DOCUMENT RESUME

ED 201 973 CS 006 067

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TITLE Comparing Stylistic Traits of Two Medical Journals: An Exploration into Factors of Readability.
PUB DATE [77]
NOTE 27p.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Comparative Analysis; Content Analysis; Discourse Analysis; *Paragraph Composition; *Readability; *Reading Research; *Scholarly Journals; Sentences; Sentence Structure; Syntax
IDENTIFIERS American Journal of Medicine; British Medical Journal; *Coherence; Cohesion (Written Composition)

ABSTRACT

Excerpts from articles in the "British Medical Journal" and "The American Journal of Medicine" were compared to determine which journal was easier to read and what stylistic traits might account for such ease. Nine paragraphs from the discussion sections of articles on hypertension were taken from each of the journals. When these paragraphs were evaluated by nine people who had little or no prior experience in reading medical journals and ten people who had read medical journals frequently, 14 of the 19 readers indicated that the British paragraphs were easier to read. Further analyses of the sentences and paragraphs showed that the British prose tended to have fewer words before the first subject of the first main clause, fewer words before the first full verb in the first main clause, less use of passives (and fewer "reversible" passives), nominalizations of verbs that were more easily understood and repeated more frequently, and nominalization constructions whose agents were more obvious than those in the American prose. The stylistic difference that was considered most important was the "web of sentence topics" in the paragraphs. Of the 57 topics in British paragraphs, only eight were unrelated to previous topics or information stressed in the immediately preceding sentences. In contrast, the American prose contained 28 unrelated topics within the 64 topics used in the paragraphs. (RL)

COMPARING STYLISTIC TRAITS OF TWO MEDICAL JOURNALS: AN EXPLORATION INTO FACTORS OF READABILITY

William J. Vande Kopple

Comparing Stylistic Traits of Two Medical Journals: An Exploration Into Factors of Readability

In undertaking this project, I had three goals. First, I had heard that the British Medical Journal prints articles that reputedly are easier to read than those The American Journal of Medicine prints. I wanted to have several people read samples from these journals and decide whether the British or American set seemed easier. Second, I wanted to analyze the samples in detail and try to find stylistic traits that might account for whatever my readers decided. And third, I hoped my analysis would stimulate experimenters to test whether each of these traits does indeed function as a factor of complexity in expository prose. Once such experiments are performed, we should know more about what makes one passage easier to read than another.

Most of my respondents rated the British samples easier. I think we can begin to explain their judgments, using some stylistic traits that many researchers have considered important as factors of complexity but also some that few have bothered to consider. And the apparent significance of the latter in this project suggests that they might be among the more important factors.

My first task was to decide how many samples I should use and how long they should be. If they were to be an all representative and if I were to avoid having one or two of them unduly influence my readers' judgments on a journal, I would have to use many long samples. However, if confronted by many long passages, people might refuse to participate or read too quickly and superficially. Also, if I had to analyze many long samples, I would be far more likely to overlook possible factors

of complexity. With all this in mind, I decided to seek seven to ten samples from each journal, each about 100 words long.[1]

After this decision, I had to make four others about the nature of my samples. First, since some medical experiments are probably more difficult to understand than others, and since it is difficult to determine what effect there would be on a reader's cognition if most of the samples from one journal but none or few of those from the other shared subject matters, I decided to select samples only from articles dealing with similar experiments. While scanning the table of contents in several issues of each journal, I realized that I had the best chance of finding seven to ten articles from each on relatively closely related projects if I looked for those that dealt with some cause or treatment for hypertension. Accordingly, I started with the most recent issues of each journal, moved to progressively older ones, and eventually found nine articles from each on hypertension. I used no article more than three years old.

Second, I decided that my test would be most valid if all the samples were identical in the section of the article I took them from. Only then would they be somewhat similar in general purpose. Since doctors are often forced to choke their styles with numerical figures and seem to follow established patterns in writing both the methods and materials section and the results section, I decided to avoid them. And since I thought it would be more revealing to use samples from the section in which doctors describe what actually happened in their own experiments rather than from the section in which they hypothesize about what might happen in their experiments or report what happened in others', I decided to skip introductions and look in discussion sections.

Third, I decided that each of my samples should be one complete paragraph. We do not know enough about how a paragraph's structure in itself affects cognition, but I felt that a sample made up of a partial paragraph or one or more complete paragraphs and a part of another might raise issues that are not clarified as fully as they would probably be in a sample made up of one complete paragraph. Moreover, I thought that a sample made up of two or more complete paragraphs might deal with more somewhat unrelated issues than a sample made up of one paragraph. Therefore, I avoided partial or multiple paragraphs.

Fourth, I decided to use as many pairs of paragraphs that beg discussion sections as possible and then to resort to pairs from non-matching positions in the sections' interiors. Ideally, all the pairs would be made up of beginning paragraphs, or all would be made up of concluding paragraphs, or some would be made up of beginning and some of concluding paragraphs. Then we could consider them somewhat similar in rhetorical functions and amounts of old, new, and partially developed information. But I found only four beginning paragraphs in each journal that were approximately 100 words long. And none of the concluding paragraphs was close at all. Therefore, I had to accept pairs from the interiors.

When I was finished pairing paragraphs, I had four pairs of beginning and five pairs of interior paragraphs. No member of a pair differed from the other by more than seven words; the mean difference between members was 3.77 words. The British paragraphs totalled 1000 words; the American added up to 988.

To ensure that style of type or length of line would not affect my readers' judgments, I typed the British paragraphs on two sheets of standard typing paper and the American paragraphs on two sheets, all in

lines almost equally long. To have enough sheets for all my readers, I simply duplicated these. To ensure that their judgments would not be skewed in favor of the samples they read first or second, I had half of them read the British paragraphs first and the other half read them second. For a similar reason, I numbered the paragraphs randomly for each reader so that no two of them read them in the same order.

Two different groups of people reacted to the paragraphs. One group consisted of nine people who had had little or no prior experience reading medical journals. The other consisted of ten people who had read medical journals frequently.[2]

Further, I divided each of these groups into three populations.[3] I showed a question sheet to a number of people from each group before they read the sets of paragraphs once. On it, I asked them to indicate whether the set they read first was easier to read than the set they read second, whether the set they read second was easier to read than the one they read first, or whether they felt there was really no perceptible difference between the two in ease of reading.

I used the same sheet for a second population of each main group. However, these readers did not see it until after they had read the sets. Since they had to rely on their memories while judging, I assumed any differences they cited had to be quite clear to them.

After a third population had read the sets once, I asked them to write comments on any differences or similarities between the styles of the two. Since they read and commented without being stimulated to think about readability, I believed that any of them who said one set was harder or easier than the other must have felt it was much harder or easier.

Of the 19 total readers, only five indicated in some way that they thought the American paragraphs were easier to read. The other 14 all indicated in some way that they thought the British paragraphs were easier. In only one of the six populations--the non-medical readers who saw the question sheet after reading--did the number of readers preferring the American paragraphs exceed the number favoring the British. And in this case, there was only one more reader who favored the American. We certainly have sufficient reason to expect to find objective stylistic traits that make the British paragraphs easier to read.[4]

Trying to find these, however, is difficult. In the first place, not all of the readers rated the British paragraphs easier. Thus we cannot realistically expect that they will be easier than the American in every possible way. Nor can we expect that all possible factors of complexity will occur much less often or extensively in them than in the American. This is especially true because of my relatively small sample sizes. Unfortunately, trying to determine when such differences in number of occurrences are cognitively significant is impossible at this time.

Perhaps even more importantly, we are not aware of all factors of complexity for expository prose. And we cannot say exactly how the factors we do know of might interact within a passage or how they rank in terms of the difficulty they bring to a text. Finally, we cannot be certain how the memory of one extremely easy or difficult sentence affects a person's judgment on the readability of a paragraph or how the memory of one extremely easy or difficult paragraph affects his judgment on the readability of a set of paragraphs. Therefore, we will have to view any explanations for the greater readability of the British paragraphs as

somewhat tentative.

But we can begin to explain, tabulating and comparing how frequently proven and intuited factors of complexity occur in each set, and trusting that future experiments will justify these intuitions. Hoping for as much clarity as possible, I will discuss the traits I believe make the British paragraphs harder in one place and the traits I think make them easier in another.

But before we see in what ways the British paragraphs are probably harder than the American, we should note briefly that in several respects, each of which is probably important in readability studies, the two sets are strikingly similar.[5] The average length of the orthographic sentences in the British paragraphs is almost identical to that of the orthographic sentences in the American paragraphs. But averages can be deceptive. The average length of one sentence 50 words long and another 10 words long, for example, is identical to that of two sentences 30 words long. Therefore, I decided to count the number of sentences in each set that are 20-25 words long, 26-29 words long, 30-39 words long, and over 40 words long. The numbers for each of these lengths in the sets are almost the same. Further, the average number of clauses per sentence in the British paragraphs is identical to the number in the American. Again, however, I sought a more realistic view. In each set I counted the number of sentences with three clauses, with four clauses, and with five clauses. Again, the numbers for each classification are almost identical.

Additionally, I looked closely at the number and nature of the divisions between constituents in the sentences. I learned that on the average in the sets there are almost the same number of words between the

main word of the subject and the main word of the verb in all the main clauses. I also learned that the writers of the British paragraphs introduce another subject-verb-object group between a subject and its verb in any type of clause--for example, by using a relative clause--exactly as often as the writers of the American paragraphs do. When I narrowed my focus to subjects, I discovered that, excluding the subjects of verbs in the passive voice, the two sets are identical in the number of grammatical subjects that are not the agents of the actions underlying the sentences they occur in. Also, I saw that the two sets are almost identical in the numbers of pronouns that serve as subjects, each of which refers to the meaning of the entire preceding sentence. When I narrowed my focus to complements, I saw that the main words of the complements in both sets are post-modified almost equally often and with strings of words similar in length.

Finally, I examined the sets from a rhetorical perspective. I checked how often the doctors use short strings of metadiscourse to show a connection between two sentences or an attitude toward forthcoming information; how often they use longer strings of metadiscourse only to comment on the primary discourse; how often the topics in their sentences coincide with the subjects of either main or noun clauses; and how often their sentence stresses include a verb plus predicate noun, a verb plus predicate adjective, or a verb plus direct object rather than just a verb plus prepositional phrase. I found very little difference between the sets in these four respects.

Now we can discuss six specific ways in which the British paragraphs seem harder than the American.[6] I stress that I am not trying to examine interactions between possible factors of complexity. If we consider

each of the following by itself, we can probably say that each makes the British paragraphs harder than the American.

First, I checked how often the doctors use orienters to times and appropriate situations to begin sentences. When they begin sentences with such phrases as "In case I," "In the other two patients," or "In 1939," it is likely that we move through their paragraphs with greater ease and clarity. If this is true, the British paragraphs should be harder since their writers use only four such orienters while the writers of the American paragraphs use 11.

Second, in each set I checked how often the doctors post-qualify nouns with strings of prepositional phrases, the last of which has a nominalization for its object. Occasionally, for example, they use such constructions as "The time from the onset of symptoms to the diazoxide treatment. . ." (O'Brien and others).[7] The more frequently they use such constructions and the more prepositional phrases they string together, the longer we have to wait to ascertain the meanings of particular nouns. Since many of these nouns function as grammatical subjects or objects, this is particularly important. The difference between the two sets in this respect is not large, but perhaps it is cognitively significant. The British paragraphs have five of these constructions, two of which have two prepositional phrases, two of which have three prepositional phrases, and one of which has four prepositional phrases. The American paragraphs contain only two such constructions, both of which have three prepositional phrases.

Next, I tried to determine how often the grammatical subject and verb in any kind of clause actually obscure the real-world agent and action. For instance in one of the British paragraphs I found this

sentence: "The evidence summarized here suggests that a full-scale trial would be scientifically and ethically justified and administratively feasible" (Medical Research Council Working Party on Mild to Moderate Hypertension). Obviously, the grammatical subject of the main clause is evidence, and the grammatical verb is suggests. In reality, however, the agents are people who act by inferring. Since we read in terms of agents, actions, and goals, constructions that obscure these might add a measure of difficulty to passages they occur in. If so, the British paragraphs would be harder, since they contain 11 pairs of obscuring subjects and verbs and the American contain only five.

After I had counted these pairs, I realized that I should check how many of the grammatical subjects in any kind of clause refer to persons. Since people are concrete and since we readily associate them with the agencies of actions, I suspect that the more frequently words referring to them act as grammatical subjects of clauses, the more easily we would process those clauses. In all the British clauses, only eight subjects refer to persons; in all the American clauses, 15 do.

While I was looking at the subjects of all the clauses, I discovered that the British subjects are post-modified 29 times, with strings averaging 6.03 words in length. On the other hand, American subjects are post-modified only 22 times, with strings averaging 6 words. We have already noted that one of the ways the doctors post-modify subjects is to use prepositional phrases. They also use participial phrases and relative clauses. Since our full recognition of the meaning of subjects is delayed seven more times in the British paragraphs, they are probably somewhat more difficult in this respect also.

Finally, I calculated the average length in words of the full topics in both sets. Doing this is probably important in readability studies since we must recognize what the rest of a clause exists to comment on before we can understand that comment. Full topics in the British paragraphs average 5.63 words; those in the American paragraphs average 4.51 words.

At this point it is important to note that the evidence suggesting that the British paragraphs are harder than the American is not overwhelming. We will see that the case is different with the evidence which suggests that the British paragraphs are easier.[8]

The first of this evidence deals with medical terms. Medical terms are difficult for non-medical readers simply because they are almost totally unfamiliar. They might be difficult for medical readers since they carry a large amount of meaning. Thus I decided to count all medical phrases, such as "reflex baroreceptor dysfunction" (Ripley and others), that have two or more words. In the British set I found 24 individual phrases. Some of these are repeated, however, bringing the total to 37. In the American set, I found 76 individual phrases, with some repeated often enough to bring the total to 91. This means that of the 1000 words in the British set, at least 74 are medical terms; of the 988 in the American set, on the other hand, at least 182 are medical terms. This difference must be significant.

But it is possible that doctors skim research reports. If this is the case, medical terms used as subjects or connected to subjects by prepositional phrases might enable them to skim rapidly. The doctors might look for a medical term early in a clause and then glance only as far beyond it as is necessary to discover what is important about it.

To find whether the American paragraphs might allow this kind of skimming, I checked how many of their medical terms are subjects in any clause or are connected to subjects by prepositional phrases. Only 27 are. In the British paragraphs, 14 are. Therefore, it is unlikely that the many medical terms in the American paragraphs help doctors skim.

The British paragraphs also seem easier in that in their sentences there are fewer words before the first subject of the first main clause. The longer we have to wait before we see a sentence's first major constituent, storing qualifying information all that time, the more difficult that sentence must be. In the British sentences, I found that on the average there are 2.7 words before the first subject of the first main clause, that three of these subjects are preceded by strings over seven words long, and that the longest of these strings is nine words long. In the American set, I found that on the average there are four words before the first subject of the first main clause, that seven of these subjects are preceded by strings over seven words long, and that the longest preceding string is 23 words long.

Primarily as a result of this, the British sentences average fewer words before the first full verb in the first main clause. In them, I found that the average number of words before such verbs is 7.3, that nine such verbs have more than ten words preceding them, and that the longest preceding string is 20 words long. Switching to the American sentences, I found that the average number of words before the first main verb is 9.2, that 17 such verbs have more than ten words ahead of them, and that the longest preceding string is 27 words long.

Many experiments have shown that verbs in the passive voice are harder to process than those in the active voice. Thus I decided to

see how many passives each set has. In the British set I found 12; in the American I found 17. But as Dan Slobin points out,[9] when clauses with passive verbs cannot be reversed without becoming anomalous, they are no harder to process than clauses with active verbs. For example, we should have little trouble processing a clause such as "the coding was designed to include any blood-pressure measurement. . ." (Heller and Rose), since we would not consider whoever designed the coding a possible subject of the verb. I found that only four of the 12 British passives are possibly reversible but that 15 of the 17 American passives are. In addition, we must consider the British easier in another respect. In the two sets I occasionally found a sentence introduced by such constructions as "It has been questioned. . ." (Basta). In these cases it is impossible to ascertain who is the agent of the action signalled by the passive verb. Only three of the British passives are in such constructions; eight of the American are.

There is substantial and increasing evidence that a highly nominal style is much more difficult to read than a highly verbal one. Looking at the nominalizations in the two sets, we can see that those in the British set are probably easier than those in the American in many ways. At first, this statement might seem to be false. For there are more total nominalizations in the British paragraphs. They have 80 while the American have 61. However, the British paragraphs contain only 40 different individual nominalizations. Study occurs 12 times, treatment nine times, reduction five times, and both change and recording four times. The American paragraphs contain 43 different individual nominalizations, with findings occurring five times and cause four times. In both sets other nominalizations occur two or three times. Since

many of the 80 total British nominalizations are repeated often, they should become more familiar and less difficult to process. Thus it would be erroneous to claim that the greater number of nominalizations in the British paragraphs necessarily makes them harder.

This becomes especially evident when we see how the repetitions are distributed through the paragraphs. In the British set, eight paragraphs have one nominalization occurring three or more times. No American paragraph has one occurring more than twice. This suggests that there might be far more linkages of meaning in the British paragraphs. To test this possibility more objectively, I checked how many of the repeated nominalizations in both sets are parts of the topics of a paragraph. I found that one nominalization in the first British paragraph is a part of three topics and that another in the second British paragraph is a part of three topics. None in the American paragraphs is a part of any topic.

Once I was looking at how some of the nominalizations are used in clauses, I thought I should check how many of the total nominalizations function as either subjects or complements. I suspect that we process nominalizations in a sentence more easily if they function as one or the other of these constituents. In the British set, 22 nominalizations function as subjects and 15 function as complements. In the other set, only 12 function as subjects and only ten function as complements.

Another important thing to check about nominalizations is how many of them have prepositional phrases attached, phrases that often refer to the agent or object of the nominalized action. It is probable that the more such constructions occur, the more the underlying meanings of sentences are spread over their surfaces. I found that 24 of the

British nominalizations and 33 of the American nominalizations have prepositional phrases attached to them. Of these, I checked how many are themselves the objects of a preposition. Five of the British and 13 of the American are.

But some scholars could object that at least the agents of the actions underlying many of the American nominalizations might be present. Realizing this, I counted the number of nominalizations in each set which occur with no construction indicating an agent but for which the agent is actually obvious. For example, for such nominalizations as treatment and study, it is obvious that doctors or researchers are the ones doing the treating and studying. I discovered that for 55 of the 57 British nominalizations of this nature the agent of the nominalized action is obvious. For only 18 of the 30 American nominalizations of this nature is the agent obvious. Furthermore, for 27 of those 55 British nominalizations, it is clear that the agent is the writer of the paragraph they occur in. For 12 of those 18 American nominalizations it is clear that the agent is the writer of the appropriate paragraph. In such cases, the agent probably becomes even more concrete and identifiable for us.

Finally, to be as objective as possible, we should see how many nominalizations in each set really could be made verbal. I considered medical nominalizations such as denervation unchangeable. I felt others were easier not to change since their agents and/or objects were obvious or since making them verbal would entail repeating previously given information. Admittedly, these were somewhat subjective judgments, but I decided that 29 of the British and 33 of the American nominalizations could be changed. Moreover, only 9 of the 29 British but 15 of the 33

American seem to demand changing. Indeed, if we could drop some possessive pronouns and prepositional phrases, and change some adjectives to adverbs, we could change these nominalizations without affecting the rest of the structure of the sentences they occur in. For instance, we could change "the patient had an illness compatible with pulmonary tuberculosis two years before death" (Arnett and others) to "the patient had an illness compatible with pulmonary tuberculosis two years before she died."

I think that this evidence is more weighty than that which suggests that the British paragraphs are harder than the American. Yet it is not altogether easy to believe that what we have discussed thus far can account for the number of readers who said the British paragraphs are easier. To account more adequately, we must note that the British paragraphs are easier in two additional and significant ways. These are rarely considered in readability studies and are apparent only when we take a rhetorical look at the two sets.

In the first place, the information that should be stressed in sentences is post-qualified by less important information less often and extensively in the British paragraphs. Of course, we must be certain that such qualifying information is not itself the most important. But consider the following sentence: "This probably relates to the major site of granulomatous reaction, since the two patients with this finding had a significant number of arterioles with obliterated lumens on biopsy whereas the other two had more of a reaction at the alveolar capillary level" (Robertson). The information in the two adverbial clauses is important, but it is not as important as that in the main clause. And it is this information that we almost forget while we

process the two long adverbial clauses. Putting the two adverbials first in the sentence would place demands on our memories, but then the sentence would move from evidence to a conclusion, and it would have its most important imformation where it should be--last.

In the British set, I found the most important information in rhetorically ineffective positions four times. The strings post-qualifying these bits of information average 11.25 words in length. In the American set, I found the most important information in such positions seven times. The post-qualifying strings average 18.28 words in length.

But the difference between the two sets that I consider most important by far became apparent only when I examined what I call the web of sentence topics in each of the paragraphs. To do this, I first had to decide what the topics in each paragraph are. After that, for each paragraph I simply listed the topics, one after the other. Then I counted how often in a paragraph a topic is not identical to a previous topic, related to a previous topic closely (for example, through pronoun substitution, synonym substitution, specification, additional characterization, slight qualification, or enumeration of members of a set), or identical to or related to stressed information in the previous sentence. I thought that the more often I found such topics in a paragraph, the more difficult that paragraph must be.

For example, the sentence topics in a paragraph I consider easy since it is finely woven are: "a full-scale trial," "the main objectives of such a trial," "such a trial," "the large control groups," and "the differences between the treatment and control groups" (Medical Research Council Working Party). The topics in a paragraph I consider difficult since it is badly woven are: "sustained hypertension," "Our patient,"

"Hypertension," "which" (tachycardia), "Test results of sympathetic function requiring reflex baroreceptor activation," "marked lability of the blood pressure with orthostatic hypotension," "the patient," "the sympathetic reflexes," and "a decreased heart rate response to an acute increase in arterial pressure" (Ripley and others). True, there are more topics in the second list, but all in the first relate closely to each other while only two pairs in the second do.

In the British paragraphs I found 57 topics. Only eight of them are unrelated to previous topics or the immediately preceding stress. Three paragraphs have no unrelated topics, four have one, and two have two. In the American paragraphs I found 64 topics. 28 of them are unrelated. One paragraph has one unrelated topic, three have two, two have three, one has four, one has five, and one has six.

Therefore, although I think each of the traits I have discussed here should be tested in an experiment as a single variable, none should be tested as carefully and as soon as the web of topics. Since it involves units larger than words or sentences, I suspect it might prove to be one of the more important factors of complexity for expository prose.

FOOTNOTES

[1]For the guidelines I used when counting words, see the Appendix, paragraph 1.

[2]For more information on the members of these groups, see the Appendix, paragraphs 2 and 3.

[3]To find how many readers were in each of these populations, see the Appendix, paragraph 4.

[4]For more information on which readers responded in which way, see the Appendix, paragraph 5.

[5]For the numerical data on all these similarities, see the Appendix, paragraphs 6, 7, and 8.

[6]For information on four less significant ways in which the British paragraphs seem harder, see the Appendix, paragraph 9.

[7]For convenience, I will refer to the article from which I take a quotation by author within parentheses in the text.

[8]For information on four less significant ways in which the British paragraphs seem easier, see the Appendix, paragraph 10.

[9]Dan I. Slobin, Psycholinguistics (Glenview, Illinois: Scott, Foresman and Company, 1971), p. 36.

APPENDIX

1. I counted an abbreviation, a numeral, a numeral followed by a percent sign, a hyphenated word, and words connected by a slant line as one word. I felt that the way we process these resembles the way we process a single word more closely than it does the way we process two or more adjacent but separate words. When the words within parentheses or brackets explained or qualified information in the text, I counted each of them. Often, however, parenthetical or bracketed information merely referred to other articles, graphs, or photographs. When that was the case, I did not count them. We cannot discount such constructions as factors of complexity, however. In fact, one of my readers commented that bracketed and parenthetical references, most of which were in the samples from The American Journal of Medicine, seemed to slow him down.

2. Five of the non-medical readers have an A. B., two have an M. A., one is a fourth-year graduate student, and one is a lawyer.

3. Four of the medical readers are third-year nursing students, one is a R. N., one is a first-year medical student, and four are instructors of nursing at North Park College. All of the instructors have an M. S. in medical-surgical nursing, some have extensive credit beyond the M. S., and one has her Ph. D.

4. I showed the question sheet to four non-medical and five medical readers before they read the sets. I showed it to three non-medical and three medical readers after they read the sets. I asked two non-medical and two medical readers to write comments.

5. Of the five readers who favored the American set, two were medical readers who saw the question sheet before reading, two were non-

medical readers who saw the sheet after reading, and one was a non-medical reader who expressed his view in a comment. Of the 14 who favored the British, four non-medical readers and three medical readers saw the sheet before reading, one non-medical reader and three medical readers saw the sheet after reading, and one non-medical reader and two medical readers commented in favor of the British. Six of the 14 read the British paragraphs first; eight read them second.

6. The British set has 39 sentences; their average length is 25.64 words. The American set also has 39 sentences; their average is 25.33. The British set has ten sentences 20-25 words long, six sentences 26-29 words long, five sentences 30-39 words long, and six sentences with more than 40 words. The American has 11 sentences 20-25 words long, four sentences 26-29 words long, five sentences 30-39 words long, and five sentences with more than 40 words. The British set has 73 clauses, for an average of 1.87 clauses per sentence. The American set is identical. The British set has seven sentences with three clauses, three with four clauses, and none with five clauses. The American has five sentences with three clauses, three with four clauses, and one with five clauses.

7. The average number of words between the main word of the subject and the main word of the verb in main clauses is 5.7 for the British and 5.1 for the American. In both sets writers introduce another subject-verb-object group between a subject and its verb in any type of clause four times. In both the grammatical subject is not the agent four times. In the British the pronoun subject carries this large semantic load five times; in the American it carries it six times. In the British the main words of the complements are post-modified with 18 strings, each averaging 5.94 words. In the American they are post-modified with 22 strings, each averaging 6.32 words.

8. The writers of both the British and the American paragraphs use

short bits of metadiscourse to show a connection or attitude eight times. The writers of the British use longer units of metadiscourse to comment on the primary discourse seven times; the average length of these is 5.14 words. The writers of the American use such units six times; their average length is 5.67 words. In the British set, the topics coincide with the subjects of main clauses 39 times and with the subjects of noun clauses 12 times. In the American set, the topics coincide with the main-clause subjects 45 times and with the noun-clause subjects five times. 57% of the British stresses include a verb plus PN, verb plus PA, or verb plus DO; 60% of the American stresses include one of these constructions.

9. I think that constructions in which a verb is followed by an infinitive with an underlying agent different from the verb's are harder to process than constructions in which a verb is followed by an infinitive with an underlying agent identical to the verb's. For example, I think "I wanted to go" would be less difficult than "The test took time to complete." Of course, the difference in agents is not all that is involved here. The British set has five such constructions; the American has three. Second, in the British set subjects and verbs in adverbial clauses are separated twice, once by a string of nine words and once by a string of eight words. In the American set, this happens only once, with a string only three words long. Third, it is probable that numerical figures (such as 240 mg/day) and abbreviations (such as SHR's) slow readers down. The British paragraphs have 11 different numerical figures while the American have only three figures and three abbreviations. Fourth, in both sets the subject in any kind of clause is sometimes modified with a prepositional phrase with a nominalization

as its object. We therefore have to wait and must process a nominalization in order to learn the meaning of an important constituent of clauses. In the British paragraphs, this happens 13 times; the phrases average 4.07 words in length. In the American paragraphs, it happens seven times; the phrases average 2.86 words in length.

10. We know that clauses with negatived verbs are harder than those without negatived verbs. Six of the British verbs are negatived. Eight of the American verbs are negatived; four of these occur in one paragraph. Second, we cannot use some verbs, such as found and included, in the active voice without a direct object. Since these verbs signal the type of complement that will follow them, they should make the clause they appear in easier. The British clauses have 26 of these, and the American have 21. Third, relative clauses with relative pronouns that are separated from their noun antecedent must be difficult to process. They force us to search for their grammatical source. In the British set there is only one such clause; there is only a three-word separation between the relative pronoun and its antecedent. In the American set there are five such clauses; there is an average of 10.4 words between the relative pronouns and their antecedents. Finally, if we look at the numbers of different kinds of subordinate clauses, we see that the British paragraphs are probably easier in another way. The British set includes 13 noun clauses, six adjective clauses, and eight adverbial clauses. The American set includes five noun clauses, eight adjective clauses, and 13 adverbial clauses. Obviously, the main differences are in the numbers of noun and adverbial clauses. Nine of the 13 British noun clauses are used as direct objects or predicate nouns of main clauses; four of the five American noun clauses are used as direct

objects or predicate nouns. If I had to choose between adverbial clauses and noun clauses mostly used as constituents of main clauses to make up a number of clauses in a passage (the total for the two kinds for the British is 21; the total for the American is 18), I would pick noun clauses if I wanted the passage to be easier. It is probably easier to process a subject-verb-object group when it is a constituent of another subject-verb-object group than when it qualifies such a group.

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