

平成12年度東京大学大学院理学系研究科  
物理学専攻修士課程入学試験問題（外国語）

英 語

平成11年8月24日（火） 13時30分～14時30分

【注意事項】

1. 試験開始の合図があるまで、この問題冊子を開いてはならない。
2. 解答には、必ず黒色鉛筆（または黒色シャープペンシル）を使用すること。
3. 問題は全部で2問ある。2問のすべてに解答せよ。
4. 答案用紙は各問につき1枚、合計2枚配布してあるから、確実に配布されていることを確かめること。
5. 各答案用紙の所定欄に科目名（英語）、受験番号、氏名、問題番号を記入すること。
6. 解答は、各問ごとに所定の答案用紙を使用すること。
7. 答案用紙は点線より切り取られるから、裏面も使用する場合には、点線の上部を使用しないこと。
8. 答案用紙には解答に関係ない文字、記号、符号などを記入してはならない。
9. 解答できない場合でも、答案用紙に科目名・問題番号・受験番号および氏名を記入して提出すること。
10. 答案用紙を草稿用紙に絶対使用しないこと。

[第1問] 次の英文を読み以下の設問に答えよ。

I propose to analyze "Talking about Science." How is it best done? Why is it that a subject presented by A is thrilling account which leaves a deep impression, whereas the very same material presented by B is dull and boring and produces no impression whatever? How should we present our branch of science to fellow scientists who work in quite another field? How can we present science to those who have little or no scientific background, as if often the case with men of high ability who are important in affairs of state? How can we make the non-scientist understand why its study means so much to us, a passion they sometimes find very difficult to understand?

What is a basic character of a (ア) "talk"? I think it can be expressed by saying that its primary object is to create a state of mind, or point of view, not to convey information. I can perhaps illustrate what I mean by dwelling on the vast difference between the spoken and written account. Under the heading "talk," I am not including a course of lectures where students take notes and the lectures follow each other as a composite whole. Nor do I include the "get together" of two or three experts in the same line of research, for which no rules are necessary. I am considering the hour's talk to an audience whose interest one has to arouse. The written account can also aim at creating a viewpoint, but its main function is to be a storehouse of information. The argument can be meaty and condensed. It can be packed with tables, graphs, and mathematical equations. This is possible because the reader can always pause and digest it at his leisure, going back over parts which he finds to be difficult. I do not mean to imply that one can be irresponsible in a talk, but one need not cross all the "t's" and dot all the "i's." In fact, the talk would be spoiled by attempt to do so.

A talk is therefore different altogether from a (イ) "paper." To my mind the governing factor which determines its art form is this: The success of the way in which the subject has been presented is measured by the extent to which the average number of the audience remembers it next day.

This may seem an obvious statement, but if we use this principle as a yardstick to assess a lecture we have listened to, or in planning to a lecture of our own, it creates a very significant viewpoint. The value of a lecture is not to be measured by how much one manages to cram into an hour, how much important information has been referred to, or how completely it covers the ground. It is to be measured by how much a listener can tell a friend about it next morning. If we honestly put this question to ourselves and think how little we can remember of talks we have heard, it gives us a sense of proportion and of values in planning a lecture and makes us realize that what we say will go over the heads of audience if we set our sights too high. I would like now to list what I believe to be some of the considerations which apply in planning a talk.

For instance, suppose we ask how many points can we hope to "get over" in an hour? I think the answer should be "one." If the average member of the audience can remember with interest and enthusiasm one main theme, the lecture has been a great success. I like to compare the composition of a lecture to that of a picture. Of course this is dangerous ground on which to venture, because art experts differ so much among themselves. But in simple terms, is it not held that a picture should have one main center of interest? It may have numerous subsidiary features, but the composition is so cunningly arranged that when the eye falls on these and follows their placing it is subtly led back to the main center of interest and does not fall out of picture frame. A lecture should be like that.

There should be one main theme, and all the subsidiary interesting points, experiments, or demonstrations should be such that they remind hearer of the theme. As in a picture, so in a lecture, the force of the impression depends upon a ruthless sacrifice of unnecessary detail. It can be richly endowed with exciting details, but they must be of such a kind that recollection of them inevitably brings the main theme back to mind. In other words, the lecture must compose in the sense of having a pattern because it is this pattern which helps so much to impress it on one's memory.

A lecture is made or marred in the first 10 minutes. This is the time to establish the foundations, to remind the audience of things they half know already, and to define terms that will be used. Again this seems obvious, but I have listened to so much splendid material lost to the audience because the lecturer failed to realize that it did not know what he was talking about, whereas, if the precious first 10 minutes had been spent on preparation, he would have carried his listeners with him for the rest of the talk.

Here a most important principle comes in which I think of as the "detective story" principle. It is a matter of order. How dull a detective story would be if the writer told you who did it in the first chapter and then gave you the clues. Yet how many lectures do exactly this. One wishes to give the audience the esthetic pleasure of seeing how puzzling phenomena become crystal clear when one has the clue and thinks about them in the right way. So make sure the audience is first puzzled.

We all know the tendency to go to sleep in lectures; how often have I felt ashamed at doing so myself. Though the best lecturer can never entirely escape from producing this effect, there is much that can be done to minimize it. A continuous even delivery is fatal. There is something hypnotic about it which induces sleep. Pauses and changes of tempo are essential. Above all, jokes have a marked and enduring effect.

*The Art of Talking about Science*, Lawrence Bragg; Science 154(1966)1614 より抜粋

A: 筆者は、下線部 (ア) の talk と下線部 (イ) の paper との本質的な相違は何だと言っているのか、また、successful talk とはどのようなものかと言っているのか、簡潔に日本語で説明せよ。

B: 筆者が、successful talk をする上で、speaker が配慮すべきものとしてあげている事柄を4つ、日本語で箇条書きにして述べよ。

C: 枠で囲ったふたつのパラグラフに共通したひとつの副題を付けたい。以下の5つの副題から最も適したものを一つだけ選べ。

- (ア) A Detective Story
- (イ) The Arousing of Interest
- (ウ) Tempo and Jokes
- (エ) Giving Clues
- (オ) The Best Lecturer

[第2問] 以下の文章を英訳せよ。ただし、必要であれば以下の単語を参考にせよ。

differential operator, simultaneity, transmitting medium, Galilean transformation

A: Schrödinger 方程式と古典的なエネルギー-運動量の方程式を比べてみると、少なくとも自由粒子に対しては、エネルギーと運動量が波動関数  $\psi$  に作用する、以下の微分作用素に対応するものと考えられる。

$$E \rightarrow i\hbar \frac{\partial}{\partial t}, \quad p \rightarrow -i\hbar \nabla.$$

B1: Michelson と Morley の有名な実験は、光速が、観測者、媒質、光源の間の相対運動に無関係にすべての方向に対して同じであることを示した。

B2: したがって、古典力学を不変に保つガリレイ変換は正しくなく、光速を一定とするような別の変換に置き換えられねばならない。

B3: Einstein は、このような変換が必然的に、従来の時間と同時性の概念を変更してしまうことを明らかにした。