

REVIEW ARTICLE

How can rehabilitation specialists write high-quality scientific English papers?

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INTRODUCTION

Differing from other kinds of writings, scientific English paper is an exposé writing (King, 1978), which is intended to convey clear information to the readers. The objectives of this article are only to give hands-on experiences with the rules of scientific English-writing for improving the writing quality of rehabilitation papers for publication. This article is revised, adapted, and updated based on an author's previous article for psychiatrists' readers (Shen, 2009).

Based on the format of my monograph, *Examples in Writing English Medical Papers for the 21st Century* (Shen, 2008), I briefly compile examples of rehabilitation paper writings to show the points in 10 *do's and don'ts* in effective scientific writings. Then step by step, I show writing examples with my copy-editing comments for the introduction, method, results, discussion, and abstract sections of manu-

Abstract

Objectives: The objectives of this review are to familiarize rehabilitation specialists or students with rules of effective English-writing and to improve the writing quality of their rehabilitation papers for scientific publication.

Method: Based on the format of author's monograph *Examples in Writing English Medical Papers for the 21st Century*, I compiled examples of scientific writings. Those examples were mainly adapted over the years from past pre-submitted manuscripts to the program of young doctors' development at Taipei Medical University-Wan Fang Medical Center, requesting for the service of copy-editing before manuscript were submitted to journals for consideration for publication. Some of them were from submitted manuscripts to the *Taiwanese Journal of Psychiatry* (www.e-tjp.org).

Results: For clear, effective English-writing, I introduce briefly in this article the rules of 10 *do's and don'ts* (using correct grammar, writing simpler sentences, varying writing styles, using more active voice writing, avoiding redundancies, reducing the use of Latinate words, choosing strong verbs, using correct parallel construction, avoiding empty words or phrases, and choosing correct specific words). Then, I show the actual hands-on copy-edited changes of sample sentences from original versions to revisions in writing the introduction, methods, results, discussion, and abstract sections of manuscripts. I also explain and illustrated in those sampled rehabilitation writings.

Conclusion: I hope that the rehabilitation specialists and students can have some ideas how to write and improve high-quality English papers in their future preparation of scientific rehabilitation manuscripts after your reading this article carefully.

scripts. Those examples were mainly adapted over the years from previous pre-submitted manuscripts written by young doctors' development program at Taipei Medical University-Wan Fang Medical Center, requesting for the copy-editing service before manuscripts were submitted to journals. Some of them were from submitted original manuscripts to the *Taiwanese Journal of Psychiatry* (www.e-tjp.org). The writing errors shown in this article are unnecessarily reflecting the original mistakes made by my hospital young doctors or the *TJP* contributors (King, 1978).

TEN DO'S AND DON'TS IN ENGLISH SCIENTIFIC WRITING

Instead of going through the drills of the English grammar (Strunk, 1918), I have found that just paying attention to the writing rules of 10 *do's and don'ts* (10 commandments) in effective scientific writings (Shen,

2008, 2009) can improve writing quality quickly and tremendously. Table 1 lists those *10 do's and don'ts*, from number “1” to “10” based on my published monograph in Mandarin (Shen, 2008) or an article in English (Shen, 2009).

Table 1. Ten *do's and don'ts* in effective scientific writings

(1) Using correct grammar
(2) Writing simpler sentences
(3) Varying writing styles
(4) Using more active voice writing
(5) Avoiding redundancies
(6) Reducing the use of Latinate words
(7) Choosing strong verbs
(8) Using correct parallel construction
(9) Avoiding empty words
(10) Choosing correct specific words

Due to the space limitations in this article, I do not attempt to elaborate *10 do's and don'ts* in effective scientific writings one-by-one right here in this section of the article. But I shall explain through examples shown in the later sections of this article. Those *10 do's and don'ts* in effective scientific writings are self-explanatory. The readers are referred to read original publications (Shen, 2008, 2009) for more examples and detailed explanation, if needed.

WRITING THE INTRODUCTION SECTION

The main purpose of writing the introduction section is to explain what are the problems of an original article or a brief report. In preparing a study paper, I recommend writing this introduction section last, after you complete writing the results, methods, and discussion sections. I also suggest that the introduction section is written in the following four steps (Shen, 2008, 2009):

1. To point out the problems in questions

In the opening sentences of the introduction section, you need to point out the problems in question right away. Usually, the key words in the title of the manuscript should appear in the first 1 to 3 opening sentences when providing the background information, otherwise, you are wasting your words. We use

present-tense sentences under this current heading of the introduction (Day, 1995, 2006). See the following example sentences (Shen, 2008) for my illustration:

Example

Original version 1-1-A

Health for ALL is the ultimate goal for the WHO, which is also most anticipated by the people all over the world.

Revision 1-1-A1

“Health for all” which is the ultimate goal for the World Health Organization (WHO), which is also most anticipated.

Revision 1-1-A2

“Health for all” is the ultimate goal for the World Health Organization. The people all over the world also anticipate this goal.

The writer mentions the title word “health” in the first opening sentence (original version 1-1-A) under the introduction section. But the presence of the word “ALL” is inappropriate because we do not often see a word spelled in all upper-case letters. In that article, the main theme is “health for all” rather than “ALL.” Therefore, we use quotation marks to designate “health for all” as an entity in two revisions to make the main theme clear.

In the sentence (original version 1-1-A1), the acronym “WHO” should not appear first without a full spelling of all words. Therefore, we spell out “World Health Organization” in both revisions. We surely can use “WHO” if this organization needs to be mentioned later in the article. Whether we add “(WHO)” after its full spelling (revision 1-1-A1), is not important because this acronym is easily understood by the readers.

In the revision 1-1-A1, the addition of the word “which” makes the clause next to “health for all,” to give a clear meaning for the sentence (Stunk, 1918). But in revision 1-1-A2, writing in two simpler sentences instead of a long sentence gives the clearest meaning. To use simpler sentences is listed one of *10 do's and don'ts* (Table 1).

2. To review published articles on the topic and to give comments

In the second part of the introduction section, we need to review the published papers only on the topic related to the problems in question rather doing a thorough or encyclopedic review of all related published articles. We need to state all related knowledge in those papers, either positive or negative view, found in the literature, and also give our own opinion or criticism at the end after the review of published articles.

Example**Original version 1-2-A**

Behavioral problems such as poor social judgment and emotion regulation or self-control may cause patients with traumatic brain injury (TBI) to misinterpret other emotions, facial expression, and behavioral intention [1,2], which may lead to disrupt social relationship with others. Other behavioral problems such as aggressive behaviors may also upset relationships with others, and hamper their social participation as well as educational and employment opportunity [3-5]. Therefore, dealing with issues related to aggressive behaviors is crucial for helping TBI patients with their problems, facilitating healthy social relationship so as to improve quality of life.

Revision 1-2-A

Behavioral problems (poor social judgment, emotion regulation, or self-control) cause patients with traumatic brain injury (TBI) to misinterpret others' emotions, facial expression, and behavioral intention [1,2], resulting in worsening social relation with others. Other behavioral problem (such as aggressive behavior) can further worsen relations with others, restrict their social participation, as well as limit opportunity at school and work [3-5]. Therefore, dealing with issues related to aggressive behavior is crucial for helping patients with TBI, solve their problems, improve social relation with others, and promote their own quality of life.

In the example sentences (original version 1-2-A) on the topic "aggressive behavior," the author defined behavior problems in patient with traumatic brain injury. The author defined that those patients can have at least one of the three problems of poor social judgment, poor emotion regulation, or poor self-control first. As cited from two published papers [1, 2], those patients can misinterpret three bad things. After giving the initial background information, the topic of aggressive behavior is introduced. Then, three consequences of aggressive behavior are listed with another references of three published papers. Finally, the author stressed the importance in treating those patients with aggressive behaviors. The logic and message of those sentences presenting from the published articles are excellent.

In the revision (1-2-A), we put "poor social judgment," "poor emotion regulation," or "poor self-control" together with parenthesis as behavior problems to define them clearly. In the second sentence, we do the same thing with parenthesis to define "aggressive behavior" effectively as another behavioral problem. In this sentence, we use three verbs (to worsen, to restrict, and to limit) to describe three consequences with parallel construction one of 10 *do's and don'ts* (Table 1). We need to note the hierarchical difference between "as well as" and "and." We also use simple Anglo-Saxon words "school" and "work" replacing for the Latinate words "education" and "employment" as listed as one of 10 *do's and don'ts* (Table 1), to convey the message effectively. We use "people-first lan-

guage" "patient with TBI" instead of "TBI patients." This kind of writing has also strongly advocated by textbook authors of occupational therapists (Rice, 2019). To note, we also use "relation" replacing for "relationship" for brevity.

3. To justify the need for this current study after pointing out further issues

After having reviewed the literature and added criticism, you need to raise further issue to justify the need of your writing current study in the third portion of the introduction section.

You do not have to find fault or discredit all the studies in the cited papers. But you can just state that you want is to strengthen the body of the literature with adding something important in the existing literature. The ability to list elegant reasons of conducting your current study is often a reason to determine whether this manuscript is accepted for publication by some editors.

Examples**Original version 1-3-A**

There sensors are widespread and are easy to use. However, there have been no reports on the gait analysis in patients with chronic psychiatric disorder using smartphone.

Revision 1-3-A

Although sensors are widespread and are easy to use, no reports exit on the gait analysis . . .

Original version 1-3-B

Few studies of the effects of background music on workers attention have focused on the role of tempo, which is an important element of music. Additionally, few studies of the effects of background music on worker attention have analyzed nursing personnel. Some studies showed music with lyrics has a negative effect on worker attention.

Revision 1-3-B

Few studies exist on the effect of background music tempo on nurses' attention using music without lyrics. Therefore, we planned to study nurses' attention using music without lyrics.

Original version 1-3-C

Although rehabilitation specialists have known for some time the physiological, psychological and social complications of obesity, the issues of quality of life in obese patients are less-documented.

Revision 1-3-C

Although rehabilitation specialists have known for some time the physiologic, psychologic, and social complications of obesity, the issues of quality of life. . .

In the example sentences (original version 1-3-A) on the topic "gait characteristics measured with a standard smartphone," the writers intended to analyze gait characteristics using smartphone in patients with chronic psychiatric patients. In the absence of existing papers on gaits analysis, they intended to do this study on gaits to add some findings in the existing literature. As shown in listing

do's and don'ts in Table 1, we discourage the use of empty phrases (it is, there are) for scientific writing. Therefore, we introduce the use of a word “exit” to get rid of “there have been” in this scientific paper.

In the example sentences (original version 1-3-B) on “absence for the effect of background music tempo on nurses’ work attention performance,” the authors wanted to amend this short-coming in the existing literature. Therefore, the writers planned a study on nurses’ work attention performance with background music without lyrics. This message can be achieved in the second simple sentence (revision 1-3-B).

In the example sentences (original version 1-3-C) on the issue of “quality of life on patients with obesity,” we use words “physiologic” and “psychologic” replacing for “physiological” and “psychological,” respectively, for the brevity of words. The words in the replacement has exact meaning of those being replaced. We also changed “obese patients” into “patients with obesity” in the second revision sentence for the rule of person-first language (Rice, 2019).

4. To give the objectives or the hypotheses to be tested of the study

The introduction section of the manuscript often is ended with a listing of the “aims” or “objectives” of the intended study. All the writings here should always use in the past-tense sentence because all those studies were finished before their writing this scientific paper. Occasionally, the investigators state the hypothesis to be tested in the study. In this case, we need to use subjunctive mood for the sentences stating the hypotheses.

Examples

Original version 1-4-A

The authors of this paper intended to investigate the use of alternative medicine among new patients in the psychiatric outpatient departments and to examine the following questions: (1) Are the alternative medicine users older? (2) Do alternative medicine users come from the patients with lower social economic status? (3) Do alternative medicine users have lower educational levels?

Revision 1-4-A

In this study, we intended to study the users of alternative medicine among new patients in the psychiatric clinics and to examine the characteristic among the alternative medicine users in their age, social economic status, and educational levels.

Original version 1-4-B

In this 10-week exercise training program, we hypothesized that the patients with exercise training will have better psychologic adaptation than those without exercise training after their receiving heart transplantation.

Revision 1-4-B

In this 10-week exercise training program, we hypothesized that

after their receiving heart transplantation, the patients with exercise training would have better psychologic adaptation than those without.

In the example sentences (original version 1-4-A) on the issue of “users of alternative medicine at outpatient psychiatric clinic,” the investigators intended to know the characteristics (in age, social economic status, and educational levels) of alternative medicine users at outpatient psychiatric clinics. The investigators can just said what information they intended to collect. Japanese has three different ways to express forms in verbs — the plain form (*kudaketa*, or “impolite,”) the simple polite form (*teinei*, “polite,”) and the advanced polite form (*keigo*, “honorific language.”) Similar forms also exist in noun. For example, a Japanese calls his/her own’s mother as “*haha*,” but all other persons’ mother as “*okasan*.” Differing from the Japanese writers who hesitate to use first person pronouns, the English writer are not restricted to use “I” (even in capitalized letter) or “we” straightforward, even in scientific writings (Roland, 1968). We are also encouraged to use short Anglo-Saxon word “study” instead of Latinate word “investigate” (Table 1).

In the sample sentence (original version 1-4-B) on “the benefit of exercise for patient who received heart transplantation,” we need to use the sentence with subjunctive mood using “would have” instead of “will have” in a clause after the verb “hypothesized” using the past-tense sentence (revision 1-4-B). We also omit “exercise program” after the preposition “with-out” because it is well-understood.

WRITING THE METHODS SECTION

One of the main tasks here, you need to describe “how did you do to get the study data” under the methods section. Although a few journals use “Materials and Methods” instead of “Methods” for the title of this section, I think that “materials” is a part of Methods section. In this section, we should use the past-tense sentences (Day, 1995, 2006) to describe methods. Usually, you are encouraged to write the methods section right after finishing the writing the results section.

For clear presentation, I suggest to use outlines with headings under the methods section to describe the complete methods systematically. Table 2 lists commonly seen headings under this section (the left column) with the number codes to show the levels of headings (the right column).

Table 2. Commonly seen headings under the section of methods

Study patients	2.1. Study patients
Inclusion criteria	2.1.1. Inclusion criteria
Exclusion criteria	2.1.2. Exclusion criteria
Recruitment procedures	2.2. Recruitment procedures
Study tools	2.3. Study tools
Data collection processes	2.4. Data collection processes
Statistical analyses	2.5. Statistical analyses

1. To state your methods in collecting data

Nowadays all journals need three complete approval information from an ethics committee for human experiments (protocol number, date of approval, and status of signed informed consent) before the clinical study can be started and published. In some countries such as the United States, South Korea or Taiwan, the name of the institutional review board of the hospital is used replacing for the ethics committee.

Examples

Original version 2-1-A

The study was approved by the ethics committee of Osaka Kawasaki Rehabilitation University (approval No. OKRU30-A0XX, Osaka, Japan), following the guidelines for good clinical practice, the Declaration of Helsinki, and the Nuremberg code.

Revision 2-1-A

The ethics committee of Osaka Kawasaki Rehabilitation University approved the study (protocol number = OKRU30-A0XX and date of approval = February 28, 2020) with the requirement of obtaining the signed informed consent of study participants.

Original version 2-1-B

Each patient was assessed with the Japanese Orthopedic Association back pain evaluation questionnaires before and after the treatment.

Revision 2-1-B1

The patient was assessed using copies of the Japanese Orthopedic Association back pain evaluation questionnaire before and after the treatment.

Revision 2-1-B2

The patients received assessment with copies of the Japanese Orthopedic Association back pain evaluation questionnaire before and after the treatment.

As shown in example sentence (2-1-A), patients' safety protection in human experiments is enough if the study protocol has been approved by the ethics committee. The cliché "guidelines for good clinical practice, the Declaration of Helsinki, and the Nuremberg code" should be omitted from the text here. Those are well-understood operational guidelines for an accredited ethics committee or an institution-

al board review. Usually a prestigious journal cannot print any clinical studies (in original articles, brief reports, reports of a series, or case reports) involving experiments on human subjects without the approval of the ethics committee or the institutional review board. We use active-voice sentence (revision 2-1-A) to convey the same approval message of ethics committee without stating the cliché.

Similar in "*tachi*" in Japanese, the word endings in English need to add an "s" or "es" to show plural numbers in meaning. As shown in example sentence (2-1-B), certain English words such as "questionnaire," "deer," and "research" are used both in same singular and plural forms. In passive-voice sentences, the word "using," or "through tools" is used (revision 2-1-B1). In an active-voice sentence, the preposition "with tools" is used (revision 2-1-B2).

2. To describe statistical analyses for the collected data

The second the main task, you need to describe "how your study data are analyzed" under the methods section. All the descriptions here in this section should also be written in the past-tense sentences.

Examples

Original version 2-2-A

We used Statistical Package of Social Sciences software version 20.0 for Windows (SPSS Inc., Chicago, IL, USA) to compute all study data.

Revision 2-2-A

We used Statistical Package of Social Science software version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA) to compute all study data.

Original version 2-2-B

All study data of patients' disability scores were analyzed using the Statistical Analytic System software version 8.2 (SAS, Cary, NC, USA). We first used student t test to test the differences between groups.

Revision 2-2-B

All study data of patients' disability scores were analyzed using the

Statistical Analytic System software version 8.2 (SAS, Cary, N.C., USA). We first used Student t test to test . . .

In the sample sentence on the name of statistical software (original version 2-2-A), we need to use correct propriety name of Statistical Package of Social Science which is in singular form in “Science” (revision 2-2-A). The names of states in the U.S.A. should be spelled in full or in standard abbreviations instead of postal zip codes (Table 3), and the use of a postal zip code is not professional for scientific writings.

In passive-voice sentence, we need to use “using” before name of the statistical software, and spelling out or standard abbreviation for the state name “North Carolina” instead of the postal zip code (Table 3). We also use the word Student in upper case letter “S” (revision 2-2-B) because “Student” is a *nom de plume* (pseudonym) of a statistician (Raju, 2005).

WRITING THE RESULTS SECTION

As stated previously, you are advised to write the results section first when you start to prepare a scientific research manuscript. You present what you found in the study and those study findings had been treated with statistical analysis. The descriptions of data in the results section should use past-tense sentences (Day, 1995, 2006).

The data can be presented in text, table, or figures. The writer can choose any above three methods to tell the study results. Duplication of presentation among three methods (text, tables, and figures) should be avoided or minimized. To realize, text, tables, and figures are printed together under the

results section. We should also restrain the use of headings of text under the results section if we have many tables and figures. The titles of those tables and figures are good headings to categorize the study data. To write the data in text through reading the tables line-by-line is a taboo, because the data of a table are self-explanatory.

1. To describe the data in text

Example

Original version 3-1-A

30 patients met the diagnostic and neuropsychological criteria and underwent MRI scanning: 8 treatment-naïve patients with Parkinson’s disease, 10 patients with PD, and 12 comparison patients.

Revision 3-1-A1

Thirty patients met the diagnostic and neuropsychological criteria and received MRI scanning — 8 treatment-naïve patients with Parkinson’s disease, . . .

Revision 3-1-A2

A total of 30 patients met the diagnostic and neuropsychological criteria and received MRI scanning — 8 treatment-naïve patients with Parkinson’s disease, . . .

Differing from the usage in Japanese, an Arab number in the beginning of a sentence cannot be started in English. We need either to spell out the number (revision 3-1-A1), or to use a noun phrase “a total of 30 patients” (revision 3-1-A2). To note, the noun phrase “thirty patients” is in plural form, but “a total of 30 patients” is in singular form. Usually, we spell out all single digit Arab numbers in a text sentence, and keep Arab numbers with 10 or more in text. But we can use all Arab numbers if they come together in a series within a sentence (*Chicago Manual of Style Thirteenth Edition* 1982). The word “received” is better word than the word “underwent.” We keep the acronym “MRI” here be-

Table 3. A sample of state names in the USA

State names	Standard abbreviation	Postal zip code
Hawaii	Hawaii	HI
Illinois	Ill.	IL
Massachusetts	Mass.	MA
Missouri	Mo.	MO
North Carolina	N.C.	NC
New Jersey	N.J.	NJ
New Mexico	N. Mex.	NM
New York	N.Y.	NY
Texas	Tex.	TX

cause it could have been spelled out as “magnetic resonance imaging” in the methods section where it appeared first.

2. To present the data in tables/figures

Most of time, the study data can be presented in tables or figures. To make both tables or figures to be read by readers themselves, all of them need to be self-explanatory. We can add footnotes under tables to show what not seen inside the cells of tables. We need to use past-tense sentences or phrases after prepositions, infinitives, or gerunds with past-tense sentences or phrases.

For self-explanatory figures, we need to prepare legends — giving titles of the figures, highlighting significant differences with *p*-values of $p < 0.05$, $p < 0.01$, and $p < 0.001$ (Table 4), and explaining labels with acronyms. Both the figure and the legend need to be prepared for separate pasting because the figure itself is subjected to be enlarged or condensed. But the text of legend needs to keep an assigned size of font for the words in the legend.

Examples

Original version 3-2-A

Table 4. Tips in showing levels of significant differences

To limit the significance levels into four levels

- * $p < 0.05$
- ** $p < 0.01$
- *** $p < 0.001$
- Non-significance

To designate *p*-values in tables always with:

- * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$
- NS (non-significance)

Never to use any phrase “significant trend” which is always considered as non-significance

Table 5. Comparison of characteristics of patients with risky sexual behaviors (Original version 3-2-A)

Characteristics	Patients without risky sexual behaviors N = 100		Patients with risky sexual behaviors N = 78		Analysis
	N	%	N	%	
Male patient	34	34%	14	17.9%	0.09
Female patient	66	66%	64	82.1%	0.09
Smoking	8	8%	34	43.6%	< 0.001
Drinking	0	0%	12	15.4%	0.004
Drop-out from school	48	48%	26	35.1%	0.23
Poor familial relation	8	8%	32	41.0%	< 0.001
Not living with the family	12	12%	18	23.1%	0.166
Major depression	15	15%	28	35.9%	0.031
Psychosis	54	54%	24	38.8%	0.028

Revision 3-2-A

Table 6. Comparison of characteristics of patients with (*n* = 100) and without (*n* = 78) risky sexual behaviors (Revision 3-2-A)

Characteristics	Patients without risky sexual behaviors n (%)	Patients with risky sexual behaviors n (%)
Male	34 (34)	14 (17.9)
Smoking	8 (8)	34 (43.6)**
Drinking	0 (0)	12 (15.4)**
Drop-out from school	48 (48)	26 (35.1)
Poor familial relation	8 (8)	32 (41.0)**
Not living with the family	12 (12)	18 (23.1)
Major depression	15 (15)	28 (35.9)*
Psychosis	54 (54)	24 (38.8)*

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, using Student's *t*-test

Revision 3-2-B

Table 7. Life table for University of Kansas and Principia College graduates, women (Revision 3-2-B)

Year	University of Kansas			Principia College		
	N ₁ Graduated	n ₁ (%) Dead	n ₁ (%) Live	N ₂ (%) Graduated	n ₂ (%) Dead	n ₂ (%) Live
1934 - 1938	763	105 (14)	668 (86)	96	15 (16)	81 (84)
1939 - 1943	863	83 (10)	780 (90)	127	19 (15)	108 (85)
1944 - 1948	868	57 (7)	811 (93)	200	14 (7)	186 (93)
1954 - 1953	788	34 (4)	754 (96)	214	18 (8)	196 (93)
1955 - 1958	603	19 (3)	584 (97)	217	12 (6)	205 (94)
1959 - 1963	752	14 (2)	738 (98)	236	5 (2)	231 (98)
1964 - 1968	1203	12 (1)	1191 (99)	336	4 (1)	332 (99)
1969 - 1973	1803	13 (1)	1790 (99)	427	4 (1)	413 (99)
1974 - 1978	2097	10 (1)	2087 (99)	532	2 (< 1)	540 (>99)
1979 - 1983	2365	5 (< 1)	2360 (>99)	553	4 (1)	549 (299)

Death number of N₂ was significantly higher than that of N₁ ($p < 0.01$), using Cochran-Mantel-Haenszel X² test

(The footnote was added by WW Shen, the author of the current article.)

Reprinted from: Simpson (1989) of JAMA of American Medical Association.

As shown in original table 3-2-A (Table 5), we can omit all percentage signs (%) in the cells for two whole columns under “Patients without sexual behaviors” and “Patient with sexual behaviors” if the percentage sign is moved to the top by designating “n (%)” for the item in revision 3-2-A (Table 6). The whole column for the item “analysis” can also be deleted because giving *p*-values of all items in the rows of original table 3-2-A (Table A) can be grouped into three categories (Table 6) as explained in the footnote with referring three kinds of significance levels with various asterisk signs.

To simplify the original version 3-2-A (Table 5), we can further delete either the row of “Female patient” or “Male patient” to make the table simple because the numbers of patients of either sex can be calculated due to the availability of total number of patients in both sexes. To further simplify Table 5, we can also move the number of both groups “n = 100” and “n = 78” from Table 5 to the title to the title of Table 6 (revision 3-2-A). To note, we use “n” (in lower case letter) to represent partial number for either groups, while we use “N” for the total study number of the patients (i.e., N = 178).

Table 7 (revision 3-2-B) shows the comparisons women total (dead and live) graduate numbers in a periods of graduated years between University of Kansas, a state university for children of general public, and those from Principia University, a university for children of Christian Scientists. Under Table 7, I have added the footnote line “death number of N_2 was significantly higher than that of N_1 ($p < 0.01$), using Cochran-Mantel-Haenszel Chi square test,” which was picked up from the text of the article. It means that the women children from a college for Christian Scientists had significantly more deaths compared to those from a college for general public. For better and clear presenting messages, I suggest that all levels of significance in scientific papers are rounded up into an assigned significance level (Table 4). In almost all research papers, the differences between groups are considered significant if p -values are smaller than 0.05, as defined under the heading of statistical analysis under the methods section.

Table 8 summaries tips how to simplify tables. Using those tips, the total number of columns or rows can be reduced. Table 9 gives tips in preparing figure/legend.

WRITING THE DISCUSSION SECTION

In the discussion section, you need to answer how do all the study results mean. We use past-tense sentences for describing your study results in this paper, and present-tense sentences for describing “facts”

(either right or wrong) from published papers (Day, 1995, 2006). You write this section after you have finished writing both the results and the methods sections, but before writing the introduction section. I would like to suggest the following steps:

1. To point out what are the most important characteristic in this study

In writing the discussion section, I suggest that you can start with pointing out what are the most important characteristics of this study. Even no new finding was found in the study, you can patently mention that your study is the first time to do a study on a specific population, in Japan, or using a new measurement.

Examples

Original version 4-1-A

The preliminary results of this study were presented through invitation at the Congress of the WFOT in Yokohama, Japan, that held in 2014.

Revision 4-1-A1

The preliminary results were presented through invitation at the Congress of the World Federation of Occupational Therapy (WFOT) in Yokohama, Japan, that was held in 2014.

Revision 4-1-A2

The preliminary results were presented through invitation at the Congress of the World Federation of Occupational Therapy in Yokohama, Japan, 2014.

Original version 4-1-B

Our study is the first to use interactive metronome training in a speech therapy program in patients who had history of stroke as well as who need to adjust the time for doing movements.

Revision 4-1-B

To our best knowledge, our study is the first to use interactive metronome training in a speech therapy program in patients who have history of stroke and who need . . .

Table 8. Tips in simplifying tables

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- To delete the number of column or row through combing the information together
 - To use of slash “/” to keep the information together into one column or row together
 - To combine M/F with the item “Male sex”
 - To avoid the use of all vertical lines
 - To give footnotes to explain what are unclear items
 - To make each table self-explanatory
-

Table 9. Tips in preparing figures

-
- To be brief for the title in a phrase or in a sentence
 - To keep only one figure on a page.
 - To prepare the figure and the legend separately
 - To explain (in the past tense) right after the title
 - To give significance levels in $p < 0.05$, $p < 0.01$, $p < 0.001$, or non-significance
 - To spell out labels in acronym to be self-explanatory for the figure
-

In the sample sentence (original version 4-1-A), we should use correct grammar (rule number 1 in 10 *do's and don'ts* rules (Table 1), to change from “held” to “was held” (revision 4-1-A1), or just to add the year “2014” at the end after “Yokomaha, Japan” (revision 4-1-A2). Or we can use “took place” (in active-voice sentence) replacing for “was held” (in passive voice) in revision 4-1-A2. The acronym “WFOT” should be spelled out if “WFOP” has not appeared previously in the text of this article. It does not matter whether “(WFOT)” is kept after the complete spelling of the organization because the later use of the acronym directly is easily understood. The phrase “though invitation” is intended to mean important study findings.

In the sample sentence (revision 4-1-B), we have added the phrase “to our best knowledge” because we may risk the chance of overlooking a paper reporting the use of interactive metronome training done already by other speech therapists. For the sake of correct grammar (rule number 1 in 10 *do's and don'ts* rules (Table 1), we need to use “have” (in present-tense sentence) instead of “had” (in past-tense sentence) because “history” means something happened already in the past. We also prefer to use “and” (with 1 word or 1 syllable) replacing for “as well as” (with 3 words or 3 syllables) as conjunctive word connecting two “who” clauses modifying the word “patients.”

2. To compare your study findings with those of other studies one by one

In comparing a study finding, you first need to give a background information by mentioning their significant study finding from a table, a figure, or a phrase in the text of the results section, and the published “knowledge” from the existing literature with references. Then, you compare your finding with that in the literature, and point out the similarity or difference. Finally, you make a brief comment or a suggestion.

You may need to repeat the whole procedure again and again in new paragraphs for all significant findings in the study. Usually, the number of repeated comparisons depends on that of significant findings reported in the result section. Never mention “a significant trend” which is non-significant. Of course, comparisons of the non-significant findings also deserve to be made in the last paragraph in the comparisons portion.

Examples

Original version 4-2-A

As shown in Table 1, the mean body weight \pm standard deviation of patients with obesity who received weight reduction exercise

program are 60.23 ± 3.20 kg at the end of the 10-week program, whereas that of sedentary patients with obesity are 66.20 ± 4.36 kg. The difference of mean body weight at the end point between those two groups is significant ($p < 0.042$).

Revision 4-2-A

As shown in Table 1, the mean body weight \pm standard deviation in patients with obesity who received weight reduction exercise program were 60.23 ± 3.20 kg at the end of the 10-week program, whereas those of sedentary patients with obesity were 66.20 ± 4.36 kg. The difference of mean body weight at the end point between those two groups was significant ($p < 0.05$).

Original version 4-2-B

Based on the discrepancy between our study results and the published data, we suggested that further study of this rehabilitation training program with a prospective and comparative design is needed to clarify this issue.

Revision 4-2-B

Based on the discrepancy of those data, we suggest that further study. . .

In the sample sentence (revision 4-2-A), we need to cite our own study results from Table 1. As the rule mentioned in the results section of this article, past-tense sentences should be used if the data were describing our own study results. Therefore, we need to use “were” (in past-tense sentence) replacing for “are” (in present-tense sentence) in three places of those two sentences (revision 4-2-A). To note, the word “those” in revision 4-2-A represents “the mean body weight \pm standard deviation.” Compared to English, the Japanese language, the concept in singular and plural forms is absent although the rule of tense is clear. As indicated in Table 4, the p -value of 0.042 (in original version 4-2-A) is rounded it up to “ $p < 0.05$ ” to make readers easily understandable.

In the sample sentence (revision 4-2-B), we need to use “suggest” (in the present-tense sentence) instead of “suggested” (in the past-tense sentence) when we are expressing our opinions.

3. To state the limitations of the study

After several paragraphs of repeated comparisons of the study findings, you need to offer your own critical assessments of weaknesses in your own study in the penultimate (next to the last) paragraph in the discussion section. The assessments include your own opinion on any shortcomings in your study design, inadequate number in sampling, and flaws in analysis, validity or assumptions (Gustavii, 2008). Often, those weaknesses are pointed out by careful reviewers in the peer review process on your submitted original manuscript. Of course, the authors usually try their best to amend those listed weaknesses, but some of them are not amendable. Therefore, in this penultimate paragraph, the authors need to admit openly the weaknesses of the study, and to warn readers

against their over-interpreting or excessively generalizing the study results.

Examples

Original version 4-3-A

The major limitation in this speech therapy study was the source of recruited patients. All study patients came from hospitals affiliated with Osaka Kawasaki Rehabilitation University, but not from any hospitals in Japan. Therefore, the readers are cautioned that the study results obtained here cannot be generalized to represent all patients with stroke in Japan.

Revision 4-3-A

The major limitation in this speech therapy study is the source of recruited patients. All study patients came from hospitals affiliated with Osaka Kawasaki Rehabilitation University, but not from any other hospitals in Japan. Therefore, the readers are . . .

Original version 4-3-B

This study on melodic intonation therapy had two or three limitations. The small sample size of this melodic intonation therapy study is a clear limitation and confirmation from larger studies is required. Besides the lack of randomization, we were unable to collect data on the size and location of the lesion of each participant as well as on the severity of their stroke.

Revision 4-3-B

This study on melodic intonation therapy has three limitations:

- The study sample size is small.
- The enrolled patients were not randomized.
- The clinical data on the size of lesion, location of the lesion, and severity of stroke of those study patients were not available.

In the first sample sentence of original version 4-3-A, we need to use “is” (in the present-tense sentence) to mean what is presented as it is now. In the second sentence, we need to add one word “other” to mean all other hospitals except those affiliated with OKRU, while the use of the verb “came” (in the past-tense sentence) is correct.

As shown in the second sample sentence of revision 4-3-B, “the study” needs to use “is” in the present tense sentence. We use the exact number of “three” limitation in this scientific writing instead of “2 or 3” (in Japanese expression) or “several” limitations in English expression. Here, we can simplify the study limitations into itemized listing with the use of bullet “•” (revision 4-3-B). More items of study limitations are often expanded after incorporating peer reviewers’ opinions if their suggestions are insurmountable. I am advising to be brief in listing of each item under study limitations without detailed elaboration because the explanations here do not add much here.

Furthermore, to pay good attention to the beauty of parallel construction as one of 10 *do’s and don’ts* rules (Table 1) is important in listing the items in limitations. We can either use infinitives or gerunds without any punctuation marks at the end of each phrase of an item except the last one, or use complete sentences with a full stop at the end of each sentence, as shown in revision 4-3-B. In English, we

use a preposition word followed with a noun or noun phrase, whereas in Japanese, a post-position word is given after a noun or a noun phrase. But the concept in beautifying the parallel construction (Table 1) in two languages are based on the same principle.

4. To make final summary

In the last paragraph, you need to summarize take-home messages of the key findings in the study in the past-tense sentence in the first sentence(s). The heading of “summary” instead of that of “conclusion” is recommended. Then, we mention what are the possible implications and plans from those key findings with the present-tense sentence in the following sentence(s).

Usually, you are refrained from throwing in any new idea or citing new references in the content without being discussed under the heading of summary. The messages here are usually reflected in the title of the manuscript or shown in the opening paragraph in the introduction section. To note, the contents of “summary” under the discussion section are roughly similar to that of “conclusion” of the abstract.

Examples

Original version 4-4-A

In this sarcopenia prevention study, we recruited only 10 women study participants with a recent onset of menopause, to receive this 10-week aerobic exercise rehabilitation program with muscle strength training as our first step to yield favorable benefits. Further studies were needed to expand the population to receive the same program.

Revision 4-4-A

The results of this sarcopenia prevention study using the program of aerobic exercise and muscle strength training on 10 women with a recent onset of menopause, showed favorable benefits in two major measurements. Further studies to enroll older and larger women samples are planned to duplicate the study results.

Original version 4-4-B

Taken together, the results of the study show that the patients with major depressive disorder received an antidepressant and exercise program three one-hour per week, improve more in their mean scores of Hamilton Depressive Rating scale and quality of life questionnaire, compared to those received antidepressant only. Those findings supported the laboratory finding that the exercise rats have higher level of brain-derived neurotrophic factor in the brain than the sedentary rats.

Revision 4-4-B

Taken together, the results of the study showed that the patients with major depressive disorder received an antidepressant and exercise program three one-hour per week, improve more in their mean scores of Hamilton Depressive Rating scale and quality of life questionnaire, compared to those with receiving antidepressant only.

The finding leads to supports the laboratory finding indirectly that the exercise rats . . .

In the first sample sentence of revision 4-4-A, we need to use “showed” (in the past-tense sentence)

because we described the study results. At this stage of giving take home message, we do not need to add the word “significantly” and *p*-values because we already discussed through comparing findings of your study with those of other studies one by one in sample sentences 4-2-A and 4-2-B. In the second sample sentence of 4-4-A, we need to use “are planned” (in the present-tense sentence) because we are stating what we plan to do after this study.

In the first sample sentence of revision 4-4-B, we need to use “showed” (in the past-tense sentence) because we described the study results. In the second sample sentence of 4-4-B, we need to use “leads to support” (in the present-tense sentence) because we are doing a small speculative statement.

WRITING AN ABSTRACT

1. To write the abstract in a structured format

In the past, traditional non-structured, conventional abstracts were used scientific journals. But later most major journals require authors to organize abstracts in a structured format, adding the section title of objective/background, methods, results, and conclusion, to make scientific articles easier to read by first giving structured and global summary. The structured abstracts can improve searching and reading as well as give high-quality information, and are favored by the readers (Sharma, 2006; Hartley, 2007).

Historically, the first abstract was introduced by Tjio and Levan in 1956 (Gustavii, 2003). In their published an article “The chromosome number of man,” they wrote an abstract with four section titles, which have become the standard for journals. In some journals such as *JAMA*, the structure abstract has more detailed section titles such as design, setting, measurements, etc.

Examples

Original version 5-1-A

Biopsy specimens were taken from intact areas of antral mucosa in 100 consecutive consenting patients presenting for gastroscopy. Spiral or curved bacilli were demonstrated in specimens from 58 patients. Bacilli cultured from 11 of these biopsies were gram-negative, flagellate, and microaerophilic and appeared to be a new species related to the genus *Campylobacter*. The bacteria were present in almost all patients with active chronic gastritis, duodenal ulcer, or gastric ulcer and thus may be an important factor in the aetiology of these diseases. (Reprinted from: Marshall and Warren 1984 of *Lancet* owned by Elsevier Ltd..)

Revision 5-1-A

Objective: Patients with gastritis and peptic ulceration received a bacterial study on their stomach. **Method:** Biopsy specimens were taken from intact areas of antral mucosa in 100 consecutive consenting patients presenting for gastroscopy. **Results:** Spiral or curved bacilli were demonstrated in specimens from 58 patients. Bacilli cultured from 11 of these biopsies were gram-negative, flag-

ellate, and microaerophilic and appeared to be a new species related to the genus *Campylobacter*. **Conclusion:** The bacteria were present in almost all patients with active chronic gastritis, duodenal ulcer, or gastric ulcer and thus may be an important factor in the aetiology of these diseases (Four section titles of the abstract and the only sentence under “**Objective:**” are added by the author of this article.)

Original version 5-1-B

Compared the cumulative death rate of Christian Scientists who received an undergraduate college education at Principia College in Elsah, Ill, a liberal arts college for Christian Scientists, was compared with that of a control population that received an undergraduate college education in the College of Liberal Arts and Sciences at the University of Kansas in Lawrence. In this study, the cumulative death rate is expressed as the percentage of the graduating class known to have died as of June 1987. The study included the graduating classes from 1934 to 1983. The graduates from Principia College had a significantly higher death rate than the control population (Simpson 1989). (Reprinted from: Simpson 1989 of *JAMA* owned by the American Medical Association.)

Revision 5-1-B

Objective: *This was to study the life span of college-educated Christian Scientists.* **Method:** *I compared the cumulative death rate of Christian Scientists who received an undergraduate college education at Principia College in Elsah, Illinois, a liberal arts college for Christian Scientists, with that of a control population that received an undergraduate college education in the College of Liberal Arts and Sciences at the University of Kansas in Lawrence.* **Results:** *In this study, the cumulative death rate was expressed as the percentage of the graduating class known to have died as of June 1987. The study included the graduating classes from 1934 to 1983. The graduates from Principia College had a significantly higher death rate than the control population ($p < 0.05$ for men, and $p < 0.01$ for women).* **Conclusion:** *The religion of Christian Scientists can shorten the believers' life spans.* (Words in italicized font are mine.)

The sample abstract (original version 5-1-A) on the topic is on *Campylobacter* bacteria in patients with peptic ulcer, is a reprinted abstract published in *Lancet* (Mashall, 1984). Both authors were later awarded with Nobel's price later, and triple therapy with antibiotics for patients with peptic ulcer has also been introduced after their study. Although the abstract is not structured, the logic of the abstract is kept roughly the same as a structured one (revision 5-1-A), where I have just added four section titles — objective, methods, results, and conclusion — and one sentence under objective. But this non-structured abstract is an exception because most non-structured ones are quite un-structured.

Table 7 is a re-printed data in table on the death rate of women college graduates between Christian Scientists and a general public published in *JAMA* (Simpson, 1989). Based on those data of women and men, I adapted this non-structured abstract (original version 5-1-B) into a structured one (revision 5-1-B). All words in italicized font have been added by me. In this structured abstracts, all section titles of the abstract have been added in bold italicized font. The missing texts under the sections of objective

Table 10. Tips in preparing a structured abstract

-
- To be written in perfect English
 - To choose the title of background/objective clearly as section title of an abstract (Usually, objective has clear specific aim or objective in the study, and background is not.)
 - To use past-tense sentences for the section of methods (Usually the information of approval from ethics committee and statistical methods are not given here.)
 - To use past-tense sentences for the section of results (Usually number of the study and important significant findings with *p*-values in text message are included here.)
 - To give roughly the same information seen under the heading summary under the section of discussion of an original article for the section of conclusion of an abstract.
-

and conclusion are also completed by me. After the phrase “significantly higher death rate,” I have also added the significance levels “($p < 0.05$ for men, and $p < 0.01$ for women” picked up from text of this *JAMA* article, in the results section. Furthermore, I also spell out the state name of Illinois in this revised abstract (Table 3).

2. To make sure that the abstract in a perfect English

The section titles of abstract are roughly similar to those of an original article or a brief report. Table 10 gives important tips in preparing an abstract. Usually we do not need to cover the method of any statistical analysis in the abstract.

The authors are advised to pay attention to number of word count of an abstract in any given journal. To remember, we can just highlight the important findings, but not to list all significant findings in the study.

3. To give key words which are not duplicated those in the title

Providing a fixed number of key words is always needed after completing the abstract.

Every noun or noun phrase in the title is already considered as key word. The authors are advised not to give nouns or noun phrases that are seen in the title, to amplify the search power. Usually, we can easily find extra related key words, for example, the name of a questionnaire, or a significant study finding. Also make sure to give exact number of key words required.

CONCLUSION

In this article, I have outlined the writing rules of 10 *do's and don'ts*. Based on those rules, I methodologically showed examples of sentences and tables with

my copy-editing comments, step-by-step for each introduction, methods, results, discussion, and abstract sections of the manuscript. I sincerely hope that you have got better idea in writing better rehabilitation scientific papers. Do enjoy writing when you prepare your next manuscripts.

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