.

Media	Frequency		
	Paratactic	Hypotactic	Passive voice
Kompas	8	4	4
NG	14	9	3

Table 1 and 2 suggest that both media present the scientific knowledge in weak formality. This is indicated by the use of only specialised terms in presenting the knowledge and the low frequency of nominalisation. Furthermore, the sentences are dominantly written in paratactic structure and active voice.

Meanwhile, the formality of the visual representation can be investigated through the analysis of the degree of abstraction (Kress and van Leeuwen, 2006). The markers of formality include elements of the scientific code, colour differentiation, colour modulation, and contextualisation. The analysis found that both images as shown in Figure 1 and 2 do not show geometrical shapes or alphanumeric strings. The background of the pictures is in the form of the photographic reception. With regards to their colours, both of the pictures are all the shades received by the photographic lens and colourful. These findings indicate that the pictures are presented in low formality

## 4.3 Framing

Framing can be verbally identified through the analysis of sentence types and the use of pronouns (first, second, and third person) in the texts (Dimopoulos, Koulaidis, and Sklaveniti, 2005). The analysis found that KOMPAS uses 17% interrogative sentences (2 out of 12 sentences) like *PernahkahAndabertanya, berapa lama umursel yang ada di dalam tubuh Anda?* and 83% declarative sentences. Meanwhile, national geographic uses only declarative sentences. With regards to the used pronouns, both use third person singular and plural.

These indicate that the media foreground low framing.

Visual framing is identified through the analysis of vertical and horizontal angle (see Kress and van Leeuwen, 2006). In terms of vertical angle, Figure 1 and 2 were taken from high angle, suggesting that viewer has power over the represented participants. Meanwhile, in terms of horizontal angle the pictures were taken from frontal angle and presented in close shot. This indicates involvement between viewers and the represented objects in the images. The use of high angle, frontal angle, and close shot indicates that the writer present the pictures in weak framing.

## 5 CONCLUSION

The science news articles project an image of science as weakly specialised bodies of knowledge (weak classification) or everyday knowledge. This trend is strengthened by the use of less specialised code (weak formality) in which the writers use only scientific terms, low frequency of (single) nominalization, paratactic structures, and less passive voice. In terms of framing, both linguistic and visual modes are presented in weak framing. This kind framing indicates that viewers' control over the act of the communication. The combination of weak classification, low formality, and weak framing makes the viewers be able to control the discourse. In other words, readers or viewers can easily grasp the information.

## REFERENCES

- Ashwell, D. J., 2014. The challenges of science journalism: The perspectives of scientists, science communication advisors and journalists from New Zealand. *Public Understanding of Science*, 1-15.
- Bernstein, B., 1996. *Pedagogy, Symbolic Control and Identity: Theory, Research*, Taylor and Francis. London.
- Bloor, T., Bloor, M., 2004. *The Functional Analysis of English: A Hallidayan Approach*, Arnold. London, 2nd ed.
- Calsamiglia, H., Van Dijk, T. A., 2004. Popularization discourse and knowledge about the genome. *Discourse Society*, 369-389.
- de Olivera, J. M., Pagano, A. S., 2006. The research article and the science popularization article: a probabilistic functional grammar perspective on direct discourse representation. *Discourse Studies*, 627-646.
- Dimopoulos, K., Koulaidis, V., Sklaveniti, S., 2003. Towards an analysis of visual images in school science textbooks and press articles about science and technology. *Research in Science Education*, 189-216.
- Dimopoulos, K., Koulaidis, V., Sklaveniti, S., 2005. Towards a framework of socio-linguistic analysis of science textbooks: The Greek case. *Research in Science Education*, 173-195.
- Halliday, M. A., Martin, J. R., 1996. *Writing Science: Literacy and Discursive Power*, The Falmer Press. London.
- Halliday, M., Matthiessen, C., 2014. *Halliday's Introduction to Functional Grammar*, Routledge. London and New York, 4th ed.
- Koulaidis, V., Dimopoulos, K., Sklaveniti, S., 2001. Analysing the texts of science and technology: School science textbooks and daily press articles in the public domain. *Proceedings of the Learning Conference 2001*, 4-25.
- Kress, G., van Leeuwen, T., 2006. *Reading Images: The Grammar of Visual Design*, Routledge. New York, 2nd ed.
- Molek-Kozakowska, K., 2016. Stylistic analysis of headlines in science journalism: A case study of new scientist. *Public Understanding of Science*, 1-14.
- Molek-Kozakowska, K., 2017. Communicating environmental science beyond academia: Stylistic patterns of newsworthiness in popular science journalism. *Discourse & Communication*, 69-88.
- Myers, G., 2003. Discourse studies of scientific popularization: Questioning the boundaries. *Discourse Studies*, 265-278.
- Stake, E., 1985. Case study. In J. Nisbet, J. Mergary, & S. Nisbet, *World yearbook of education 1985: Research, policy and politics*, Nicholas Publishing Company. London.