Heading-Introduction Technique

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Heading-Introduction Technique

By

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Heading-Introduction Technique

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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
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
that 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 helps 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.

![Figure 2.---Singular and plural coordinate headings.](image)

(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 headings are parallel.

![Figure 3.---Forced parallel wording.](image)

![Figure 4.---Coordinate headings in which different kinds of noun modifiers are used.](image)
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.

Figure 5.--Faulty parallelism.

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 unforgettable.

Figure 6.--Superior and coordinate subheadings.

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 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:

\[ \text{Topic A} = \text{Topic AA} + \text{Topic AB} \] (1)
\[ \text{Topic AA} = \text{Topic A} - \text{Topic AB} \] (2)
\[ \text{Topic AB} = \text{Topic A} - \text{Topic AA} \] (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.
Thus, the meaning of one heading in a group helps to reveal the meaning of the others. In figure 6, 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 idea 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 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 tell what the other headings mean.

Organizing the Technical Article

| I. Classical method |
| II. Inverse classical method |

Figure 8.—Giving the group greater meaning by making the title more meaningful.

We also try, of course, to make each heading self-sufficient. With his thought in mind, we would change the wording of the topics in figure 8 perhaps to that in figure 9. Note that by adding three words—namely, "of outline formation"—to both Topics I and II, we make their 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, Tower² refers to the tower itself, whereas Tower¹ includes the guy wires. How do we solve the problem? We try, if we can, to find either a more general expression for Tower¹ or a more specific expression for Tower². In this example, we find it simpler to replace Tower¹ by a more general expression, as indicated in figure 12.

I. Tower¹

II. Tower²

I. Tower

II. Guy wires

Figure 11.—Subtopic with the same title as the superior topic.

Figure 12.—Tower¹ 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 need to make our headings meaningful. But are transitions from topic to topic the only kind of transitions we ask him to make? No. We also ask him to make transitions from one level of outline division to another, for our topics do not all occur at the same level in the outline.

In general, the transitions among our topics are of three kinds (1) those from a superior to subordinate topic, (2) those from one coordinate topic to another, and (3) those from a subordinate topic to a superior topic. Transition involves a change from one level in our outline to the next lower level, and Transition 3 involves change from a lower level to higher level. Transition 2 is the only transition that takes place at the same level. Thus, when reader makes a transition from one topic to another, he has to know not only what topics are involved but also what levels of outline division are involved. Otherwise he will not completely understand what is taking place.

The longer an article is and the more complex its subject matter is, the greater will be the number of levels of division in our outline. These different levels are signalled to the reader by means of differences in styles of headings.

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

1. Positioning—such as in the center, flush with the margin, or indented (fig. 13).

<table>
<thead>
<tr>
<th>Center heading</th>
<th>Level 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flush heading</td>
<td>Level 1</td>
</tr>
<tr>
<td>Indented heading</td>
<td>Level 2</td>
</tr>
</tbody>
</table>

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).

3. Underlining (fig. 15).

4. Using coefficients—such as, numbers, alternating numbers and letters, or words and numbers (fig. 16).

5. Punctuating (fig. 17).

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.
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.
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.

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<table>
<thead>
<tr>
<th>Basic topic outline:</th>
<th>Outline with introductions inserted:</th>
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</thead>
<tbody>
<tr>
<td>Topic A</td>
<td>Topic A</td>
</tr>
<tr>
<td>I. Topic AA</td>
<td>Introduction A</td>
</tr>
<tr>
<td>A. Topic AAA</td>
<td>I. Topic AA</td>
</tr>
<tr>
<td>B. Topic AAB</td>
<td>Introduction AA</td>
</tr>
<tr>
<td>II. Topic AB</td>
<td>A. Topic AAA</td>
</tr>
<tr>
<td>A. Topic ABA</td>
<td>B. Topic AAB</td>
</tr>
<tr>
<td>B. Topic ABB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Topic AB</td>
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<tr>
<td></td>
<td>Introduction AB</td>
</tr>
<tr>
<td></td>
<td>A. Topic ABA</td>
</tr>
<tr>
<td></td>
<td>B. Topic ABB</td>
</tr>
</tbody>
</table>

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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 Introductions A, AA, or AB—may be divided into a number of parts (fig. 20). Each part has a definite function in giving the reader certain transitional information.

<table>
<thead>
<tr>
<th>Introduction</th>
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</thead>
<tbody>
<tr>
<td>Part I</td>
</tr>
<tr>
<td>Part II</td>
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<tr>
<td>Part IIA1</td>
</tr>
<tr>
<td>Part IIA2</td>
</tr>
<tr>
<td>Part IIB</td>
</tr>
<tr>
<td>Part IIB1</td>
</tr>
<tr>
<td>Part IIB2</td>
</tr>
</tbody>
</table>

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: major 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 extensively.

A. MAJOR INTRODUCTIONS

To understand introductions, we must understand units of outline division, for the function of introductions is to reveal these units.

But what is a unit of division? For answer, let us see how units are made. When making an outline, we start with one idea, say Topic A. If this idea is complex, we simplify it by dividing it into two or more smaller, and therefore less complex, subideas, say Topic AA and AB (fig. 21).

Figure 21.—Simplification of Topic A division.

Is our outline now complete? Possibly. If Topics AA and AB are not too complex for the reader to grasp readily, we need not divide them further. If, however, Topic AA, say, is complex, we continue to divide (fig. 22). Similarly, Topic AAA, say, is still too complex, we continue to divide (fig. 23). We continue in this manner until we have simplified our overall idea, topic A, enough so that the reader can grasp it readily. Because of the technique of division we use, our finished outline
is made up of a number of interlocking 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 probably 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
"chemistry" even though they may know nothing about the specific topic called "physical chemistry.

So, starting with a general topic allows us to use the technique of guiding the reader from the known to the lesser known.

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

Ideally, when relating, say Topic G" to Topic A, we should completely reveal Units -III, -II, and - I. Revealing all the topics in each unit, however, would require us to reveal Topics H', H, and L. On weighing the value of this information against the need for brevity, however, we may decide to omit mention of these topics, since they do not lead the reader directly to Topic A (fig. 27). Having, in th
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 recalling 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. Because each of our statements now leads the reader directly to Topic A, we can usually make our review 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 information 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 develop 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 examine it before examining the developing topics.

a. Controlling topic (Topic A).—The reader has to know what subject 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 following sentence states a controlling idea:

The object of the work reported in the present paper was to determine 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
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 understandable, 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 rapidly toward the more specific one that is the subject of the article.
they can be produced from menhaden, 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 controlling 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 controlling topic instead of forward toward the developing topics. After we once state the controlling topic, we want to discuss its development. We do not want to interrupt the forward movement of our thought to insert background information on the controlling topic that the reader needs in order to grasp its significance to him.

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

(1) Answering anticipated questions. 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 answers the questions he otherwise would ask if this discussion were omitted. If the orientation is adequate, all the underlined words in the statement of our controlling topic will either appear or be strongly implied in our discussion 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 discussion leads the reader directly and understandably 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 problem 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 include some word such as "object," "aim," or "purpose" (fig. 32). Including 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 traditionally under the headings "Methods and Materials" and "Results and Discussion"), he has no idea of how we are going to discuss, or develop, Topic A. Yet,
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.
Little has been published, however, on the use of the glycerolysis reaction in the production of alpha monoglycerides from oils of marine origin.

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.

Introduction

Part I. Reveals the antecedent units of outline division

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

Part II A. Reveals the controlling topic of the unit

Part II A1. Answers anticipated questions

Part II A2. States the controlling topic (Topic A)

(1) Answering anticipated questions.--After we have completed Part II A2 of our introduction, we consider our forthcoming developing topics to decide whether our listing of them in Part II B will raise questions in the reader's mind. If so, we write an orienting
... The purpose of this report is to focus attention on the prevalence of faulty organization in technical 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 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.

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 AA

Figure 36.--Three transitions aided by listing of Topics AA and AB.
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 boot-strap." 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

<table>
<thead>
<tr>
<th>Methods and Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of the methods and materials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results and Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of the results and the discussion of them</td>
</tr>
</tbody>
</table>

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 two "new" levels of outline division (that is, levels occupied by topic that are new to the reader). Attempting such complex transition confuses him. Accordingly, we should not make the following kind of statement: "In the development of Topic A, the next topics to b

![Diagram](image-url)

**Figure 38.**—Attempt to carry the reader down two levels of outline division simultaneously.

![Diagram](image-url)

**Figure 39.**—Levels of outline division involved in the transition from Topic G to Topic
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 non-sequential 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 non-sequential 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
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 information.

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

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

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 understanding 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 non-sequential 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. In his

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.

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.

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 understandably 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.

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.

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.

Figure 44.--Part IIA retained (compare with fig. 34). (Note 1: Part IIA had to be retained to define the 'these,' which was not defined in Introduction A. Note 2: Observe that 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 division.
"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].

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:

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)

We have now seen that making an outline by the deductive method consists essentially of achieving correct coordination and correct subordination.

The method works well when we have our main idea, Topic A, at the start. But what if we do not have our main idea clearly in mind? Often, at the beginning, we have only a number of miscellaneous detailed ideas that we want to weave into an article. What then:

As Chapman (1964) has suggested, we can use the inductive method. This method involves two main steps: getting the ideas and arranging them into a pattern.

Figure 48.—Part I included as well as Part II (note, however, that Part IIB1 is omitted since this information seems obvious.)

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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 introduction differs from a major introduction, however, in that Parts and IIA normally are not treated as extensively as they are in a major introduction. But there
one way in which all three introductions—major, sequential, and nonsequential—closely resemble each other. They all usually include Part IIIB2.

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 IIIB2, 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.

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

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.

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
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 will raise questions in the reader's mind, we try to anticipate what they will be and then write an orienting discussion that answers them before they are asked. If we adequately supply the background information needed, this discussion will contain, or imply, all the important words in our statement of Topic A.

We design our introduction in such a way that this orienting discussion comes first and the statement comes second. Often we include in this discussion contrasting word, such as "however," to point to an unsolved problem and thereby set the stage for us to state our controlling idea.

Revealing the developing topics Topics AA and AB, follows the same technique that we use in revealing the controlling topic. That is, we tell the reader exactly what Topics AA and AB are, but we precede this statement by an orienting discussion that answers any questions we anticipate that the reader would ask concerning Topics AA and AB.

In revealing Topics AA and AB, we take care not to give him information that he already knows or can easily infer. Furthermore, we confine ourselves to Topics AA and AB. We do not try, for example, to reveal Topics AAA and AAB. In short, we do not attempt to carry the reader down more than one level of outline division at a time.

Minor Introductions

Minor introductions may be divided into two groups: sequential or first coordinate, introductions, and nonsequential, or second coordinate, introductions. All sequential introductions contain essentially the same parts, and nonsequential introductions contain essentially the same parts. So we may take Introduction AA, which is associated with Unit II, as
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.

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