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This essay presents a pedagogical approach to causal hypothesis as a unit and an assignment in Freshman Composition. I want to plug causal hypothesis as a logical exercise so important that it belongs in every freshman English syllabus. The majority of our arguments are causal: we argue deliberately about what the consequences of a present act will be and judiciously about what the causes of a present situation have been. The war horses of Freshman Comp are causal topics: the effects of pollutants, T.V. violence, foreign policies, definitions of life and death, the death penalty, and gun control. All arguments of value inevitably become arguments of consequence. Yet many text books I've read and teachers I've talked with have not felt obliged to offer guidelines for ascertaining that probable connection between one set of events and an event which follows which we term a causal connection.¹ Most texts limit their remarks to the arrangement of events in the direction of first cause to last effect or the reverse. This negligence is hard to excuse if the Freshman Composition class is a micro-university providing an introduction to those basic rhetorical and logical skills called for in later courses or in the work-a-day world.

But I am also speaking of causal hypothesis, and the hypothesis is even more ubiquitous than the causal arguments cast in its form. Recall that inductive logic is divided into two kinds of arguments: generalization and hypothesis. I stress the importance of hypothesis partly because the usual approach to logic in composition courses is misguided and misproportioned. Too much attention is placed on the syllogism and the fallacies. Only the brightest students can put to use the rules of syllogistic logic after our necessarily slight treatment of it. Moreover, arguments of certitude are rarely admissible in our arguments. Teaching fallacies in Freshman Comp is teaching vocabulary when the student is assaulted in most of his classes with a long list of definitions. Psychology 101, for instance, is "behaviorism," "compensation," and "reaction formation." From the student's exam-centered perspective these are just words to learn, not processes, a fact evident in their notebook and memorization approach to even our classes where not knowledge but performance based on understanding method is paramount. Only a very intelligent student can combine these discreet logical flaws into an understanding of valid logical operations. Even if you introduce post hoc ergo propter hoc after a review of the causal analysis, you risk distracting the student from the whole with a definition of its part. I hope my approach to causation and hypothesis provides sufficient obvious examples of the processes to overcome the confusion from the necessary terminology.

I begin my unit on causal hypothesis with problems from autobiography and biography, and then I introduce simple problems from general science. Without any attention to generalities, which might falsify or inhibit response, I question the motives for the actions and attitudes of my students. Perhaps I'll first reveal why I went to college--thrown off as procrastination. I used to tell my uncles that I wanted to be an economist, but I was really dodging the draft, especially at first, and then luxuriating in Byron's imaginings. I solicit empathetic remarks--soon there are admissions of similar dissimulations and of honest doubts about the real reasons for entering college. Then I

interrogate them to complicate the causal conditions. Now we are faced with a discrepancy between the real reasons and the good reasons, or advantages, of college with which we rationalize for our own and others' benefit. This distinction is important, for many students will mistake advantages and benefits for formative conditions.²

The students are now questioning their motives, but they lack any method, and their memories are lazy. They must be forced back into the past. Parents, older siblings, and teachers, what did they do and say? What video and literary treatments prompted what expectations of college and adult life? When the students have learned the questions to be asked, I set them writing on these influences for whatever time remains and for homework.

Another autobiographical exercise I use to introduce causal hypothesis obliquely develops from a discussion of connotation as the mental residue of our experience with the referent of a word. I ask the students to jot down their associations and imagery when I speak a few words, like "country," "rural," and "woods." Then I return to "country" and request they record whatever extended trains of thoughts it generates. After students read aloud their initial responses, we consider what in Allen's background accounts for how different his associations are from Brenda's and Carl's. When these stereotypes or conceptions of the country are recognized, I ask the class to organize their associations into affinities and patterns: farm as place of recreation, farm as work place, wilderness as camping adventure, and wilderness as habitat for flora and fauna. This done, I ask them to find in their past the experiences determining their predominant attitudes and associations. I suggest they list their significant encounters with the country or the idea of it in chronological order. Then I ask them to group whatever experiences promoted particular attitudes and to omit lesser associations not founded in experience and events without much effect. Now they have the materials properly ordered for a causal hypothesis explaining their primary attitudes toward and use of the country.

A student who enjoys the challenging activities in camping may have a list of causal events including: early experiences on his uncle's farm, social studies classes on Indians, western and pioneer movies, fishing trips with his dad, and boy scouts. His essay reads as a narration with causation growing more complex as multiple early events determine each later event. Each paragraph treats a major influence or a number of influences at a stage of development, concluding with his response to these events and his newly reformed attitude. The paper comes to its inevitable conclusion when he has brought his development up to the effect he set out to explain.

This assigned self-scrutiny introduces the student to the determination of present from past, of being from doing. Karl Hess organizes his autobiographical Dear America around this human model:

The way I have lived explains the way I think. Out of what I was came what I am. It seems to me this is generally true for all of us. Even in those moments where the opposite seems true, in those crashing moments where some single human seems to have, by an act of mind, shattered history and flung loose from the past, there is, in fact, nothing but the flowering of the moment before--a direct line through what the person had been doing to what the person suddenly does and which appears to watchers suddenly to change the world.³

If you think our youth is ahistorical and solipsistic, such a model and the assignment which emphasizes it may be tools you should put to use.

In my first class, then, I provide a sense of purpose and a range of subjects. I might limit the topic to one of the previously discussed topics or expand it to any personal or biographical event or belief (why I loath English or why I stopped going to church) or even to any social or historical fact (why Americans do or believe in X). I devote two more classes to this assignment: the first is on hypothesis, the second on causation, though there is always some need to overlap them.

In my second class I distribute an assignment sheet which emphasizes the importance of the guidelines to be presented in that class and the next. I begin my discussion of hypothesis with advice about the introduction of their essays. It must define very particularly the phenomenon to be causally explained. First, there is a danger that someone will set out to define why he went to college and conclude with shallow analysis that he wanted financial success. Here the student is ignoring the proper subject of his analysis: why he has this strong desire for money. But there is a more important reason for this definition. The nature of the student's involvement with the country must be carefully delineated for him to discover signs of his real motivations. He cannot begin simply with the fact that he likes to camp. What kind of camping does he do? What does he enjoy most? What does he say of such trips before hand and afterwards? His preference for cooking or for trailblazing will suggest different motivations.⁴

At this point the hypothesis as a kind of argument is introduced. A hypothesis explains something that has happened by placing it within a general pattern. It has at least three parts, as can be seen in Monroe Beardsley's definition: "An explanation, then, is a set of statements of which at least one is reported as a fact and at least one is offered as a hypothesis to account for that fact in virtue of one or more generalizations connecting the events or states of affairs referred to in the fact and the hypothesis."⁵

In demonstrating this activity, I prefer to use examples from the sciences, for generalizations from psychology and the social sciences don't always receive a consensus. Beardsley uses the dead plant example, which is familiar and simple. The fact to be explained in the plant's death, the hypothesis over-watering, the generalization "plants die from overwatering." I begin with this as it allows me to emphasize the particular definition of the fact to be explained. We must collect a set of facts: the kind of plant, its needs, color of the dead plant's leaves, moisture of its soil, lighting. As we collect this data, we may suddenly discern a pattern suggesting a different hypothesis, no sun light, which can also account for the death with an equally acceptable generalization. As a means of generating facts, we suppose that each hypothesis is true and ask what else would follow if it were over-watered or under-lighted. The consequences of these conditions, what we ought to look for, can be found in a book on plant care. Now we marshal all the facts that each hypothesis can explain into two columns. Whichever hypothesis explains the most facts is probably the stronger.

The existence of a second hypothesis allows us to introduce two rules for choosing between alternate hypotheses: the frequency of the event which the hypotheses propose and the simplicity of their explanations. These two rules can be well illustrated with a crime mystery. T. H. Huxley's example comes easily to mind: the silverware is missing, a window is open, and there are tracks leading to and from the window. Theft commonly occurs, and a single

thief simply explains the facts. Huxley, digging at anti-Darwinians, has a friend argue that perhaps a monkey committed the burglary and the tracks were made by a curiously amazed bystander. The latter explanation is weaker because it involves a most unusual occurrence and is complicated by its use of two agents to account for the facts.⁶

Examples from biography are especially useful if the students are writing about their own lives. I offer them the problem biographers of Samuel Johnson have constructed from his inordinate fear of death. I note that, though some have explained the fear as natural for a Christian believing in hell, W.J. Bate argued that it derived from Johnson's fear of losing consciousness, of unplugging his rational faculty. Bate noted that this hypothesis would also account for Johnson's insomnia. If Bate is right about the cause of his fearing death, what else will be true? What else can he find to strengthen his hypothesis? One student will suggest a fear of insanity, another a fear of intoxication, another a fear of extreme emotional states, and perhaps another will suggest sexual inhibition. If the Doctor's were a more common case, they might rely on their experience with such a general type of behavior. But in all such hypothesizing, especially in cases like Johnson's, they are engaged in an imaginative act resembling the novelist's creation of character. I stress that hypothesizing is the imaginative act which all the arts, humanities, and sciences rely upon. Many of our reading anthologies contain Jacob Bronowski's "The Reach of Imagination," where he enthusiastically argues that the imagination "is the faculty that is specifically human, and it is the common root from which science and literature both spring and grow and flourish."⁷ This point can be continually demonstrated by taking your examples from different disciplines, though each discipline's hypotheses are often especially suited for illustrating different aspects of the hypothesis. Science has provided me with my best examples for demonstrating the rounding up of facts within a hypothesis' generalizations. One of my favorites is why there are two high tides a day if the earth shows but once a day its surface to the moon, the obvious active cause.⁸ The explication of poetry requires a complicated juggling of hypothesized, alternative meanings.

This brings me to my third class, spent on causation. First, let me summarize the guidelines I have offered for hypothesis: 1) a hypothesis is an explanation of a fact or facts with reference to a generalization, 2) the more facts the hypothesis explains, the stronger it is, 3) hypothetical thinking requires an imaginative act: you find the facts supporting your hypothesis by supposing it true and looking for what else would follow, 4) look for alternative hypotheses, 5) prefer the hypothesis that most simply explains the facts with the fewest suppositions, and 6) prefer the hypothesis whose generalized event occurs most frequently.

After quickly reviewing the hypothesis, we consider the causal logic in the hypothetic arguments of the last class. Is overwatering a sufficient cause by itself of all the facts to be explained? Is the fear of losing consciousness? Is the pleasant solitude of hiking? I work the class round to an example which admits the introduction of rules regarding the degree of causal connections. A cannot be a single sufficient cause of B unless whenever A occurs B does. If A alone will not cause B but B would not occur without it, we call A a necessary condition of B. Causation is usually complex. I emphasize that, although A maybe the active cause initiating B,

surely there were additional conditions that were also necessary. For instance, if the plant had been healthier, or of a different species, or placed in a pot with drainage holes, then the active cause, overwatering, would not have killed the plant. The concept of immediate and remote causes might also be useful to students' limiting the pretensions of their analyses.⁹

I refer the students to the guidelines on the assignment sheet and advise them to initially state the limits of their hypothesis. If other causal conditions promoted their involvement with X, but these are not investigated, then the students must indicate that they are considering only certain necessary conditions or an active immediate cause and neglecting other conditions and remote causes. The students must realize that their cause will only explain the effect to the degree that it generally causes such effects. A reminder about testing generalizations is called for here. You cannot say that you wrestled varsity because Bob Hoehn beat you up in second grade, for the readers will easily discover exceptions to the implied generalization. They were beaten up, but they never wrestled. Even if the causal generalization indicates a nearly universal correlation of event A causing event B, so long as there is only case of A not causing B, there must be other conditions necessary for B. The students are also warned not to take whatever comes before as a cause of what follows (post hoc ergo propter hoc).

It is also profitable to introduce as formal knowledge four tests for questioning the degree of correlation between cause and effect. These four tests, positive cause and effect and negative cause and effect, are fairly well discussed by Beardsley, but our common sense puts them to daily use. I present these tests not as materials for their papers but as tools for determining the extent of the causal relations they described. If this were an assignment in evaluating another's causal hypothesis, I would assign the identification of all implicit generalizations and their fourfold testing. Positive and negative cause testing involves applying and removing the cause to perceive if the effect first increases and then decreases. So, if Laetrile prevents cancer, we would expect people who consume it, like those in Hunzaland who consume apricot-pit oils rich in Laetrile, to be free of cancer and people who do not ingest it not to be free of it. Positive and negative effect testing involves finding where the effect is present or absent and determining if the cause had or had not been present. This would require a survey of people with and without cancer to discover if their previous diets have contained Laetrile.

I drill the students on these tests by asking them to create experiments testing specific causal generalizations all four ways. Often some of the tests are not applicable, but with the relation of vitamin C to the common cold all tests can be easily reviewed. All four can be applied to censorship arguments: T.V. violence begets violence, pornography begets sex crimes. Beardsley successfully illustrates negative and positive effect testing with the generalization that pot smoking leads to heroin addiction. Previous reading assignments and current issues in the media, like gun control and capital punishment, offer causal generalizations that provoke the students to imagine possible tests and to recall reports of testings already performed.¹⁰

I hope to have offered fellow teachers a profitable assignment and a review of logical operations that it requires and that are essential to any exercise in causal analysis and hypothesis. My faith in the assignment

derives from the quality of the students' work that it instigates. In so far as the materials can be personal and the arrangement is largely narrative, this assignment is fairly elementary. I have used it in my syllabus as a bridge from narration to argument. The review of inductive logic prepares the students for more rigorous argumentative tasks later in the semester. Of course, you may not find it useful to treat causation and hypothesis as I have done or even together, though I think causal hypothesis a very comprehensible form of the hypothesis, but I hope you will teach them and that this essay will be some remote cause conditioning your success.

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Notes

¹Composition texts that treat causation and hypothesis thoroughly are usually no longer in use or presently restricted to upper-level courses. Those texts which I have profited from include: Monroe C. Beardsley's Thinking Straight, 4th ed. (Englewood Cliffs., N.J.: Prentice Hall, 1975) and his Writing with Reason: Logic for Composition (Englewood Cliffs, N.J.: Prentice Hall, 1976), Cleanth Brooks and Robert Penn Warren's Modern Rhetoric, 3rd ed. (New York: Harcourt, Brace & World, 1970), Richard D. Altick's Preface to Critical Reading, 5th ed. (New York: Holt, Rinehart, & Winston, 1969), and Troy Wilson Organ's The Art of Critical Thinking (Boston: Houghton Mifflin, 1965), the last of which belongs to a class insufficiently used by composition teachers, introductions to logic and practical reasoning written by our colleagues in philosophy.

²James H. Robinson's "On Various Kinds of Thinking," an excellent discussion of rationalization, provides an illuminating contrast between the good and real motives for our actions and beliefs. Robinson's analysis fingers the unquestioned assumptions derived from family and culture that Paul Goodman calls "props" to be removed by a college education. The essay is anthologized by Sylvan Barnet and Marcia Stubbs in Barnet & Stubbs's Practical Guide to Writing, 3rd ed. (Boston: Little, Brown and Company, 1980), pp. 59-71; it is reprinted from Robinson's The Mind in the Making (New York: Harper & Row, 1921).

³Karl Hess, Dear America (New York: William Morrow, 1975), p. 23.

⁴In Barnet & Stubbs's there is a causal hypothesis by Sheila Tobias, entitled "Who's Afraid of Math, and Why," which provides a good example of the detailing of the facts to be explained. She sets out not simply to determine why boys' and girls' math performances differ but why they differ in particular respects, as that "Girls compute better than boys," in Barnet & Stubbs's, p. 526.

⁵Thinking Straight, p. 97.

⁶Huxley presents the example in the third lecture of a series of six entitled "On Our Knowledge of the Causes of the Phenomenon of Organic Nature"

(1863). The essay is published in Huxley's Collected Essays, vol. 2 (New York: MacMillan, 1893), pp. 358-75; it is reprinted in Brooks and Warren's Modern Rhetoric.

⁷Jacob Bronowski; "The Reach of Imagination," A Sense of the Future (Cambridge, Mass: MIT Press, 1977), p. 28; the essay is reprinted in both Barnet & Stubbs's and Brooks and Warren's Modern Rhetoric.

⁸Isaac Asimov offers a causal explanation of earth's two high tides in Asimov on Astronomy (Garden City, N.J.: Doubleday, 1974), pp. 1-3.

⁹Beardsley discusses immediate and remote causes in Writing with Reason, pp. 134-35, and on p. 132 he presents a more qualified definition of necessary condition, distinguishing it from "circumstantially necessary condition."

¹⁰Brooks and Warren offer additional guidelines for drawing causal generalizations from diverse events, which are interesting but beyond my classroom needs, in Modern Rhetoric, pp. 591-95.