Heading-Introduction Technique

Heading-Introduction Technique

By

F. BRUCE SANFORD

CONTENTS

Heading-Introduction Technique

By

F. BRUCE SANFORD, Senior Scientific Editor
Bureau of Commercial Fisheries Branch of Reports
U.S. Naval Air Station
Seattle, Wash. 98115

ABSTRACT

Because of the vast increase in the scientific literature, technical writers must help the reader grasp ideas quickly. For this purpose, headings and introductions are two of the most useful devices.

Headings give the reader immediate insight into large blocks of information and help him digest them rapidly. Accordingly, they are an exceedingly valuable aid to speed reading.

Although headings are greatly helpful, they are not sufficient. They sometimes are ambiguous, they do not give reasons, and they look neither backward nor forward in the article--they are concerned only with the present. They therefore need supplementation by introductions, which supply this information that headings, because of their brevity, cannot give.

Introductions, in contrast to headings, are complex devices. They have five transitional functions; therefore, a complete introduction is made up of five parts. This manual defines the functions, names the parts, and shows how to use them.

The manual thus is concerned with the heading-introduction technique, and its aim is to show how we can use this technique to help the reader grasp our idea fast.

INTRODUCTION

When we write our article, we use an outline to help us organize our ideas. If, however, the ideas are complex, the outline is complex. It then tends to be self defeating. Though it enables us to present our ideas logically, they may be so complexly interrelated that the reader cannot follow them readily. How do we solve this problem?

To solve it, we help the reader make the transitions from one section of our article to another. Helping him make them, however, is hard. The aim of this manual therefore is to present a technique for giving him the transitional aid he needs.

This technique is based on two devices--headings and introductions. These devices are not

1

independent, for they supplement one another. This fact gives rise to the expression "Heading-Introduction Technique." For the sake of simplicity, despite this relation, we shall consider the two devices separately. We shall look into headings first. A knowledge of them will lay a basis for our study of introductions.

I. HEADINGS

We take our headings from our outline. So, once we have made an outline, our main work on our headings has been done. To use headings with skill, however, we need to keep in mind that they have two major functions:

1. To tell the reader what, in a nutshell, our subject, or topic, is.
2. To indicate to him its level in the outline (fig. 1) relative to our other topics.

When devising headings that will serve these functions best, we keep in mind two main needs: the need for meaningfulness and the need for distinctiveness.

A. MEANINGFULNESS

What transitional function does meaningfulness have in headings? And granted that their meaningfulness aids transitions, how do we make them meaningful?

1. Transitional Function of Meaningfulness

To grasp our ideas quickly, the reader must know what we are talking about. If, for example, he thinks we are talking about salmon when we are actually talking about Salmonella, a bacteria named after Daniel E. Salmon, he will be confused until he finds out what our true subject is. Recognizing that the reader must know what we are talking about before he can understand our discussion, we do not waste his mental energy and slow him down by making him guess. We tell him immediately. How? By the use of headings.

Headings, being signalling devices for telling the reader what our subject is, also signal to him when we change our subject. Upon seeing a new heading, he knows that our thought is taking a new direction. He therefore does not continue reading while mistakenly believing that we are still discussing the previous topic. By signalling

Branch-chain outline:

Conventional outline:

Topic A		Level 0
I. Topic AA		Level 1
A. Topic AAA		Level 2
B. Topic AAB		
II. Topic AB		Level 1
A. Topic ABA		Level 2
B. Topic ABB		
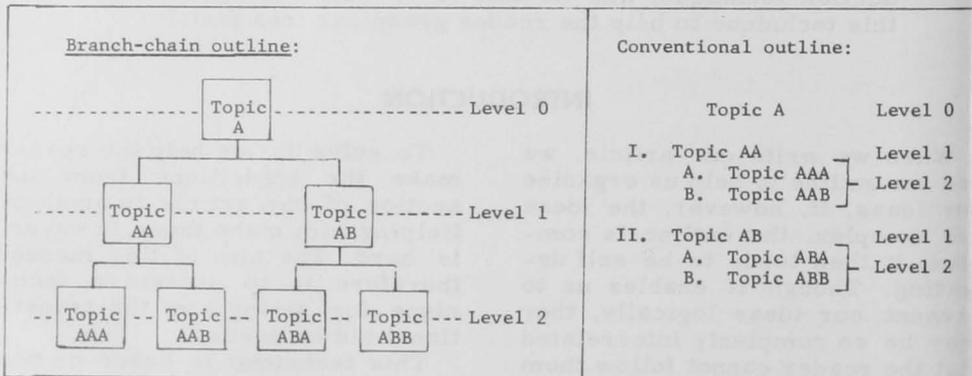
Figure 1.--Levels of outline division.

hat the subject has changed, headings thus help him make the transition from one subject to another. By merely signalling that a change is taking place, headings are greatly helpful. To achieve maximum transitional value, however, they not only should signal the change but should tell exactly what the new subject will be. The transition from one subject to another is not complete until the reader again knows what we are talking about.

Meaningful headings also aid transitions in another way. If they are fully meaningful, the reader can remember them better. By being able to keep them in mind, he can follow our thought easier in its flow from superior topic to subordinate topic and from one coordinate subtopic to another. Wording headings meaningfully therefore is one of our main ways of helping the reader grasp our ideas quickly.

2. Achievement of meaningfulness

Exactly how do we make our headings meaningful? We try to word them in such a way (a) that the coordinate headings are parallel in form and (b) that all headings--including the title of our article--are clear.

a. Wording for parallelism.--What advantage is parallel wording to the reader? It help him recognize which of our topics are coordinate. It thereby aids him in making the transition from one coordinate topic to another. As we shall see, however, we have other techniques to aid him in making this transition. But communicating complex ideas is hard; therefore, we use every means we can to enable him to grasp our ideas quickly. So we make our coordinate headings parallel in form.

In wording our coordinate headings for parallelism, we often are troubled by questions concerning (1) singular and plural subjects and (2) noun modifiers.

(1) Singular and plural subjects.--Suppose that we have two coordinate headings such that one is singular and the other is plural (fig. 2). Is this deviation from strict parallel form permissible? Yes. Both headings have the same kind of core--in this case, a noun. So we consider them to be parallel.

I. Sun

II. Planets
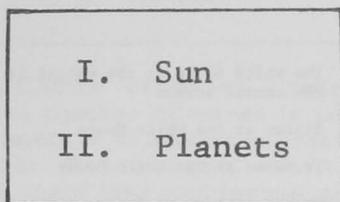
Figure 2.--Singular and plural coordinate headings.

(2) Noun modifiers.--Another problem that often confronts us is the use of different noun modifiers. Suppose that we have been able to force our headings into parallel form as shown in figure 3. To make the headings more meaningful, could we change them as shown in figure 4? Yes. Again, all the

I. The White House

II. The seven-gables house

III. The Jack-built house
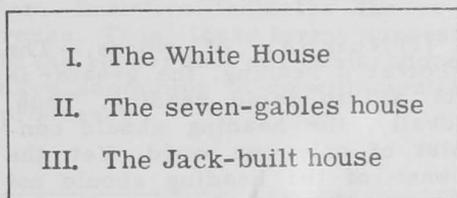
Figure 3.--Forced parallel wording.

I. The White House

II. The house of seven gables

III. The house that Jack built
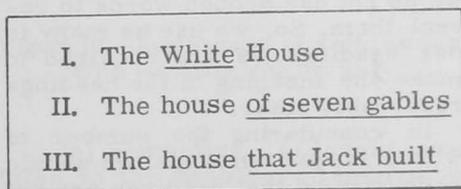
Figure 4.--Coordinate headings in which different kinds of noun modifiers are used.

headings have the same kind of core--in this case, the noun "house." We would consider them to be parallel. But we have to be careful that the headings do have the same kind of core. Otherwise, we may fall into errors as ridiculous as those in figure 5.

I.	The White House at the height of the social season
II.	Dining at the White House
III.	To dance at the White House
IV.	My impressions of famous visitors at the White House are unforgetable.

Figure 5.--Faulty parallelism.

b. Wording for clarity.--As we have just seen, in wording our headings for parallelism, we encounter problems, as for example, when we mix gerund phrases with infinitive phrases and phrases with sentences. What problems do we now encounter in wording our headings for clarity? The main ones concern the number of words and the choice of words.

(1) Number of words.--The shorter a heading, the greater is its aid to rapid reading. Thus, ideally, the heading should consist of only one word. Yet, the sense of the heading should not be sacrificed to brevity. To express any idea, we need a certain minimal number of words. We therefore do not speed the reader's rate of grasping our ideas when we do not use enough words to reveal them. So, we use as many in our headings as are required to make the meaning of the headings reasonably clear.

In considering the number of words in our headings, we should keep in mind that headings are not independent of one another. They occur in groups comprising a superior heading and two or more coordinate subheadings (fig. 6). Note in figure 6 that the total

Organization
I. Classical method
II. Inverse classical method
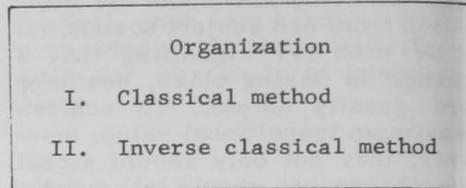
Figure 6.--Superior and coordinate subheadings.

number of words in the group is six, whereas the number of words, say, in Topic I is only two. Because the group has greater number of words, it enables us to communicate better than does any one heading alone.

Of course, where the members of the group independent of one another, the greater number of words would be of no consequence. But they are not independent. To see this point clearly, let us put figure 6 in symbolical form (fig. 7). According to logic:

Topic A = Topic AA + Topic AB (1)
Topic AA = Topic A - Topic AB (2)
Topic AB = Topic A - Topic AA (3)

Because the topics are interrelated, the reader can ordinarily gain insight into any one topic by considering the other topics with which it is associated. If Topic AA, for example, is not clear to him, he can study Topics A and AB in combination to see if he can infer the meaning of Topic AA, as suggested by Equation 2.

Topic A
I. Topic AA
II. Topic AB
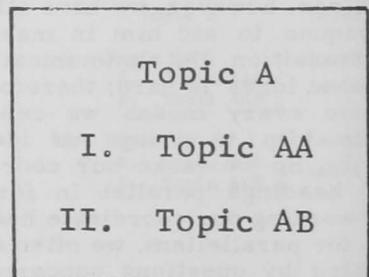
Figure 7.--Symbolical representation of figure 6.

Thus, the meaning of one heading in a group helps to reveal the meaning of the others. In figure for example, imagine that "Classical Method" were the only topic presented. Now, imagine the reader's difficulty in answering the question: What does "Classical Method" mean? Without knowing that "Organization" is the superior topic and that "Inverse Classical Method" is the coordinate topic, he would have no inkling that the method refers to a method of making outlines rather than, say, to some method of making pottery.

But even the combined headings will not be helpful if, in combination, they still are not meaningful or if they give the wrong idea. In figure 6, for example, "Organization" might refer to a method, say, of structuring an industrial firm or of organizing a charity drive. We therefore make our meaning less subject to misinterpretation by adding more words to the title perhaps as shown in figure 8. Thus, in devising our headings, we try to word them in such a way that each heading helps to tell what the other headings mean.

```
Organizing the Technical Article

  I.  Classical method

 II.  Inverse classical method
```

igure 8.--Giving the group greater meaning by making the title more meaningful.

We also try, of course, to make ach heading self sufficient. With his thought in mind, we would hange the wording of the topics in igure 8 perhaps to that in figure 9. Iote that by adding three words-- amely, "of outline formation"-- o both Topics I and II, we make heir meaning clearer and thereby make each heading better able to stand alone.

```
Organizing the Technical Article

  I.  Classical method of outline formation

 II.  Inverse classical method of outline formation
```

Figure 9.--Attempt at self-sufficient headings.

(2) Choice of words.--Increasing the number of words is not our only method of making our meaning clearer. For example, we often can make them less ambiguous, and we can help ensure that, semantically, they will have only one meaning.

(a) Ambiguity.--As we have seen, the term "Classical" in figure 6 furnishes an example of ambiguity. This term could apply to physics, art, music--many fields.

To reduce the ambiguity of these headings, we replace "Classical" and "Inverse Classical" by more specific terms--"Deductive" and "Inductive" (fig. 10). Deductive indicates that we are reasoning from the general to the particular. Inductive indicates the reverse. Thus, these terms suggest to the reader that our subject does have something to do with mental processes.

```
Organizing the Technical Article

  I.  Deductive method of outline formation

 II.  Inductive method of outline formation
```

Figure 10.--Replacement of ambiguous terms (compare with fig. 9).

(b) Semantics.- - Closely related to the problem of ambiguity is the problem of semantics. This problem is one in which we ourselves attach two different meanings to the same word. The one

meaning we attach is always more general than the other. When we make an outline, for example, we often find that one of our subtopics is expressed by the same term as that expressing our superior topic (fig. 11). On analysis, we find that the common term always has different meanings in the two headings. In the particular case shown in figure 11, for example, Tower^2 refers to the tower itself, whereas Tower^1 includes the guy wires. How do we solve the problem? We try, if we can, to find either a more general expression for Tower^1 or a more specific expression for Tower^2. In this example, we find it simpler to replace Tower^1 by a more general expression, as indicated in figure 12.

Tower^1

I. Tower^2

II. Guy wires
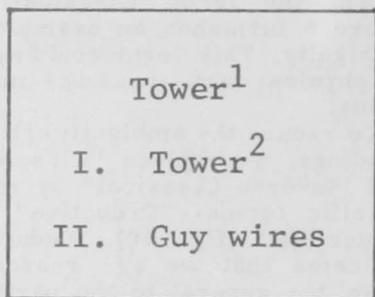
Figure 11.--Subtopic with the same title as the superior topic.

Tower System

I. Tower

II. Guy wires
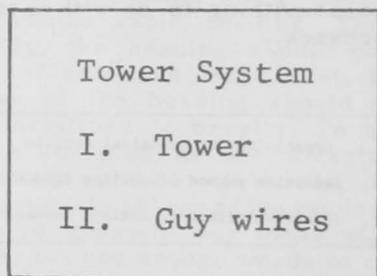
Figure 12.--Tower^1 replaced by a more general expression.

B. DISTINCTIVENESS

In Section A, we saw that to help the reader make transitions

from one topic to another, we nee to make our headings meaningfu But are transitions from topic topic the only kind of transitio we ask him to make? No. We al ask him to make transitions fro one level of outline division another, for our topics do not a occur at the same level in the ou line.

In general, the transitions amo our topics are of three kind (1) those from a superior to subordinate topic, (2) those fro one coordinate topic to another, a (3) those from a subordinate top to a superior topic. Transition involves a change from one lev in our outline to the next lowe level, and Transition 3 involves change from a lower level to higher level. Transition 2 is th only transition that takes place the same level. Thus, when reader makes a transition fro one topic to another, he has to kno not only what topics are involve but also what levels of outlin division are involved. Otherwise he will not completely understan what is taking place.

The longer an article is and th more complex its subject matte is, the greater will be the numbe of levels of division in our outline These different levels are sig nalled to the reader by means o differences in styles of heading

But the greater the number o styles of headings required, th harder it becomes for us to inve styles that differ. So we need t consider ways of varying them. Ou basic means are:

1. Positioning--such as in t center, flush with the margin, o indented (fig. 13).

---------- Center heading ---------- Level 0

Flush heading ---------------------- Level 1

    Indented heading.-- ----------- Level 2
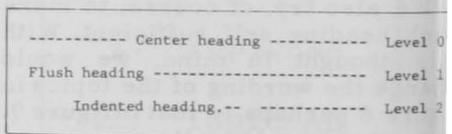
Figure 13.--Differentiating by position.

2. Altering size, class, weight, or width of type--such as by the use of upper and lower case type (fig. 14).

```
---------- CENTER HEADING ----------- Level 0

Flush Heading ----------------------- Level 1

Indented heading ---------------- Level 2
```

Figure 14.--Differentiating by upper-case or lower-case type.

3. Underlining (fig. 15).

```
---------- CENTER HEADING ----------- Level 0

Flush Heading ----------------------- Level 1

Indented heading ---------------- Level 2
```

Figure 15.--Differentiating by underlining.

4. Using coefficients--such as, numbers, alternating numbers and

letters, or words and numbers (fig. 16).

5. Punctuating (fig. 17).

```
----------- CENTER HEADING ----------- Level 0

Flush Heading ----------------------- Level 1

Indented heading.-- ------------- Level 2
```

Figure 17.--Differentiating by punctuation.

We try to combine these variations in such a way that the reader can immediately identify our topics as to level. The headings in figure 18 shows a combination that we use in Fishery Industrial Research. Many other combinations are, of course, possible as are illustrated by the different ones used in other publications by the Bureau.

```
Number coefficients:

       1.       Primary Heading
       1.1      Secondary Heading
       1.1.1    Tertiary Heading

- - - - - - - - - - - - - - - - - - - -
Number-letter coefficients:

       I.   Primary Heading
       A.   Secondary Heading
       1.   Tertiary Heading

- - - - - - - - - - - - - - - - - - - -
Word-number coefficients:

            Part 1
        Primary Heading

          Chapter 1.1
        Secondary Heading

         Section 1.1.1
        Tertiary Heading
```

Figure 16.--Differentiating by heading coefficients.

Part 1
PRIMARY HEADING IN A LONG ARTICLE

Chapter 1.1
SECONDARY HEADING IN A LONG ARTICLE

Section 1.1.1
TERTIARY HEADING IN A LONG ARTICLE

I. GRADE 1 HEADING

This heading is printed in boldface.

A. Grade 2 Heading

This heading, although underlined when typed, is printed in boldface and is not underlined when printed.

1. Grade 3 Heading

This heading, although underlined when typed, is printed in boldface and is not underlined when printed.

a. Grade 4 heading.--This heading, although underlined when typed, is printed in boldface and is not underlined when printed.

(1) Grade 5 heading.--This heading is printed in light face but is underlined.

(a) Grade 6 heading.--This heading, although underlined when typed, is printed in italics and is not underlined when printed.

(a.1) Grade 7 heading.--This heading, although underlined when typed, is printed in light face and is not underlined when printed.

(a.1.1) Grade 8 heading.--This heading, although underlined when typed, is printed in light face and is not underlined when printed.

Note: The use of Grade 1-6 headings is preferential to the use of part, chapter, and section headings, which are used only in long articles to reduce the need for headings of Grade 7 or of larger number.

Figure 18.--System of headings used in Fishery Industrial Research.

II. INTRODUCTIONS

As our treatment of headings indicated, the underlying aim of this manual is to increase the rate at which our article can be read. Rapid reading is of concern not only to the reader but also to us, for we authors are the ones who control the reading situation. The best-trained speed reader can never grasp our ideas faster than our writing techniques permit him. So we control the maximum reading rate.

By the use of meaningful headings, we prepare the reader's mind to grasp rapidly each of our topics as he comes to them. Also, by the use of distinctive headings, we help him keep track of whether the topic we are talking about is superior, coordinate, or subordinate. By these means, we help the reader make full transitions from one topic to another and from one level of outline division to another.

Valuable though headings are in helping the reader make these transitions, they are not sufficient. The reader must keep our topics in mind if he is not to get lost. By making our headings meaningful, we can help impress them on his memory. Nevertheless, if our article is complex, we present him with more topics than he can remember without taking the time to memorize them.

Though we would like the reader to fix them in mind, we do not want him to spend the time required. Once he picks up our article and decides to read it, we want him to keep his forward reading momentum. How then can we solve this problem? We can use introductions.

But what are introductions? Are they topics that we omitted from our topic outline? No. They are what we tell the reader about the topics so as to aid his memory and in other ways help him make the transitions from one to another.

If introductions are not topics, how then can we fit them into our topic outline? The answer is easy. We insert them as shown in figure 19.

Basic topic outline:	Outline with introductions inserted:
Topic A	Topic A
	Introduction A
I. Topic AA	
A. Topic AAA	I. Topic AA
B. Topic AAB	Introduction AA
	A. Topic AAA
II. Topic AB	B. Topic AAB
A. Topic ABA	
B. Topic ABB	II. Topic AB
	Introduction AB
	A. Topic ABA
	B. Topic ABB

Figure 19.--Insertion of introductions into a topic outline. (Note: Since introductions are not topics, they are not given coefficients. Omitting the coefficients enables us to keep the logical coefficients that we gave the topics when we made the topic outline. Furthermore, omitting them signals the reader that we are not presenting another topic but rather that we are introducing another topic or series of topics.)

An introduction--such as Intro-
ductions A, AA, or AB--may be
divided into a number of parts
(fig. 20). Each part has a definite
function in giving the reader cer-
tain transitional information.

Introduction

Part I

Part II
    Part IIA
        Part IIA1
        Part IIA2
    Part IIB
        Part IIB1
        Part IIB2
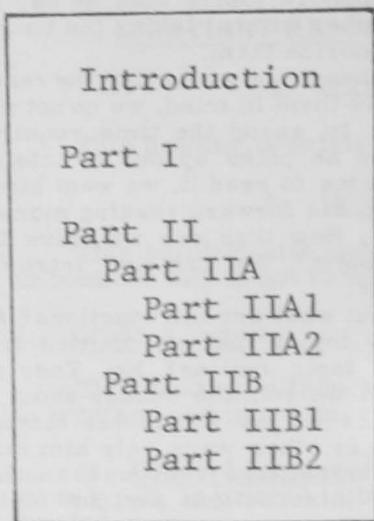
Figure 20.--Number-letter names of the
parts of an introduction.

In theory, all introductions could
contain the same number of parts.
In practice, they do not. At certain
transitional points in the article,
the reader has no need for certain
transitional information. So, in
some introductions, certain parts
may be omitted. When designing
an introduction, we therefore need
to know whether we should include
a given part or leave it out.

The start of an article is the point
where the reader needs the most
transitional aid. This is the point
where he is making a transition
from his knowledge of all subjects
to a knowledge of ours. So, in the
opening introduction, we usually
include all of the parts. In the
other introductions in the article,
we usually omit some of them or,
at least, give them less extensive
treatment than we would in an
opening introduction.

We thus can divide introductions
into two main groups: m a j o r

introductions, such as Introduction
A, which usually includes all of
the parts, and minor introductions
such as Introductions AA and AB
which usually omit certain of the
parts or treat them less exten
sively.

A. MAJOR INTRODUCTIONS

To understand introductions, w
must understand units of outlin
division, for the function of intro
ductions is to reveal these units
But what is a unit of division
For answer, let us see how unit
are made. When making an outline
we start with one idea, say Topi
A. If this idea is complex, w
simplify it by dividing it into tw
or more smaller, and therefor
less complex, subideas, say Topic
AA and AB (fig. 21).
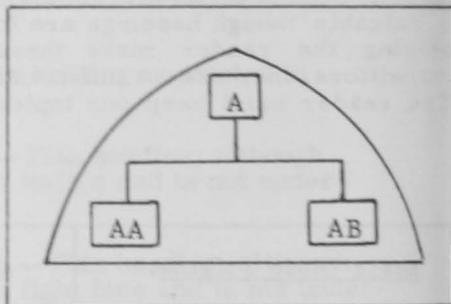
Figure 21.--Simplification of Topic A l
division.

Is our outline now complete
Possibly. If Topics AA and A
are not too complex for the reade
to grasp readily, we need not divic
them further. If, however, Topi
AA, say, is complex, we continu
to divide (fig. 22). Similarly,
Topic AAA, say, is still too con
plex, we continue to divide (fi
23). We continue in this manne
until we have simplified our over
all idea, topic A, enough so th
the reader can grasp it readil
Because of the technique of divi
sion we use, our finished outli

10

is made up of a number of inter-
locking units. We call them units
of outline division (fig. 24).
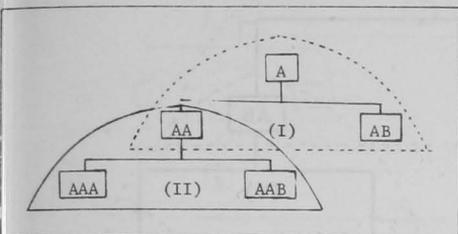
Figure 22.--Simplification of Topic AA by
division.

In making an outline, we do not,
of course, have to start with Topic
A. For example, we could start
with a topic that is more general,
say, Topic G. Then, in abridged
form, our outline might look like
the one in figure 25. Evidently,
then, as can be inferred from
figure 26, we can start with as
general a topic (or, conversely,
with as specific a topic) as we
wish.

Let us assume now that we are
writing an article about Topic A
and not about Topic G'' even though
the outline in figure 26 may be

valid and may thus contain Topic A
as a subtopic. Then, although our
article is about Topic A, we prob-
ably will want to tell the reader
of the relation between Topic A
and Topic G''. And we will want
to tell him about the relations
among Topics A, AA, and AB.

Since the topic outline has no
place to reveal this information,
we insert Introduction A, as was
shown earlier in figure 19, to
give us a place. Thus, we can now
use Introduction A to reveal the
units that are antecedent to Unit
I (for example, Units -III, -II, and
-I) and then to reveal Unit I itself.

1. Revealing Units Antecedent
   to Unit I

When we write an article, we
have to start somewhere. But
where? Assuming that the article
is about Topic A, we usually start
by discussing a more general topic,
such as Topic G''.

In any given field, the more
general a topic is, the more likely
the reader is to know something
about it already. For example,
most readers know something
about the general topic called
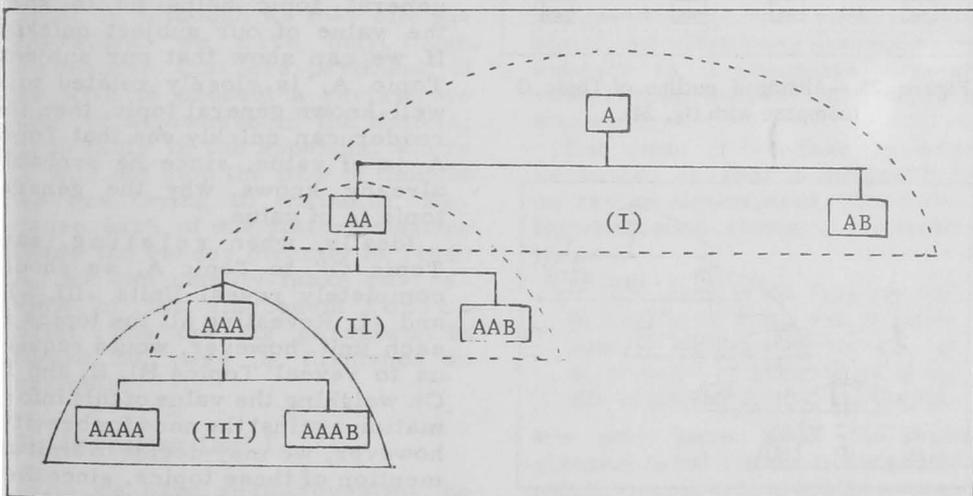
Figure 23.--Simplification of Topic AAA by division.

11

Figure 24.--Units of outline division.

Figure 25.--Abridged outline of Topic G
(compare with fig. 24).

Figure 26.--Abridged outline of Topic G".

"chemistry" even though they m
know nothing about the specif
topic called "physical chemistry
So, starting with a general top
allows us to use the technique
guiding the reader from the kno
to the lesser known.

Furthermore, starting with
general topic helps us to sho
the value of our subject quickl
If we can show that our subjec
Topic A, is closely related to
well-known general topic, then t
reader can quickly see that Top
A is of value, since he probab
already knows why the gener
topic is of value.

Ideally, when r e l a t i n g, sa
Topic G" to Topic A, we shou
completely reveal Units -III, -
and -I. Revealing all the topics
each unit, however, would requi
us to reveal Topics H', H, and
On weighing the value of this info
mation against the need for brevi
however, we may decide to omit
mention of these topics, since th
do not lead the reader directly
Topic A (fig. 27). Having, in th

12

Figure 27.--Line of direct descent from Topic G" to Topic A.

instance, decided not to present the antecedent units completely, we would merely present Topics G", G', and G in sequence. Since the reader probably already has some knowledge of these topics, telling him about them has more the function of re-calling them to his mind than of telling him something that he did not know before. So, this review can be brief, as shown by the abridged introduction in figure 28. When designing Part I of an introduction (fig. 28), we aim at guiding the reader directly from our general topic, say Topic G", to our major topic, Topic A. In leading the reader directly to Topic A, although we may cite the literature, we cite only those references that are pertinent. If we wish to present a review, we give it elsewhere in the article, preferably in the appendix, where it will not stop the flow of thought we are trying to maintain. Be-cause each of our statements now leads the reader directly to Topic A, we can usually make our re-view of the antecedent topics brief. The opening paragraph in figure 30, page 16, furnishes an example.

2. Revealing Unit I

As we have seen, revealing the units antecedent to Unit I is largely a review of ideas that the reader already more or less knows. Unit I is where we present new infor-mation to him. Because it is new, Unit I (and the units subordinate to it) must be revealed completely. What is in Unit I that needs to be revealed? Looking at it (fig. 29), we see that it has two major parts: (1) a controlling topic (Topic A), so-called because it controls the scope of the unit--that is, it defines and limits its subject area--and (2) two or more developing topics (Topics AA and AB)--so called because they de-velop or explain the particular aspects of the subject as defined by the controlling topic.

These, then, are the contents of Unit I that need to be revealed. Because the controlling topic is the heart of the unit, let us ex-amine it before examining the developing topics.

a. Controlling topic (Topic A).--The reader has to know what sub-ject we are talking about before he can understand what we are trying to tell him about it. This fact explains the great value of headings. As we saw earlier, they indicate to the reader, at a glance, what the subject is. Nevertheless, headings, owing to the need for brevity, are often more or less ambiguous . Hence, to tell the reader exactly what we are talking about, we often need to express our subject in a complete sentence rather than merely in a word or a phrase.

But even if we take an entire sentence, is that sufficient? Let us try an experiment. The follow-ing sentence states a controlling idea:

The object of the work reported in the present paper was to deter-mine if alpha-monoglycerides can be produced by glycerolysis of the oils of menhaden, tuna, and herring.

We now know what the author planned to talk about in his paper--namely, production of alpha-mono-glycerides. Suppose that he would immediately start to report on

13

Specific illustration of Part I of an introduction:

FAULTY ORGANIZATION IN TECHNICAL BOOKS

Introduction

In the advanced countries of the world, education is one

of the main industries, for it involves a large part of the

population in each country and a large investment of the

national resources. This involvement is easily understand-

able, since a science-based society requires that most of its

members be highly trained.

Fundamental to the educational process is the use of

textbooks. Their usefulness, however, depends in large part

upon their communication efficiency, and their efficiency,

in turn, depends considerably upon how well they are organized.

Yet, despite the great social and economical importance of

textbooks, despite the need to maintain their communication

efficiency at a high level, and despite the close relation of

their efficiency to their organization, authors are not giving

sufficient thought to organizing the books logically . . .

- -

General illustration of Part I of an introduction:

Introduction

Part 1.   Reveals the pertinent parts of the antecedent units

of outline division

Figure 28.--Introduction starting with an extremely general topic and then moving rapidl
toward the more specific one that is the subject of the article.

producing them. Would we be
satisfied with the foregoing state-
ment? No--not if we are thinking.
The author would have left us
with such questions as: Why do

we need to know about alpha
monoglycerides? And why do w
need to know whether they can b
produced by glycerolysis? Also
why do we need to know whethe

14
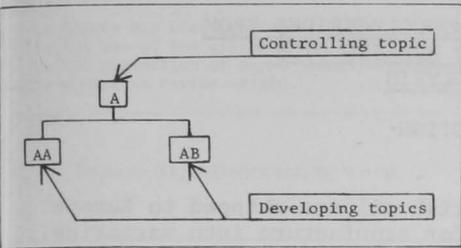
Figure 29.--Unit I.

they can be produced from men-
haden, tuna, and herring oils? What
has all this to do with us? Thus,
when we state our controlling idea
explicitly, we raise questions in
the reader's mind unless we have
previously given him background
information that answers the
questions before he has felt the
need to ask them.

So, before stating our controlling
idea, we should anticipate such
questions and supply answers to
them before they are asked. We
could, of course, state the con-
trolling topic and then answer the
questions afterwards. If, however,
we use that technique when we
write our orienting discussion,
we are directing the reader's
thought backward toward the con-
trolling topic instead of forward
toward the developing topics. After
we once state the controlling topic,
we want to discuss its develop-
ment. We do not want to interrupt
the forward movement of our
thought to insert background infor-
mation on the controlling topic
that the reader needs in order to
grasp its significance to him.

The full revelation of our con-
trolling idea therefore involves
two steps: (1) supplying answers
to the reader's anticipated ques-
tions and (2) stating the controlling
idea in a complete sentence.

(1) Answering anticipated ques-
tions.--To answer the questions
we anticipate a thoughtful reader
would ask, we first, for our own
benefit, write out our controlling
idea. Then, we underline all the
important words in this statement.

Next, we consider what questions
those words would raise in the
reader's mind. Finally, we write
an orienting discussion supplying
background information that an-
swers the questions he otherwise
would ask if this discussion were
omitted. If the orientation is ade-
quate, all the underlined words in
the statement of our controlling
topic will either appear or be
strongly implied in our discus-
sion answering the questions that
we anticipate he would ask. Figure
30 gives an example.

Note that all literature cited is
pertinent and that no unnecessary
information is given. The discus-
sion leads the reader directly and
understandingly to the statement
of the controlling idea.

In designing introductions of this
kind, we often include a "however,"
"yet," "although," or some other
word indicating a contrast in
thought (fig. 31). This contrasting
word shows that an unsolved prob-
lem exists and paves the way for
us to state our controlling topic at
the end of the orienting discussion.

(2) Stating the controlling
topic.--Obviously, the statement
of the controlling topic should not
indicate more coverage than the
subject actually encompasses, nor
should it indicate less coverage.

Also, the statement should in-
clude some word such as "object,"
"aim," or "purpose" (fig. 32). In-
cluding this identifying word leaves
no ambiguity as to what we intend
to discuss.

b. Developing topics (Topics AA
and AB).--We now have carried
the reader to the point (fig. 33)
where he knows that we plan to
discuss Topic A. Furthermore, he
knows why we plan to discuss it.

Unless, however, we are writing
an article such as one reporting
on a simple piece of research
(which can be reported tradi-
tionally under the headings
"Methods and Materials" and "Re-
sults and Discussion"), he has no
idea of how we are going to dis-
cuss, or develop, Topic A. Yet,

PREPARATION OF ALPHA-MONOGLYCERIDES FROM
MENHADEN, TUNA, AND HERRING OILS
BY GLYCEROLYSIS

INTRODUCTION

Large quantities of fish oil are shipped to Europe from the United States for manufacture into margarine. It is desirable to find additional uses for American fish oil in order to expand the domestic and export markets for this product.

Alpha-monoglycerides from vegetable sources are used for oil-modified alkyd resins (Rank, 1952) and chemical intermediates (Ross, 1954; and Vitale and Liftin, 1956). The fatty acid constituents of oils from marine sources generally have longer chain lengths and higher degrees of unsaturation than do those from other sources. Alpha-monoglycerides from marine oils might have unusual and useful properties. These oils, however, present problems in synthesis, since they tend to oxidize readily. Accordingly, it would be of economic value to determine if alpha-monoglycerides can be produced from marine oils.

There are two commercially important methods for producing alpha-monoglycerides of long-chain fatty acids: (1) esterification of glycerol with fatty acids and (2) glycerolysis of triglycerides under conditions of ester interchange. The simplicity of the glycerolysis reaction makes it the more attractive of the two methods. Little has been published, however, on use of the glycerolysis reaction in the production of alpha-monoglycerides from oils of marine origin. Information on the reaction of glycerol with menhaden, tuna, and herring oils would be particularly desirable. These oils are important to the United States, as they are processed here in large quantities.

The object of the work reported in the present paper therefore was to determine if alpha-monoglycerides can be produced by glycerolysis of the oils of menhaden, tuna, and herring.

Marginal labels:
- Orientation of the reader to the controlling idea
  - (Antecedents)
  - (Answers to anticipated questions)
- Controlling idea

Figure 30.--"Important" words. (This introduction is produced by permission of th authors--Gruger, Malins, and Gaughlitz (1960) and the American Oil Chemists' Society.)

for him to follow our thought in its various branchings, he has to know what directions it is going to take. Hence, we ordinarily should tell him what precisely our developing topics (Topics AA and AB) are going to be and give him enoug background so that he can see th reasons for our choice. A com plete introduction therefore in cludes Part IIB, as indicated i figure 34.

The object of the work reported in the present paper therefore was to determine if alpha-monoglycerides can be produced by glycerolysis of the oils of menhaden, tuna, and herring.

Figure 31.--Contrasting word.

Figure 32.--Identifying word.

Introduction

Part I. Reveals the antecedent units of outline division

Part II. Reveals the present unit of outline division (Unit I)

Part IIA. Reveals the controlling topic of the unit

Part IIA1. Answers anticipated questions

Part IIA2. States the controlling topic (Topic A)

Figure 33.--Parts of an introduction corresponding to figure 30.

Introduction

Part I. Reveals the antecedent units of outline division

Part II. Reveals the present unit of outline division

Part IIA. Reveals the controlling topic of the unit

Part IIA1. Answers anticipated questions

Part IIA2. States the controlling topic (Topic A)

Part IIB. Reveals the developing topics of the unit

Part IIB1. Answers anticipated questions

Part IIB2. States the developing topics (Topics AA and AB)

Figure 34.--Introduction with Part IIB added. (This is a complete introduction.)

The technique for revealing the developing topics thus is similar to that for revealing the controlling topic. It involves the two corresponding steps: (1) answering the reader's anticipated questions and (2) stating, or listing, the developing topics.

(1) Answering anticipated questions.--After we have completed Part IIA2 of our introduction, we consider our forthcoming developing topics to decide whether our listing of them in Part IIB2 will raise questions in the reader's mind. If so, we write an orienting

17

Introduction

Statement
of Topic A — ... The purpose of this report is to focus attention on the prevalence of faulty organization in technical | Part IIA2

Orientation — Supplies answers to anticipated questions concerning Topics AA and AB —

books. Simply making a statement that faulty organization is prevalent, however, will not impel the scientific and technical community to remedy the defect, because such a statement, without support, is not convincing. What is needed are quantitative data showing precisely how prevalent poor organization actually is. In addition, we need a program that will encourage authors to give the required thought to | Part IIB1

Listing of
Topics AA
and AB — organization. Accordingly, this report (1) presents data showing the prevalence of faulty organization in technical books and then (2) suggests how we can solve the problem. | Part IIB2

Figure 35.--Abridged introduction showing the technique for answering the reader's anticipated questions concerning Topics AA and AB.

discussion in Part IIB1 that answers his questions before he has been impelled to ask them. Figure 35 gives an example of the technique for supplying the information needed.

(2) Stating the developing topics.--By giving an orienting discussion of our developing topics, we set the stage for us to list them. But now that we have set the stage, does the reader really need to be told that they are forthcoming? Is he not going to read them anyhow? Surely he will find the topics for himself when he continues reading.

He will, but by that time, he may be lost unless we given him transitional aid by listing our developing topics. Simple though this listing is, it helps him make three difficult transitions (fig. 36): (1) the transition from Level 0 to Level 1, (2) that from Topic A to Topic AA, and (3) that from Topic AA to Topic AB.

The listing shows the level of division occupied by Topics AA and AB and thereby enables the reader to make a mental transition down to this next lower level from that of Topic A. Without this listing, he would not know that the level exists--or at least, he would not know what it consists of and therefore would not be able to visualize it. The listing also shows that Topic AA is the next topic to be treated. Finally, it shows that when the discussion of Topic A
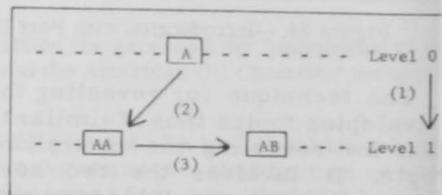
Figure 36.--Three transitions aided by listing of Topics AA and AB.

18

is done, Topic AB will be discussed next.

Transition 1--that is, the transition from Level 0 to Level 1--is subtle. This transition often escapes our notice because it is largely hidden by the more obvious transition from Topic A to Topic AA. For that reason, we may fail to call the transition from Level 0 to Level 1 to our reader's attention.

Granted, the reader who understands the tactics of transition can attempt all three of the transitions without our aid by looking at our forthcoming headings and by noting what the topics are and what their level of outline division is relative to that of Topic A. But even so, would he know why we had chosen these topics and arranged them in the sequence we had? Ordinarily, no--not unless he reads what we have to say and then can make the inferences required to arrive at the answers.

For him to know all the transitional information needed--that is, to answer the why's as well as the what's of our outline--he must be as well informed about our subject as we are. Forcing the reader to attempt these inferences therefore can be termed "operation bootstrap." It is equivalent to asking him to lift himself from the ground by tugging on his boots.

To make the inferences, he must know, a priori, the very information he is trying to gain by reading our article. This fact explains why a reader so often has to read an article several times before he can understand it. Each re-reading helps him to make an inference he could not make the time before.

By supplying him with the required transitional information, we can help eliminate any need for him to read our article more than once.

Suppose, however, that we grant the reader the ability to read the discussion of our topics and then make the inferences required to see why we have chosen these topics. Suppose also that we grant that he has the ability to infer why we have arranged them in the order we have. Nevertheless, forcing him to carry out our function of providing transitions would slow him down. We therefore help him make these transactions. In so doing, however, we must avoid two pitfalls (a) that of revealing the obvious and (b) that of attempting to carry him down more than one "new" level of outline division at a time.

(a) Abstaining from the obvious.--Although our revealing the developing topics ordinarily helps the reader make the three transitions just discussed, our revealing the obvious does not help. For example, if the first topic is "Methods and Materials" and the second is "Results and Discussion," the reader can infer from the heading "Methods and Materials" that the next heading will be "Results and Discussion" (fig. 37), since research reports are commonly

Methods and Materials

Presentation of the methods and materials

Results and Discussion

Presentation of the results and the discussion of them

Figure 37.--Common organization used in research reports.

organized in this manner. Hence, listing such topics as "Methods and Materials" and "Results and Discussion" is useless.

The test then of whether or not we should list the developing topics is whether the reader, after seeing the heading to the first subsection, can immediately guess what the heading or headings to the remaining coordinate subsections will be.

(b) Attempting only one level. Figure 38 illustrates an attempt simultaneous transition down tw "new" levels of outline divisio (that is, levels occupied by topic that are new to the reader). At tempting such complex transition confuses him. Accordingly, w should not make the following kir of statement: "In the developmer of Topic A, the next topics to b
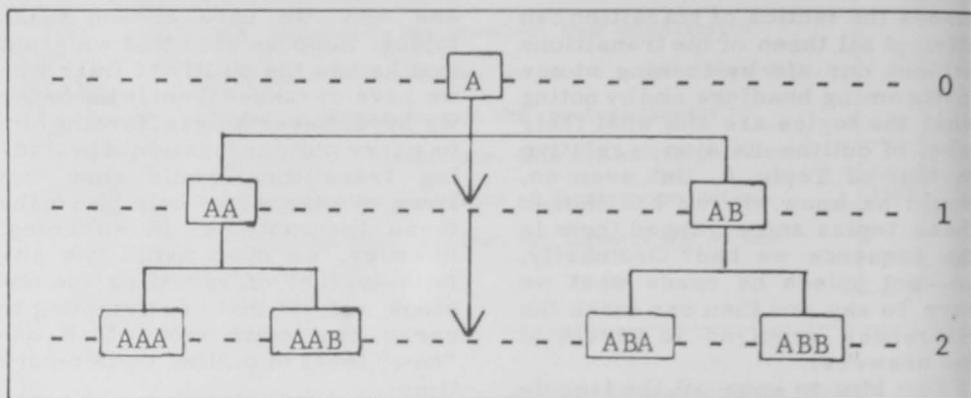
Figure 38.--Attempt to carry the reader down two levels of outline division simultaneousl
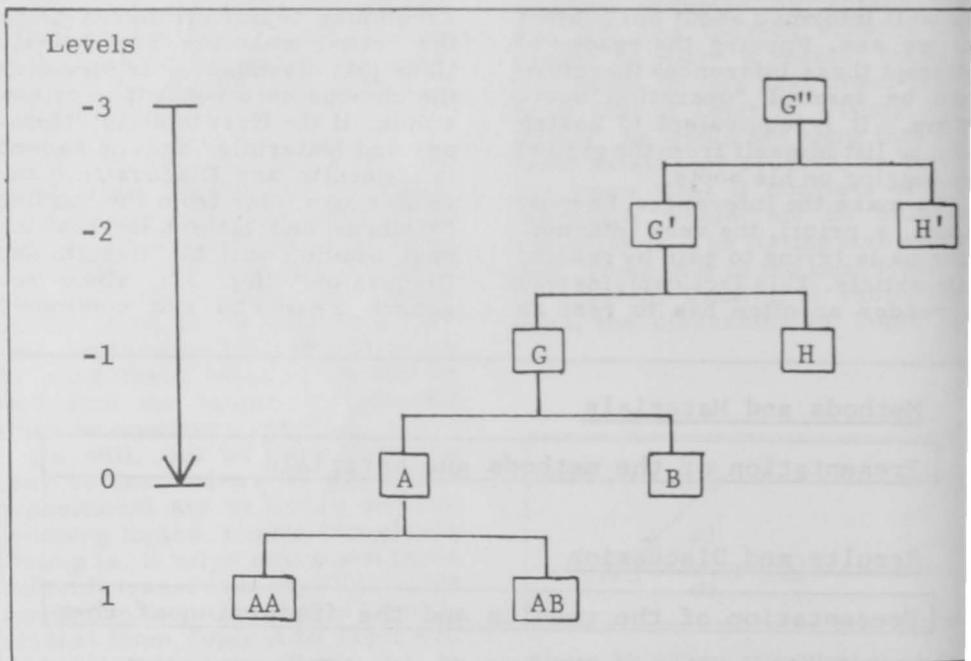
Figure 39.--Levels of outline division involved in the transition from Topic G to Topic

20

considered are Topics AA, AAA, AAB, AB, ABA, and ABB." We have enough difficulty in carrying him down one new level (as shown in Part II of fig. 34) without trying to carry him down two new levels at a time.

This recommendation that we carry the reader down no more than one new level at a time may seem contradictory if we consider what is involved in acquainting him with our general field--that is, in carrying him from, say, Topic G" to Topic A (fig. 39) which requires a transition from Level -3 to Level 0. But carrying the reader from Level -3 to Level 0 differs fundamentally from carrying him from Level 0 to Level 1. Why? As we saw earlier, Topics G", G', and G already are more or less known to him, whereas Topic A and those subordinate to it are new to him. For this reason, bare mention of Topics G", G', and G will suffice, whereas it will not suffice for Topic A and its subtopics. So, we do not attempt to carry the reader down more than one new level of outline division at a time.

B. MINOR INTRODUCTIONS

All introductions in an article, other than Introduction A, are minor introductions.

To understand minor introductions, we have to understand units of transition, and to understand them, we need to know their make up. As can be seen from the article symbolized in figure 40, a unit of transition consists of a superior heading, an introduction, and two or more subordinate headings. These units correspond to our units of outline division (fig. 41). Whereas, the topics in the unit of outline division stand for the ideas themselves, the headings in the unit of transition merely name the ideas. The difference, for example, is the difference between New York City and the sign pointing to it. Because of this difference, units of transition do not include detailed discussions, for these discussions

constitute the actual expression of our ideas, not the names of our ideas.

In designing introductions, we keep in mind that an introduction is not a complete unit of transition-- that the headings also play a role. The headings instantaneously reveal what we are discussing and the level of outline division of our discussion. But, by the same token, we do not expect the headings to carry the full transitional load. We recognize that introductions also have a role. We keep in mind that (1) headings do not reveal reasons, (2) they point neither backward nor forward in the outline, and (3) they are often ambiguous, both as to the subject we are discussing and as to its level in the outline. So, to help the reader maximally in making the transitions from one section to another in our article, we use heading and introductions conjointly.

In addition to our knowing about the unit of transition, we need also to know about sequential and nonsequential introductions. In figure 42, note that the introductions pointed to by arrows--that is, the sequential introductions, such as Introduction AA--are separated from the preceding introduction only by a heading, whereas the nonsequential introductions, such as Introduction AB, are separated from the preceding introduction by a detailed discussion. Note also that sequential introductions-- such as Introductions AA, AAA, or ABA--are always first coordinate introductions, whereas nonsequential introductions--such as Introductions AAB, AB, or ABB--are always second coordinate introductions.

Because of these differences between the sequential and nonsequential introductions, they differ as to the number of introductory parts they contain.

1. Sequential Introductions

All sequential introductions have the same properties. So, to make our discussion specific, let us

Topic A
(Title)

Introduction A

(I)

Topic AA
(Heading)

Introduction AA

(II)

Topic AAA
(Heading)

Introduction AAA

(III)

Topic AAAA
(Heading)

Discus-
sion
AAAA

Topic AAAB
(Heading)

Discus-
sion
AAAB

Topic AAB
(Heading)

Introduction AAB

(IV)

Topic AABA
(Heading)

Discus-
sion
AABA

Topic AABB
(Heading)

Discus-
sion
AABB

Topic AB
(Heading)

Introduction AB

(V)

Topic ABA
(Heading)

Introduction ABA

(VI)

Topic ABAA
(Heading)

Discus-
sion
ABAA

Topic ABAB
(Heading)

Discus-
sion
ABAB

Topic ABB
(Heading)

Introduction ABB

(VII)

Topic ABBA
(Heading)

Discus-
sion
ABBA

Topic ABBB
(Heading)

Discus-
sion
ABBB

Figure 41.--Comparison of units of outline division and outline transition.

confine our illustrations to Introduction AA. Whatever applies to it will apply to the others.
Circumstances, however, vary widely from one article to another. We therefore would not be wise to lay down hard and fast rules concerning sequential introductions. Nevertheless, we can indicate the probable parts that a sequential introduction will have (table 1). Two important points can be inferred from table 1.
The first is we must keep in mind that Topic AA plays two roles. It is a developing topic in Unit I and a controlling topic in Unit II. Because of this dual role of Topic AA, the superior introduction, Introduction A, plus the heading will often have supplied much or all of the Part I and Part IIA introductory information needed concerning Topic AA.
The second point is that, because we never try to carry the reader down more than one level of outline division at a time, the superior introduction will not supply the Part IIB information needed to carry the reader from Level 1 to Level 2--that is, from Topic AA to Topics AAA and AAB. So, we cannot omit Introduction AA entirely. We need it to supply Part IIB infomation.
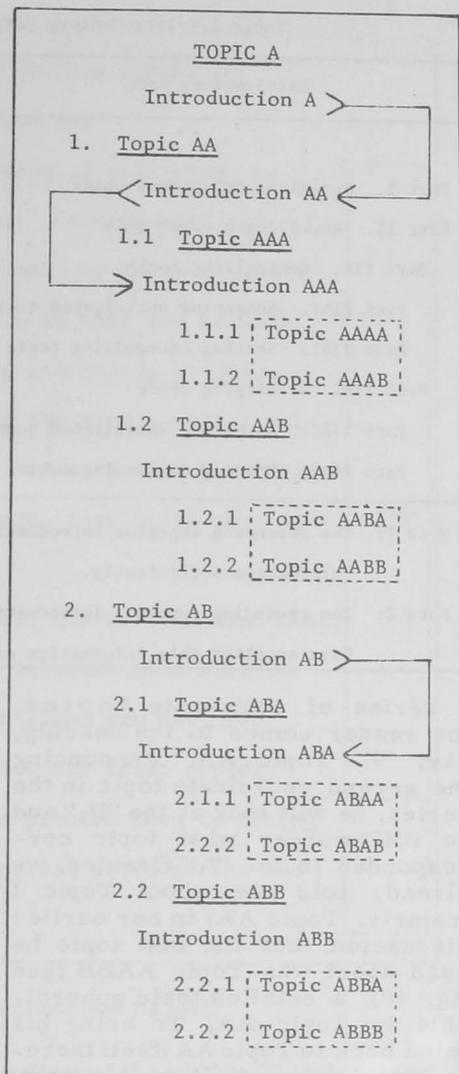
Figure 42.--Sequential introductions (those pointed to by arrows). (Underlined topics represent headings. Boxed topics represent detailed discussions.)

2. Nonsequential Introductions

What is the essential difference between a sequential and a nonsequential introduction? The nonsequential introduction normally includes Part I information; the sequential introduction, as we just saw, normally does not.
Why do the two introductions differ in this way? When, in reading

Table 1.--Introductory parts in a sequential introduction

Introductory part	Very probably will be:		Reason	Example
	Omitted	Included	Reason	Example
Part I. Revealing antecedent units	Yes		Note 1	Fig. 43
Part II. Revealing present unit				
Part IIA. Controlling topic	Yes		Note 2	Fig. 43
Part IIA1. Answering anticipated questions				
Part IIA2. Stating controlling topic				
Part IIB. Developing topic		Yes	See	Fig. 43
Part IIB1. Answering anticipated questions		Yes	pages	
Part IIB2. Stating developing topics		Yes	15-19	

Note 1: The preceding superior introduction will probably have supplied this information sufficiently.

Note 2: The preceding superior introduction plus the heading will probably have supplied this information sufficiently, but see figure 44.

a series of coordinate topics, the reader comes to the heading, say, "II. Topic AB," announcing the second coordinate topic in the series, he will look at the "II," and he will wonder what topic corresponded to the "I." Granted, we already told him about Topic I (namely, Topic AA) in our earlier discussion, but the last topic he read about was Topic AABB (see fig. 40), a detailed topic subordinate to Topic AA. To bring his mind back to Topic AA itself therefore requires effort on his part. And recalling it to his memory takes his time. In fact, to get the larger picture encompassed by Topic AA, he would probably have to look back over what he already has read. Accordingly, he needs the help of a quick review to refresh his memory of Topic AA and thereby bring Topic AA sharply into focus before starting to read Topic AB.

Unless the reader has the preceding coordinate topic clearly in mind, he will not be able to complete the transition from the one coordinate topic to the next, as is required for a complete under-

standing of our subject. The function of the Part I information thus is to help the reader complete this transition. In fact, in Part I we might even have to tell him about Topic A if our subject is so complicated that he may have momentarily forgotten what Topics AA and AB are supposed to be developing.

For an example of how to include Part I information in a nonsequential introduction, we turn to Aristotle (Grube, 1958, pp. 65-66). In explaining how to give a speech (Topic A), he divided his explanation into three main sections (Topics AA, AB, and AC). After completing his discussion of Topic AA, he then reviewed his antecedent units of division before starting on Topic AB. Figure 45 shows how he established his overall unit--that is, Unit I--in the first sentence of his review[1]. In his

---

[1] From Aristotle: ON POETRY AND STYLE, translated by G. M. A. Grube, copyright 1958, by the Liberal Arts Press, Inc. and reprinted by permission of the Liberal Arts Press Division of the Bobbs-Merrill Company, Inc.

24

I. DEDUCTIVE METHOD OF OUTLINE FORMATION

(Introduction AA)

When considering the principles of outlining, we immediately encounter the ideas: "coordinate" and "subordinate." But what do we mean by these commonly used terms? By coordinate, we mean that two or more ideas are of the same degree of generality or specificity. In short, they are at the same level of outline division. By subordinate, we mean that one idea is less general--or alternatively, that it is more specific--than another idea is.

IIB — IIB1

For the outline to be logical, the coordination must, of course, be correct, and the subordination must be correct. Unless these two conditions are met, the reader will not be able to follow our ideas rapidly when he reads our article. Our problem then in making an outline is how to achieve correct coordination and correct subordination.

IIB2

Figure 43.--Parts I and IIA omitted (see fig. 34).

second sentence, he then established his second unit of division (fig. 46). Having reestablished in the reader's mind the first branch in the branch-chain of thought, Aristotle then brought to the center of the stage the controlling topic (Topic AB) of the second main division in his branch-chain. This reintroduced the reader to Topic AB and thereby started him down the new branch (fig. 47).

Ordinarily, we do not review the antecedent units as extensively as Aristotle did. In figure 48, for example, only Unit II (fig. 49) was reviewed. Thus, in this particular nonsequential introduction, no attempt was made to review Unit I

or Units III and IV. This information could have been included, however, if the reader had required it.

Note in figure 48 that although Part IIB1 is omitted, Part IIB2 is included. Of all the parts of an introduction, Part IIB2 is the part that is least likely to be omitted, since it is needed in helping the reader make the transition to the next lower level of outline division.

The most essential parts then of a nonsequential introduction is Parts I and IIB2. Parts IIA and IIB1 usually are included, however, to carry the reader understandingly from Part I to Part IIB2. For this reason, a minor

I.   UNCOVERING THE PREVALENCE OF FAULTY ORGANIZATION

(Introduction AA)

The basic organizational defect in technical books is erroneous coordination. To obtain the data needed to test the validity of this premise for the entire field of technical books, however, would require more time than a lone researcher has to spend. Accordingly, the work presented here was limited to texts dealing only with mathematics, physics, chemistry, and engineering.

IIA1

The purpose of this part of the report is to give a quantitative indication of how prevalent erroneous coordination is in the structure of these technical books.

IIA2

The investigational approach is based upon an earlier report (Sanford, 1966), which showed that faulty coordination can be detected by (1) counting the topics presented as coordinate and (2) searching among these topics for special relations.

IIB1

IIB2

Part IIA

Part IIB

Figure 44.--Part IIA retained (compare with fig. 34). (Note 1: Part IIA had to be retaine to define the "these," which was not defined in Introduction A. Note 2: Observe tha Part IIB1 consists of a reference to the literature.)

Sentence 1:

"There are three subjects that need to be dealt with in connection with a speech [Topic A]; first, the sources of convincing argument [Topic AA]; second, matters of style [Topic AB]; and third, how to arrange the different parts of speech [Topic AC].

Corresponding unit of division:
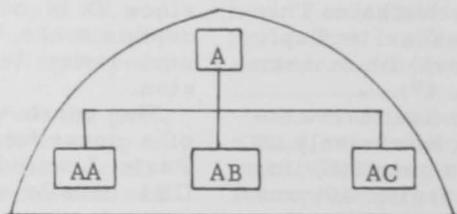
Figure 45.--Relation of Aristotle's opening sentence to his overall unit of outline divisi

Sentence 2:

"We have already dealt with the sources of convincing arguments [Topic AA]; we have seen that they are of three kinds, what these three kinds are, and why there are only three: the first kind depends on the character of the speaker [Topic AAA], the second on the feeling of his hearers [Topic AAB], and the third depends on the speech itself, something is proved or appears to be proved [Topic AAC].

Corresponding unit of division:
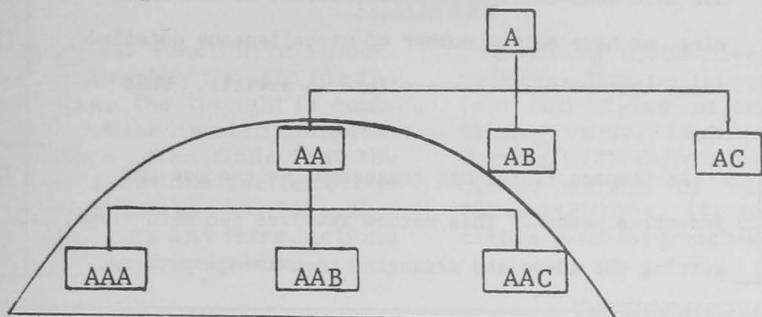
Figure 46.--Relation of Aristotle's second sentence to his second sequential unit of division.

Sentence focusing attention on the second coordinate topic:

"The next step is to discuss style [Topic AB], for it is not enough to know what should be said; it must be said in the right way, and many factors contribute to the impression made by a speech."

Reader's corresponding center of attention:

Topic heading the new branch that Aristotle planned to reveal next
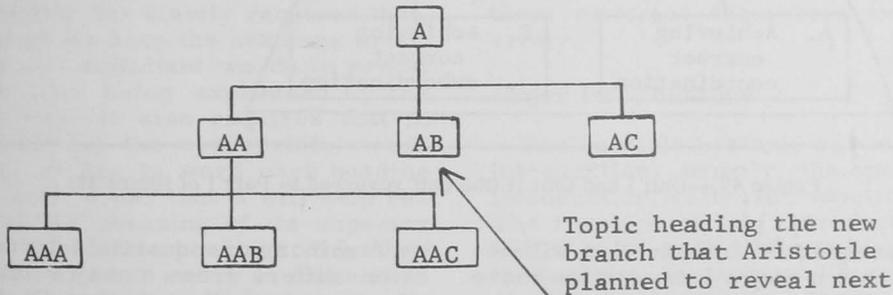
Figure 47.--Aristotle's statement starting the reader down the second main branch in his branch-chain of thought.

II. INDUCTIVE METHOD OF OUTLINE FORMATION

(Introduction AB)

Figure 48.--Part I included as well as Part II (note, however, that Part IIB1 is omitted since this information seems obvious.)
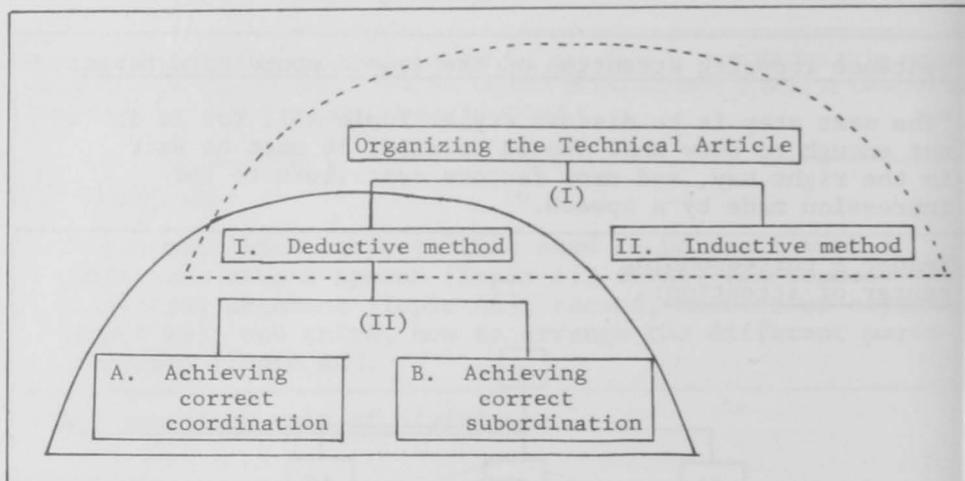
Figure 49.--Unit I and Unit II (the unit reviewed in Part I of figure 48).

nonsequential introduction will resemble a major introduction more closely than it will a minor sequential introduction. That is, it usually will contain most of the parts found in a major introduction.

A minor nonsequential introduc- tion differs from a major intro- duction, however, in that Parts and IIA normally are not treate as extensively as they are in major introduction. But there

one way in which all three introductions--major, sequential, and nonsequential--closely resemble each other. They all usually include Part IIB2. From our various illustrations, we now see that we have complete flexibility as to the parts of the introduction that we include or omit. On the one extreme, we may include all parts; on the other,

we may omit all parts. That is, we may omit the introduction entirely. In those introductions in which we include only one part, the one that we most usually include in Part IIB2, which helps the reader make the difficult transition from one level of outline division to the next lower level.

SUMMARY

Although the function of an outline is to simplify thought for the reader, when the thought is complex, the outline is also complex. He therefore often finds that the transitions from one section of our article to another are hard to make. We use headings and introductions in combination to help him.

Devising distinctive headings requires that we introduce variety into the styles of headings. Obtaining variety involves: (1) positioning, (2) differentiating size, class, weight, or width of type, (3) underlining, (4) using coefficients, and (5) punctuating.

HEADINGS

Headings have two main functions: namely, to enable the reader to determine, at a glance, (1) what the topic of discussion is and (2) what the level of outline division of the topic is. (Levels of division reveal whether a topic is superior, coordinate, or subordinate.) To carry out these functions maximally, headings should be both meaningful and distinctive.

Wording headings in such a way that they will be meaningful requires that we make the coordinate headings parallel in form and that we make all the headings clear. Wording for clarity requires that, though we keep the headings brief, we use sufficient words to reveal the idea being expressed by the heading. It also requires that in conceiving the appropriate wording, we try to word each heading in such a way that it will help reveal the meaning of its superior and coordinate headings. It further requires that we try to make each heading self sufficient as well. Each term in the heading should be unambiguous and each term should have only one meaning.

INTRODUCTIONS

To make our topic outline workable, we insert an introduction at each transition in level of division. Each introduction is made up of several parts, and each part has a specific transitional function. The more complex a given transition is, the greater is the number of parts that the corresponding introduction requires.

Introductions may be classified into two groups: major and minor. The major introductions normally require the use of all the parts of an introduction; the minor introductions may omit one or more of them or treat them less extensively.

Major Introductions

Each article has only one major introduction--namely, the opening introduction, called Introduction A. The function of this introduction, like that of each of the minor introductions, is to reveal a unit of division.

In the construction of an outline, a unit of division is formed whenever a superior topic is divided

29

into two or more coordinate sub-topics. Each unit therefore involves two levels of division--that of the superior topic and that of the coordinate subtopics. The superior topic is called the controlling topic; the subtopics are called the developing topics.

A major introduction accompanies Unit I, the opening unit of division in the article. This introduction has two main parts: Part I, which reveals the units antecedent to Unit I, and Part II, which reveals Unit I itself.

Revealing units antecedent to Unit I.

--Our universe of ideas consists of a network similar to that of fish net of infinite size. In this network, the ideas become increasingly general in the upward direction and increasingly specific in the downward one.

Each outline can be thought of as being cut from this net. To show the reader how our outline fits into it, Part I of Introduction A reviews one or more units of division that are more general than is Unit I--that is, that are antecedent to it. Because the topics reviewed are more or less well known to the reader, this review need not reveal each unit completely. It need reveal only those topics that are in the most direct line of descent to Topic A.

In the discussion of the antecedent units, no extraneous information is presented nor are any references to the literature cited that are not pertinent.

Revealing Unit I.

--In contrast to the review of the units antecedent to Unit I, revealing Unit I requires that we completely reveal the unit--in short, that we reveal the controlling topic (Topic A) and the developing topics (Topics AA and AB).

In revealing Topic A, we tell the reader, in a grammatically complete sentence, what Topic A is, so that he will know exactly what we are going to talk about. To ensure that he will be able to identify this statement immediately, we include in it some word such [as] "purpose," "aim," or "object."

Knowing that this statement wi[ll] raise questions in the reader['s] mind, we try to anticipate wh[at] they will be and then write [an] orienting discussion that answe[rs] them before they are asked. If [we] adequately supply the backgroun[d] information needed, this discus[s]ion will contain, or imply, all t[he] important words in our stateme[nt] of Topic A.

We design our introduction [in] such a way that this orienting di[s]cussion comes first and the stat[e]ment comes second. Often we in[c]lude in this discussion [a] contrasting word, such as "how[-]ever," to point to an unsolv[ed] problem and thereby set the sta[ge] for us to state our controlli[ng] idea.

Revealing the developing topic[s,] Topics AA and AB, follows t[he] same technique that we use in r[e]vealing the controlling topic. Th[at] is, we tell the reader exactly wh[at] Topics AA and AB are, but we pre[-] cede this statement by an orientin[g] discussion that answers any que[s-] tions we anticipate that the read[er] would ask concerning Topics A[A] and AB.

In revealing Topics AA and A[B,] we take care not to give him info[r-] mation that he already knows [or] can easily infer. Furthermore, [we] confine ourselves to Topics AA a[nd] AB. We do not try, for example, [to] reveal Topics AAA and AAB. [In] short, we do not attempt to car[ry] the reader down more than one n[ew] level of outline division at a tim[e.]

Minor Introductions

Minor introductions may be d[i-] vided into two groups: sequenti[al] or first coordinate, introductio[ns] and nonsequential, or second coo[r-] dinate, introductions. All seque[n-] tial introductions contain esse[n-] tially the same parts, and [all] nonsequential introductions co[n-] tain essentially the same parts. S[o] we may take Introduction AA, whi[ch] is associated with Unit II, as [a]

prototype for sequential introductions, and we may take Introduction AB, which is associated with Unit V, as a prototype for nonsequential introductions.

Sequential introductions.--Since Introduction AA follows immediately after Introduction A, the reader needs only a small amount of added transitional information in Introduction AA. Ordinarily, all he needs to be told is what the developing topics in Unit II are-- namely, that they are Topics AAA and AAB. Revealing them involves the usual pattern of presenting (1) an orienting discussion giving background information in which anticipatory questions are answered and (2) a terminal statement telling the reader exactly what Topics AAA and AAB are.

Nonsequential introductions.-- Nonsequential introductions always follow a discussion of details. Introduction AB at Level 1 for example, follows the discussion of Topic AABB at Level 3. To bring the reader's mind back up to Level 1 from Level 3, we must give him extra transitional help. We may have to recreate in his mind the picture of Unit II, and possibly that of Units, I, III and IV

as well. This orientation may suffice to bring back to his mind our earlier remarks given in Introduction A concerning Topic AB. Hence, we may be able to make only brief mention of Topic AB and let the heading to Section AB carry the main load of telling the reader that the topic we are discussing at the moment is Topic AB. Ordinarily, then, the primary function of Introduction AB is to reveal the units antecedent to Unit V (particularly Unit II) and to reveal the developing topics in Unit V-- namely, Topics ABA and ABB.

CONCLUDING REMARKS

As we now have seen, our topic outline, by itself, is not a workable instrument. The meanings of the topics are not always clear, the reasoning underlying the choice of the topics is not self evident, and the interrelations among the topics are too numerous for the reader to keep in mind. By using the heading-introduction technique, we solve these difficulties. As a consequence, we enable our outline to perform its function of simplifying thought, and we thereby take a long step toward helping the reader grasp our ideas completely and quickly.

ACKNOWLEDGMENTS

31

This manual is an extension of
lectures given in "A Short Course
in Technical Writing" offered dur-
ing the past several years by the
Department of Humanistic-Social

Studies, College of Engineerii
University of Washington, and t
Seattle Chapter of the Society
Technical Writers and Publishe:

LITERATURE CITED

GRUBE, G. M. A.
1958. Aristotle on poetry and
style. The Bobbs-Merrill
Company, Inc., Indianap-
olis, Inc., pp. 65-66.
GRUGER, EDWARD H. JR., DON-
ALD C. MALINS, and ERICH J.

GAUGHLITZ, JR.
1960. Glycerolysis of mari
oils and the preparation
acetylated monoglyceride
J. Amer. Oil Chem. Sc
37(5): 214-217.

MS #16