SJSC Spring 1965

Letter - 11-1964

Bogosian

Philosophy - Humanities 160

Essay: Awareness 4-8-1965

Scientific Educ — Snow and Oppenheimer 5-27-65

Correspondence 5-1966

U of Denver Colloquium 5-1966 on Physical Reality ...

Pigeon Droppings letter 9-30-1966

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Jim Williamson
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SJSC 11-1964

Article in 'The Rule' Receives Comment

Editor:

"Education or Castration?"—this is the title of a short, not too witty, little article published recently in The Rule magazine by Gene LeRose. Mr. LeRose feels that the gigantic (140 unit) technical curricula required by that little known building on the east side of Seventh Street is so stringent that he cannot obtain a liberal education.

Mr. LeRose currently is taking Philosophy 57, Logic, a course which might more accurately be called "Mathematics for the General Education Requirement in Philosophy." What about a philosophy of personal values course, Mr. LeRose, or a course in social problems? Are these off-bounds because they are upper division, because engineers may not predominate, because they are not generally considered as "easy" as Logic?

I agree that many and perhaps most of the requirements of the Engineering Division are outmoded, obsolete, and unrealistic, but let's be honest. That liberal education is there if you want it—if you are aware of its availability. No one expects you to be graduated with 140 units in four years. Those who do so seldom become more than slide-rule experts.

Let's continue to criticize the engineering curricula; we all know it needs it—but let's be authentic enough to realize that the four-year, 140 unit program is a big joke (perhaps a morbid one) to anyone who wants an education. Play their 140-unit game, say to hell with the theoretical four-year time limit, and wander over to the west side of Seventh Street.

When technicians become aware of things that may be more important than an obsession with technology, they cease being technicians. That's why you find people with degrees in physics acquiring degrees in philosophy; it's also why some rare engineers go to law and med schools.

Sit in on a real non-technical course sometime, Mr. LeRose. It may be quite an experience. General Education requirements and 140-unit programs are a minimum—the rest is up to you.

Joe Andrade
A1932

More Comments On Travel Feature

Editor:

About the article on "Vagabond Kings" in your Nov. 13 issue, I have just one comment. Mr. Weik has been all over the world but certainly not to NEW YORK—the west side of it in particular, with his reference to INDIA. World's Fair is a temporary thing but west side is permanent, should have looked that too.

Anil A. Desai
(Bombay, India)

Models

2/19 - 1

FOR SCIENCE MAJORS WHO NEED

UPPER DIVISION UNITS
GENERAL EDUCATION
ELECTIVES
A LAST LOOK AT THE
HUMANITIES
BEFORE
GRADUATION

Two essays on any theme developed in course or in rdgs — something sincerely interested in. — personal essay, informal.

I: Foreign language concept — humanities: lang of mathematics. Logical Positivism

Scientist → Applyd

Hostility due to language ?

Dr. Einarsson — physics

Scie fails ... community

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Dr. Shoorno

HUMANITIES 160: CONTEMPORARY ISSUES * SCIENCE IN WESTERN CULTURE 3 Units

Pre-requisites: Upper division standing, science major, a fair idea of a gene, a quantum, a sin and a law, and some interest in the place of science in our civilization.

Schedule: One evening a week (Thursday, 7:00-9:40) Lecture and lecture-discussions with Dr. Ezekiel Bogosian and interested science staff members:
Dr. Harold DeBey, Chemistry
Mr. Christopher Broadwell, Science Education
Mr. Robert Richardson, Chemistry
Dr. Charles E. Smith, Biology
Mrs. Pauline McMaster, Biology
Dr. Norman Dolloff, Geology - Dr. Duncan on Social Responsibility. — Population Explosion

Texts for the course:
2/25 3/4 Robert Junck, Brighter Than A Thousand Suns
3/11 - 3/25 Giorgio De Santillana, The Crime of Galileo
4/1 - 4/8 J. Robert Oppenheimer, The Open Mind
4/22 C.P. Snow, The Two Cultures And A Second Look
4/29 - 5/6 F.R. Leavis, Two Cultures? The Significance of C.P. Snow
5/13 J. Bronowski, "The Abacus and the Rose." dialogue
5/20 - 5/27 Aldous Huxley, Literature And Science

AWARENESS

By Joe Andrade

Humanities 160
Dr. Ezekiel Bogosian
San Jose State College
April 8, 1965

An eloquent use of metaphor, but I like the later pages better because they come to closer grips with specific issues.

B+

The primary purpose of this paper is not to cite references and authorities as a substitute for individual and perhaps original thought. It is not a critical essay in the conventional sense.

The purpose of this paper is to express some personal thoughts on the concept of Awareness in a "two-culture" society. The paper is an exposition of questions and issues which have concerned me. It is an exposition of my personal concern for the gaps and inadequacies in my own education. It is an optimistic and hopefully realistic extrapolation of my personal views to the more general concerns of Sir Charles Snow and the so-called "culture gap."

Why do men migrate? Why did some men leave the valley of creation, if indeed it was a valley? Let us imagine an area surrounded by tall mountains, where early man lived. Some men roamed -- some migrated. They began to ascend the surrounding mountains. And as they climbed, their valley became smaller and less important. They saw new flowers, new animals, new rocks, and felt new winds. Finally they reached the top and, perhaps hesitatingly, looked on the other side. What they saw is immaterial, but it was <u>different</u> -- <u>new</u>. Perhaps it was a new valley, perhaps a lake, perhaps a desolate desert. It was something which they had been totally unaware of, and now they were aware. Their entire life was momentarily changed. They saw new lands, touched new ground,

felt new winds, and, most importantly, discovered new knowledge. They increased their awareness.

Some were thrilled; others were afraid; and still others were unaffected. Some of their number no doubt went back home, seldom if ever to think of the new knowledge again. The scared ones went home and told of the fears, suspicion, and terror of what lay beyond the mountains. But the curious ones went on, desiring to see more, feel more, and learn more.

The unaffected probably had little or no effect on their fellow man upon returning. The scared may have instilled a fear in the minds and hearts of the others in the valley, thus inhibiting any further exploration. The migratory ones went on: To obtain new knowledge, see new lands, feel new winds,—perhaps never to return to their original homes, never to affect their tribesmen with the experience and awareness they felt.

Scientists and literary-intellectuals live in valleys. They devote their lives to the pursuit of some particular field of knowledge, often at the expense of other knowledge. They may become thoroughly familiar with their area of study, but are often grossly unaware of the existence of other areas.

But some men do migrate, and these include scientists and humanists. I do not know why men migrate, why they are curious, why some want to explore. To me the reason is unimportant. I think the effect is good, so I do not concern myself with the cause.

The unaware man lives and works in the center of his valley. He cannot even see the surrounding mountains, let alone the lands beyond. To him the nearby environment is everything -- nothing else exists. This man will spend his entire life in the valley, performing his experiments, doing his calculations, or, in the case of the literary-intellectuals, writing critical analysis of often obscure and insignificant essays. He will have no inclination to do anything else.

There are various means of achieving awareness. The most common is to communicate with men who have seen other places and done other things. This can be accomplished through any means of communication. A man may someday chase his sons or sheep into the nearby hillsides and suddenly realize that there is more to them than the enshrouding mist. The rare and most difficult method of achieving awareness is the one devoid of external influences: The man simply sits back and allows his thoughts to drift to the edges of the valley, to the surrounding mist, and soon he begins to wonder and think. This latter approach necessitates the rare combination of an open, creative, and intelligent mind.

Gazing at one's navel, it is sometimes asserted, also produces insight.

Initial awareness alone does not describe the phenomenon of curiosity and migration. The men I mentioned are now all aware of the existence of the mountains. Many will be disinterested, a few will feel insecure and afraid, and still fewer will venture up the slopes of the mountain. Some will continue until they reach the summit.

Here they will split up. Some will go on -- interested, curious, wondering. Some will stop, content with their view and awareness at the summit. Some will feel a desire, perhaps an obligation, to return to the valley and tell of their experiences and knowledge. Some will feel a fear, perhaps a terror and awe, and will return home for the security and consolation that awaits them.

To those remaining on the summit, their valley is smaller and less important, but it still exists; they can see it, and perhaps later they may return to it. But those who migrate on may never see their home again. They may never feel a desire to return and will remain content by exploring or settling in some new area. Or they may wish to return and be unable to find their way back. Many of them realize these possibilities as they descend the mountain towards the new valley. Many will not realize it until later. Some are filled with anxiety, perhaps some fear, but a great deal of curiosity. Others are perfectly secure, happy, and perhaps unaware of the future ramifications of their current awareness. But those who never return do know of the existence of their original valley. They will inform the new people they meet of the existence of the valley, of the people in it, its scientists, its humanists, and its government. They will tell what they know of it, and the new people will become aware. They will know of the existence of other lands and other peoples. And some of them will venture out, for no particular reason, but simply because they

want to see and learn for themselves. Once begun, the process of obtaining awareness cannot be easily halted.

It is awareness that is responsible for a student changing majors in college. It is awareness that makes a man suddenly begin an entirely new area of study, because it interests him more than other areas. It is awareness that allows an Oppenheimer to emerge from an existence with no comprehension, knowledge, or concern of society to a life intensely concerned with politics, government, and social problems. It is awareness and interest. Awareness alone does not make a man change majors, run for political office, rebel, picket, or demonstrate. But awareness plus interest, cause, and concern do cause these effects. A man cannot realize that he is interested in politics, science, humanities, or rebellion unless he is first aware of them. The awareness is the first and most important step. Then the particular individuality and personality of the man take over; his interests, concerns, anxieties, and pleasures then become the main criteria involved in his decisions and choices.

The culture gap exists because most men are not aware. Most literary-intellectuals are not aware of the wonders, beauty, curiosity, and pleasure of science -- and vice versa; they are like the men at the base of a mountain who cannot see the peak for the mist. When those who have climbed and seen the summit and other lands -- when they descend and tell the man at the base of the

majesty, beauty, and importance of what lies beyond, the literary-intellectual or scientist will feel a tinge of awareness. He may ignore it, fear it, or pursue it. His choice is purely a function of his own individuality. But he has no possibility for choice until he has the awareness.

The gap between the two cultures will largely vanish when each becomes aware of the existence of the other. The minute this awareness occurs, many will cross the gap; not because they feel obligated to cross it, not because they have a duty to cross it, but because they want to cross it -- they want to learn, they are interested. And many will not cross it. Those who do cross will have the facility to communicate with both groups. The curious and exploring man will communicate with his disinterested colleagues. The colleagues, though perhaps disinterested, will at least know of the existence of the other group. And this is the important fact.

Society is aware of the importance of awareness, at least in the United States. The purpose of the general education requirement is to enable students to obtain a basic knowledge -- an awareness -- of other fields. The purpose should be to obtain a general and conceptual knowledge of other areas. Hopefully, the Humanities Program accomplishes this objective. The new Tutorials Program should accomplish the same objective but for all areas of knowledge.

The general education approach often fails. The English literature instructor who is obsessed with the

critical analysis of isolated, infinitesimal portions of one particular play or story will alienate many of his students (and for good reason). The same is true of the general physics instructor who insists on displaying his charts, graphs, equations, and tables, rather than discussing the general concepts of physics (often because he does not understand them).

The important factor is the individual. Some students see through the insignificant critical analysis or equations to the general picture, but most cannot. Some individuals become aware with no help, tools, or crutches, but the great majority need contact, communication, lectures, and help. They can be made aware of nearly everything. They may not be interested in everything, but they will at least be aware. They will be interested in different things, and this interest will be communicated. The end result result is an increase in the awareness and breadth of the entire society; it is also the abolition of gaps and canyons, of non-communicative cultures. There will still be scientists and literary-intellectuals -- for these people will be primarily interested in those fields. But they will not be strangers or aliens. They will be aware of each other's existence, of each other's knowledge and interests. And they will respect each other's competency, knowledge, and awareness of his own particular field, rather than feel guilty, awed, or jealous -- as many do now.

This can only come about through a true general education program. We will need a conceptual approach to the sciences, one with a continuity. We will need programs similair to the

Humanities and Tutorials Programs. But most importantly, we will need individuals with a burning desire to share their knowledge, to instruct, communicate, illuminate, and fire the imaginations and awareness of others. We need debates between literary-intellectuals and scientists. We need coffee hours with diverse people, not merely with those in our own major. We need groups and organizations composed of people with diverse backgrounds and interests and not merely mathematical, philosophical, or scientific societies.

The problem and question that now arises is that we live in a highly specialized society -- a society in which the specialist is in demand and is rewarded -- a society that is obsessed with science and technology. I feel that it is this very obsession with science and technology which may free us. We will soon live in a highly cybernated society in which "productive" work may be a privilege granted to a very few. This new society will either be a blessing or a curse. To be a blessing it will require an entirely new system of values, an entirely new concept of worth, value, and work. This is the society where men will be able to pursue their interests because they are interested, not because such a pursuit is economically advantageous.

Choices, decisions, education, interests, and life itself are all dependent on awareness. Awareness excites interest, and interest leads to study, to experience, and to knowledge. It is too important to ignore.

SCIENTIFIC EDUCATION:

An Analysis of the Views of Oppenheimer and Snow

By Joe Andrade

Humanities 160
Dr. Ezekiel Bogosian
San Jose State College
May 27, 1965

The phrase "scientific education" is to be used in one context in this paper: the education of non-scientists in science. Both C.P. Snow and Robert Oppenheimer have definite views on this area of education. The object of the paper is to compare, contrast, and analyze their views with the views of others and my own.

It is generally accepted that there is some difference between the scientific and the non-scientific disciplines. The many writings noting the existence of "two cultures", and a deficiency in communication between the two, are also commonly accepted. Some may take argument with my statement, particularly Leavis [1] and Yudkin [2], but they basically agree. Their arguments center around the definition and examples of culture. Yudkin claims that a third culture is emerging which will essentially assimilate the literary one into a modified scientific culture. Leavis simply argues for the sake of argument, producing biting, caustic comments and criticisms which often lower Dr. Leavis to the depths of simple name-calling. Even if his analysis of C.P. Snow can be considered "brilliant," [3] it is in poor taste, childish, and a hindrance rather than a contribution to the solution of the two-culture problem.

I chose to discuss the topic of Scientific Education because it is one of the more critical and neglected areas of the two-culture discussion -- and one of the most misrepresented. There is constant talk about the necessity

for scientists to become educated in the humanities and arts [4], and I enthusiastically concur. But the argument for the scientific education of non-scientists is a much neglected one (possibly because it is much more difficult to achieve).

C.P. Snow impresses me as an honest, sincere, and dedicated man who is intensely interested in the communication gap between scientists and non-scientists. His feelings are made particularly clear in his essay "The Two Cultures: A Second Look," [5] where he critically analyzes his earlier essay.[6]

Mr. Yudkin,[7] discussing the "bridging" of Sir Charles' culture gap, claims:

> The scientists could certainly bridge Sir Charles' gulf.
> But it can only be a one-way bridge. For the non-scientist, an understanding of science rests not on the acquisition of scientific knowledge, but on scientific habits of thought and method.

Yudkin continues, on a later page:[8]

> The most that might be expected would be that the education of children -- whether they subsequently become scientists or not -- should include an awareness of the most valuable achievements in our literary and artistic culture. For the reasons that I have outlined, the converse -- a useful scientific education of non-scientists -- is not a practical aim.

I submit that Mr. Yudkin has missed one of the more important points of C.P. Snow's lecture. I must admit that the bridge is much easier to cross in one direction than another, in the direction <u>from</u> science <u>to</u> the humanities. But it is certainly not impossible to cross in the other direction -- more difficult, perhaps, but not impossible.

Yudkin assumes that a scientific education for the non-scientist must be a "useful" one. I disagree. For one thing, he fails to qualify the term useful." But assuming he means useful in the sense that the individual will find his scientific education valuable and of use to him in society, then Mr. Yudkin is in error. The non-scientist with a "scientific" education cannot by definition be a scientist in society. This does not mean that his scientific education is not useful. It is useful -- extremely useful -- in that he will have an appreciation for scientists, their work, and their amazing method. It will be useful in that the non-scientist will at least appreciate, even if he only partially understands, the significance of many scientific theories and concepts. The important point is that he will not harbor an antagonism or fear of science; he will appreciate it, hopefully, even if he does not fully understand it.

Snow, speaking of the two culture gulf, says:[9]

> There is only one way out of all this: it is, of course, by rethinking our education. In this country, for the two reasons I have given [educational specialization and crystallization of social forms], that is more difficult than in any other. Nearly everyone will agree that our school education is too specialized. But nearly everyone feels that it is outside the will of man to alter it.

And later, on page 60:

> The chief means open to us is education -- education mainly in primary and secondary schools, but also in colleges and universities. There is no excuse for letting another generation be as vastly ignorant, or as devoid of understanding and sympathy, as we are ourselves.

Snow is obviously not speaking only of scientific education. He is speaking <u>against</u> education which is narrow and specialized, both in science and in the humanities. One can be a narrow, specialized, and uneducated man as easily studying Renaissance art ast studying quantum mechanics. But it is much easier, as Mr. Yudkin[7] so clearly stated, for the quantum mechanicist to study Renaissance art as a hobby than for the Renaissance art-ist to dabble in quantum mechanics.

Oppenheimer is but one of many examples of scientists who have successfully (and probably unintentionally) bridged the gap. This is expressed beautifully in Jungk:[10]

> ...the amazing "Oppie," who managed to pursue in Gottingen not only his physical studies but also his philosophical, philological and literary hobbies. He was particularly deep in Dante's <u>Inferno</u>....

The same Oppenheimer, when asked why he decided to teach at the University of California, answered:[11] "Just a few old books. I was enchanted by the collection of sixteenth- and seventeenth-century French poetry in the university library." This is obviously a scientist who is much more than a scientist; he is also a lay literacist and philosopher. Oppenheimer expresses his concern for those who also appreciate poetry and philosophy, but cannot appreciate science:[12]

> There is no doubt that even the theory of relativity, which has been so much vulgarized and so little understood, that even the theory of relativity is a matter which would be of real interest to people at large. There is no doubt that the findings of biology and astronomy and chemistry are discoveries that would enrich our whole culture if they were understood.

> And what is perhaps more troublesome, there is a gulf between the life of the scientist and the life of a man who isn't actively a scientist, dangerously deep. The experience of science -- to stub your toe hard and then notice that it was really a rock on which you stubbed it -- this experience is something that it is hard to communicate by popularization, by education, or by talk. It is almost as hard to tell a man what it is like to find out something new about the world as it is to describe a mystical experience to a chap who has never had any hint of such an experience.

Is this the ultimate heresy -- a scientist talking of mystical experiences? But while I am on the subject, I will quote one more scientist, a brilliant, eccentric, and oft-misunderstood man -- Albert Einstein:[13]

> The most beautiful and most profound emotion we can experience is the sensation of the mystical. It is the sower of all true science. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead. To know that what is impenetrable to us really exists, manifesting itself as the highest wisdom and the most radiant beauty which our dull faculties can comprehend only in their most primitive forms -- this knowledge, this feeling is at the center of true religiousness.

The consideration of non-specialized education in areas outside of one's particular specialty is an important one. Snow[14] admits that the problem is particularly acute in Great Britain but is, in fact, being solved in the United States by the emergence of a third culture, the social scientists.[15] If scientists and engineers have some amount of leisure time, they will often cross the gap and develop interests in non-scientific areas -- IF they are aware of the existence of these areas. The same is true for the non-scientist. He may find himself readin a copy

of *Scientific American* or one of the other responsible and not overly technical magazines -- if he is not afraid of science. This leads us back to the topic of education.

It is quite possible to organize an educational program or system which will provide the functions of initial awareness and knowledge in many areas -- both in science and in the humanities and arts. Again I cite the oft-cited examples: the humanities and tutorials programs; there is a strong need for similar programs in the sciences.

If these programs are offered, will the students respond? They will -- and very enthusiastically.

One particularly competent Photography 1A instructor here at San Jose State College has taught his students the basics of quantum mechanics, the wave-particle duality, the essence of the structure of atoms and molecules, optics, and chemical reactions -- in addition to conventional photography. The response has been unanimous. The students are intensely interested. The enrollment in the course has tripled. These students had only a common high school mathematics and science background, and they will graduate with an excellent conceptual understanding and appreciation of basic physics and chemistry -- a feat which nearly all of thei non-scientific classmates will fail to accomplish. And this is only one course. A series of courses, designed for a continuity of conceptual presentation with competent and enthusiastic professors, couldinstill an understanding and appreciation of science in literally thousands of students on this campus. The major problem is finding the men (or women) to teach the course.

Materials Science 25 Mr. Andrade
Laboratory FINAL EXAM Name:

The written portion of the final exam is worth 80 points; the oral portion is 40. You will be called out individually while you are taking the written exam. The oral portion will be informal and brief (10-15 minutes). As this course is primarily concerned with fundamentals and basic concepts, you must justify your answers to the questions in terms of these fundamentals and concepts. Think about the questions -- do not answer blindly and thoughtlessly. Be concise, brief, complete, and NEAT. Have a good time.

3 1. What are Miller Indices? How are they used? Give some examples of their use for application.

6 2. Sketch the unit cells for a BCC, FCC, and HCP structure. Determine the number of atoms/unit cell for each.

3 3. How could you calculate the theoritical density of an element given only its unit cell and atomic weight (and Avogadro's No.)? SET UP the calculation for an FCC unit cell.

3 4. Why do grain boundaries exist? How are they formed?

This semester the Engineering Division offered a course titled "Cybernation and Man," a commendable attempt at partially spanning the technology--sociology gulf. When the concept of entropy -- the second law of thermodynamics -- (which, incidentally, was an excellent example in C.P. Snow's lecture [16], though he handled it very poorly) was to be presented, one electrical engineering professor went to the blackboard, scrawled an equation, and said this is the second law of thermodynamics. In a class of nearly all non-science majors, most of whom hadn't seen an equation since high school, this was a ridiculous and frankly irresponsible approach to the concept. The result was to immediately alienate the students from a concept which is perhaps the most significant in all of science. The concept of entropy (the universe's continuous and universal tendency towards disorder and randomness) has a very significant philosophical and theological implications. This is one example of the problems involved in teaching science to non-scientists. It will be a simple task if the right instructors are found, e.g., the Photography 1A professor. The proper men, teaching science and using possibly the "case approach" suggested by Conant[17], will contribute much toward eliminating the gulf -- in its most difficult direction.

In conclusion, I would like to quote from an article by President Clark:[18]

> I am certain that we have never really tried to teach science and mathematics to non-scientists. I could almost assert that there has been a general conspiracy, conscious or unconscious, to keep him from learning science and mathematics. Our view of education is so instrumental that we consistently direct the student away from mathematics unless he is going to be a scientist or engineer. We rationalize our behavior in immediate vocational goals, or more subtly on the general ground that natural interests divide the future scientist from the future man of letters. I do not believe it.

Neither do I.

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2. Michael Yudkin, "Sir Charles Snow's Rede Lecture," in Leavis, ~~ibid.~~, pp. 51-64.

3. Robert D. Clark, " Snow, Bronowski, Leavis, the Two Cultures, and American Education," The Tower (San Jose State College: Fall, 1964) p. 4.

4. Philipp Frank, Modern Science and its Philosophy, (New York: Collier Books, 1961) p. 253.

5. C. P. Snow, The Two Cultures: And A Second Look, (New York: New American Library, 1964).

6. Ibid., pp. 1-52.

7. Michael Yudkin, op. cit., p. 55.

8. Ibid., p. 57.

9. Snow, op. cit., pp. 23, 60.

10. Robery Jungk, Brighter Than A Thousand Suns, (New York: Grove Press, 1958) p. 21.

11. Ibid., p. 124.

12. Robert Oppenheimer, "The Scientist in Society," in The Open Mind, (New York: Simon and Schuster, 1955) pp. 126-7.

13. Lincoln Barnett, The Universe and DR. Einstein, (New York: New American Library, 1958) p. 108.

14. Snow, op. cit., pp. 66-7.

15. Clark, op. cit., p. 8.

16. Snow, op. cit., p. 20.

17. James B. Conant, On Understanding Science, (New York: New American Library, 1958) pp. 17-40.

18. Clark, op. cit., p. 10.

1267 S. Emerson Street
Denver, Colo. 80210
May 19, 1966

Professor Bogosian...

A year ago, in the Spring Semester of 1965, I was enrolled in a special section of your Humanities 160 course: Science in Western Culture.

In that course we discussed Snow, Leavis, Bronowski and the general topics of the so-called "Two Cultures," scientific responsibility (or irresponsibility), the education on non-scientists in science, and the non-scientific education of scientists.

Frankly, it was one of the most interesting and stimulating courses I have ever taken. Recently I have had an opportunity to follow up on it a bit.

This week the University of Denver (a little known school in a well known city) is sponsoring an International Colloquium on "Logic -- Physical Reality -- History." This meeting has brought together philosophers, historians, mathematicians, and physicists from all over the world. These gentlemen are talking, discussing, conversing, and arguing with each other -- yes, even the philosophers and physicists! Most of the sessions are private to allow for more intimate discussions. There have been four public sessions which I have marked in the enclosed program.

The sessions have been enlightening, humorous, exciting, and stimulating -- to the audience as well as the participants. Vigier, a French physicist who is also interested in the origin of life and a personal friend of J. P. Sartre, proposed a theory which may be a fundamental advance in physics -- a theory which essentially (IF I understood it correctly) combines the Einsteinian concepts of relativity with small particle physics (quantum mechanics). The questions from the participants related (or tried to) his theory to philosophy, causality, and history.

The program is enclosed and speaks for itself, particularly the first page. The proceedings of the Colloquium will be published in book form soon.

The gaps, if they exist, are being "bridged." Admittedly, the participants of this Colloquium are not "run-of-the-mill" scientists and philosophers, and perhaps it may be some time before the two cultures merge into one. But a start has been made.

I sincerely hope the Hum. 160 special classes are still being offered. But please don't limit them only to science students.

Sincerely,

Joe Andrade

June 2, 1966

Dear Joe Andrade,

Thank you for your very appreciative note on the science and culture course and the information of the conference at Denver University. That first semester was certainly an exciting and informative one for me too. The course is still going strong, except that now I am giving it during the day (Tuesdays and Thursdays 12:30-1:45) and it is open to all students. At present we have four from science, one from mathematics; the rest of the class of fifteen come from psychology, art and music, English, humanities, philosophy, and political science. There has been more tension between students as a result of this variety. I came into class about two weeks ago and found the philosopher and the physicist in a most personal argument. Basically it was a conflict of values, the philosopher arguing for a democratic view of the worth of life (one life is as valuable to him as another) and the aristocratic (some lives are superior--better for society--than others). Practically this issue was somehow joined with the question of the draft.

The course has been well enough to warrant my trying it out as a summer session offering. I understand from the director of the summer session that twenty-four students have tentatively enrolled in it. This is too many but I'm afraid I'm stuck with it, summer sessions being a self-supporting institution. It will mean less of the colloquium technique and more of the lecture--a pity, considering how genuinely informative discussion can be.

During the last semester we had on campus, as visiting scholar (or rather scholar in residence), Buckminster Fuller, a sort of 20th century Renaissance man--poet, architect, and scientist. For two months the atmosphere was full of Fullerisms: if all the politicians in the world were shot into outer space the world would go on just the same, perhaps better; but if the scientists were shot into outer space, the world would come to a stop in a very short while. Again: Ten percent of the top faculty should be entrusted with education in college; the other ninety percent should be given sabbaticals to keep permanently away from college. The last idea comes from his book on Automation and Education. He was good for a good deal of hot debate in our class.

If you are up this way I hope you will take time out for a visit. In the meanwhile the best of luck in your enterprise. I suppose you are working for a degree at Denver.

Sincerely yours

E. Bogman

the university of denver
in cooperation with
the martin-marietta corporation foundation

international colloquium on logic-physical reality-history

may 16-20, 1966

margaret rogers phipps house
lawrence c. phipps memorial conference center
3400 belcaro drive, denver, colorado

NEF

The purpose of this International Colloquium is to lay bare the ever-present links between Logic—Physical Reality—History.

It is a trite and often lamented fact that every academic discipline suffers from the malady of overspecialization and expertise. Who has not encountered technical gibberish and the jargon of the pundit in his scholarly experience?

We, who are convening this Colloquium, wish to remove the artificial barriers between these respective disciplines. Indeed there are not two or three or four cultures: there is only one culture, but our generation has lost its awareness of this truism. This state of affairs, though serious, is not tragic. All we need is to free ourselves from the fetters of mere "technelese" and search for a comprehensive interpretation of logical and physical theories.

Historians, Logicians, Physicists—all are banded in one common enterprise, namely in their desire to weave an enlightened fabric of human knowledge.

It is a current and perhaps welcome trend in philosophic inquiry to de-psychologize systems, methods, and theories. However, there is an equally fashionable tendency to minimize or even eschew the historical aspects of logical or physical theories, and analogously, there is a deep-seated mistrust among physicists and cosmologists against the seemingly pure abstractions of logical formalisms.

Finally, the so-called humanistically-oriented historian has long given up any attempt to understand the findings of logic and the physical sciences. As stated before, he is intimidated by the jargon and often contemptuous of the narrow provincialism and the cant displayed by the "other side."

We are convinced that logic, physical reality and history form *one rational unity*. Although this colloquium is divided into sessions, such a procedure is only meant to render possible intimate discussions among smaller groups. We shall not try to build imaginary bridges between the three topics chosen for this Colloquium. We intend to show that real bridges have always existed and that without them the *edifice of human knowledge will remain unfinished.*

PROGRAM

Monday, May 16

9:00 a.m. OPENING SESSION: Margaret Rogers Phipps House.

Opening Remarks, CHESTER M. ALTER, Chancellor, University of Denver

Introduction of the Theme of the Colloquium, ALLEN D. BRECK, University of Denver; WOLFGANG YOURGRAU, University of Denver

"A Realist View of Logic, Physics, and History," SIR KARL POPPER, London School of Economics

10:30 a.m. SESSION II: PHYSICAL REALITY

Chairman, HERMANN BONDI, University of London

"Knowledge and Physical Reality," ANDRE MERCIER, University of Berne

2:00 p.m. SESSION III: HISTORY

Chairman, GEORGE RANKI, Hungarian Academy of Sciences

"The Notion of Personality *versus* The Science of History," HERMAN TENNESSEN, University of Alberta

3:45 p.m. SESSION IV: HISTORY

Chairman, ARNE NAESS, University of Oslo

"The Growth of a Theoretical Model: a Simple Case Study," HAKON TOERNEBOHM, University of Goeteborg

Tuesday, May 17

9:00 a.m. SESSION V: LOGIC

Chairman, CZESLAW LEJEWSKI, University of Manchester

"Existence," WILLARD VAN ORMAN QUINE, Harvard University

10:45 a.m. SESSION VI: LOGIC

Chairman, GEORGE POLYA, Stanford University

"Proofs, Explanations, and Refutations," IMRE LAKATOS, London School of Economics

2:00 p.m. SESSION VII: HISTORY, Student Union Lounge

Presiding, HARVEY D. WILLSON, Vice Chancellor-Treasurer of the University of Denver

Chairman, ALLEN D. BRECK

"The Evolution of Evolution," JULIAN VICTOR LANGMEAD CASSERLEY, Seabury-Western Theological Seminary

Tuesday, May 17—Continued

3:30 p.m. SESSION VIII: Student Union Lounge

Chairman, JOHN U. NEF, University of Chicago Center for Human Understanding, Washington, D. C.

"A Note on the Relation between Physical and Philosophical Pluralism," ARNE NAESS, University of Oslo

Wednesday, May 18

9:00 a.m. SESSION IX: LOGIC

Chairman, DAVID KAPLAN, University of California at Berkeley

"Depth Information and Surface Information," JAAKKO HINTIKKA, University of Helsinki

10:45 a.m. SESSION X: LOGIC

Chairman, WILLARD VAN ORMAN QUINE

"Logic and Ontology," CZESLAW LEJEWSKI

2:00 p.m. SESSION XI: PHYSICAL REALITY, Student Union Lounge

Presiding, ROBERT S. MCCOLLUM, Vice Chancellor for Public Affairs, University of Denver

Chairman, HAKON TOERNEBOHM

"General Relativity and Elementary Particle Theory," JEAN PAUL VIGIER, Institute Henri Poincaré, Paris

3:30 p.m. SESSION XII: PHYSICAL REALITY, Student Union Lounge

Chairman, WOLFGANG YOURGRAU

"The Three Kings in Physics," GEORGE GAMOW, University of Colorado

Thursday, May 19

9:00 a.m. SESSION XIII: HISTORY

Chairman, DONALD KEYES, University of Toronto

"Skepticism and Historical Research from the Renaissance to the Enlightenment," RICHARD POPKIN, University of California at San Diego

10:45 a.m. SESSION XIV: HISTORY

Chairman, TOSHITAKA YADA, Hokkaido University

"Causation in History," ROBERT COHEN, Boston University

Thursday, May 19—Continued

2:00 p.m. SESSION XV: PHYSICAL REALITY

Chairman, ANDRE MERCIER

"Relativity Theory and the Historical Properties of Physical Systems," HANS-JUERGEN TREDER, German Academy of Sciences

3:30 p.m. SESSION XVI: PHYSICAL REALITY

Chairman, ROBERT CHASSON, University of Denver

"The Non-quantal Foundations of Quantum Mechanics," ALFRED LANDE, The Ohio State University

Friday, May 20

9:00 a.m. SESSION XVII: LOGIC

Chairman, ARNE NAESS

"What is Russell's Theory of Descriptions?" DAVID KAPLAN, University of California at Los Angeles

10:45 a.m. SESSION XVIII: LOGIC

Chairman, JAAKKO HINTIKKA

"On Some Aspects of Mathematical Logic," GEORGE KREISEL, University of Paris

2:00 p.m. SESSION XIX: PHYSICAL REALITY

Chairman, ROBERT COHEN

"Cosmology and Elementary Particles," DMITRI IVANENKO, Moscow State University

3:30 p.m. SESSION XX: SUMMARY AND CONCLUSION

Presiding, WILBUR C. MILLER, Vice Chancellor for Academic Affairs, University of Denver

"Is Science Human?" HERMANN BONDI

"A Summary and a Look at the Future," ALLEN D. BRECK and WOLFGANG YOURGRAU

participants

HERMANN BONDI, Professor of Mathematics, King's College, University of London. Co-founder (with Fred Hoyle) of the steady-state theory of the universe. Cosmology and relativity theory, astrophysics, writings on relativity, "the universe at large."

ALLEN BRECK, Chairman, Department of History, University of Denver. Co-chairman of the Colloquium. Medieval history, historiography, philosophy of history.

JULIAN V. LANGMEAD CASSERLEY, Professor of Philosophy of Religion, Seabury-Western Theological Seminary, Evanston, Illinois. Philosophy of history, apologetics, moral dimensions of the social sciences, "the evolution of evolution."

ROBERT L. CHASSON, Chairman, Department of Physics, University of Denver. Cosmic ray research, planetary physics.

ROBERT COHEN, Chairman, Department of Physics, Boston University. Editor, *Boston Studies in the Philosophy of Science*. History and philosophy of science, plasma theory, relations of history and physics, causation in history.

GEORGE GAMOW, Professor of Physics, University of Colorado. Founder of the "Big-Bang" theory of the universe. Theoretical physics, cosmology.

YUSUF FADL HASSAN, Director of the Sudan Unit of the University of Khartoum, the primary research unit in the Sudan. Middle East migration into North Africa.

JAAKKO HINTIKKA, Professor of Philosophy, University of Helsinki. Editor-in-chief of *Synthese*. Mathematical logic, epistomology.

DMITRI IVANENKO, Professor of Physics, Moscow State University. Co-author (with W. Heisenberg) of a meson theory. Cosmology, elementary particles, field theory.

DAVID KAPLAN, Professor of Philosophy, University of California at Los Angeles. Symbolic logic, semantics, philosophy of science.

DONALD KEYES, Fellow and Tutor, Trinity College, University of Toronto. Christian existentialism, logic, history of philosophy.

GEORGE KREISEL, Professor of Mathematics, University of Paris. Proof theory, mathematical logic, author of "Kreisel Theorems."

IMRE LAKATOS, Reader, Department of Logic and Scientific Methodology, London School of Economics. Proof theory, foundations of mathematical logic, history of mathematics.

ALFRED LANDE, Professor of Theoretical Physics, Emeritus, The Ohio State University. Atomic structure and quantum theory, spectral lines, Zeeman Effect, multiplet theory, Landé g-factor.

CZESLAW LEJEWSKI, Professor of Philosophy, University of Manchester. Greek philosophy, Aristotelian logic, mathematical logic, ontology.

ANDRE MERCIER, Chairman, Department of Theoretical Physics, University of Berne. Secretary General, International Committee on General Relativity and Gravitation. Philosophical interpretation of physics.

ARNE NAESS, Institute of Philosophy and the History of Ideas, University of Oslo. Editor of *Inquiry,* an international journal of philosophy and the social sciences. Symbolic logic, history of scientific ideas, theory of knowledge.

JOHN U. NEF, Chairman, Center for Human Understanding, the University of Chicago, Washington, D. C. Founder of the Center and of the Committee on Social Thought of the University. Relations between the natural, social, and behavioral sciences and the arts of literature, painting, music and architecture.

GEORGE POLYA, Department of Mathematics, Stanford University. History of mathematics, proof theory, induction, inference, mathematical theories.

RICHARD POPKIN, Chairman, Department of Philosophy, University of California at San Diego. Editor, *Journal of the History of Philosophy*. History of philosophy in the 16th and 17th centuries, history of culture.

SIR KARL R. POPPER, Chairman of the Department of Philosophy, Logic, and Scientific Method in the London School of Economics. History and philosophy of science, philosophy of history, logic, metaphysics, ethics, mathematics, physics.

WILLARD VAN ORMAN QUINE, Peirce Professor of Philosophy, Harvard University. Mathematical logic, theory of knowledge, author of "Quine Theorems."

GEORGE RANKI, Deputy Director of the Historical Institute of the Hungarian Academy of Sciences, Budapest. History of Europe, particularly its economic history in the 19th and 20th centuries, East Central Europe.

HERMAN TENNESSEN, Professor of Philosophy and Co-Director, Center for Advanced Studies in Theoretical Psychology, University of Alberta. Logic and philosophy of language, social research, philosophy of science.

HAKON TOERNEBOHM, Chairman, Department of Philosophy, University of Goeteborg. Logical foundations of relativity theory, explanations in history, history of science.

HANS-JUERGEN TREDER. Director of the Institute for Pure Mathematics, German Academy of Sciences, Berlin. Relativity physics, in particular theory of gravitation, the historical properties of physical systems.

JEAN PAUL VIGIER, Institute Henri Poincaré, Paris. Collaborated with Louis de Broglie and Bohm on a new particle model. Elementary particle physics, general relativity theory.

EUGENE P. WIGNER, Professor of Mathematics, and Director, Palmer Physical Laboratory, Princeton University. Nobel Laureate, 1964. Mathematics, theoretical physics, invariance principles.

TOSHITAKA YADA, Law Faculty, Hokkaido University. Habsburg Monarchy in the 19th century, modern, European and German history, political science.

WOLFGANG YOURGRAU, Acting Chairman, Department of Philosophy, University of Denver. Co-chairman of the Colloquium. Philosophy of science, mathematical logic, irreversible and statistical thermophysics, quantum theory, variational principles.

9-30-1966

CONTINUED

Letters to the Editor

Continued from Page 4

into a babbling idiot. If there had been any question, as to whether or not Mr. Kemerly was transformed into a stuttering nitwit at D.U., his testimony should leave no doubt. Mr. Kemerly, however, is absolutely correct about one matter; he won't be missed. Good-by Mr. Chips.

Joseph M. Siracusa
Graduate Student

To the Editor:

The great University of Denver, known only for its winter sports teams and its student apathy, now seeks to stamp out the only life on a dead campus: the loyal pigeon.

It is very unfortunate that pigeon droppings have a low pH; the pigeons would surely try to correct the situation if they only knew. It is equally unfortunate that the gutters and roofs of the buildings, which comprise our educational institution might be susceptible to acidic pigeon droppings. Do Brigham Young University or San Francisco State suffer from acidic sea gull droppings? Perhaps a perceptive botanist might discover a type of corrosion caused by the ivy holding up our hallowed eastern institutions. Massacre the sea gulls! Poision the ivy! And what about the corrosion products of the many beer cans, which many a DU student carelessly and irresponsibly strews around his campus, his dorms and houses, and his lovely adopted city? Should not the University kill off the source—or would it miss the tuition he pays?

The "pigeon problem" is more of a reflection on the problem-solving ability of the University's staff than on the diet and metabolism of the unsuspecting pigeon. If the roofs and gutters must be replaced, it is surely possible that a replacement material exists which might just be resistant to pigeon droppings, and possibly cheaper than the original. Has there been any attempt to solve the problem from a non-massacre viewpoint?

And the University's sacred "image"—what would Lady Bird say if she knew poisoned pigeons were floating in the garden she dedicated?

This is a campus where student activity is nil, where apathy is not only prevalent, but apparently desired, where little happens unless it is something which may bolster the University's "image," not to the academic, but to the revered endowers. Frankly, on such a dead campus, it is very heartwarming to see some life in the form of a happy, carefree pigeon flying and dropping by.

Joe Andrade
Grad. Student